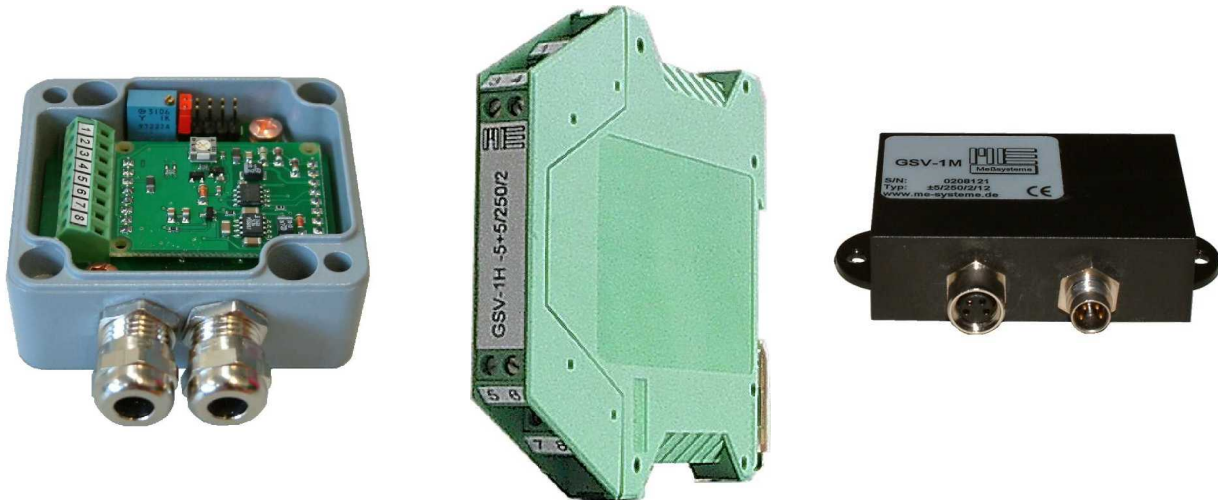


## Strain Gage Measuring Amplifier GSV-1



## Strain Gage Measuring Amplifier GSV-1

Description.....	3
Models.....	4
Technical Data.....	5
Top hat rail housing GSV-1H.....	6
Pin Configuration.....	6
Dimensions.....	6
Adjustment of Input Sensitivity .....	7
Top Hat Rail Housing GSV-1HSW.....	8
Functional Diagram.....	9
Pin Configuration.....	10
Adjustment of Input Sensitivity.....	10
Layout of Jumpers.....	11
Dimensions.....	11
Option EP (cConnection of an External Potentiometer).....	11
Aluminum housing GSV-1A.....	13
Pin Configuration.....	13
Adjustment of Input Sensitivity.....	14
Dimensions.....	14
Module housing GSV-1M.....	15
Dimensions.....	15
Pin Configuration.....	15
Printed Circuit Board GSV-1L .....	16
Pin Configuration.....	16
Dimensions.....	16

## Description

The GSV-1 is a precise bridge amplifier with an analog output for strain gage full bridges.

The special feature of the GSV-1 is the automatic zero balancing within just 90 milliseconds across 100% of the measurement range.

The zero balancing is triggered by means of a control signal from the PLC or with a pushbutton. The control levels may be in between 3.5 and 30 volts.

The GSV-1 is available in many housing variants and many options, e.g. threshold value sensor, peak value store, amplification selection by means of jumpers, stepless amplification adjustment, plug connections etc.

The maximum range for the zero balancing is 100% of the sensitivity range with an output signal  $\pm 5V$  at the GSV-1L. The GSV-1L with an output signal 0-10V is the zero balancing  $\pm 50\%$  of the sensitivity range.

With options GSV-1H and GSV-1A the zero balancing accounts for  $\pm 100\%$  of the nominal sensitivity in every amplification level (2mV/V or 3.5mV/V).

The range for the zero balancing does not get reduced when the amplification is increased.

The GSV-1 can supply up to 4 parallel-connected weighing cells with 350 ohm bridge resistance each and is therefore eminently suitable for applications in weighing technology. The option GSV-H can supply for 8 weighing cells with 350 ohm bridge resistance.

