

imc CANSAS-SCI8, SCI16

8- or 16-channel module for isolated measurement of voltage, current and temperature

The SCI16 and SCI8 measurement modules are analog input modules with 8 and 16 multiplexed isolated inputs, respectively. Voltage signals of up to 60 V, current signals of up to 20 mA, Pt100 sensors and any commercially available thermocouples can be connected directly. Advanced signal processing techniques provide fully simultaneous sampling without any channel dependent time delays, despite it's multiplexed architecture. Refined filtering and noise suppression methods allow highly sensitive voltage and thermocouple measurements, even in demanding environments. The noise suppression provided is most effective at low sampling rates and decreases as the sampling rate is raised.

Highlights

- Measurement ranges and sampling rates can be set per channel in steps of 1, 2, 5
- 16 bit resolution (with internal 24 bit processing)
- Supports imc Plug & Measure TEDS (Transducer Electronic Data Sheets, IEEE 1451.4) Support of TEDS for storing and exporting sensor information. Parameterization of a measurement channel at the click of a mouse.



imc CANSAS-SCI8

General characteristics of imc CANSAS modules

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, statistics 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 ex-factory.
- The module's current configuration can be extracted and exported by the software; this makes it possible to transfer configurations made by others by means of just the module.
- 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.
- 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.

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 or imc DEVICES
Hardware: imc measurement systems with CAN interface such as imc BUSDAQ, imc CRONOS series (CRC, CRFX, CRSI, CRPL), imc C-SERIES, imc SPARTAN
- any 3rd party CAN data logger systems

Overview of the available variants

Order Code	Article No.	Housing	Signal-connector	CAN-connector	Extra
CAN/SCI8	1050128	short aluminum profile	DSUB-15	DSUB-9	
CAN/SCI16	1050127		DSUB-15	DSUB-9	
CAN/L-SCI8	1050150	aluminum profile	DSUB-15	DSUB-9	
CAN/L-SCI16	1050149	aluminum profile	DSUB-15	DSUB-9	
CAN/L-SCI8-SUPPLY	1050210	aluminum profile	DSUB-15	DSUB-9	Sensor-Supply
CAN/L-SCI16-SUPPLY	1050184	aluminum profile	DSUB-15	DSUB-9	Sensor-Supply
CAN/L-SCI8-2T	1050167	aluminum profile	thermocouple terminal connector	DSUB-9	
CAN/L-SCI8-2T-Y	1050254	aluminum profile		DSUB-9	type K (yellow)
CAN/L-SCI16-2T	1050187	aluminum profile	thermocouple terminal connector	DSUB-9	
CAN/K-SCI8 / CAN/K-SCI16	1050125 1050124	cassette	DSUB-15	DSUB-9	
CAN/K-SCI8-SUPPLY / CAN/K-SCI16-SUPPLY	1050240 1050295	cassette	DSUB-15	DSUB-9	Sensor-Supply
CAN/K-SCI8-L-SUPPLY / CAN/K-SCI16-L-SUPPLY	1050409 1050407	cassette	LEMO.1B	DSUB-9	Sensor-Supply
CAN/K-SCI8-BNC / CAN/K-SCI16-BNC	1050335 1050175	cassette	BNC	DSUB-9	
CAN/K-SCI8-2T / CAN/K-SCI16-2T	1050168 1050188	cassette	thermocouple terminal connector	DSUB-9	
CAN/SL-SCI8-D / CAN/SL-SCI16-D	1150006 1150008	sealed IP65 (SL)	DSUB-15	DSUB-9	

Order Code	Article No.	Housing	Signal-connector	CAN-connector	Extra
CAN/SL-SCI8-D-SUPPLY / CAN/SL-SCI16-D-SUPPLY	1150025 1150034	sealed IP65 (SL)	DSUB-15	DSUB-9	Sensor-Supply
CAN/SL-SCI8-L / CAN/SL-SCI16-L	1150005 1150007	sealed IP65 (SL)	LEMO	LEMO	
CAN/SL-SCI8-L-SUPPLY / CAN/SL-SCI16-L-SUPPLY	-	sealed IP65 (SL)	LEMO	LEMO	Sensor-Supply
CAN/SL-SCI8-2T / CAN/SL-SCI16-2T	1150018 1150051	sealed IP65 (SL)	thermocouple terminal connector	DSUB-9	

