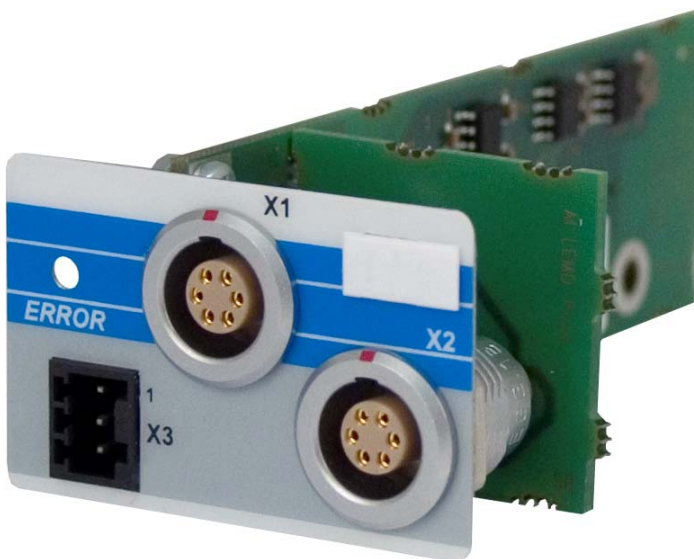


AI Insert Module (Pt100)

MSR 223



This analog insert module is used to detect temperatures in the range of $-200\text{ }^{\circ}\text{C}$ to $+250\text{ }^{\circ}\text{C}$ ($-328\text{ }^{\circ}\text{F}$ to $+482\text{ }^{\circ}\text{F}$). A Pt100 resistance thermometer is used as the temperature sensor in a 2 or 4-wire configuration. The module has two channels. Additionally, each channel has a switchable 24 V supply voltage.

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

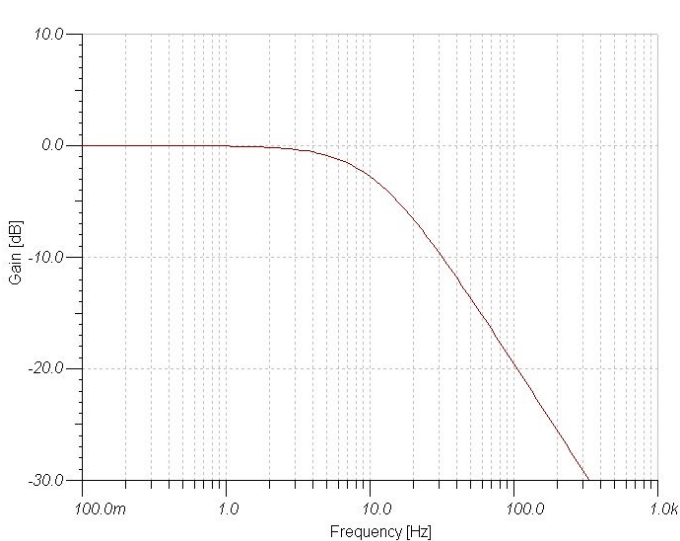
Technical Data

The following entries are valid in conjunction with the base module.

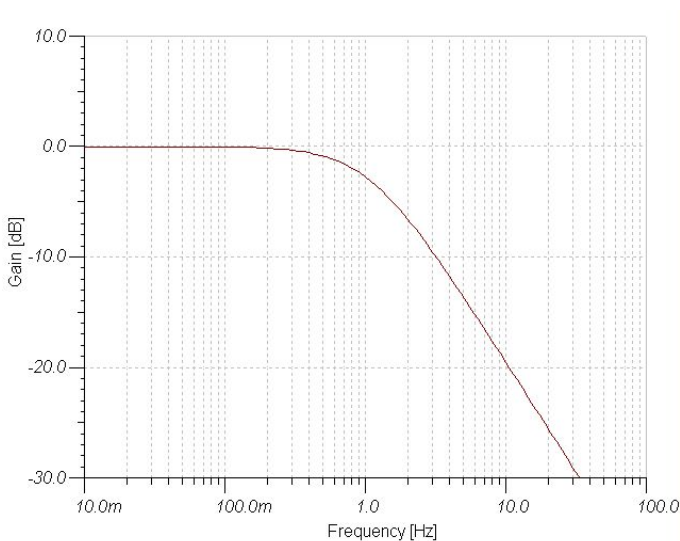
Analog channel specifications

Number of channels	2
Measurement range	-200 °C...+250 °C An open input returns 9999.99 °C
Resolution	0.01 K
Resolution [Bit]	16
Sensor break detection	Yes
Conversion time per channel	≤ 25 µs
Sensor current	Typically 0.34 mA
Sensor voltage	10 V maximum
Analog channel accuracy from end value 0 °C ... 60 °C	Typically 0.3 K
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 an ideal PT100 sensor.

