C-DIAS Analog Input Module   **CAI 089**
Four inputs for resistance bridges with 20 mV/V
Four 0 – 10 V voltage inputs

This analog input module provides 4 inputs for resistance bridges and 4 voltage inputs.

The resistance bridges, with a resolution of 20 mV/V, are powered by a 5 V supply.

Using the analog inputs, voltages from 0 to 10 V can be measured.

Technical Data

Measuring bridge input specifications

| Number of channels	4 (4-wire connection)	
Measuring bridge resolution	20mV/V	
Measurement range	500 to 15000 parts 300 to 16000 parts	
Resolution	14-bit	
Conversion time per channel	≤1 ms	
Input filter	Cutoff frequency 1 kHz (1ms)	Low pass 3 system
Supply voltage	5 V / ±2.5 %	
Maximum voltage supply capacity	100 mA short circuit protected	
Precision of Analog channel measurement	±0.3 % of the end value	

Voltage input specifications

Number of channels	4	
Measurement range	-0 – +10 ℃	
Resolution	14-bit	
Conversion time per channel	≤1 ms	
Input filter	Cutoff frequency 1 kHz (1ms)	Low pass 3 system
Precision of Analog channel measurement	±0.3 % of the end value	

Step response CAI 089 input filter
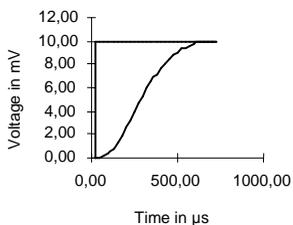
CAI 089 input signal delay
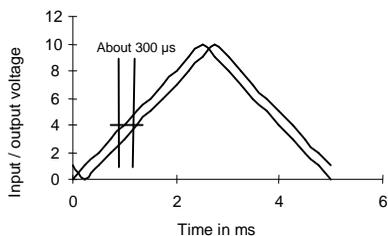
Electrical requirements

Power supply from C-DIAS bus	+5 V / +24 V	
Current consumption of C-DIAS bus (+5 V supply)	Typically 75 mA	Maximum 100 mA
Current consumption of C-DIAS bus (+24 V supply) Voltage supply load	Typically 140 mA	Maximum 210 mA

IMPORTANT:
This module exceeds the standard current consumption for C-DIAS modules!
(+24 V: 210 mA)

If this C-DIAS module is mounted on an 8-module carrier (CMB 08x), the total current of the C-DIAS modules used must be determined and checked.

The specification for the current can be found in the module-specific documentation under "Electrical Requirements".

The total current of the +24 V supply cannot exceed 1.2 A (150 mA / slot).
This is also true for the total current of the +5 V supply, which also cannot exceed 1.2 A (150 mA / slot).

IMPORTANT:
La consommation de courant de ce module dépasse les valeurs typiques pour les modules C-DIAS! (+24 V: 210 mA)

Si ce module C-DIAS est monté sur un fond de panier de taille 8 (CMB 08x), le courant total des modules utilisés doit être déterminé et vérifié.

Les données de la consommation de courant sont mentionnées dans la documentation technique du module respectif dans le paragraphe "Spécifications électriques".

Le courant total de l'alimentation +24 V ne peut pas dépasser 1,2 A (150mA / module).
Cela vaut également pour le courant total de l'alimentation +5 V, lequel ne peut également pas dépasser 1,2 A (150 mA / module).

Miscellaneous

Article number	12-009-089
Hardware version	2.x
Standardization	UL (E247993)

Environmental conditions

| Storage temperature	-20 – +85 ℃	
Operating temperature	0 – +60 ℃	
Humidity	0 - 95 %, uncondensed	
EMV stability	According to EN 61000-6-2 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s²
Protection Type	EN 60529	IP20

