

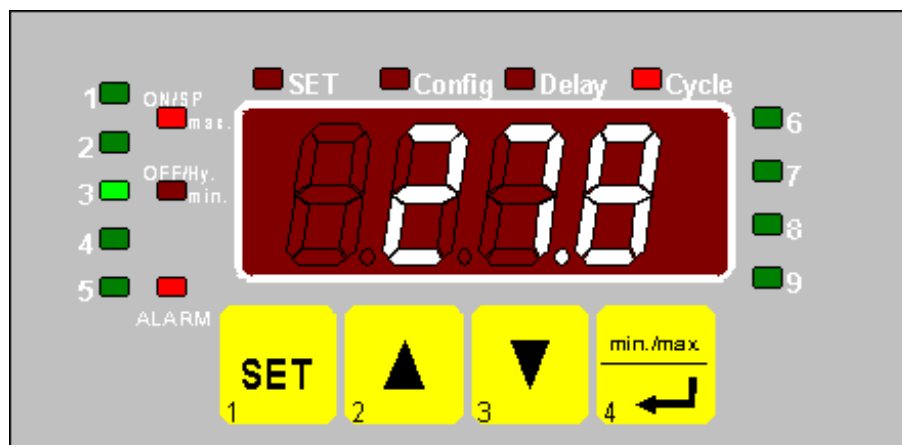
Operating manual

EB2000 MC

EASYBUS-display with MIN-/MAX-alarm

for up to 9 sensor modules

Version 3.0



Pursuant to EN 50 081-1 and EN 50 082-2 for unlimited use
in industrial and residential areas (EMVG)

We reserve the right for any alterations whatsoever



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1 General advise

1.1 The **EASYBUS**

The **EASYBUS** is a digital field bus allowing connection of up to 239 sensor modules to one single 2-wire line. Sensor modules may take measurements for pressure, temperature or other units, all of them will be converted into digital signals and transmitted via the 2-wire line. Measuring values are being evaluated by a so called 'Busmaster' (EB2000, PC, ...). Current is also supplied to the sensor modules via the 2-wire line. Long distance transmission (up to 1000m) is possible without any additional measuring fault. Sensor connection is flexible and without polarity.

1.2 **EASYBUS**-terms and definitions

Declaration of used terms and definitions:

EASYBUS-sensor modules sensor module for connection on **EASYBUS**
(e.g. **EASYLOG** 40K, **EASYLOG** 24RFT, EBHT)

EASYBUS-measurement channel measurement channel of an **EASYBUS**-sensor
module.
The **EASYBUS**-modules can feature one or
more measurement channels
(e.g. **EASYLOG**24RFT and EBHT features 2 channels – one channel for
humidity and one channel for temperature measurement)

1.3 The EB2000

The EB2000 is a universal display device for up to 9 **EASYBUS**- measurement channels featuring, among others, the following functions:

- display of current measuring values of measurement channels
(selection via 'up' (key2) / 'down' (key3), or cyclic)
- MIN/MAX-value display for all measurement channels
(call-up via key 4)
- MIN/MAX-alarm with two volt-free switching outputs for alarm limits exceeding
or falling below MIN/MAX alarm limits
(individual setting for each measurement channel)
- Level converter function (similar to EBW1) for **EASYBUS** PC-Software



1.4 Safety regulations

Make it a rule to always observe the following points to exclude any risk whatsoever for the operator.

- a) In case of any obvious damage or functional problems disconnect unit immediately
- b) Prior to opening it, disconnect device and supply voltage source. Make sure that all parts of the device are protected against direct touching when mounting the device and setting its connections.
- c) Please always adhere to the standard safety regulations for electric devices, power systems and light-current installations, and make sure that your national safety regulations (e.g. VDE 0100) are observed.
- d) If device is to be connected to other devices (e.g. personal computer) the circuitry has to be designed most carefully. Internal connection in third party devices (e.g. connection GND with protective earth) may result in not-permissible voltages.