Accuracy	Typically ± 0.095 K	Maximum ± 0.15 K
Noise	Typically ± 0.1 K	Maximum ± 0.14 K
Temperature input 0 °C ... 40 °C 0 °C ... 60 °C	Typically ± 0.05 K Typically ± 0.1 K	Maximum ± 0.1 K Maximum ± 0.2 K
Cross talk from previous channel -200 °C to +250 °C	Typically ± 0.005 K	Maximum ± 0.01 K
Total error 0 °C ... 40 °C 0 °C ... 60 °C	Typically ± 0.25 K Typically ± 0.3 K	Maximum ± 0.4 K Maximum ± 0.5 K
Long-term drift 1000 h	Typically ± 0.03 K	

Calibration errors are not taken into consideration. The calibration is performed at a sensor temperature of -50 °C and $+250$ °C.

Supply voltage

$\Theta_U = 0 \dots 60$ °C

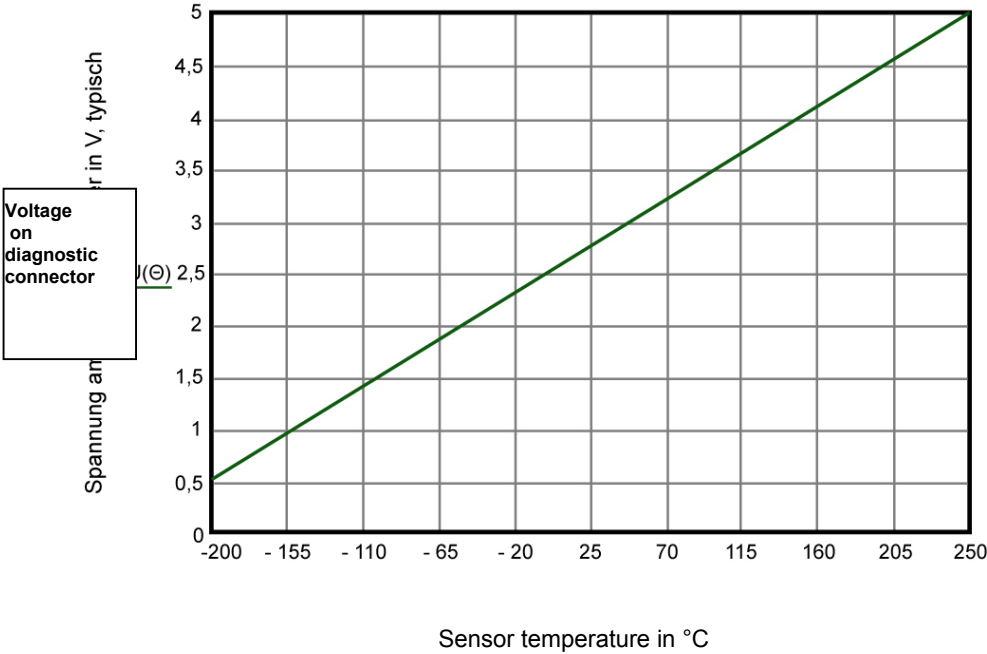
Output voltage	+23.343 V ... 24.330 V ... 25.127 V
Output current / channel	100 mA maximum, short-circuit proof
Total current / base module	Maximum 800 mA
Galvanic isolation	500V DC

Guidelines for using the Supply Voltage Outputs

When using sensors, the following switching sequence is recommended:
Activate the sensors sequentially with an offset of 100 ms.

Diagnostic connector

Voltage range with cable break	Circa 0.5 V to 5 V, see diagram 0 V or circa 7 V
Load capacity	10 mA
Short-circuit proof	Yes



Miscellaneous

Article number	18-001-223
Hardware version	1.x

Environmental conditions

Storage temperature	-30 – +85 °C	
Operating temperature	0 – +60 °C	
Humidity	0 - 95 %, uncondensed	
EMV stability	According to EN 61000-6-2:2001 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s ²
Protection Type	EN 60529	IP 00

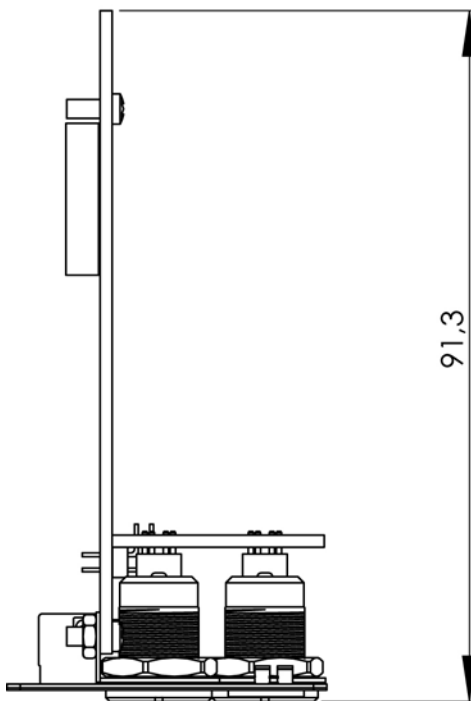
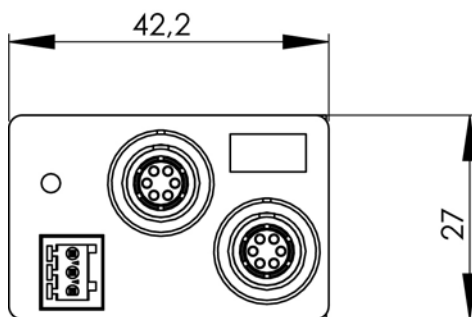
CAUTION:

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 a factory setting or calibration.