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 as per DIN EN ISO 9001
- Instruction manual (Getting started)
- Suitable power input plug:
PHOENIX plugable terminal block (aluminum profile housing)
LEMO.1B plug (SL housing)

Optional accessories

DSUB-15 plugs

• ACC/DSUBM-U4	DSUB-15 plug with screw terminals for 4-channel voltage measurement	1350166
• ACC/DSUB-U4-IP65	sealed version, suitable for SL series	1350056
• ACC/DSUBM-TEDS-U4	DSUB-15 plug with screw terminals for 4-channel voltage measurement	1350189
• ACC/DSUB-TEDS-U4-IP65	sealed TEDS version	1350066
• ACC/DSUBM-I4	DSUB-15 plug with screw terminals for 4-channel current measurement of up to 50 mA (50 Ω shunt, scaling factor: 0.02 A/V)	1350168
• ACC/DSUB-I4-IP65	sealed version, suitable for SL series	1350058
• ACC/DSUBM-TEDS-I4	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	1350192
• ACC/DSUB-TEDS-I4-IP65	sealed TEDS version	1350068
• 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	sealed version, suitable for SL series	1350057
• ACC/DSUBM-TEDS-T4	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	1350190
• ACC/DSUB-TEDS-T4-IP65	sealed 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	mounting bracket for DIN-Rail	1050324
• CAN/BRACKET-DIN-M	mounting bracket for DIN-Rail	1050325

Mounting brackets for fixed installations of CANSAS-SL modules

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

Technical Specs - SCI8/-SCI16

Channels, Measurement modes		
Parameter	Value	Remarks
Channels SCI16 SCI8	16 8	4x DSUB-15 with each 4 channels 2x DSUB-15 with each 4 channels
Measurement mode DSUB	voltage measurement current measurement temperature measurement: thermocouple, RTD (PT100)	voltage plug (ACC/DSUBM-U4) shunt plug (ACC/DSUBM-I4) thermo plug (ACC/DSUBM-T4)
Measurement mode LEMO	voltage measurement ≤60 V RTD (PT100) current measurement	with internal shunt
Measurement mode Thermocouple terminal socket (-2T)	thermocouple type-K	miniature thermocouple terminal
Measurement mode BNC	voltage measurement ≤60 V	

Sampling rate, Bandwidth, CANopen®, TEDS		
Parameter	Value	Remarks
Sampling rate SCI16 SCI8	max. 500 Hz (2 ms) / channel max. 1 kHz (1 ms) / channel	max. allowable input signal frequency: 100 Hz 150 Hz The data rates 500 Hz and 200 Hz are based on a slower working sampling rate and will be interpolated.
Sampling rate, Temperature SCI16 SCI8	max. 1 Hz (1 s) / channel max. 2 Hz (500 ms) / channel	recommended maximum for optimized noise reduction; filter: 12 Hz (-3 dB); -60 dB @ 50 Hz no restrictions for input signal frequency (except for narrow band 0.5 Hz to 12 Hz); All channels with the same sampling rate.
Bandwidth SCI16 SCI8	23 Hz sampling rate / 7 42 Hz sampling rate / 7	with compensation filter, at sampling rate 500 Hz (2 ms), 200 Hz (5 ms) 100 Hz (10 ms) to 2 Hz (500 ms) 1 kHz (1 ms), 500 Hz (2 ms) 200 Hz (5 ms) to 5 Hz (200 ms)
Resolution	16 bit	
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 PDOs in INT16, INT32, and FLOAT	SCI16: in CANopen® mode: max. 100 Hz (10 ms) / channel SCI8: in CANopen® mode: max. 200 Hz (5 ms) / channel
TEDS - Transducer Electronic Data Sheets	conformant to IEEE 1451.4 Class II MMI	ACC/DSUBM-TEDS-xxx

