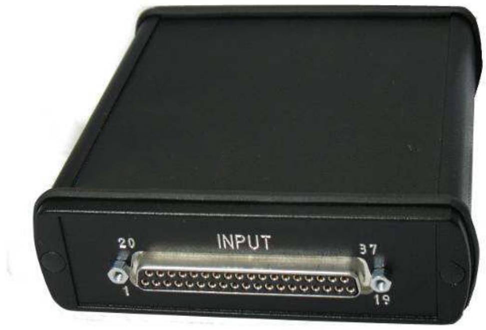
4 channel measuring amplifier BSC4D

USB Version
Operating Instructions
15-183 Revision A

mV/V measuring amplifier BSC4-USB

BSC4D-Cxx (M12)
Front view sensor connection



BSC4D-Dxx (SUB-D37)
Front view sensor connection

- 4-channels
- Power supply via USB port
- Inputs for mV/V / 0–5 V
- Measurement ranges 2 mV/V / 10 mV/V
- DMS quarter / half / full bridges
- 8 digital inputs / outputs
- Data rate 0 Hz–125 Hz

Description

This 4-channel measuring amplifier for sensors with strain gauges is equipped with a USB interface. The DC supply voltage for the unit is provided via the USB port at the back of the measuring amplifier. The measuring amplifier can be delivered with an SUB-D37 connection or with 4x M12 ports. The unit also has eight digital inputs and outputs.

Dimensions

(See page 32 for mounting instructions)

Figure 1: Dimensions BSC4D-Dxx (SUB-D37)

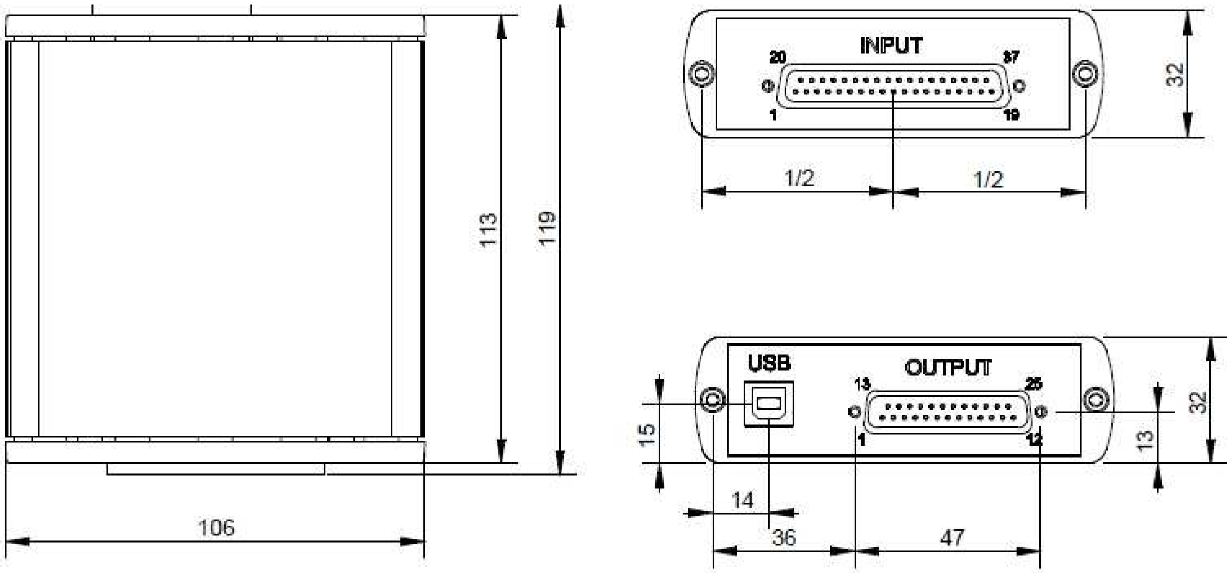
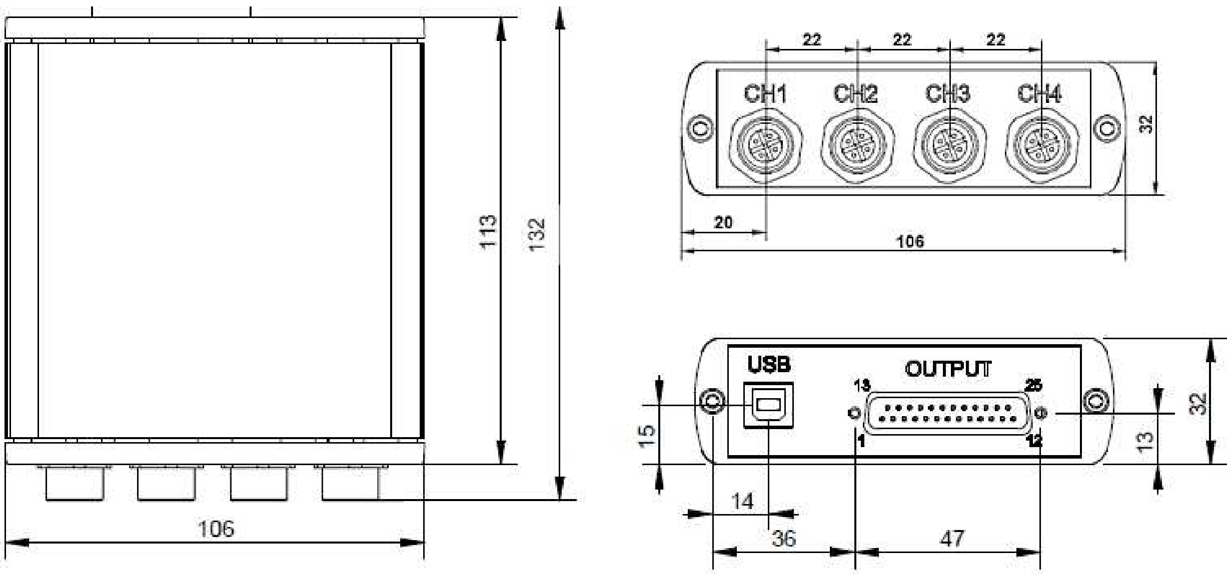


Figure 2: Dimensions BSC4D-Cxx (M12)

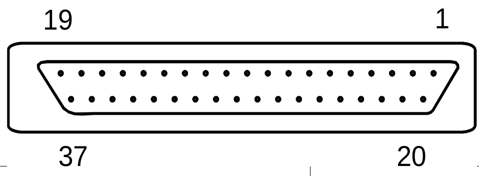


Technical data

1.Accuracy class	**0.05**	**%**
Inputs		
Resolution	16	Bit
DMS inputs Full bridge Half bridge Quarter bridge	 350-5000 350-5000 120 / 350 / 1000	 Ohm Ohm Ohm
Common mode rejection at 60 Hz common-mode signal	 95–110	 dB
Measurement frequencies		
Data frequency	0–125	Hz
Sampling frequency	1.92	MHz
Cut-off frequency analog digital	 1000 Notch filter	 Hz Hz
Outputs		
Bridge supply voltage Current load capacity	2.5 10	Volt mA
Fixed voltage output Current load capacity	5 20	V mA
Switching outputs/inputs I/O 1-8 Current load capacity:	TTL level 5 (active High) 5	 V mA
Interface	USB 1.1, USB 2.0 compatible	
Supply voltage Nominal range Isolation voltage Current consumption	 4.5...5.5 via USB port 1000 < 200	 V DC Vrms mA
Temperature range		
Nominal temperature range Storage temperature range Zero point drift Sensitivity drift	-10…+65 -40…+85 < 0.05 < 0.01	°C °C %/10°C %/10°C
Dimensions		
L x W x H	106 x 119 (132) x 32	mm
Protection type / Weight		
Protection type	IP40	
Weight BSC4-USB SUB-D37	239	g

