imc CANSAS-UNI8

Universal module with 8 channels for voltage, current, thermocouples, PT100, measurement bridges, strain gauge and resistance measurement

The CAN-Bus measurement module imc CANSAS-UNI8 is an analog input module with 8 channels which are individually filtered, amplified and digitized; the module is ideal for the measurement of:

- Voltage (5 mV to 50 V)
- Current (20 mA sensors)
- Temperature (thermocouple, PT100)
- Bridge and strain gauge measurements (full-, half- and quarter bridge 120 Ω, optional 350 Ω)
- Resistance (0 to 800 Ω)

imc CANSAS-L-UNI8

For the supply of external sensors and bridge measurement a sensor supply with adjustable voltages 2.5 V to 24 V is included.

Highlights

- Universal amplifier for all relevant measurement quantities
- 200 Hz bandwidth with max. 1 kSps/channel sampling rate
- Bridge offset balancing upon push of a button, via CAN bus or automatically upon power-up
- Measurement range and sampling rates can be set per channel in steps of 1, 2, 5
- 24 Bit digitization and internal handling, CAN-output format: 16 Bit
- Support of imc Plug & Measure:
  TEDS (Transducer Electronic Data Sheets, IEEE 1451.4)

Typical applications

Provides maximum flexibility for changing measurement and sensor requirements

imc CANSAS - General Functions and Specifications

Properties and capabilities

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 consistancy monitoring (checking of whether the correct module is still being used, for instance in installations undergoing maintenance)

Measurement operation:

- simple measurement operation with imc CANSAS*pro*
  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 3.rd party CAN data logger systems

Models and Options

Overview of the available variants for imc CANSAS-UNI8

Order Code	Article No.	Housing	Signal-connector	CAN-connector	Extra
CAN/L-UNI8	1050051	aluminum profile	ITT Veam	DSUB-9	
CAN/L-UNI8-350	1050296	aluminum profile	ITT Veam	DSUB-9	350 Ω internal *
CAN/L-UNI8-L	1050xxx	aluminum profile	LEMO.1B	DSUB-9	
CAN/L-UNI8-L-350	1050xxx	aluminum profile	LEMO.1B	DSUB-9	350 Ω internal *
CAN/L-UNI8-LEMO	1050084	aluminum profile	*LEMO.2B*	DSUB-9	(LEMO.2B!)
CAN/L-UNI8-DSUB	1050115	aluminum profile	DSUB-15	DSUB-9	
CAN/L-UNI8-DSUB-350	1050298	aluminum profile	DSUB-15	DSUB-9	350 Ω internal *
CAN/K-UNI8	1050070	cassette	ITT Veam	DSUB-9	
CAN/K-UNI8-350	1050297	cassette	ITT Veam	DSUB-9	350 Ω internal *
CAN/K-UNI8-DSUB	1050116	cassette	DSUB-15	DSUB-9	
CAN/K-UNI8-DSUB-350	1050299	cassette	DSUB-15	DSUB-9	350 Ω internal *
CAN/SL-UNI8-L	1150001	sealed IP65 (SL)	LEMO.1B	LEMO	
CAN/SL-UNI8-L-350	1150039	sealed IP65 (SL)	LEMO.1B	LEMO	350 Ω internal *
CAN/SL-UNI8-D	1150002	sealed IP65 (SL)	DSUB-15	DSUB-9	
CAN/SL-UNI8-D-350	1150040	sealed IP65 (SL)	DSUB-15	DSUB-9	350 Ω internal *
CAN/SL-UNI8-LV	1150045	sealed IP65 (SL)	ITT Veam	DSUB-9	
CAN/SL-UNI8-D-PROTECT	1150023	sealed IP65 (SL)	DSUB-15	DSUB-9	ESD protected
CAN/SL-UNI8-D-PROTECT-350	1150041	sealed IP65 (SL)	DSUB-15	DSUB-9	ESD protected and 350 Ω internal *

* internal quarter bridge completion 350 Ω instead of 120 Ω

The 350 Ω variant (1/4 bridge completion) does not support current measurement with internal shunt. Alternatively an external shunt can be used. For the DSUB-15 variant an appropriate shunt plug is available (ACC/DSUB(M)-I2).