Warning: When operating electric devices parts of these devices will, as a matter of course, be live. Unless the warnings are observed severe damage to life and limb or to property may be the result. Make sure that only skilled personnel is working with this device. Trouble-free operation of this device can only be guaranteed if it is properly transported and stored. Carefull installation, mounting, operation and maintenance are vital factors for the safe operation of this device.



Warning:

Do not use these product as safety or emergency stop devices, or in any other appli-cation where failure of the product could result in personal injury or material damage.

Failure to comply with these instructions could result in death or serious injury and material damage.

Skilled personell

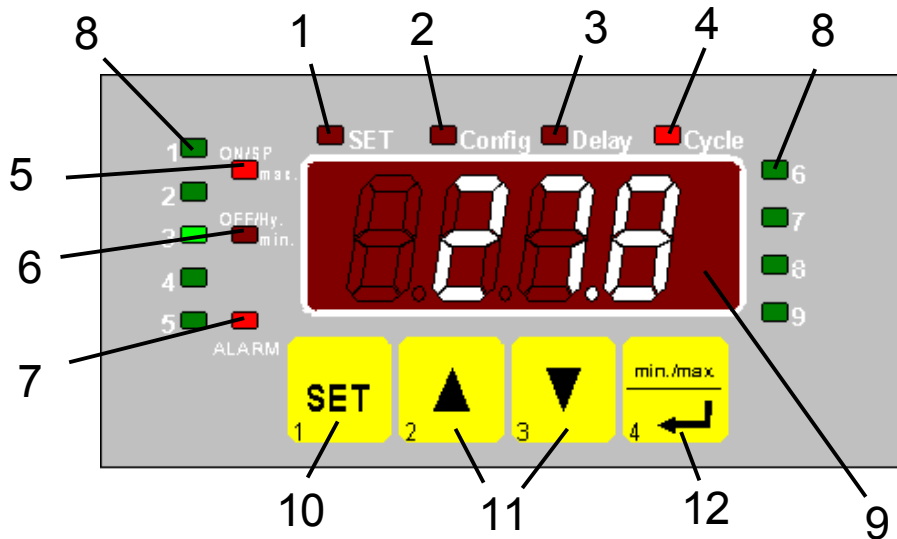
These are persons who are familiar with the installation, mounting, commissioning and the operation of the product and have acquired a qualification for their job:

For example:

- Training or instructions or qualification to switch on/off, isolate, ground and apply markings to circuits and devices/systems in accordance with the latest state of the art standards of safety technology.
- Training or instructions regarding the proper care and use of suitable safety equipment in accordance with the latest state of the art standards of safety technology
- First aid training.

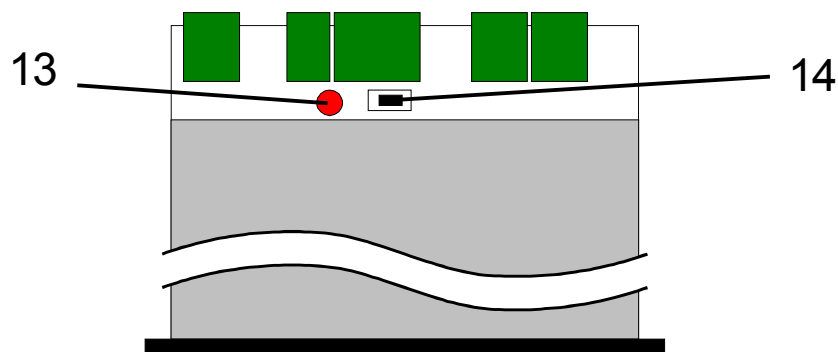


2 Display elements and pushbuttons



Device front view

- 1 LED SET:** blinking while device settings are carried out
- 2 LED Config:** illuminated during configuration setting
- 3 LED Delay:** illuminated while alarm display is set
- 4 LED Cycle:** illuminated, if cyclic display has been selected (automatic change-over of the channel displayed)
- 5 LED max:** illuminated in case of Max. alarm
- 6 LED min:** illuminated in case of Min. alarm
- 7 LED ALARM:** blinking, in case of an alarm or fault
- 8 LEDs 1...9:** current channel
- 9 Data display**
- 10 Key 1:** change-over to setting mode
- 11 Keys 2/3:** change of channel displayed
- 12 Key 4:** display of Min / Max values



