

imc CANSAS-CI8

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

The CAN-Bus Measurement Module imc CANSAS-CI8 is a isolated analog input module with 8 isolated channels ideal for the measurement of:

- Voltage
- Current (20 mA sensors)
- Thermocouples
- PT100 (PT1000 optionally) temperature sensors
- Resistance

Highlights

- isolated channels enable measurement
 - in environments where the ground reference voltage conditions are not well defined
 - signals riding on a high common mode level
- 440 Hz bandwidth with max. 1 kSps/channel sampling rate
- Measurement ranges and sampling rates can be set per channel in steps of 1, 2, 5
- 16 bit resolution (with internal 24 bit processing)
- Support of imc Plug & Measure TEDS (Transducer Electronic Data Sheets, IEEE 1451.4) for storing and exporting sensor information



imc CANSAS-L-CI8



imc CANSAS-SL-CI8-D

Operating conditions:

- extended temperature range, including humidity / condensation
- mechanically robust

CAN interface:

- configurable baud rate up to 1 MBit/s
- galvanically isolated

Synchronization:

- simultaneous sampling of all module's channels
- synchronizing of multiple imc CANSAS modules and with global CAN logger both via dedicated SYNC signal or based on CAN messages

Power supply and operation:

- galvanically isolated
- wide input voltage range
- supply via CAN cable possible
- automatic self start upon power-up

Onboard signal processing:

- "virtual channels"
- integrated signal processor (DSP) for online processing: data reduction, filtering, scaling etc.
- programmable multi function status LED (front panel)

Housing and Connectors:

- variety of different housings and connections

Software**Configuration:**

- with imc CANSAS Software (free of charge)
- supports the CANopen® protocol according "CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2"; 4 TPDO (Transmit Process Data Objects) in INT16, INT32, and FLOAT; the supported capabilities, more standards and the settings which can be edited via CANopen® are described in the "CANSAS CANopen®" documentation
- capable of automatic start upon power up with preloaded configuration; also available pre-configured
- The module's current configuration can be read out and exported by the software; For transfer of configuration via physical transport of the module; for back tracing and recovery.
- The "-L" and "-K" models, when installed and operated in the 19" subrack backplane, can automatically identify their slot position within the rack and pass this information on to automation software.
- Configurable with cyclical "life-sign", e.g. for integrity check purposes in test rigs
- Contains checksum for configuration and serial number, e.g. for consistency monitoring (checking of whether the correct module is still being used, for instance in installations undergoing maintenance)

Measurement operation:

- simple measurement operation with imc CANSASpro using CAN interface such as imc CAN-USB or any other 3rd party PC CAN interface
- Data logger operation
Software: imc STUDIO
Hardware: imc measurement systems with CAN interface such as imc BUSDAQ, imc CRONOS family (CRONOSflex, CRONOScompact, CRONOS-SL), imc C-SERIES, imc SPARTAN
- any 3rd party CAN data logger systems

Overview of available variants

Order Code	article number	housing	signal-plug	option
CANSAS-L-CI8	1050211	aluminum housing	DSUB	
CANSAS-L-CI8-SUPPLY	1050219	aluminum housing	DSUB	Sensor-Supply
CANSAS-L-CI8-V	1050293	aluminum housing	ITT Veam	
CANSAS-L-CI8-V-SUPPLY	1050364	aluminum housing	ITT Veam	Sensor-Supply
CANSAS-L-CI8-L	1050426	aluminum housing	LEMO	
CANSAS-L-CI8-L-SUPPLY	1050378	aluminum housing	LEMO	Sensor-Supply
CANSAS-L-CI8-2T	1050265	aluminum housing	Thermo-Plug	
CANSAS-L-CI8-BNC	1050367	aluminum housing	BNC	
CANSAS-L-CI8-PT1000	1050400	aluminum housing	DSUB	PT1000
CANSAS-K-CI8	1050252	cassette	DSUB	
CANSAS-K-CI8-BNC	1050268	cassette	BNC	
CANSAS-K-CI8-PH	1050322	cassette	Phoenix-Plug	
CANSAS-K-CI8-2T	1050363	cassette	Thermo-Plug	
CANSAS-SL-CI8-L	1150013	waterproof SL housing	LEMO	
CANSAS-SL-CI8-L-SUPPLY	1150052	SL housing	LEMO	Sensor-Supply
CANSAS-SL-CI8-D	1150014	SL housing	DSUB	

