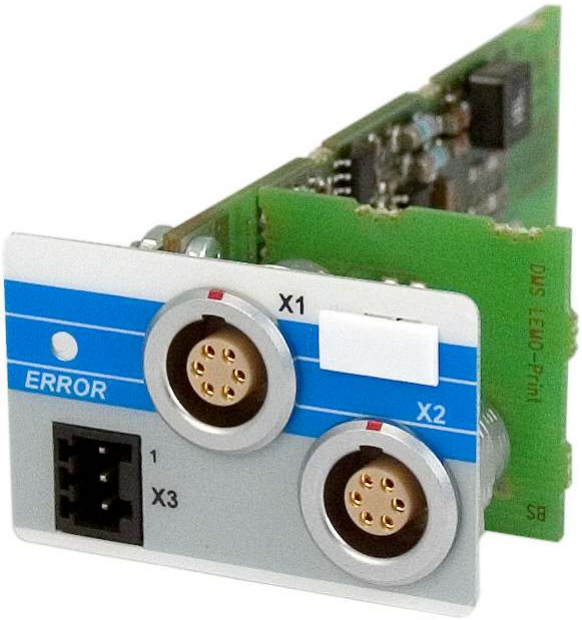
DMS Insert Module MSR 281



This input module is used to measure the expanding or compression of strain gauges with a Wheatstone bridge. The module has two channels, each with a short-circuit proof excitation voltage of 3.333 V. The measurement range of the Wheatstone bridge is 3 mV/V. Other measuring ranges starting from 1.5 mV/V are available on request. The strain gauges can be connected with 4 or 6-wire technology. Drift correction (zeroing) is Possible.

The processed input signals can be measured over the diagnostic connector. The signals on the diagnostic connector are for diagnostic purposes only and cannot be calibrated.

The DMS MSR 281 insert module is compatible with the MSR 211 base module version 1.10 and higher !

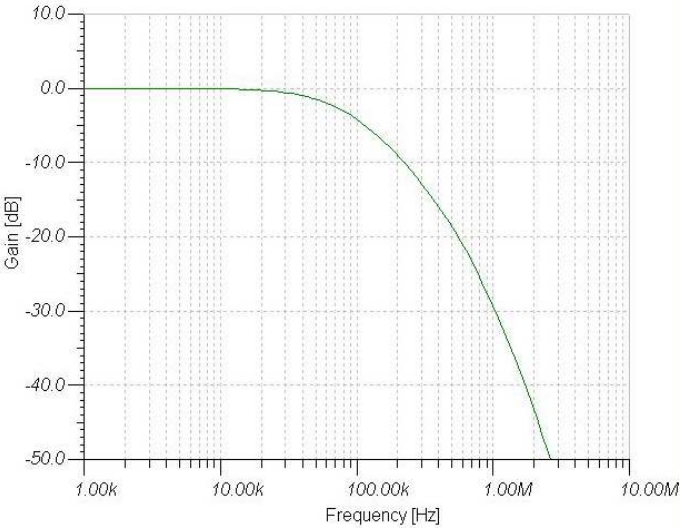
Technical Data

The following specifications are valid in conjunction with the MSR 211 base module.

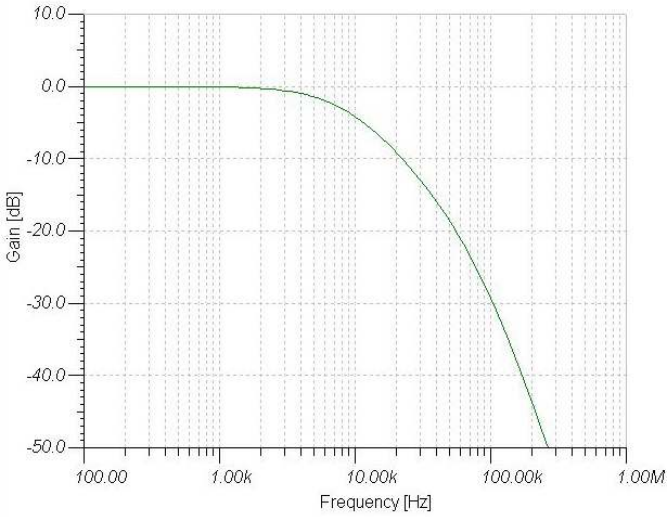
Analog channel specifications

Number of channels	2
Excitation voltage	3.333 V
Measurement range	3 mV/V
Bridge resistance	100 Ω...5000 Ω
Measurement range [Digit]	± 100.000
Resolution [Bit]	16
Sensor break detection	Yes
Input filter	8 kHz (-3dB) -60 dB / decade
Conversion time per channel	≤ 25 µs
Common mode range	1V...2.3 V
Analog channel accuracy from end value, 25 ℃	Typically ± 0.0565%
Status display	ERROR (red) (located on the base)
Converter	18-bit Serial SAR
Galvanic isolation	500 V DC

Input Filter Characteristics



Typical common mode frequency response



Typical differential mode frequency response

Analog channel accuracy

Accuracy based on the final value.