Device top view

13 Warning-LED: EASYbus- overload

14 Button on the back side of the device (for special functions)



3 Electric connection

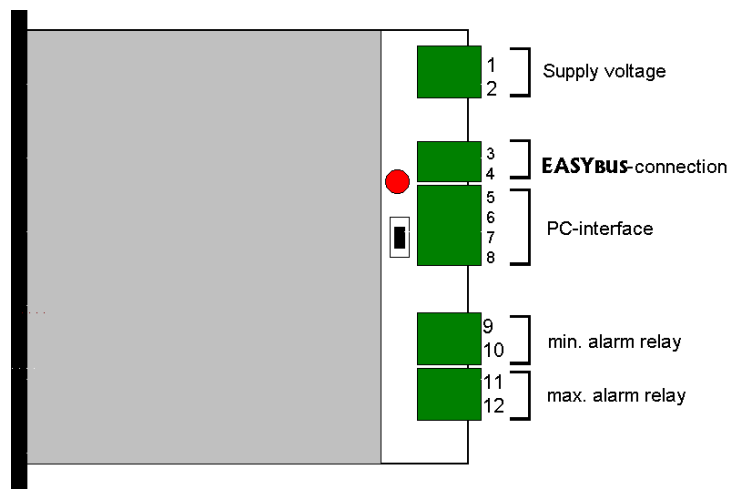
Electric connections for the EB2000 are located at the back of the device.
Connection is made via screw-type/plug-in terminals.

Make it a rule to always mount screw-type/plug-in terminals while they are still loose and connect only later. If terminals are mounted after connection there is a risk that soldering eyes may come loose. Please use suitable screw-driver and do not tighten screws by force.

Switching outputs: volt-free relay
Switching power: 10A, 250V AC (ohmic load)

*Use RC circuit elements for inductive loads
Suitable RC elements are available under ref. RC220.*

The device must be connected or commissioned by skilled personnell only. If device is connected incorrectly this may result in its damage or destruction. In such a case we cannot assume any liabilities.



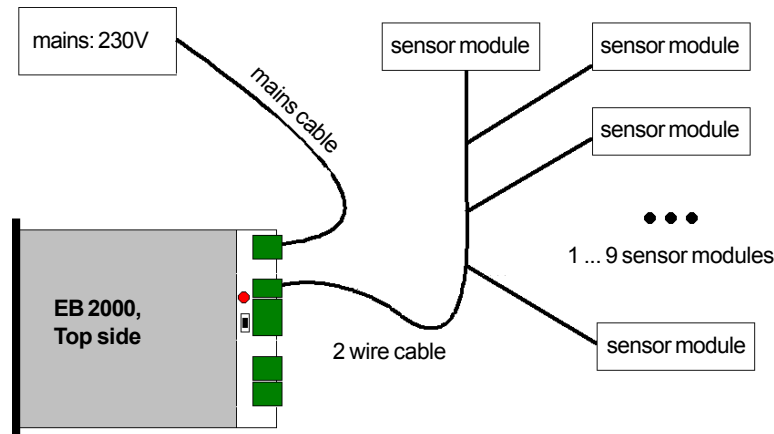
Electric connections - top view

| Terminal number | max. terminal range | Assignment | Notes |
|-----------------|---------------------|----------------------|----------------------------------------------------------------------------------|
| 1 | 2,5 mm ² | Supply voltage | 230V AC, 50/60 Hz |
| 2 | | | |
| 3 | 1,5 mm ² | EASYBUS-connection | connector to sensor modules, polarity does not matter |
| 4 | | | |
| 5 | 1,5 mm ² | RS232 interface: GND | PC-interface, (please refer to chapter 9) |
| 6 | | RS232 interface: DTR | |
| 7 | | RS232 interface: TxD | |
| 8 | | RS232 interface: RxD | |
| 9 | 2,5 mm ² | Max-Alarm Relay | standard break contact in case of alarm (p.r.t. chapter 8: 'configuration mode') |
| 10 | | | |
| 11 | 2,5 mm ² | Min-Alarm Relay | standard break contact in case of alarm (p.r.t. chapter 8: 'configuration mode') |
| 12 | | | |



3.1 Sensor module connection

The connections of the max. 9 measurement channel can be freely selected. Please make sure that connections do not result in short-circuits in the bus lines.



