

SIRIUS®

 **DEWESoft®**

TECHNICAL REFERENCE MANUAL

SIRIUS® V25-1



4.2.1.1. Single slice: USB

This chapter describes the SIRIUS® USB single slice enclosure.



Important

The LED indicator on the front side shows system status.

LED status	Description
 Green	Power is connected, system self-test PASSED.
 Red Blinking	Power is connected, system self-test error! - RAM - I2C bus (PLL, Temperature) - CAN (optional) - EtherCAT (optional)
 Green Blinking	“Easy device identification” feature. When selected in the setup, the corresponding SIRIUS Green LED indicator is blinking.

4.2.1.2. Single slice: Rear side

The SIRIUS® USB chassis has following connectors at the rear side:



SIRIUS rear side

Name	Description
CAN	CAN bus DSUB-9 male connector
SYNC	Two 4-pin LEMO female sync connectors
USB	USB-mini to transfer the data to the SBOX or PC
GND	Protective Ground banana plug and M4 screw insert.
POWER IN	2-pin LEMO male connector
POWER OUT	2-pin LEMO female connector

Analog-out connectors

The optional analog output version of the SIRIUS Single Slice has 8 additional BNC connectors for the analog output channels on the rear side (for detailed information see chapter: Analog out option).

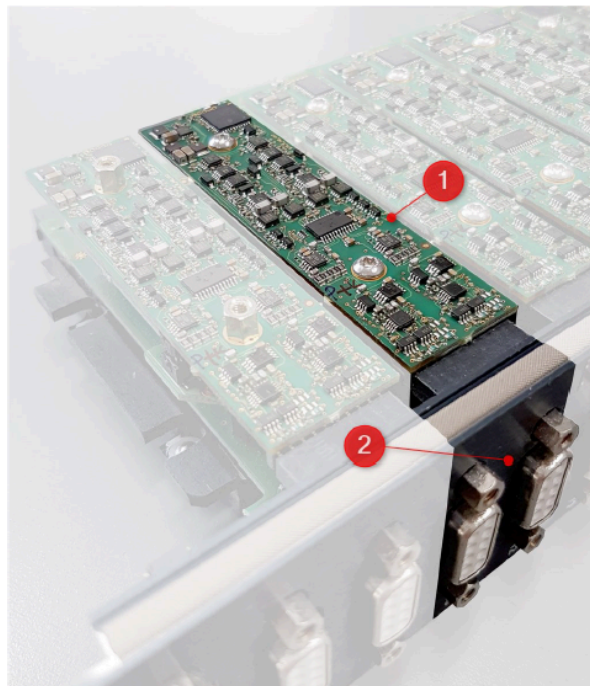


Rear side connectors of the analog-out version

5.2. Technology overview

Module

Each SIRIUS® slice can contain up to 8 measurement modules. The illustration below “SIRIUS-HD module” shows an open SIRIUS® HD measurement slice. The highlighted green PCB ① is a single measurement module. You can see ② that this HD slice has 2 connectors (and thus 2 channels) which are both connected to the same measurement module.



SIRIUS-HD module

The next illustration below “SIRIUS-STGM+ module” shows SIRIUS front with two STG-M+ modules in different colours. The first module ① is surrounded by yellow boxes, the 2nd module ② is highlighted with blue boxes. Each module has a DSUB-9 connector for the analog signals and a LEMO connector for the digital signals.

Note that the STGM (DSUB-9 female) & CNT (7-pin LEMO female) connectors for the 2 modules share the common electronic circuit inside. Thus you must always configure these modules as pairs.

