

SIRIUS®

 DEWESoft®

TECHNICAL REFERENCE MANUAL

SIRIUS® V25-1



5.7. General specification

The general specifications apply to all SIRIUS® measurement slices unless otherwise noted at the specific measurement slice.

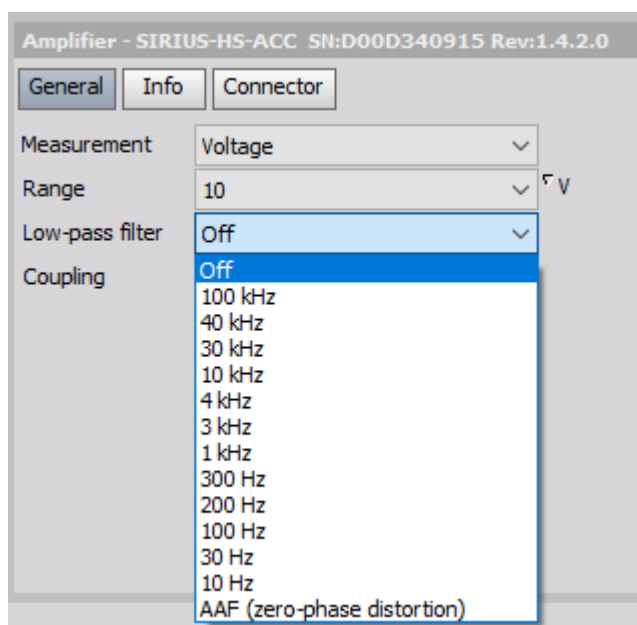
Power	
Power Supply	9 - 36 V DC
Power consumption	Typ. 15 - 35 W
Environmental	
Operating Temperature	-10 to 50 °C (40 °C for fanless series)
Storage Temperature	-40 to 85 °C
Humidity	5 to 95 % RH non condensing @ 60 °C
IP rating	IP20 (IP50 for fanless series)
Shock & Vibration	Vibration sweep sinus (EN 60068-2-6:2008) Vibration random (EN 60721-3-2: 1997 - Class 2M2) Shock (EN 60068-2-27:2009) MIL-STD-810D
Dimensions	266 mm x 149 mm x 55 mm 266 mm x 149 mm x 69 mm (extended slice)
Acquisition rate	
Time base accuracy	Typical 5 ppm, Max: 20 ppm
Synchronisation	
Delay between slices	50 nsec
Max. Sync-cable length	100 m (Master/Slave), 200 m (IRIG)
EtherCAT®: Max. cable length	100 m
Sync Input / Output	
Level (Input/Output)	TTL compatible
Max. Output Current	±24 mA (±50 mA for 1 sec)

5.7.2. HS general specifications

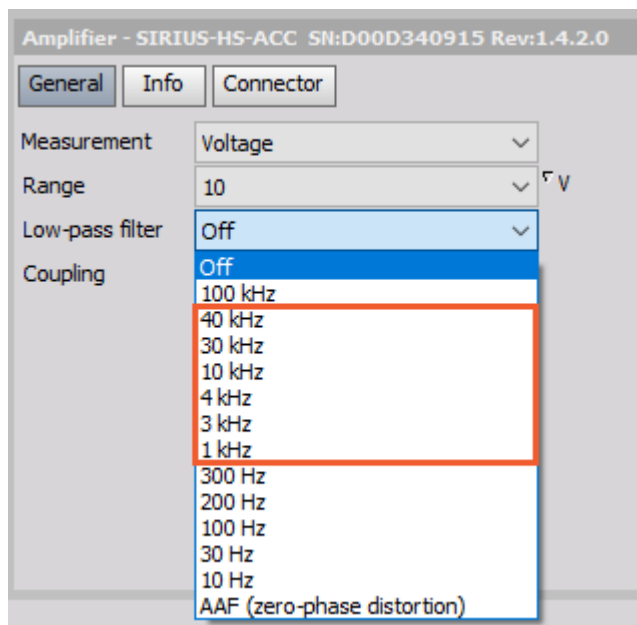
ADC	
Type	16-bit SAR
Sampling Rate	Simultaneous 1 MS/sec
Analog anti alias filter	Bypass or analog 100 kHz 5th order Bessel
Digital low pass filter	Software selectable
Digital filter Characteristic	Bypass, Butterworth or Bessel
Filter Order	2nd , 4th, 6th or 8th
Ratio Sample rate to Filter Freq.	From 2 to 100
Topology	Cascaded IIR Filter (up to 4 sections)

