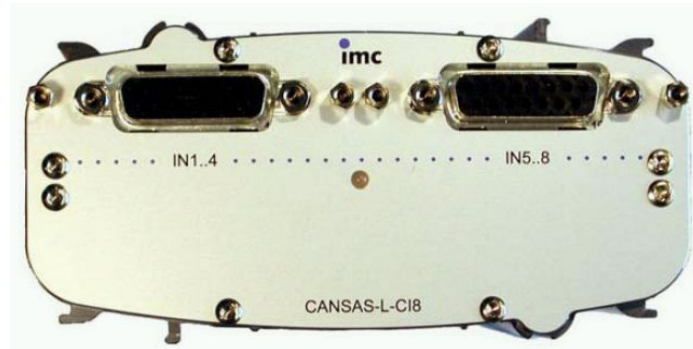


CANSAS-CI8

8-channel differential amplifier for measuring current, voltage and temperature

Version 1.7



CANSAS-CI8 is a **isolated analog input module** with 8 differential channels. By means of 8 galvanically separate channels the measurement of tension, river, resistance and temperature is with the CI8 module possible.

This amplifier's features are:

- Isolated channels permit measurement in environments having ill-defined voltage fields.
- *imc Plug & Measure* is supported (Transducer Electronic Data Sheets, IEEE 1451 standard)

Order code:	Article #
CANSAS-L-CI8	1050211
CANSAS-L-CI8-SUPPLY	1050219
CANSAS-L-CI8-V	1050293
CANSAS-L-CI8-V-SUPPLY	1050248
CANSAS-L-CI8-2T	1050265
CANSAS-K-CI8	1050252
CANSAS-K-CI8-BNC	1050268
CANSAS-SL-CI8-L	1150013
CANSAS-SL-CI8-D	1150014
CANSAS-SL-CI8-L-SUPPLY	-
CANSAS-SL-CI8-D-SUPPLY	1150029
CANSAS-SL-CI8-LV-SUPPLY	1150036

7 different models available:

CANSAS-L-CI8

Fan-less extruded aluminum housing (Long model, 2x DSUB signal terminals)
55 x 111 x 145 (W x H x D in mm)

CANSAS-L-CI8-SUPPLY

Like CANSAS-L-CI8 (Long model, 2x DSUB signal terminals)
55 x 111 x 145 (W x H x D in mm)
with built-in supply module

CANSAS-L-CI8-V

Fan-less extruded aluminum housing (Long model, 8x ITT-Veam signal terminals)
55 x 111 x 145 (W x H x D in mm)

CANSAS-L-CI8-V-SUPPLY

Fan-less extruded aluminum housing (Long model, 8x ITT-Veam signal terminals)
55 x 111 x 145 (W x H x D in mm)
with built-in supply module

CANSAS-L-CI8-2T

Fan-less extruded aluminum housing (Long model, 2x DSUB, 8 x thermocouples type-K)
55 x 111 x 145 (W x H x D in mm)

CANSAS-K-CI8

Fan-less cassette, 3U/8HP (Cassette model, 2 x DSUB signal terminals)
for installation in the imc 19" subrack
CAN-Bus and supply connected to the module via the 19" subrack
40 x 128 x 145 (B x H x T in mm)
Weight typ. 450 g

CANSAS-K-CI8-BNC

Like CANSAS-K-CI8 with 8 x BNC signal terminals

CANSAS-SL-CI8-L

Fan-less IP65 extruded aluminum housing (SL model, Lemo signal terminals)
58 x 112.5 x 152 (W x H x D in mm)

CANSAS-SL-CI8-D

Fan-less IP65 extruded aluminum housing (SL model, DSUB-15 signal terminals)
38 x 112.5 x 152 (W x H x D in mm)

CANSAS-SL-CI8-L-SUPPLY

Fan-less IP65 extruded aluminum housing (SL model, Lemo signal terminals)
78 x 112.5 x 152 (W x H x D in mm)
with built-in sensor supply

CANSAS-SL-CI8-D-SUPPLY

Fan-less IP65 extruded aluminum housing (SL model, DSUB-15 signal terminals)
58 x 112.5 x 152 (W x H x D in mm)
with built-in sensor supply

CANSAS-SL-CI8-LV-SUPPLY

Fan-less IP65 extruded aluminum housing (SL model, ITT-VEAM signal terminals)
58 x 112.5 x 152 (W x H x D in mm)
with built-in sensor supply

Refer also to the document "CANSAS Installation and Assembly" for information on the models and module racks.

