



# GSV-2MSD-DI Data Logger

## Instruction manual

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## GSV-2MSD-DI Strain gage Data Logger



### Connection and commissioning

To switch on, press the MODE button until the display is illuminated.

The device contains a battery that is charged by connecting the power adapter supplied.

The "ON" LED flashes while charging.

To switch off, hold the MODE button (outside the menu) down and confirm the following message "Power off? (OK)" by pressing the OK button.

Please use SDHC Memory Cards, class 6 or class 10, but no UHS 2.

### Operating the menu

The device has two main menus:

#### Logger menu.

The logger menu has the following functions:

- View and set data recording mode on the SD memory card,
- Select USB connection mode,
- Select display illumination characteristics,
- Display battery life,
- Set date and time,
- Select additional functions e.g. display and recording of maximum, minimum and average measured values.

The Logger menu can be reached by pressing the MODE button from the measured value display or via the last entry of the measuring amplifier main menu.



## Description of the logger menu:

Menu entry Level 1	Menu entry Level 2	Menu entry Level 3
Logging ON, OFF, onOK	<p>→Set Log.: ON Permanent recording of measured data on the SD card</p> <p>→Set Log: onOK Recording of measured data on the SD card as long as the OK button (at measured value displayed) is pressed</p> <p>→Set Log: OFF No Recording</p>	
USBmode: Comm, SDCard, none	<p>→USBmode: SDCard The device is a Mass Storage Device when connected to the USB port, which provides access to the data on the SD card. Simultaneous recording of measured value to file is not possible. If this mode is activated, recording is switched off.</p> <p>→USBmode: Comm The device is in serial USB mode. Our communication programs (e.g. GSVcontrol, GSVmulti) can then be used. A standard driver is loaded when connected for the first time, see below</p> <p>→USBmode: none USB is switched off.</p>	
Bat: level bar or Charge (with percentage display)	<p>→USB power: ON, OFF</p> <p>If power supply is via USB port is enabled, the GSV-2MSD-DI can be supplied by the USB bus if it is connected to a PC and configured as an USB device. If the device is switched off, the battery can be charged.</p>	<p>→Set: USBpwr ON</p> <p>→Set USBpwr OFF</p> <p>Switch power supply via USB on or off</p>
Light ON, Auto	<p>→Set: Light ON Display is permanently illuminated</p> <p>→Set: Light Auto Display is illuminated when buttons are pressed and in the menu and goes out after 5 seconds - this preserves the battery.</p>	
date / time	<p>→Date TT Mon JJJJ</p> <p>→Time HH:MM:SS</p>	<p>→Setting the date</p> <p>→Setting the time</p> <p>→(see description of numeric settings below)</p>
Val.mode normal, MaxMin	<p>→SetMode: normal: Only displays the current measured values</p> <p>→SetMode: MaxMin: The maximum, minimum or mean value can be displayed in the display and all three are</p>	



Menu entry Level 1	Menu entry Level 2		Menu entry Level 3
	recorded to file.		
Menu entry Level 1	Menu entry Level 2	Menu entry Level 3	Menu entry Level 4
Logging options	→ Row elements	→ With date: Yes/No	→ With [...] Yes/No i.e. switching to the setting not yet selected
		→ With time: Yes/No	
		→ With unit: Yes/No	
	→ File options	→ heade: Yes/No	→ Setting the max. number of lines in a file
		→ Number of lines	
		→ Length of time	→ Setting the max. duration of the file
	→ Directory	→ Every month	
→ Every day			

## Notes

- If a setting is in brackets in Level 1, this means that this setting has been selected but is not currently active. This is the case if the conditions for this operating mode are not met. Example:
- Logging (on): SD card is not inserted or write-protected or full or defective.
- USBmode: (SDcard): USB cable is not connected or no SD card is inserted

## Measuring amplifier menu

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

- Sensor scaling factor
- Unit
- User-definable offset
- Parameter memory

The measuring amplifier main menu can be reached by pressing the MENU button from the measured value display.



