OCTOGON

# MANUAL

# EHOA

## MOBILE STRAIN GAUGE AMPLIFIER

Operating manual




| Document | Version | Date | Applies to |
|---|---|---|---|
| Operating manual | V00x | 10/2026 | EHOA, IP51 (IP65 as option) |

This manual describes commissioning, menus, keys and LEDs, recording of measured data on the SD card, USB operation, connection of strain gauge bridges and the technical data of the mobile strain gauge amplifier with data logger EHOA.

# Contents

**1 About this manual** ..... 2
1.1 Device covered ..... 2
1.2 Scope of supply ..... 2
**2 Connection and commissioning** ..... 3
**3 Operating the menu** ..... 3
3.1 Logger menu ..... 3
3.2 Notes on the logger menu ..... 4
3.3 Amplifier menu ..... 4
3.4 Navigation and notes ..... 5
**4 Keys, number format and LEDs** ..... 5
4.1 Description of the keys ..... 5
4.2 Number format ..... 5
4.3 Description of the LEDs ..... 6
**5 Maximum, minimum and average value** ..... 6
**6 Recording measured data to file** ..... 6
**7 USB operation** ..... 7
7.1 USB operating mode ..... 7
7.2 Power supply via the USB port ..... 7
7.3 USB mass storage mode ..... 7
7.4 Driver installation for communication mode ..... 7
7.5 Determining the interface number (COM port) ..... 8
**8 Dimensions and connection** ..... 8
8.1 Dimensions ..... 8
8.2 Pin assignment ..... 8
8.3 Connection diagram for strain gauge bridges ..... 9
**9 Technical data** ..... 10

# 1 About this manual

This English version is a translation of the German version (EHOA Manual V00x DE.pdf) by octogon. The German version is authoritative; markings and approval details apply in the wording of the respective certificate.

Display texts and menu entries are shown in fixed-width type, for example **`Set.Aufn: AN`** or **`OK zum Setzen`**. They are written as they appear on the display with the German menu language. The menu language can be switched to English (section 3.3, **`Sprache`**); English display texts are given in brackets where they are known, for example **`Normierung`** (**`Set scaling`**).

## 1.1 Device covered

| | **EHOA** |
|---|---|
| Device | Mobile strain gauge amplifier with data logger (device type EOD) |
| Connections | 15-pin D-sub socket (sensor connection) · USB · SD card slot · plug-in power supply |
| Keys | MODE · MENU · UP · DOWN · OK · SHORT · ZERO |
| LEDs | ON · CARD · COM · LOG · ERR |

## 1.2 Scope of supply

Standard accessories supplied:

- Switching power supply 100 ... 240 V / 18 V, 1.67 A
- 15-pin D-sub mating connector
- SD memory card
- USB cable
- Software-CD
- Operating manual

Required accessory: SDHC Class 10 (recommended for recording at 1000 Hz).

# 2 Connection and commissioning

To switch on, press the MODE key until the display backlight comes on.

The device contains a rechargeable battery, which is charged by connecting the supplied plug-in power supply. While charging, the LED ON flashes.

To switch off, press the MODE key long (outside the menu) and confirm the following message **`Ausschalten? (OK)`** by pressing the OK key.

For the data logger, use an SDHC memory card of class 6 or class 10, but not UHS-2.

Sensor connection and connection of strain gauge bridges: chapter 8.

# 3 Operating the menu

The device has two main menus: the logger menu and the amplifier menu.

## 3.1 Logger menu

The logger menu provides the following functions:

- viewing and setting the mode for data recording on the SD card
- selecting the mode of the USB connection
- selecting the behaviour of the display backlight
- display of the charge level
- setting date and time
- selecting additional functions, e.g. display and recording of the maximum, minimum and average measured value

The logger main menu is entered by a short press on the MODE key from the measured value display or via the last entry of the amplifier main menu.

