



GSV-5A3 M12 GSV-5A3 SubD44HD

3-Channel strain gauge measuring amplifier

Operating Manual



Measuring amplifier GSV-5A3

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3-channel measuring amplifier GSV-5A3



- Input sensitivities: [0,5 1,0 2,0 4,0] mV/V
- Output signal: $\pm 10V/4-20-12$ mA at a 15-pin Sub-D
- Zero setting function: For individual channels or for all channels simultaneously by pushbuttons.
- Function-LED
- Operating menu via pushbuttons and LEDs

Description:

The GSV-5A3 measuring amplifier is an amplifier with 3 independent channels for sensors with strain gauges, such as force sensors, torque sensors, acceleration sensors or strain transducers.

This measuring amplifier is suitable for connecting bridge sensors from 120 ohms to 5000 ohms or full bridge strain gauges. Input is configurable for full, half, quarter bridges, 120-350- 1000 Ohms. The inputs are factory adjusted for four-wire technology sensors.

Configurable for six-wire sensors by factory upon request.

The GSV-5A3 measuring amplifier is delivered with an 18 V CE-certified power supply and cable for the Sub-D15 Output socket.

Factory adjustable $\pm 10V$ or 4-20-12mA Outputs are located on the 15-pin Sub-D socket, 1x ground per channel for the analog output and a switching input for the shunt and the tare function. All outputs are calibrated and can be used synchronously.

The GSV-5A3 is configured with 4 push buttons and the current state of the 3 channels can be seen on 11 LEDs.