## Description of the measuring amplifier menu

Menu entry Level 1	Menu entry Level 2	Menu entry Level 3
Sensor config.	<ul style="list-style-type: none"> <li>→unit</li> <li>→Sensor capacity</li> <li>→Rated output</li> </ul>	<p>Select unit<sup>1</sup></p> <p>Numeric setting of the physical nominal value of the sensor.<sup>2</sup></p> <p>Numeric setting of the electrical characteristic value of the sensor.<sup>2</sup></p>
Strain analysis	<ul style="list-style-type: none"> <li>→Set gage factor</li> <li>→Set bridge type</li> </ul>	<ul style="list-style-type: none"> <li>→Numeric setting of the K-factor between 0.2 and 258<sup>3</sup></li> <li>→Full bridge: Full bridge circuit with 4 individual DMS, all in longitudinal direction<sup>3</sup></li> <li>→Half bridge: Half bridge circuit with 2 individual DMS, both in longitudinal direction<sup>3</sup></li> <li>→Quarter bridge: Quarter bridge circuit with one DMS<sup>3</sup></li> <li>→PR.full bridge: Full bridge circuit with 4 individual DMS, 2 in longitudinal direction and 2 in cross direction<sup>3</sup></li> <li>→PR.half bridge: Half bridge circuit with 2 individual DMS, one in longitudinal direction and one in cross direction<sup>3</sup></li> </ul>
		<p style="text-align: center;"><b>Menu entry Level 4</b></p> <p>Poissons ratio (only with selection of cross-direction full bridge or cross-direction half bridge in Level 3) Numerical value from 0 to 0.5.<sup>3</sup></p>
Load settings	<ul style="list-style-type: none"> <li>→default: Manufacturer's settings i.e. restoring GSV-2 parameters to default settings.</li> <li>→user 1: User-configurable data set no.1 i.e. loading the parameters that were</li> </ul>	

1 Changing the unit does not change the measured value scaling!

2 Modification of the sensor measurement range or the characteristic value changes the scaling of the measured value.

3 Modification of the DMS parameter of the strain analysis changes the scaling of the measured value and the unit.



Menu entry Level 1	Menu entry Level 2	Menu entry Level 3
	previously filed as user 1 with save settings. →...and so on, until →user 6: like user 1, but No 6	
Save settings	Saves the current configuration under user 1 to user 6	
Set scaling	Numerical value between 0.1 ...999999	
Data acquisition <sup>1</sup>	→Data frequency →Data period	Numerical value: Num. Of values per second Numerical value: Data period of acquired values Note: the last confirmed with OK value is adopted. Please confirm data period for slow measurements, data rate for fast measurements.
Options	→Set channel (Set channel) →Set threshold (Set threshold)  →Offset value →Language 1	Numerical value 0 or 1 →On-threshold Numerical value of the switch-on threshold →Off-threshold Numerical value of the switch-off threshold →Value that is added to each measured value. →German or English (Menu language setting)
Logger config.	See logger menu.	


- Press the Menu button to go back one level.
- Press the OK button to confirm an entry or to go to the next level.
- If a setting is selected with the OK button, the following message will appear "OK to confirm", which you can confirm by pressing OK to approve the setting - or cancel by pressing the MENU button.

<sup>1</sup> This menu entry is available from firmware version 1.5.08 on.





## Notes

- The symbol  on the right edge of the display indicates that the menu entry is activated.
- Access to the measuring amplifier menu will be blocked if communication is taking place via the serial interface. In this case, the following is displayed:  
"Menu blocked"



## Description of the buttons

Button	Function
MODE	To switch on and off or access the Logger menu
MENU (LEFT)	To access the measuring amplifier menu, to go one menu level higher or to cancel an entry. For numeric settings: to move the cursor left.
UP	To move around the menu within the same level: switching to the next entry. For measured value mode=MaxMin: to switch from one measured value display to the next one up. For numeric settings: to increase number and/or setting above the cursor.
DOWN	To move around the menu within the same level: switching to the previous entry. For measured value mode=MaxMin: To switch from one measured value display to the next one down. For numeric settings: to decrease number and/or setting above the cursor.
OK (RIGHT)	To confirm the entry or move down one level. For measured value display and recording mode "withOK": to record measured values to file. For numeric settings: to move the cursor right.
SHORT	To connect the +Ud and -Ud inputs (short-circuit of sensor signal)
ZERO	To trigger an automatic zero adjustment.

## Number setting

To set a numerical value and the date or time, move the cursor right by pressing OK and left by pressing MENU. The digit (and/or the month) above the cursor flashes and can be increased or decreased using the UP / DOWN buttons.

