Sensors and measuring amplifiers

Operating manual

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ME-Meßsysteme GmbH
Neuendorfstr. 18a
16761 Hennigsdorf

Tel.: +49 3302 89824 60
Fax: +49 3302 89824 69

Mail: info@me-systeme.de
Web: www.me-systeme.de

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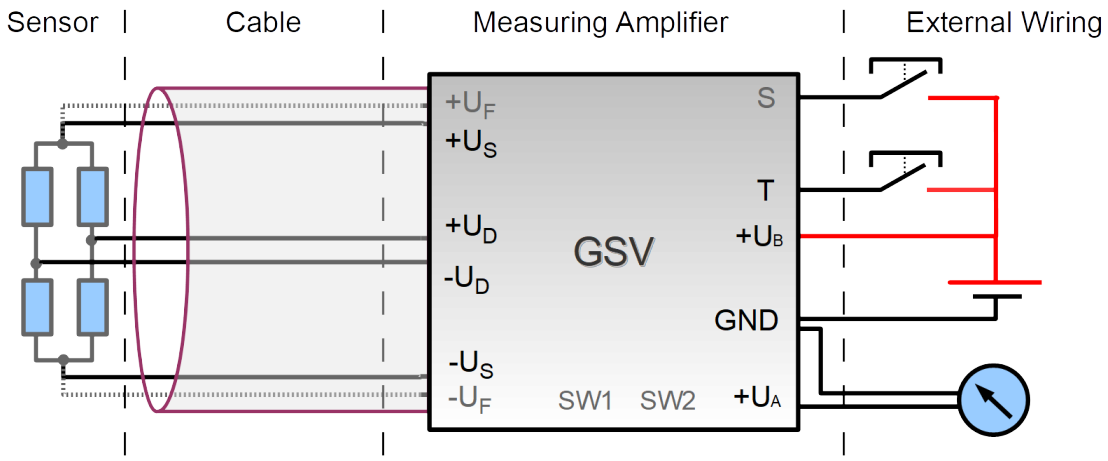

Figure 1: Connection of the sensor to the measuring amplifier

Notes

- Please use a shielded cable for the sensor.
- The shield of the sensor cable is applied to -US or GND or on a provided terminal.
- The wires of + UB and GND, as well as wires of + UA and GND should be installed in pairs.
- The GND terminal has to be assigned twice for some amplifiers.
- A low-noise and stabilized power supply is required. Please use separate power supplies for sensors and actuators.
- For sensors with shielded connectors the shield is only applied at the sensor: the sensor is grounded or connected to GND.

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Pin assignment sensor

	Designation Sensor	Designation GSV	Note
$-U_S$	negative bridge supply (-Excitation, -Input)	negative bridge supply	-Us is connected to GND for some amplifiers
$+U_S$	positive bridge supply (+Excitation, +Input)	positive bridge supply	For most measuring amplifiers the positive bridge supply is 5V DC or 2.5V DC.
$+U_D$	positive bridge output (+Output)	positive differential input	The positive signal of the sensor bridge output is connected to the positive differential input of the GSV.
$-U_D$	negative bridge output (-Output)	negative differential input	The negative signal of the sensor bridge output is connected to the negative differential input of the GSV.
$-U_F$	negative sensor cable (-Sense)	negative sensor cable	The sensor cable $-U_F$ of the sensor can be parallel connected with -Us if there is no input at the measuring amplifier.
$+U_F$	positive sensor cable (+Sense)	positive sensor cable	The sensor cable $+U_F$ of the sensor can be parallel connected with +Us if there is no input at the measuring amplifier.

Table 1: Wiring diagram for the connection of the sensor to the measuring amplifier

For measuring amplifiers with connections for sensor cables (6-wire connection) a bridge from $-U_S$ to $-U_F$ and a bridge of $+U_S$ to $+U_F$ can be connected, if the sensor is made in 4-wire technology.