Table 1: Technical data BSC4D

Connection plan for 37-pin D-sub port



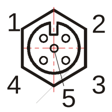
	BSC4D-Dxx assignment	37-pin D-sub port (PIN No.)			
		Channel 1	Channel 2	Channel 3	Channel 4
+US	positive sensor supply	20	2	11	29
+UD	positive differential input	22	4	13	31
QB1000	quarter bridge extension 1kOhm	23	5	14	32
HB	half bridge extension	24	6	15	33
-UD	negative differential input	25	7	16	34
-US	negative sensor supply	27	9	18	36
UE	analog input	28	10	19	37
	screen	1	1	1	1

Table 2: Analog inputs

Connection assignment for BSC4D-Cxx (M12)

5-pin port M12x1, type 763

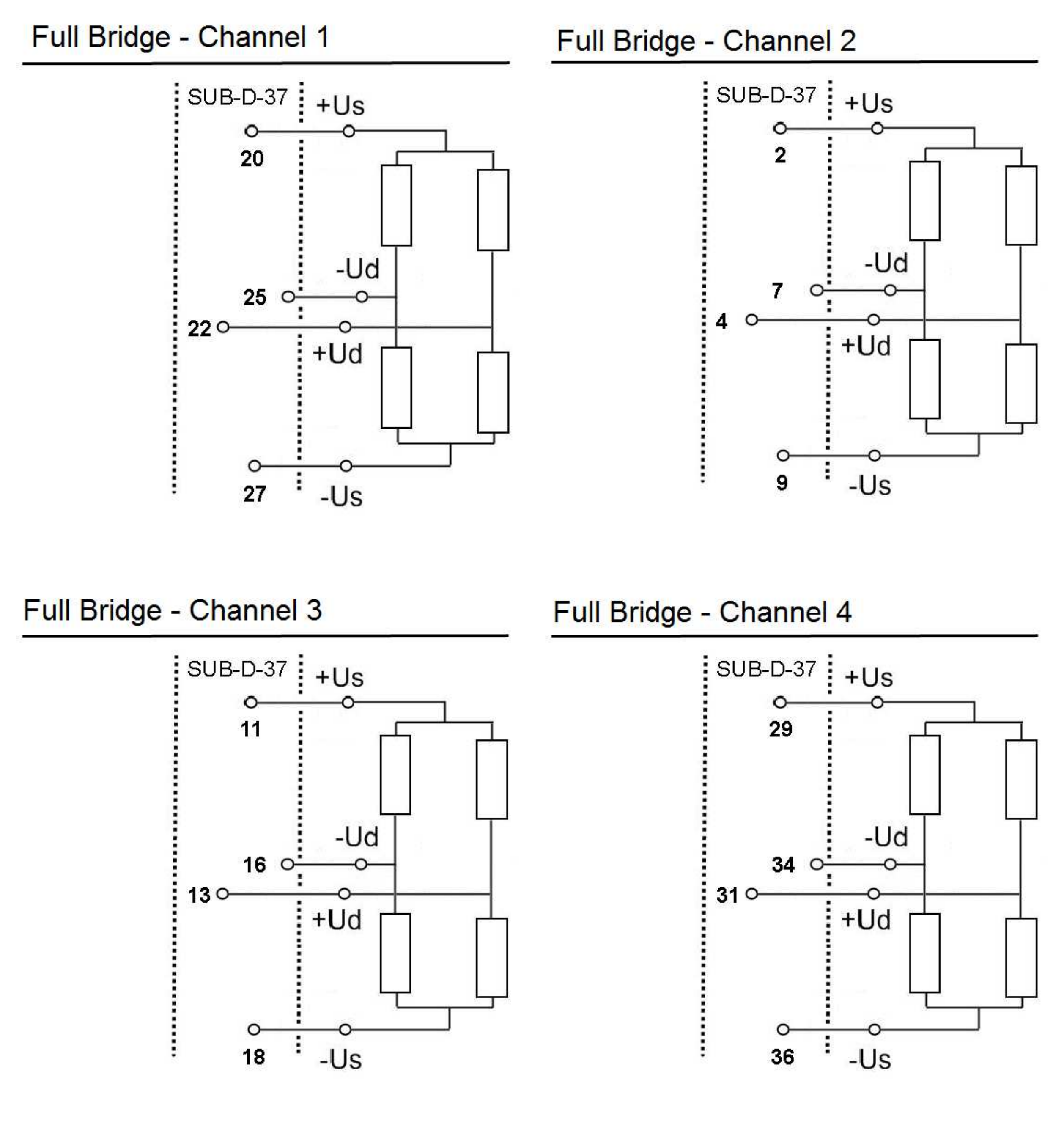
Top view:



5-pin	Description	Color code for cables
2	-US negative bridge supply	white
1	+US positive bridge supply	brown
3	+UD positive differential input	blue
4	-UD negative differential input	black
5	AUXin input without cable	grey