Connections at standard L extruded aluminum housing and cassette modules

- CAN-Bus connected via 2x DSUB-9 terminals; CAN IN (male), CAN OUT (female) ¹
CAN-Bus Interface for sending measurements on the CAN-Bus at rates of up to 1Mbit/s,
(equipped in accordance with the CiA[®] Draft Standard 102 Version 2.0, CAN Physical Layer for
Industrial Applications)
- Signal terminals on the module:
 - 2x 15-pin DSUB-screw terminal blocks (for 4 channels per terminal)
 - 8x ITT-VEAM (VPT02Y10-7S) connectors for -CI8-(L)V(-SUPPLY)
 - 8x BNC connectors for -K-CI8-**BNC**
- Power supply via PHOENIX (MC1, 5/4STF-3,81) socket ¹

¹ not with Cassette model

Connections at SL extruded aluminum housing

- CAN-Bus Interface for sending measurement channel signals on the CAN-Bus at up to 1Mbit/s, (equipped according to the CiA® Draft Standard 102 Version 2.0, CAN Physical Layer for Industrial Applications)
 - CAN-Bus connected via 2x DSUB-9 terminals, CAN IN and CAN OUT for -SL-CI8-D(-SUPPLY)
 - 2x 10-pin LEMO 1B (HGA.1B.310) terminals, CAN IN and CAN OUT for CANSAS-SL-CI8-L(-SUPPLY), -SL-CI8-LV(-SUPPLY)
- Voltage supply via 6-pin LEMO 1B (HGA.1B.306) connector
- Signal terminal at module:
 - 2x DSUB-15 with 4 channels per DSUB-15 connector for CANSAS-SL-CI8-D(-SUPPLY)
 - 8x 7 pin LEMO 1B (HGG.1B.307) connectors for CANSAS-SL-CI8-L(-SUPPLY)¹
 - 8x ITT-VEAM (VPT02Y10-7S) connectors for CANSAS-SL-CI8-LV(-SUPPLY)¹

Power supply for standard L extruded aluminum housing and cassette modules

- Supply voltage: 10 V to 50 V DC² via (4-pin) PHOENIX plug or via CAN-Bus plug
- Automatic independent start upon application of supply voltage
- Power consumption <4.5 W (typ.)

Power supply for SL extruded aluminum housing

- Supply voltage: 10 V to 50 V DC via 6-pin LEMO connector or via CAN-Bus plug
- Automatic startup upon applying supply voltage
- Power consumption <4.5 W (typ.)

Operating conditions for standard L extruded aluminum housing and cassette modules

- Operating temperature: -30°C to 85°C condensation allowed
- Shock resistance 50 g pk over 5 ms (without plug)
- With extruded aluminum housing: voltage supply connected via PHOENIX socket

Operating conditions for SL extruded aluminum housing

- Operating temperature: -30°C to 85°C condensation allowed
- Shock resistance: MIL STD810F (without plug), Protection class: IP65
- With extruded aluminum housing: voltage supply connected via LEMO socket

Included accessories

- Calibration certificate as per DIN EN ISO 9001
- Instruction manual
- With extruded aluminum housing: Connection terminal for power supply via PHOENIX socket or via LEMO socket with gum sealing ring at SL models

Plug & Measure

- The CI8 module is fully equipped with *imc Plug & Measure* technology.
- Support of TEDS for storing and exporting sensor information
- Parameterization of a measurement channel at the click of a mouse

Measurement characteristics

- Sampling rates can be set to up to 1 kHz per channel in steps of 1, 2, 5
- 440 Hz bandwidth (-3 dB)
- 16 bit resolution (with internal 24 bit processing)
- Integrated DSP for online signal processing: data reduction, filtering, scaling, statistics etc.

¹ for different measurement modes see table

² modules build before April 2011: 9 V to 32 V see specification label

Measurement channels

- 8 differential analog channels individually filtered and conditioned for measurement of: voltage, thermocouples, Pt100, current
- Synchronized sampling of all measurement channels
- Synchronized sampling with measurement systems or appropriate modules possible both with additional synchronization line and via CAN-bus only.