Pin assignment of the measuring amplifier

	Designation	Example	Type
$+U_B$	positive operating voltage	12V DC or 24V DC	input
$+U_A$	analog output	±10 V or 4..20mA or 0...10V	output
T	Tara (zero setting input)	connect the operating voltage for 2 s. Triggering on falling edge	input
S	Scale (autoscale input)	connect the operating voltage for 3 s. Triggering on falling edge	input
GND	mass		Reference potential for operating voltage and output signal

Table 2: Wiring diagram for the connection of the measuring amplifier with operating voltage and with external signal processing.

Color codes for connection cable

		Color code Nr.				
	Description	1	2	3	4	5
$+U_S$	positive bridge supply	**brown**	**brown**	**red**	**red**	**green**
$-U_S$	negative bridge supply	**white**	**white**	**black**	**black**	**black**
$+U_D$	positive bridge output	**green**	**blue**	**green**	**green**	**white**
$-U_D$	negative bridge output	**yellow**	**black**	**white**	**yellow**	**red**
$+U_F$	positive sensor cable	**pink**			**blue**	**yellow**
$-U_F$	negative sensor cable	**gray**			**white**	**blue**

Table 3: Color codes for sensor cable

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Direction of the output signal

The direction of the output signal (e.g. positive output signal at compression load) can be reversed (e.g. negative output at compression load), by changing the wires + UD and-Ud at the inputs of the measuring amplifier.

Commissioning the measuring system

- Installation of the sensor and the measuring amplifier to the correct positions.
- Connect the sensor to the measuring amplifier according to the wiring diagram in table 1.
- Connect the measuring amplifier with operating voltage and signal processing according to the wiring diagram in table 2.
- Setting of zero of the output signal by triggering the automatic zero setting function "Tara".

Scaling of the output signal

The relationship between input quantity (e.g., force, torque or strain) and output signal is determined by the following characteristics of sensor and measuring amplifier:

- measuring range of the sensor (e.g. 100N)
- output signal (characteristic value) of the sensor (e.g. 0,9950 mV/V per 100N)
- measuring range (Input sensitivity) of the measuring amplifier (e.g. 2,0000 mV/V)
- Output signal of the measuring amplifier at 100% modulation of the measuring range (e.g. 10,00V)

Example 1, measuring amplifier with voltage output

$$\frac{100\,N}{0{,}9950\,mV/V}\cdot\frac{2{,}0000\,mV/V}{10\,V}=20{,}10\,\frac{N}{V}$$

Example 2, measuring amplifier with current output

- Output signal of the measuring amplifier at 0% modulation of the measuring range (e.g. 4 mA)

$$\frac{100\,N}{0{,}9950\,mV/V}\cdot\frac{2{,}0000\,mV/V}{16\,mA}=12{,}56\,\frac{N}{mA}$$

For measuring amplifiers with analog output the maesuring range can be adjusted by setting a jumper on e.g. 1,000 mV/V or 0,5000 mV/V or 0,2000 mV/V.

For measuring amplifiers with digital output signal the scale factor and the unit can be stored in the non-volatile memory of the measuring amplifier.

To calculate the scaling factor the software GSVmulti provides an input mask for teh four characteristic variables of sensor and measuring amplifier. In the non-volatile memory of the measuring amplifier can only be stored the scaling factor and unit, not the input data.

Checking the function

The following properties can be used for checking the function in case of a malfunction.

Property	Value
Operating voltage U_B to GND	e.g. 12V DC or 24V DC
Bridge excitation voltage +U_S to -U_S	0 mV (±1 mV)
Sensor resistance +U_D to -U_D	e.g. 350 Ohm or 700 Ohm or 1000 Ohm (±5%)
Sensor resistance +U_S to -U_S	e.g. 400 Ohm or 800 Ohm or 1200 Ohm (± 20%)
Sensor resistance to sensor housing	>20 MOhm

Changelog

Version	Date	Changes
kb-wiringplan.odt	27.03.12	First german version
ba-sensoren-v1.0.odt	02.01.19	Layout edited; wiring diagram; commissioning;
ba-sensors-v1.0-en.odt	14.01.19	First english version

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Änderungen vorbehalten.
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