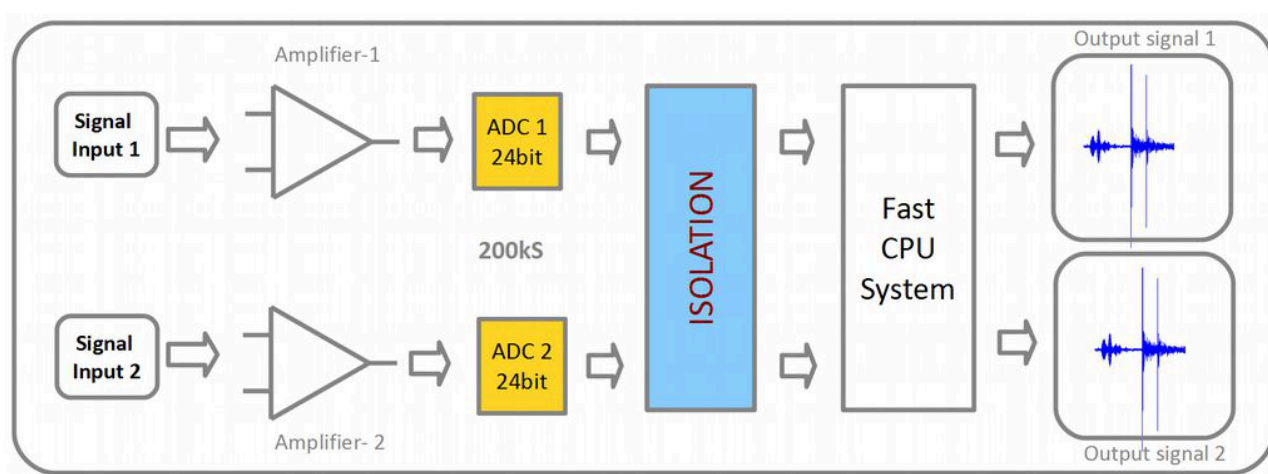
5.2.2. SIRIUS®-HD series: high density (16 channel per slice)

For highest channel density this solution offers 24-bit resolution with up to 200 kS/sec sample rate.



Important

The 2 amplifiers of the HD-modules share a common GND and are isolated against all other modules.