General			
Parameter	Value (typ. / max)		Remarks
Block isolation CAN-bus DC supply input	± 60 V ± 60 V		each function block to case (CHASSIS) nominal rating; tested: 300 V (10 s) nominal rating; tested: 300 V (10 s)
Max. common-mode input voltage	± 60 V		analog input to case (CHASSIS) nominal rating; tested: 300 V (10 s)
Channel isolation:	± 60 V		max. voltage between any two arbitrary input pins of different channels; for specified accuracy nominal rating testing: 300 V (10 s)
Ovvoltage protection	± 60 V		differential channel input voltage (long-term)
Input configuration	DC, differential		isolated to: case, supply and CAN-bus
Input impedance (static)	10 M Ω 1 M Ω 50 Ω		voltage mode ≤ 10 V voltage mode ≥ 20 V current mode (Shunt plug)
Input current: static dynamic on overvoltage condition	1.5 nA (typ.) 0.1 mA (typ.) 10 nA (typ.)	15 nA (max.) 1.5 mA (max.) 1 μ A (max.) 1.5 mA	dynamic input currents: (scanner/multiplexer) settled current at time of sampling peak dynamic input current (typ. @100 mV, max. @10 V) average dynamic input current (typ. @100 mV, max. @10 V) $ V_{in} > 17$ V in range $\leq \pm 10$ V
Noise	25 μ V _{pk-pk} 10 mV _{pk-pk} 0.5 K _{pk-pk} 6 μ V _{pk-pk}	5 μ V _{rms} 2 mV _{rms} 0.08 K _{rms}	sample rate: 2 ms, R _s = 50 Ω range ± 100 mV range ± 20 V thermocouple type K sample-rate: 1 s, R _s = 50 Ω
Source impedance	5 k Ω		of sensor or signal source
Cable length (signal-input)	200 m		100 pF / m
Crosstalk (channel to channel)	< -105 dB		60 Hz, source impedance R _s = 100 Ω , range ± 100 mV
CMRR / IMR	100 dB (50 Hz)		Common-Mode reference: case (CHASSIS) all other channels: CHASSIS

Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 60 \text{ V}$, $\pm 20 \text{ V}$, $\pm 10 \text{ V}$, $\pm 5 \text{ V}$, $\pm 2 \text{ V}$, $\pm 1 \text{ V}$, $\pm 500 \text{ mV}$, $\pm 200 \text{ mV}$, $\pm 100 \text{ mV}$		
Gain error	<0.025%	<0.05%	at 25°C with voltage plug
Gain drift	30 ppm/K 50 ppm/K	60 ppm/K 90 ppm/K	range $\leq \pm 10 \text{ V}$ range $\geq \pm 20 \text{ V}$
Offset error	<0.02%		over entire temperature range
Linearity error	<50 ppm		range $\pm 10 \text{ V}$

Current measurement with shunt plug			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 40 \text{ mA}$, $\pm 20 \text{ mA}$, $\pm 10 \text{ mA}$, $\pm 4 \text{ mA}$, $\pm 2 \text{ mA}$		
Shunt impedance	50 Ω		
Gain error	<0.075%	<0.15%	at 25°C
Offset error	<0.02%		over entire temperature range