5.7.3. Low-pass filters on Sirius HS

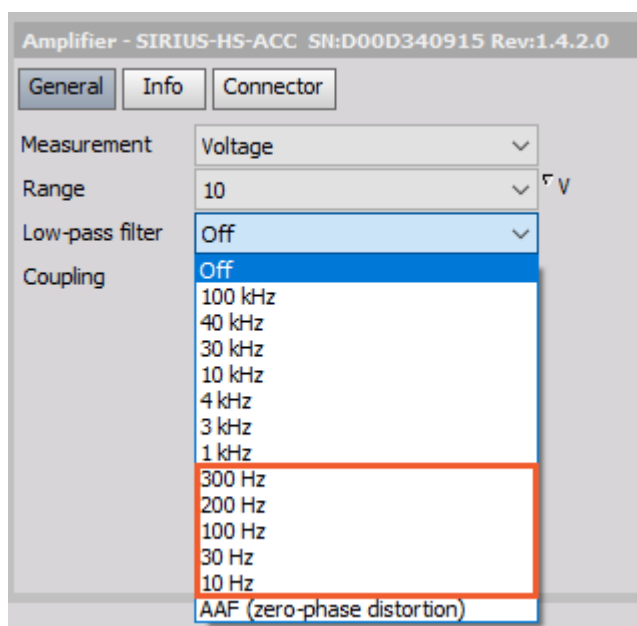
- The **100 kHz filter** is a hardware filter and is always applied except for when the "Off" option is selected in the dropdown menu.
This hardware filter is a Bessel 5th order filter.



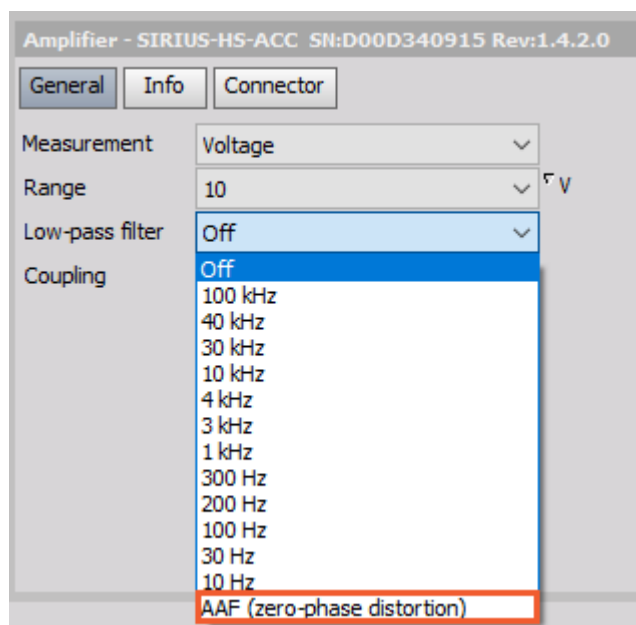
- IIR filters **between 40 and 1 kHz** are firmware filters, which means, that they are calculated on the FPGA.



- IIR filters with cut-off frequencies **lower than 1 kHz** are Software filters. If one of these filters is selected in the dropdown menu, then in addition to the software filter, with the selected cut-off frequency, a firmware filter with 1 kHz cut-off frequency is applied (the type and order of this filter is the same as the software one).