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

Then release the OK button, and the following message will appear "OK to confirm". Confirm this by pressing OK. To cancel the numeric setting, hold down the MENU button.



## Description of LEDs

LED	Meaning
ON	Permanently on: Device on, no charging. Flashing slowly: Device off, battery charging. Flashing faster: Device on, battery charging.
CARD	USB mass storage device active.
COM	USB serial communication mode active.
LOG	Measured data recording to SD card active. <b>Do not remove card!</b>
ERR	An error has occurred. Flashes permanently after switching on: the battery was empty, therefore the date and time must be reset. Flashes alternately with ON after switching on for approximately 3 seconds: the battery is empty, please connect power adapter to charge. Flashes alternately with LOG: an error occurred whilst attempting to record measured data e.g. the SD card may be write protected, full, incompatible or defective.

## Maximum, minimum and mean value

The maximum, minimum and mean value mode can be activated in the logger menu under Val. mode. In this operating mode you can switch between these values and the current value in the display using the UP and DOWN buttons. These values are written in every line in the measured value file; in the order:

Current value, maximum, minimum and mean value.

If activated, a header is written in the file, the second line of which designates the corresponding column:

Scaling: +3,5000 Data frequency: 10,000 Hz

Date	Time	Value	Max	Min	Mean	Unit
13/05/03,15:38:31.99960		-0.0004	+2.9967	-3.0084	-0.0468	mV/V

The header is only written when *Recording options* → *File options* → *Header: Yes* is selected in the menu.

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

The following actions reset the determination of the maximum, minimum and mean value, i.e. then re-determined with the subsequent measured values:

- By switching on the device
- By activating max./min./mean value mode
- By zero setting
- By starting permanent file recording



- By ending manual file recording, i.e. by releasing the OK button

## Recording measured data to file

If data recording is active, the GSV-2MSD-DI creates directories on the SD card, which contain the measured data files.

The directory name is created from the current date, depending on the directory mode setting. A new directory is created every month in the initial state, with the name: **G20JJ\_MM**, for example in November 2012 this would be "**G2012\_11**".

The name of the files within it are then formed based on the day and time, i.e.: **DDHHMMSS.TXT**. For example, if a file is created on 14.11.2012 at 14:41:39, then the directory name is as above and the file name:

**14144139.TXT**

The files are written in ASCII text format. Each measured value creates a line that is terminated with <LF> and <CR>. Depending on the line settings, each line begins with the time stamp consisting of date, time and fractions of seconds, then the measured value and the unit. The default setting for lines is as follows (first line of the example above):

**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 satisfies the big-endian convention, i.e.

**JJ/MM/DD**

Date and time are separated by comma. The time format is

**HH:MM:SS.bbbbbb**

whereby the 5-digit fractions of seconds bbbbbb, interpreted as a whole number, indicate 10 $\mu$ s steps. In the example above, the data rate of the measuring amplifier is set to 10 measured values/seconds ( $(37669 - 27669) * 10\mu s = 100ms = 1/10 s$ ).<sup>1</sup>

Time stamp and measured value are separated with the tab character ('/t'). Measured value and unit are separated with a space.

The default setting for the maximum number of lines (i.e. displayed measured values) in a file is 32,000. As soon as this number is reached, a new file is opened.

In the "onOK" recording mode, whereby recording are only made by pressing the OK button, the data sets (continuous lines during a recording) are written in the same file. After

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<sup>1</sup> For synchronisation reasons, there can be small deviations in the fractions of the time steps.



terminating a data set, i.e. by releasing the OK button, the maximum number of lines is tested. If this is larger than or equal to 32000, a new file is opened. Therefore the number of lines can also be larger than 32000 in this mode.

In this mode at least one line, i.e. one measured value, is written per data set. If you always want exactly one measured value per data set, it is recommended that the data rate of the measuring amplifier is set to a low value e.g. 1 measured value/second using communication software (e.g. GSV control). By pressing OK, the device waits until a value is measured at records this value.

## USB operation

The USB operating mode can be selected in the logger menu at any time (see above), regardless of whether the condition(s) for this operating mode are currently met or not - see note above. In the latter case, the setting will be displayed in brackets in menu Level 1, and with an unchecked box instead of a checked box in menu Level 2.

