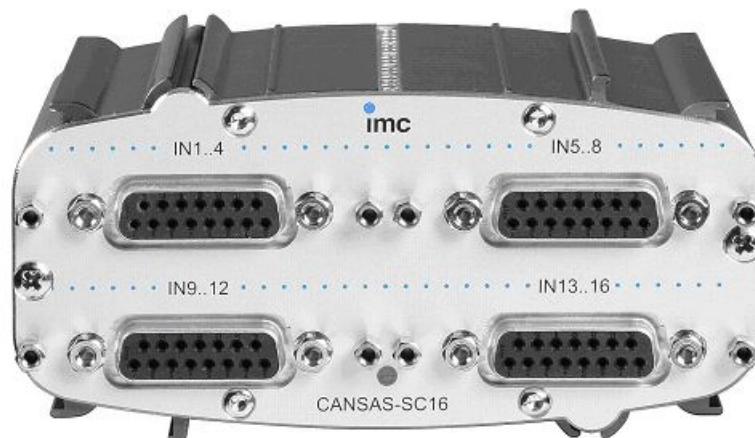


CANSAS-SC16

16-channel module for measuring voltage, current and temperature

Version 1.5



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.

Modern, intelligent TEDS sensors are completely supported. Conventional sensors can be retrofitted with sensor recognition in the connector pod or in the cable (*imc Plug & Measure*).

Order code:	Article #
CANSAS-SC16	1050126
CANSAS-L-SC16	1050148
CANSAS-L-SC16-2T	1050220
CANSAS-K-SC16	1050123
CANSAS-K1-SC16-2T	1050231
CANSAS-SL-SC16-L	1150009
CANSAS-SL-SC16-D	1150010
CANSAS-SL-SC16-L-SUPPLY	-
CANSAS-SL-SC16-D-SUPPLY	-

9 different models available:

CANSAS SC16

Fan-less extruded aluminum housing (Short model, 4 x DSUB signal terminals)
55 x 111 x 90 (W x H x D in mm)
Weight typ. 300 g

CANSAS-L-SC16

Fan-less extruded aluminum housing (Long model, 4x DSUB signal terminals)
55 x 111 x 145 (W x H x D in mm)
Weight typ. 850 g

CANSAS-L-SC16-2T

Fan-less extruded aluminum housing (Long model, 2x DSUB signal terminals)
Signal connection 16 x 2-pin TK socket per IEC 584 (green)
only appropriate for temperature measurement with Type K thermocouple
55 x 111 x 145 (W x H x D in mm)
Weight typ. 850 g

CANSAS-K-SC16

Fan-less cassette, 3U/8HP (Cassette model, 4x DSUB signal terminals)
for insertion into the imc 19" subrack; CAN-Bus and supply are connected to the module via the 19"
subrack
Weight typ. 900 g

CANSAS-K1-SC16-2T

Fan-less cassette, 3U/8HP (signal terminals 16x TK-female connector 2 pol. Type K)
only appropriate for temperature measurement with Type K thermocouple
for insertion into the imc 19" subrack; CAN-Bus and supply are connected to the module via the 19"
subrack
Weight typ. 500 g

CANSAS-SL-SC16-L

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

CANSAS-SL-SC16-D

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)

CANSAS-SL-SC16-L-SUPPLY

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

CANSAS-SL-SC16-D-SUPPLY

Fan-less IP65 extruded aluminum housing (SL model, DSUB-15 signal terminals)
78 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 normal extruded aluminum housing and cassette modules

- CAN-Bus connected via 2 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:
 - 4x 15-pin DSUB-screw terminal blocks (for 4 channels per terminal) for *CANSAS-(L)(K)SC16*
 - 16x 2-pin TK socket per IEC 584 (green) for *CANSAS-L(K)SC16-2T*
- Power supply via Phoenix (MC1, 5/4STF-3,81) socket¹

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 connectors, CAN IN and CAN OUT
for *CANSAS-SL-SC16-D(-SUPPLY)*
 - CAN-Bus connected via 2x 10-pin LEMO 1B (HGA.1B.310) connectors, CAN IN and CAN OUT
for *CANSAS-SL-SC16-L(-SUPPLY)*
- Voltage supply via 6-pin LEMO 1B (HGA.1B.306) connector
- Signal terminal at module:
 - 4x DSUB-15 with 4 channels per DSUB-15 connector for *CANSAS-SL-SC16-D, (-SUPPLY)*
 - 16x 7 pin LEMO 1B (HGG.1B.307) connectors for *CANSAS-SL-SC16-L(-SUPPLY)*
With LEMO connectors temperature measurement with thermocouples is not supported.