Example for connection

3.2 Connection information:

The interface-converter can supply the specified numbers of **EASYBUS** standard loads.

The module management is limited to max. 9 EASYBUS-measuring channels.



Please note that some EASYBUS-modules have a higher bus load as the standard load!

Please notice the corresponding specification in the module manual.

Bus loads of some **EASYBUS** modules:

| | | |
|---------------------------|-----|-------------------------------|
| EASYLOG -family: | 2 | EASYBUS standard loads |
| EBN : | 2 | EASYBUS standard loads |
| EBHT, EBT, EBH : | 1.5 | EASYBUS standard loads |
| GIA20EB, GIR2002 : | 1 | EASYBUS standard load |

When connecting the modules keep in mind that the sum of all bus loads of the modules must not exceed the maximal allowed number.

Worked sample:

- 1) Connection of 2 **EASYLOG**, 2 EBHT and 5 GIA20EB:
 $2 * 2 + 2 * 1.5 + 5 * 1 = 4 + 3 + 5 = 12$ standard loads (9 devices) => connection is possible
- 2) Connection of 5 **EASYLOG**, 4 EBN:
 $5 * 2 + 4 * 2 = 10 + 8 = 18$ standard loads (9 devices) => EB2000 are overloaded!
- 3) Connection of 4 EBHT and 4 GIA20EB:
 $4 * 1.5 + 4 * 1 = 6 + 4 = 10$ standard loads (8 devices / 12 meas. channels) => max. number of meas. channels transcended!

Please note: The EASYBUS-modules can feature more as one measurement channels (e.g: EBHT)



4 Initial commissioning

First, connect all sensor modules to the **EASYbus**-connection.

As soon as all supply voltages have been applied to the EB2000 a segment test will be carried out for approx. 10 sec., i.e. all displays will be illuminated (display '8.8.8.8.').

Please check the Warn-LED at the back side of the device: it must not be illuminated. (Please refer to chapter 10.1: Warn-LED at the back side of the device: **EASYbus**-overload)

4.1 How to carry out a system initialisation

When the display device is switched on for the first time it will, first of all, have to 'get to know' the sensor modules connected to your system. This is achieved by means of a 'system initialisation':

Press the **button on the back of the device** and the **'SET'**-key simultaneously until **'Init'** is displayed.

The system will now be initialised. The components connected will be detected automatically and assigned to one of the channels 1...9. The device with the lowest serial number (printed on unit) will be assigned to channel 1, the device with the second lowest serial number will be assigned to channel 2 etc.

As soon as the system initialisation has been completed the device is ready for operation; measuring values for the measuring points connected will be displayed cyclically (i.e. at 4 second intervals).

The following faults may occur when carrying out a system initialisation:

FE 20: The EB2000 could not find any sensor modules.
This may either result from faulty cable connections or from the fact that the sensor modules were not yet ready for operation (after the sensor modules have been connected to the **EASYbus** it takes them approx. 5 seconds to get ready for operation). Check connections and repeat system initialisation.

FE 21: The EB2000 has found more than 9 measurement channel.
Disconnect surplus sensor modules and repeat system initialisation.

In both cases the EB2000 will automatically carry out a system initialisation if it is re-started. A new start is carried out after the 230V voltage supply has been interrupted.



5 Standard operation

5.1 How to display the current measuring values

In the standard mode the current measuring values of the sensor modules will be displayed. There are two modes of display:

Static display:

The channel selected will be displayed constantly; use keys 2 and 3 for channel selection (*'up'* and *'down'*).