**Description of the logger menu**

| Level 1 | Level 2 / 3 | Meaning |
|---|---|---|
| **`Aufnahme`** (**`AN`**, **`AUS`**, **`mitOK`**) | **`Set.Aufn: AN`** | Continuous recording of measured data on the SD card |
| | **`Set.Aufn: mitOK`** | Recording of measured data on the SD card as long as the OK key is pressed (with measured value display) |
| | **`Set.Aufn: AUS`** | No recording |
| **`USBtyp:`** (**`Komm`**, **`SDkart`**, **`kein`**) | **`Set.USB: SDkart`** | At the USB port the device is a mass storage device giving access to the data on the SD card. Recording measured values to a file at the same time is not possible. If this mode is activated, recording is switched off if necessary. |
| | **`Set.USB: Komm`** | The device is in serial USB mode. Communication programs (e.g. GSVcontrol, GSVmulti) can be used. On first connection a standard driver is loaded (section 7.4). |
| | **`Set.USB: kein`** | USB is switched off. |
| **`Bat:`** level bar or **`Ladend`** (with percentage) | **`USB Power`**: **`AN`**, **`AUS`** › **`Set: USBpwr AN`**, **`Set USBpwr AUS`** | Switch power supply via USB on or off. If power supply via the USB port is on, the device can be powered via the USB bus when it is connected to a PC and configured as a USB device. If the device is switched off, this can also be used to charge the battery. |
| **`Licht`** (**`AN`**, **`Auto`**) | **`Set: Licht AN`** | Display backlight is permanently on |
| | **`Set: Licht Auto`** | Display backlight comes on when a key is pressed and in the menu and goes off after approx. 5 seconds – this makes the battery last somewhat longer. |
| **`Datum / Uhrzeit`** | **`Datum TT Mon JJJJ`** | Setting the date (section 4.2) |
| | **`Uhrzeit HH:MM:SS`** | Setting the time (section 4.2) |
| **`Messmodus`** (**`normal`**, **`MaxMin`**) | **`SetModus: normal`** | Display of the current measured value only |

| Level 1 | Level 2 / 3 | Meaning |
|---|---|---|
| | **SetModus: MaxMin** | The maximum, minimum or average value can be shown on the display, and all three can be recorded to file (chapter 5). |
| **Aufnahmeoptionen** | **Zeilenelemente** › **Mit Datum: Ja/Nein**, **Mit Uhrzeit:Ja/Nein**, **Mit Einheit: Ja/Nein** | Level 4 **Mit […] Nein/Ja**, i.e. switching to the setting not selected so far |
| | **Dateioptionen** › **Kopfzeile: Ja/Nein** | Header line in the measured value file (chapter 5) |
| | **Dateioptionen** › **Zeilenanzahl** | Setting the max. number of lines per file |
| | **Dateioptionen** › **Zeitdauer** | Setting the max. time duration of the file |
| | **Verzeichnis** › **Jeden Monat**, **Jeden Tag** | Directories on the SD card (chapter 6) |

## 3.2 Notes on the logger menu

If a setting in level 1 is shown in brackets, this setting is selected but not active at present. This is the case if the conditions for this operating mode are not met. Examples:

- **Aufnahme (an)**: SD card not inserted, or write-protected, full or defective.
- **USBtyp: (SDkart)**: USB cable not connected or no SD card inserted.

## 3.3 Amplifier menu

The amplifier menu is used to set parameters of the amplifier, for example:

- sensor scaling factor
- unit
- user-definable offset
- parameter memory

The amplifier main menu is entered by pressing the MENU key from the measured value display.

**Description of the amplifier menu**

| Level 1 | Level 2 / 3 | Meaning |
|---|---|---|
| **Sensor Konfig.** | **Einheit** | Select the unit. Changing the unit does not change the scaling of the measured value! |
| | **Messbereich** | Numerical setting of the physical rated value of the sensor. Changing the sensor measuring range adjusts the scaling of the measured value. |
| | **Kennwert** | Numerical setting of the electrical rated output of the sensor. Changing the rated output adjusts the scaling of the measured value. |
| **Dehnungsanalyse** | **K-Faktor setzen** | Numerical setting of the gauge factor between 0.2 and 258 |
| | **Brückentyp** › **Vollbrücke** | Full bridge circuit with 4 individual strain gauges, all in longitudinal direction |
| | **Brückentyp** › **Halbbrücke** | Half bridge circuit with 2 individual strain gauges, both in longitudinal direction |
| | **Brückentyp** › **Viertelbrücke** | Quarter bridge circuit with one strain gauge |
| | **Brückentyp** › **Quer-Vollbrücke** | Full bridge circuit with 4 individual strain gauges, 2 in longitudinal and 2 in transverse direction |
| | **Brückentyp** › **Quer-Halbbrücke** | Half bridge circuit with 2 individual strain gauges, one in longitudinal and one in transverse direction |
| | Level 4: set **Querkontraktionszahl** | Only if **Quer-Vollbrücke** or **Quer-Halbbrücke** is selected in level 3. Numerical value from 0 to 0.5 (Poisson's ratio). |
| **Param. laden** | **default** | Factory settings, i.e. restoring the parameters of the device as delivered |
| | **Satz 1** … **Satz 6** | User-configurable data set no. 1 … 6, i.e. loading the parameters previously stored with **Param. speichern** (**save settings**) or by software |
| **Param. speichern** | | Saving the current configuration under **Satz 1** to **Satz 6** |
| **Normierung** (**Set scaling**) | | Numerical value between 0.1 … 999999 |