4. **AAF (zero-phase distortion)** has a cut-off frequency of 80 kHz, if the channel sample rate is equal or above 160 kHz. When a lower sample rate is selected, then the cut-off frequency of the AAF is equal to half the sampling rate of that channel.



5. **Special case:** If on a channel, that has a sample rate divider, a IIR filter is applied whose cut-off frequency is greater then 0.4 times the channels sampling rate, then in addition to the selected IIR filter a filter with a cut-off frequency at 0.4 times the sampling rate of the channel is also applied to the filter chain.

5.24. HS-STG / HS-STG+

The STG module is THE universal amplifier perfectly fitting for high-speed, high-sample-rate, wide-bandwidth strain gauge and mid-level voltage measurements with powerful sensor constant voltage and current excitation.



Hint

Internally, potentiometer mode is actually a half-bridge connection. Pin IN- is connected to the half-bridge point.

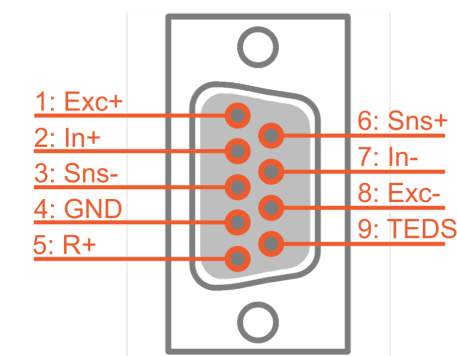
5.24.1. HS-STG Specifications

Inputs				
Input types	Voltage Full/Half/Quarter bridge strain (120 Ω and 350 Ω) Potentiometer, RTD, Resistance Current (ext. Shunt)			
ADC Type	16-bit SAR			
Sampling Rate	Simultaneous 1 MS/s			
Filtering	See "HS general specifications"			
Analog bandwidth	1 MHz (800 kHz for ranges ≤0.2 V)			
Voltage Mode				
Ranges	±50, 20, 10, 5, 2, 1, 0.4, 0.2, 0.1, 0.04 and 0.02 Volt			
Input Accuracy	Signal frequency	Accuracy		
	DC	Range <10 V: ±0.03 % of reading ±0.04 % of range ±10 μV		
		Range ≥10 V: ±0.05 % of reading ±0.01 % of range ±5 mV		
	Up to 1 kHz	±0.03 % of reading ±0.02 % of range		
	Up to 10 kHz	±0.1 % of reading ±0.05 % of range		
	Up to 100 kHz	±2 % of reading ±0.1 % of range		
	Up to 500 kHz	±10 % of reading ±0.5 % of range		
Offset accuracy after Balance Amplifier	Range <10 V: ±0.002 % of range ±3 μV; Range ≥10 V: Not performed			
Typ. Noise floor	Sample rate/Range →	50 V	5 V	0.2 V
	1 MS/s	-87 dB	-88 dB	-81 dB
	200 kS/s	-88 dB	-88 dB	-85 dB
	20 kS/s	<-100 dB	<-100 dB	-94 dB
Typical CMR	Bandwidth/Range →	50 V	5 V	0.2 V
	50 Hz	70 dB	88 dB	102 dB
	400 Hz	70 dB	86 dB	100 dB
	10 kHz	55 dB	70 dB	80 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K			
Offset Drift	typical 0.3 μV/K + 15 ppm of range/K, max 2 μV/K + 40 ppm of range/K			
Gain Linearity	<0.02 %			
Inter channel phase mismatch	0.02° * fin [kHz] + 0.1° (5 V Range)			