If a 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 new mode is activated after 5 seconds. If the host PC is equipped with speakers, you will hear the corresponding acoustic signal.

If the USB operating mode "SDcard" is selected and one of the recording modes is selected at the same time, the recording will be switched off.

In this Mass Storage mode, files on the SD card can be read, written, deleted or formatted.

## Power supply per USB connection

If the USB power supply "USB Power" is activated in the logger menu, the device can also be powered via the USB port if it is connected to a host PC and fully configured. The battery is emptied barely or not at all when switched on. 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, irrespective of the set USB mode.<sup>1</sup> A USB charging device cannot be used at this time.

## USB driver

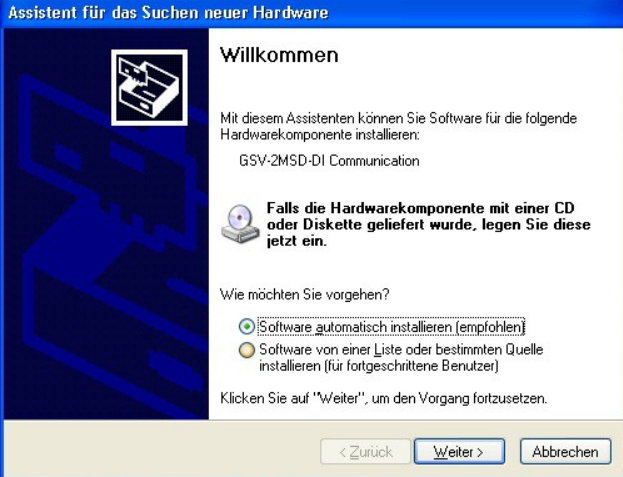
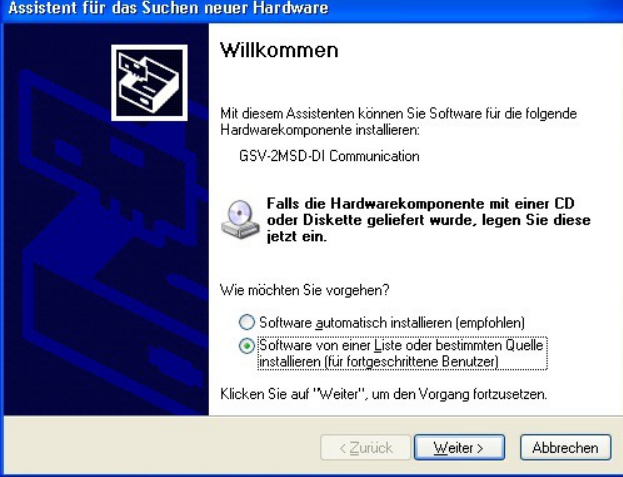
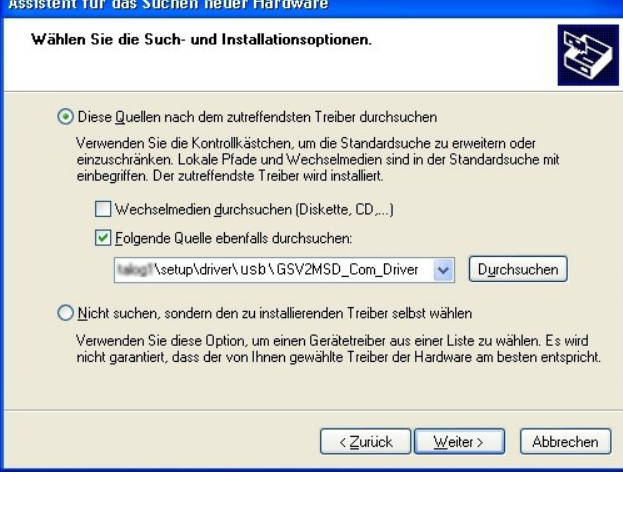
The **USB Mass Storage mode** does not need a driver for Windows systems from Windows XP - once the USB cable is connected a window will appear (depending on operating system settings), where you can access the files; or you can reach the GSV-2MSD-DI drive via "My computer" or with the Windows explorer.



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<sup>1</sup> This is necessary as the device requires 500mA and according to USB 2.0 specification, this is only permitted in completely configured (enumerated) communication mode.