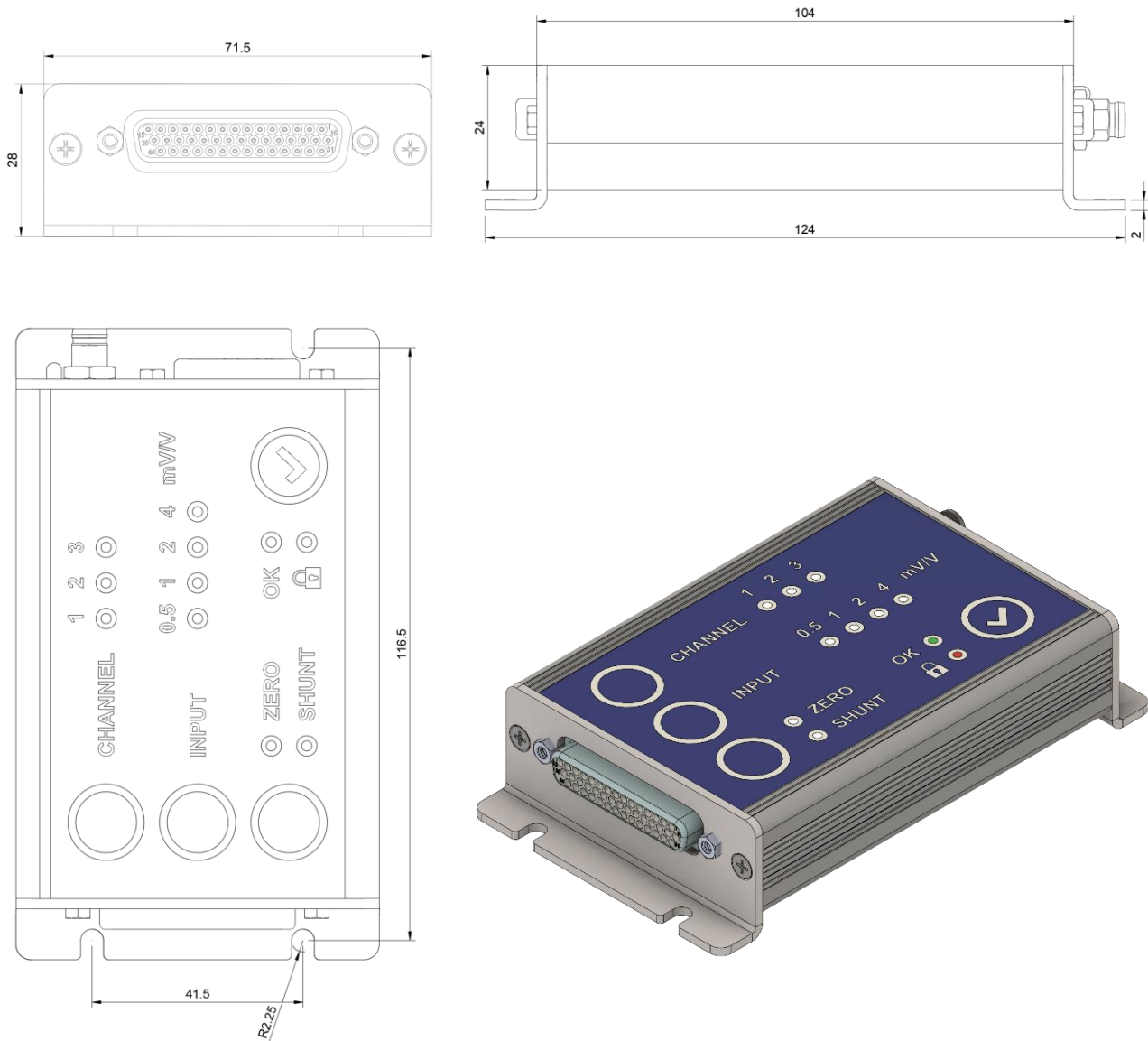


Variants

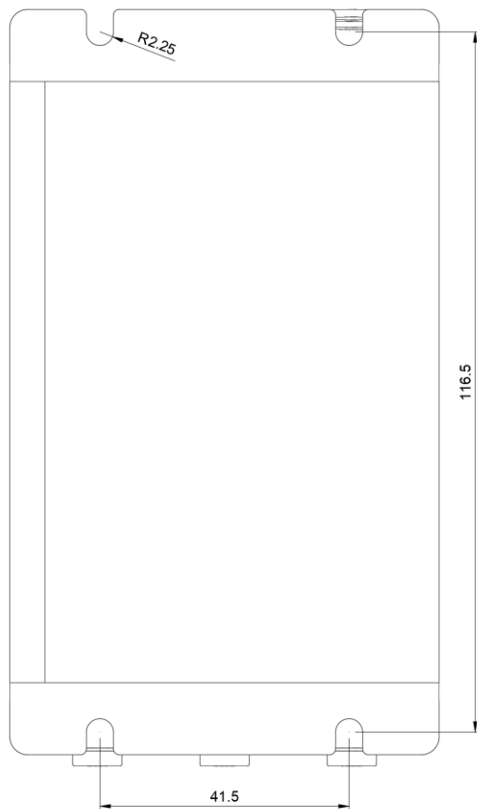
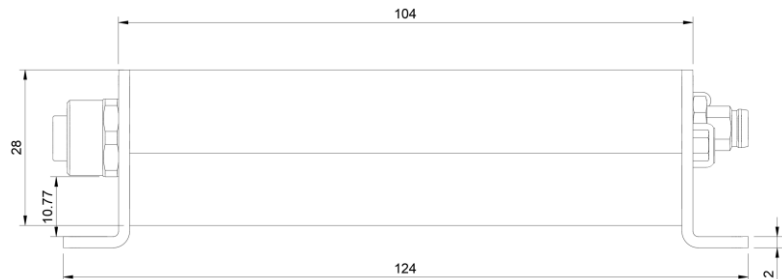
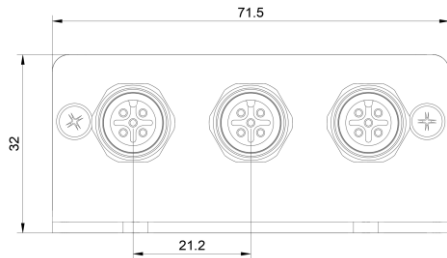
Type	Sensor Input	Signal-Output
GSV-5A3 010/10kHz/M12	3x M12	1x Sub-D15/±10V
GSV-5A3 010/2.5kHz/M12	3x M12	1x Sub-D15/±10V
GSV-5A3 4-20-12/2.5kHz/M12	3x M12	1x Sub-D15/4-20-12 mA
GSV-5A3 010/10kHz/SubD44HD	1x SubD44HD	1x Sub-D15/±10V
GSV-5A3 010/2.5kHz/SubD44HD	1x SubD44HD	1x Sub-D15/±10V
GSV-5A3 4-20-12/2.5kHz/SubD44HD	1x SubD44HD	1x Sub-D15/4-20-12 mA