Integral non-linearity error	Typically ±0.008 %	Maximum ±0.02 %
Noise voltage	Typically ±0.046 % ≙ 1.4 µV rms	Maximum ±0.056 % ≙ 1.7 µV rms
Cross talk from previous channel -10 mV ... +10 mV	Typically ±0.0025%	Maximum ±0.0035 %
Temperature drift 0 °C ... +40 °C 0 °C ... +60 °C	 Typically ±0.065 % Typically ±0.15 %	 Maximum ±0.2 % Maximum ±0.45 %
Total error*1 +25 °C 0 °C ... +40 °C 0 °C ... +60 °C	 Typically ±0.0565 % Typically ±0.1215 % Typically ±0.2065 %	 Maximum ±0.0795 % Maximum ±0.2795 % Maximum ±0.5295 %
Effects of the supply line resistance, ΔR = ±1% from the bridge resistance 4-wire measurement 6-wire measurement	 Typically ±1 % Typically ±1 ppm	 Maximum ±1 % Maximum ±3 ppm
Long-term drift 1000 h	Typically ±0.007 %	

*1 – When using the drift correction, 25°C is valid for all temperatures.

Drift correction

The input for the measuring amplifier can be shorted through the class. The offset of the amplifier can then be measured and the following values corrected. Temperature errors are thereby eliminated.

Turn-on time*2	Typically 80 ms	Maximum 120 ms
Turn-off time*3	Typically 105 ms	Maximum 160 ms

*2 – Time from triggering the drift correction to the first valid measurement value for the shorted input
*3 – Time from deactivating the drift correction to the first valid measurement value from the measuring bridge

The drift correction must be made separately for each channel with a base in a minimum interval of 100 ms!

Excitation voltage

Rated voltage +25 ℃	+3.333 V	
Initial accuracy +25 °C	Typically ±0.05%	Maximum ± 0.3 %
Temperature drift 0 ℃ ... +40 ℃ 0 ℃ ... +60 ℃	 Typically ±0.01% Typically ±0.025%	 Maximum ±0.03 % Maximum ±0.05 %
Total error 0 ℃ ... +40 ℃ 0 ℃ ... +60 ℃	 Typically ±0.06 % Typically ±0.075 ppm	 Maximum ±0.33 % Maximum ±0.35 %
Additional error under load RBridge = 5 kΩ RBridge = 100 Ω	 Typically 0.0003% Typically 0.03%	 Maximum ±0.0015 % Maximum ±0.06 %
Long-term drift 1000 h	Typically ±0.007 %	
Maximum load (per channel)	35 mA	
Short-circuit proof	Yes*1	

*1 – for error-free function of the remaining channels, one short circuit per base is allowed

Diagnostic connector

Voltage range With cable break	-5V ... +5 V (-10 mV ... +10 mV) circa +14 V
Load capacity	10 mA
Short-circuit proof	Yes

Miscellaneous

Article number	18-001-281
Hardware version	1.x

Environmental conditions

Storage temperature	-30℃ ... +85℃	
Operating temperature	0℃ ... +60℃	
Humidity	0 ... 95 % , non-condensing	
EMV stability	According to EN 61000-6-2:2001 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s²
Protection Type	EN 60529	IP 00

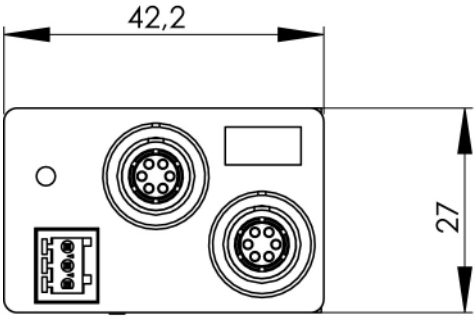
Caution:

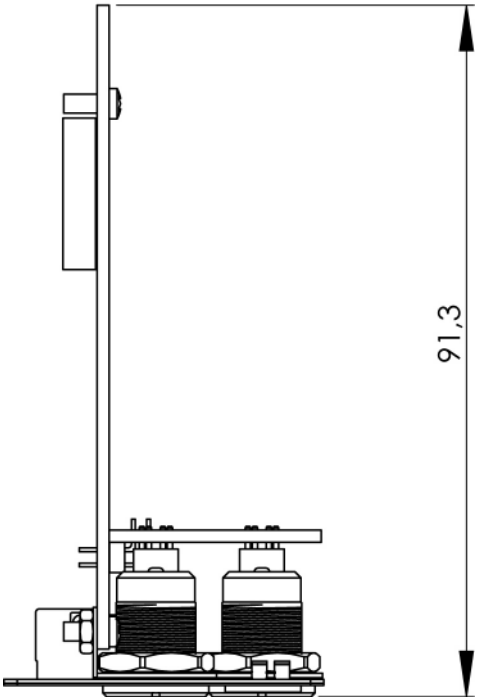
To ensure the accuracy of the card over a long period of time, annual calibration is necessary to compensate for component aging. This can be in the form of setting at the factory or calibration.

If the aging of the card does not have a significant influence on the application, the annual calibration does not have to be performed. However, Sigmatek then no longer guarantees the specified accuracy.

