Strain Gage Bridge Amplifier GSV-2

User's Manual

Update 02.01.2007

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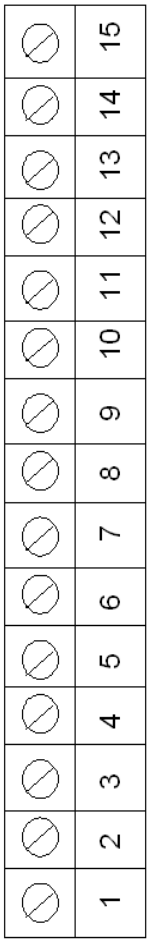
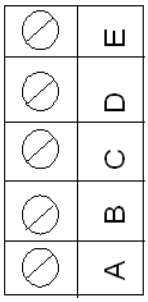
Pin Configuration



GND	: supply ground
UB	: Power supply (12...28V DC)
UB	: Power supply (12...28V DC) 1)
T	: Tara (Offset & Zero) 2)
SW	: Treshold output
GND	: Ground analog input / output
UA	: analog output
UE	: analog input
-US	: negative sensor supply
-UF	: negative sensor supply for 6 wire technology
-UD	: negative difference input
+UD	: positive difference input
+UF	: positive sensor wire for 6 wire technology
+US	: positive sensor supply
GND	: supply ground

RS232 Interface



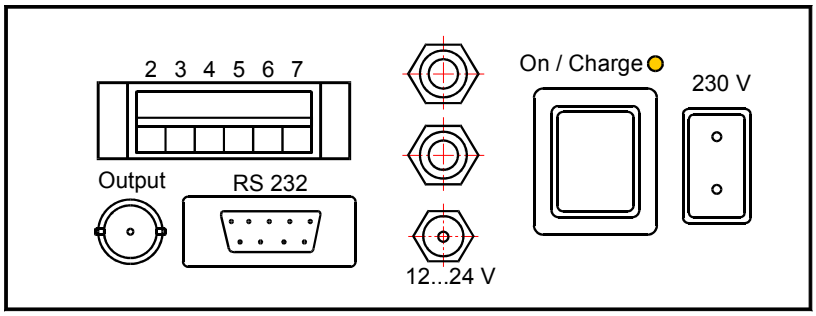
TX+	: Transmit Data + (just for RS422)
RX+	: Receive Data + (just for RS422)
TX-	: Transmit Data -
RX-	: Received Data -
GND	: interface ground

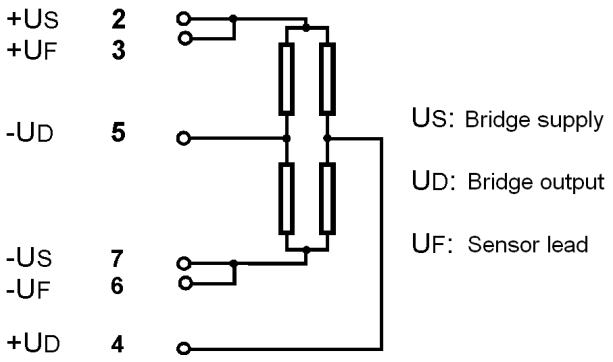
All ground connections (terminals 1, 10, 15 and A) are individually protected in the GSV by means of interference suppressor inductor. Terminals 1 and 15 are connected to the housing via interference suppression inductor. Currents above 1A between the terminals and the housing result in damage to the interference suppression inductor. Before connecting, please check whether housing, supply ground, the ground of your data acquisition system and your port are at the same potential.

1) can be used for sensing supply interruptions
2) In case of voltages above 3.4 V at this connection, a taring process is initiated. Offset balancing is then carried out in the analog part of the GSV. In case of models with a serial port, the digital output is also set to zero in addition.
3) Threshold values are programmed via the RS 232 port; only possible in case of version GSV-2LS and GSV-2AS
4) Wires should not be connected to resist continuous short-circuit, nor with one another, nor with GND or U_B
5) When connecting sensors in 4-conductor technology, the sensor inputs can be connected with the respective neighboring bridge supply; : Terminal 3 to terminal 2 and terminal 6 to terminal 7. However, there is no need for these connections, since the connections are internally bridged with high impedance.

Backplate of the table case (TSD)

Connections on the back plate:

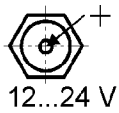


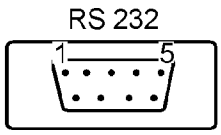


US: Bridge supply

UD: Bridge output

UF: Sensor lead





PC	PIN	GSV	PIN
RX	2	TX	3
TX	3	RX	2
GND	5	GND	5

The connections 2 to 7 of the back plate are reffering to the connections of the connection panel.

To connect theGSV-2TSD via a serial interface from a PC you need a RS232 with two plugs. And you have to cross the connections RX and TX.

We recommend, to connect the shilding of the interface wire of the RS232 or RS422 with the ground connection of the case GSV-2AS.

Connection and start-up

A straingage-fullbridge or a load cell is getting connected to the amplifier as shown below:

4- Wire technology		**6-Wire technology[1]:**	
Sensor supply +	Clip 2	Sensor supply +	Clip 2
Sensor supply -	Clip 7	Sensor supply -	Clip 7
Sensor signal +	Clip 4	Sensor signal +	Clip 4
Sensor signal -	Clip 5	Sensor signal -	Clip 5
		Sense wire +	Clip 3
		Sense wire -	Clip 6

The supply voltage should be connected with the clips 14 (+) and 15 (GND).

The analogue output transmits a signal, which is proportional to the measured force. We offer the GSV-2 with the following options ±5 V, 0...10 V, or 4...20 mA., The output signal can be found at the clips 9 and10 (Ground).

The sensitivity of the amplifier can be changed by removing the Jumper „JP1“ from 2 mV/V[2] to 1 mV/V. The jumper „JP1“ is located on the circuit board, For more detailed informations have a look at the chapter “PCB dimensions of the GSV-2L“.

Connecting the clips 12 and 13 causes a zero-point balancing at the analog and digital output. The analog output delivers a voltage from 0 V or 4mA. The system is then ready for measurements.

If an RS 232 or RS422 port is used, the following connections should be set up to the PC:

GSV-Clip		**Cable type**		**9-pol. Sub-D-Pin (PC-side)**
A	GND	Interface ground	GND	5
B	RX	Data wire	TX	3
C	TX	Data wire	RX	2
D (nur RS 422)	TX+	Data wire	TX+	
E (nur RS 422)	RX+	Data wire	RX+	

The data cables RX and TX between the amplifier are crossed by then.

By starting the configuration mode of the PC, the PC is showing measured values.

1) If the analog output is used, the 6-conductor technology is not supported.

Selection of the input sensitivity

The input sensitivity of the amplifier is in Jumper plug 1 1mV/V and in jumper plug 2 2mV/V or 3,5mV/V, “have a look at chapter GSV-2L“ and a look at discriptions of the settings Set/Get Range.

A sensor with the characteristic value of 1 mV/V delivers in jumper setting1 within a rated load an analog output signal of 5 V or 10 V or 20 mA depending on your order. A sensor with the charcteristic value of 2 mV/V delivers by halv of the normal load, 100% of the output signal .

Attention: After changeing the jumper it is absolutly important to accomplish the calibration function in the card index expert of the configuratin programm GSV Controll.

Zero point balancing

The balancing range of the amplifier is ±120% of the measurment range, so that even significantly asymetric bridges can be balanced.

The operating program of the GSV-2 is going to go through a zero point balncing program itself when there is, at the onput T, a higher voltage level of more than 3,4V reffering to GND. It is permissable to connect the input T with the rating voltage, to go through a zero point balacing program. This voltage has to stay for a minimum of 8 ms to do so.

A voltage level at the input T causes within devices with serial interfaces a combination of an offset balancing and a compensation of the digital output value to “0“. The release of an Offset balance and the setting of the output value to “0“ can be done seperatly via the serial interface.

It takes the GSV-2 approximately 0,12 s for the zero point balancing within devices with an analog filter of 250 Hz and a seted transfer rate of f = 10Hz.

During the balance there is no valid signal at the analog output. The serial data transfer and the checking of the threshold values is deactivated for the period of balancing.

Devices with an analog filter of 2.5 kHz set the zero point within 0.01 s, if the serial data transfer has been set at least to 390 Hz.

Attention: When the so called "Logger-Modus" is activated, and the maximum value mode is inactiv and when there is a high level at the T-input, then there is **NO** balancing; but there will be a measured value via the serial interface instead.