Special characteristics

- The module can send a CAN-Bus message at intervals ("heartbeat"). This periodic message can serve the purpose of monitoring whether the correct module is being used with the correct configuration.
- The module's configuration can be exported by the software; this makes it possible to transfer configurations made by others by means of just the module.
- With the Long and Cassette models, the module can import slot data from the rack and pass it to automation software.
- It supports the **CANopen**[®] protocol according to "CiA[®] DS 301 V4.0.2" and "CiA[®] DS 404V1.2"; 4 TPDO (Transmit Process Data Objects) in INT16, INT32, and FLOAT ¹. The supported capabilities, more standards and the settings which can be edited via CANopen[®] are described in "CANSAS CANopen[®]"

¹ CANopen[®] mode does not support virtual channels and controlling the LEDs

Included accessories

- Calibration certificate as per DIN EN ISO 9001
- Instruction manual
- With extruded aluminum housing: Connection terminal for power supply via Phoenix socket or via LEMO socket with gum sealing ring at SL models

Optional accessories

- Supply voltage for external sensors optionally available
- **Connection terminals:**
 - **ACC/DSUB-U4**, 15-pin DSUB connection terminal for each 4-channel group: voltage measurement
 - **ACC/DSUB-T4**, 15-pin DSUB connection terminal for each 4-channel group for measurement of voltages as well as temperatures with Pt100 and thermocouples (with integrated cold-junction compensation)
 - **ACC/DSUB-I4**, 15-pin DSUB connection terminals for each 4-channel group (50 Ω shunt). For measurement of currents of up to 40 mA
 - **ACC/DSUB-TEDS-U4**, 15-pin DSUB connection terminal for each 4-channel group: voltage measurement, according to IEEE 1451.4 for use with imc Plug & Measure
 - **ACC/DSUB-TEDS-T4**, 15-pin DSUB connection terminal for each 4-channel group for measurement of voltages as well as temperatures with Pt100 and thermocouples (with integrated cold-junction compensation), according to IEEE 1451.4 for use with *imc Plug & Measure*.
 - **ACC/DSUB-TEDS-I4**, 15-pin DSUB connection terminals for each 4-channel group (50 Ω shunt). For measurement of currents of up to 40 mA, according to IEEE 1451.4 for use with imc Plug & Measure
 - **ACC/DSUB-U4-IP65**, 15-pin DSUB connection terminal for each 4-channel group: voltage measurement adapted for CANSAS-SL.
 - **ACC/DSUB-T4-IP65**, 15-pin DSUB connection terminal for each 4-channel group for measurement of voltages as well as temperatures with Pt100 and thermocouples (Pt100 or thermocouple) adapted for CANSAS-SL. Inside of the terminal pod, there is an isothermal plate and a Pt1000 unit for cold-junction compensation.
 - **ACC/DSUB-I4-IP65**, 15-pin DSUB connection terminals for each 4-channel group (50 Ω shunt). For measurement of currents of up to 40 mA adapted for CANSAS-SL.
 - **ACC/DSUB-TEDS-U4-IP65**, 15-pin DSUB connection terminal for each 4-channel group: voltage measurement adapted for CANSAS-SL, according to IEEE 1451.4 for use with *imc Plug & Measure*.
 - **ACC/DSUB-TEDS-T4-IP65**, 15-pin DSUB connection terminal for each 4-channel group for measurement of voltages as well as temperatures with Pt100 and thermocouples (with integrated cold-junction compensation) adapted for CANSAS-SL. According to IEEE 1451.4 for use with *imc Plug & Measure*.
 - **ACC/DSUB-TEDS-I4-IP65**, 15-pin DSUB connection terminals for each 4-channel group (50 Ω shunt). For measurement of currents of up to 40 mA adapted for CANSAS-SL. According to IEEE 1451.4 for use with *imc Plug & Measure*

Additional options and accessories

- Depending on the model, the modules can be either attached together to form stacks or installed in racks; see the document "*CANSAS Installation and Assembly*" for more on these options.
- The connectors necessary for the signals are described in "*Signal Connection Terminals*".
- The modules can be configured for CAN-network applications either -by order- at factory, or by the customer using appropriate configuration software. The necessary software as well as cables and additional accessories are presented in the documentation "*Integrating CANSAS in CAN Networks*".