Connection of full bridge with SUB-D37 version

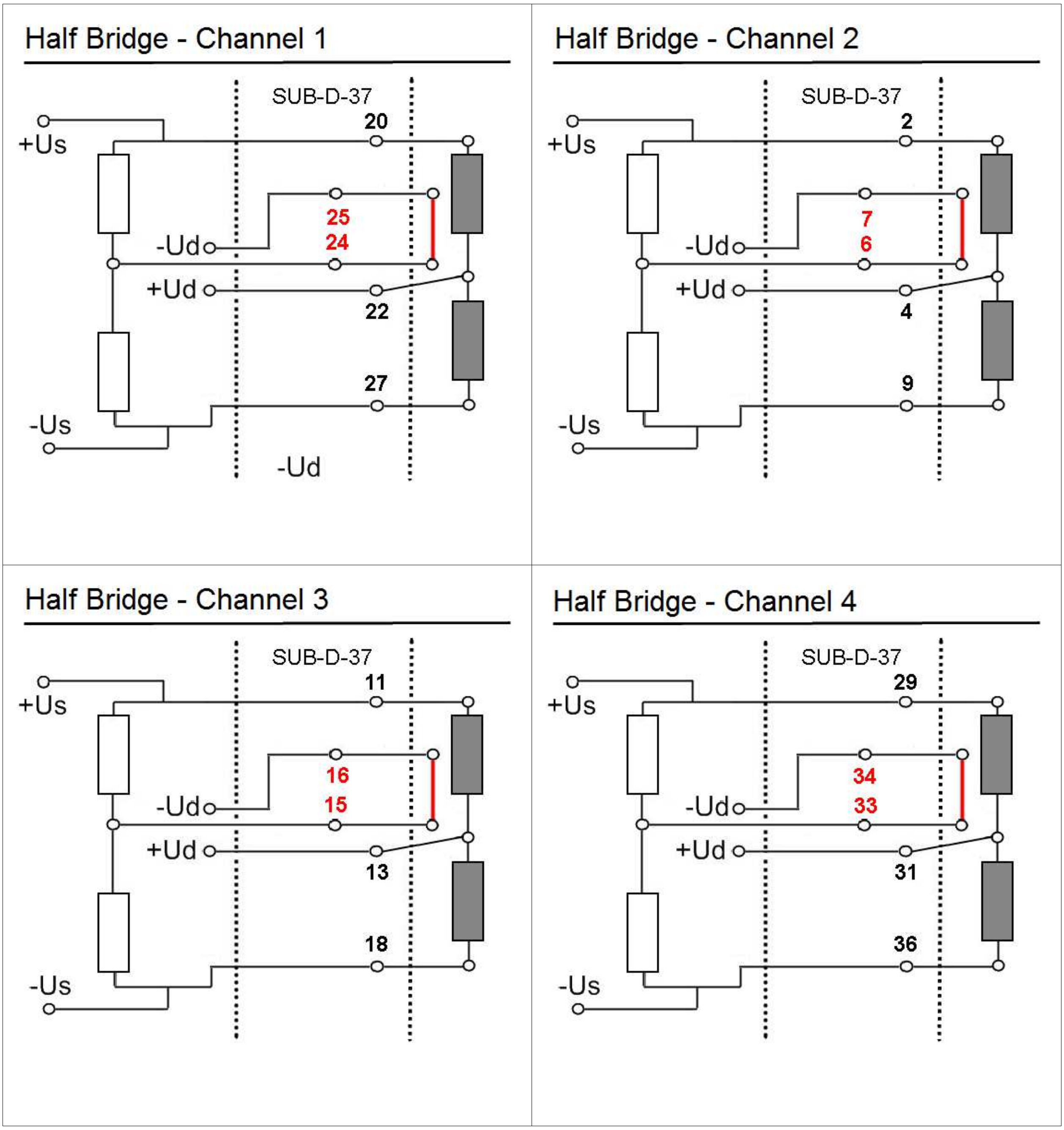
The following graphics show the connection of a full bridge to channel 1 through to channel 4.



Connection of half bridge with SUB-D37 version

The following graphics show the connection of a half bridge to channel 1 through to channel 4.

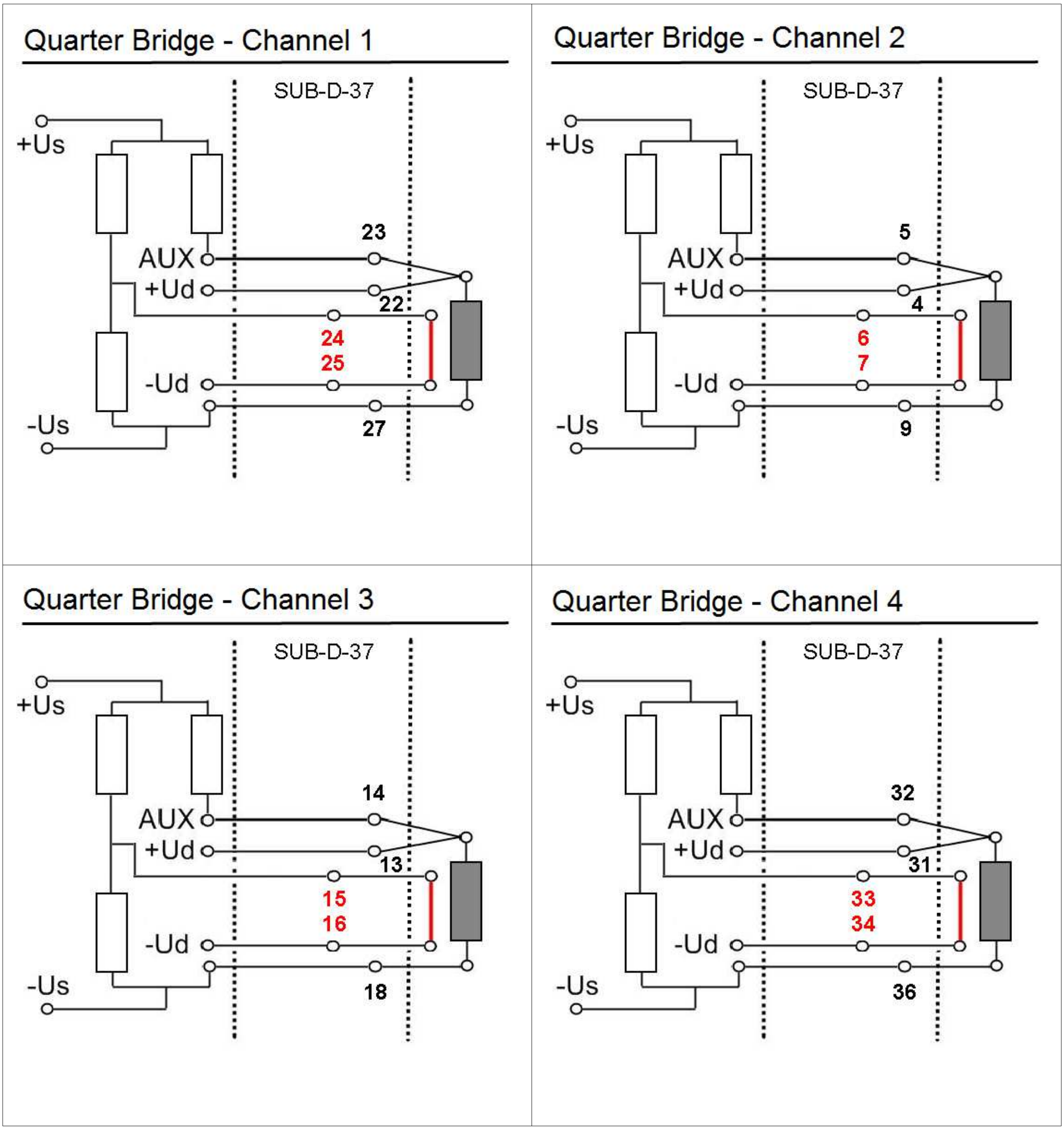
The bridge extension should be adapted depending on the application.



Connection of quarter bridge with SUB-D37 version

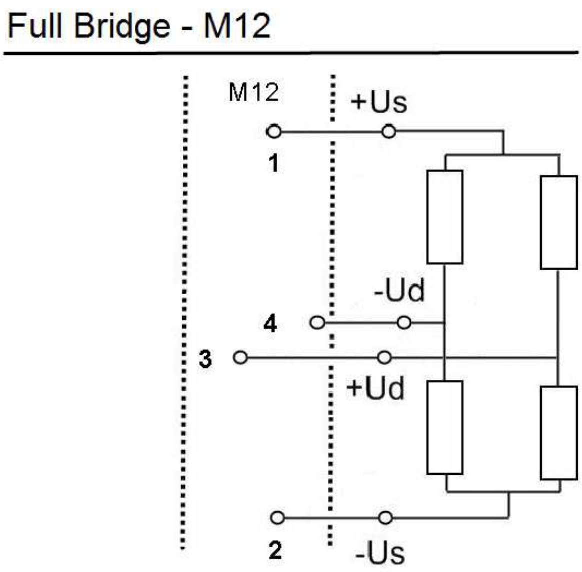
The following graphics show the connection of a quarter bridge to channel 1 through to channel 4.