Die Leiterkarte GSV-1L misst nur 30mm x 40mm x 6,5mm und kann aufgrund der Stiftleisten leicht als Aufsatz in größere Leiterplatten integriert werden.

The GSV-1L printed circuit board measures just 30mm x 40mm x 6.5mm and can easily be integrated as an add-on in larger PCBs thanks to the the pin strips.

The top hat rail housing GSV-1H for mounting rails according to EN50022 is just 12.5mm wide and 114.5mm long.

The measuring amplifier GSV-1HSW additionally contains two threshold value sensors with a relay and a peak value store. The thresholds are set either from front-side spindle trimmers or connectable remote potentiometers.

The measuring amplifier GSV-1A has a robust aluminum pressure-cast housing in environmental protection rating IP66. There is a light cast-plastic housing GSV-1M in IP66 available for portable applications.

For multi-channel applications for stress analysis with strain gages, in addition, we also offer affordable 8-channel devices with analog outputs.

## Models

Characteristic data for all versions (basic equipment)	Voltage supply 12V or 24V DC output signal $\pm 5V$ limiting frequency 250Hz optionally 2.5kHz or 10kHz; remote controllable null balancing above 2mV/V; input sensitivity 2mV/V, optionally 3.5mV/V or 1mV/V	GSV-1L, GSV-1H, GSV-1HSW, GSV-1A GSV-1M GSV-1T8 GSV-1A8
L-Version:	Printed circuit board LxBxH 30mm x 40mm x 6,5mm; 2 gold-plated pins, 8-pole	GSV-1L
A-Version	Aluminum die-cast housing LxBxH 64mm x 58mm x 34mm 4 amplification stages (1x-2x-4x-10x) and trimmer (1x...10x) $\pm 5V$ , $\pm 10V$ , 4...20mA, 0...20mA	GSV-1A Option xV: remote controllable amplification switching Option 718: plug connection
M-Version	Cast housing, IP67 cast printed circuit board in module housing 55mm x 36mm x 17mm with miniature round plugs type 718 $\pm 5V$	GSV-1M
H-Version:	Top hat rail housing BxLxH 12.5mm x 114.5mm x 99mm; 4 amplification stages (1x-2x-4x-10x) and trimmer (1x...10x) $\pm 5V$ , $\pm 10V$ , 4...20mA, 0...20mA	GSV-1H amplification switching Option TR: stepless amplification setting via trimmer potentiometer
HSW-Version:	Top hat rail housing BxLxH 25mm x 114.5mm x 99mm; 4 amplification stages (1x-2x-4x-10x) peak value store, 2 threshold values with relay (8A), sensor output for potentiometer setting 0...1 Volt, output signal 0...+5V	GSV-1HSW Option EP: external potentiometer connectable for adjusting the threshold values
T-Version, 8 channels	Table top housing BxLxH 158mm x 199 x 62mm 8 measuring channels, front side 15 pole Sub D input socket, rear side BNC socket, external power supply, zero-setting button, output signal $\pm 5V$	GSV-1T8 Option AD: 37-pole Sub-D socket for connecting with AD insertable card
A-Version, 8 channels	Aluminum portable housing, IP65 BxLxH 169mm x 100 x 52mm 8 measuring channels, front side 4 pole sockets type 718, rear side 9-pole Coninvers socket, external power supply, zero-setting button, optionally with handle output signal $\pm 5V$	GSV-1A8

## Technical Data

Design	GSV-1	Unit
<b>Accuracy class</b>	0.1	
Measurement range	±2 optional ±1.0 and ±3.5	mV/V mV/V
Connectable full bridges	4 x 350 (87) up to 1 x 5000	Ohm
Bridge supply voltage	5	V
Input impedance	> 20 / 300pF	MOhm
Linearity deviation	< 0.02	% v.E.
Temperature influence on the zero point per 10K referred to the measurement range (v.E.)	< 0.2 typ. 0.05	% v.E. % v.E.
Temperature influence on the measuring sensitivity per 10K referred to the measured value (v.S.)	< 0.1 typ. 0.05	% v.S. % v.S.
Output filter, analog output 3dB limiting frequency analog, Bessel, 2 <sup>nd</sup> order	250 (20) (2k5) (10k)	Hz
Resolution	>20000 parts	
<b>Analog output</b>		
Nominal range	±5	V
Operating range	-6 ...+7.5	V
Output resistance	47	Ohm
optional for GSV-1H	±10V, 4...20mA, 0...20mA	
<b>Operating voltage</b>	GSV-1A / GSV-1A:	
Nominal range	12.0...24	V
Operating range	10.5...28	V
Nominal range	GSV-1L: 10,5...16 or 18...28	V
<b>Current consumption</b>		
GSV-1L, GSV-1M	approx. 36	mA
GSV-1H	55...75 for option 4...20mA	
GSV-1HSW	approx. 90	
<b>Zero balancing</b>		
Tolerance	< 5, typ. < 2.5	mV
Duration	< 90	ms
Triggering on falling edge after at least 4ms High-level (3,5V ... 30V or supply voltage)		
<b>Memory</b>	last zero point	
Nominal temperature range	-10...+65	°C
Storage temperature range	-40...+85	°C
<b>Amplification stages</b>		
for GSV-1H and GSV-1HSW	1x, 2x, 4x, 10x (2, 1, 0.5 0.2)	mV/V
<b>Switch thresholds</b> for GSV-1HSW	3 to 95	% v.E.
Switching hysteresis	2.5	%v.E.
Sensor output for potentiometer position	0.03...1.0	V
<b>Peak value memory</b> for GSV-1HSW		
Rise time:	< 50	µs/V
optionally for 10.000Hz:	< 25	µs/V
Drift of the peak value:	< 0.1	%v.E./s

## Top hat rail housing GSV-1H

The measuring amplifier GSV-1H is available with voltage outputs  $\pm 5V$ ,  $\pm 10V$  and current output 4...20mA.

The force sensor is connected to terminals 1 to 4.

The voltage supply (11-28V) is connected to terminal 5 and 8 (ground).

For zero setting, terminal 6 is connected to the mains supply or a control signal between 5 and 24 volts is applied.

The amplification can be switched 1-2-4-10-times with internal jumpers.

If the input signal is negative, output follows up to 0mA the input signal, beyond it remains at 0mA.

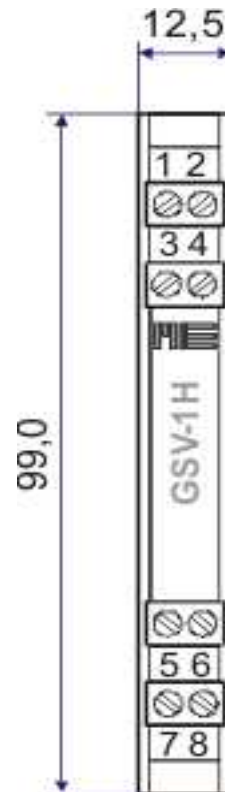
### Pin Configuration

Pins				
1 / 2	+U <sub>S</sub>	-U <sub>S</sub>	Bridge supply (for sensor input, "excitation", "input")	
3 / 4	+U <sub>D</sub>	-U <sub>D</sub>	Differential input (for sensor output "output", sensor signal)	
5 / 6	+U <sub>B</sub>	Tara	DC voltage supply +12V or +24V	Steuereingang Nullabgleich
7 / 8	U <sub>A</sub>	GND	Analog output	Masse

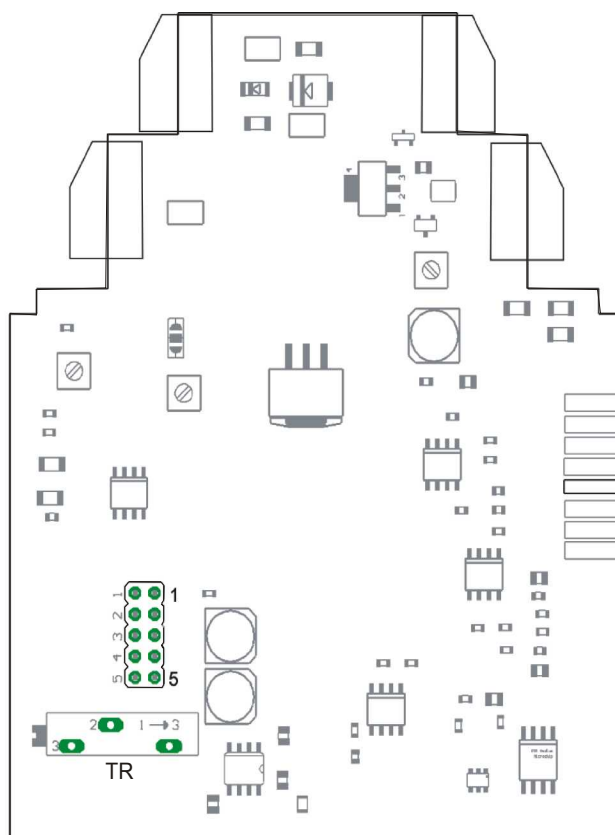
Note: The ground of the voltage supply is connected to terminal 8.

### Dimensions

GSV-1H:  
Depth: 114.5mm  
for installation on mounting rails according to  
EN50022



## Adjustment of Input Sensitivity



Input sensitivity can be adjusted by relocating the jumper. Input sensitivity for position 1 is given in the type designation. With position 5 amplification can be adjusted continuously by the trimmer "TR".

Position	Amplification factor	Output voltage at sensitivity option 2 mV/V		Output voltage at sensitivity option 3.5 mV/V	
1	1	±5 volts at ±2 mV/V		±5 volts at ±3.5 mV/V	
2	2	±5 volts at ±1 mV/V	±10 volts at ±2 mV/V	±5 volts at ±1.75 mV/V	±10 volts at ±3.5 mV/V
3	4	±5 volts at ±0.5 mV/V	±10 volts at ±1 mV/V	±5 volts at ±0.875 mV/V	±10 volts at ±1.75 mV/V
4	10	±5 volts at ±0.2 mV/V	±10 volts at ±0.4 mV/V	±5 volts at ±0.35 mV/V	±10 volts at ±0.7 mV/V
5	1...10	±5 volts at ±0.2...2 mV/V	±10 volts at ±0.4 ...2 mV/V	±5 volts at ±0.35...3.5 mV/V	±10 volts at ±0.7 ...3.5 mV/V

## Top Hat Rail Housing GSV-1HSW



The measuring amplifier GSV-1H is equipped with a voltage output and a current output. It is provided with two threshold switches with a relay and a very fast peak value storage for signals up to 2.5kHz (optionally 10kHz)

The bridge excitation of the measuring amplifier (terminal 1 and 2) is connected with the sensor input.

The differential input of the measuring amplifier (terminal 3 and 4) is connected with the sensor output (output).

The supply voltage is connected on to terminal 11 and 8 (ground).

For automatic zero adjustment and resetting the peak value storage terminal 9 is connected with the supply voltage or else a control signal between 5 volts and 24 volts is fed in. In this way the zero point of the force sensor will be balanced and the peak value storage will be reset to zero.

Through internal jumpers the amplification can be switched 1-2-4-10-times larger. At the voltage output (terminal 6) a signal in the range between -5 volts to +10 volts is provided.

At terminal 5 an output 4...20mA is provided. The calibration at the plant of the GSV-1HSW is carried out optionally for the output 4...20mA (terminal 5) or for the voltage output (terminal 6),

Thresholds for relay contacts 1 and relay contacts 2 are adjusted by a front side trimmer. The pins F1 and F2 serve for measurement of the selected threshold value or for connection of external potentiometers if option EP was chosen.

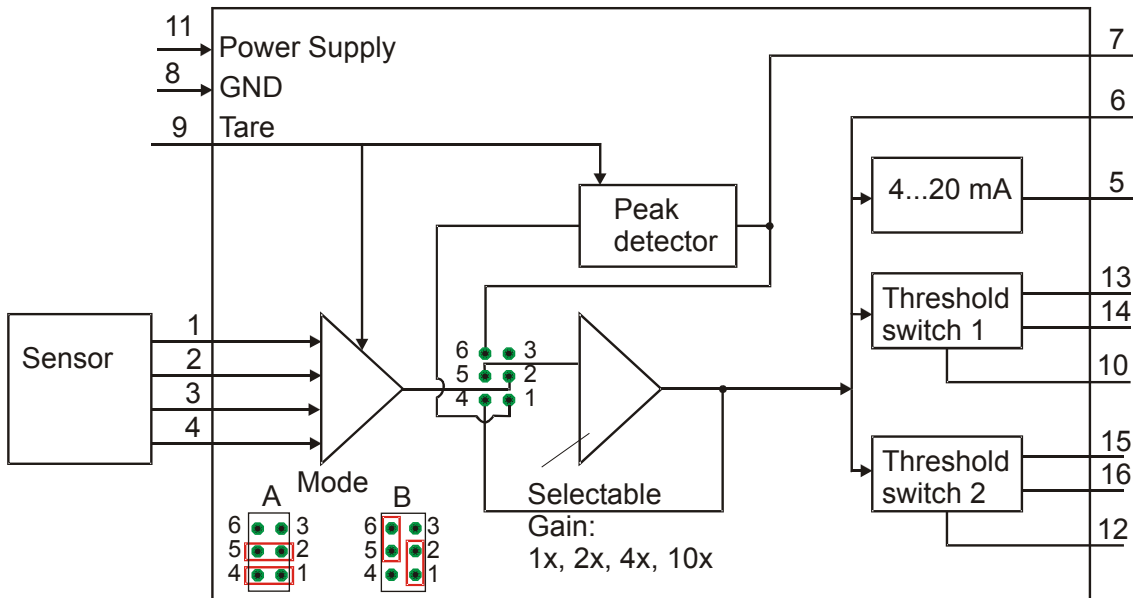
Threshold values can be set within 3%...100% of the measurement range. Switching hysteresis is 2.5% of the measurement range.

At outputs F1 and F2 voltages of 0.03 volts up to 1 volts are detected.

Below the switching thresholds the relays are in the working state, the relay contacts are opened. The corresponding light-emitting diodes (LED) light below the switching thresholds.

On exceeding the thresholds or with the failure of the supply voltage  $U_B$  the relay contacts close. The exceeding of the threshold is signalled by the switching off of the LED. Special variants as U/I-converters or peak value display with voltage input 0...5V are optionally available.

## Functional Diagram



Through the layout of jumpers two operating modes ("A" and "B") can be selected:

**Mode "A"** : (actual value-mode)

Signal-sequence: Amplification, peak value storage

The threshold indicator reacts to the actual value.

The actual value is shown on terminal 6.

The peak value is shown on terminal 7.

**Mode "B"**: (Peak value-mode)

Signal-sequence: Peak value storage, amplification

The threshold indicator reacts to the peak value.

The peak value is indicated (with the amplification selected) on terminal 6.

At terminal 7 the peak value with the amplification "1" is indicated.

**The maximum output voltage on the peak value display (terminal 7) is limited to 5 volts. The maximum output signal on terminal 6 amounts to +10 volts.**

## Pin Configuration

Terminal	Designation				Description			
	$-U_S$	$+U_S$	$+U_D$	$-U_D$	bridge supply $U_S$		Differential input $U_D$	
1 / 2 / 3 / 4								
5 / 6 / 7 / 8	$I_A$ 4...20mA	$U_A$ $\pm 5V$	$U_M$ 0..5V	GND	output signal current	output signal voltage	peak value output	Ground
9/10/11/12	Tare	F1	$U_B$	F2	tare	sensor 1	DC voltage supply	sensor 2
13/14/15/16	K1	K1	K2	K2	Relay contacts 1		Relay contacts 2	

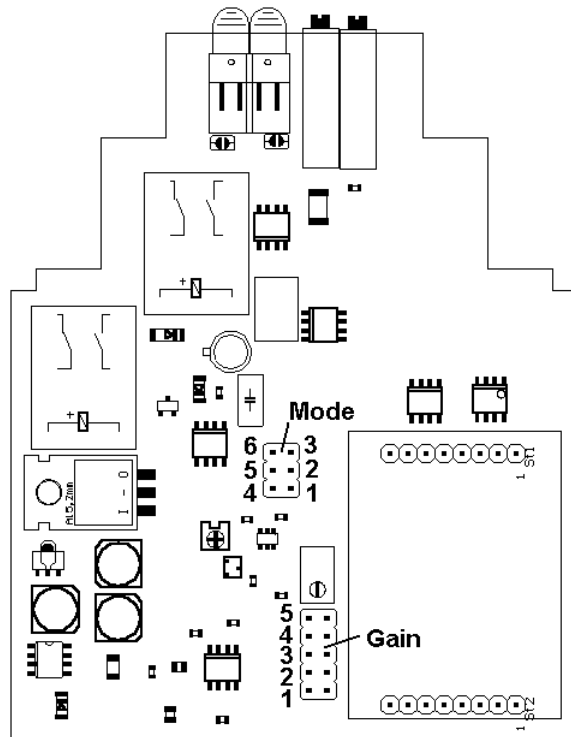
Note: The ground of the supply voltage **and** the ground of the output signal are connected to terminal 8.