Mechanical Dimensions
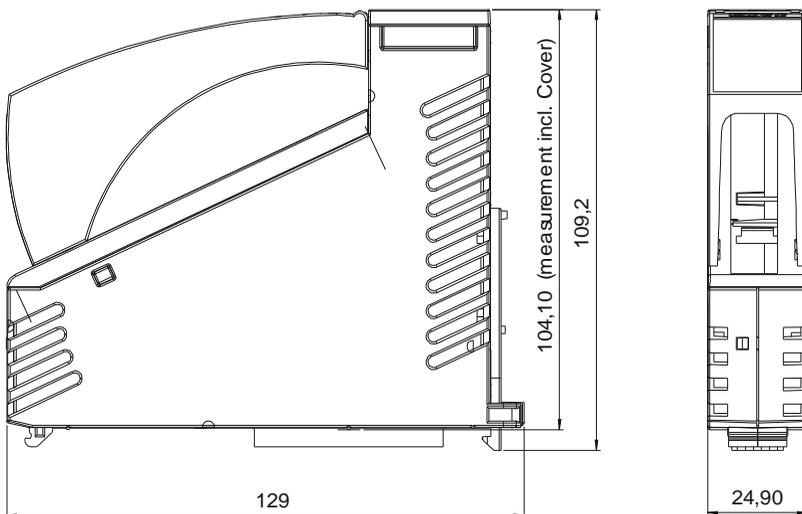
Connector Layout
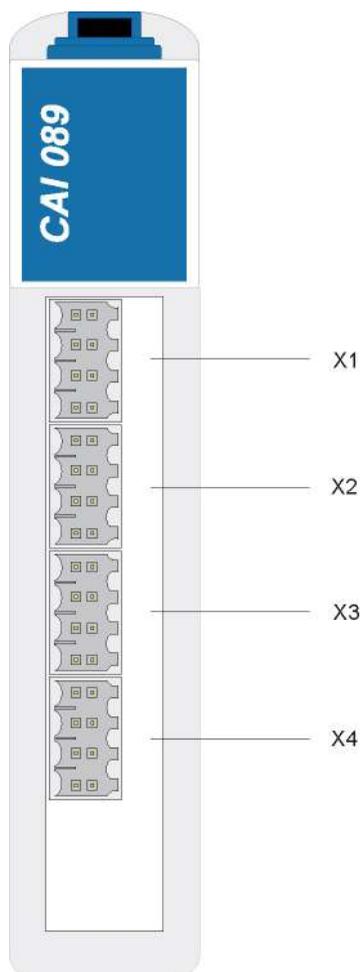
X1:
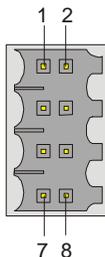
Pin	Assignment
1	Bridge input 1-
2	Bridge input 1+
3	AGND
4	+5 V supply voltage
5	Bridge input 2-
6	Bridge input 2+
7	AGND
8	+5 V supply voltage

X2:
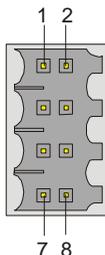
Pin	Assignment
1	Bridge input 3-
2	Bridge input 3+
3	AGND
4	+5 V supply voltage
5	Bridge input 4-
6	Bridge input 4+
7	AGND
8	+5 V supply voltage

X3:
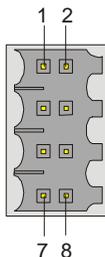
Pin	Assignment
1	Voltage supply 1-
2	Voltage supply 1+
3	AGND
4	N.C.
5	Voltage supply 2-
6	Voltage supply 2+
7	AGND
8	N.C.

X4:
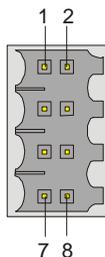
Pin	Assignment
1	Voltage supply 3-
2	Voltage supply 3+
3	AGND
4	N.C.
5	Voltage supply 4-
6	Voltage supply 4+
7	AGND
8	N.C.

N.C. – not connected

Applicable connectors

**X1, X4:** 8-pin Weidmüller plug B2L3.5/8

The complete C-DIAS CKL 047 connector set with spring terminals is available from SIG-MATEK under the article number 12-600-047.

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 DIN rail must have an adequate mass connection.

- 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 must be shielded.

- The shielding should be connected to a shielding bus.

Measuring Bridge Circuit with 20mV/V
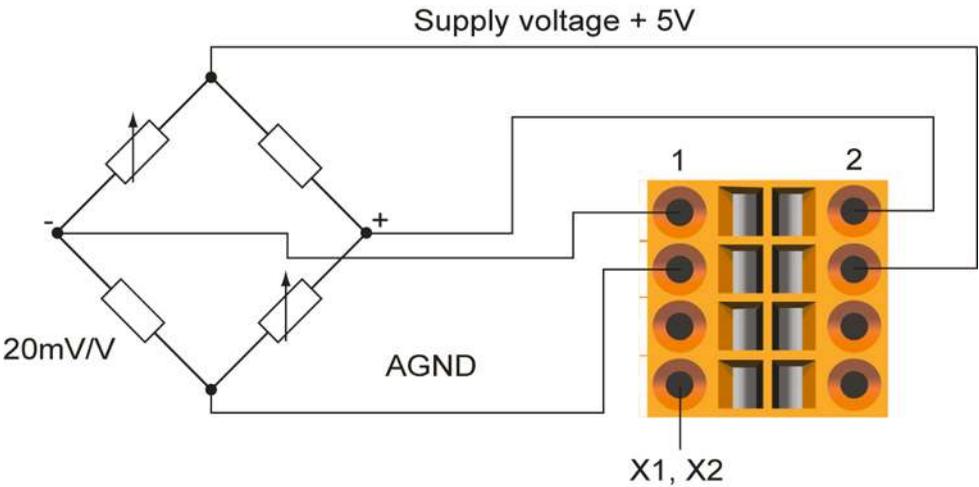
Active Voltage Source

