C-DIAS Temperature Sensing Module CAI 888

8 x Thermocouple inputs
8 x digital outputs+24 V

This analog input module is used for the recording of temperatures.

The following thermocouple inputs can be connected:

Fe-CuNi (Type J) ... 0 – 600 °C
NiCr-Ni (Type K) ... 0 – 800 °C
FeCu-Ni (Type L) … 0 – 600 °C

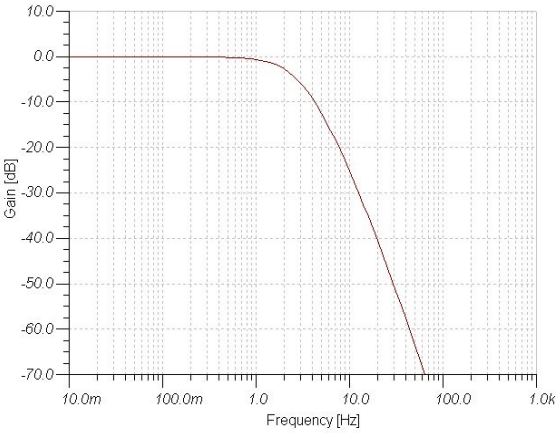
In addition, 8 digital +24 V outputs (positive switching) are available. The supply voltage is monitored for under voltage.

Technical Data

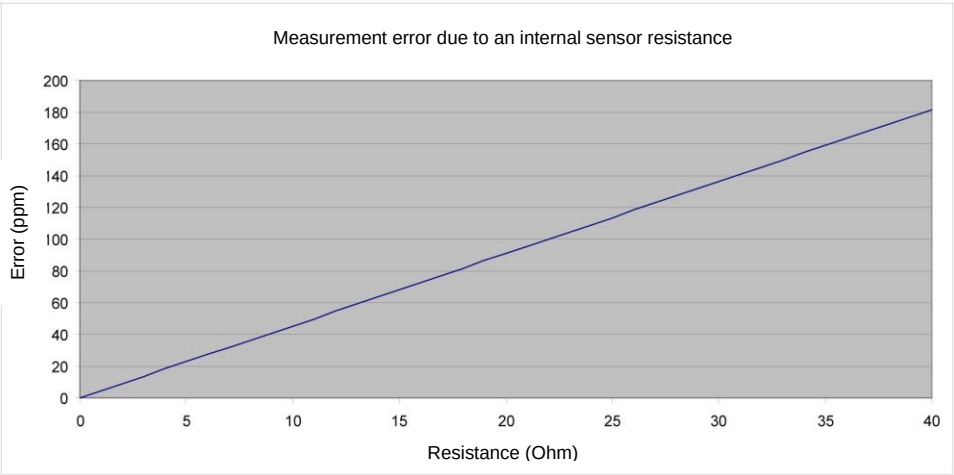
Analog channel specifications

Number of channels	8	
Measurement range	Type J (0 - 600 °C; 0 – 33.1 mV) Type K (0 - 800 °C; 0 – 33.3 mV) Type L (0 - 600 °C; 0 – 33.7 mV)	
Measurement value	0 – 6000 or 0 – 8000	An open input returns a value of -2147483631
Resolution	0.15 °C / 12 Bits	
Conversion time per channel	1 ms	
Applicable sensor type according to DIN 43710	FeCu-Ni (Type J) NiCr-Ni (Typ K) FeCu-Ni (Typ L)	
Input filter	0.5 s	Low pass 3 system
Common mode range	±10 V	
Sensor type for cold junction	KTY10-62	
Cold junction	-20 to 80 °C	
Precision of Analog channel measurement	±0.70 % of the maximum measurement value (with use of KTY10-62 terminal compensation sensors)	

Frequency Curve



Measurement error due to an internal sensor resistance error



Digital Outputs

Number of outputs	8
Short-circuit proof	Yes
Maximum continuous current per channel allowed	0.5 A
Maximum total current	4 A (100% of on-time)
Voltage drop over power supply (output active)	≤ 0.16 V
Residual current (inactive)	≤ 10 µA
Turn-on delay	≤ 100 µs
Turn-off delay	≤ 150 µs
Max. Braking energy per output	1 J