With the "protected" variant (imc CANSAS-SL-UNI8-D-PROTECT) an increased robustness versus ESD and transient overvoltage is ensured. In this variant the shunt calibration as well as the RTD (PT100) 3-wire configuration is disabled and sensor supply is limited to max 15 V.

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

Accessories and 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 plugable terminal block (aluminum profile housing)
  LEMO.1B plug (SL housing)

Optional accessories

DSUB-15 plug		
ACC/DSUBM-UNI2	DSUB-15 plug with screw terminals for 2-channel voltage, current[1] and bridge measurement as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC) [1] single-end current measurement, for differential measurement an external shunt or appropriate connector (ACC/DSUBM-I2) is necessary	1350169
ACC/DSUB-UNI2-IP65	wasserdichte Version, passend für die SL Serie	1350049
ACC/DSUBM-TEDS-UNI2	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	1350188
ACC/DSUB-TEDS-UNI2-IP65	wasserdichte TEDS Version	1350069
ACC/DSUBM-I2	DSUB-15 plug with screw terminals for 2-channel current measurement of up to 50 mA (50 Ω shunt, scaling factor: 0.02A/V)	1350180
ACC/DSUBM-I2-IP65	wasserdichte Version, passend für die SL Serie	1350xxx
ACC/DSUBM-TEDS-I2	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	1350193
ACC/DSUBM-TEDS-I2-IP65	wasserdichte TEDS Version	1350xxx
ACC/DSUB-U2-BNC	15-poliger DSUB für je 2 Kanäle; Signalanschluss BNC; zur Messung von Spannungen.	

LEMO and ITT Veam connector (variants)		
ACC/TH-LEM-150	LEMO.1B plug for thermocouple measurement with built-in cold-junction compensation (CJC) via PT100	1350086
CAN/UNIST-PT100	ITT Veam plug for 1 channel thermocouple measurement with built-in cold-junction compensation (CJC) via PT100	1050120
CAN/UNIST-7-3	ITT Veam plug for 1 channel, all measurement modes; cable diameter 3 mm	1050059
CAN/UNIST-7-6	ITT Veam plug for 1 channel, all measurement modes; cable diameter 6 mm	1050060

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

Technical Specs - UNI8

Channels, Measurement modes		
Parameter	**Value**	**Remarks**
Channels	8	
Measurement modes DSUB	voltage measurement voltage measurement with adjusted supply current measurement resistance measurement thermocouples (mounted with and without contact to GND) bridge-sensor bridge: strain gauge PT100 in 3- and 4-wire configuration	 internal shunt (single-end) or with shunt connector (ACC/DSUBM-I2) half-, quarter- and full bridge the "protect" variant does not support the 3-wire configuration
Measurement modes LEMO and ITT Veam	voltage measurement voltage measurement with adjusted supply current measurement resistance measurement thermocouples (mounted with and without contact to GND) bridge-sensor bridge: strain gauge PT100 in 3- and 4-wire configuration	 internal shunt (single-end) LEMO.1B connector with built-in cold-junction compensation (CJC) ACC/TH-LEM-150 half-, quarter- and full bridge

Sampling rate, Bandwidth, CANopen®, TEDS		
Parameter	**Value**	**Remarks**
Sampling rate	≤1 kHz	per channel, output rate on the CAN-bus
Bandwidth	200 Hz	-3 dB; Filter OFF
	190 Hz	-3 dB; with AAF-filter
Resolution	16 bit	internal 24 bit processing output rate: 16 bit Integer
TEDS - Transducer Electronic Data Sheets	conformant to IEEE 1451 Class II MMI	ACC/DSUBM-TEDS-xxx
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 PDOs in INT16, INT32, and FLOAT	