## Driver installation


When the device is connected in **Communication mode** for the first time, Windows will ask for a driver directory. The installation process is described below.

	<p>This must first be defined for your GSV-2MSD-DI to work in USB communication mode.</p> <p>To do this, click the MODE button of the measuring amplifier and select <b>USBmode: Comm</b> in the logger menu.</p> <p>Now you can connect your GSV-2MSD-DI to the PC via USB cable. Once connected the driver installation window appears.</p>
	<p>Select "Install software from a list or specific source (advanced users)".</p> <p>Click "Continue &gt;".</p>
	<p>Click "Search for the best driver in these locations"</p> <p>Check the option "Include this location in the search:" and then click "Browse".</p> <p>Select the following link of the CD supplied:</p> <p><b>CD:\setup\driver\usb\GSV2MSD_Com_Driver</b></p>

	<p>[CD] corresponds to your disk letters. Click "Continue &gt;".</p>
	<p>In the dialogue window "Hardware installation" click "Continue installation".</p>
	<p>The driver was installed successfully. Click "Finish".</p>

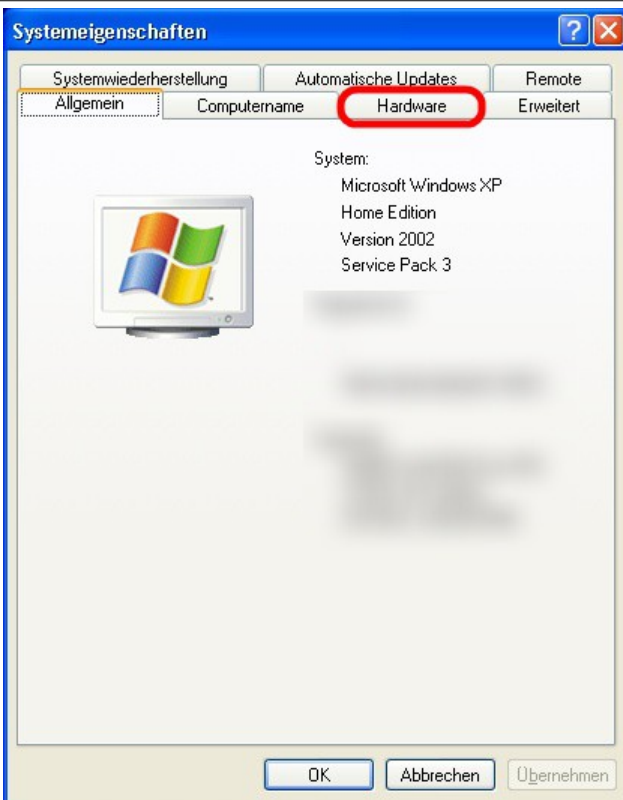
### Interface number / Determine COM-Port

If the driver is installed successfully, it is useful to know the number of the virtual COMport assigned by Windows so that this can be specified to the communication program to allow it to open the interfaces. Proceed as follows:

	<p>Right-click on "Workstation".</p>
---	--------------------------------------

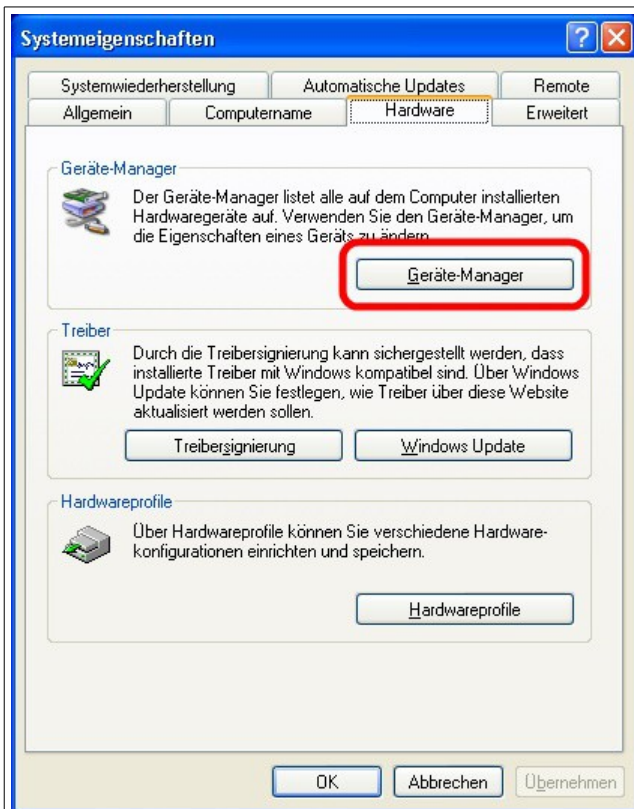


Select "Properties" in the context menu..