Cyclic display:

All channels will be displayed one after the other at 4 second intervals, with the **'Cycle'** LED being illuminated. The cycle time can be changed via the configuration (p.r.t. chapter 8).

Change-over from one display mode to the other:

Press keys 2 and 3 simultaneously till the **'Cycle'** LED is illuminated or extinguished.

5.2 MIN/MAX-value recording

During operation the EB2000 automatically memorizes the highest (max) and lowest (min) values of all measurement channels connected.

5.2.1 Display of MIN/MAX values

Use key 4 (*'min/max'*) to select one of the following three display modes:

- to display current measuring value of current channel, neither LED **'min'** nor LED **'max'** illuminated
- to display max. measuring value of the current channel, LED **'max'** illuminated
- to display min. measuring value of the current channel, LED **'min'** illuminated

If no key is pressed for a time of 20 seconds the device returns to displaying the current measuring value.

5.2.2 How to delete the MIN/MAX values

Press key 4 for approx. 4 seconds to reset MIN/MAX values of the current channel to the current measuring value. Alarms, if any, of the corresponding sensor module will also be deleted.



6 MIN/MAX-alarm function

The device is constantly checking the individual MIN/MAX- alarm limits of the sensor modules. If the values fall below or exceed the limits the '**ALARM**' LED will be illuminated.

If the channel, triggering the alarm, is in the display, the '**ALARM**' LED will be blinking; additionally, depending on the kind of alarm, the LEDs '*min*' or '*max*' will be blinking.

Switching state of relay outputs (independent from display):

| State of EB2000 | State of relais outputs | | | |
|---------------------------------------|-------------------------|-----|----------|-----|
| | Standard | | Invertet | |
| | MIN | MAX | MIN | MAX |
| no supply | ┘ _ | ┘ _ | ┘ _ | ┘ _ |
| segment test | ┘ _ | ┘ _ | ┘ _ | ┘ _ |
| error (EB2000 or sensor module error) | ┘ _ | ┘ _ | — | — |
| no alarm, no error | — | — | ┘ _ | ┘ _ |
| min. alarm, no error | ┘ _ | — | — | ┘ _ |
| max. alarm, no error | — | ┘ _ | ┘ _ | — |
| min. and max. alarm, no error | ┘ _ | ┘ _ | — | — |

┘ _ : relay contacts open
 — : relay contacts closed

State of alarm switching outputs

The standard switching state of the relays may be inverted by changing the configuration (p.r.t. chapter 8: configuration).

The following chapter describes the setting of the alarm limits.



7 Settings

On this level the alarm settings of all measurement channels connected can be displayed and set:

- MAX-alarm limit (LEDs **'ALARM'** and **'max'** illuminated, **'SET'** blinking)
- MIN-alarm limit (LEDs **'ALARM'** and **'min'** illuminated, **'SET'** blinking)
- Alarm delay (LEDs **'ALARM'** and **'DELAY'** illuminated, **'SET'** blinking)

Attention: The alarm settings of dataloggers of the EASYLog series, which keep already data in their memory, can be examined but not altered!
Before altering the settings the data has to be cleared (eg. by means of GSOFT40k)

7.1 Setting of alarm limits

Press key 1 (**'SET'**) for approx. 2 seconds to reach the 'setting level'. The display is extinguished for a short time and the **max-alarm limit** of the current sensor module will be displayed. The current sensor module is identified by the corresponding green channel-LED.

Please note: Scanning of the sensor modules connected is interrupted as long as the EB2000 is in the setting mode.

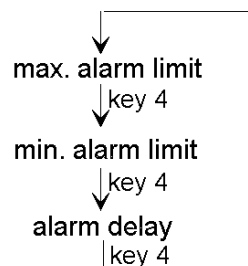
Use the following keys to carry out alarm settings:

Key 2 ('up'): Raise alarm limit

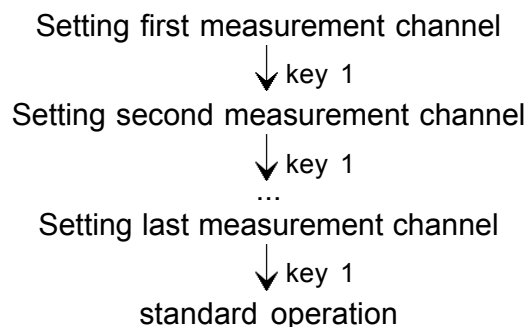
Key 3 ('down'): Lower alarm limit.