Case dimensions GSV-5A3

GSV-5A3 SubD44HD



GSV-5A3 M12



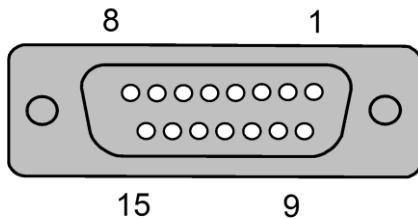
Connection diagram for plug for supply voltage: M8 Round, male



1	UB+	brown	Positive supply voltage 10-28V, brown
2	n.c	white	Not connected
3	0V	blue	Negative supply voltage (GND), blue
4	n.c	black	Not connected



Connection diagram for output socket: 15-pin Sub-D, female



Pin	Signal	Color	Description	Channel
1	Ua1/ Ia1	shiny black	Analog output	1
2	Ua2/ Ia2	brown	Analog output	2
3	Ua3/ Ia3	red	Analog output	3
4	GND	orange	Electrical ground	-
5	GND	yellow	Electrical ground	-
6	GND	dark green	Electrical ground	-
7	Shunt	blue	External shunt trigger	-
8	Tare	purple	External zero trigger	-
9	GND	gray	Electrical ground	1
10	GND	white	Electrical ground	2
11	GND	pink	Electrical ground	3
12	GND	light green	Electrical ground	-
13	GND	black-white	Electrical ground	-
14	GND	brown-white	Electrical ground	-
15	UB-EXT	red-white	Positive supply voltage 10-28V	-

The colors refer to the wire colors of the included 3 m cable with the 15-pin plug (SubD15).

External zero point adjustment

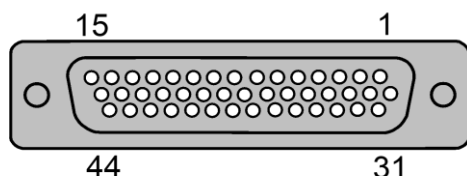
The zero setting range is $\pm 100\%$ of the measuring range for $\pm 10V$ variant. For the 4-20-12 mA variant the zero setting range is $+100\%/-60\%$.

A brief (< 2 s) high level >3 V (max. 24 V) at the tare input pin 8 sets all analog outputs to 0 V.

External shunt trigger

A high level signal >3 V (max. 24 V) at the shunt input pin 7 will activate the 624 kOhms shunt resistor between Negative differential input UD- and Negative bridge supply US- on all inputs simultaneously.

Connection diagram for input socket: 44-pin Sub-D HD, female



Channels 1,2,3, Sub-D HD 44			
Pin	Signal	Description	Channel
Shield	PE	Earth (housing)	-
1	n.c.	not connected	-
2	US-	Negative bridge supply	1
3	US+	Positive bridge supply	1
4	Q350	Quarter bridge completion 350 Ohm	1
5	UD+	Positive differential input	1
6	n.c.	not connected	-
7	UF-	Negative sense line (6-wire connection only)	1
8	UF+	Positive sense line (6-wire connection only)	1
9	Q120	Quarter bridge completion 120 Ohm	1
10	UD-	Negative differential input	1
11	Q1k	Quarter bridge completion 1000 Ohm	1
12	HB	Half bridge completion	1
13	n.c.	not connected	-
14	GND	Ground	-
15	PE	Earth (housing)	-
16	n.c.	not connected	-
17	US-	Negative bridge supply	2
18	US+	Positive bridge supply	2
19	Q350	Quarter bridge completion 350 Ohm	2
20	UD+	Positive differential input	2
21	n.c.	not connected	-
22	UF-	Negative sense line (6-wire connection only)	2