Electrical requirements

Supply voltage of the digital outputs (X6)	18 – 30 V DC	
Current consumption of the digital output supply (X6)	Corresponds to the load on the digital outputs plus 45 mA	
Voltage supply from C-DIAS bus	+5 V and +24 V	
Current consumption on DIAS bus (+5 V supply)	Typically 70 mA	Maximum 90 mA
Current consumption of C-DIAS bus (+24 V supply)	Typically 30 mA	Maximum 40 mA

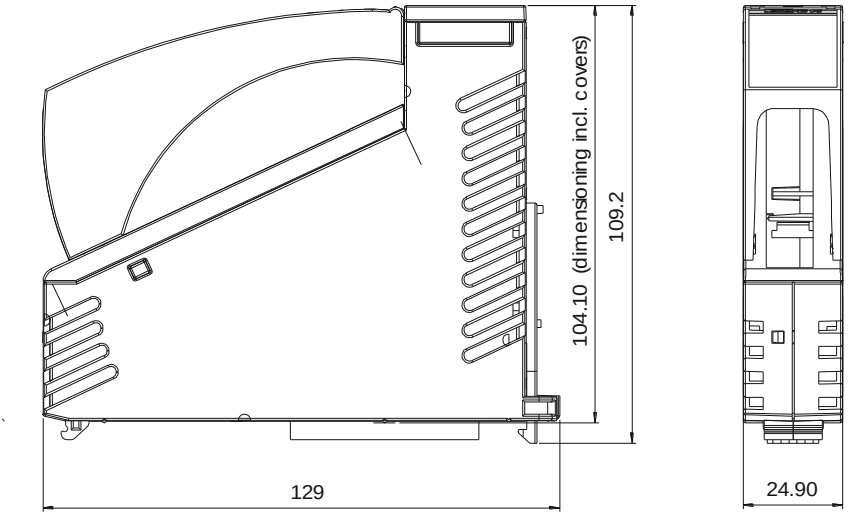
Miscellaneous

Article number	12-009-888
Hardware version	2.x

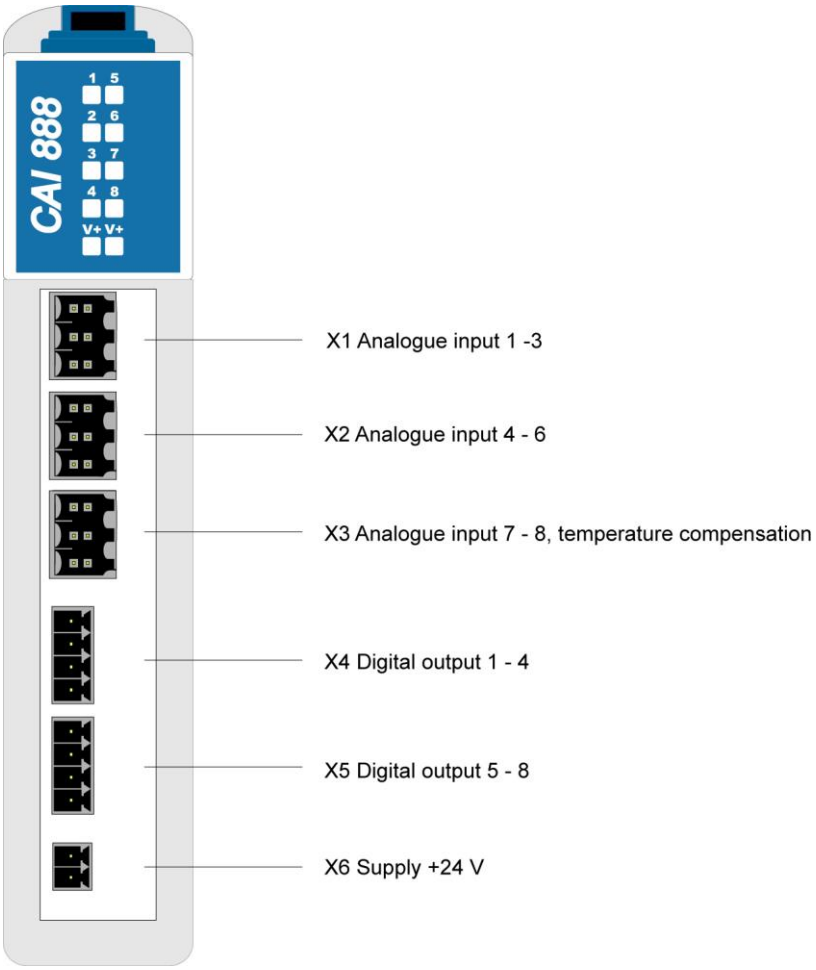
Environmental Conditions

Storage temperature	-20 – +85 °C	
Operating temperature	0 – +60 °C	
Humidity	0 - 95 %, uncondensed	
EMV stability	According to EN 61000-6-2 (industrial area)	
EMV noise emission	According to EN 61000-6-4 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s²
Protection Type	EN 60529	IP 20

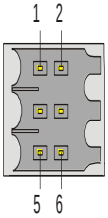
Mechanical Dimensions



Connector Layout

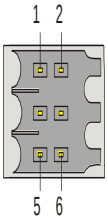


X1: Temperature input plug 1 - 3



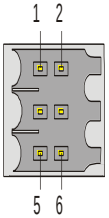
Pin	Function
1	Temperature input 1-
2	Temperature input 1+
3	Temperature input 2-
4	Temperature input 2+
5	Temperature input 3-
6	Temperature input 3+

X2: Temperature input plug 4 - 6



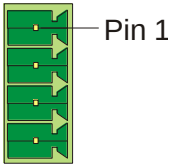
Pin	Function
1	Temperature input 4-
2	Temperature input 4+
3	Temperature input 5-
4	Temperature input 5+
5	Temperature input 6-