Order Code	article number	housing	signal-plug	option
CANSAS-SL-CI8-D-SUPPLY	1150029	SL housing	DSUB	Sensor-Supply
CAN/SL-CI8-D-PT1000	1150064	SL housing	DSUB	PT1000

The **measurement of IEPE/ICP sensors** with optional DSUB-15 plug (**ACC/DSUB-ICP4**) is possible with module variant having DSUB signal plugs.

Housing types: imc CANSAS - classic

	CANSAS	CANSAS-L	CANSAS-K	CANSAS-SL
General				
Housing type	Alu profile	Alu profile	cassette	sealed
Size (W x H x D, mm)	W x 111 x 90	W x 111 x 145	W x 128 x 145	W x 113 x 152
Weight (typical: UNI8)	800g	800g	450 g	900 g
Stackable	●	●	●	●
Subrack mounting		●	●	
Subrack slot recognition		●	●	
DIN-rail mounting kit	●	●		
Versatile mounting kit	●	●		●
Operating conditions				
Extended temp. range, incl. condensation	●	●	●	●
Shock and vibration rating	50g pk (5 ms)	50g pk (5 ms)	50g pk (5 ms)	MIL STD810F
IP rating	IP40	IP40	IP20	IP65
Connectivity				
CAN connector (in / out)	2 x DSUB-9	2 x DSUB-9	2 x DSUB-9	2 x DSUB-9 or 2 x LEMO
Power input connector	PHOENIX	PHOENIX	PHOENIX	LEMO.1B
Control LED (front)	●	●	●	●

Operating conditions for Alu profile and cassette

- Operating temperature: -40°C to 85°C condensation allowed
- Shock resistance 50 g pk over 5 ms

Operating conditions for sealed IP65 (SL) profile

- Operating temperature: -40°C to 85°C condensation allowed
- Shock resistance: MIL STD810F
- Ingress Protection rating: IP65

Option ex-factory (ordering option)

- Adjustable supply voltage is available at dedicated pins of the DSUB-15 connectors.

Included accessories

- Calibration certificate with test equipment verification as per ISO 9001 (manufacturer's calibration certificate)
- Instruction manual, getting started with imc CANSAS (one copy per delivery)
- Suitable power input plug:
PHOENIX pluggable terminal block (aluminum profile housing)
LEMO.1B plug (SL housing)

Optional accessories

AC/DC power adaptor 110-230V AC		
CAN/POWER-SUPPLY	24 V DC, 60 W, PHOENIX-connector	1050022

AC/DC power adaptor 110-230V AC

CAN/SL-POWER-SUPPLY	24 V DC, 60 W, LEMO.1B.306	1150032
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DSUB-9 connector (CAN)

CAN/RESET	Reset-plug	1050025
CAN/KABEL-TYP2	CAN-Bus connection cable 2x DSUB-9 1:1, 2 m length	1050027