With non potential-free voltage sources, the input and GND or analog GND cannot be connected.

Analog IN +   1   2

U

Analog IN -   X3, X4
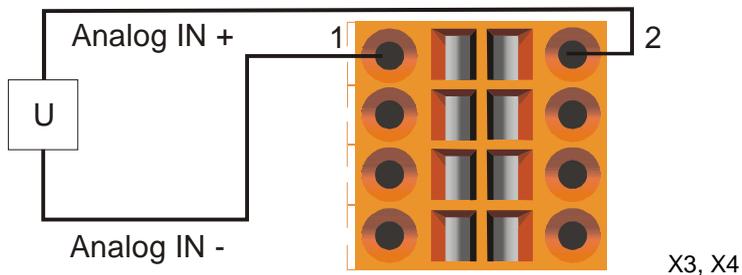
Schematic 2

Addressing

Address	RD/WR	Function / Bits
$00	RD16	14-bit reference voltage for the analog measurement value
$02	RD16	Analog measurement value channel 1, 14 Bits, 20 mV/V
$04	RD16	Analog measurement value channel 2, 14 Bits, 20 mV/V
$06	RD16	Analog measurement value channel 3, 14 Bits, 20 mV/V
$08	RD16	Analog measurement value channel 4, 14 Bits, 20 mV/V
$0A	RD16	Analog measurement value channel 5, 14 Bits, 0-10 V
$0C	RD16	Analog measurement value channel 6, 14 Bits, 0-10 V
$0E	RD16	Analog measurement value channel 7, 14 Bits, 0-10 V
$10	RD16	Analog measurement value channel 8, 14 Bits, 0-10 V
$16	WR8	ADC-DAC configuration: Bit 7 Enable 10 V-Reference
$16	RD8	ADC-DAC Status: Bit 0 10 V Reference OK Bit 1 5 V voltage supply OK Bit 7 10 V Reference enabled
$17	RD8/WR8	Difference input ON/OFF Bit 4 = channel 5, Bit 5 = channel 6, Bit 6 = channel 7, Bit 7 = channel 8 0 = ON, 1 = OFF
$18	RD8	PLL Status register Bit 1 = PLL online Bit 0 = PLL lock (PLL engaged)
$19	RD8/WR8	PLL configuration register Bit 0...3: Period of the PLL base time in ms
$1A	RD8	Reserved
$1B	RD8	Xilinx Version

Calibration data (the serial EEPROM is organized by bite)

Address	Data	Description
$00	$xx	Check sum
$01	123	Identification
$02	5	Module group 5=CAI
$03	16	Module version
$04	8	Number of channels
$05	10	Hardware version $10=HW 1.0
$06-$3F	0	FILL
$10		Serial number
		AI calibration data 4 x 20 mV/V 4 x 0-10 V
$40	$xxxx	Check sum
$42	12345	Identification
$44	28	Length of the following data blocks in WORD
$46	8	Number of channels
$48		AI0 Offset = Reference voltage at the time of calibration
$4A		AI0 Multiplicand is not used
$4C		AI0 Divisor is not used
$4E		AI1 Offset
$50		AI1 Multiplicand
$52		AI1 Divisor
$54		AI2 Offset
$56		AI2 Multiplicand
$58		AI2 Divisor
$5A		AI3 Offset
$5C		AI3 Multiplicand
$5E		AI3 Divisor
$60		AI4 Offset
$62		AI4 Multiplicand
$64		AI4 Divisor
$66		AI5 Offset
$68		AI5 Multiplicand
$6A		AI5 Divisor
$6C		AI6 Offset
$6E		AI6 Multiplicand
$70		AI6 Divisor
$72		AI7 Offset
$74		AI7 Multiplicand
$76		AI7 Divisor
$78		AI8 Offset
$7A		AI8 Multiplicand
$7C		AI8 Divisor
$7E-$7F	0	FILL