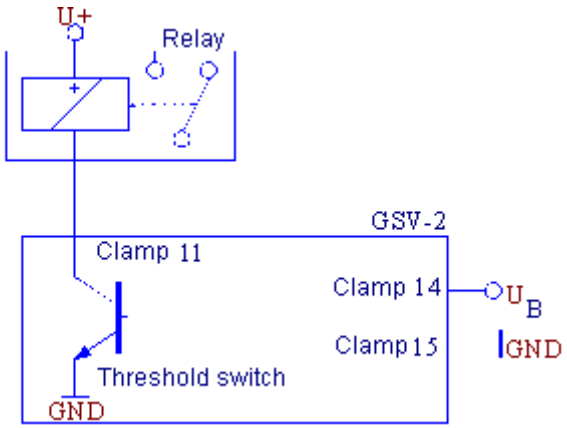
Useing of the switching output

The GSV-2 is equipped with 2 Open-Drain-outputs (clip 11 and 13). These switch thresholds can be set either via the serial port using the configuration program **GSV.EXE** or programmed with the Windows-DLL **MEGSV.DLL**.

The switching output can be optionally used either as a threshold switch or as a window comparator.

The switching on threshold has to get a higher value than the switching off threshold.

The threshold swithch, for example, can be used to operate a relay, by connecting the relay between the positive operating voltage and the threshold value output in the amplifier (clip 11). When the higher, programmed, switch threshold is exceeded, the threshold output switches to ground and opens this contact when the lower switch threshold is undershot. The positive operating voltage at the relay does not have to correspond to the operating voltage of the amplifier.



RS 232/422 Protocol of the GSV-2 Strain Gauge Bridge Amplifier GSV-2

Data output

The GSV is operating at the default settings with a transfer rate of 38400 Baud[1], 1 Startbit, 8 data bits, no Parität und 1 stop bit (8N1).

There are two types of data formats for the output of the measuring values:
1. Binary format
2. Text format
The settings of the data formats are to be done by the software GSV Control.

The GSV transmits, in the normal mode, permanent its measuring values to the serial interface. In the binary format the GSV transmits 5 bytes for every single measuring value.

, (ASCII: 44)	Status	HByte	MByte	LByte

The first byte is used for the synchronization. The status byte transmits information about the status of the GSV's itself. This byte can also be used for special costumer requirements.
Afterwards there are the three data bytes, starting with the-high byte. By this way there were 24 byte transmitted. In the uni-polar-mode the measuring value is equal the data value-zero. In the bi-polar-mode corespondens the measuring value zero the data value 800000 as a hexa dezimal measured value.
At a amplification of 1 mV/V you will get the following datas:

Measured value (hexadezimal)	**Uni-polar**		**Bi-polar**	
00 00 00	0,0	mV/V	-1,05	mV/V
80 00 00	0,525	mV/V	0,0	mV/V
FF FF FF	1,05	mV/V	1,05	mV/V

When another aplification is used, it is nessesery to multiply it with the corespondending factor of proportionality.
The full deflection of 1,05 mV/V was chosen, to show measuring values which are a bit over 1,0 mV/V.

If nessesary you can switch the data output to the **ASCII Format** with the help of the configuration program **GSV.EXE** or with Windowas-DLL (or with the firmware-command Set Mode, 38d) . The output recommands to the displayed values and it also can be shown with a terminal program.
In the default settings the data format is:
sign, 6 numbers dezimal point, free space, unit, CR, LF
for example

```
+1.2345 kgCRLF
```

Attention: If the unit is switched off (with the command number 15, setunit), then the output end shut down with „space“ and CRLF: **+1.2345 CRLF**

1 1) The baudrate can be changed , SetBaud Page 29

Display settings

At the binary coded data prtocoll the measured values are getting standardized to ± 1 transmitted.
The display values are a result of the faktor of standadization x measured value. The factor of standardization can be set by the command “setNorm“ or with the configuration program.
This is the formular to calculate the factor of standization:
factor of standization= input sensitivity / rated output * normal load.

Example:
normal load of the load cell: 100kg
rated output of the load cell: 2 mV/V
Input sensitivity of the strain gauge amplifier: 2 mV/V
==> factor of standardization = 100

Output of the register data

After requesting the data the datas are getting sended devided by a simicolon. 2 to 8 data bytes are getting transmitted depending on the range of the register. You recive the following format:

for 3 Bytes:	**;** (ASCII: 59)	HByte	MByte	LByte
for 2 Bytes:	**;** (ASCII: 59)	HByte	LByte	

Commands to the GSV-2

Commands to the GSV are in the following format:

Operating number	P1	P2	P3	P4

The operating number followed by the parameters P1…P4, is sended. The number of the demended parameters is varying with the operating number and is between 0 and 4.

Table of commands

Operating No.	Operating No. (Hexadezimal)	Command name	Number of parameters	Number of the from GSV sended data bytes
0	0	reset status	0	0
1	1	read scale	0	3
2	2	read zero	0	3
3	3	read control	0	3
4	4	read offset	0	2
5	5	write scale	3	0
6	6	write zero	3	0
7	7	write control	3	0
8	8	write offset	2	0
9	9	get all	1	0
10	A	save all	1	0
11	B	set cal	0	0
12	C	set zero	0	0
13	D	set scale	0	0
14	E	set offset	0	0
15	F	set unit	1	0
16	10	set norm	3	0
17	11	set dpoint	1	0
18	12	set frequency	2	0
19	13	set gain	1	0
20	14	set bipolar	0	0
21	15	set unipolar	0	0
22	16	***Read frequency***	0	3
23	17	*Manufacturer setting*		
24	18	*Manufacturer setting*		
25	*19*	*Manufacturer setting*		
26	1A	get norm	0	3
27	1B	get unit	0	1
28	1C	get dpoint	0	1
29	1D	switch	1	0
30	*1E*	*Manufacturer setting*		
31	1F	get serial number	0	8
32	20	set threshold1	4	0
33	21	get threshold1	0	4
34	22	set channel	1	0
35	23	stop transmission	0	0
36	24	start transmission	0	0
37	25	clear buffer	0	0
38	26	set mode	1	0
39	27	get mode	0	1
40	*28*	*Manufacturer setting*		
41	29	get equipment	0	1
42	2A	*Manufacturer setting*		
43	2B	firmware version	0	2
44	*2C*	set gauge factor	2	0
45	*2D*	get gauge factor	0	2
46	*2E*	set poisson	1	0
47	*2F*	get poisson	0	1
48	*30*	set bridge type	1	0
49	*31*	get bridge type	0	1
50	*32*	*Set Range*	1	0
51	*33*	get range	0	1
52	*34*	*Reseriviert*		
53	35	get offset wait	0	1
54	36	get options	0	3
55	37	*reservated*		
56	38	*reservated*		
57	39	*reservated*		
58	3A	*reservated*		
59	3B	get value	0	5 [2]

Operating No.	Operating No. (Hexadezimal)	Command name	Number of parameters	Number of the from GSV sended data bytes
60	3C	clear maximum value	0	0
61	3D	set Digits	1	0
62	3E	get Digits	0	1
63	3F	*reservated*		
64	40	*reservated*		
65	41	*Get Channel*	0	1
66	42	*Get Last Error*	0	1
67	43	*Set Second Threshold*	4	0
68	44	*Get Second Threshold*	0	4
69	45	*Get Device Type*	0	1
70	46	calc norm	0	0
128	80	Reserviert		
129	81	Get TXmode	0	1
130	82	Set Baud[3]	1	0
131	83	Get Baud	0	1
132	84	*reservated*		
133	85	*reservated*		
134	86	*reservated*		
135	87	*reservated*		
136	88	Set Special Mode	2	0
137	89	Get Special Mode	0	2
138	8A	Write Sampling Rate	3	0
139	8B	Read Sampling Rate	0	3
140	8C	*reservated*		
141	8D	*reservated*		
142	8E	*reservated*		
143	8F	*reservated*		
144	90	Set Analogue Filter	2	0
145	91	Get Analogue Filter	0	2
146	92	Switch Blocking	3	0

2 At a normal version with binary output

3 This command can just be done with installed configuration jumper.

Description of commands

Comment: For most in this chapter discribed commands are operating proclamations with the same name of a Windows-DLL (it is discribed in the procession manual). There are useful tips to understand the RS 232-commands below.

reset status
Operating number: 0
number of parameters: 0
from the GSV sended bytes: 0

Reset status: resets the amplifier status and the error code (status=0).
Possible error codes: 0x00

read scale
operating number: 1
Number of parameters: 0
From the GSV sended bytes: 3

Read scale determineds the content of the scale-registers of the GSVs. You can save the seen value on your pc and you can restore it with the help of *write scale*.
Possible error codes: 0xA0, 0x91

read zero
operating number: 2
number of parameters: 0
From the GSV sended bytes: 3

Read zero determineds the content of the zero-registers of the GSVs. You can safe the seen value on your pc and restore it afterwards with the help of ***write zero***
possible error codes: 0xA0, 0x91

read control
operating number: 3
number of the parameters: 0
From the GSV sended bytes: 3

Read control determineds the current configuration of the GSV. The returned bytes consists of coded channel, dadta rate, kind of operation, polarity as well as aplifiering of the AD-transmitter. The recived value can be sended back with *write control to the transmitter*.
Possible error codes: 0xA0, 0x91

read offset
Operation number: 4
number of parameters: 0
From the GSV sended bytes: 2

Read offset determinds the offset setting of the preamplifier. The recived value can be sended back with ***write offset*** to the GSV.
Possible error codes: 0xA0, 0x91

write scale
operation number: 5
number of parameters: 3
From the GSV sended bytes: 0

Write scale sets the input sensitivity of the AD converter. The transmitted 3 bytes should get a value, which was recently determined with ***read scale***.