The bridge extension should be adapted depending on the application.



Connection of full bridge with M12 version

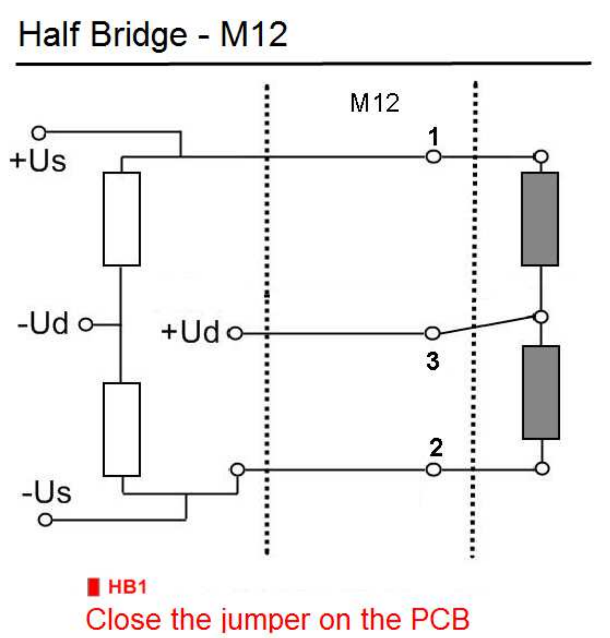
The following graphic shows the connection of a full bridge for the M12 version.



Connection of half bridge with M12 version

The following graphic shows the connection of a half bridge for the M12 version.

The bridge extension should be adapted depending on the application.



Please set the solder bridges:

- •HB1 when using channel 1 with a half bridge.
- •HB2 when using channel 2 with a half bridge.
- •HB3 when using channel 3 with a half bridge.
- •HB4 when using channel 4 with a half bridge.

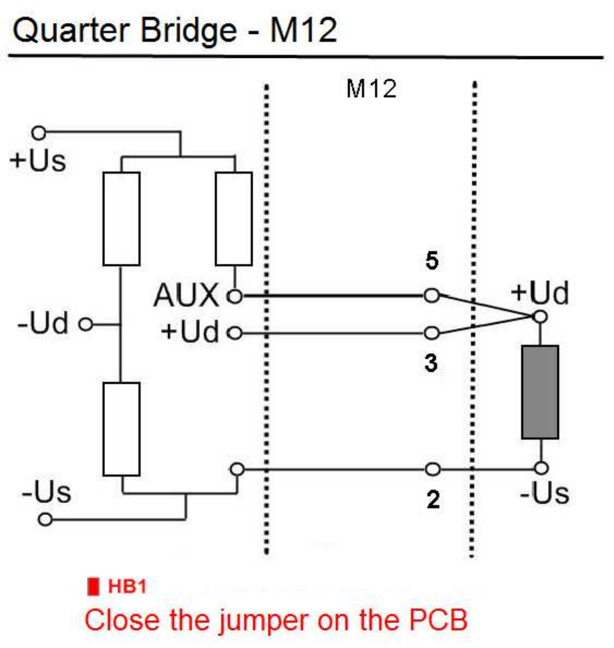
Solder bridges: Figure 3: Solder bridges for configuring bridge extensions

see page 11

Connection of quarter bridge with M12 version

The following graphic shows the connection of a quarter bridge for the M12 version.

The bridge extension should be adapted depending on the application.

	**Please set the solder bridges:** •HB1 when using channel 1 with a quarter bridge. •HB2 when using channel 2 with a quarter bridge. •HB3 when using channel 3 with a quarter bridge. •HB4 when using channel 4 with a quarter bridge. Solder bridges: Figure 3: Solder bridges for configuring bridge extensions see page 11

Configuring the channel sensor impedance

The bridge sensor impedance can be configured individually for each channel; open the device and configure the desired solder bridge according to the following figure.