¹ Not with Cassette model

Power supply for normal extruded aluminum housing and cassette modules

- Supply voltage: 10 V to 50 V DC ² via (4-pin) Phoenix plug or via CAN-Bus plug¹
- Automatic independent start upon application of supply voltage
- Power consumption: 2.0 W (typ.); max.: 2.6 W

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 2.0 W (typ.); max.: 2.6 W

Operating conditions for normal 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 SC16 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 rate 500 Hz max. per channel; selectable in steps of 1-, 2-, 5
- 28 Hz or sampling rate/7 (with compensation filter, see appended table)
- 16-bit resolution (with internal 24-bit processing)
- Synchronized acquisition of all measurement channels
- Synchronized sampling with measurement systems or other appropriate modules is possible both with extra synchronization line and also simply via the CAN-Bus.
- Built-in DSP for online signal processing:
data reduction, filtering, scaling, statistics etc.

Measurement channels

- 16 differential, analog inputs for your choice of:
voltage, current, temperature
See technical specs in appended table
- CAN-Bus interface for sending measurement channel signal on the CAN-Bus
(up to 1 Mbit/s, configured as per ISO11898)
- The multiplexer for channel rotation can, under certain circumstances, compromise the calibrator's operation

¹ Not with Cassette model

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

³ CANopen[®] mode does not support virtual channels and controlling the LEDs

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 "CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2"; 4 PDO (Process Data Objects) in INT16, INT32, and FLOAT³. The supported capabilities, more standards and the settings which can be edited via CANopen® are described in "CANSAS CANopen®".

Optional accessories

Sensor supply:

- **CAN/SEN-SUPPLY**, built-in sensor supply; the output voltage is present at the DSUB-terminals. This integrated sensor supply is only for Long and Cassette models possible.

Connectors:

- **ACC/DSUB-U4**, 15-pin DSUB connection terminal for each 4-channel group: voltage measurement
- **ACC/DSUB-UD4**, 15-pin DSUB connection terminal for each 4-channel group: voltage measurement with built-in voltage divider for measurement of voltages > 10V
- **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-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-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 (with integrated cold-junction compensation) adapted for CANSAS-SL.
- **ACC/DSUB-I4-IP65**, 15-pin DSUB connection terminals for each 4-channel group (50 Ω shunt). For measurement of currents of up to 40mA 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*".

SC16

Datasheet Version 1.5 (16 differential analog inputs)

Parameter	Value (typ. / max)	Remarks
Channels	16	4-channel groups on 4x DSUB-15
Measurement mode (DSUB) CANSAS-SC-16, -L-SC16, -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)
Meas. mode (SL DSUB) CANSAS-SL-SC16-D -SL-SC16-L- SUPPLY	voltage ≤ 10 V	ACC/DSUB-U4-IP65
Meas. mode (SL LEMO) CANSAS-SL-SC16-L, -SL-SC16-L-SUPPLY	voltage ≤ 10 V RTD (Pt100) current	with external shunt
Meas. mode (TK-plug) CANSAS-L-SC16-2T, -K1-SC16-2T	thermocouple type-K	
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	
Sampling rate CANSAS-SC-16	max. 500 Hz (2 ms) / channel	maximum allowable input signal frequency: 100 Hz
Sampling rate, temperature CANSAS-SC-16	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			
Parameter	typ.	min. / max.	Remarks
Range	± 10 V, ± 5 V ± 2 V, ± 1 V ± 500 mV, ± 200 mV, ± 100 mV ± 60 V, ± 20 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 $\leq \pm 50$ V range $\geq \pm 10$ V
Offset	<0.02 %		over entire temperature range
Linearity uncertainty	<50 ppm		range ± 10 V

Voltage		
Current mode		
Range	± 40 mA, ± 20 mA, ± 10 mA, ± 4 mA, ± 2 mA	with shunt connector (50 Ω)

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	± 0.2 K	$< \pm 0.5$ K	Typ: J, T, K, E, L (other types: uncertainties of voltage measurements) @ 20°C over entire input range sample rate SC16: ≥ 1 s with imc plug ACC/DSUB-T4
Drift	± 0.02 K/K $\cdot\Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $; ambient temp: T_a
Uncertainty of cold junction Compensation		$< \pm 0.15$ K $< \pm 0.5$ K	with imc plug ACC/DSUB-T4 with CANSAS-K1-SC16-2T
Drift of cold junction	± 0.001 K/K $\cdot\Delta T_j$		$\Delta T_j = T_j - 25^\circ\text{C} $ cold junction T_j

RTD mode (Pt100)			
Range	-200°C to +850°C		(reference current: 410 μ A, int. calibrated) Use of thermo-plug provides complete set of terminals for full 4-wire connection scheme; mixed configuration with thermocouples supported
Uncertainty		$< \pm 0.2$ K $< \pm 0.05$ %	-200°C to 850°C, four-wire connection plus percentage of reading
Drift		± 0.01 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
Oversvoltage 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 oversvoltage condition	2 nA (typ.) 0.2 mA (typ.) 20 nA (typ.)	25 nA (max.) 20 mA (max.) 2 μ A (max.)	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

General			
Parameter	typ.	min. / max.	Remarks
	0.1 μ A	1 μ A	
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 \pm 100 mV range \pm 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 \pm 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 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-SC16 CANSAS-L-SC16, -L-SC16-2T CANSAS-K-SC16, -K1-SC16-2T (=3HE/8TE) 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 measurement 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

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			