DSUB-15 plug

ACC/DSUBM-U4	DSUB-15 plug with screw terminals for 4-channel voltage measurement.	1350166
ACC/DSUB-U4-IP65	IP65 sealed version of the plug	1350056
ACC/DSUBM-TEDS-U4	U4 plug variant with TEDS support, according IEEE 1451.4 for use with imc Plug & Measure	1350189
ACC/DSUB-TEDS-U4-IP65	IP65 sealed version of the plug	1350066
ACC/DSUBM-I4	DSUB-15 plug with screw terminals for 4-channel current measurement of up to 50 mA (shunt 50 Ω, scaling factor 0.02 A/V)	1350168
ACC/DSUB-I4-IP65	IP65 sealed version of the plug	1350058
ACC/DSUBM-TEDS-I4	I4 plug variant with TEDS support, according IEEE 1451.4 for use with imc Plug & Measure	1350192
ACC/DSUB-TEDS-I4-IP65	IP65 sealed version of the plug	1350068
ACC/DSUB-ICP4	DSUB-15 plug with screw terminals for conditioning of 4 IEPE/ICP inputs	1350032
ACC/DSUBM-T4	DSUB-15 plug with screw terminals for 4-channel measurement of voltages as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC).	1350167
ACC/DSUB-T4-IP65	IP65 sealed version of the plug	1350057
ACC/DSUBM-TEDS-T4	T4 plug variant with TEDS support, according IEEE 1451.4 for use with imc Plug & Measure	1350190
ACC/DSUB-TEDS-T4-IP65	wasserdichte TEDS Version	1350067

Mounting brackets for fixed installations of CANSAS modules with Alu profile housing

CAN/BRACKET-90	mounting bracket 90°	1050319
CAN/BRACKET-DIN-S	DIN Rail mounting bracket - Type S	1050324
CAN/BRACKET-DIN-M	DIN Rail mounting bracket - Type M	1050325

Mounting brackets for fixed installations of CANSAS-SL modules

CAN/SL-BRACKET-CON	connection bracket	1150048
CAN/SL-BRACKET-90	mounting bracket 90°	1150047
CAN/SL-BRACKET-180	mounting bracket 180°	1150049

Miscellaneous

Calibration report set for each device	Report set with manufacturer's calibration certificate and individual readings, as well as list of test equipment used. Meets requirements of DIN EN ISO 17025
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Connectors and sealing options

ACC/CAP-LEMO.1B	Dust protection cap for LEMO.1B sockets	1350233
ACC/CAP-DSUB-15	Dust protection cap for DSUB-15 sockets	1350339
ACC/CAP-DSUB-9	Dust protection cap for DSUB-9 sockets	1350340

Technical Specs - CI8

Channels, Measurement modes		
Parameter	Value	Remarks
Channels	8	
Measurement modes DSUB	voltage measurement current measurement temperature measurement thermocouples temperature measurement PT100 temperature measurement PT1000 resistance measurement current fed sensors	voltage plug (ACC/DSUBM-U4) shunt plug (ACC/DSUBM-I4) thermo plug (ACC/DSUBM-T4) only with standard variant only with PT1000 variant not supported with PT1000 variant IEPE/ICP expansion plug (ACC/DSUB-ICP4)
Measurement modes LEMO and ITT Veam (-L, -V)	voltage measurement current measurement temperature measurement PT100 / PT1000 resistance measurement	PT1000 variant upon request not supported with PT1000 variant
Measurement mode Thermocouple terminal socket (-2T)	thermocouple type-K	miniature thermocouple terminal
Measurement modes Phoenix-plug (-PH)	voltage measurement RTD (PT100) in 4-wire-configuration	
Measurement mode BNC (-BNC)	voltage measurement	

Sampling rate, bandwidth, filter, TEDS		
Parameter	Value	Remarks
Sampling rate	≤ 1 kHz	per channel
Bandwidth	440 Hz	-3 dB without lowpass filter
Filter cutoff frequency filter characteristic	1/6 of sampling rate	digital lowpass, Butterworth, Bessel 2.order
TEDS - Transducer Electronic DataSheets	conformant to IEEE 1451.4 Class II MMI	ACC/DSUBM-TEDS-xxx
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 TPDOs in INT16, INT32, and FLOAT	