6	Temperature input 6+

X3: Temperature input plug 7 – 8, temperature compensation



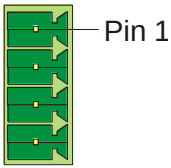
Pin	Function
1	Temperature input 7-
2	Temperature input 7+
3	Temperature input 8-
4	Temperature input 8+
5	Terminal compensation -
6	Terminal compensation +

X4: Digital outputs plug 1 - 4



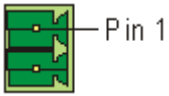
Pin	Function
1	Output 1
2	Output 2
3	Output 3
4	Output 4

X5: Digital outputs plug 5 - 8



Pin	Function
1	Output 5
2	Output 6
3	Output 7
4	Output 8

X6: Voltage supply for the digital outputs



Pin	Function
1	+24 V
2	GND

Applicable connectors

X1-X3: 6-pin. Weidmüller plug B2L/B2CF 3,5/6 AU

X4-5: Phoenix Contact: FK-MCP 1,5/ 4-ST-3,5

X6: Phoenix Contact: FK-MCP 1,5/ 2-ST-3,5

The complete C-DIAS CKL 043 connector set with spring terminals is available from SIGMATEK under the article number 12-600-043.

Status Displays

LED number	LED color	Definition
1	Yellow	Output 1
2	Yellow	Output 2
3	Yellow	Output 3
4	Yellow	Output 4
5	Yellow	Output 5
6	Yellow	Output 6
7	Yellow	Output 7
8	Yellow	Output 8
V+	Red	Voltage monitor

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 or at least twisted pair wires.

General Information on the Contact Point

Temperature measurement using thermocouples is based on the temperature-dependent voltage, which is generated through the combination of two conductors from different metals (alloys); this is called the Seebeck effect.