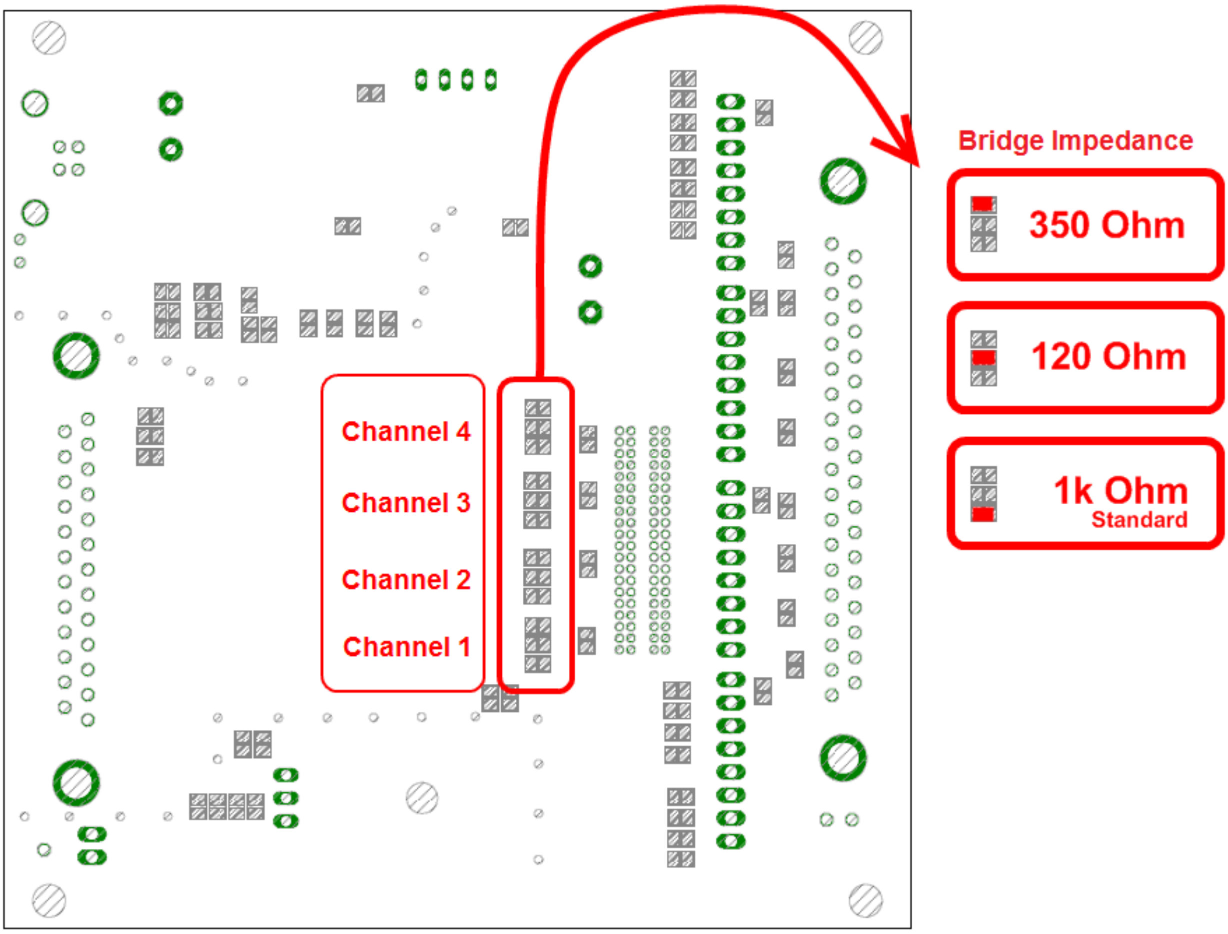
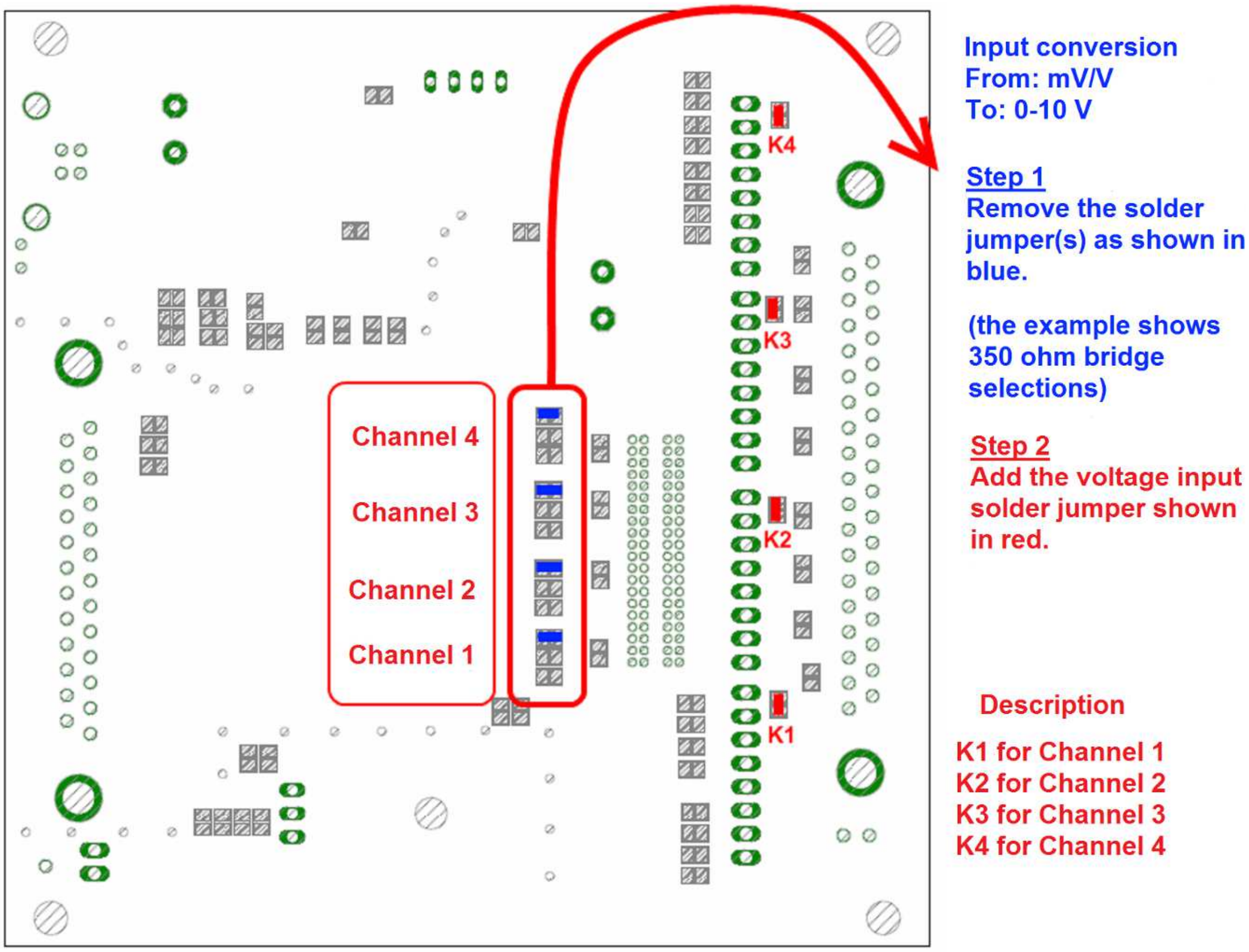


Figure 4: Solder bridges for configuring bridge impedance

Altering from mV/V input to a voltage input

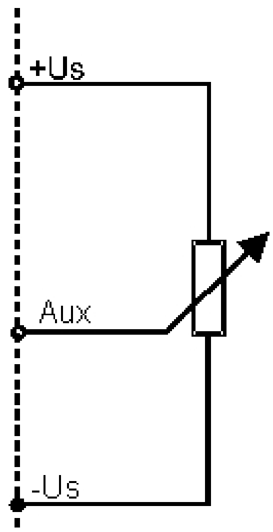
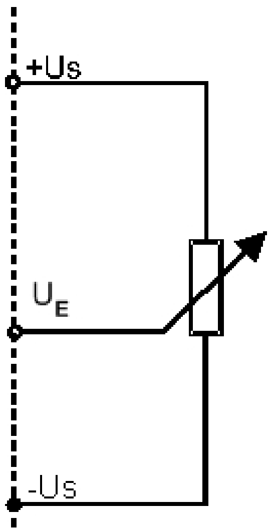


Opening the device

1.Remove both screw covers from the input side and remove the fastening screws from the front cover.
2.The two hexagonal bolts on the 37-pin D-Sub port must be loosened using a socket spanner (5 mm).
3.The printed circuit board is pulled out on the side of the 25-pin D-Sub port.

Wiring diagram for position sensors

The measuring amplifier BSC4D must be configured by the manufacturer separately when using it with potentiometric position sensors (linear potentiometers or draw wire displacement sensors) for the M12 version.
The position sensor's wiper is connected to the measuring amplifier's "Aux" input (M12) or "U" (SubD37). The position sensor supplies via the sensor supply +Us and -Us.

5-pin port	37-pin D-SUB port
	

The potentiometric position sensor is supplied with 2.5 V.
The "Aux" input or U_E records voltages of 0...5 V.