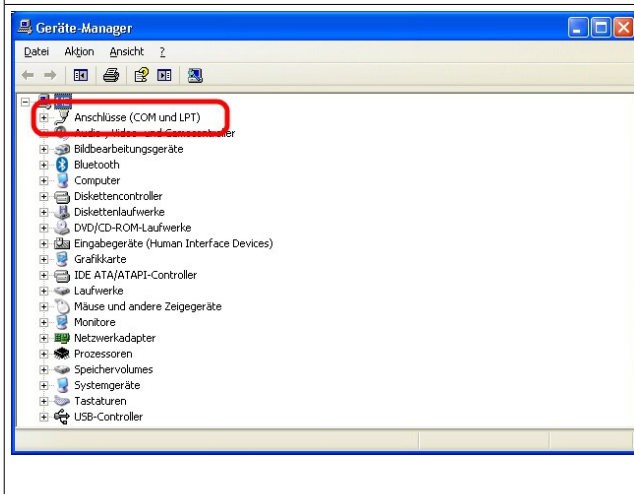


Click on the "Hardware" tab in the "System properties" window displayed.

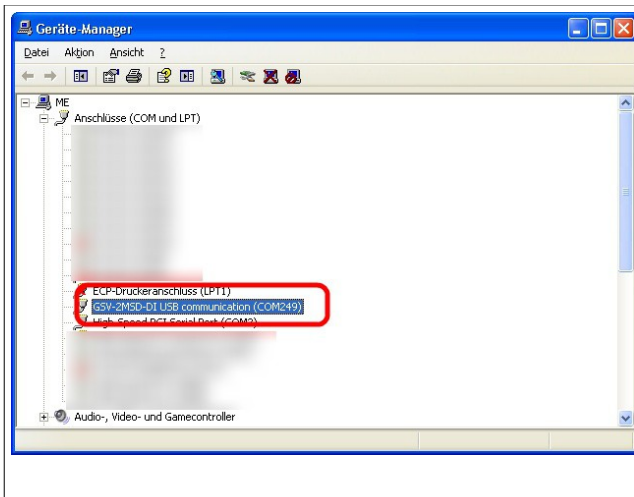




Click on the "Device Manager" button.