Temperature measurement - Thermocouple			
Parameter	Value typ.	min. / max.	Remarks
Measurement mode	R, S, B, J, T, E, K, L, N		(max. one type per configuration)
Range	-50°C to +1760°C -50°C to +1760°C -45°C to +1820°C -210°C to +1200°C -270°C to +400°C -270°C to +1000°C -270°C to +1240°C -200°C to +900°C -270°C to +1300°C		type R type S type B type J type T type E type K type L type N
Temperature error	$\pm 0.2 \text{ K}$	$<\pm 0.5 \text{ K}$	-150 °C to max range type: J, T, K, E, L (other types: uncertainties of voltage measurements apply) sample rate SCI16: $\geq 1 \text{ s}$ respectively SCI8: $\geq 0.5 \text{ s}$ with imc plug ACC/DSUBM-T4 also apply for SCI8(16)-2T variant
Drift	$\pm 0.02 \text{ K}/\text{K} \cdot \Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $ ambient temperature T_a
Error of cold junction compensation		$<\pm 0.15 \text{ K}$ $<\pm 0.5 \text{ K}$	with imc plug ACC/DSUBM-T4 with SCI8(16)-2T
Drift of cold junction	$\pm 0.001 \text{ K}/\text{K} \cdot \Delta T_j$		$\Delta T_j = T_j - 25^\circ\text{C} $ cold junction T_j

Temperature measurement - RTD (PT100)			
Parameter	Value typ.	min. / max.	Remarks
Range	-200°C to +850°C		mixed configuration with thermocouples supported; Use of thermo-plug provides complete set of terminals for full 4-wire connection scheme; reference current: 410 µA, int. calibrated
Gain error		<±0.2 K	-200°C to 850°C, four-wire connection
		<±0.05%	plus percentage of reading
Drift		±0.01 K/K·ΔT _a	ΔT _a = T _a -25°C ambient temperature 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	non isolated		output to case (CHASSIS)
optional, upon request	isolated		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			
Parameter	Value typ.	min. / max.	Remarks
Input supply voltage		10 V to 50 V DC	
Power consumption			
SCI8	2.8 W	<3.3 W <7 W	without supply with optional supply
SCI16	4 W	<4.6 W <8 W	without supply with optional supply

Operating conditions and terminal connections of the module		
Parameter	Value	Remarks
Operating temperature	-40°C to 85°C	
Dimensions (W x H x D), weight		CANSAS-SCI16 CANSAS-SCI8 CANSAS-L-SCI16, L-SCI16-2T CANSAS-L-SCI8 CANSAS-K-SCI8(16), K-SCI8-2T, -K-SCI8-BNC (=3HE/8TE) CANSAS-K-SCI16-2T -K-SCI16-BNC (=3HE/16TE) CANSAS-SL-SCI8-L CANSAS-SL-SCI16-L CANSAS-SL-SCI8-D CANSAS-SL-SCI16-D with optional sensor supply CANSAS-SCI16-SUPPLY CANSAS-SCI8-SUPPLY CANSAS-L-SCI16-SUPPLY CANSAS-L-SCI8-SUPPLY CANSAS-K -SCI8(16)-SUPPLY (=3HE/8TE) CANSAS-SL-SCI8-L-SUPPLY CANSAS-SL-SCI16-L-SUPPLY CANSAS-SL-SCI8-D-SUPPLY CANSAS-SL-SCI16-D-SUPPLY
Terminal connection	4x DSUB-15 2x DSUB-15 8(16)x 2-pin Thermo-plug 8(16)x BNC 2x DSUB-9 PHOENIX (MC 1,5 /4STF-3,81)	inputs (CANSAS-SCI16) inputs (CANSAS-SCI8) thermocouples type-K (CANSAS-X-2T) inputs (CANSAS-K-SCI8(16)-BNC) CAN (in / out), power supply (alternatively) DC power supply
Terminal connection for SL	2(4)x DSUB-15 8(16)x LEMO (HGG.1B.307) 2x DSUB-9 2x 10-pin LEMO (HGA.1B.310) 1x 6-pin LEMO (HGA.1B.306)	inputs CANSAS-SL-SCI8(16)-D(-SUPPLY) CANSAS-SL-SCI8(16)-L(-SUPPLY) CAN (in / out) power supply (alternatively) CANSAS-SL-SCI8(16)-D(-SUPPLY) CANSAS-SL-SCI8(16)-L(-SUPPLY) DC power supply