Connection assignment

Label	5-pin port	37-pin D-SUB port				
			CH 1	CH 2	CH 3	CH 4
positive supply +Us	1	positive supply +Us	20	2	11	29
negative supply -Us	2	negative supply -Us	27	9	18	36
"Aux" input	5	U_E input	28	10	19	37

Connection of the Way Con – draw wire sensor SX

4-pin port Waycon draw wire sensor SX	**5-pin port**	**Label**	**Color code M12 sensor-actuator cable**
1 (+supply)	1	positive supply +Us	brown
3 (GND)	2	negative supply -Us	blue
2 (wiper)	5	“Aux” input	white

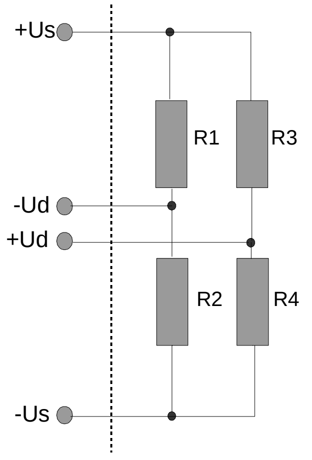
4-pin port Waycon draw wire sensor SX	***37-pin D-SUB port***				
	CH 1	**CH 2**	**CH 3**	**CH 4**	
1 (+supply)	20	2	11	29	pos. supply +Us
3 (GND)	27	9	18	36	neg. supply -Us
2 (wiper)	28	10	19	37	U_E input

Connection assignment SUB-D25 port

BSC4D assignment	**25-pin D-sub port (PIN-No.)**			
IO 5 V fixed voltage output	1			
IO GND	2			
IO 1	3			
IO 2	4			
IO 3	5			
IO 4	6			
IO 5	7			
IO 6	8			
IO 7	9			
IO 8	10			
TX	11			
RX	12			
GND	13			
	Channel 1	**Channel 2**	**Channel 3**	**Channel 4**
Channel GND	14	17	20	23
	15	18	21	24
Channel AUX	16	19	22	25

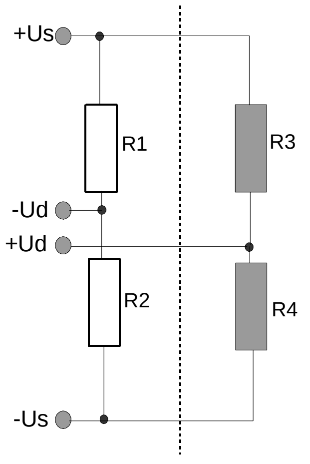
Wiring diagram

mV/V full bridge



	ch 1	ch 2	ch 3	ch 4
+Us	2	13	24	35
+Ud	3	14	25	36
-Ud	4	15	26	37
-Us	5	16	27	38
Sw.	1	12	23	34

mV/V half bridge

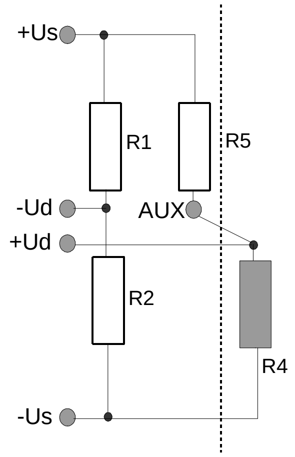


	ch 1	ch 2	ch 3	ch 4
+Us	2	13	24	35
+Ud	3	14	25	36
-Us	5	16	27	38
HBx	8	19	30	41
Sw.	1	12	23	34

The active strain gage R3 and R4 are connected to the terminals +Us, +Ud and -Us.

HBx: The solder bridges “8”, “19”, “30” or “41” must be closed so that the internal bridge completion resistors R1 and R2 are activated.

mV/V quarter bridge



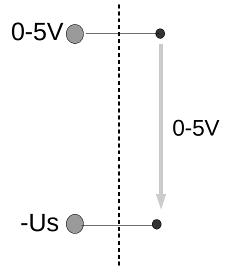
	ch 1	ch 2	ch 3	ch 4
+Ud	3	14	25	36
-Us	5	16	27	38
HBx	8	19	30	41
AUX	6	17	28	39
QB 120	11	22	33	44
QB 350	10	21	32	43
QB 1000	9	20	31	42
Sw.	1	12	23	34

The active strain gage R4 is connected to the terminals +Ud, AUX and -Us in 3-wire technology.

HBx: The solder bridges “8”, “19”, “30” or “41” must be closed so that the internal bridge completion resistors R1 and R2 are activated.

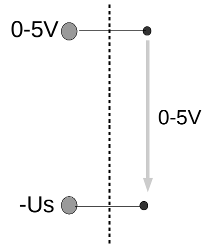
A solder bridge should be set depending on the DMS resistance (120/350/1000 Ohm), e.g. 120 Ohm at channel 1: Solder bridge 11 (vertical); 350 Ohm at channel 2: Solder bridge 21 (horizontal).

Voltage input 0-5 V



	ch 1	ch 2	ch 3	ch 4
	7	18	29	40
-Us	5	16	27	38
Sw.	1	12	23	34

Voltage input 0-10 V



	ch 1	ch 2	ch 3	ch 4
	7	18	29	40
-Us	5	16	27	38
Sw.	1	12	23	34

Programming / configuration

Scaling of measured values

Each channel can be configured individually for a defined measuring range, e.g.

For measuring

- with wire strain gauges 2 mV/V,
- with wire strain gauges 10 mV/V,
- with active sensors 0-5 V,
- with temperature sensors PT1000,
- with type K thermocouples,
- with active sensors 0–10 V,

The measuring range is set using the command “set_gain”.

105% of the input signal matches a value range of 0x0000 to 0xFFFF.

Measuring range 2.0 mV/V

Measuring range ±2 mV/V (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x01		
Input signal in mV/V	***Measuring range in %***	***16 Bit output value (hexadecimal)***
2.1	**105.00%**	**FFFFh**
2.0	**100.00%**	**F9E7h**
0.0	**0.00%**	**8000h**
-2.0	**-100.00%**	**0618h**
-2.1	**-105.00%**	**0000h**

Conversion of digital output value to analogue input signal:
Output value = Highbyte * 256 + Lowbyte;
Input signal Ud = (output value - 32768) / 32768 * 2.10 **mV/V;**

Measuring range 10.0 mV/V

Measuring range ±10 mV/V (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x02		
Input signal in mV/V	***Measuring range in %***	***16 Bit output value (hexadecimal)***
10.5	**105.00%**	**FFFFh**
10.0	**100.00%**	**F9E7h**
0.0	**0.00%**	**8000h**
-10.0	**-100.00%**	**0618h**
-10.5	**-105.00%**	**0000h**

Conversion of digital output value to analogue input signal:
Output value = Highbyte * 256 + Lowbyte;

Input signal Ud = (output value - 32768) / 32768 * 10.5 **mV/V;**

Measuring range 0.0 to 5 V

Measuring range 0-5 V (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x03		
Input signal in V	***Measuring range in %***	***16 Bit output value (hexadecimal)***
5.25	**105.00%**	**FFFFh**
5.0	**100.00%**	**F9E7h**
0.0	**0.00%**	**8000h**

Conversion of digital output value to analogue input signal:
Output value = Highbyte * 256 + Lowbyte;
Input signal Ud = (output value - 32768) / 32768 * 5.25 **V;**

Measuring range 0.0 to 10 V

Measuring range 0-10 V (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x07		
Input signal in V	***Measuring range in %***	***16 Bit output value (hexadecimal)***
10.5	**105.00%**	**FFFFh**
10	**100.00%**	**F9E7h**
0.0	**0.00%**	**8000h**

Conversion of digital output value to analogue input signal:
Output value = Highbyte * 256 + Lowbyte;
Input signal Ue = (output value - 32768) / 32768 * 10.5 **V;**

Measuring range PT1000

Measuring range PT1000 (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x04		
Input signal in °C	***Measuring range in %***	***16 Bit output value (hexadecimal)***
1050	**105%**	**FFFFh**
1000	**100%**	**F9E7h**
0.0	**0.0%**	**8000h**
-40	**-4%**	**6DB0h**