Channel Cross talk	Range <10 V: -120 dB @ 10 kHz; Range ≥10 V: -95 dB @ 10 kHz
Input Coupling (see 1)	DC, AC 1 Hz (3 Hz, 10 Hz per SW)
Input Impedance	Range <10 V: 10 MΩ; Range ≥10 V: 1 MΩ between INx to GND
Max. common mode voltage	Isolated version: ±500 V
	Differential version: Ranges ≥10 Volt: ±60 V; all other Ranges: ±12 V
Overvoltage Protection	Range <10 V: 100 V (200 V peak for 10 msec); Range ≥10 V: 300 V cont.
Excitation Voltage	
Excitation Voltage	Free programmable (16-bit DAC)
Predefined levels	0, 1, 2.5, 5, 10, 15 and 20 VDC
Accuracy	±0.05 % ±2 mV
Drift	±10 ppm/K ±100 µV/K
Load stability 0 % to 100 % load	<0.01 %
Line regulation over 20 Ω of change	<0.005 % @ 120 Ω load
Noise @ 10 Volt / 350 Ω	< 200 µVrms @ 10 kHz BW
Sense Impedance to Exc / to GND	100 kΩ / 100 MΩ
Current limit	100 mA (max. 800 mW)
Protection	Continuous short to ground
Input short, Sensor offset adjust	Software selectable
Excitation Current	
Excitation Current	Free programmable (16-bit DAC)
Predefined levels	0.1, 1, 2, 5, 10, 20 and 60 mADC
Accuracy (>10 mA)	0.1 % ±2 µA [0.5 % ±50 µA]
Drift (>10 mA)	15 ppm/K [100 ppm/K]
Compliance voltage	20 Volt, max. 300 mW
Output Impedance	>1 MΩ
Bridge Connection Types	
Bridge types	Full / Half / Quarter bridge (3-wire or 4-wire)
Ranges	2 mV/V...1000 mV/V free programmable
Internal Bridge Completion	½ bridge and ¼ bridge 120 Ω and 350 Ω
Bridge Completion Accuracy	0.05 %; TCR: 5 ppm/K (others on request)
Internal Shunt Resistor	59.88 kΩ and 175 kΩ, bipolar (to +Exc and -Exc)
Maximum sensor resistance	5 kΩ for Full and Half bridge measurements
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K (others on request)
Sensor Balance Range	220 % of Range (70 % for input Range ≥5 Volt)
Input Short, Sensor Offset Adjust	Software selectable
Counters (only on HS STG+)	
Inputs	1 digital counter input 3 digital inputs

	Fully synchronised with analog data
Counter modes	counting, waveform timing, encoder, tacho, gear-tooth sensor
General Counter Specifications	See "SIRIUS counter specification"
Additional Specifications	
Input connector	DSUB-9 (others on request)
TEDS support	Standard + DSI® adapters
1) In- must be within ±10 V referred to GND (iso); for Ranges ≥10 V the DC value of In- is not rejected	

5.24.2. HS-STG



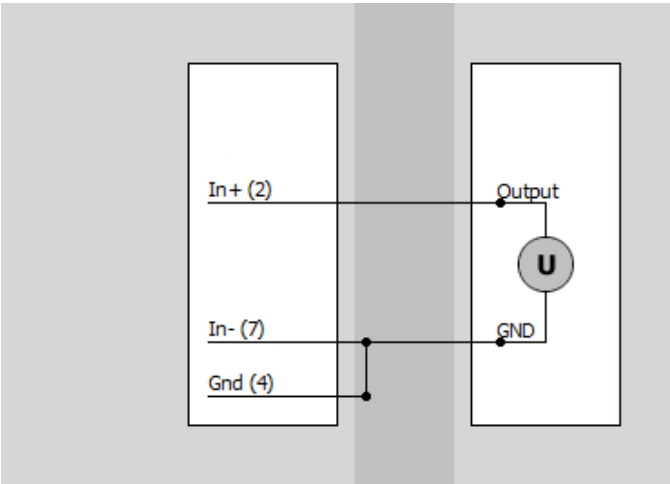
HS-STG connector: pin-out (DSUB-9 female)



