

imc CANSAS-SC16

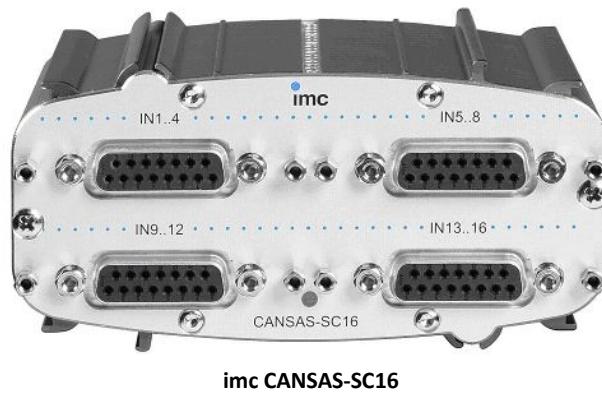
16-channel module for measuring voltage, current and temperature

Data Sheet Version 1.10

The **SC16 CAN-Bus measurement module** is an especially affordable analog input module with 16 multiplexed differential inputs. Voltage signals of up to 60 V (≥ 20 V via optional divider plug), current signals of up to 20 mA, Pt100 sensors and any commercially available thermocouples can be connected directly. Special noise suppression functionality makes highly sensitive voltage and thermocouple measurements in difficult environments possible despite the multiplexer. The noise suppression provided is most effective at low sampling rates and decreasingly effective 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



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:

- 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 (included)

- Supports the CANopen® protocol according "CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2"; 4 PDO (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-Nr.	Housing	Signal-plug	Option
CAN/SC16	1050126	aluminum housing	DSUB-15	
CAN/L-SC16	1050148	aluminum housing	DSUB-15	
CAN/L-SC16-SUPPLY	1050214	aluminum housing	DSUB-15	Sensor-Supply
CAN/L-SC16-2T	1050220	aluminum housing	Thermo couple type-K	
CAN/L-SC16-2T-Y	1050397	aluminum housing	Thermo couple type-K with yellow TK plug	
CAN/K-SC16	1050123	cassette	DSUB-15	
CAN/K-SC16-2T	1050332	cassette	Thermo couple type-K	
CAN/K-SC16-2T	1050333	cassette	Thermo couple type-T	
CAN/K1-SC16-2T	1050231	cassette	Thermo couple type-K	
CAN/K1-SC16-3T	1050275	cassette	Thermo couple type-K 3-pin TK plug	
CAN/SL-SC16-L	1150009	waterproof SL-housing	LEMO	
CAN/SL-SC16-D	1150010	SL-housing	DSUB-15	
CAN/SL-SC16-L-SUPPLY		SL-housing	LEMO	Sensor-Supply
CAN/SL-SC16-D-SUPPLY		SL-housing	DSUB-15	Sensor-Supply

Housing types

	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) IP40	50g pk (5 ms) IP40	50g pk (5 ms) IP20	MIL STD810F 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)

- Integrated sensor supply unit available for DSUB and LEMO versions of SCI8 and SCI16. Adjustable supply voltage is available at dedicated pins of the DSUB-15 and LEMO 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)

SC16

Data Sheet Version 1.10 (16 differential analog inputs)

