

# interface

ADVANCED FORCE MEASUREMENT

## 8 channel measuring amplifier BSC8D

### Operating Instructions 15-208 Revision A



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## Features:

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

## Description

The measuring amplifier BSC8D 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 up to 16 analog 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 master unit via a 37-pin flat ribbon cable.

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

The analog input signals from the strain gauges are amplified by 8 or 16 precision measuring amplifiers GSV-1L to  $\pm 5$  volt and digitalized 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 BSC8D and can be activated via solder bridges.

The benefit of the GSV-1L measuring amplifier used is the low-noise amplification and automatic analog 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


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 1: Terminal assignment round connector 5-pin M12

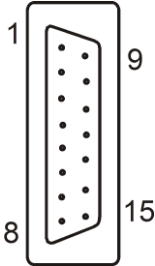
Socket Spring contacts	Pin No.	Terminal assignment	ME	SAC-5P
(Top view) 	1	GND (-U <sub>S</sub> ) for shielding		
	5	-U <sub>S</sub> negative bridge power supply	white	white
	6	+U <sub>S</sub> positive bridge power supply	brown	brown
	8	+U <sub>D</sub> positive differential input	green	blue
	15	-U <sub>D</sub> negative differential input	yellow	black
	14	AUX quarter bridge completion 350Ω	grey	grey

Table 2: Terminal assignment Sub-D 15 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

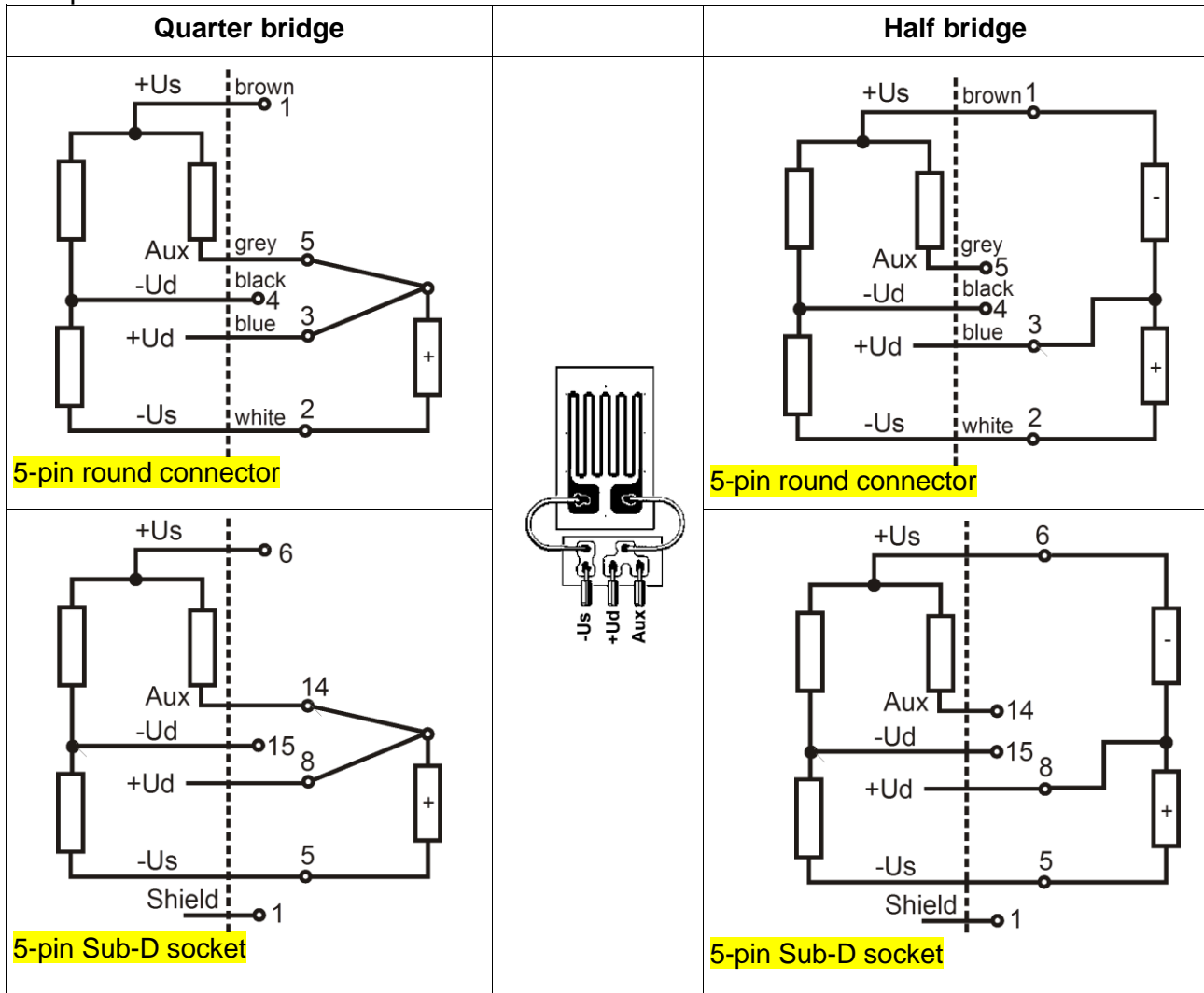
Table 3: Connection for voltage supply, M8 plug connector

## Wiring diagram for quarter bridges and half bridges

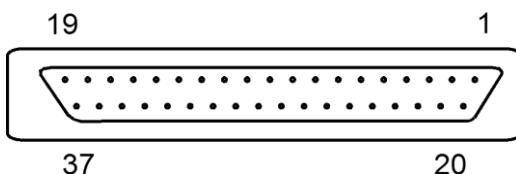
To connect quarter or half bridges, the measuring amplifier must be configured accordingly. The supplement resistors are connected by closing the solder bridges. For closed solder bridges, the connection of strain gauge full bridges is possible but reduces the sensitivity to the supplied calibration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



## Pin assignment for 37-pin Sub-D



## Assignment for BSC8S *without* USB port (slave unit)

PIN	BSC8S
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
35	"Tare - function" - Display by "error" LED
All pins not listed are not connected / n.c.	