Affected register: Scale.
Range of values: 0x20.00.00..0xFF.FF.FF
possible error codes: 0xA0, 0x55,0x71

write zero

Operation number 6
number of prameters: 3
From the GSV sended bytes: 0

Write zero sets the zero balancing of the AD-converter. The transmitted 3 bytes have to get a value, which was recently determined with ***read zero***.

Affected register: Zero.
Rabge of values: 0x00.00.00..0xFF.FF.FF
possible error codes: 0xA0,0x71

write control

Operation number: 7
Number of parameters: 3
From the GSV sended bytes: 0

Write control resets the configuration, which was determined with ***read control*** before. The kind of operatin, polarity, amplifikation and Notch-frequenz are getting set.

Affected register: Channel, frequenz, gain, bi-polar/un-ipolar.
Range fo values: 0x00.00.00..0xFE.76.FF
possible error : 0xA0,0x53,0x54,0x58,0x71

write offset

Operation number: 8
Number of parameters: 2
From the GSV sended bytes: 0

Write offset sets the Offset configuration of the preamplifier. The transmitted parameters correspond to the values, which were recently determined with ***read offset***.

Remarks: Just the commands ***write offset*** and ***set offset*** are affecting the analog output.

Affected register: Offset.
Range of values: 0x00.00..0x0F.FF
possible errorcodes: 0xA0,0x54,0x71

get all

Operating number: 9
Number of parameters: 1
Fom the GSV sended bytes: 0

Get all resets the konfiguration, chosen by the parameters:

0:	:	Setting before the last turn off
1:	:	Manufacturer presettings
2...7	:	Configurations chosen by the user 1...6

Affected registers: channel, gain, frequenz, offset, zero, scale, threshold.
Range of values: 0x00..0x07
possible error codes: 0xA1,0x54,0x80,0x71

save all

Opertation number: 10
number of parameter: 1
From the GSV sended bytes: 0

Save all saves all relevant registers of the GSV in a intern memory. This datas remain even when the device is turned off. It is possible to save different configurations. After turning on the amplifier 64 memory procedures are possible. The parameter indicates the destination of memorization.

Parameters= 2 to 7: : From the customer seted configuration 1 to 6
The Positons 0 and 1 are not getting programed by the user. On the position 0 the current configuration of the GSV is automaticlly getting saved.
You can load the memorized datas with ***get all***.
Range of values: 0x02..0x07
Possible error codes: 0xA0,0x54,0x55,0x74,0x71

set cal

Operation number: 11
number of parameter: 0
From the GSV sended bytes: 0

Set cal accomplishs a intern sensitivity balnce. After these balnce you are operating with the amplification which ***set gain*** was selecting.

Attention: The calibrations which were done by set scale are getting lost. The analog outout is not affected.

Remark: After this command the GSV is not sending datas for a period of time. For this purpose all data loggers have to be deleted.

Affected registers: Scale.
Possible error codes: 0xA0,0x82

set zero

Operation number: 12
Number of parameter: 0
From the GSV:sended bytes 0

Set zero accomplishs if a sensor is connected a system zero point balancing. The analog output is not affected.

Remark: After this command the GSV is not sending datas for a period of time. For this purpose all data loggers have to be deleted. If Log- and maximum value mode (have a look at ***set mode***) is seted, the latest maximum value is getting transmitted once.

Affected register: Zero.
Possible error codes: 0xA0

set scale

Operation number: 13
Number of parameters: 0
Number of parameters: 0

Set scale accomplishs if a sensor is connected a system sensitivity balancing. In the contrast to ***set scale,*** the sensitivity of the entire system including the connected reciver is getting set. After a zero point balancing with ***set zero*** this operation is able to calibrate the reciverat a full deflection if a normal load is put on it. This command has no affect on the analog output.

Attention: Don't accomplish ***Set scale*** (with a normal load) not before a zero point balncing with***set zero*** (without a normal load).

Remark: After this command the GSV is not sending datas for a period of time. For this purpose all data loggers have to be deleted.

Affected register: Scale.
Possible error codes: 0xA0,0x81,0x83,0x71

set offset

Operation number: 14
number of paramerter: 0
From the GSV sended bytes: 0

Set offset accomplishs a Offset balance of the input stage of the GSV. This balance affects in the contrast of ***set zero*** the analog output of the GSV.

Remark:
While balancing, the GSV is not sending any values.

The collabsed time of the ofset balance can be checkted with ***get offset wait*** or it can be checkted in the technical datas as well.

Affected register: Offset.
Possible error codes: 0xA0,0x83

set unit

Operation number: 15
number of parameter: 1
From the GSV sended bytes: 0

Set unit sets the wanted unit on the LC-display.

0: : mV/V
1: : kg
2: : g
3: : N
4: : cN
5: : V
6: : µm/m
7: : (none)
8: : t
9: : kN
10: : lb
11: : oz
12: : kp
13: : lbf
14: : pdl
15: : mm
16: : m
17: : cNm
18: : Nm

range of value: 0x00..0x12
Possible error code: 0xA0,0x54,0x71

set norm

Operation number: 16
Number of parameter: 3
From the GSV sended bytes: 0

Set norm standerized the on the LC-Display showen value to the transmitted value. The standardization takes place without considering the dezimal point. It has to be set seperatly with set dpoint.

To calculate the parameter value for ***set norm*** the intermediate value dp for the dezimal point has to get calculated first. To do so the log to the base of 10 of the wanted standarized value has to get calculated and round off to whole value.

Afterwards the the wanted standardirized value is devided by 10 to the power of dp.
If tenanswer is higher than 1,6666/1,05 then it has to get divided by 10 again.
And you have to add 1 to the dp.

The so calculated value is getting multiplied by 5250020 and it gets rounded to a whole value. The number will get transmitted in the order Highbyte, Midbyte, Lowbyte to the GSV.
Range of values: 0x10.05.94..0x7F.26.E8
Possible error codes 0xA0,0x54,0x55,0x71

set dpoint

Operation number: 17
Number of parameter: 1
From the GSV sended bytes: 0

Set dpoint sets the dezimal point in the LC-Display to the wanted place. To calculate the parameter value on the basis of a wanted standarized value the latest recived value of the dp from the formula for ***set norm*** is used increased by one and as parameter value for the command ***set dpoint*** gesendet. The setting is just vaild when the parameter value is in the range from 1 to the maximum of 8, this means dpoint is not allowed to be bigger then the setted amount of numbers (have a look at Get Digits)

Absolute range of values: 0x01..0x08
Possible error codes 0xA0,0x55,0x56,0x71

set frequency

Operation number: 18
Number of parameter: 2
From the GSV sended bytes: 0

With ***Set frequency*** the measured data range of the GSV can be set. Frequencies between 0,3125 Hz and 2000Hz can be selected. For example at a data range of 100 Hz, 100 values per second wil be send to the interface. The range of the information signal of the GSV depends on the data range and the settings of analog and digital filter.
Two of the parameter bytes will be transmit. The transmitted register value ***N*** does not consist of the datarate itself. You can get the datarate by the following formula:

$$f_{Data} = \frac{10^7}{512 \cdot N}$$

Attention: After a change of the data rate a balnce with ***set cal*** and ***set zero*** is necessary.

Affected register: Frequenz.
The GSV-21 proves the transmitted value of its range of values and it determines the data range for itself, which is close to the next value. So the data rate is not continious setable a combination of the sampling rate of the AD-converter and a firmware-intern average value will be determined and set in stead.
absolute range of values: 0x00.00..0xFA.12

The acutal range of values of the data range depends on the seted baud rate and and on the data format output.
The following connection is true for:

seted Baudrate (default settings: 38400 Bits/s)	Maxium Data rate Binary output (5 Bytes/measured value) in Hz	Maximum data rate ASCII-output in Hz
4800	90,9	25
9600	181,8	50
19200	333,3	100
38400	625	200
57600	1071	285,7
115200	2000	666,7

Possible error codes 0xA0,0x54,0x58,(0x80),0x71

set gain

Operation number: 19
Number of parameter: 1
From the GSV sended bytes: 0

Set gain sets the amplification of the AD-converter of the GSV compared to the following table, which indicates the finally resulting value of the input sensitivity of the bridge input. **With Gain-Parameter= 2 is the normal-input sensitivity,** it means the amplification of the AD-converter is=1. The gain-register has no affect on the analog output.