Channels 1,2,3, Sub-D HD 44			
Pin	Signal	Description	Channel
23	UF+	Positive sense line (6-wire connection only)	2
24	Q120	Quarter bridge completion 120 Ohm	2
25	UD-	Negative differential input	2
26	Q1k	Quarter bridge completion 1000 Ohm	2
27	HB	Half bridge completion	2
28	n.c.	not connected	-
29	GND	Ground	-
30	n.c.	not connected	-
31	n.c.	not connected	-
32	US-	Negative bridge supply	3
33	US+	Positive bridge supply	3
34	Q350	Quarter bridge completion 350 Ohm	3
35	UD+	Positive differential input	3
36	n.c.	not connected	-
37	UF-	Negative sense line (6-wire connection only)	3
38	UF+	Positive sense line (6-wire connection only)	3
39	Q120	Quarter bridge completion 120 Ohm	3
40	UD-	Negative differential input	3
41	Q1k	Quarter bridge completion 1000 Ohm	3
42	HB	Half bridge completion	3
43	n.c.	not connected	-
44	GND	Ground	-

M12 connector with A-coding, female

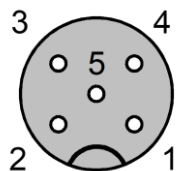


Figure 1: Pin configuration of M12 socket for sensor connection

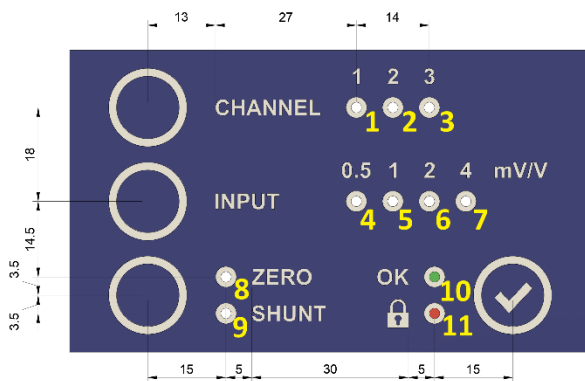
5-pin socket

Pin-No.	Pin assignment	ME (Type 1)	ME (Type 2)	Phoenix SAC-5P
1	+U _S positive bridge supply	brown	red	brown
2	-U _S negative bridge supply	white	black	white
3	+U _D positive bridge output / differential input	green	green	blue
4	-U _D negative bridge output / differential input	yellow	white	black
5	Quarter bridge QB ¹	gray		gray

Minimum required wiring: Pins 1-4 for bridge sensors.

¹At delivery state, pin 5 is not connected (see p.14 for connection plan)

LEDs and buttons



Indication of the LEDs

- LEDs 1-3: Selected channel
- LEDs 4-7: Sensitivity of input
- LED 8: Zero/Tare
- LED 9: Shunt
- LED 10: Enter confirmation
- LED 11: Menu locked

LEDs 1-3 represent the selected channel. LED 4-7 flashes to represent the current sensitivity of the selected channel. Continuous lighting of these LEDs indicates a selected input sensitivity, which can be switched to by pressing the "OK" button.

LEDs 8 and 9 light up permanently when the respective option is selected, and LED 9 flashes when the shunt is active. LED 10 flashes when a previously selected setting is confirmed with "OK". For example, changing a channel from 2 mV/V to 4 mV/V.

Function of the push buttons

Button	Designation	Abbreviation
1	CHANNEL button	„CH“
2	INPUT button	„IN“
3	ZERO/SHUNT button	„ZS“
4	OK button	„OK“

Button 1 [CH]:

1. Short press:
With "CH" one or all channels can be selected by pressing. First, the 3 individual channels are selected by pressing a button and then all channels. When you press the button again, no channel is selected and the sequence starts again. LEDs 1-3 indicate the selected channel, all LEDs glowing means all channels are selected.
2. Long press:
No function

Button 2 [IN]:

1. Short press: (Only possible if a channel has been previously selected)
If one or all channels have been selected, a new input sensitivity can be set with "IN". This needs to be confirmed by pressing "OK". Similar to "CH", each sensitivity is selected one after the other with a push of the button.
2. Long press (min. 3s): (Only possible if a channel has been previously selected)
By long pressing "IN" the "manufacturer tare" can be set for a selected channel. This does not have to be confirmed by pressing "OK" but is carried out immediately.
3. No function if no channel was selected or Activate Shunt was selected with "ZS".