## Assignment for BSC8D *with* USB port

PIN	GSV-1A8USB		NI-6210-USB	
1			AI 8	Input ±10V
2			AI 9	Input ±10V
3			AI 10	Input ±10V
4			AI 11	Input ±10V
5			AI 12	Input ±10V
6			AI 13	Input ±10V
7			AI 14	Input ±10V
8			AI 15	Input ±10V
9	CH1 - Channel 1	Output ±5V	AI 0	Input assigned
10	CH2 - Channel 2	Output ±5V	AI 1	Input assigned
11	CH3 - Channel 3	Output ±5V	AI 2	Input assigned
12	CH4 - Channel 4	Output ±5V	AI 3	Input assigned
13	CH5 - Channel 5	Output ±5V	AI 4	Input assigned
14	CH6 - Channel 6	Output ±5V	AI 5	Input assigned
15	CH7 - Channel 7	Output ±5V	AI 6	Input assigned

16	CH8 - Channel 8	Output $\pm 5V$	AI 7	Input assigned
20-27	Ground	Analog 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			P1.2	Digital output
35	Tare	reserved	P1.3	Reserved for "Tare -Function" Display by "error" LED
36			D GND	Digital ground
All pins not listed are not connected / n.c.				

## Assignment for BSC16D with USB port

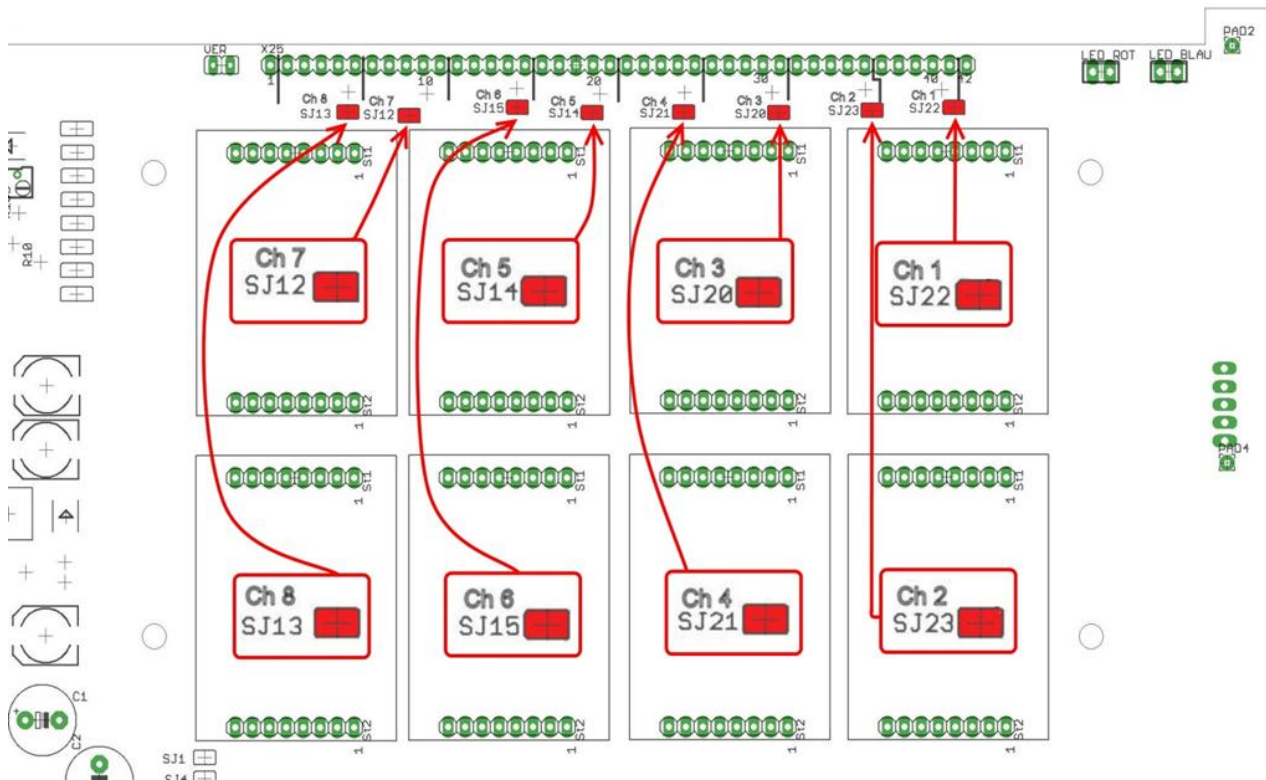
The measuring amplifier BSC16D consists of 1 x BSC8D and 1x BSC8S. Both devices are connected via a flat ribbon cable at the rear.

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	Analog 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			P1.2	Digital output
35	Tare	reserved	P1.3	Reserved for "Tare -Function" Display by "error" LED
36			D GND	Digital ground

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

		
Sensor-actuator cable with M12 plug connector	Grounding plug (included)	Cable for connecting devices "BSC8D" and "BSC8S", (included)

## 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
Analog filter	2500, optional 250 or 10000	Hz
<b>Outputs</b>		
Analog output Output resistance	$\pm 5$ 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	-10...+65	°C
Storage temperature range	-20...+65	°C
Drift of zero point	< 0.05	%/10°C
Drift of sensitivity	< 0.01	%/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.

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