Gain Parameter	Amlification of the AD converter	JP1 setting 1	JP1-setting 2 with MB= 2mV/V[2]	JP1-setting 2 with MB= 3,5mV/V [2]
0[1]	0,25	4 mV/V	8 mV/V	14 mV/V
1	0,5	2 mV/V	4 mV/V	7 mV/V
2	1	1 mV/V	2 mV/V	3,5 mV/V
3	2	0,5 mV/V	1 mV/V	1,75 mV/V
4	4	0,25 mV/V	0,5 mV/V	0,875 mV/V
5	8	0,125 mV/V	0,25 mV/V	0,4375 mV/V
6	16	0,0625 mV/V	0,125 mV/V	0,21875 mV/V

Attention: After a change of the amplification a balance with ***set cal*** and ***set zero*** is necessary.

Affected register: Gain.
Range of values: 0x00..0x06
Possible error codes 0xA0,0x54,0x71

set bipolar

Operation number: 20
Number of parameter: 0
From the GSV sended bytes: 0

Set bipolar shifts the GSV in a bipolar mode. Zero reffers to the data value 800000 hexa dezimal.
Possible error codes 0xA0,0x71

set unipolar

Operation number: 21
Number of parameter: 0
From the GSV sended bytes: 0

Set unipolar sets the GSV in the uni polar mode (the measured value 0 correspondents to the data value 0).
Possible error codes 0xA0,0x71

2 Have a look at Set/Get Range
1 The final value of the imput sensitivity can not be reached, because a digital over flow would occur.

Read Frequency

Operation number: 22
Number of parameter: 0
From the GSV sended bytes: 3

The 3 returned parameter of the command ReadFrequency sets the setting of the measured data range.
At the GSV-21 the data range is not absolutly continuous setable (look at *Set Frequency*). The with Read Frequency determined “true” date rate can be a little bit vary from the before determied value(for example with *Set Frequency)*.

The connection for the command 22 is:
Datenrate = 5000000 / (16777216 – Registerwert)
Possible error codes 0xA0,0x91,(0x81)

get norm

Operation number: 26
Number of parameter: 0
From the GSV sended bytes: 3

Get norm determineds the with ***set norm*** seted codation (without the related setting of the dezimal point).
Possible error codes 0xA0,0x91

get unit

Operation number: 27
Number of parameter: 0
From the GSV sended bytes: 1

Get unit determineds the with ***set unit*** seted unit (look at the list of meanigs).
Possible error codes 0xA0,0x91

get dpoint

Operation number: 28
Number of parameter: 0

From the GSV sended bytes: 1*Get dpoint* determineds the with ***set dpoint*** seted dezimal point.
Possible error codes 0xA0,0x91

switch

Operation number: 29
Number of parameter: 1
From the GSV sended bytes: 0

Switch switches the switch output corresponding to the parameter bytes on (1) or off (0). The position of the switch output stays just there, if the measured value – with turned off

range comperation (Fensterkomparator) – between switch threshold is. With ***set threshold*** the thresholds can be set. Thresholds at the measuring range end deaktivating the threshold switch. Now you can use the switch output ***switch*** indipedent from the measured value.
Range of values: 0x00..0x01
Possible error codes 0xA0,0x71

get serial number

Operation number: 31
Number of parameter: 0
From the GSV sended bytes: 8

Get serial number determine the serial number of the amplifier (ASCII character string).
Possible error codes 0xA0,0x91

set threshold1

Operation number: 32
Number of parameter: 4
From the GSV sended bytes: 0

Set threshold1 set the threshold of the amplifier. The first two parameter equivalent to the higher bytes of the switch on threshold, the next two equivalent to the switch off threshold. At first they expect the high gradet byte. The switch on threshold always need to be bigger then the turn off threshold. You can choose the frequency range discriminator With the command **set mode.** In this case, you see the values of the upper and lower switch threshold.
Range of values: 0x00.01.00.00..0xFF.FF.FF.FE
Possible error codes 0xA0,0x56,0x71

get threshold1

Operation number: 33
Number of parameter: 0
From the GSV sended bytes: 4

Get threshold determine the with ***set threshold*** setted switch thresholds.
Possible error codes 0xA0,0x91

set channel

Operation number: 34
Number of parameter: 1
From the GSV sended bytes: 0
Set channel ISet a chanel in which you want the AD- Converter, and restore the for this chanel pre adjusted operating Parameter.
Channel=0 : bridge entrance
Channel=1 : analog-measuring entrance
Range of values: 0x00..0x01
Possible error codes 0xA1,0x54,0x71

stop transmission

Operation number: 35
Number of parameter: 0
From the GSV sended bytes: 0

Stop transmission stop the serial transmission of the measured values. The serial buffer of the GSV will be deleted. This operation status will be lost after turning off the amplifier.
Possible error codes 0xA0,0x71

start transmission

Operation number: 36
Number of parameter: 0
From the GSV sended bytes: 0

Start transmission starts the serial transmission of the values, if they have been stoped with „stop transmission“ before.
Possible error codes 0xA0

clear buffer

Operation number: 37
Number of parameter: 0
From the GSV sended bytes: 0

Clear buffer delete the exitpuffer of the GSV´s.
Possible error codes 0xA0

set mode

Operation number: 38
Number of parameter: 1
From the GSV sended bytes: 0

Set mode configures the GSV for different modes of operation. The setted mode stays even after the turn off. Before you change the mode-register you need to read it with ***get mode***. You can only change bits 1..4. Description of mode-variable:

MSB	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	LSB
Block	x	x	Window-Modus	Log-Modus	Max-Modus	Text-Modus	reserved

Text-modus	= 1:	transmission in Text-Format is aktiv (only values)
Max-Modus	= 1:	maximum value transmission is aktiv
Log-Modus	= 1:	transmission of measured values only by requirement is aktiv
Window-Modus	= 1:	threshold switch acting as frequency range
Block:	=1:	Blocking-Zustand: All Set- Write-commands woll be rejected (read Switch Blocking) **Read only**
x:		do not change because of the possibility of missunderstandings (read GSV mode)

Range of values: 0x00..0x1E

Functions by activating of taringline (Input "T")

	Meßwert senden	Maximalwert senden	Nullabgleich	Maximalwert rücksetzen
Log-Modus= off Max-Modus = off	No (is Constatly sending measured values)	no	yes	no (irrelevant)
Log-Modus = off Max-Modus = on	no	no (is sending constantly max-values)	yes	yes
Log-Modus = on Max-Modus = off	yes	no	no	no (irrelevant)
Log-Modus = on Max-Modus = on	no	yes	yes	yes

Possible error codes 0xA0,0x56,0x59,0x71

get mode

Operation number: 39
Number of parameter: 0
From the GSV sended bytes: 1

Get mode reads the adjusted mode of GSVs, read ***set mode***.
Possible error codes 0xA0,0x91

get equipment

Operation number: 41
Number of parameter: 0
From the GSV sended bytes: 1

Get equipment reads informations about the hardware konfigurations of the GSV I
Description of the equipment-variable:

MSB	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	LSB
x	x	AnaFilt	x	SI	x	ADC	LCD

LCD = 1: Liquid Crystal Display installed
ADC = 1: Analog-Digital-Konverter (always) existing
SI = 1: GSV is intended for use as stretch indicator
AnaFilt: =1: Adjustable similar input filter (available)
x: reserved, not defined
Possible error codes 0xA0,0x91

firmware version

Operation number: 43
Number of parameter: 0
From the GSV sended bytes: 2

Firmware version reads the version-number of the firmwares GSV. By doing this, the first Byte is ten times the version-number. The second byte contains the revision number.
Possible error codes 0xA0,0x91

set gauge factor

Operation number: 44

Number of parameter: 2
From the GSV sended bytes: 0

Set gauge factor sets the K-factor. By using the GSV as a stretch indicator, the saved K factor, of the bridge type, or out of the poisson of the indicating standardisation with ***calc norm*** could be recalculated. It will be transmitted as a whole 2 byte number, it is showing 100 times the K-factor.
Range of values: 0x00.09..0x7F.BC (corresponding K-Factor= 0,09 bis 327,00).
Possible error codes 0xA0,0x54,0x55,0x71

get gauge factor

Operation number: 45
Number of parameter: 0
From the GSV sended bytes: 2

Get gauge factor reads the K-factor with the before named paddern.
Possible error codes 0xA0,0x91

set poisson

Operation number: 46
Number of parameter: 1
From the GSV sended bytes: 0

Set poisson sets the poisson µ. The poisson is important by calculating bridge type with one or two measuring grid which are demandet crosswise. The poisson is handed over as a whole byte. which is 500 times the poisson.
Range of values: 0x00..0xFA (entsprechend 0,000 bis 0,500).
Possible error codes 0xA0,0x54,0x71

get poisson

Operation number: 47
Number of parameter: 0
From the GSV sended bytes: 1

Get poisson read the piosson with the before named pattern
Possible error codes 0xA0,0x91

set bridge type

Operation number: 48
Number of parameter: 1
From the GSV sended bytes: 0

Set bridge type set the bridge type of the straingage-sensor, by taking the display standardization with ***calc norm*** as basis to recalculate.
0: Bridge
1: Half Bridge
2: Quater Bridge
3: Half Bridge with transverse contraction
4: Bridge with transverse contarction