To 'scroll' press keys 2 and 3 for a longer period of time. The longer you keep the keys pressed the faster the scrolling.

Key 4: Saving of new alarm limit, start setting of new value:



Key 1: Complete alarm setting of current measurement channel, start setting of the next measurement channel:



As soon as all measurement channels have been set (use key 1 '**SET**' for module change), the device automatically returns to standard mode. If 5 measurement channels have been connected, key 1 must be pressed 5 times for the device to automatically leave the setting mode.

Please note: If no settings are made within a time of 20 seconds, the device automatically leaves the setting mode to return to the standard mode.

The max. alarm limit can be any value between the min. alarm limit and the upper limit of the measuring range.

The min. alarm limit can be any value between the lower limit of the measuring range and the max. alarm limit.

The alarm delay is displayed in minutes and can be any value between 0 and 9999.

7.2 How to lock the setting mode

Setting of the limit values via front-sided keys may be prohibited by the device configuration (p.r.t. chapter 9: configuration level). In such a case the limits can be displayed but cannot be changed via the front-sided keys.

This is to prevent unauthorized persons from changing the settings.

If the limits are to be changed although the setting mode has been locked, both the corresponding key at the front side and the key at the back side of the device have to be pressed..

7.3 Sensor modules which do not support the alarm settings

For sensor modules / measurement channels which do not support all alarm settings (e.g. no alarm delay possible) the EB2000 will display 4 dashes: '----' instead of the respective value in the display. An input is not possible.



8 Configuration mode

In the configuration mode various changes can be made to the EB2000. The 'configuration mode' is reached by simultaneously pressing the **key at the back of the device** and key 4:

LED '**SET**' blinking, and '**Config**' illuminated.

Please note: Scanning of the sensor modules connected is interrupted as long as the EB2000 is in the configuration mode.

To be able to change the following device characteristics a configuration code (to be calculated with the help of the following table) has to be used:

Cycle time for display change

It is possible to select the interval (1, 2, 4 or 8 seconds) after which the next channel is to be displayed if cyclic display is to be chosen.

Locking of setting mode

You may decide if it should be possible to change the parameters of the setting and the configuration via the front-sided keys. If the locking function has been activated, the key at the back of the device will have to be pressed in addition to the one on the front side of the device to be able to change the corresponding value. This is to prevent unauthorized persons from changing the settings.

Invert alarm outputs

If the configuration bit for 'alarm outputs inverted' is set the relay contacts will be closed in case of an alarm.

As a standard the bit is not set, i.e. in case of an alarm the relay contacts will open.

Locking of the display channel 1..9

By locking the display of certain measurement channels the display of less important measurement channels may be suppressed.

In case of a fault or alarm occurring at one of the locked modules the locking will be overridden and the fault resp. alarm will be displayed nevertheless.

It is not possible to lock all channels connected at the same time. If you should try to lock all channels, the device automatically returns to the previous configuration and carries out a new start (segment test ...).



In order to be able to carry out the configuration of the device all values corresponding to the configuration desired have to be selected from the following table and added up (p.r.t. table).

Thus, independent from the number of measurement channels the configuration code will always be between 0 and a max. of 8175.

This sum is entered by means of keys 2 and 3; use key 4 to memorize.