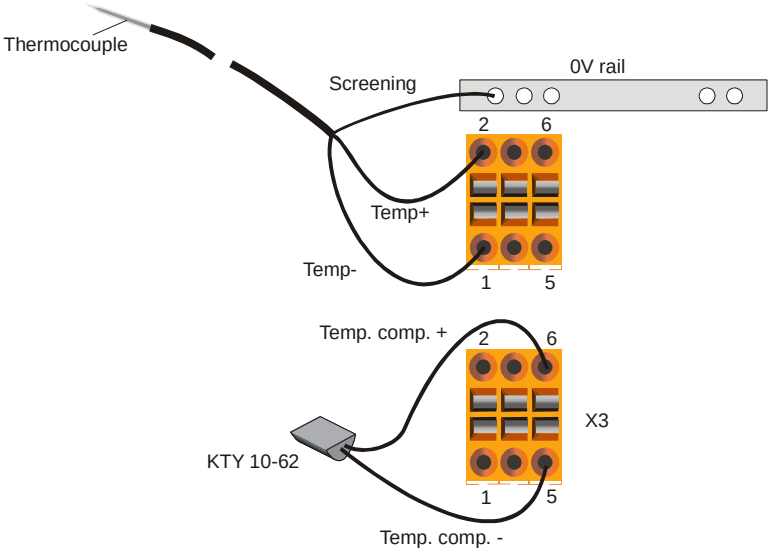
This voltage exists therefore not only at the measurement point (where it is desired) but also at the coupling between the Thermocouple conductors and the copper connection. The thermo voltage at this location is not desired, however, it is unavoidable. This voltage falsifies the measurement value by that of the temperature at the coupling!

An exact measurement is therefore only possible if the voltage corresponding to temperature of the cold junction is measured and added the voltage at the measurement point. All required circuits are integrated in the analog card. The HW class runs the compensation.

Thermocouples should therefore be connected directly to the connector plug on analog card (over compensating circuits when possible).

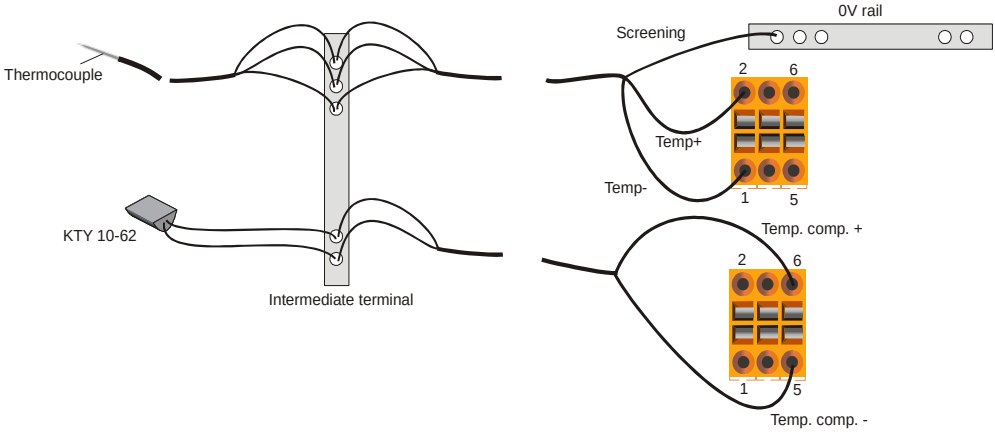
For thermocouple applications where the compensating circuit is not connected to the control, the comparison measurement must be made at the junction of the thermocouple (or compensating circuit) and the copper conductor.

Connecting the Thermocouple to the control



- If the sensor is galvanically separated, GND must be bridged with the Temp input at the terminal.
- With non-separated sensors, a sufficient mass connection between the machine mass and the 0 V bus in the control box must be provided.
- The KTY 11-62 serves as the terminal compensation.

Connecting the Thermocouple over an intermediate terminal



- If the sensor is galvanically separated, GND must be bridged with the Temp input at the terminal.
- With non-separated sensors, a sufficient mass connection between the machine mass and the 0 V bus in the control box must be provided.
- The KTY 11-62 serves as the terminal compensation.

General Information on the Digital Outputs

Up to 8 outputs are powered by a common +24 V supply.

The cross section of the conductor for the +24 supply must be sufficient for the maximum total current.

The outputs and can be turned off by turning off the +24 V supply voltage.

Applying power to an output whose supply voltage exceeds 0.7 V is not allowed.

Inductive loads must always be connected to a free wheeling diode or an RC network. This should be placed as close to the load as possible.

Connecting inductive loads: