Strain Gage Measuring Amplifier GSV-3

ME-Meßsysteme GmbH, Neuendorfstr. 18b, D-16761 Hennigsdorf
Tel 03302 559 282, Fax: 03302 559 141, info@me-systeme.de, www.me-systeme.de

Strain Gage Measuring Amplifier GSV-3

Description

This measuring amplifier can be adapted for almost any application with strain gages. The core is formed by a printed circuit board of only 30mm x 15mm, which already provides all essential functions of a modern measuring amplifier: analog output, 16 bit A/D-transformer with serial interface, adjustable digital filter, threshold output, trigger input, taring function.

The housed variants contain support boards, which provide different interfaces and data protocols.

As with the models GSV-1 and GSV-2 this measuring amplifier also has automatic zero balancing, which can be triggered through a control line.

The 16-bit A/D transformer operates with an internal measuring frequency of maximum 10kHz.
The models GSV-2 and GSV-3 contain a largely compatible command set. The Windows DLL "MEGSV" can be used with both models, whereby even existing applications can be adapted with very few alterations to the new GSV-3.

The printed circuit board GSV-3LS stands out on account of:
- ✔ low supply voltage of 5.6 volts or optionally 5.0 volts,
- ✔ low power consumption of maximum 24 mA with maximum data frequency with 350 Ohm strain gage,
- ✔ high data frequency of up to 1220 measured values per second,
- ✔ high measuring resolution and programmable filters,
- ✔ analog output 0...5 volts (zero point at 2.5 volts, output signal ±2.25 volts),
- ✔ one switching output, configurable to threshold monitoring or as window comparator,
- ✔ two digital in-/outputs.

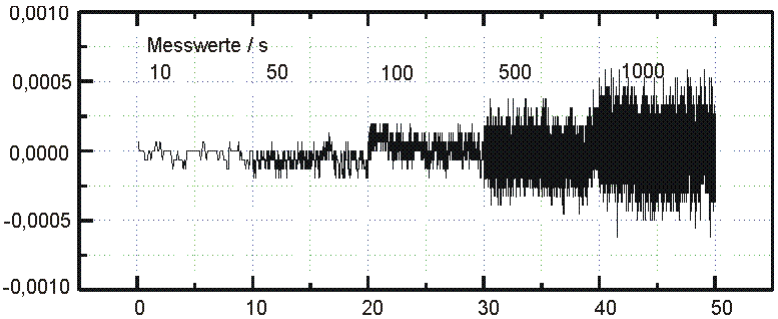
The filter of the analog output has a cut-off frequency of 1250 Hz, (3dB, Bessel 3rd order).
The analog output is provided with automatic zero balancing, which is triggered by a control impulse (TTL level up to 30 volts).
The amplification of the analog output is adapted by replacement of resistances.

The model GSV-3AS is optimized for a supply voltage of 2.4 volts. It can therefore be operated with 2 NC mini-batteries (AA) or micro-batteries (AAA). Operation with a supply voltage between 8 volts and 30 volts is also optionally possible. The serial output is either standard RS232 or TTL-RS232. For operation with a data modem an extensive command set is provided, such as e.g. shift between transceiver and receiver, sleep-function for reduction of power consumption with low scanning frequencies, etc.

Models

Characteristic data for all versions (basic equipment)	Output signal 2.5V ±2.25V 16 Bit A/D, TTL-RS232, 2 switching outputs, cut-off frequency 1250Hz optional 2.5kHz or 10kHz; remote control zero balancing over 100%; input sensitivity 2mV/V, optional 3.5mV/V or 1mV/V	GSV-3LS GSV-3AS
LS version:	conductor card LxWxH 30mm x 15mm x 6.5mm; 2 gilded pin strips, 5- and 10-pole, RM2.0	GSV-3LS
AS version	RS232, optional TTL-RS232 Supply voltage 2.4V, optional 8V...30V 2 terminal strips, 6-pole	GSV-3AS
CAN version	Can bus, with galvanic separation, Supply voltage 15...30V 2 terminal strips, 8-pole	GSV-3CAN
USB version	USB 2 optional as 1-channel or 2-channel model	GSV-3USB and GSV-3USBx2

Measurement Resolution



Time in s vs. display in mV/V

The reachable ratio signal/noise is dependant on the ambient conditions (cable length, shield), the set data rate and the optionally switched on FIR filter. The diagram shows the resolution with 1m connection cable, measurement range ±2mV/V, FIR filter switched off.