Range of values: 0x00..0x04
Possible error codes 0xA0,0x54,0x71

get bridge type

Operation number: 49
Number of parameter: 0
From the GSV sended bytes: 1

Get bridge type reads the bridge type with the before named codierung.
Possible error codes 0xA0,0x91

Set range

Operation number: 50
Number of parameter: 1
From the GSV sended bytes: 0

if the Jumper JP1 on the circuit board is in position 2, that means if the supply voltage of the sensorbridge is =2,5V, you can choose the input sensitivity of the analog frontends of the amplifier with *Set Range*. The 10 times higher input sensitivity will be transmitted. Valid values are 20d and 35d; corresdonding 2mV/V or 3,5mV/V.
Range of values: 2 reliable values: 0x14 und 0x23
Possible error codes 0xA0,0x50,0x56,0x71

get range

Operation number: 51
Number of parameter: 0
From the GSV sended bytes: 1

Get range reads the seted input sensitivity of the analog input stage of the GSV21, that means that the position of the jumper JP1 can be determined. With the in *range* coded input sensitivity calculates ***calc norm*** the display standardization. *Range* declares 10 times sas much as the full-scale value in mV/V:
10 = 1 mV/V; 20 = 2 mV/V; 35 = 3,5 mV/V
Possible error codes 0xA0,0x91

get offset wait

Operation number: 53
Number of parameter: 0
From the GSV sended bytes: 1

Get offset wait determineds the time, which has to observe at least after ***set offset***. The determined value has to get multiplyed with 0,0062 to get seconds.
Possible error codes 0xA0,0x91

get options

Operation number: 54
Number of parameter: 0
From the GSV sended bytes: 3

Get options Determineds the information above the range of the instruction set and special characteristics of the firmware as 24 bit value. At the GSV-21 bit 6 and bit 8 are always set. The lower valued 6 bit is to interpret as whole number in the range from 0..63 and contain the identification of a possible special application. Is this Identification different from zero you have to deal wit restrictions of the firmware.
Possible error codes 0xA0,0x91

get value

Operation number: 59
Number of parameter: 0
From the GSV sended bytes: 5 (at a binary data transmission)

Get value releases the transmission of a measured value.
Because of the steady transmission of values this function is of special interest if the transmission was stoped by ***stop transmission*** or if the logger mode is active; look at ***set mode.*** The data format of the returned datas of the GSV correspondents to the datas which are steady transmitted (binary or ASCII), look at Set/Get mode.
Possible error codes 0xA0,0x91

clear maximum value

Operation number: 60
Number of parameter: 0
From the GSV sended bytes: 0

Clear maximum value sets back the in maximum mode measured (look at ***set mode***) maximum value so that a maximum value can be generated.
Possible error codes 0xA0,0x71

set Digits

Operation number: 61
Number of parameter: 1
From the GSV sended bytes: 0

Set Digits sets the number of the showen values on the LC-Display. If the ASCII-data output is seted (by SetMode), the number of the transmitted value bytes is seted as well. The range of values of the number of values is in dezimal point settin untill 8, that means the number of values is not allowed to be smaller than the dezimal point setting (look at Set Dpoint).
absolute Range of values: 0x01..0x08
Possible error codes 0xA0,0x54,0x71

get Digits

Operation number: 62
Number of parameter: 0
From the GSV sended bytes: 1

Get Digits determineds the number of the showen values.
Possible error codes 0xA0,0x54

Get Channel

Operation number: 65
Number of parameter: 0
From the GSV sended bytes: 1

Get Channel reads out the the setted analog input channel. In the standadr version there are the bridge input (channel 0) and the channel 1, which has an input voltage range from 0 to 10V. We offer optionally the GSV-21 in a more channel version, which hase 5 more input channel.
Possible error codes 0xA0,0x91

Get Last Error

Operation number: 66
Number of parameter: 0
From the GSV sended bytes: 1

With get last error the the error status of the last given command can be determined
The following **error codes** are seted (so far):

Default: (no command given or error code deleted):	0x00	
No Error (OK), no further changings of the setting activated:	0xA0	
No Error (OK), but* further changings of the setings activated:	0xA1	
From this point: former command were declined because:		
Command number mot given:	0x40	
command No given but not implemented in this FW:	0x41	
Access denied (not closer specifyed):	0x70	
Access denied, because "Blocking" is seted:	0x71	
Access denied, because password not or wrong given:	0x72	
Access denied, because configuration jumper is not set:	0x73	
Access denied, because number of orders too high:	0x74	
Access denied, because this port stops Set/Write:	0x75	
wrong parameter, (not closer specifyed):	0x50	
wrong parameter, (partly) wrong bits:	0x53	
wrong parameter, parameter absolutly too big:	0x54	
wrong parameter, parameter absolutly too small:	0x55	
wrong parameter, invalid setting combination:	0x56	
wrong parameter, parameter relatively** too big:	0x57	
wrong parameter, parameter relaively** too small:	0x58	
wrong parameter, functionality not implement in this FW:	0x59	
To little parameter or rather parameter timeout:	0x5A	
Return was impossible (not closer specifyed):	0x90	(reservated)
Return was not possible because sending cach was full:	0x91	
Return was/is not (yet) possible because (CAN-)Bus busy:	0x92	
Performance was impossible because the recive cach is full:	0x99	
From this point: former command was eventually accomplished but:		
Intern mistaek (not closer specifyed):	0x80	
Intern arithmetical mistake:	0x81	

Error at AD-converter settings	0x82
Error: measurand for wanted action improper	0x83

* possibly; not only throu the last command koordinated settings, but also other settings are loadet. Nothing could have changed because the former settings and the loadet settings are similar.
** because of not permitted settingcombinations

set second threshold

Operation number: 67
Number of parameter: 4
From the GSV sended bytes: 0

Set second threshold **S**ets the second threshold of the amplifier. The first two parameter correspond to the higher bytes of the switching-on-threshold, the next two correspond to the bytes of the turn-off-threshold. At first the higher byte is expected. The turn on value alway needs to be bigger than the turn off value. Through the command ***set mode*** the funktion of the fensterdiskrimainator can be selected. In this case the values are the higher and lower threshold.
Range of values: 0x00.01.00.00..0xFF.FF.FF.FE
Hinweis: The second threshold is only affecting, if the GSV is setted with the right hardware options.
Possible error codes 0xA0,0x56,0x71

get second threshold

Operation number: 68
Number of parameter: 0
From the GSV sended bytes: 4

Get second threshold identify the with ***set second threshold*** setted second threshold.
Possible error codes 0xA0,0x91

Get device Type

Operation number: 69
Number of parameter: 0
From the GSV sended bytes: 1
Get device Type name the type number of the connected GSV`s, at GSV-21 constant 21d.
Possible error codes 0xA0,0x91

calc norm

Operation number: 70
Number of parameter: 0
From the GSV sended bytes: 0

Calc norm answers the calculation of the displaystandartysation according to the stretched reciverfunktionality. For this:the K-factor, Bridgetype inputsensitivity and possibly acording to the bridgetype the transversedcontractionnumber has been concidered***.*** At the same time channel 0 will be setted, as well as the amplification of the AD-converter to one and the shown unit to µm/m.
Possible error codes 0xA1,0x81,0x71

GetTXmode

Operation number: 129
Number of parameter: 0
From the GSV sended bytes: 1
With **GetTXmode** you can read flags about the features of the measured value transmission protocol.

MSB	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	LSB
x	x	x	x	Is 5 Byte	x	x	Konfiguration

konfiguration: if =1, the link plug JP2 for the konfiguration mode id setted.
Is 5 Byte =1: if the binary transmission protocol is aktiv (read Set Mode), the measurement frame consists out of 5 bytes.
X: reserved do not change.
Possible error codes 0xA0,0x91

SetBaud

Operation number: 130
Number of parameter: 1
From the GSV sended bytes: 0
With ***SetBaud*** you can deternemine the serial kommunication of the bitrate. The Bitrate can only be changed by setted linkplug JPS for the konfiguration mode read "GetTXmode". The procedure to change the bitrate is: turn off – set link plug – turn on- open interface with 38400 bps - programming with SetBaud – turn off – remove link plug – turn on.
To read the special mode register use command 131.
For bautrate apply:

Parameter / Register	**Baudrate**
0	4800
1	9600
2	19200
3	38400
4	57600
5	115200
6	250000
7	625000
8	1,25M

Your commend will be denied if the setted datarate ist too high for your bautrate.
If the link plug is setted for the konfiguration mode, is the kommunication bitrate always 38400, indipendently of the baut register. The setted biterate in the baudregister applyes only with removed link plug JP2.
Possible error codes 0xA0,0x54,0x58,0x73,0x71

GetBaud

Operation number: 131
Number of parameter: 0
From the GSV sended bytes: 1
With GetBaud you can read the former written baudrateregister.
Possible error codes 0xA0,0x91

SetSpecialMode

Operation number: 136
Number of parameter: 2
From the GSV sended bytes: 0

Via the Special-Mode-Register speacial features of the GSV-21 are setted.
The content of highbytes is 0
The content of the Lowbytes is shown in the table below:

MSB	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	LSB
Unipolar-Modus	x	FIR_N5	AutoFilt	x	FIR-Filter	MW-Filter	x

MW-Filter: Read-Only Flag: is 1, if Mwsum>1 (commend 138, 139)
FIR-Filter: =1: turns on FIR-Filter; a digital low pass filter, which is connect at the outlet side build after the firmware-intern average determination. Its barrier frequency depends on the measured data rate.