Conversion of digital output value to analogue input signal:
Output value = Highbyte * 256 + Lowbyte;
Input signal Ue = (output value - 32768) / 32768 * 1050 **°C;**

Measuring range K thermocouple cable

Measuring range K-thermocouple cable (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x06		
Input signal in °C	***Measuring range in %***	***16 Bit output value (hexadecimal)***

Measuring range K-thermocouple cable (set_gain 0xB2 <p1> <p2>) with p1=ch, p2=0x06		
1050	**105%**	**FFFFh**
1000	**100%**	**F9E7h**
0.0	**0.0%**	**8000h**
-40	**-4%**	**6DB0h**

Conversion of digital output value to analogue input signal:
Output value = Highbyte * 256 + Lowbyte;
Input signal Ud = (output value - 32768) / 32768 * 1050 **°C;**

Commands for configuration

The code of the command concerned is sent to the measuring amplifier for configuration. Some commands expect parameters, e.g. the channel number “ch” and potentially other bytes.
Note: To set the configuration, the data transfer should be interrupted by sending the command “stop_transmission”.
After completing the configuration, the data transfer can be restarted again by executing the command “start_transmission”.
Notes: After each switch-on, the “normal mode” must be set in order to send commands (0x26 01 62 65 72 6C 69 6E).

List of commands

The table lists the available commands (rev0x0B) and their hexadecimal codes.

Commands	Code	p1	p2	p3	p4	p5	p6	p7	p8	p9
set_zero	0C	ch								
save_configuration	09	B								
restore_configuration	0A	B								
set_offset	0B	ch	B	HB	B	LB				
get_offset	0D	ch	B							
set_frequency	12	B								
get_frequency	16									
get_serial_number	1F									
set_serial_number	1E	B	B	B	B	B	B	B	B	
set_threshold	20	B	HB	LB						
set_threshold	21	B								
stop_transmission	23									
start_transmission	24									

Commands	Code	p1	p2	p3	p4	p5	p6	p7	p8	p9
set_mode	26	B	B	B	B	B	B	B		
get_mode	27									
set_tx_status	28	B								
get_tx_status	29									
get_firmware_version	2B									
get_value	3B									
set_cal_factor	88	ch	HB	B	B	LB				
get_cal_factor	89	ch	B							
set_rs232	B0	ch								
get_rs232	B1									
set_gain	B2	ch	B							
get_gain	B3									
set_unit	B4	ch	B							
get_unit	B5	ch								
set_digital	B6	B								
get_digital	B7									
set_digital_on_off	B8	B	B							
get_digital_port	B9									
set_user_sring	BC	HB	B	B	B	LB				
get_user_sring	BD									
get_bat	BE									
set_user_scale	BA	ch	HB	B	B	LB				
get_user_scale	BB	ch	HB	B	B	LB				
set_can_bitrate	C0	B								
get_can_bitrate	C1									
reserved	C2									
reserved	C3									
set_can_id	C5	B	B	B	B	B				
get_can_id	C6	B								
reserved	C7									
reserved	C8									

Commands	Code	p1	p2	p3	p4	p5	p6	p7	p8	p9
reserved	D0	B	B	B	B	B	B	B		
reserved	D1									
reserved	D2	B	B							
reserved	D3									
reserved	D4									
reserved	D5	B	B							
reserved	D6									

Table 8: Command list for BSC4D (ch = channel number), B = byte, HB = high byte, LB = low byte)
Commands in grey are reserved for the initial setup or calibration. The commands shaded grey are only available after restarting.

Description of commands

set_gain (B2)

With the command set_gain, the 4 inputs on the measuring amplifier can be configured individually for various sensor types.

Parameters in HEX	Description
01	DMS input ±2 mV/V
02	DMS input ±10 mV/V
03	Analogue input 0-5 V
04	Input for PT1000 -40°C ... 1000 °C
06	Input for K-thermocouple cable -40°C ... 1000 °C
07	Analogue input 0 – 10 V

set_frequency (12)

The data frequency is set with the command set_frequency. The measurement data is acquired with the data frequency and are ready to be transmitted via the interface. By setting the data frequency, the digital filter is set automatically, see data frequencies and filter properties.

After executing the command "start_transmission", the measurement data is transmitted steadily at the set data frequency. After executing the command "stop_transmission", the measuring data is only sent when required. It can be requested with the command "get_value" or for devices with CAN bus via CAN-Sync_ID (page **Error! Bookmark not defined.**).

Note: Care should be taken to ensure that the request for measured values does not occur more frequently than the set data frequency. Otherwise, a current measured value will not be available every time there is a request. The same measured values are requested repeatedly.

Parameters in HEX	**Data frequency in Hz(nominal)**	**Data frequency in Hz(effective)**
A0	0.63	0.625
A1	1.25	1.250
A2	2.5	2.500
A3	3.75	3.750
A4	6.25	6.250
A5	7.5	7.500
A6	12.5	12.400
A7	15	14.700
A8	25	24.400
A9	125	114.000
AA	250	208.000
AB	500	
AC	937.5	
AD	1875	
AE	3750	
AF	7500	

set_can_bitrate (C0) / get_can_bitrate (C1)

Parameters in HEX	**Bitrate in kbit/s**
10	20
20	50
30	80
40	100
50	125
60	250
70	500 (standard)
80	1000

save_configuration (0A) / restore_configuration (09)

The entire configuration (data frequency, configuration of inputs, etc.) can be saved and restored as a parameter set. Two memories are available for the configuration.

Parameters in HEX	Description
01	Manufacturer setting
02	User setting 1
03	User setting 2

set_user_scale (BA) / get_user_scale (BB)

A scaling factor in 32 Bit format can be stored for each channel.
This scaling factor is stored in the EEProm of the measuring amplifier and can be read with get_user_scale.

Parameters in HEX	Memory No.	Label
01	1	Channel 1
02	2	Channel 2
03	3	Channel 3
04	4	Channel 4

Number format:

Sign	*Index*	*Significand*
Bit 0	Bit 1 ... Bit 8	Bit 9 ... Bit 31

Protocol for measured values

Measured values are framed by a prefix 0xA5 and a postfix from the sign 0x0D 0x0A (carriage return linefeed).
The entire frame is 11 bytes long.

Prefix	Channel 1		Channel 2		Channel 3		Channel 4		Postfix	
A5	HB	LB	HB	LB	HB	LB	HB	LB	0D	0A

Table 9: Protocol for transmitting the measured values via RS232 interface

Protocol for commands

After switching on, only the commands:

get_value (0x3B)

set_mode (0x26 01 62 65 72 6C 69 6E)

get_mode (0x27)

get_tx_status (0x29)

get_firmware_version (0x2B)

can be used! To be able to use all of the commands, “set_mode” has to be sent.

Commands begin with the code followed by parameters.

Code	Parameter			
xx	p1	p2	...	pn

Examples:
Requesting serial number 1F
Setting channel 1 to zero: 0C 01

Protocol for responding to commands

Responses are framed by a prefix 0x3B and a postfix from the sign 0x0D 0x0A (carriage return linefeed).
The entire frame has a variable length. The number of frames still to follow is given with “n”. The number of variable bytes is defined in the fourth and fifth Byte with the data word “len”. The entire length of the response is (10 + len) bytes.
The command “get_value” is an exception. The response to this command takes place with a protocol for measured values.