| Level 1 | Level 2 / 3 | Meaning |
|---|---|---|
| **Datenerfassung** (from firmware version 1.5.08) | **Datenfrequenz** | Numerical value for measured values per second [Hz] |
| | **Datenperiode** | Numerical value for the data period in seconds. Note: the value last confirmed with OK is applied. Confirm **Datenperiode** for slow measurements, **Datenfrequenz** for fast measurements. |
| **Optionen** (**Options**) | **Kanal setzen** (**Set channel**) | Numerical value 0 or 1 |
| | **Schwelle setzen** (**Set threshold**) | **Ein-Schwelle**: numerical value of the switch-on threshold · **Aus-Schwelle**: numerical value of the switch-off threshold |
| | **Offsetwert** | Value added to every measured value |
| | **Sprache** | German or English (menu language) |
| **Logger Konfig.** | | See logger menu (section 3.1) |

Changing the strain gauge parameters of the strain analysis adjusts the scaling of the measured value and the unit.

## 3.4 Navigation and notes

- The MENU key always returns to the next higher level.
- The OK key confirms an entry or moves forward to a lower level.
- When a setting is selected with the OK key, the message **OK zum Setzen** then appears; it is confirmed with the OK key so that the setting becomes valid – or cancelled with MENU.
- A filled box at the right edge of the display indicates that the menu entry is activated.
- Access to the amplifier menu is blocked while communication via the serial interface is taking place. In this case **Menu blockiert** (**Menu blocked**) is displayed.

# 4 Keys, number format and LEDs

## 4.1 Description of the keys

| Key | Function |
|---|---|
| MODE | Switching on and off or entering the logger menu |
| MENU (LEFT) | Entering the amplifier menu, one menu level up or cancelling an entry. For number setting: move the cursor to the left. |
| UP | Moving in the menu within a menu level: go to the next entry. In measured value mode **MaxMin**: go from one of the measured value displays to the next higher one. For number setting: increase the digit or setting above the cursor. |
| DOWN | Moving in the menu within a menu level: go to the previous entry. In measured value mode **MaxMin**: go from one of the measured value displays to the next lower one. For number setting: decrease the digit or setting above the cursor. |
| OK (RIGHT) | Confirming the entry or moving forward to a lower level. With measured value display and recording mode **mitOK**: record measured values to file. For number setting: move the cursor to the right. |
| SHORT | Connecting the inputs +UD and –UD (short-circuiting the sensor signal) |
| ZERO | Triggering an automatic zero adjustment |

## 4.2 Number format

To set a numerical value, the date or the time, the cursor is moved to the right with a short press on OK and to the left with MENU. The digit (or the month) above the cursor flashes and can be increased or decreased with the UP / DOWN keys.

**Important** For the setting to take effect, the OK key must be held until the whole number flashes.

Then release the OK key; **OK zum Setzen** appears. Confirm this by pressing OK. To cancel the number setting, press the MENU key long.

## 4.3 Description of the LEDs

| LED | Meaning |
|---|---|
| ON | Permanently on: device on, not charging. Flashing slowly: device off, battery is charging. Flashing somewhat faster: device on, battery is charging. |
| CARD | USB mass storage mode active. |
| COM | Serial USB communication mode active. |
| LOG | Recording of measured data on the SD card active. The card must not be removed! |
| ERR | An error has occurred. Flashing permanently after switching on: the battery was empty, so date and time must be set again. Flashing alternately with ON for approx. 3 seconds after switching on: the battery is empty, please connect the plug-in power supply for charging. Flashing alternately with LOG: an error occurred when trying to record measured data, e.g. the SD card may be write-protected, full, incompatible or defective. |

# 5 Maximum, minimum and average value

The max, min and average value mode is activated in the logger menu under **`Messmodus`**. In this operating state these values and the current value can be switched on the display with the UP and DOWN keys. In the measured value file these values are written to every line, in the order: current value, maximum, minimum and average value.