Parameter	Value (typ. / max.)	Remarks
Channels	16	4-channel groups on 4x DSUB-15
Measurement mode (DSUB) CANSAS-SC16, CANSAS-L-SC16, CANSAS-K-SC16	voltage ≤ 60 V voltage ≤ 10 V thermocouple, RTD (Pt100) current	with divider plug (ACC/DSUB-U4D) standard plug (ACC/DSUB-U4) thermo plug (ACC/DSUB-T4) with shunt plug (ACC/DSUB-I4)
Measurement mode (SL DSUB) CANSAS-SL-SC16-D CANSAS-SL-SC16-L-SUPPLY	voltage ≤ 10 V	ACC/DSUB-U4-IP65
Measurement mode (SL LEMO) CANSAS-SL-SC16-L, CANSAS-SL-SC16-L-SUPPLY	voltage ≤ 10 V RTD (Pt100) current	with external shunt
Measurement mode (TK-plug) CANSAS-L-SC16-2T, CANSAS-L-SC16-2T-Y, CANSAS-K-SC16-2T CANSAS-K1-SC16-2T, CANSAS-K1-SC16-3T CANSAS-K-SC16-2T	thermocouple type-K thermocouple type-K thermocouple type-K thermocouple type-K thermocouple type-K thermocouple type-T	article number: 1050397 (yellow plug) article number: 1050332 article number: 1050333
TEDS - Transducer Electronic DataSheets	conform IEEE 1451.4 Class II MMI	ACC/DSUB-TEDS-U4, TEDS-U4D ACC/DSUB-TEDS-U4-IP65 ACC/DSUB-TEDS-T4, -TEDS-T4-IP65 ACC/DSUB-TEDS-I4, -TEDS-I4-IP65
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 PDOs in INT16, INT32, and FLOAT	in CANopen® mode: max. 100Hz (10ms) / channel
Sampling rate CANSAS-SC16	max. 500 Hz (2 ms) / channel	maximum allowable input signal frequency: 100 Hz The sampling rates 500Hz and 200Hz are based on a slower working sampling rate and will be interpolated.
Sampling rate, temperature CANSAS-SC16	max. 1 Hz (1 s) / channel	recommended maximum for optimized noise reduction; filter: 12 Hz (-3 dB); -60 dB @ 50 Hz no restrictions for input noise frequency (except for narrow band 0,5 Hz to 12 Hz)
Bandwidth with compensation filter	28 Hz sampling rate / 7	at sampling rate 500 Hz (2 ms), 200 Hz (5 ms) 100 Hz (10 ms) to 2 Hz (500 ms)
Resolution	16 bit	

Voltage measurement			
Parameter	typ.	min. / max.	Remarks
Range	$\pm 10 \text{ V}$, $\pm 5 \text{ V}$ $\pm 2 \text{ V}$, $\pm 1 \text{ V}$ $\pm 500 \text{ mV}$, $\pm 200 \text{ mV}$, $\pm 100 \text{ mV}$ $\pm 60 \text{ V}$, $\pm 20 \text{ V}$		with divider-plug
Gain uncertainty	<0.025 % <0.075 % <0.075 %	<0.05 % <0.15 % <0.15 %	23°C with standard connector with divider connector (only SC-16) shunt connector
Gain drift	30 ppm/K(typ.) 50 ppm/K(typ.)	60 ppm/K(max.) 90 ppm/K(max.)	range $\leq \pm 50 \text{ V}$ range $\geq \pm 10 \text{ V}$
Offset	<0.02 %		over entire temperature range
Linearity uncertainty	<50 ppm		range $\pm 10 \text{ V}$
Current mode			
Range	$\pm 40 \text{ mA}$, $\pm 20 \text{ mA}$, $\pm 10 \text{ mA}$, $\pm 4 \text{ mA}$, $\pm 2 \text{ mA}$		with shunt connector (50Ω)

Temperature			
Thermocouples			
Range	-200°C to +1200°C		Typ: R, S, B, J, T, E, K, L, N (max. one type per configuration)
Temperature uncertainty	$\pm 0.2 \text{ K}$	$<\pm 0.5 \text{ K}$	Typ: J, T, K, E, L (other types: uncertainties of voltage measurements) @ 20°C over entire input range sample rate SC16: $\geq 1 \text{ s}$
Drift	$\pm 0.02 \text{ K/K} \cdot \Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $; ambient temp: T_a
Uncertainty of cold junction Compensation		$<\pm 0.15 \text{ K}$ $<\pm 0.5 \text{ K}$ $<\pm 0.15 \text{ K}$	with imc plug ACC/DSUB-T4 with CANSAS-K1-SC16-2T with CANSAS-L-SC16-2T-Y
Drift of cold junction	$\pm 0.001 \text{ K/K} \cdot \Delta T_j$		$\Delta T_j = T_j - 25^\circ\text{C} $ could junction T_j
RTD mode (Pt100)			
Range	-200°C to +850°C		(reference current: $410 \mu\text{A}$, int. calibrated) Use of thermo-plug provides complete set of terminals for full 4-wire connection scheme; mixed configuration with thermocouples supported
Uncertainty		$<\pm 0.2 \text{ K}$ $<\pm 0.05 \%$	-200°C to 850°C, four-wire connection plus percentage of reading
Drift		$\pm 0.01 \text{ K/K} \cdot \Delta T_a$	$\Delta T_a = T_a - 25^\circ\text{C} $; ambient temp: T_a