## Adjustment of Input Sensitivity

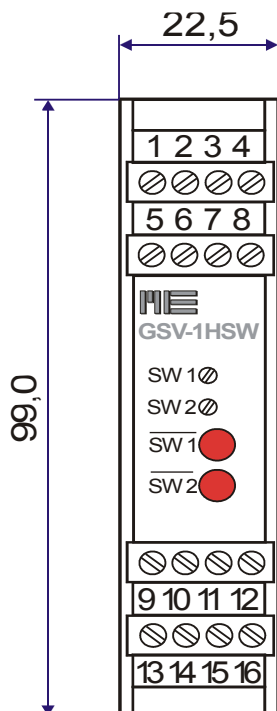
The input sensitivity can be adapted by displacement of the jumper. The input sensitivity for position 1 is indicated in the type designation.

Position	Input sensitivity in mV/V		Amplification factor	Output voltage	
1	2	3.50	1	5 volts at 2 mV/V	
2	1	1.75	2	5 volts at 1 mV/V	10 V at 2 mV/V
3	0.5	0.88	4	5 volts at 0.5 mV/V	10 V at 1 mV/V
4	0.2	0.35	10	5 volts at 0.2 mV/V	10 V at 0.4 mV/V
5	0.5...1.95	0.88...3.33	1.05...4		

## Layout of Jumpers



## Dimensions



Depth: 114.5mm;  
for mounting on carrying rails according to EN50022;

On exceeding the threshold value or with the failure of the supply voltage  $U_B$  the relay contacts close. The exceeding of the threshold value is signalled by the switching off of the LED.

## Option EP (cConnection of an External Potentiometer)

The external potentiometers (1kOhm, 0.25 Watt) are connected between F1 or F2 and the ground.

They are for the setting of the threshold values.

#### Notes

- a) The voltage output 0...10V is realised with the amplification level "2".
- b) In the standard design the device is equipped with a Bessel-filter 2<sup>nd</sup> order, 250 Hz.
- c) The calibration by the manufacturer is carried out either for the current output or for the voltage output.

## Aluminum housing GSV-1A

The measuring amplifier GSV-1A is available with voltage outputs  $\pm 5V$ ,  $\pm 10V$  and with current output 4-20 mA.

The force sensor is connected to terminals 1 to 4.

The voltage supply (11-30 volts) is connected to terminal 7 and 5 (ground).

For zero setting, terminal 8 is connected to the voltage supply or a control signal between 5 volts and 24 volts is applied.

Amplification can be switched 1-2-4-10-times by means of jumpers.



## Pin Configuration

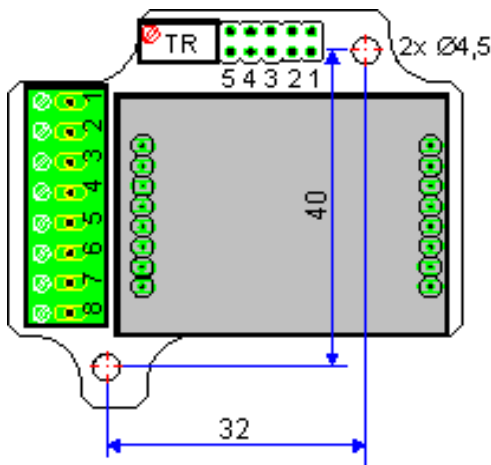
Terminals	
1	- $U_D$ : negative differential input
2	+ $U_D$ : positive differential input
3	+ $U_S$ : positive bridge supply (5V)
4	- $U_S$ : negative bridge supply (GND)
5	GND : ground
6	+ $U_A$ : analog output
7	+ $U_B$ : voltage supply (12V or 24V)
8	T: control input, zero balancing