General			
Parameter	Value typ.	min. / max.	Remarks
Isolation:	galvanically isolated		channel to case (housing, CHASSIS, case) and channel-to-channel
CAN-Bus power supply input analog input	$\pm 60 \text{ V}$ $\pm 60 \text{ V}$ $\pm 60 \text{ V}$		nominal; testing voltage: 300 V (10 s) nominal; testing voltage: 300 V (10 s) nominal; testing voltage: 300 V (10 s)
Ovvoltage protection	$\pm 60 \text{ V}$ ESD 2 kV transient protection: automotive load dump ISO 7637, Testimpuls 6		differential input voltage (continuous) human body model 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	DC		
Input configuration	differential, isolated		galvanically isolated to System-GND (case, CHASSIS)
Input impedance	$10 \text{ M}\Omega$ $1 \text{ M}\Omega$ 50Ω		ranges $\leq \pm 2 \text{ V}$ ranges $\geq \pm 5 \text{ V}$ an device powered-down with shunt-plug (ACC/DSUBM-I4) respectively current input (-L, -V)
Input current operating conditions on overvoltage condition	1 nA 1 mA		at operating conditions $ V_{in} > 5 \text{ V}$ on ranges $< \pm 5 \text{ V}$ or device powered-down
Auxiliary supply voltage available current internal resistance	5 V >0.26 A 1.0 Ω	$\pm 5\%$ >0.2 A <1.2 Ω	for IEPE/ICP plug independent of optional sensor supply, short circuit proof power per DSUB-plug

Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 60 \text{ V}$, $\pm 20 \text{ V}$, $\pm 10 \text{ V}$, $\pm 5 \text{ V}$, $\pm 2 \text{ V}$, $\pm 1 \text{ V}$, $\pm 500 \text{ mV}$, $\pm 200 \text{ mV}$, $\pm 100 \text{ mV}$, $\pm 50 \text{ mV}$, $\pm 20 \text{ mV}$		
Gain error	<0.025%		<0.05% of the measured value, at 25°C
Gain drift		0.0006%/K· ΔT_a 0.005%/K· ΔT_a	ranges $\leq \pm 2 \text{ V}$ ranges $\geq \pm 5 \text{ V}$ $\Delta T_a = T_a - 25^\circ\text{C} $
Offset error		0.02%	of range
Offset drift			over full temperature range
Non-linearity	<40 ppm		range $\pm 10 \text{ V}$
Input voltage noise	$7.2 \mu\text{V}_{\text{rms}}$ $36 \mu\text{V}_{\text{pkpk}}$		range $\pm 20 \text{ mV}$ sampling rate 1 kHz, $R_{\text{source}} = 0 \Omega$
IMR (isolation mode rejection)	>145 dB (50 Hz) >70 dB (50 Hz)		range $\leq \pm 2 \text{ V}$ range $\geq \pm 5 \text{ V}$
Channel isolation	>1 G Ω , <40 pF >1 G Ω , <10 pF		channel-to-ground / protection ground channel-to-channel

Voltage measurement

Parameter	Value typ.	min. / max.	Remarks
Channel isolation (crosstalk) channel-to-channel	>165 dB (50 Hz) >92 dB (50 Hz)	range $\leq \pm 2$ V range $\geq \pm 5$ V	$R_{\text{source}} \leq 100 \Omega$

Current measurement

Parameter	Value typ.	min. / max.	Remarks
Current input ranges	± 20 mA, ± 10 mA		
Shunt impedance	50 Ω		DSUB variant: shunt-plug LEMO/ITT Veam variant: internal shunt
Gain error	<0.07% <0.025%	<0.15% <0.05%	DSUB variant LEMO/ITT Veam variant
Offset error		2.4 μ A	
Offset drift		0.00025%/K $\cdot \Delta T_a$	over full temperature range

Temperature measurement - thermocouples

Parameter	Value typ.	min. / max.	Remarks
Measurement mode	R, S, B, J, T, E, K, L, N		
Measurement range	-50°C to 400°C -50°C to 150°C -270°C to 1370°C		type K
Resolution	0.063 K (1/16K)		
Measurement error		< ± 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
Error of cold junction compensation temperature drift		< ± 0.15 K < ± 0.5 K	ACC/DSUBM-T4 variant CI8-2T $\Delta T_j = T_j - 25^\circ\text{C} $ cold junction temperature T_j