SIRIUSi-HS-8xSTG

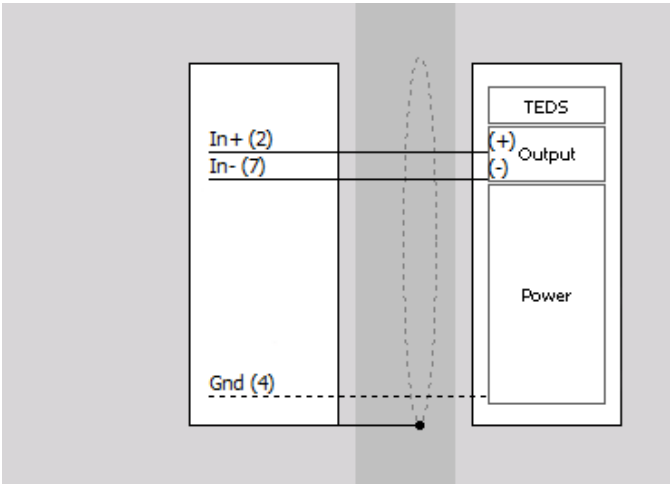
5.24.2.1. HS-STG: Voltage

Voltage - Single ended



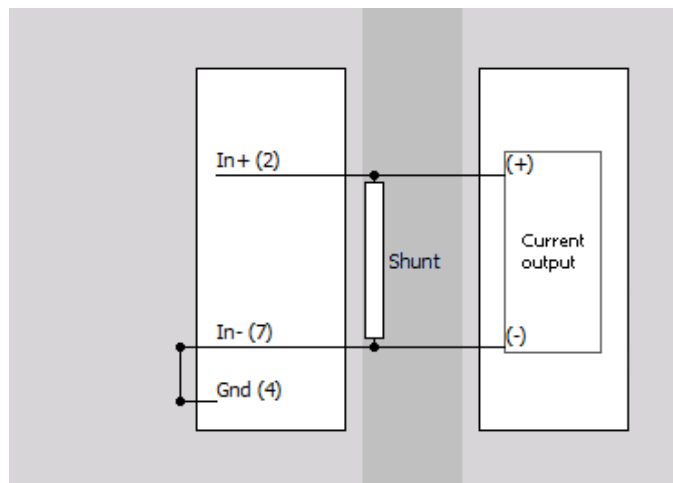
Voltage – Differential

Use only when sensor Output (+) and Output (-) are referenced to Gnd. Gnd must be connected.