If activated, a header is written to the file whose second line names the corresponding columns:

```
Normierung: +3.5000 Datenrate: 10.000 Hz
Datum Zeit                Wert     Max      Min      MitW     Einheit
13/05/03,15:38:31.99960   -0.0004  +2.9967  -3.0084  -0.0468  mV/V
```

The header is only written if **`Aufnahmeoptionen`** › **`Dateioptionen`** › **`Kopfzeile: Ja`** is selected in the menu.

In this operating state the maximum data rate for recording to file is 1000 measured values/s.

The determination of the maximum, minimum and average value is reset with the following actions, i.e. determined anew with the measured values that follow:

- when the device is switched on
- when the max/min/average value mode is activated
- when zeroing
- when permanent recording to file is started
- when manual recording to file is ended, i.e. when the OK key is released

# 6 Recording measured data to file

When data recording is active, the device creates directories on the SD card into which the files with the measured data are written.

The directory name is created from the current date, depending on the setting of the directory mode (**`Verzeichnis`**). As delivered, a new directory is created every month with the name **`G20JJ_MM`**, for example **`G2012_11`** in November 2012.

The names of the files in it are formed from the day and the time: **`DDHHMMSS.TXT`**. If a file was created, for example, on 14.11.2012 at 14:41:39, the directory name is as in the example above and the file name is **`14144139.TXT`**.

The files are written in ASCII text format. Each measured value produces one line terminated with <LF> and <CR>. Depending on the line settings, each line contains first the time stamp, consisting of date, time and fractions of a second, then the measured value and then the unit. As delivered, lines look like this, for example:

```
12/11/14,14:41:39.27669   -0.0011 mV/V
12/11/14,14:41:39.37669   -0.0011 mV/V
```

The date format follows the big-endian convention, i.e. **`JJ/MM/TT`** (year/month/day). Date and time are separated by a comma. The time format is **`HH:MM:SS.bbbbb`**; the 5-digit fractions of a second bbbbb, read as an integer, give 10 µs steps. In the example above the data rate of the amplifier is therefore set to 10 measured values/second ((37669 – 27669) × 10 µs = 100 ms = 1/10 s). For synchronisation reasons there may be small deviations in the fractions of the time steps.

Time stamp and measured value are separated by the tab character ('\t'), measured value and unit by a space.

As delivered, the maximum number of lines (i.e. recorded measured values) per file is set to 32,000 lines. As soon as this number is reached, a new file is created.

In recording mode **mitOK**, where recording only takes place while the OK key is pressed, the data sets (consecutive lines during one recording) are written to the same file. When a data set ends, i.e. when the OK key is released, the number of lines is checked. If it is greater than or equal to 32,000, a new file is opened. In this mode the number of lines can therefore also exceed 32,000.

In this mode at least one line, i.e. one measured value, is written per data set. If exactly one measured value per data set is always wanted, it is advisable to set the data rate of the amplifier to a low value, e.g. 1 measured value / second, with communication software (e.g. GSVcontrol). On a short press of OK the device then waits, if necessary, until a value has been measured and records it.

# 7 USB operation

## 7.1 USB operating mode

The USB operating mode can be selected in the logger menu at any time (section 3.1), regardless of whether the conditions for this operating mode are currently met (section 3.2). In the latter case the setting is shown in brackets in menu level 1, and with an empty box instead of a filled one in menu level 2.

If one USB operating mode is currently active (i.e. the USB cable is connected to a PC) and the other is selected, the current operating mode is switched off and the newly selected one is activated after 5 seconds. If the host PC has loudspeakers, corresponding acoustic signals can be heard.

If USB operating mode **SDkart** is selected while one of the two recording modes is selected, recording is switched off. In this mass storage mode, files on the SD card can be read, written or deleted, and formatting is also possible.