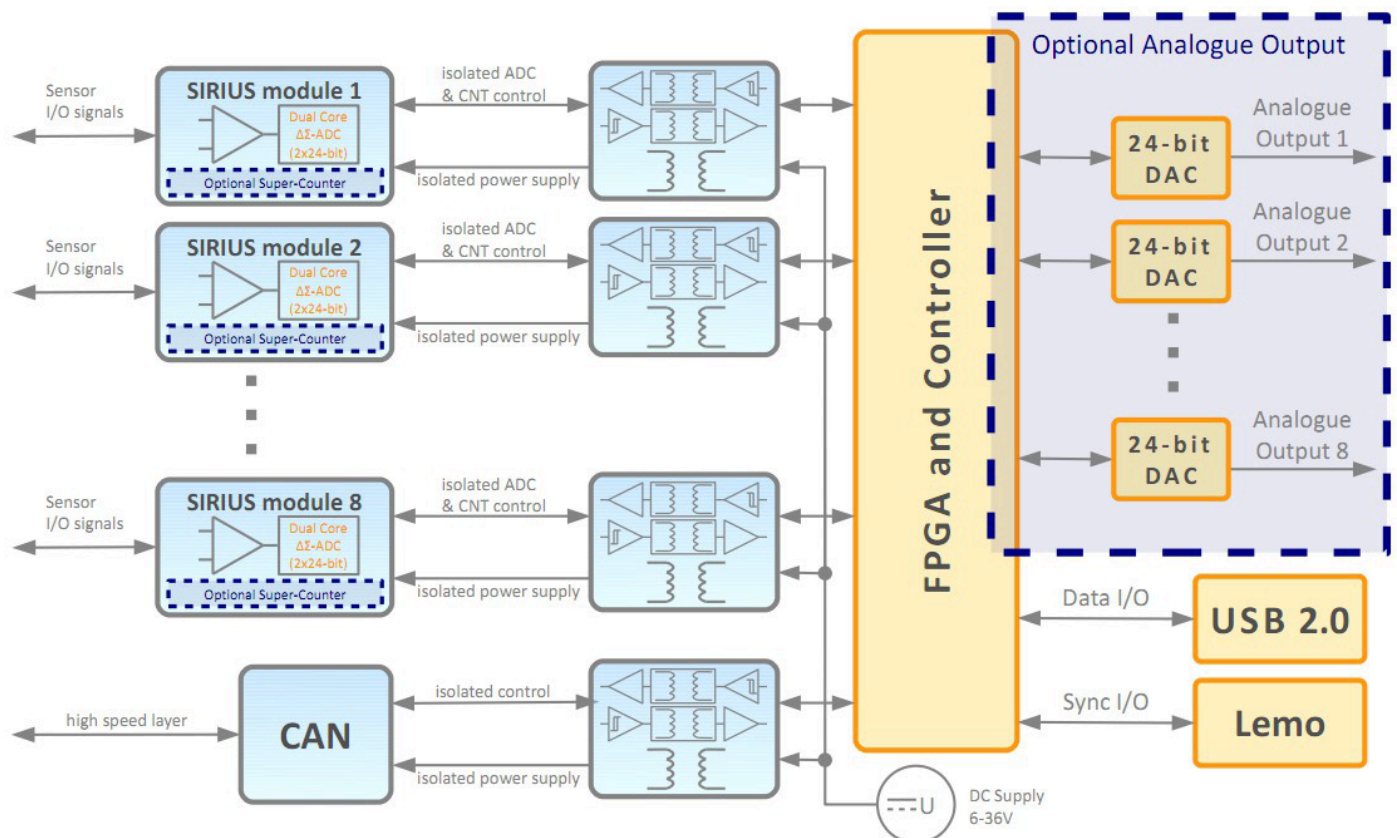


SIRIUS High Density

5.2.5. Isolated version: USB

The (standard) SIRIUSi modules are isolated between each other and the main board. Some modules generate power for electronics and for external pins: this power supply is again isolated against other modules, the main board and the housing.

Inside of one module, the power supply pins, counter and analog inputs are not isolated between themselves (they have the same ground) that is available on the GND connector pin (e.g. The analog input and the counter of one ACC+ module share the same GND).



Isolated motherboard



Warning

Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.

SIRIUS HD

	HD-STGS	HD-LV	HD-ACC
Connectors	DSUB-9, LIB10f	DSUB-9, BNC	BNC
Counter version	✗	✗	✗
Isolated version	✓	✓	✓
Differential version	✓	✓	✓
EtherCAT version	✓	✓	✓
Rack version	✓	✓	✓
Fanless version	✗	✗	✗
Channels per slice	16	16	16
Data rate / channel	200 kS/sec USB, 10 kS/sec EtherCAT	200 kS/sec USB, 10 kS/sec EtherCAT	200 kS/sec USB, 10 kS/sec EtherCAT
Resolution	24-bit	24-bit	24-bit
Bandwidth	70 kHz	71 kHz	72 kHz
Voltage ranges	±10 V, ±1 V, ±100 mV, ±10 mV	±100 V, ±10 V, ±1 V, ±100 mV	±10 V, ±5 V, ±1 V, ±200 mV
Input coupling	DC	DC	DC, AC 0.1 Hz, 1 Hz
Sensor excitation	0..12 V max. 44 mA	2...30 V bipolar, 0...24 unipolar, max. 0.2 A / 2 W	IEPE 4,8,12 mA
Bridge connection	Full, ½, ¼ 350 Ω, ¼ 120 Ω 3-wire	Full	✗
Programmable shunt	100 kΩ	✗	✗
IEPE input	DSI-ACC	DSI-ACC	✓
Resistance	✗	✗	✗
Temperature (PTx)	DSI-RTD	DSI-RTD	✗
Thermocouple	DSI-TH	DSI-TH	✗
Potentiometer	✓	✗	✗
LVDT	DSI-LVDT	DSI-LVDT	✗
Charge	DSI-CHG	DSI-CHG	✗
Current	ext. shunt, DSI	ext. shunt, DSI	ext. shunt
TEDS	✓	✓	✓
Isolation voltage	500 V in pairs	500 V in pairs	500 V in pairs
Power consumption per channel	1.3 W/pair	1.3 W/pair	1.3 W/pair
Advanced functions	Low power, sensor and amplifier balance	High sensor power and multi range	Sensor error detection



Warning

Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.

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)

5.19. HD-STGS

The STGS module is a universal amplifier perfectly fitting for high-count strain gauge and voltage measurements.