Technical Data

(at nominal operating voltage in the nominal temperature range at 2.5 V bridge supply with 350 ohm strain gage)

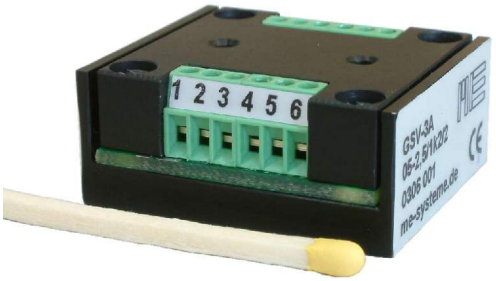
	GSV-3LS	GSV-3AS	Unit
Accuracy class	0.1		%
Measurement range (v.E.)	2 optionally 1.0 or 3.5		mV/V mV/V
Connectable full bridges	1 x 350 [1)]	1 x 350 opt. 1x 1000 opt. 4x 350 [2)]	Ohm
Bridge supply voltage	2.5	2.5 optionally 5.0	V V V
Input impedance	> 20 / 300pF		MOhm
Common mode rejection			
DC	100		dB
100Hz	80		dB
Linearity deviation	< 0.02		% v.E.
Temperature influence on zero per 10K	< 0.1		% v.E.
Temperature influence on measurement sensitivity per 10K referred to the measured value	< 0.1		% v.S.
Output filter			
Analog output			
3dB limiting frequency analog, Bessel, 3rd order	1.250 optionally 2.500 or 10.000		kHz kHz
Output filter digital	FIR filter + configurable MW filter		
Data frequency	0.00 ... 1,220.00		Hz
Measurement frequency	76.80 ... 10,080.67		Hz
Resolution			
Analog output			
Nominal range	2.5 ±2.25		V V
Operating range	0.01...5.2		V
Output resistance	1	1	kOhm
Zero balancing			
Tolerance	< 5, typ. < 2.5		mV
Duration	< 90		ms
Triggering on falling edge after min. 4ms high level (3.5V ... 30V or supply voltage)			
Switching output S1	TTL level	open collector	

	GSV-3LS	GSV-3AS	Unit
Maximum current:	active high 5 mA	22 mA / 25V	
Switching outputs/-inputs RB0, RB6 Maximum current:	TTL level active high 5 mA	TTL level active high 22 mA / 25V	
Interface: Baud rate Format	TTL-RS232 4,800...115,200 (8N1)	RS 232 4,800...115,200 (8N1) optional TTL-RS232	 Baud
Supply voltage Nominal range	 5.6 ±0,1 optional: 5.0 ±0.1	 2.4 ±0.9 optional: 8.0 ... 20.0 or 4.8	 V DC V DC V DC
Current consumption at nominal operating voltage at 12 volts in sleep mode	 < 24 < 1	 < 84 < 30 < 1	 mA mA mA
Parameter memory	Saving of four complete parameter sets in the EEProm 1. Last setting 2. Manufacturer's setting 3. User 1 4. User 2		
Nominal temperature range	-10…+65	-10…+65	°C
Storage temperature range	-40…+85	-40…+85	°C
Dimensions (L x W x H) PCB Housing	 30 x 15 x 6.5	 35 x 30 x 15	 mm mm
Environmental protection (DIN 40 050)	IP 40	IP54 optionally IP66	

Abbreviations:
v.E. (of final value)
v.S. (of specified value)

1) The bridge supply of GSV-3LS is optimized for 350 ohms strain gages. For operation with 120 ohms or 1000 ohms strain gages adequate models are available.
2) With 2.4V power supply only 1x350 ohms up to 1x5,000 ohms.

Ultra Miniature Measuring Amplifier GSV-3AS



The model GSV-3AS is optimized for a supply voltage of 2.4 volts.
The power consumption is less than 84mA at maximum data frequency with a 350 ohms strain gage. With a 1000 ohms strain gage the power consumption is reduced to approx. 60mA.
Where operated with 2 NC-mini-batteries (type AA, 1000mAh) a running time of at least 11 hours is achieved.
The bridge supply voltage is set to 2.5 volts.