## 7.2 Power supply via the USB port

If USB power supply **USB Power** is activated in the logger menu, the device can be powered via the USB port when it is connected to a host PC and enumerated by it. When switched on, the battery is then hardly or not at all discharged. When the device is switched off, the battery can be charged by the host PC. In this state the device is then an SD card reader, regardless of the USB mode set. This is necessary because the device requires 500 mA, which according to the USB 2.0 specification is only permitted in fully enumerated communication operation.

**Note** A USB charger cannot be used at present.

## 7.3 USB mass storage mode

The USB mass storage mode does not require a driver for Windows systems from Windows XP onwards. After the USB cable has been connected, a window opens (depending on the operating system settings) giving access to the files; or the drive of the device is reached via “My Computer” or Windows Explorer.

## 7.4 Driver installation for communication mode

When the device is connected in communication mode for the first time, Windows asks for a driver directory. The steps and dialog texts are those of Windows XP:

| Step | Action |
|---|---|
| 1 | Set communication mode: press the MODE key and select **Komm** under **USBtyp:** in the logger menu. |
| 2 | Connect the device to the PC with the USB cable. After plugging in, the driver installation dialog appears. |
| 3 | Select “Software von einer Liste oder bestimmten Quelle installieren (für fortgeschrittene Benutzer)” (install from a list or specific location) and click “Weiter >” (Next). |
| 4 | Select “Diese Quellen nach dem zutreffendsten Treiber durchsuchen” (search for the best driver in these locations), tick “Folgende Quelle ebenfalls durchsuchen:” (include this location in the search) and click “Durchsuchen” (Browse). |
| 5 | Select the driver folder under **[CD]:\setup\driver\usb** on the supplied software CD; [CD] is the drive letter. Click “Weiter >” (Next). |
| 6 | In the dialog window “Hardwareinstallation” (hardware installation) click “Installation fortsetzen” (continue anyway). |
| 7 | The driver installation is complete: click “Fertig stellen” (Finish). |

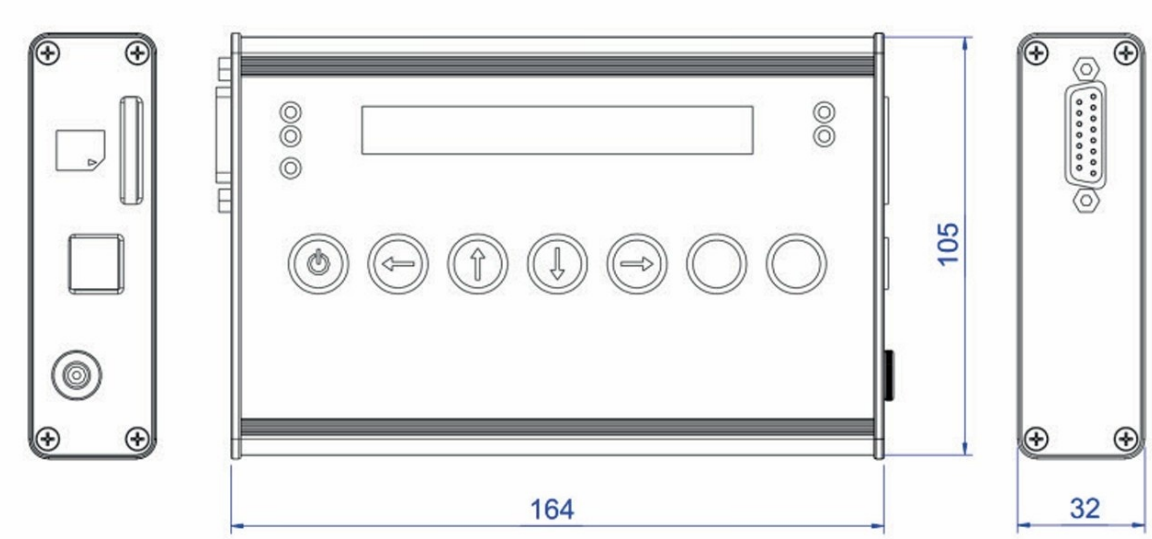
## 7.5 Determining the interface number (COM port)

Once the driver is installed, the number of the virtual COM port assigned by Windows is needed so that it can be entered in the communication program to open the interface:

| Step | Action |
|---|---|
| 1 | Right-click “Arbeitsplatz” (My Computer) and select “Eigenschaften” (Properties) in the context menu. |
| 2 | In the dialog “Systemeigenschaften” (System Properties) click the tab “Hardware” and then the button “Geräte-Manager” (Device Manager). |
| 3 | In Device Manager click the plus sign next to “Anschluss (COM und LPT)” (Ports (COM & LPT)) to show the list of ports. |
| 4 | Look for the name **`GSV-2MSD-DI USB communication (COM<Nummer>)`**; <Nummer> is the COM port number you are looking for. It is entered in the communication program (e.g. GSVcontrol). |

# 8 Dimensions and connection

## 8.1 Dimensions




Dimensions in mm.