Hint

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

5.19.1. HD-STGS: Specification

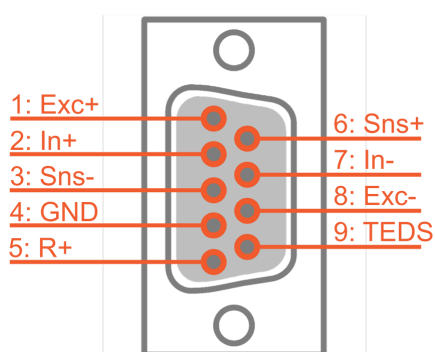
Inputs				
Input types	Voltage Full/Half/Quarter bridge strain (120 Ω and 350 Ω) Potentiometer Current (ext. Shunt)			
ADC Type	24-bit delta-sigma with anti-aliasing filter			
Sampling Rate Simultaneous	200 kS/sec			
Voltage Mode				
Ranges	±10 V	±1 V	±100 mV	±10 mV
Gain Accuracy	±0.05 % of reading			
Offset Accuracy	±2 mV	±0.2 mV	±0.1 mV	±0.1 mV
Offset Accuracy after Balance Amplifier	±0.2 mV	±0.02 mV	±0.01 mV	±0.01 mV
Dynamic Range @ 10 kS	-137 dB	-137 dB	-130 dB	-112 dB
Typ. Noise floor @ 10 kS	-105 dB	-104 dB	-95 dB	-75 dB
Typ. CMR @ 400 Hz / 1 kHz	86 / 84 dB	96 / 95 dB	112 / 102 dB	112 / 102 dB
Gain Drift	Typical 10 PPM/K, max. 40 PPM/K			
Offset Drift	Typical 0.3 μV/K + 5 ppm of range/K, max 2 μV/K + 10 ppm of range/K			
Gain Linearity	<0.02 %			
Inter Channel Phase-mismatch	0.02° * fin [kHz] + 0.1° (@ 200 kS/sec)			
Channel Cross talk	-120 dB @ 10 kHz			
Input Coupling	DC			
Input Impedance	10 MΩ			
Max. common mode voltage	±12 V			
Overvoltage Protection	In + to In-: 50 V continuous; 200 V peak (10 msec)			
Excitation Voltage				
Excitation Voltage	Free programmable (16-bit DAC)			
Predefined levels	0, 1, 2.5, 5, 10 and 12 VDC			
Accuracy	±0.05 % ±2 mV			
Drift	±50 ppm/K ±100 μV/K			
Stability 10 % to 90 % load	<0.01 %			
Current limit	45 mA (350 mW max. power)			
Protection	Continuous short to ground			
Bridge Connection Types				
Bridge types	Full / Half / Quarter bridge (3-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	100 kΩ (others on request)
Maximum sensor resistance	5 kΩ for Full and Half bridge measurements
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K (others on request)
Input Short, Sensor Offset Adjust	Software selectable
Additional Specifications	
Input connector	DSUB-9
TEDS support	Standard + DSI® adapters

5.19.2. HD-STGS



SIRIUSi-HD-16xSTGS



HD-STGS connector: pin-out (DSUB-9 female)

Pin	Name	Description
1	Exc +	Excitation +
2	In+	Input +
3	Sns-	Sense -
4	GND	Ground
5	R+	¼ Bridge/Shunt
6	Sns+	Sense +
7	In-	Input -
8	Exc-	Excitation -
9	TEDS	TEDS

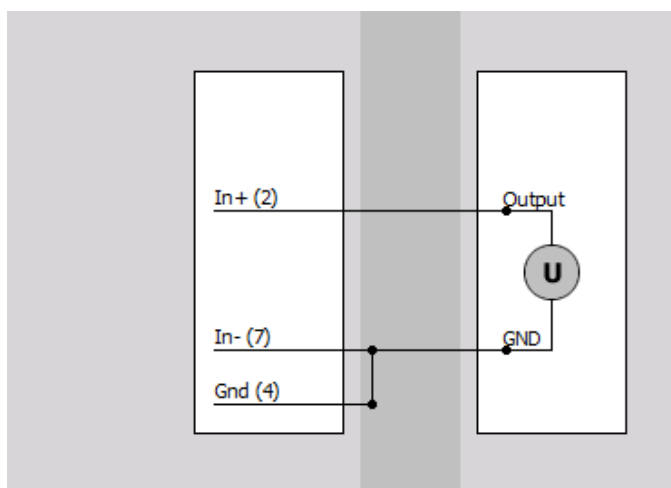


Caution

DSUB-9 mating connector backshells shall be no more than 15.0 mm wide in order to populate all 16 channels at once