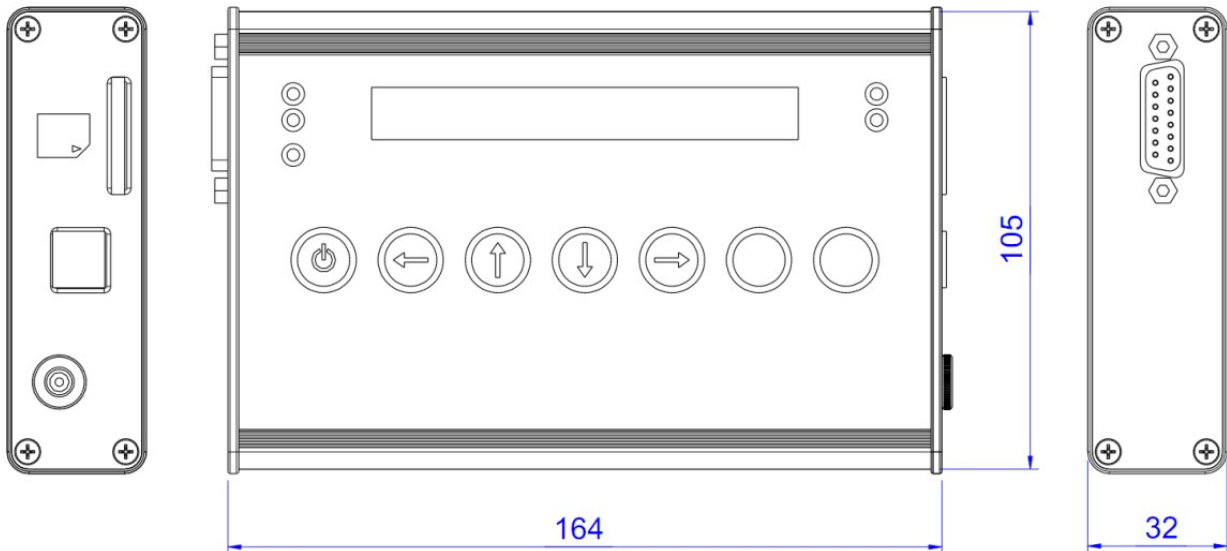


In Device Manager, click on the plus sign next to "Connection (COM and LPT)" to display the connection overview.



Look for the title "GSV-2MSD-DI USB communication (COM<Number>)", whereby <Number> indicates the number of the COMport that you are looking for. You need this COM-Port number to use the GSV-2MSD-DI, for example under GSV-Control.

## Dimensions



## Terminal assignment

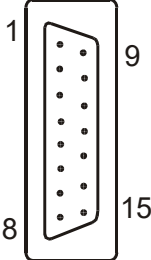
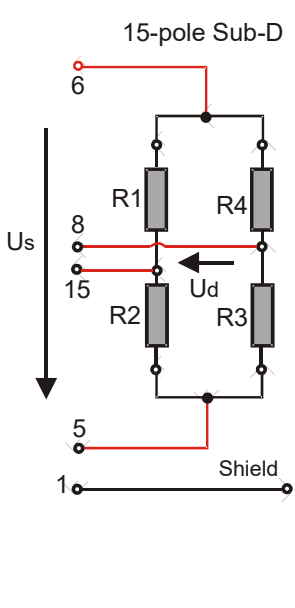
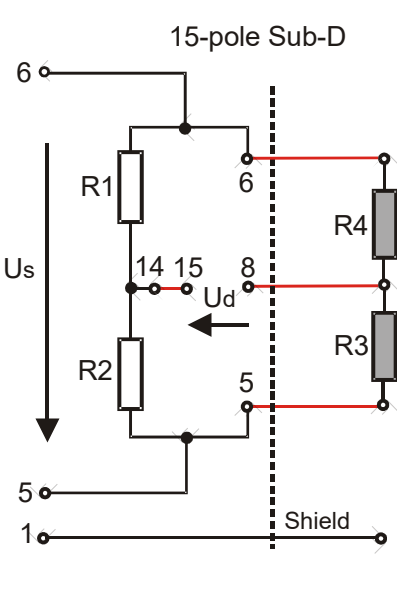
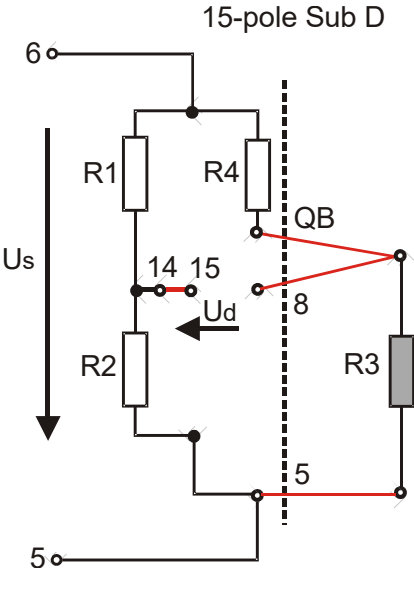
1	Screen		 <p>Pin 14 must be bridged with Pin 15 to connect half and quarter bridges.</p> <p>Quarter bridge are connected in three-wire connection to Pin 5, Pin 8 and QB (3 and/or 11 or 4).</p>
2	GND <sub>A</sub>	Ground analog input / analog output	
7	Tare	Zero-setting input / Trigger input	
9	U <sub>E</sub>	Analog input	
10	U <sub>A</sub>	Analog output	
6	+U <sub>S</sub>	Positive bridge power supply	
5	-U <sub>S</sub>	Negative bridge power supply (GND)	
8	+U <sub>D</sub>	Positive differential input	
15	-U <sub>D</sub>	Negative differential input	
13	+U <sub>F</sub>	Positive sensor cable	
12	-U <sub>F</sub>	Negative sensor cable	
14	HB	Half Bridge selector	
11	QB120 Ohm	Bridge Completion Resistor 120 ohm	
3	QB350 Ohm	Additional quarter bridge 350 ohm	
4	QB1000 Ohm	Additional quarter bridge 1000 ohm	