Button 3 [ZS]:

1. Short press:

With "ZS" you choose between 2 options: Set zero/tare or activate shunt resistor.

Set zero: When this function is selected, the ZERO LED No. 8 lights up. Zeroing is possible for individual channels or all at the same time and causes the output to be set to 0V.

Activate shunt resistor: When this function is selected, SHUNT LED No. 9 lights up. The shunt can only be activated on all channels at the same time. When the shunts are activated, the bridge inputs are additionally detuned, so that the output signals change significantly. This allows the function of the measuring amplifier to be checked.

Both options must be confirmed by pressing "OK". If neither of the two associated LEDs lights up, neither zero/tare nor shunt activation is selected - then, a channel can be selected as usual and the input sensitivity can be changed.

2. Long press:

No direct function, only in combination with a simultaneous long press on "OK" (see there).

Button 4 [OK]:

1. Short press:
Briefly pressing "OK" confirms the entry you have set. This locks each button for 3 seconds and is visually indicated by the flashing of LED 10.
2. Long press:
No direct function. In combination with "ZS", **if both buttons are pressed simultaneously for at least 3 seconds, all buttons are locked.** If both buttons are later pressed simultaneously for at least 3 seconds, all buttons are unlocked again. If LED 11 lights up permanently, the menu is locked.

Further functions of all buttons:

1. Power saving/sleep mode
If no button is pressed for at least 30 seconds, the device has not been actively locked and the shunt is not active, the energy saving mode is activated. In this mode, all LEDs are turned off except for the green Power LED on the side (this lights up permanently). The power-saving mode is terminated by pressing any key. The device can then be used as usual by pressing any button again, for example on "CH".
2. Shunt active mode:
If the shunt resistor has been activated (visually recognizable by the flashing of LED 9), it can be disabled by pressing any button. The GSV-5A3 can then be used as usual.

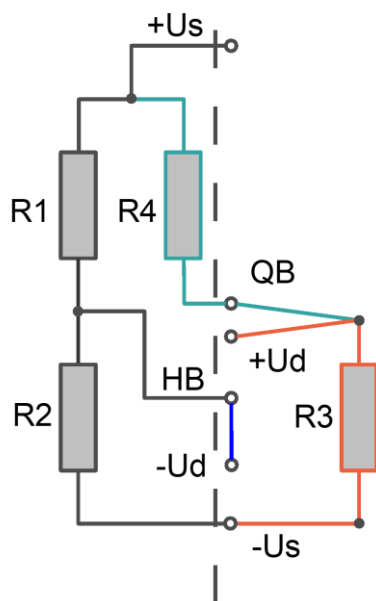
Analog outputs

The analogue outputs can be configured as **voltage: $\pm 10\text{V}$** or **current: 4-20-12mA** by factory. It is not possible to change output signal configuration after manufacturing retrospectively.

Connecting six-wire technology sensors

By factory default all GSV-5A3 variants are delivered with internally bridged sense inputs and calibrated for four wire technology sensors. Six-wire sensors can be connected using internally bridged sense input pins +UF/-UF of the SubD44-HD socket, however not taking advantage of six-wire technology benefits. All **SubD44-HD** variants of GSV-5A3 can be reconfigured upon request for proper use of six-wire technology by factory.

Connection strain gauge quarter bridge

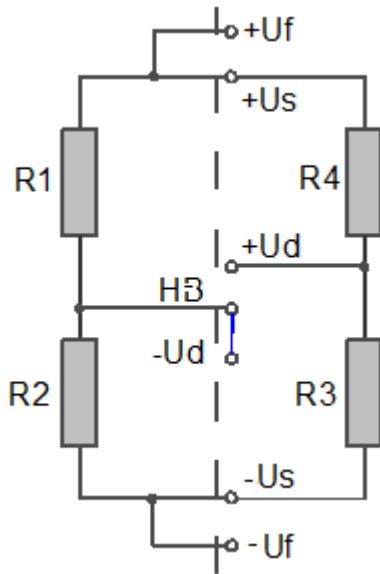


The active strain gauge R3 is connected by 3-wire technology.

The internal completion resistors 120 Ohm (QB = Q120), 300 Ohm (QB = Q350) and 1 kOhm (QB = Q1k) are lead through on the connection "QB".