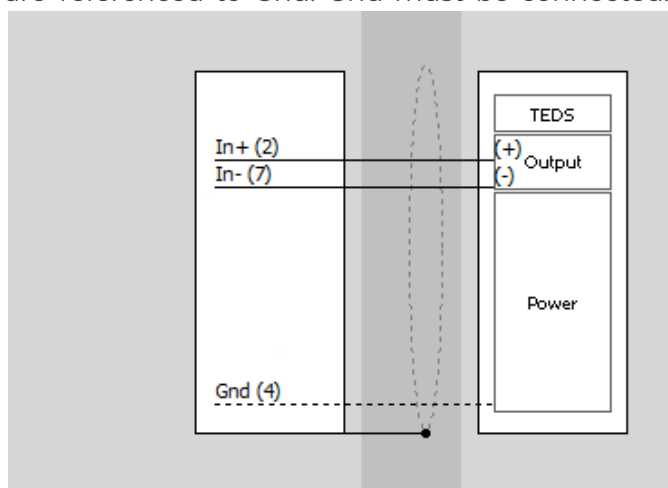
5.19.2.1. HD-STGS: Voltage

Voltage - Single ended



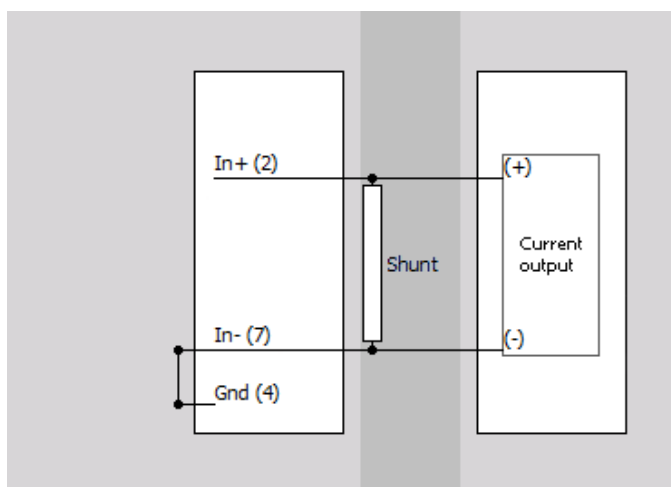
Voltage – Differential

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

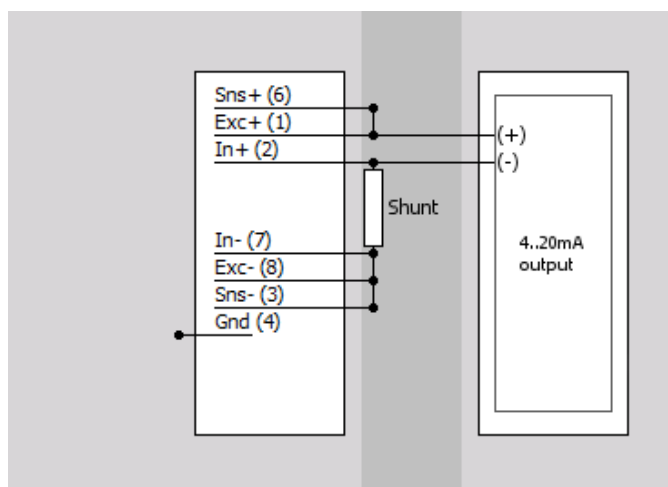


5.19.2.2. HD-STGS: Current

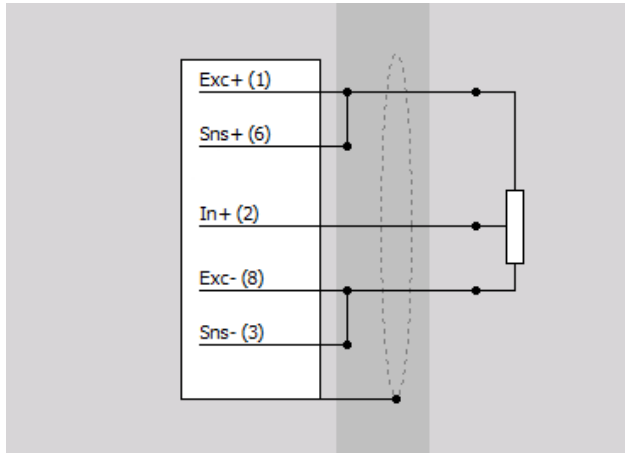
External direct shunt



External loop powered shunt

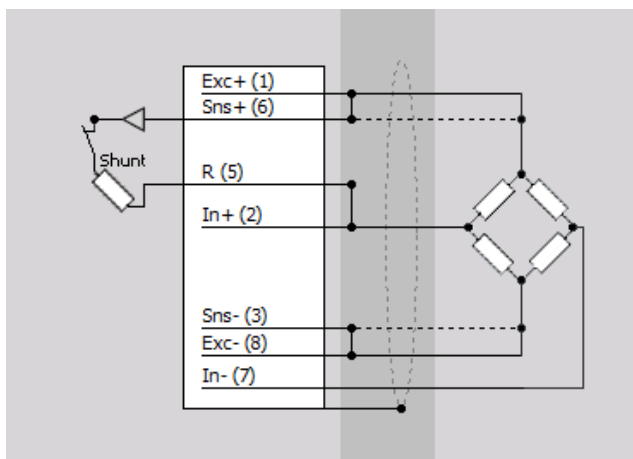


5.19.2.3. HD-STGS: Potentiometer

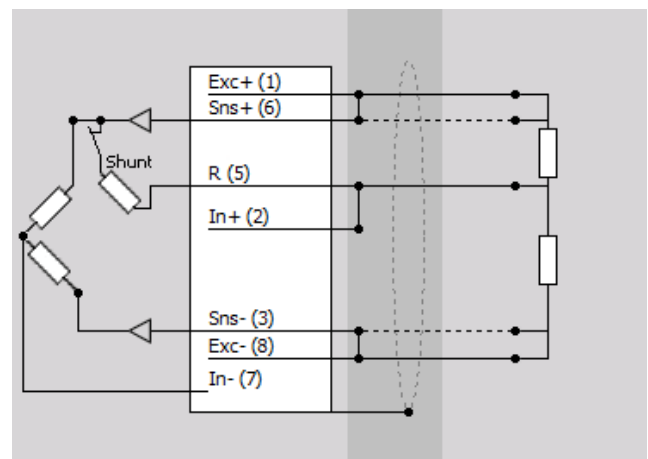


5.19.2.4. HD-STGS: Bridge

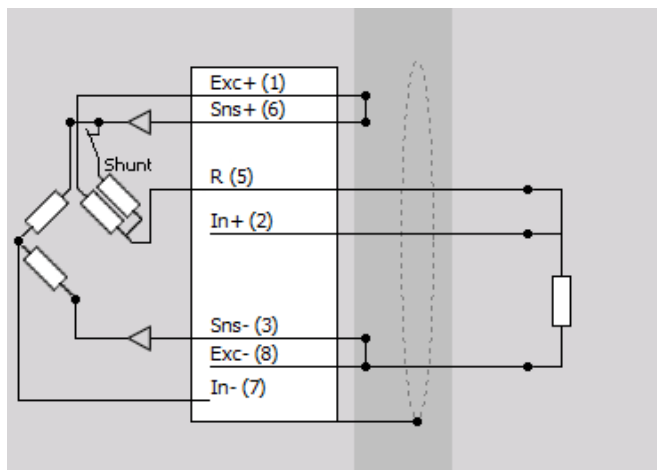
Full bridge



Half bridge



Quarter bridge – 3 wire



5.19.2.4.1. HD-STGS: Bridge

Bridge range	Set excitation	Accuracy
2 mV/V	1 V	0.057 % of reading + 100 μ V/V
20 mV/V	1 V	0.11 % of reading + 100 μ V/V