AutoFilt: if =1, the pre filter will be setted automatically because of the datarate Fdatat.
In this case:

	schaltet fg = 3,5 Hz	**schaltet fg = 260 Hz**	**schaltet fg = 1,7 kHz**
FIR-Filter off	if Fdata <= 7,14/s	if 7,14/s < Fdata < 625/s	if Fdata >= 625/s
FIR-Filter on	if Fdata <= 15/s	wifenn 15/s < Fdata < 1071/s	if Fdata >= 1071/s

FIR_N5: defined the charakteristik of the digital FIR-filters, if the FIR-Filter is turnt on (Bit 2=1). If the FIR_N5 =0, it is a 2. order. its -3dB-boarder frequency is = Datarate * 0,18 and its transfer function is gentle, without overshot in the switch response its operating time is only 3 measured values. If FIR_N5 =1, its a 5. order. Its boarder frequency is = datarate * 0,25 and its transfer function is much steeper in the attenuating band, but with 6% overshot in the switch response; and the operaing time takes 6 measured values. Thats why the FIR-Filter 5. order is more recommendable at higher datarates, if (for example for vibration analysing) a very high frequenzy response at the transmission range and a sttep tapered is wished at the attenuating band.
Unipolar-Modus: Read-Only Flag. Shows if the unipolar- or bipolar-Mode
is setted.
x: Reserved, do not change.
Possible error codes 0xA0,0x53,0x59,0x71

GetSpecialMode

Operation number: 137
Number of parameter: 0
From the GSV sended bytes: 2

With ***GetSpecialMode*** you can readout the described register.
Possible error codes 0xA0,0x91

WriteSamplingRate

Operation number: 138
Number of parameter: 3
From the GSV sended bytes: 0

This command sets the sample rate and the number of the summands of the average determination as well as the resulting data rate.
The samplinrate determined how many analog-digital transformations the AD-converter per second does.
The relation between measured data range and sample rate shown via the averaging:
measured data range = sample rate/ average summand amount
The average summand amount can assume every value from 1 to 11.

Parameter 1: Average summand amount
Parameter 2: Highbyte of the Sampling-Rate-Register
Parameter 2: Lowbyte of the Sampling-Rate-Register

Parameter 1:
Bits 6 und 7 must =1 be.
0xC1 equivalent average determination
0xCB equivalent average determination over 11 summands.

Parameter 2 and 3:
the computation formula for the Sampling-Rate-Register (second and third Parameter) of command 138/139 is:
Registervalue = 2 x sample rate
Der AD-converter of the GSV-21 knows the following discrete sample range:
2.5, 5, 10, 15, 25, 30, 50, 60, 100, 500, 1000, 2000, 3750, 7500 and 15000 Samples/Second. It will be setted the next closest available sample range for parameter 2 and 3 if nothing like a too high resulting measured data rate (read table under set frequency) or one that is too low (under 0,125/s) speaks against it.
Absolute range of values: 0xC8.00.05..0xC1.75.30
Possible error codes 0xA0,0x53,0x54,0x55,0x57,0x58,(0x80),0x71

ReadSamplingRate

Operation number: 139
Number of parameter: 0
From the GSV sended bytes: 3

With **ReadSamplingRate** the sampling rate ande the number of the average values can be checked by the way it is described under WriteSamplingRate:
Byte 1: Number of the average values in Bits <5:0>, Bits 6 und 7 =1
Byte 2: Highbyte of the Sampling-Rate-Register
Byte 2: Lowbyte of the Sampling-Rate-Register
Whereas the samplinrate = Sampling-Rate-Registe / 2
Possible error codes 0xA0,0x91

Set analogue filter

Operation number: 144
Number of parameter: 2
From the GSV sended bytes: 0

With Set analogue filter the limit frequency of the prefilter can be changed, if the AutoFilt-Flag of the Special-Mode-Registers =0 is. (read Set/Get special Mode). This low pass filter is in front of the AD-converter and it is able to improve the signal to noise ratio as well as the digital and analog output.
The Standard version hast 3 limit frequencys:
1. 3,5Hz, 1.order; ab 260Hz 2.order
2. 260Hz, 1. order; ab 1,7kHz 2. order
3. 1,7kHz 1. order

The parameter (1. parameter: Highbyte, 2. parameter: Lowbyte) are showing twice the

amount of the wished limit frequency, the closest limit frequency lying to the parameters will be selected and setted.
Range of values: 0x00.07..0x0D.FF

Possible error codes 0xA0,0x54,0x55,0x56,0x71

Get analogue filter

Operation number: 145
Number of parameter: 0
From the GSV sended bytes: 2
Get analogue filter shows twice the amount of the active setted limit frequency of the analoque prefilter back. Possible return-values in Standard version are:
0x00.07: limitfrequency = 3,5 Hz
0x02.08: limitfrequency = 260 Hz
0x0D.48: limitfrequency = 1,7 kHz
Possible error codes 0xA0,0x91

Switch Blocking

Operation number: 146
Number of parameter: 3
From the GSV sended bytes: 0

With Switch Blocking the GSV-21 can be protected for unintentional changes of the operationparameter. If the blocking status is on, every set and write commands will be denied, the error-code for thi case is 0x71. This status can be identified with Get Mode (read: Bit 7). Because the GSV- commands consist out of only one byte, there could be an accidentally call of commands or because of the seriell connected devices (PC, SPS or other) this could happen because of the confusion of portnumbers, call of a wrong programm and so on. The blocking status is controlled by two constant ASCII-strings as a parameter of this command:
turn on blocking: **Parameter = "e3F"**, that means. Param.1=0x65, Param.2=0x33, Param.3=0x46
turn off Blocking: **Parameter = "k7B"**, that means Param.1=0x6B, Param.2=0x37, Param.3=0x42
Attention: Every other parameter will be interpreted as a wrong blocking-password and after 3 trys with wrong parameters the command will always be denied (indipendent of the parameter), the eror code in this case is 0x74. After a restart this status will be reset.
Possible error codes 0xA0,0x70,0x74

General advices and Tips

Please attend the actuell documents on:
http://www.me-systeme.de/software.html

The command number is sent as a byte to measuring amplifier.

The command parameter and return parameter are bytes and no numerical values (The parameter „01“ means 0x01 and not 0x31).

Under Windows a DLL with all the features for the measuring amplifier is available.

For the direct programming via RS232 or via CAN Bus the text format is recommended.

In the binary format every measured value need to be multiplied with the scale factor, because the physical measurement range need to be shown (for example ±2mV/V) at the Range of values.

The setting of the datarate and the scale factor is by help of the direct programming via RS232 lavish. You can set up to 6 different configurations in the EEProm of the GSV-2 (by help of the konfiguration programm GSV.EXE) and called if its needed with the command „getAll“.

In the Textformat is one space character between the numerical value and the CRLF (always even if the exposition of the unit was turned off).

Attention: after every replacing of the jumper JP1, after every programming of the datarate or resetting of the amplification or other commands which effect the digital analoque transmission, the command „setcal“ must be applied.

The configuration software GSV.EXE sets the command setcal automatically.

It is recomenndet to use always the mode bipolar.

Technical Data

(in case of U_B = 12…26V DC in the nominal temperature range)

Model	GSV-2L / GSV-2A	GSV-2LS / GSV-2AS	GSV-2ASD / FSD / TSD	Unit
Accuracy class				
analog	0,1	0,1	0,1	
digital		0,1	0,1	
Measurement ranges				
Analog output	±1	±1;		mV/V
with the jumper set	±2, optional ±3,5	±2, optional ±3,5		mV/V
Display / serial output with the jumper set		±0,125; ±0,25; ±0,5; ±1		mV/V
Connectable full bridges	4 x 350	4 x 350	4 x 350	Ohm
Bridge supply voltage	2,5	2,5	2,5	V
Input impedance	>20 / 300pF	>20 / 300pF	>20 / 300pF	MOhm
Common mode rejection				
DC	>120	>120	>120	dB
100Hz	>100	>100	>100	dB
Linearity deviation	<0,02	<0,02	<0,02	% v.E.
Temperature influence on the zero point per 10K	Measuring range 1mV/V: typ. 0.2 Measuring range 2mV/V: typ. 0.1		<0,4 <0,2	% v.E. % v.E.
Temperature influence on the measuring sensitivity per 10K referred to the measured value	< 0,1; typ. 0,05	< 0,1; typ. 0,05	< 0,1; typ. 0,05	%
Analog output		<0,01; typ. 0,005	<0,01; typ. 0,005	%
Display / digital				
Output filter analog output				
3dB limiting frequency analog, Bessel, 2nd order	250, (10) (2k5) (10k)	250, (10) (2k5) (10k)	250, (10) (2k5) (10k)	Hz
Output filter digital				
3dB limiting frequency digital and display,		2,6…100	2,6…100	Hz
Measuring rate, digital		10…400	10…400	Hz
Resolution	>30000 parts	>30000 parts	>30000 parts	
Analog output				
useful output range at:				
Nominal range 0…10V	-5,2…11	-5,2…11	-5,2…11	V
Nominal range ±5V	-5,2…6	-5,2…6	-5,2…6	V
Output resistance	47	47	47	Ohm
Analog input				
Input voltage range		0…10	0…10	V
Input resistance		45	45	kOhm
Control cables[1)]				
automatic null point balancing	Low level: <1.4, High level: >3.4		(active high)	V

Model	GSV-2L / GSV-2A	GSV-2LS / GSV-2AS	GSV-2ASD / FSD / TSD	Unit
Switch output				
for threshold value switch		200mA / 30V	200mA / 30V	
Saturation voltage		<1,0	<1,0	V DC
Port		RS 232	RS 232	

Baud rate		38400 (8N1)	38400 (8N1)	Baud
Operating voltage **Nominal range** Operating range[2)]	 11,3…30 9,8...42	 11,3…30 9,8...42	 11,3…26 10...32	 V DC V DC
Current drawn with display illumination	<100	<120	<120 <210	MA mA
Parameter memory	Last setting, manufacturer's setting	Last setting manufacturer setting 2 parameter sets	Last setting, manufacturer setting 2 parameter sets	
Other functions for the serial output		- Programmable threshold value with hysteresis - programmable amplification - programmable balancing of the end value (scaling function) - programmable null balancing		
Nominal temperature range	-10…+65	-10…+65	0…+50[3)]	°C
Storage temperature range	-40…+85	-40…+85	-20…+70	°C
Dimensions (L x B x H) PCB Housing	 125 x 53 x 30 180 x 65 x 36	 125 x 53 x 30 180 x 65 x 36	 180 x 65 x 40	 mm mm
Method of protection of the housing variants (DIN 40 050)	IP66	IP66	IP40	

1) for Version LS und AS, optionally, 2 additional control cables
2) Temperature range and accuracy restricted
3) Display with extended temperature range optional

Absolute limiting values
(all voltages with reference to the supply ground)

Operating voltage:	-200…+100V
Single pulse 200ms:	+200V
Differential input:	-4…+12V
Sense inputs:	-4…+12V
Control wires:	-30…+30V
Analog input:	-20…+20V

Resolution

By setting the data frequency (amount of measured values per second) the analouque prefilter is changed automaticaly as well as filter features of the delta sigma A/D Converter.

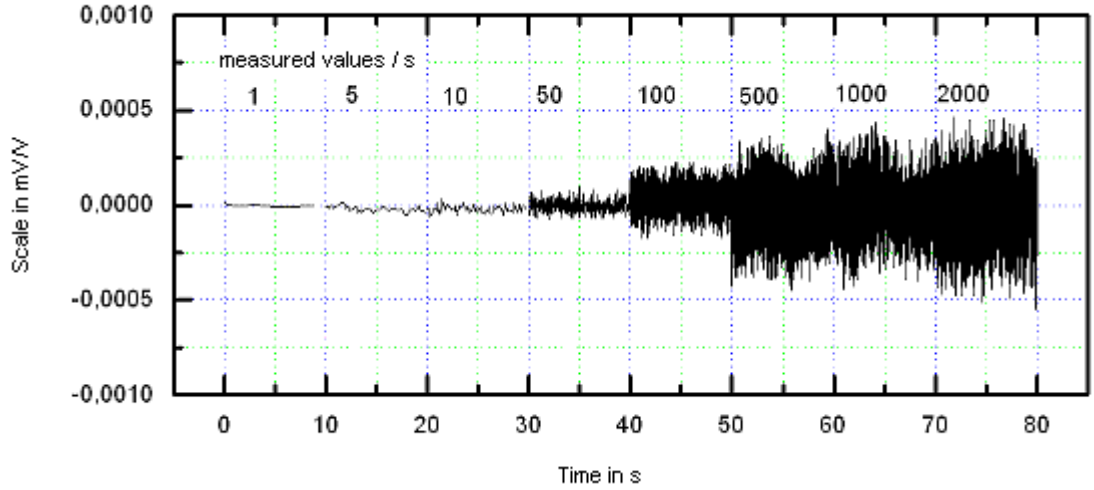
Through the intern oversampling and filtering you can do without extra filtering and averaging.

The charts below show measured values with a shielded connecting cable of 1 meter, and twisted pairs of wires

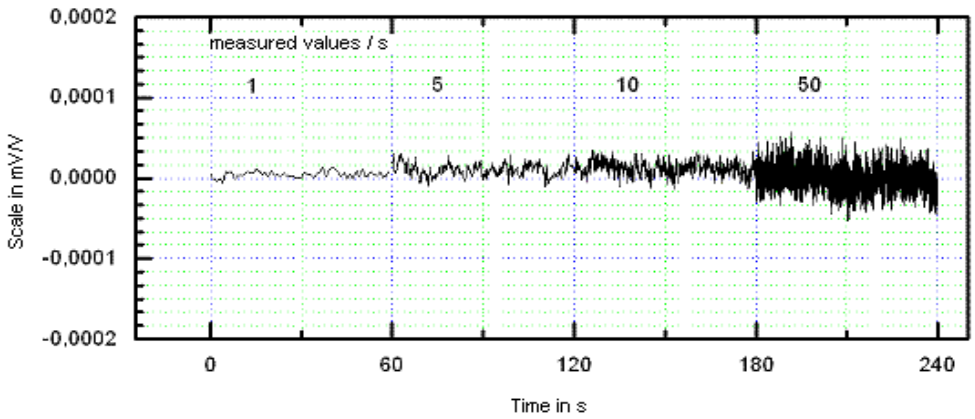
Similar outputs are found in practice with cable length of 50 meter if seperated control and sensor-cable and a good electromagnetic shielding is provided.

The electronic shielding of the RS232-connecting cable should be put on the grounding-plug of the housing.

Resolution in the measuring range „2 mV/V“ (2,5V supply voltage, JP1 in position 2)



Resolution in the measuring range „1mV/V“ (5V tension of supply, JP1 in position 1)



The best resolution at a datarate of 10Hz is at least 30000 digits, if you define the measured value compared to the amplitude of the maximum measured value (measured value maximum value tolerance).

The rms-resolution from a datarate of 10Hz is at least 150000 displaysteps (measured value / 2x standart-deviation)
more informations http://www.me-systeme.de/gsv2-dat.html#resolution

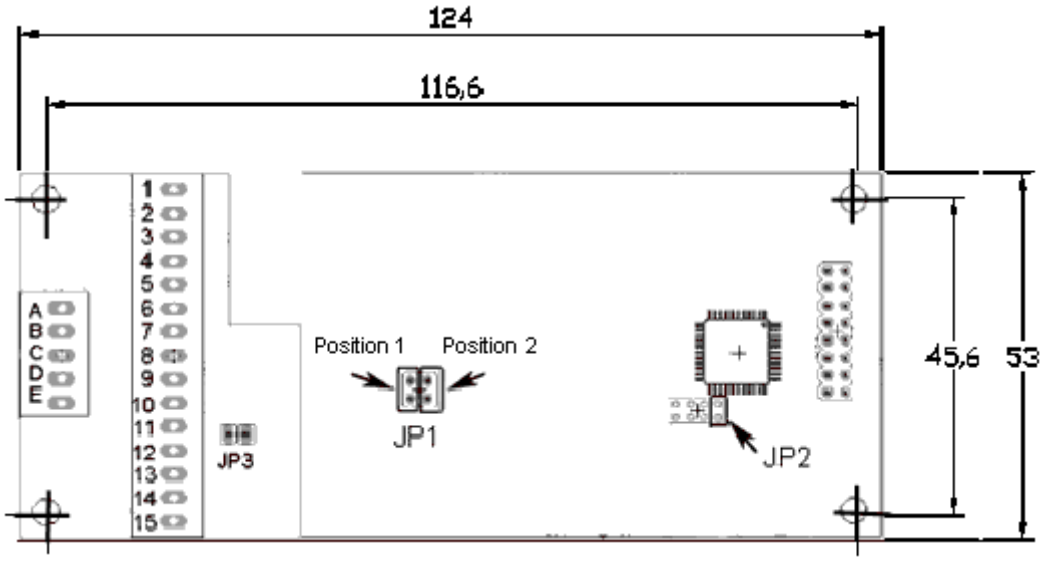
Description of the jumpers / selectors

JP1: changing the bridge supply voltage:
position 1 (left): bridge supply voltage = 5V, input sensitivity = 1mV/V
position 2 (left): bridge supply voltage = 2,5V, input sensitivity = 2 or 3,5mV/V
(look Set/Get Range) **Attention: the jumper need to be plugged on!**