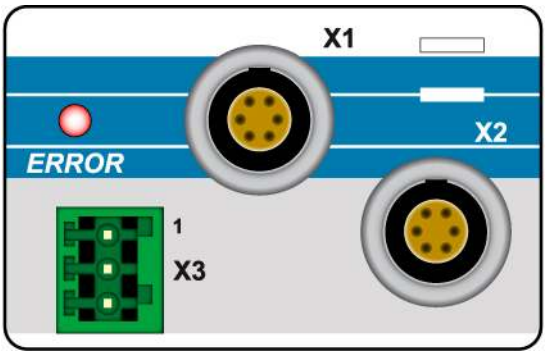
Also, a minimum warm-up phase of 10 minutes is to be expected!

Mechanical Dimensions

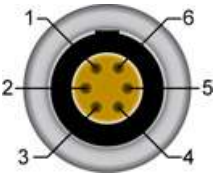




Connector Layout

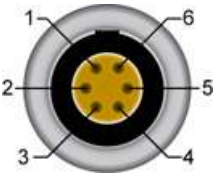


X1: AI 1
Lemo 6-pin (EGG.1B.306.CLN)



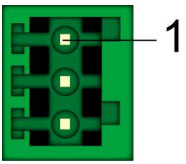
Pin	Function
1	Analog input 1+
2	Analog input 1-
3	Supply voltage 1+
4	AGND
5	Sensor supply voltage 1+
6	Sensor AGND

X2: AI 2
Lemo 6-pin (EGG.1B.306.CLN)



Pin	Function
1	Analog input 2+
2	Analog input 2-
3	Supply voltage 2+
4	AGND
5	Sensor supply voltage 2+
6	Sensor AGND

X3: Diagnostic
Phoenix 3-pin (MC0,5/3-G-2,5THT)

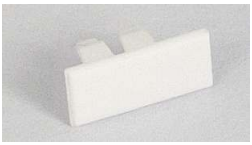


Pin	Function
1	Analog input 1
2	Analog input 2
3	AGND

Applicable connectors

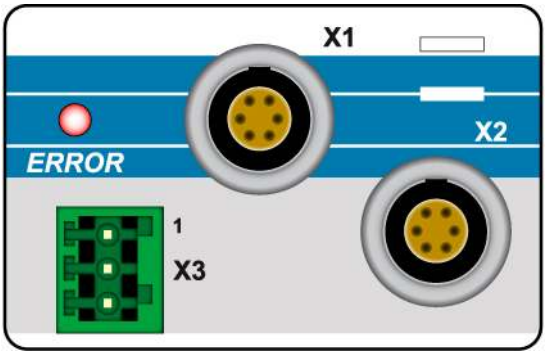
X1 - X2: LEMO FGG.1B.306.CLADxx
X3: PHOENIX FK-MC 0,5/3-ST-2,5

Applicable cable marker



Weidmüller MultiFit MF 10/5 MC CABUR
order number: 1854510000

Status display



LED-Nr.	LED color	Definition
1	Red	Over current or supply voltage short

Wiring Guidelines

The signals recorded by the analog modules are very small, as compared to the digital signals. To ensure error-free operation, a careful wiring method must be followed.

- The 0 V connection of the excitation voltage must be connected with the 0 V assembly point over the shortest route possible.
- The lines connected to the source of the analog signals must be as short as possible and parallel wiring to digital signal lines must be avoided.
- The signal lines should be shielded pairs.

Measuring with a Wheatsone bridge

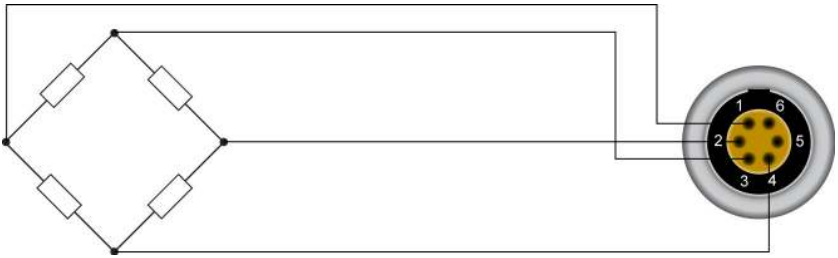
In general, a calibration of the component with a measuring bridge installed is necessary to adjust all inaccuracies in the complete system. These include, above all, the basic accuracy and offset of the measuring bridge as well as the resistance of the supply lines.

Normally in measuring bridges, 1, 2 or all 4 resistors are changeable. The accuracy of the measuring bridge results from, among other things, the properties of the resistors being very similar under all circumstances (i.e. temperature response, ageing).

If a single resistor (strain gauge) is used for measuring, the remaining resistors must be connected externally as shown in the following schematic.

4-wire circuit

The 4-wire circuit can be used with short supply wires it the measuring bridge resistance is high and no significant changes in the resistance of the wires are expected. Note the temperature dependence of copper (circa 0.39% · K-1).



6-wire circuit

Basically, it is recommended to always use the 6-wire circuit, especially with small bridge resistance and high accuracy requirements.