By pressing the '**SET**' key you may leave the configuration mode without the new configuration being memorized.

| Function | Value | Standard | Example 1 | Example 2 | Personal configuration | Personal configuration |
|-----------------------------------|-------|----------|-----------|-------------|------------------------|------------------------|
| Cycle time for display change | | | | | | |
| 1s | 0 | | | | | |
| 2s | 1 | | | | | |
| 4s | 2 | 2 | | 2 | | |
| 8s | 3 | | 3 | | | |
| Locking of setting mode | 4 | | 4 | | | |
| Invert alarm outputs | 8 | | 8 | | | |
| Locking of the display channel 1 | 16 | | | 16 | | |
| Locking of the display channel 2 | 32 | | | 32 | | |
| Locking of the display channel 3 | 64 | | | 64 | | |
| Locking of the display channel 4 | 128 | | | | | |
| Locking of the display channel 5 | 256 | | | | | |
| Locking of the display channel 6 | 512 | | | 512 | | |
| Locking of the display channel 7 | 1024 | | | 1024 | | |
| Locking of the display channel 8 | 2048 | | | 2048 | | |
| Locking of the display channel 9 | 4096 | | | 4096 | | |
| Sum (= configuration code) | | 2 | 15 | 7794 | | |

Calculation table for configuration

Example for calculation 1 (p.r.t. table)

The display is to change at 8 second intervals. The setting mode is to be locked, the alarm outputs are to be inverted and all measurement channels connected are to be displayed.

Example for calculation 2 (p.r.t. table)

The display is to change at 4 second intervals; out of all measurement channels connected only measurement channels 4 and 5 are to be displayed.

The last two columns can be used for the calculation of your personal device configuration: carry over values of the functions desired into the column and add them up.

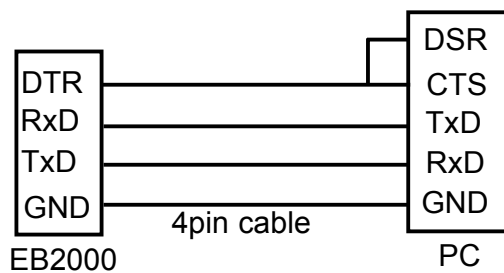
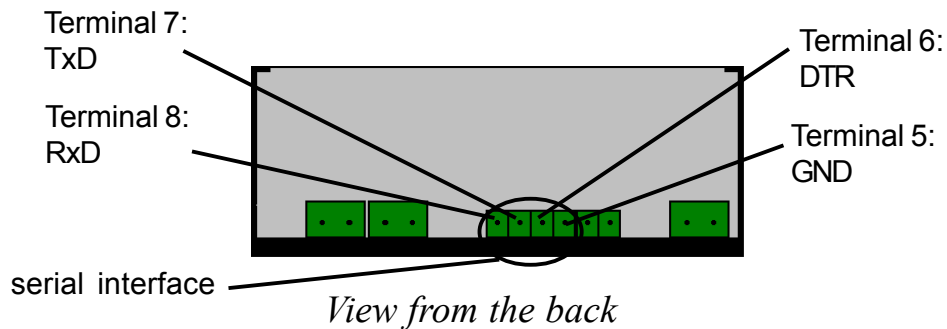


9 The serial interface

By means of a serial interface and a PC the EB2000 is able to carry out additional functions:

function as **EASYbus**-Converter
configuration with a PC

9.1 Connecting cable PC <-> EB2000



RS232 connecting cable

| PC-SubD connection | | |
|--------------------|-------|--------|
| Name | 9pol. | 25pol. |
| DSR | 6 | 6 |
| CTS | 8 | 5 |
| TxD | 3 | 2 |
| RxD | 2 | 3 |
| GND | 5 | 7 |

Assignment of serial interface

A suitable connecting cable is available under accessories.

9.2 The EB2000 as **EASYbus**-level converter

The EB2000 can be used as a full-fledged **EASYbus** level converter for the sensor modules connected (similar to the EBW 1). To be able to work in this function the EB2000 has to be connected to the PC with the interface cable available under accessories.

As the device has to ensure actualisation of its own data (e.g. min/max values, alarm) in addition to carrying out the data transmission to the PC the data transmission speed is relatively low.

9.3 Operation with the EBxKonfig program

EBxKonfig is a software for the setting of individual measurement channels.