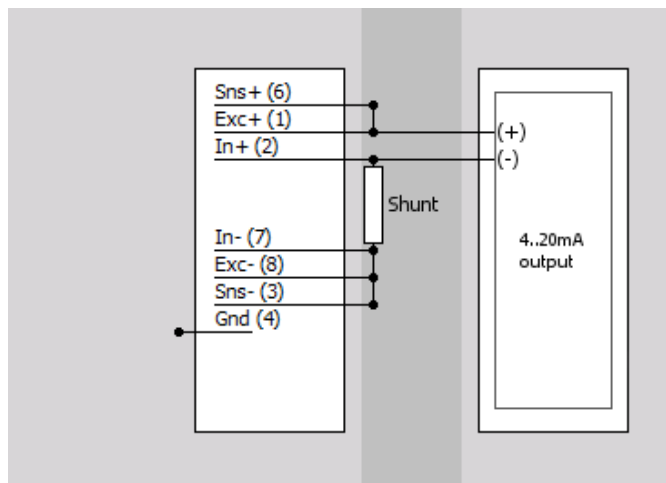


5.24.2.2. HS-STG: Current

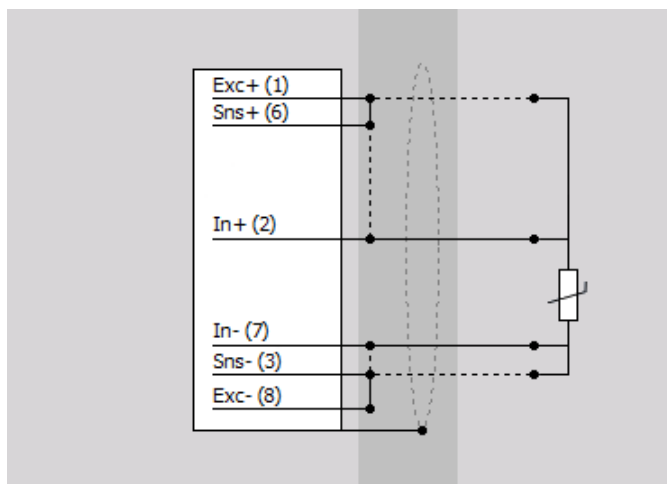
External direct shunt



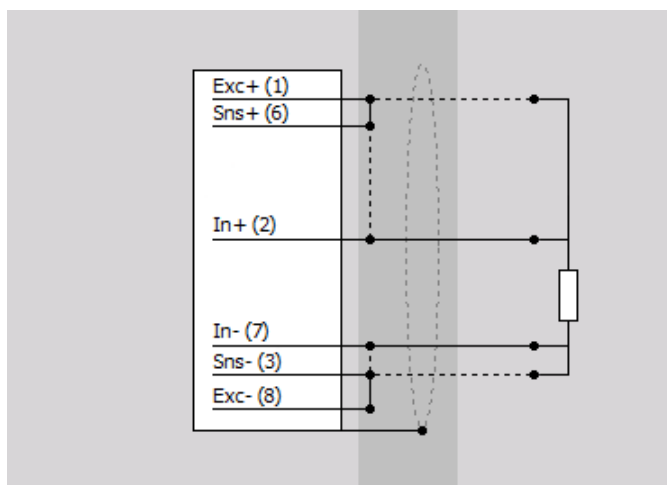
External loop powered shunt



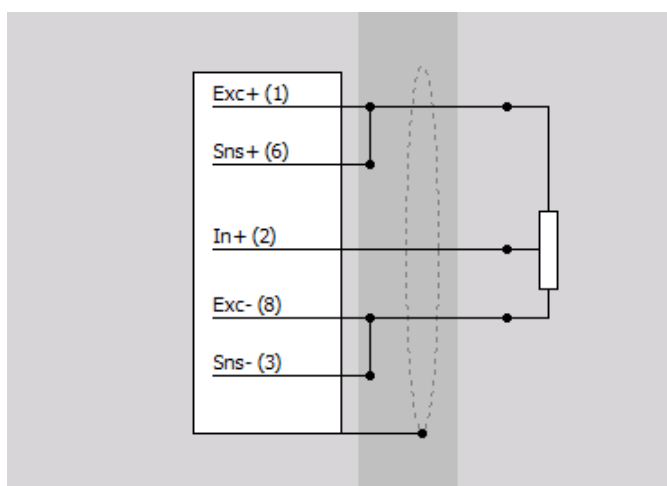
5.24.2.3. HS-STG: Temperature



5.24.2.4. HS-STG: Resistance

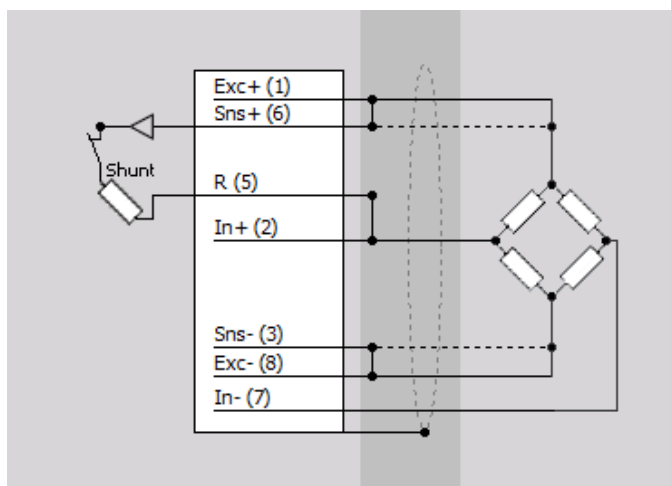


5.24.2.5. HS-STG: Potentiometer

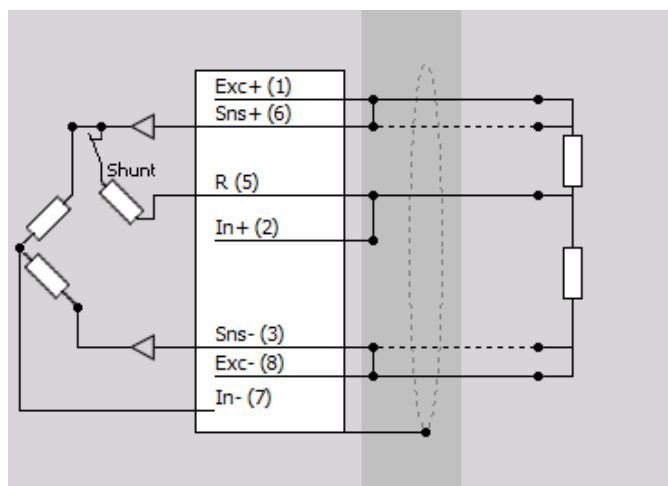


5.24.2.6. HS-STG: Bridge

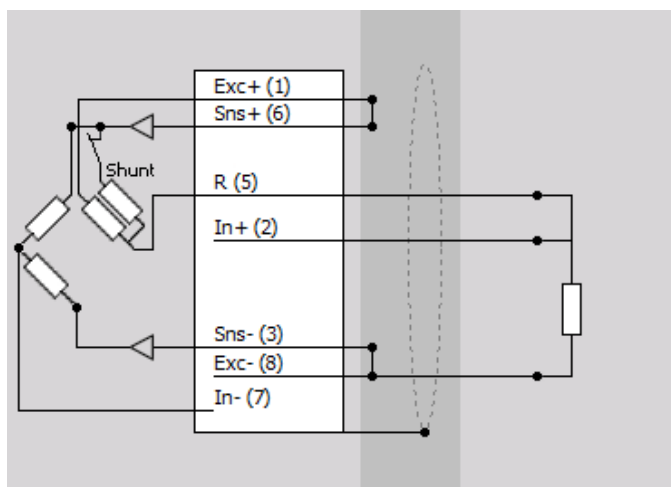
Full bridge



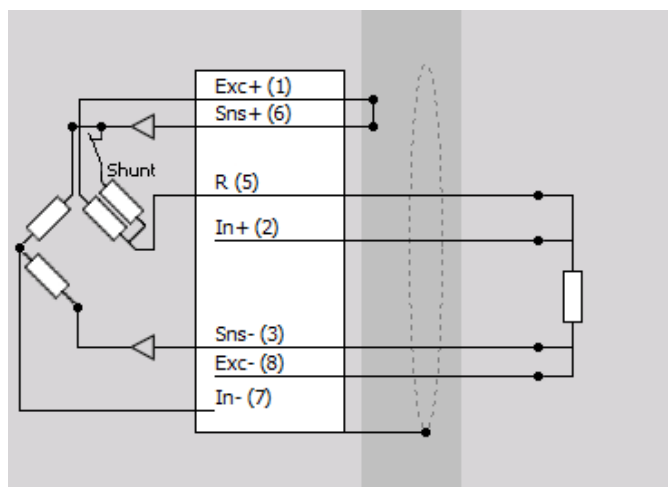
Half bridge



Quarter bridge – 3 wire



Quarter Bridge – 4 wire

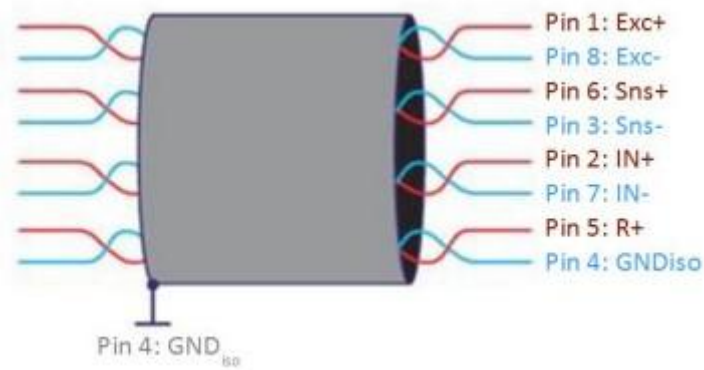


5.24.2.6.1. HS-STG: Bridge Accuracy

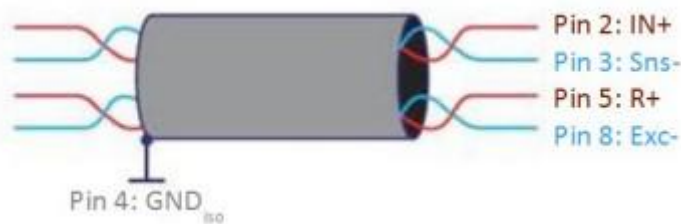
Bridge range	Set excitation	Accuracy
2 mV/V	1 V	0.063 % of reading + 18 μ V/V
20 mV/V	1 V	0.19 % of reading + 18 μ V/V
200 mV/V	1 V	0.22 % of reading + 90 μ V/V
1000 mV/V	1 V	0.22 % of reading + 410 μ V/V
2 mV/V	2.5 V	0.052 % of reading + 7.2 μ V/V
20 mV/V	2.5 V	0.084 % of reading + 20 μ V/V
200 mV/V	2.5 V	0.09 % of reading + 170 μ V/V
1000 mV/V	2.5 V	0.091 % of reading + 810 μ V/V
2 mV/V	5 V	0.049 % of reading + 3.6 μ V/V
20 mV/V	5 V	0.071 % of reading + 10 μ V/V
200 mV/V	5 V	0.074 % of reading + 82 μ V/V
1000 mV/V	5 V	0.074 % of reading + 410 μ V/V
2 mV/V	10 V	0.049 % of reading + 1.8 μ V/V
20 mV/V	10 V	0.058 % of reading + 9.0 μ V/V
200 mV/V	10 V	0.059 % of reading + 81 μ V/V
1000 mV/V	10 V	0.066 % of reading + 210 μ V/V
2 mV/V	15 V	0.047 % of reading + 1.8 μ V/V
20 mV/V	15 V	0.051 % of reading + 12 μ V/V
200 mV/V	15 V	0.049 % of reading + 140 μ V/V
1000 mV/V	15 V	0.064 % of reading + 140 μ V/V
2 mV/V	20 V	0.048 % of reading + 1.3 μ V/V
20 mV/V	20 V	0.052 % of reading + 8.5 μ V/V
200 mV/V	20 V	0.05 % of reading + 110 μ V/V
1000 mV/V	20 V	0.063 % of reading + 110 μ V/V

5.24.3. HS-STG: Sensor connection

To minimize electromagnetic influence, it is recommended to use twisted pair cables. The shield of the cable should be connected to GNDiso on pin 4 of the DSUB-9 connector.



HS-STG Sensor connection



HS-STG Sensor 1/4 Bridge connection



Hint

When your application requires a bandwidth ≥ 100 kHz, it is recommended to use external bridge completion. This fully symmetrical system configuration will guarantee the best possible noise reduction.