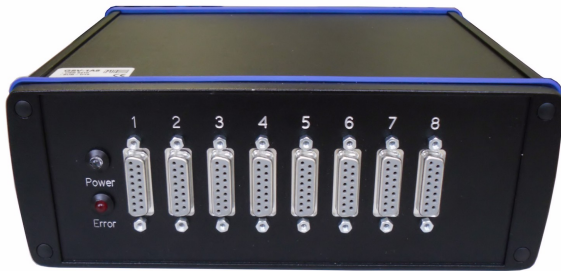


# Strain gauge Measuring Amplifier GSV-1A8

Instruction manual

GSV-1A8, GSV-1A8USB, GSV-1A16USB



GSV-1A8USB SubD15 (front side)



GSV-1A8USB M12 (front side)



GSV-1A16USB (rear side)



GSV-1A8USB K6D (front side)

Version: 18.11.2016

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## Features:

- USB port,
- 16 Bit, 200kHz total sampling rate,
- 8x strain gauge input, 8x analogue input  $\pm 10$  V, 8x IO
- Optional 16x strain gauge input
- Zero adjustment across 100% of the measuring range
- Integrated bridge completion 350 ohm can be activated through solder bridges,
- Analogue filter 2.5kHz, optional 250Hz or 10kHz

## Description

The measuring amplifier GSV-1A8USB is a DC voltage measuring amplifier with USB interface.

The resolution is 16 bit with a total sampling rate of 200kHz. The integrated A/D measurement card NI USB 6210 has 16 analogue input channels and digital inputs/outputs which are led outside on a 37-pin Sub-D socket.

To upgrade to 16 channels, a second, structurally identical housing without A/D measuring card is connected to the basic unit via a 37-pin flat ribbon cable.

Several 16-channel devices can be evaluated using the software.

The analogue input signals from the strain gauges are amplified by 8 or 16 precision measuring amplifiers GSV-1L to  $\pm 5$  volt and digitalised by the integrated A/D card with USB interface.

A supplement for quarter bridges 350 ohm, and for half bridges 120, 350 or 1000 ohm is included in the GSV-1USB and can be activated via solder bridges.

The benefit of the GSV-1L measuring amplifier used is the low-noise amplification and automatic analogue zero adjustment.

The zero adjustment is triggered via a switch or via software.

The zero point is stored internally and is available again after a voltage interruption.

Due to the automatic zero adjustment, the low-noise amplifier and the optimally adjusted Bessel filter, high input amplifications can also be set for the A/D digital converter in order to record the smallest signals.

The supply voltage is 12...24V DC and is supplied via a plug-in power supply provided.

## Advantages

- ✓ compact dimensions and low weight,
- ✓ simple connection of strain gauge full, half and quarter bridges via 5-pin M12 or Sub-D15 plug connectors,
- ✓ automatic zero adjustment with tare switch across 100% of the measuring range

(3.5mV/V),

- ✓ high limit frequencies up to 10kHz per channel as an order option (2.5kHz standard)
- ✓ low-noise input stage for high measurement resolution,
- ✓ high amplification of the output signal possible through automatic zero adjustment,
- ✓ low current consumption and supply with car supply voltage,
- ✓ stable strain gauge supply for up to 4 parallel 350 ohm full bridges per channel.

## Terminal assignment

### Pin assignment Sub-D15 socket

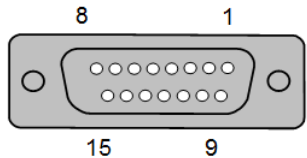
1	Shield		 <p>Top view</p> <p>Pin 14 with pin 15 must be bridged for connecting half bridges and quarter bridges. Quarter bridges are connected to pin 5, pin 8 and QB (3 or 11 or 4) in three-wire technology.</p>
6	+Us	positive bridge supply	
5	-Us	negative bridge supply (GND)	
8	+UD	positive differential input	
15	-UD	negative differential input	
13	+UF	positive sensor line	
12	-UF	negative sensor line	
14	HB	Completion of the half Bridge	
11	QB120 Ohm	Completion of the quarter bridge 120 Ohm	
3	QB350 Ohm	Completion of the quarter bridge 350 Ohm	
4	QB1000 Ohm	Completion of the quarter bridge 1000 Ohm	
10	+ext. Us	External sensor supply 5V 100mA (optional 1...7V ; Observe current limitation)	
2	-ext. Us	Mass/ GND	

Table 1: Pin assignment Sub-D15 socket


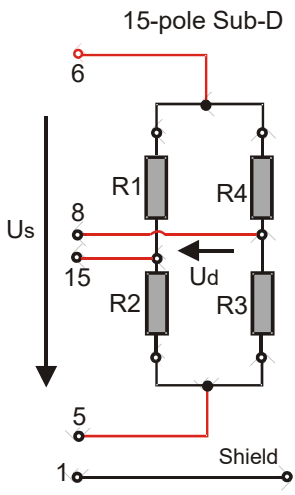
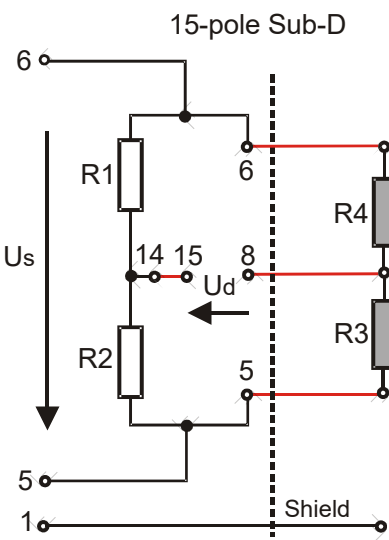
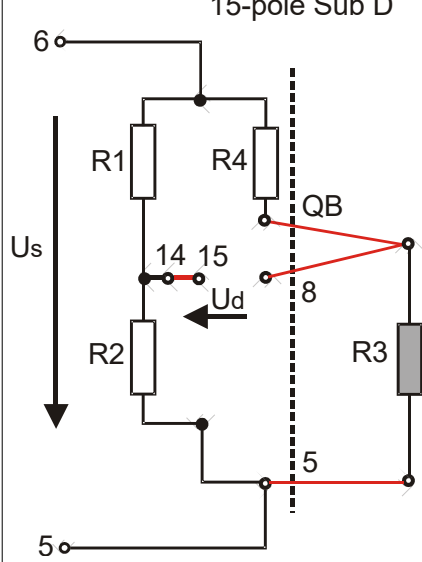
Plug Pin contacts	Pin No.	Terminal assignment	SAC-5P
(Top view) 	1	Supply voltage 12...24 V DC	brown
	2	not assigned	white
	3	GND supply voltage	blue
	4	Tare	black

Table 2: Connection for voltage supply, M8 plug connector

## Connection plan for strain gauges on Sub-D 15

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

**Table 3: Connection of full or half and quarter bridges to 15 pin sub D sockets**

## Connection assignment for M12 connectors

To connect quarter or half bridges, the measuring amplifier must be configured accordingly. The supplement resistors are connected by closing the solder bridges. For closed solder bridges, the connection of strain gauge full bridges is possible but reduces the sensitivity to the supplied calibration by approx. 1% and is independent of the terminal resistance of the strain gauge.

Strain gauge quarter bridges are connected in three-wire technology.

As a result, the influence of the supply cable on the zero point and the zero point drift is compensated.

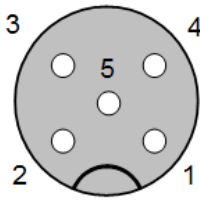
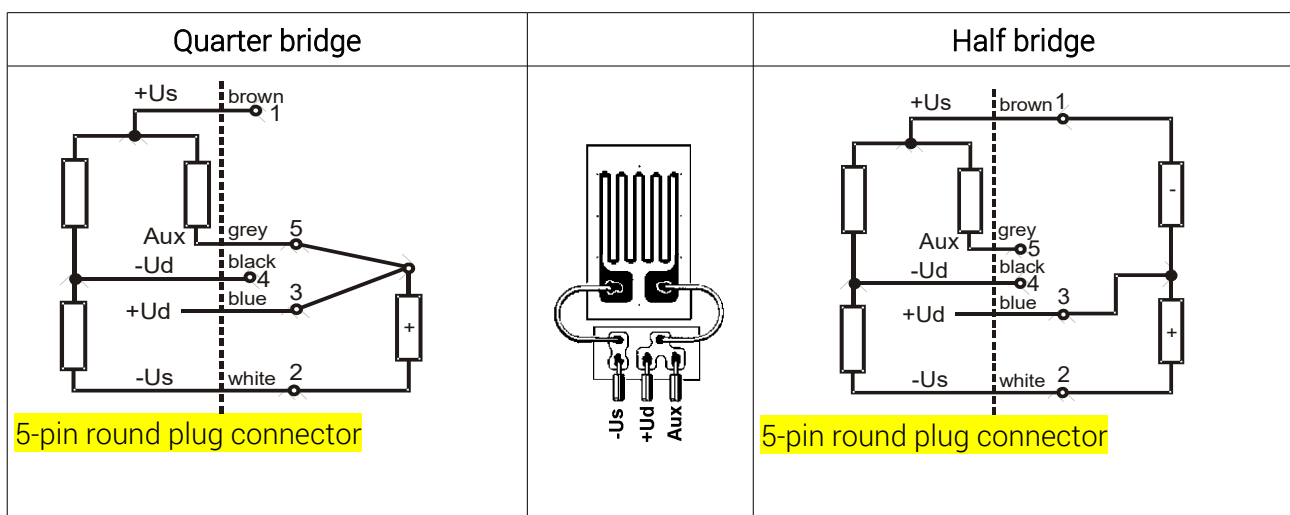
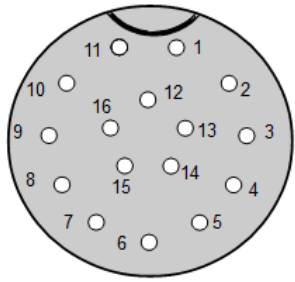
Socket Spring contacts	Pin No.	Terminal assignment	ME	SAC-5P
(Top view) 	1	+U <sub>s</sub> positive bridge power supply	brown	brown
	2	-U <sub>s</sub> negative bridge power supply	white	white
	3	+U <sub>D</sub> positive differential input	green	blue
	4	-U <sub>D</sub> negative differential input	yellow	black
	5	AUX quarter bridge completion 350Ω,	grey	grey

Table 4: Terminal assignment round connector 5-pin M12

## Wiring diagram for quarter bridges and half bridges

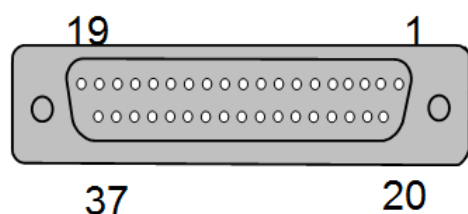


## Connection assignment for M23 round plug connectors

 <p>View of solderside</p>	Flange box, 16-pin, (female), Coninvers, RC-16S1N122200
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Axis		Description	PVC/PUR cable	Teflon Cable	PIN
X-axis	- Us	Sensor supply	white	white	1
	+ Us	Sensor supply	brown	brown	2
	+ Ud	Bridge output	green	green	3
	-Ud	Bridge output	yellow	yellow	4
Y-axis	- Us	Sensor supply	grey	grey	5
	+ Us	Sensor supply	pink	pink	6
	+ Ud	Bridge output	blue	blue	7
	- Ud	Bridge output	red	red	8
Z-axis	- Us	Sensor supply	black	black	9
	+ Us	Sensor supply	purple	purple	10
	+ Ud	Bridge output	grey-pink	orange	11
	- Ud	Bridge output	red-blue	transparent	12

## Pin assignment for 37-pin Sub-D



Front side view

## Assignment for GSV-1A8 **without** USB port

PIN	GSV-1A8
1	CH1 - Channel 1
2	CH2 - Channel 2
3	CH3 - Channel 3
4	CH4 - Channel 4
5	CH5 - Channel 5
6	CH6 - Channel 6
7	CH7 - Channel 7
8	CH8 - Channel 8



20-27	GND / Ground
34	"Short -function" - display by „error“ -LED
35	"Tare - function" - display by "error" LED
36	GND / Masse
All pins not listed are not connected / n.c.	

### Assignment for GSV-1A8USB **with** USB port

PIN	GSV-1A8USB		NI-6210-USB	
1			AI 8	Input $\pm 10V$
2			AI 9	Input $\pm 10V$
3			AI 10	Input $\pm 10V$
4			AI 11	Input $\pm 10V$
5			AI 12	Input $\pm 10V$
6			AI 13	Input $\pm 10V$
7			AI 14	Input $\pm 10V$
8			AI 15	Input $\pm 10V$
9	CH1 - Channel 1	Output $\pm 5V$	AI 0	Input assigned
10	CH2 - Channel 2	Output $\pm 5V$	AI 1	Input assigned
11	CH3 - Channel 3	Output $\pm 5V$	AI 2	Input assigned
12	CH4 - Channel 4	Output $\pm 5V$	AI 3	Input assigned
13	CH5 - Channel 5	Output $\pm 5V$	AI 4	Input assigned
14	CH6 - Channel 6	Output $\pm 5V$	AI 5	Input assigned
15	CH7 - Channel 7	Output $\pm 5V$	AI 6	Input assigned
16	CH8 - Channel 8	Output $\pm 5V$	AI 7	Input assigned
20-27	Ground	Analogue ground	AI GND	Analog ground
28			P0.0	Digital input
29			P0.1	Digital input
30			P0.2	Digital input



31			P0.3	Digital input
32			P1.0	Digital output
33			P1.1	Digital output
34	Short	reserved	P1.2	Reserved for „Short -Function“ display by „error“ -LED
35	Tare	reserved	P1.3	Reserved for “Tare -Function” Display by “error” LED
36			D GND	Digital ground
37	external sensor control 5V 100mA (optional 1...7V ; observe the current limit)			
All pins not listed are not connected / n.c.				

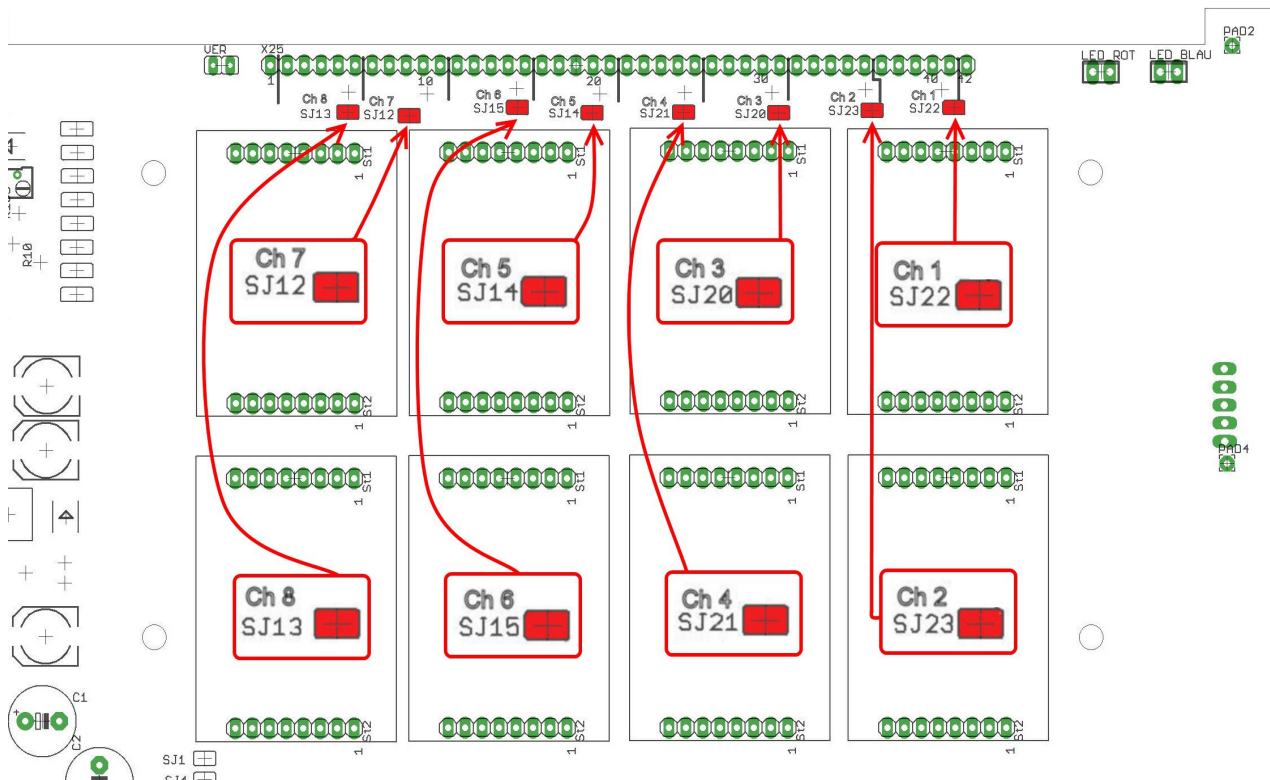
### Assignment for GSV-1A16USB with USB port

The measuring amplifier GSV-1A16USB consists of 1 x GSV-1A8 and 1x GSV-1A8USB. Both devices are connected via a flat ribbon cable at the rear.

PIN	GSV-1A16USB		NI-6210-USB	
1	Channel 9	Output $\pm 5V$	AI 8	Input assigned
2	Channel 10	Output $\pm 5V$	AI 9	Input assigned
3	Channel 11	Output $\pm 5V$	AI 10	Input assigned
4	Channel 12	Output $\pm 5V$	AI 11	Input assigned
5	Channel 13	Output $\pm 5V$	AI 12	Input assigned
6	Channel 14	Output $\pm 5V$	AI 13	Input assigned
7	Channel 15	Output $\pm 5V$	AI 14	Input assigned
8	Channel 16	Output $\pm 5V$	AI 15	Input assigned
9	Channel 1	Output $\pm 5V$	AI 0	Input assigned
10	Channel 2	Output $\pm 5V$	AI 1	Input assigned
11	Channel 3	Output $\pm 5V$	AI 2	Input assigned
12	Channel 4	Output $\pm 5V$	AI 3	Input assigned
13	Channel 5	Output $\pm 5V$	AI 4	Input assigned
14	Channel 6	Output $\pm 5V$	AI 5	Input assigned
15	Channel 7	Output $\pm 5V$	AI 6	Input assigned
16	Channel 8	Output $\pm 5V$	AI 7	Input assigned
20-27	Ground	Analogue ground	AI GND	Analogue ground
28			P0.0	Digital input
29			P0.1	Digital input

30			P0.2	Digital input
31			P0.3	Digital input
32			P1.0	Digital output
33			P1.1	Digital output
34	Short	reserved	P1.2	Reserved for „Short -Function“ display by „error“ -LED
35	Tare	reserved	P1.3	Reserved for “Tare -Function” Display by “error” LED
36			D GND	Digital ground
37	external sensor control 5V 100mA (optional 1...7V ; observe the current limit)			
All pins not listed are not connected / n.c.				

## Activating the bridge completion for strain gauge quarter bridges



For closed solder bridges, connecting quarter bridges to 350 ohm is possible. The use of half and full bridges is also possible with closed solder bridges. The measurement result for full bridges is then displayed too small by approx. 1% to 2%. Optionally, the measuring amplifier is supplied with 120 ohm or 1000 ohm bridge completion.

## Accessories

		
<p>Sensor-actuator cable with M12 plug connector</p>	<p>Earthing plug (included in scope of delivery)</p>	<p>Connector "GSV-1A8-37T" for connecting devices "GSV-1A8USB" and "GSV-1A8", (included in the scope of delivery for GSV-1A8USB)</p>



## Technical data

<b>Accuracy class</b>	<b>0,1</b>	<b>%</b>
<b>Inputs</b>		
Measurement range	2 (optional 3.5)	mV/V
Resolution of the input signal	16	bit
Strain gauge inputs Full bridge	70... 50000 ohm	ohm
Common mode rejection for 60Hz common-mode signal	95-110	dB
<b>Measuring frequencies</b>		
Total sampling rate	200	kHz
Analogue filter	2500, optional 250 or 10000	Hz
<b>Outputs</b>		
Analogue output Output resistance	±5 47	volt ohm
Bridge supply voltage	5	volt
<b>Zero adjustment</b> Tolerance Duration Resolution on falling edge after at least 4ms high level (3.5V ... 30V)	<5, type <2.5 <90	mV ms
<b>Supply</b>		
Supply voltage Power consumption 24V (12V) DC	11...28 300	V DC mA
<b>Temperature range</b>		
Nominal temperature range Storage temperature range Drift of zero point Drift of sensitivity	-10...+65 -20...+65 < 0.05 < 0.01	°C °C %/10°C %/10°C
<b>Dimensions</b>		
L x W x H	75 x 38 x 45	mm x mm x mm
<b>Protection class</b>		
	IP40	
<b>AD converter</b>		
Type	NI USB 6210,	
Input voltages	-10 ...+10	V
Number of digital inputs	4	
Number of digital outputs	4	
Counter timer	2 (32 Bit)	



Subject to modifications.

All details describe our products in a general form.

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