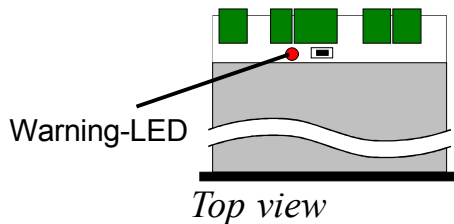


10 Error messages

10.1 LED-warning at the back side of the unit: **EASYBUS** overload

If the Warning-LED at the back side of the device is illuminated during operation of the EB2000, there is a bus overload (too many sensor modules connected) or even a short circuit. In such a case a trouble-free data exchange between the sensor modules and the EB2000 can no longer be guaranteed.

Try to remedy the fault cause prior to re-starting the device!



In case of a short circuit the short circuit protection of the device will be activated after some time and the LED is extinguished. As soon as the short circuit has been remedied the device will automatically be ready for operation after a short 'recovery time' for the data saving.

10.2 Sensor module error

In case of one of the following errors occurring the function of the EB2000 is not inhibited; however, both alarm relays will be activated (standard configuration).

FE1: Values exceeding measuring range

Values exceeding the max. permissible meas. value of the measurement channel.

FE2: Values falling below the measuring range

Values below the min. permissible meas. range of the measurement channel.

FE7: System error

The sensor module is damaged. We recommend returning the module to the manufacturer's for repair.

FE8: Low battery

We recommend to return the respective sensor module to the manufacturer's for a battery exchange.

FE10: Transmission error

Data from measurement channel cannot be read. Check cable connection and function (e.g. on-site display) of the respective sensor module.

10.3 EB2000-errors

In case of one of the following faults occurring the function of the EB2000 can no longer be guaranteed; both alarm relays are activated (standard configuration).

FE3: Display range of the EB2000 has been exceeded

Values are exceeding the max. permissible display value of the EB2000.

FE4: Values falling below the display range of the EB2000

Values have been falling below the minimum permissible display value of the EB2000.

FE20: no sensor modules detected

No sensors modules were detected during system initialisation.

Check cable connection and function (e.g. on site display) of the sensor modules connected and repeat system initialisation (p.r.t. chapter 'How to carry out a system initialisation').

If the EB2000 will be re-started (e.g. due to a short interruption in the 230V AC voltage supply) a new system initialisation is carried out automatically.

FE21: too many measurement channels detected

More than 9 measurement channels were detected during system initialisation: remove surplus measurement channels and repeat system initialisation (p.r.t. chapter 'How to carry out a system initialisation').

If the EB2000 will be re-started (e.g. due to a short interruption in the 230V AC voltage supply) a new system initialisation is carried out automatically.

FE28: Sysetm error

The EB2000 is defective. We recommend to return the device to the manufacturer's for repair.



ANNEX A: Specification for EB2000

Voltage supply: 230V AC, 50/60Hz, approx. 3,5 VA

Housing:

Front side: Membrane keyboard IP65 (sealings for housing for installation pursuant to IP65 available under accessories)

Dimensions: 48 x 96 x 100 mm (H x W x D)

Display:

4-digit, red 13 mm LED display
 16 additional LEDs as functional displays
 Display range: -1999 ... 9999
 Decimal point: set automatically (depending on the sensor modules connected)

Connections: (screw-type/plug-in terminals)

Mains connection
 Serial interface RS232
 Min-/Max- relay outputs
EASYbus-interface

Min-/Max-value memory: for all sensors connected

EASYbus-interface:

max. number of meas. channels: 9
 maximum bus load 16 **EASYbus**-standard loads
 Baud rate: 4800 Baud
 No sensor polarity, short circuit protection included

Alarm:

Min-/Max alarm outputs : 2 volt free relays
 8A, 250V (ohmic load)
 (ex works, open in case of an emergency p.r.t. page 9)

Nominal temperature: 25°C

permissible ambient temperature: 0 to 50 °C

Times (PC interface not being used):

All sensor modules operating trouble free:
 Actualisation of all data: < 4 sek.
 Relay reaction after alarm: < 5 sek.

Sensor module defective:

Actualisation of all data
 Worst Case: all modules defective < 8 sek.
 Relay reaction after alarm: < 5 sek.