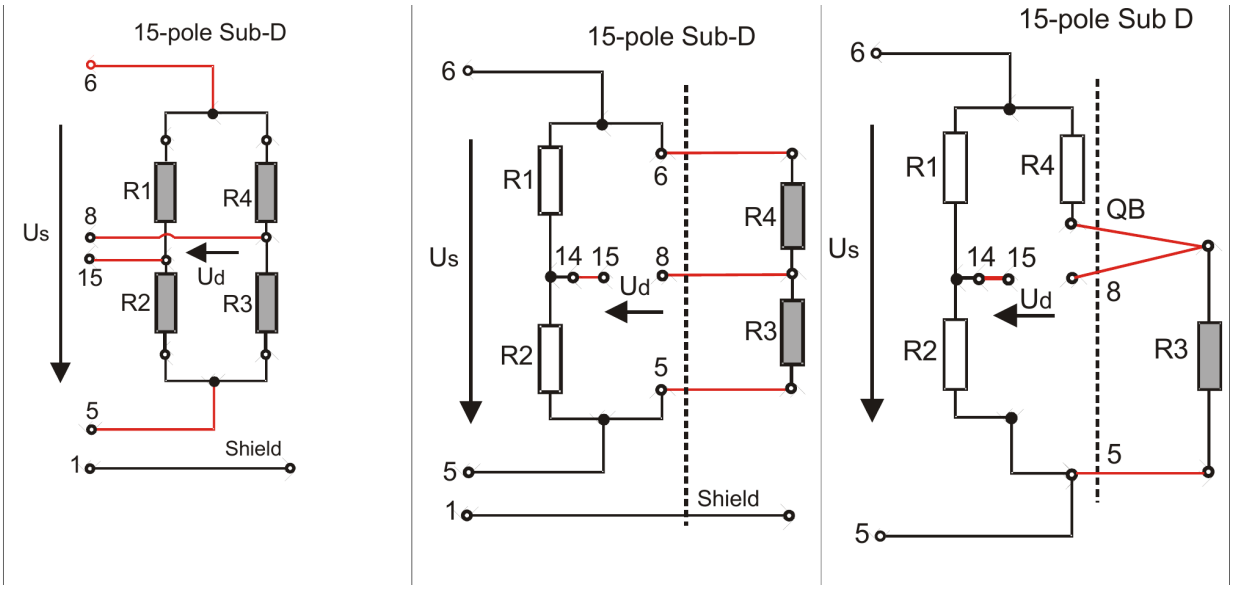
## 8.2 Pin assignment

Sensor connection: 15-pin D-sub socket.

| Pin | Signal | Meaning |
|---|---|---|
| 1 | Shield | |
| 2 | GNDA | Ground analog input / analog output |
| 7 | Tara | Zero set input / trigger input |
| 9 | UE | Analog input |
| 10 | UA | Analog output |
| 6 | +US | Positive bridge supply |
| 5 | –US | Negative bridge supply (GND) |
| 8 | +UD | Positive differential input |
| 15 | –UD | Negative differential input |
| 13 | +UF | Positive sense line |
| 12 | –UF | Negative sense line |
| 14 | HB | Half bridge completion |
| 11 | QB120 Ohm | Quarter bridge completion 120 Ω |
| 3 | QB350 Ohm | Quarter bridge completion 350 Ω |
| 4 | QB1000 Ohm | Quarter bridge completion 1000 Ω |

**Important** To connect half and quarter bridges, pin 14 must be bridged to pin 15. Quarter bridges are connected in three-wire technique to pin 5, pin 8 and QB (3, 11 or 4).