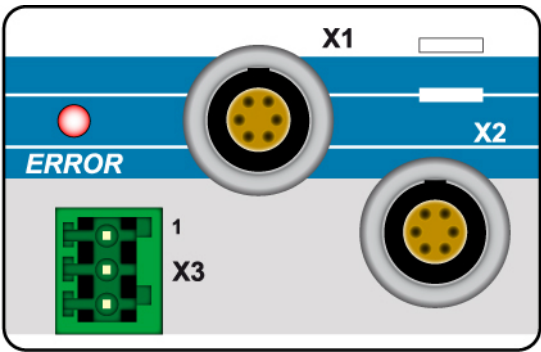
If the aging of the card does not have a significant influence on the application, the annual calibration does not have to be performed. However, Sigmatek then no longer guarantees the specified accuracy.

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

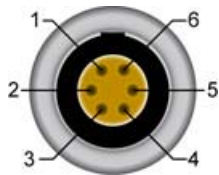
Mechanical Dimensions



Connector Layout

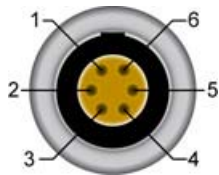


X1: AI 1
Lemo 6-pin (EGG.1B.306.CLN)



Pin	Function
1	Sensor wire 1+
2	Sensor wire 1-
3	Supply wire 1+
4	Supply wire 1-
5	+24 V power supply
6	GND

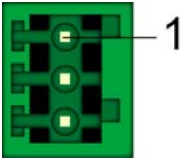
X2: AI 2
Lemo 6-pin (EGG.1B.306.CLN)



Pin	Function
1	Sensor wire 2+
2	Sensor wire 2-
3	Supply wire 2+
4	Supply wire 2-
5	+24 V power supply
6	GND

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

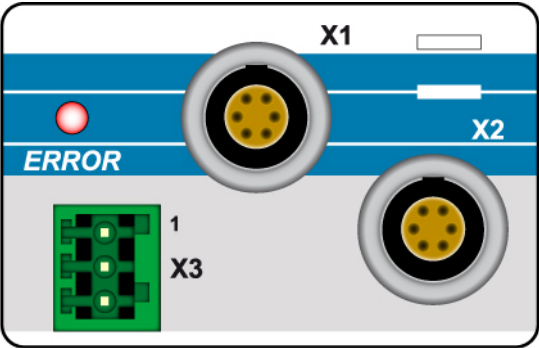
- X1 - X2:** LEMO FGG.1B.306.CLADxx
- X3:** PHOENIX FK-MC 0,5/3-ST-2,5

Applicable connection marker



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

Status display



LED-Nr.	LED color	Definition
1	Red	Over current or short circuit of the 24 V voltage supply

Wiring Guidelines

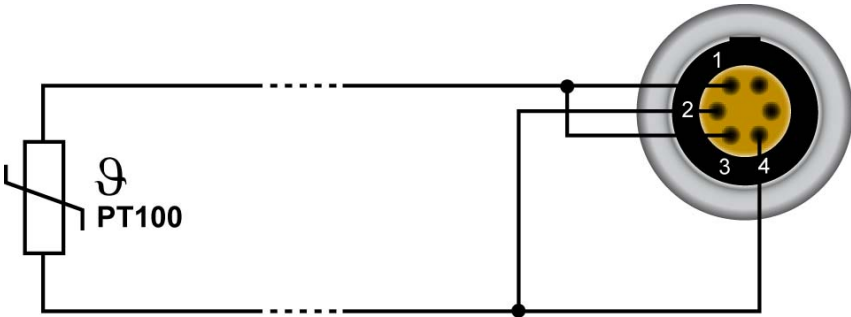
The signals recorded by the analog modules are very small, as compared to the digital signals. To ensure error-free operation, a careful wiring method must be followed.

- The 0 V connection of the supply 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 2, 3 or 4-pin shielded wires.

Temperature Measurement with Thermo Resistors

2-wire measurement

For 2-wire measurement, short sensor wires are recommended since the resistance of the wire affects the measurement.



4-wire measurement

This configuration is recommended. The sensor wires generate minimal additional measurement errors.