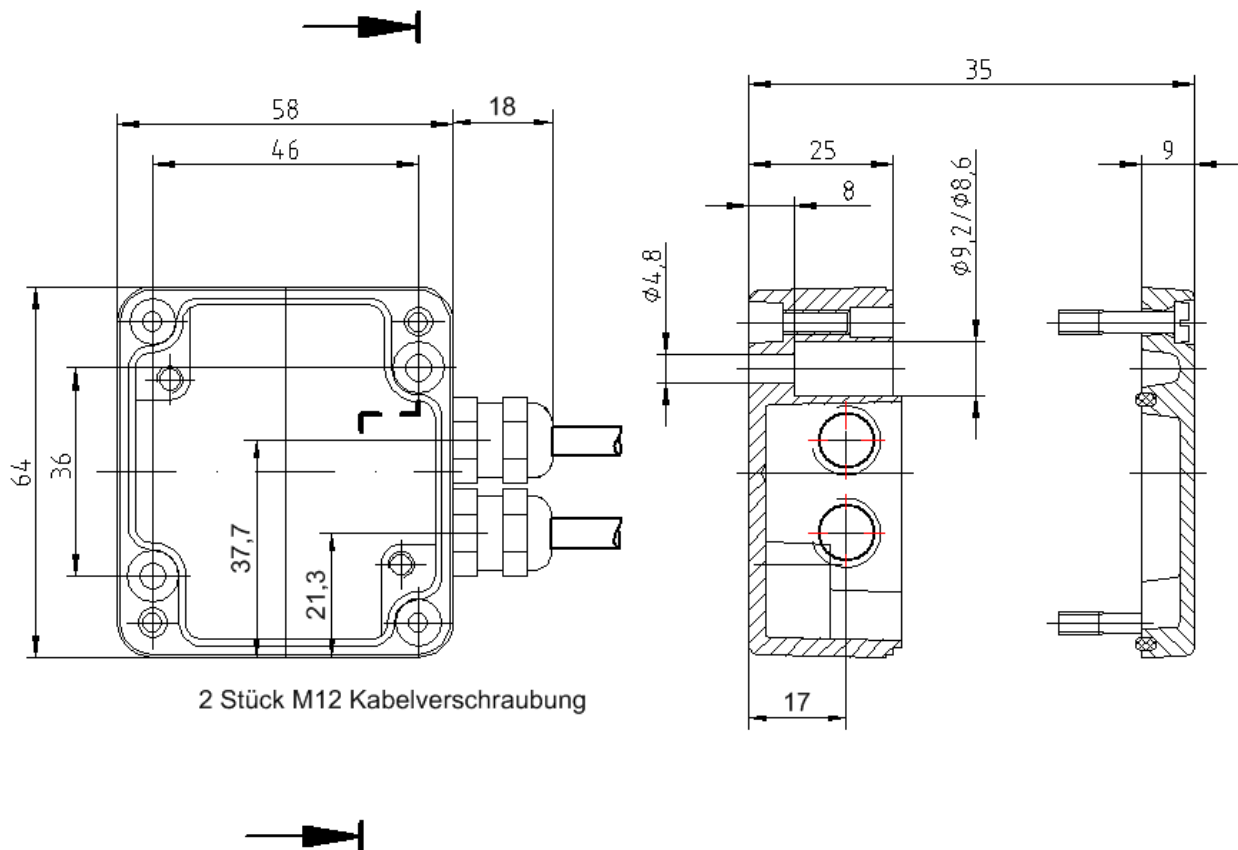
## Adjustment of Input Sensitivity

The input sensitivity can be adjusted by moving the jumper. The input sensitivity for position 1 is specified in the type designation. In position 5, the amplification can be steplessly adjusted with the Trimmer "TR".

Position	Amplification factor	Output voltage at sensitivity option 2 mV/V		Output voltage at sensitivity option 3.5 mV/V	
1	1	±5 volts at ±2 mV/V		±5 volts at ±3.5 mV/V	
2	2	±5 volts at ±1 mV/V	±10 volts at ±2 mV/V	±5 volts at ±1.75 mV/V	±10 volts at ±3.5 mV/V
3	4	±5 volts at ±0.5 mV/V	±10 volts at ±1 mV/V	±5 volts at ±0.875 mV/V	±10 volts at ±1.75 mV/V
4	10	±5 volts at ±0.2 mV/V	±10 volts at ±0.4 mV/V	±5 volts at ±0.35 mV/V	±10 volts at ±0.7 mV/V
5	1...10	±5 volts at ±0.2...2 mV/V	±10 volts at ±0.4 ...2 mV/V	±5 volts at ±0.35...3.5 mV/V	±10 volts at ±0.7 ...3.5 mV/V

## Dimensions





#### Option 718 (plug)

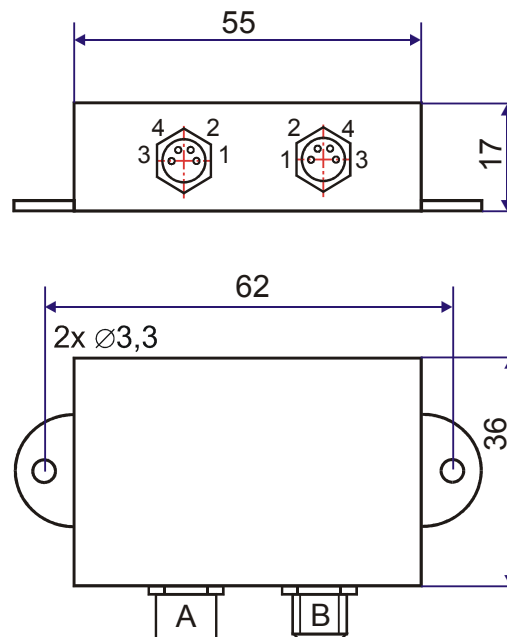
The measuring amplifier GSV-1A is also supplied with plugs of type type 718. The pin configuration is the same as that of module housing GSV-1M.

## Module housing GSV-1M

The measuring amplifier GSV-1M is available with voltage outputs  $\pm 5V$  and  $0...10V$ . It is completely cast. The method of protection is IP67. There are two 4-pole round plugs, type 718, available for connecting.

The force sensor is connected to Pin 1 to 4 or the round plug connector A (socket). The voltage supply, the analog output and the taring input are connected to the round plug B (pin contacts). For zero-setting, Pin 4 is connected to the voltage supply Pin 1 or a control signal between 5 Volt and 24 Volt is applied.

## Dimensions



## Pin Configuration

	PIN No.		
B Pin contacts	1	+U <sub>B</sub> supply voltage	brown
	2	+U <sub>A</sub> Analog output	white
	3	GND: ground	blue
	4	T. control input, null balancing	black

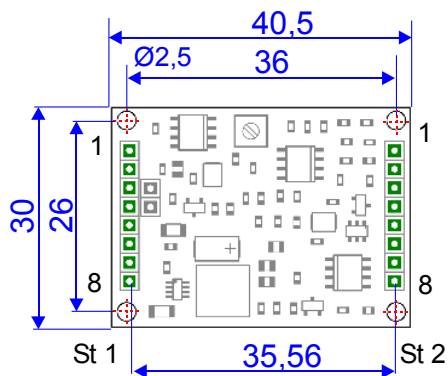
	PIN No.		
A Spring contacts	1	+U <sub>S</sub> positive bridge supply	brown
	2	-U <sub>S</sub> negative bridge supply	white
	3	+U <sub>D</sub> positiver differential input	blue
	4	-U <sub>D</sub> negativer differential input	black

## Printed Circuit Board GSV-1L

### Pin Configuration

St 1		St 2	
1	-U <sub>D</sub> : negative differential input	1	+U <sub>B</sub> : voltage supply
2	+U <sub>D</sub> : positive differential input	2	GND : ground
3	+U <sub>S</sub> : positive bridge supply	3	+5V stabilized
4	-U <sub>S</sub> : negative bridge supply (GND)	4	internally reserved
5	GND : ground	5	internally reserved
6	+U <sub>A</sub> : analog output	6	optional +8 volts stabilized
7	+U <sub>B</sub> : voltage supply	7	optional -7 volts
8	T: control input zero balancing	8	T: control input, zero balancing

### Dimensions



v: resistance for determining the input sensitivity  
 a: short-circuit bridge for determining the supply voltage (12V DC or 24V DC)