Prefix	Code	n	len		No.			len bytes				Postfix	
3B	xx	B	HB	LB	aa	bb	cc	p1	p2	...	pn	0D	0A

Table 10: Protocol for responding to commands

Example: Releasing commands

Send: 0x26 01 62 65 72 6C 69 6E

Example: Locking commands

Send: 0x26 00 62 65 72 6C 69 6E

Example: Request serial number

Send: 0x23
Send: 0x1F
Receive 0x 3B 1F 0100 08 30 35 30 30 38 34 34 39 30 35 30 0D 0A
Send 0x24
Result: The serial number is “08449050”.

Example: Change status(Send measured value OFF/ON)

To permanently save the value send stop or start measured value, the command set_tx_status (0x28<p1>) can be used.

Parameters in HEX	**Parameters in Bit**	**Current**	**After switching on**
00	0 0 0 0 0 0 0 0	Send measured value OFF	Send measured value OFF
01	0 0 0 0 0 0 0 1	Send measured value OFF	Send measured value ON
02	0 0 0 0 0 0 1 0	Send measured value ON	Send measured value OFF
03	0 0 0 0 0 0 1 1	Send measured value ON	Send measured value ON

Send: 0x23
Send: 0x29
Receive : 0x 3B 29 0100 01 30 33 33 01 0D 0A

Result: Current-OFF , After switching on-ON

Send: 0x28 02
Send: 0x29
Receive : 0x 3B 29 0100 01 30 33 33 02 0D 0A
Result: Current-ON , After switching on-OFF

Digital IOs

The entire port is always read (IO8 to IO1).

-4Example: Read port

Send: 0x23
Send: 0xB9
Receive : 0x 3B B9 0100 01 30 33 33 00 0D 0A

Result: all inputs and outputs are “low”

Parameters in HEX	**Parameters in Bit**	**Port**
00	0 0 0 0 0 0 0 0	IO8 IO7 IO6 IO5 IO4 IO3 IO2 IO1

The digital port can be configured with set_digital (0xB6 <p1><p2>) and set_digital_on_off(0xB8 <p1> <p2>). The port is set with <p1>/

set_digital (0xB6 <p1> <p2>)

Parameters in HEX <p2>	**Description**

Parameters in HEX <p2>	Description
00	Input
01	Output
02	get_Value
0A	Tara all
0B	Tara channel1
0C	Tara channel2
0D	Tara channel3
0E	Tara channel4
11	SW1
12	SW2
13	SW3
14	SW4
15	SW5
16	SW6
17	SW7
18	SW8

set_digital_on_off(0xB8 <p1> <p2>)

Parameters in HEX <p2>	Parameters in Bit	Port	Description
00	0 0 0 0 0 0 0 0	For IO1 to IO8	OFF
01	0 0 0 0 0 0 0 1	For IO1 to IO8	ON

Example: Change IO1

Send: 0x23
Send: 0xB6 01 0B
Send: 0xB7
Receive : 0x 3B B7 0100 02 30 33 33 01 0B 0D 0A

Result: IO1 is configured as Tara for channel1

Send: 0xB6 01 00
Send: 0xB7
Receive : 0x 3B B7 0100 02 30 33 33 01 00 0D 0A
Send: 0x24

Result: IO1 is configured as an input and can be read with 0xB9

set_threshold (0x20 <p1> <p2>)

Parameters in HEX <p1>	Description	Channel assignment	Switching threshold
01	SW1	1	ON
02	SW1	1	OFF
03	SW2	1	ON
04	SW2	1	OFF
05	SW3	2	ON
06	SW3	2	OFF
07	SW4	2	ON
08	SW4	2	OFF
09	SW5	3	ON
0A	SW5	3	OFF
0B	SW6	3	ON
0C	SW6	3	OFF
0D	SW7	4	ON
0E	SW7	4	OFF
0F	SW8	4	ON
10	SW8	4	OFF

By setting the on and off switching thresholds differently, a hysteresis can be programmed. The second parameter (<p2>) is the switching threshold in HEX e.g.: 0x89 FF.

Caution: in order to compare the threshold value with the measured value directly, it has to be added with 0x80 00.

Example: Configuration of SW1 IO8 (or digital 5)

Send: 0x 23
Send: 0x B6 08 11

Configure IO8 for SW1

Send: 0x 20 01 01 00

The turn-on threshold of SW1 is set to 0x81 00.

Send: 0x 20 02 FE 00

The turn-off threshold of SW1 is set to 0x7E 00.
If the measured value increases above 0x81 00, IO8 is switched on. If the measured value falls below 0x7E 00, IO8 is switched off.

Analog input

Example: Requesting the configuration of analog inputs

Send: 0x23
Send: 0xB3
Receive : 0x 3B B3 0100 04 30 35 30 01 01 02 03 0D 0A
Send 0x24
Result: Channel 1 = 2 mV/V, channel 2 = 2 mV/V, channel 3 = 10 mV/V, channel 4 = 0-5 V;

Example: Setting the configuration of analog inputs

Specification: configuring channel 1 to channel 4 for PT1000
Send: 0x23
Send: 0xB2 01 04
Send: 0xB2 02 04
Send: 0xB2 03 04
Send: 0xB2 04 04
Send 0x24

Example: Setting the data frequency to 12.5 Hz

Specification: The measured value should be sent steadily with a frequency of approx. 12.5/s.
Send: 0x23
Send: 0xA6
Send 0x24

Data frequency and filter

Analog filter

The integrated analog filter is a first-order low-pass filter with a cut-off frequency of 1 kHz. It is set as an *antialiasing* filter for the A-D converter. This filter is permanently installed and cannot be changed.

Digital filter

The digital filter is indirectly set with the data frequency. The effective data frequency may differ slightly from the set (nominal) data frequency. The grey shaded settings are recommended as with these settings faults with a mains frequency of 50 Hz are best suppressed by the integrated "notch filter".

Data frequency in Hz (nominal)	Data frequency in Hz (effective)	Notch frequency in Hz	-3db cut-off frequency in Hz (digital filter)	Parameters for "set frequency"
250	208	1000	441	0xAA
125	114	500	221	0xA9
25	24.4	100	44.2	0xA8
15	14.7	60	26.5	0xA7
12.5	12.4	50	22.1	0xA6
7.5	7.5	30	13.3	0xA5
6.25	6.25	25	11.1	0xA4
3.75	3.75	15	6.63	0xA3
2.5	2.5	10	4.42	0xA2
1.25	1.25	5	2.21	0xA1
0.625	0.625	2.5	1.1	0xA0

Table 14: data frequencies and filter properties

BSC4 Mounting Kit

The BSC4 comes with a bracket kit suitable for mounting the unit to a wall or plate.

Contents:

4X Wall Brackets

4X Screws for attaching the brackets to the housing

4X Bracket seals

Required tools: T10X80 Torx driver.

Carefully remove the black plugs shown in the picture above and remove the Torx screws underneath. Press the black rubber seals into the holes and use the black Torx screws provided with the mounting kit to attach the brackets.

The mounting feet can be oriented either inboard or outboard as needed.