The internal half bridge R1, R2 is activated with a wire jumper from HB to -Ud.

Connection strain gauge half bridge

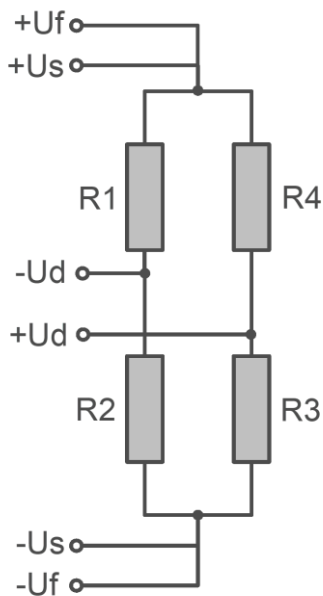


The active strain gauges R3 and R4 are connected to **+Us**, **+Ud** and **-Us**.

For very long cable lengths the sense lines **+Uf** and **-Uf** can be used additionally (*6-wire technology is not implemented in standard factory configuration of GSV-5A3*).

The internal half bridge R1, R2 is activated with a wire jumper from **H3** to **-Ud**.

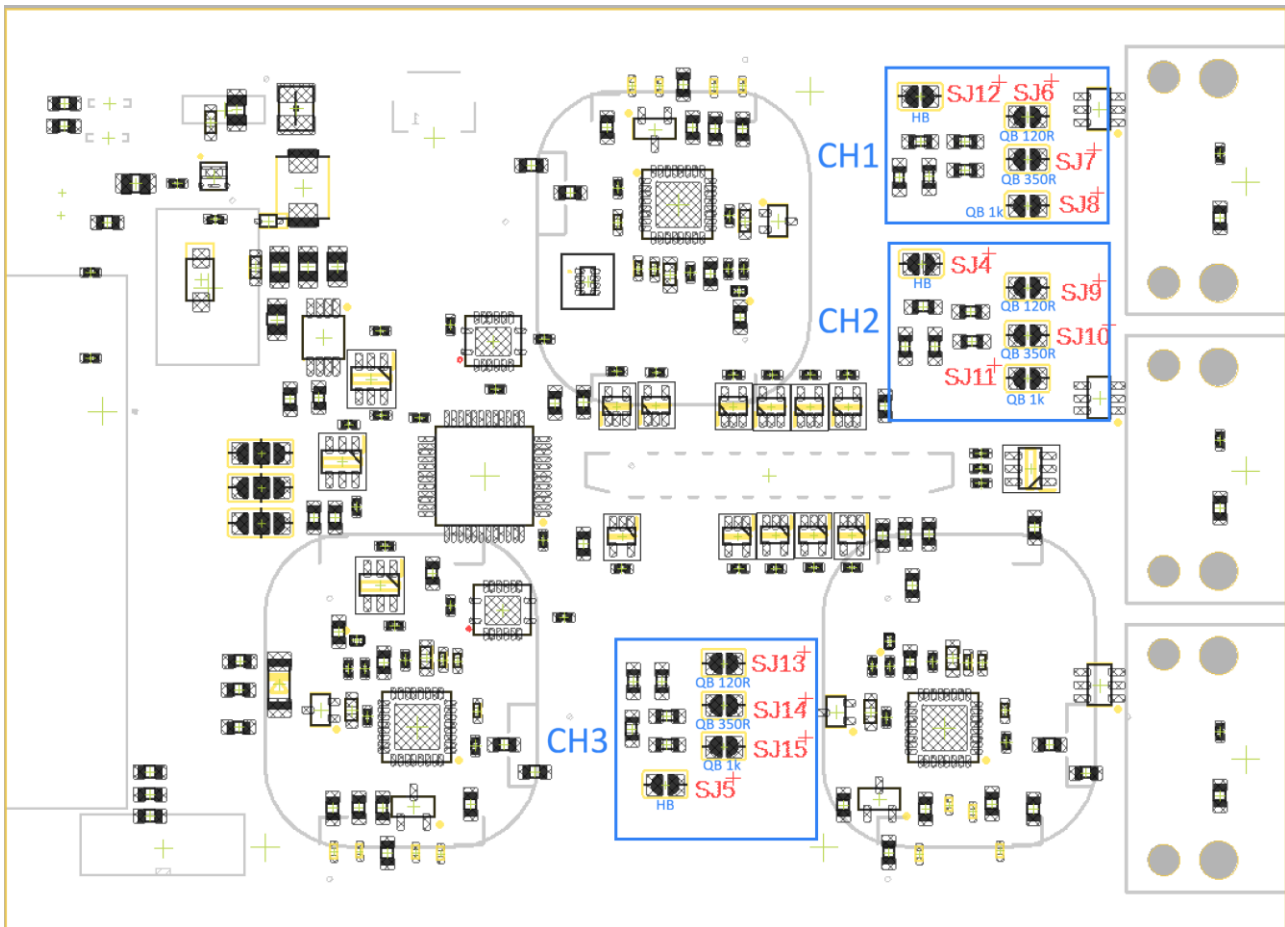
Connection strain gauge full bridge



The active strain gauges R1 to R4 are connected on **+Us**, **-Us**, **+Ud**, **-Ud**.

For very long cable lengths the sense lines **+Uf** and **-Uf** can be used additionally (*6-wire technology is not implemented in standard factory configuration of GSV-5A3*).

Connecting Strain Gauge Half- and Quarter bridges to GSV-5A3 M12



When connecting half- or quarter bridges to the GSV-5A3 M12, the housing has to be opened by loosening the screws. Then, that side can be pulled out, together with the PCB. The top side of the casing which contains the keyboard, requires to be handled with care, as the keyboard ribbon cable is very sensitive to mechanical influence.

Behind the M12 connectors, on the bottom side of the PCB, there are 4 solder jumpers for each channel 1, 2 and 3.

The jumper "HB" (SJ4, SJ5, SJ12) has to be closed for both half- and quarter bridges. Only in case of quarter bridges, additionally one of the three solder jumpers "QB 120R" (SJ6, SJ9, SJ13), "QB 350R" (SJ7, SJ10, SJ14) or "QB 1k" (SJ8, SJ11, SJ15) has to be closed, too. It must match the resistance of the single grid strain gauge used (e.g. QB 350R for 350 Ohms or QB 1k for 1000 Ohms).