CI8

Datasheet Version 1.7 (8 differential analog inputs, individually filtered and conditioned)

Parameter	typ.	min. / max.	Remarks
Inputs		8	2x DSUB-15 / 4 channels
Measurement modes (DSUB)	voltage thermocouples, RTD (Pt100) current resistor		ACC/DSUB-U4 ACC/DSUB-T4 ACC/DSUB-I4 (shunt connector) ACC/DSUB-T4
Measurement modes (LEMO and ITT Veam)	voltage RTD (Pt100) Current resistor		
Measurement mode (2T)	thermocouples type-K		
Sampling frequency/channel	≤1 kHz		
Bandwidth	440 Hz		- 3 dB without lowpass filter
Filter cutoff frequency filter characteristic	1/6 of sampling rate		digital lowpass, Butterworth, Bessel 2. order
Connection terminals	2 plug DSUB-15, 4 channels per plug 2x DSUB-9 PHOENIX (MC 1.5/4STF-3.81)		CANSAS-L-CI8 CAN (in / out), supply (alternative) power supply
	ITT-Veam (VPT02Y10-7S)		CANSAS-L-CI8-V-SUPPLY CANSAS-L-CI8-V
Connection terminals for SL inputs: CAN (in / out): inputs: CAN (in / out) DC power supply:	2 plug DSUB-15, 4 channels per plug 2x DSUB-9		CANSAS-SL-CI8-D, (-SUPPLY) ACC/DSUB-(X4)-IP65 power supply (alternatively)
	8x 7 pin LEMO (HGG.1B.307) 2x 10-pin LEMO (HGA.1B.310)		CANSAS-SL-CI8-L, (SUPPLY) power supply (alternatively)
	1x 6-pin LEMO (HGA.1B.306)		for all SL models

Voltage and current measurement			
Parameter	typ.	min. / max.	Remarks
Voltage input ranges	±20 mV, ±50 mV, ±100 mV, ±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V, ±20 V, ±60 V		
Current input ranges	±10 mA, ±20 mA		with shunt-plug (Shunt 50 Ω) (ACC/DSUB-I4)
Gain uncertainty	<0.025 %	<0.05 %	voltage, 23°C current with shunt-plug
	<0.07 %	<0.15 %	
Offset uncertainty	15 μV or 4LSB		range ≤100 mV
			range >100 mV
Non-linearity	<40 ppm	<60 ppm	range ±10 V
Gain drift		6 ppm/K 50 ppm/K	ranges ≤±2 V ranges ≥±5 V
			over full temperature range
Offset drift		2.5 ppm/K	over full temperature range
Input voltage noise	7.2 μVrms 36 μVpkk		range ±20 mV
			sampling rate 1 kHz, R _{source} = 0 Ω
IMR (isolation mode rejection)	>145 dB (50 Hz)		range ≤±2 V
	>70 dB (50 Hz)		range ≥±5 V R _{source} = 0 Ω

Voltage and current measurement			
Parameter	typ.	min. / max.	Remarks
Channel isolation	>1 G Ω , < 40 pF		channel-to-ground (protection ground)
	>1 G Ω , < 10 pF		channel-to-channel
Channel isolation (crosstalk) channel-to-channel	>165 dB (50 Hz) >92 dB (50 Hz)		range $\leq \pm 2$ V range $\geq \pm 5$ V
			$R_{source} \leq 100 \Omega$

Temperature measurement - thermocouples			
Parameter	typ.	min. / max.	Remarks
Measurement range	R, S, B, J, T, E, K, L, N		according IEC 584
Resolution	0.063 K (1/16K)		
Measurement uncertainty		< ± 1.0 K	type K
Temperature drift	± 0.02 K/K $\cdot\Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $ ambient temperature T_a
Uncertainty of cold junction compensation temperature drift	± 0.001 K/K $\cdot\Delta T_j$	< ± 0.15 K	ACC/DSUB-T4 $\Delta T_j = T_j - 25^\circ\text{C} $ cold junction temperature T_j

Temperature measurement – Pt100			
Measurement range	-200°C to +850°C -50°C to +150°C		
Resolution	0.063 K (1/16K)		
Measurement uncertainty	< ± 0.2 K < ± 0.05 %		-200°C to +850°C, 4-wire connection plus of reading
Temperature drift	± 0.01 K/K $\cdot\Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $; ambient temp. T_a
Sensor feed (PT100)	250 μA		

Resistance measurement			
Measurement range	0 Ω to 150 Ω , 250 Ω 0 Ω to 500 Ω , 1 k Ω		