200 mV/V	1 V	0.2 % of reading + 200 μ V/V
1000 mV/V	1 V	0.24 % of reading + 200 μ V/V
2 mV/V	2.5 V	0.055 % of reading + 40 μ V/V
20 mV/V	2.5 V	0.082 % of reading + 40 μ V/V
200 mV/V	2.5 V	0.12 % of reading + 80 μ V/V
1000 mV/V	2.5 V	0.11 % of reading + 800 μ V/V
2 mV/V	5 V	0.054 % of reading + 20 μ V/V
20 mV/V	5 V	0.075 % of reading + 20 μ V/V
200 mV/V	5 V	0.094 % of reading + 40 μ V/V
1000 mV/V	5 V	0.088 % of reading + 400 μ V/V
2 mV/V	10 V	0.055 % of reading + 10 μ V/V
20 mV/V	10 V	0.066 % of reading + 20 μ V/V
200 mV/V	10 V	0.066 % of reading + 200 μ V/V
1000 mV/V	10 V	0.079 % of reading + 200 μ V/V
2 mV/V	12 V	0.055 % of reading + 8.4 μ V/V
20 mV/V	12 V	0.066 % of reading + 17 μ V/V
200 mV/V	12 V	0.066 % of reading + 170 μ V/V
1000 mV/V	12 V	0.078 % of reading + 170 μ V/V