Temperature measurement – RTD (PT100/ PT1000)

Parameter	Value	Remarks
Measurement modes	PT100 PT1000	standard variant special variant only: PT1000 instead of PT100 mode
Measurement range	-50°C to +150°C -200°C to +850°C	
Resolution	0.063 K (1/16 K)	
Measurement error	< ± 0.2 K < ± 0.05 %	-200°C to +850°C, 4-wire connection corresponding resistance
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 and resistance measurement)	250 μ A	
Sensor feed (PT1000 variant)	50 μ A	special variant PT1000

Resistance measurement		
Parameter	Value	Remarks
Measurement range	1 kΩ, 500 Ω, 250 Ω, 150 Ω	for variant with DSUB-15 sockets: max. usable range 500 Ω (limited voltage swing of reference current source) with PT1000 variant there is no resistance measurement available
Measurement error	0.06 Ω <0.05%	4-wire measurement plus of reading
Temperature drift	±0.004 Ω/K · ΔT _a	ΔT _a = T _a -25°C ; ambient temp. T _a

Optional sensor supply (CAN-xx-SUPPLY)			
Parameter	Value		Remarks
Configuration options	7 selectable settings		
Output voltage	voltage +2.5 V +5.0 V +7.5 V +10 V +12 V +15 V +24 V	current 580 mA 580 mA 400 mA 300 mA 250 mA 200 mA 120 mA	net power 1.5 W 2.9 W 3.0 W 3.0 W 3.0 W 3.0 W 2.9 W
Isolation standard optional, upon request	non isolated isolated		set globally for all channels of a module output to case (CHASSIS) nominal rating: 50 V, test voltage (10 sec): 300 V
Short-circuit protection	unlimited duration		to output voltage reference ground
Accuracy of output voltage	<0.25% (typ.) / <0.5% (max.) <0.9% (max.)		at terminals, no load 25°C; 2.5 V to 24 V over entire temperature range
Max. capacitive load	>4000 µF >1000 µF >300 µF		2.5 V to 10 V 12 V, 15 V 24 V

Power supply	Value	Remarks
Input supply voltage	10 V to 50 V DC	
Power consumption	<5.5 W <10 W	without supply with optional supply

Terminal connections	Value	Remarks
Terminal connection CANSAS-K, -L	8x ITT-Veam (VPT02Y10-7S) or 8x 7-pin LEMO (HGG.1B.307) or 2x DSUB-15 or 8x BNC or 8x Thermocouple type-K or 4x 8-pin Phoenix plug (Typ MC1,5/8-GF-3,5)	4 channels per plug
	2x DSUB-9 PHOENIX (MC 1.5/4STF-3.81)	8 channels per plug (CANSAS-K-CI8-PH)
		CAN (in / out), power supply (alternatively) DC power supply
Terminal connection CANSAS-SL	8x Litton-Veam (VPT02Y10-7S) or 8x 7-pin LEMO (HGG.1B.307) or 2x DSUB-15	CANSAS-SL-CI8-LV-SUPPLY
	2x 10-pin LEMO (HGA.1B.310) 1x 6-pin LEMO (HGA.1B.306)	4 channels per plug
Dimensions (W x H x D)	55 x 111 x 145 mm 41 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, -BNC, -PT1000 CANSAS-L-CI8-V(-SUPPLY) CANSAS-K-CI8, -BNC, -PH, -2T CANSAS-SL-CI8-L CANSAS-SL-CI8-D CANSAS-SL-CI8-L-SUPPLY CANSAS-SL-CI8-D-SUPPLY, CANSAS-SL-CI8-D-PT1000
Weight	approx. 800 g approx. 450 g approx. 600 g	aluminum housing (CANSAS-L) cassette (CANSAS-K) SL housing
Operating temperature	-40°C to 85°C	