An operation with a supply voltage between 8.0 volts and 20 volts or with 4.8 volts is also optionally possible.

The serial output is either standard RS232 or TTL-RS232. For operation with a radio data modem an extensive command set is provided, such as e.g. shift between transceiver and receiver, sleep function for reduction of power consumption at low scanning frequencies, etc.

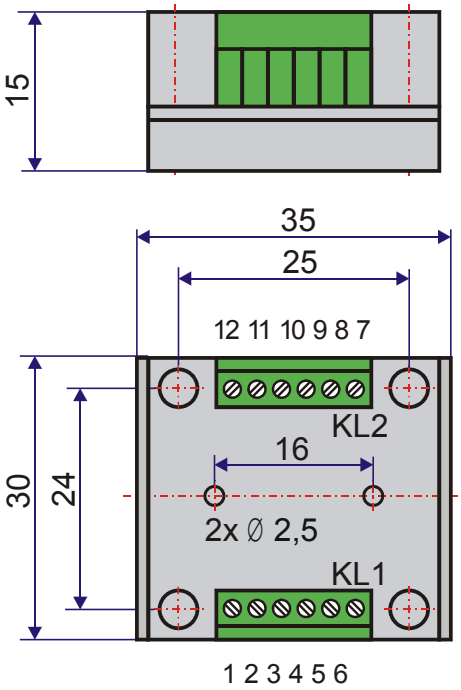
Order designation :

							Options
GSV-3AS	2,5/	1k2/	2/	2,4/	RS232/	2,5	
						Bridge supply voltage 2.5V	5
					Standard RS232		TTL-RS232
				Voltage supply 2.4V			12
			Input sensitivity 2mV/V				1 or 3.5
		Analog filter 1250 Hz					
	Analog output 0...5 V, Zero signal at 2.5 V or 0.01 V						
Amplifier with **A**luminium housing + **S**erial interface							

Pin Configuration

	Terminal 1		Terminal 2
1	RB6	12	$+U_B$: voltage supply
2	$+U_A$: analog output	11	GND: ground
3	$-U_S$: negative bridge supply (GND)	10	S_1: switching output 1
4	$+U_S$: positive bridge supply	9	RxD (to connect to TxD of PC, pin 3)
5	$+U_D$: positive differential input	8	TxD (to connect to RxD of PC, pin 2)
6	$-U_D$: negative differential input	7	T: control input zero balancing

Dimensions



Printed Circuit Board GSV-3LS

The printed circuit board GSV-3LS contains the most important functions of the GSV-3 series.
It is suitable for integration in sensors and electronic circuits with strain gages.
When designing electronic evaluation circuits you simply have to provide switching circuits for the supply voltage and take suitable actions for electro-magnetic compatibility (EMC).
With an operating voltage of 5.6 volts an analog output signal of 0.1 … 4.8 volts is provided. Zero balancing is carried out automatically through the input T at 2.5 volts.
The bridge supply voltage is set to 2.5 volts. The power consumption comes to less than 24mA at maximum data frequency and with a 350 ohms strain gage.

Order designation:

GSV-3LS	2,5/	1k2/	2/	5,6/	**Options**
				Voltage supply 5.6V	5.0
			Input impedance 2mV/V		1 or 3.5
		Analog filter 1250 Hz			2k5 or 10k
	Analog output 0...5 V, zero signal at 2.5 V or 0 V				
Amplifier PCB (**L**eiterplatte) + **S**erial Interface					

For the smallest possible power usage a version for 1000 ohms strain gages is available. It is optimized for a power consumption of maximum 20mA.

Pin Configuration

St1		St2	
1	-U_D: negative differential input	1	GND: ground
2	+U_D: positive differential input	2	+U_B : voltage supply
3	+U_S: positive bridge supply	3	TxD (from GSV-3)
4	-U_S: negative bridge supply (GND)	4	RxD (to GSV-3)
5	+U_A: Analog output	5	T: control input zero balancing
		6	RB0
		7	S_1: switching output 1
		8	RB6

Dimensions