General			
Parameter	typ.	min. / max.	Remarks
Block isolation: CAN-bus DC supply input	± 60 V ± 60 V		each function block to case (CHASSIS) nominal; testing: 300 V (10 s) nominal; testing: 300 V (10 s)
Max. common-mode input voltage	± 40 V		analog input to case (CHASSIS) nominal rating
Channel isolation: CAN-bus supply	± 15 V ± 40 V		max. voltage between any two arbitrary input pins of different channels; for specified accuracy fault protection
Ovvovoltage protection	± 40 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 (divider) current mode (Shunt plug)
Input current : static dynamic on overvoltage condition	2 nA (typ.) 0.2 mA (typ.) 20 nA (typ.) 0.1 μ A	25 nA (max.) 20 mA (max.) 2 μ A (max.) 1 μ A	dynamic input currents: scanner-device! 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} > 15$ V ;or device powered-down
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 temperature mode: Thermocouple Type K sample-rate: 1 s, $R_s = 50$ Ω
Source impedance	5 k Ω (max.)		of sensor or signal source
Cable length (signal-input)	200 m (max.)		100 pF / m
Crosstalk (channel to channel)	<-105 dB		60 Hz, 100 Ω source impedance, range ± 100 mV
CMRR / IMR	100 dB (50 Hz)		Common-Mode reference: frame (CHASSIS) all other channels: CHASSIS
Supply voltage	10 V to 50 V DC		
sensor supply voltage (optional)	2.5 V to 24 V		
Power requirements:	2.6 W (typ.)	<3.0 W (max.)	12 V DC, over full temperature range
Operating temperature	-30°C to 85°C		
Dimensions (W x H x D), weight	55 x 111 x 90 mm; 300 g 55 x 111 x 145 mm; 850 g 41 x 128 x 145 mm; 500 g 81 x 128 x 145 mm		CANSAS-SC16 CANSAS-L-SC16, -L-SC16-2T CANSAS-K-SC16, -K(1)-SC16-2T CANSAS-K1-SC16-3T

General			
Parameter	typ.	min. / max.	Remarks
	78 x 112.5 x 152 mm 58 x 112.5 x 152 mm 55 x 111 x 90 mm 55 x 111 x 145 mm 58 x 112.5 x 152 mm 78 x 112.5 x 152 mm		CANSAS-SL-SC16-L CANSAS-SL-SC16-D with optional sensor supply CANSAS-SC16-SUPPLY CANSAS-L-SC16-SUPPLY CANSAS-SL-SC16-L-SUPPLY CANSAS-SL-SC16-D-SUPPLY
Terminal connection	4x DSUB-15 16x 2-pol. TK-connector		inputs CANSAS-SC16 only for thermocouple type K
	2x DSUB-9		CAN (in / out), power supply (alternatively)
	PHOENIX (MC 1,5 /4STF-3,81)		DC power supply
Terminal connection SL	4x DSUB-15 16x LEMO (HGG.1B.307)		inputs CANSAS-SL-SC16-D(-SUPPLY) CANSAS-SL-SC16-L (-SUPPLY)
	2x DSUB-9 2x 10-pin LEMO (HGA.1B.310)		power supply (alternatively) CANSAS-SL-SC16-D(-SUPPLY) CANSAS-SL-SC16-L (-SUPPLY)
	1x 6-pin LEMO (HGA.1B.306)		power supply (for all SL models)

Sensor Supply Module

Order code: CAN/SEN-SUPPLY

The Sensor Supply Module comes in different versions: Each version offers 7 selectable output voltages (see table below)

- default case: all voltage settings not isolated (+2.5 V to +24 V and ± 15 V is not included!)
- special order: all voltage settings isolated, ± 15 V is not included
(only available with LEMO connectors)
- special order: with range ± 15 V in exchange for one other setting, however all voltages not isolated
(only for C8, CI8, not available with LEMO connectors)

Parameter	Value (typ. / max.)			Remarks
Configuration options	8 ranges			
Output voltage	voltage +2.5 V +5.0 V +7.5 V +10 V +12 V +15 V +24 V ± 15 V	current 580 mA 580 mA 400 mA 300 mA 250 mA 200 mA 120 mA 190 mA	net power 1.5 W 2.9 W 3.0 W 3.0 W 3.0 W 3.0 W 2.9 W 3.0 W	globally selected, isolated on request available on request for C8, CI8 (non isolated only; 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
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