General			
Parameter	typ.	min. / max.	Remarks
Isolation:			channel to case (chassis) and channel-to-channel
CAN-Bus	± 60 V		nominal; testing voltage: 300 V (10 s)
power supply input	± 60 V		nominal; testing voltage: 300 V (10 s)
analog input	± 60 V		nominal; testing voltage: 300 V (10 s)
Overvoltage protection	± 60 V ESD 2 kV		differential input voltage (continuous) human body model
	transient protection: automotive load dump ISO 7637, Testimpuls 6		test pulse 6 with max. -250 V $R_i=30 \Omega$, $t_d=300 \mu\text{s}$, $t_r<60 \mu\text{s}$
Input coupling configuration	DC, isolated (differential)		isolated to System-GND (case, CHASSIS)
Input impedance	10 M Ω 1 M Ω 50 Ω		voltage mode (range $\leq \pm 2$ V), temperature mode voltage mode (range $\geq \pm 5$ V) current mode (shunt-plug)
Input current operating conditions		1 nA	

General			
Parameter	typ.	min. / max.	Remarks
on overvoltage condition		1 mA	Vin >5 V on ranges ± 5 V or device powered-down
TEDS - Transducer Electronic DataSheets	conformant to IEEE 1451.4 Class II MMI		
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 TPDOs in INT16, INT32, and FLOAT		
Power supply	10 V to 50 V DC		
Power-consumption of analog conditioning	< 4.5 W		24 V _{DC}
Operating temperature	-30°C to 85°C		
Dimensions (W x H x D)	55 x 111 x 145 mm 40 x 128 x 145 mm 58 x 112.5 x 152 mm 38 x 112.5 x 152 mm 78 x 112.5 x 152 mm 58 x 112.5 x 152 mm		CANSAS-L-CI8(-SUPPLY), 2T, CANSAS-L-CI8-V(-SUPPLY) CANSAS-K-CI8, -BNC CANSAS-SL-CI8-L CANSAS-SL-CI8-D CANSAS-SL-CI8-L-SUPPLY CANSAS-SL-CI8-D-SUPPLY
Weight	560 g		

Optional: sensor supply			
Parameter	typ.	min./max.	Remarks
Ranges	7		selectable, global to all channels
Standard version	+2.5 V to +24 V		non-isolated
Upon request	isolated versions +2.5 V to ± 15 V, +24 V		non-isolated only

Sensor SUPPLY module

Version 1.1

For CANSAS C8, CI8, SCI8, SC16, SCI16 and INC4-V-SUPPLY optional

(Optional for model long and cassette CANSAS-SC16)

Order code: CAN/SEN-SUPPLY

The sensor supply module always makes only 7 of 8 selectable voltage ranges available:

- default case: all voltage ranges not isolated (standard ranges: +2.5 V to +24 V; ± 15 V optional)
- upon request: all voltage ranges isolated, but only if the range ± 15 V is not included (only for SL with LEMO connectors)
- upon request: with range ± 15 V instead of one other range, however all voltage ranges not isolated (only for C8, CI8, not for SL with LEMO-connectors)

Parameter	Value (typ. / max.)			Remarks
Configuration options	8 ranges			
Output voltage	voltage	current	net power	globally selected, isolated on request (not for LEMO)
	+2.5 V	580 mA	1.5 W	
	+5.0 V	580 mA	2.9 W	
	+7.5 V	400 mA	3.0 W	
	+10 V	300 mA	3.0 W	
	+12 V	250 mA	3.0 W	
	+15 V	200 mA	3.0 W	
	+24 V	120 mA	2.9 W	
	± 15 V	190 mA	3.0 W	available on request for C8, CI8 (then only non isolated; not for LEMO)
Short-circuit protection	unlimited duration			to output voltage reference ground
Output voltage accuracy	<0.25 % (typical) <0.5 % (max.) < 0.9 % (max.) <1 % (max.)			at terminal plugs, no load 25°C; 2.5 V to 24 V 25°C; 2.5 V to 24 V full temperature range ± 15 V
Deviation control of lead impedance	3-wire control: SENSE lead as feedback (-VB is supply ground)			available for 5V and 10V requirements: 1) balanced cables 2) identical cables on all channels 3) representative measurement with channel 1
Efficiency	typ. 55 % typ. 50 % typ. 70 % min. 40 %			5V, to 15 V 24 V ± 15 V 2.5 V
Capacitive load (max.)	>4000 μ F >1000 μ F >400 μ F			2,5 V, 10 V, ± 15 V 12 V, 15 V 24 V
Operating temperature	-30°C to 85°C			