The configuration can be done by factory upon request.

Technical data

Inputs	GSV-5A3	Unit
Input sensitivity (factory setting)	±2,0	mV/V
Can be switched to	±4,0; ±1,0; ±0,5	mV/V
Analog outputs		
Number	3	
Analog current Output	4-20-12	mA
Analog voltage output	±10	V
Output Impedance	47	Ohm
Cutoff frequency	2500 (configurable upon request)	Hz
Supply		
Supply voltage	10 ... 28	V
Bridge supply voltage	5	V
Type of interface	Analog	
Zero adjustment		
Tolerance	1	mV
Duration	160	ms
Debounce time	2	s
Trigger level switch input	3 ... 24	V
Trigger edge	falling	
Environmental data		
Nominal temperature range	-10 ... 65	°C
Usage temperature range	-40 ... 85	°C
Basic data		
Case dimensions SubD44HD var. (without plugs)	124 x 71,5 x 28	mm
Case dimensions M12 var. (without plugs)	124 x 71,5 x 32	mm
Channels	3	
Analogue socket (input)	Sub-D 44 HD/M12	
Analogue socket (output)	Sub-D 15	
Accuracy data		
Accuracy class	0,1	%
Relative linearity deviation	0,02	%FS
Temperature influence on the zero point	0,2	%FS/10°C
Temperature influence on the sensitivity	0,1	%RD/10°C
Warm-up time (99,8%FS)	5	Min.
Power consumption		
Continuous current consumption at 12 V	140	mA
Continuous current consumption at 18 V	115	mA
Continuous current consumption at 24 V	100	mA



Change log

Version	Date	Changes
1	12/2025	Initial release
1.1	03/2026	Case dimensions, Tare/Shunt pinout corrected
1.2	03/2026	Corrections of zero setting range, cutoff frequency
1.3	03/2026	Corrected LED indicator description

Subject to change.
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