Table 1: Allocation Sub-D 15 socket

## Connection plan for DMS bridges

Full bridge	Half bridge	Quarter bridge
		
No bridge	Bridge between 14 and 15	Bridge between 14 and 15

**Table : Connection of full and/or half and quarter bridges to 15 -pin Sub D socket**

The following are supplied as standard accessories:

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

**Required accessories:**

- Class 10 (recommended for recordings of 1000Hz)



## Technical data

(in battery operation or  $U_B = 8...26V$  DC in the nominal temperature range)

Size	Value	Unit
<b>Accuracy class</b>		
Analog	0,1	%
Digital	0,05	%
<b>Inputs</b>		
Measurement range	$\pm 1$ (JP1 on 1 with 5V sensor supply) $\pm 2$ or $\pm 3.5$ per software (JP1 on 2 with 2,5V sensor supply)	mV/V mV/V
Connectible full bridge	4 x 350	Ohm
Bridge supply voltage	2,5 / 5	V
Input impedance	>20 (300pF)	MOhm
<b>Common mode rejection</b>		
DC	>120	dB
100Hz	>100	dB
<b>Analog input 1)</b>		
Input voltage range	0...10	V
Input resistance	56	kOhm
<b>Accuracy</b>		
Linearity deviation	<0,02	% of unit
Influence of temperature on the zero point per 10K	Measurement range 1mV/V: <0.4 type 0.2	% of unit
	Measurement range 2mV/V: <0.2 type 0.1	% of unit
Influence of temperature on the measurement sensitivity per 10K referring to the measured value	< 0,1; type. 0,05	%
	Analog output <0,01; type. 0,005	%
Display / digital		
<b>Resolution</b> Peak value	>30000 parts	
RMS	>150000 parts	
<b>Output</b>		
Analog output filter		
-3dB cut-off frequency, Bessel, 2. order	3.5; 260; 1700 (can be switched using software)	Hz
Digital output filter		Hz
- 3dB cut-off frequency	0.06..1700	Hz
Digital output measuring rate	0..3750	
Analog output	-5...+5	V
Source resistance	47	Ohm
Control cables	High level: 3.4 (active high)	



Size	Value	Unit
Automatic zero-point adjustment	Low level: < 1.4	V
<b>Supply</b>		
Supply voltage		
Nominal range	7..27	V DC
Operating range	6...30	V DC
<b>Power input</b>	2 (charge battery: max. 11)	VA
<b>Battery</b>	31,2	Wh
Operating time with battery		
Normal operation	max. 20	Hours
Standby	max. 300	Days
Duration of battery charging		
Supply voltage 10..27V	max. 6	Hours
Supply with USB (standby operation)	max. 27	Hours
<b>Interface</b>		
USB version	2.0 Fullspeed	
Device classes	Mass Storage Device, Communication Device Class	
<b>Memory card</b>	SD (1.x), SDHC, class6 or 10, (not UHS-1 and not UHS-2)	
<b>File system</b>	FAT16, FAT32	
<b>Functions, user menu (selection)</b>		
Parameter memory	Last setting (automatic) Manufacturer's settings 6 parameter sets	
Other functions	- programmable amplification - programmable adjustment of the digital final value - activation of the zero-point adjustment	
<b>Temperature range</b>		
Nominal temperature range	0...+50	°C
Storage temperature range	-20...+70	°C
<b>Dimensions</b>		
L x B x H	35 x 171 x 110	mm
Weight	610	g
<b>Protection class</b>		
	IP51 / IP65	

1) The Analog input is not switched over to the Analog output.

#### Absolute limit values

(all voltages based on supply chassis)

<b>Differential input::</b>	-12...+12V
<b>Sense inputs:</b>	-12...+12V
<b>Control cables:</b>	-30...+30V



**Analog input:** -20...+20

Subject to technical modifications.





Subject to modifications.

All details describe our products in a general form.

They constitute neither warranty of characteristics in the sense of § 459, Paragraph 2, of the German Civil Code nor grounds for liability.

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