## 8.3 Connection diagram for strain gauge bridges




Connection of full, half and quarter bridges to the 15-pin D-sub socket (from left).

| Full bridge | Half bridge | Quarter bridge |
|---|---|---|
| no bridge | bridge between 14 and 15 | bridge between 14 and 15 |

# 9 Technical data

With battery operation or UB = 8 ... 26 V DC in the rated temperature range.

### Accuracy and inputs

| Quantity | Value | Unit |
|---|---|---|
| Accuracy class, analog | 0.1 | % |
| Accuracy class, digital | 0.05 | % |
| Measuring ranges | ±1 (JP1 on 1 with 5 V sensor supply) | mV/V |
| | ±2 or ±3.5 by software (JP1 on 2 with 2.5 V sensor supply) | mV/V |
| Connectable full bridges | 4 × 350 | Ω |
| Bridge supply voltage | 2.5 / 5 | V |
| Input impedance | > 20 (300 pF) | MΩ |
| Common mode rejection, DC | > 120 | dB |
| Common mode rejection, 100 Hz | > 100 | dB |
| Analog input: input voltage range [1] | 0 ... 10 | V |
| Analog input: input resistance | 56 | kΩ |

[1] The analog input is not switched through to the analog output.

### Transfer characteristics

| Quantity | Value | Unit |
|---|---|---|
| Linearity error | < 0.02 | % F.S. |
| Temperature effect on zero per 10 K, measuring range 1 mV/V | < 0.4; typ. 0.2 | % F.S. |
| Temperature effect on zero per 10 K, measuring range 2 mV/V | < 0.2; typ. 0.1 | % F.S. |
| Temperature effect on sensitivity per 10 K, related to the measured value: analog output | < 0.1; typ. 0.05 | % |
| Temperature effect on sensitivity per 10 K, related to the measured value: display / digital | < 0.01; typ. 0.005 | % |
| Resolution, peak value | > 30,000 parts | |
| Resolution, RMS | > 150,000 parts | |

### Output and control lines

| Quantity | Value | Unit |
|---|---|---|
| Output filter, analog: –3 dB cut-off frequency, Bessel, 2nd order | 3.5; 260; 1700 (switchable by software) | Hz |
| Output filter, digital: –3 dB cut-off frequency | 0.06 ... 1700 | Hz |
| Measuring rate, digital output | 0 ... 3750 | Hz |
| Measuring rate when recording | 0 ... 1000 | Hz |
| Analog output | –5 ... +5 | V |
| Source resistance | 47 | Ω |
| Control lines, automatic zero adjustment | High level: > 3.4 (active high) · low level: < 1.4 | V |

### Power supply

| Quantity | Value | Unit |
|---|---|---|
| Operating voltage, rated range | 8 ... 27 | V DC |
| Operating voltage, operating range | 6 ... 30 | V DC |
| Power consumption | 2 (charging battery: max. 11) | VA |
| Battery | 31.2 | Wh |
| Operating time on battery, normal operation | max. 20 | h |
| Operating time on battery, standby | max. 300 | days |
| Battery charging time, supply voltage 10 ... 27 V | max. 6 | h |
| Battery charging time, USB supply (standby operation) | max. 27 | h |

### Interface

| Quantity | Value | Unit |
|---|---|---|
| USB version | 2.0 Fullspeed | |
| Device classes | Mass Storage Device, Communication Device Class | |
| Memory card | SD (1.x), SDHC (no UHS-1, UHS-2) | |
| File system | FAT16, FAT32 | |

### Functions, user menu (selection)

| Quantity | Value | Unit |
|---|---|---|
| Parameter memory | last setting (automatic) | |
| | factory setting | |
| | 6 parameter sets | |
| Further functions | programmable gain | |
| | programmable adjustment of the digital full-scale value | |
| | triggering the zero adjustment | |

### Environment and mechanics

| Quantity | Value | Unit |
|---|---|---|
| Rated temperature range | 0 ... +50 | °C |
| Storage temperature range | –20 ... +70 | °C |
| Dimensions | see dimension drawing, section 8.1 | mm |
| Weight | 610 | g |
| Degree of protection | IP51 / IP65 | |

### Absolute limits (all voltages with respect to supply ground)

| Quantity | Value | Unit |
|---|---|---|
| Differential input | –12 ... +12 | V |
| Sense inputs | –12 ... +12 | V |
| Control lines | –30 ... +30 | V |
| Analog input | –20 ... +20 | |

Subject to technical changes.