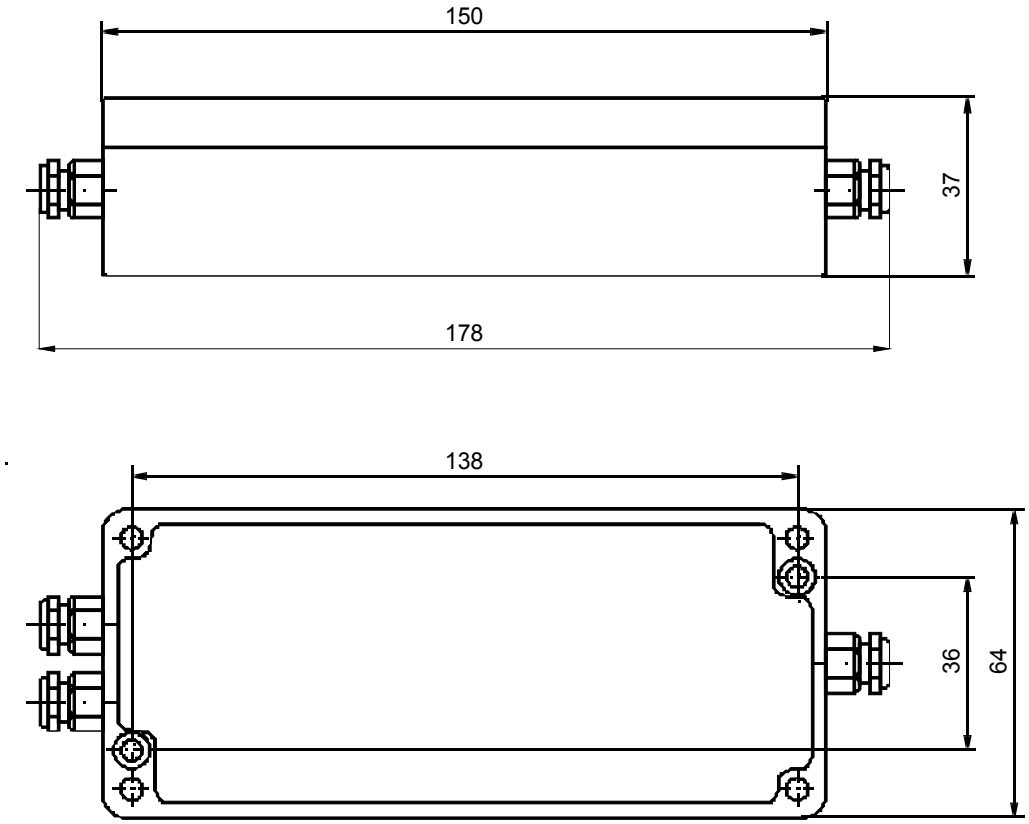
JP2: Configuration mode for baudrate and protokoll settings
stucked: Configuration mode is active, Baudrate is fixed to 38400 Bits/s
pulled: Configuratio mode is inactiv, it is essential the baudrate of the baudrate-register (look Set /Get Baud) (changes will appear after power on reset).

JP3: change over to the seriell interface from RS232 (V24) to RS422:
stucked: RS422. pulled: RS232 (V24), delivery condition
closing configuration RS232: A: GND, B: RX, C: TX
closing configuration RS422: A: GND, B: RX-, C: TX-, D: RX+, E: TX+

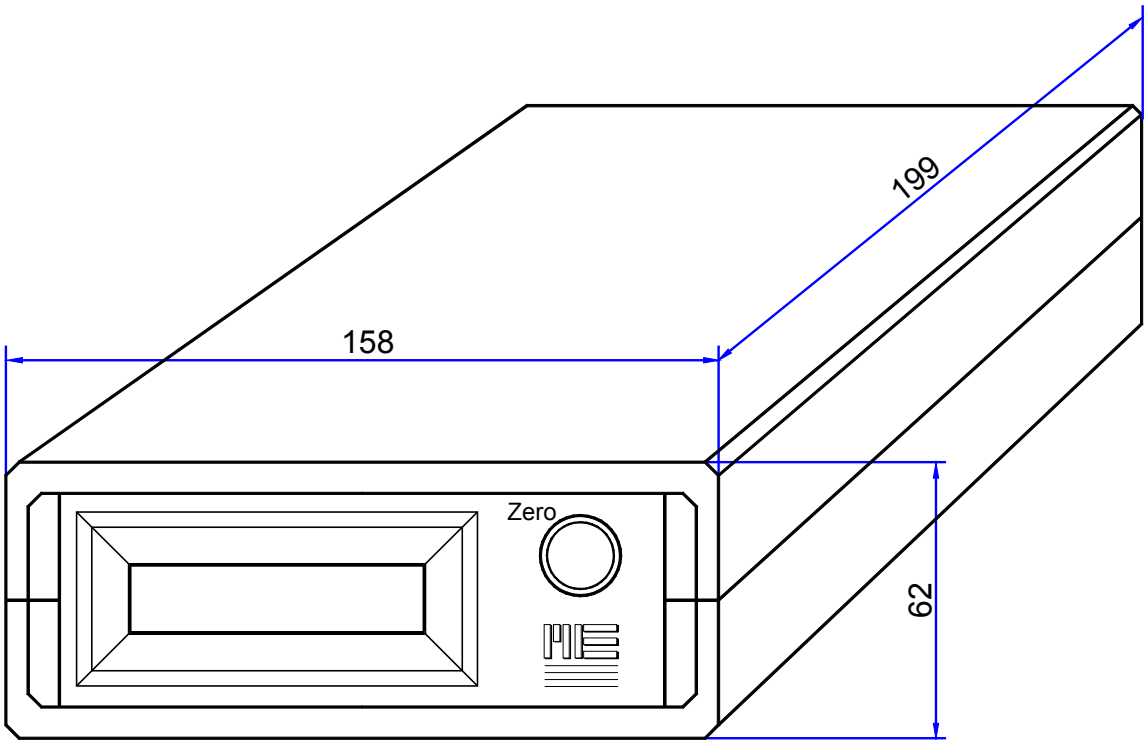
Dimensions of the circuit board of the GSV-2L



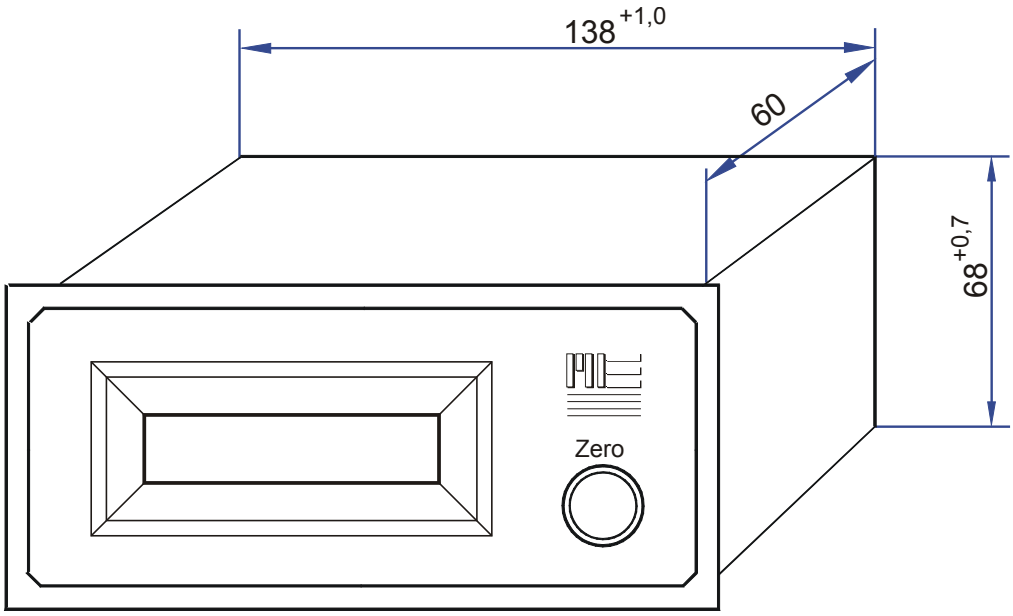
Dimensions of the aluminium case of the GSV-2AS



Dimensions of the GSV-2TSD



Front panel cut out of for the GSV-2FSD



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

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They are no assurence of features in the sense of §459 Abs. 2, BGB
and assume no liability.

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