General		
Parameter	**Value**	**Remarks**
Isolation CAN-Bus power supply input analog input	 ±60 V ±60 V no isolation	channel to case (CHASSIS) nominal; testing voltage: 300 V (10 s) nominal; testing voltage: 300 V (10 s) analog reference ground: CHASSIS
Overvoltage protection	±80 V	permanent, channel to chassis
Input coupling	DC	
Input configuration	differential	
Input impedance	1 MΩ 20 MΩ	measurement ranges: >±10 V measurement ranges: ≤±10 V

Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input ranges	±50 V, ±20 V, ±10 V, ±5 V, ±2 V, ±1 V... ±5 mV		
Gain error	0.02%	0.05%	of measured value, at 25°C
Gain drift	20 ppm/K·ΔT_a	80 ppm/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a
Offset error	0.02%	 0.05% 0.06% ≤0,15%	percentage of range, in specified ranges: >±50 mV range ≤±50 mV range ±5 mV range
Offset drift	±60 µV/K·ΔT_a ±0.06 µV/K·ΔT_a	±100 µV/K·ΔT_a ±0.3 µV/K·ΔT_a	>±10 V ≤±10 V ΔT_a=|T_a -25°C|; ambient temperature T_a
CMRR Common mode rejection ratio	 62 dB 92 dB 120 dB	 >46 dB >84 dB >100 dB	DC and f≤60 Hz range ±50 V... ±20 V range ±10 V... ±50 mV range ±20 mV... ±5 mV
Noise	0.4 μV_{rms} 14 nV/√Hz		(RTI) bandwidth 0.1 Hz to 200 Hz

Current measurement with shunt plug			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input ranges	±50 mA, ±20 mA, ±10 mA, ,.., ±1 mA		
Shunt impedance	50 Ω		external shunt plug ACC/DSUBM-I2
Over load protection		±60 mA	permanent
Input configuration	differential		with 50 Ω impedance in shunt plug
Gain error	0.02%	0.06% 0.1%	of reading plus error of 50 Ω shunt
Gain drift	20 ppm/K·ΔT_a	95 ppm/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a
Offset error	0.02%	0.05%	of measurement range, at 25°C
Offset drift	±0.05 nA/K·ΔT_a	±0.5 nA/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a

Current measurement with internal shunt			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input ranges	±50 mA, ±20 mA, ±10 mA, ,.., ±1 mA		
Shunt impedance	120 Ω		internal (only the 120 Ω variant)
Over load protection		±60 mA	permanent
Input configuration	single-end		internal current backflow to -VB
Gain error	0.02%	0.06%	of reading
Gain drift	20 ppm/K·ΔT_a	95 ppm/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a
Offset error	0.02%	0.05%	of measurement range, at 25°C
Offset drift	±0.05 nA/K·ΔT_a	±0.5 nA/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a

The 350 Ω variant (1/4 bridge completion) does not support current measurement with internal shunt.
Alternatively an external shunt can be used. For the DSUB-15 variant an appropriate shunt plug is available: ACC/DSUBM-I2

Bridge measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Modes	DC		
Measurement modes	full-, half bridge quarter bridge		 max. 5 V bridge excitation voltage
Input ranges bridge excitation voltage: 10 V bridge excitation voltage: 5 V bridge excitation voltage: 2.5 V	±1000 mV/V, ±500 mV/V, ±200 mV/V, ±100 mV/V ... ±0.5 mV/V ... ±1 mV/V ... ±2 mV/V		
Bridge excitation voltage	10 V 5 V 2.5 V		not for quarter bridge measurement
Internal quarter-bridge completion	120 Ω		optional 350 Ω
Input impedance	20 MΩ	±1%	differential, full bridge
Gain error	0.02%	0.05%	of the measured value, at 25°C
Gain drift	20 ppm/K·ΔT_a	80 ppm/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a
Offset error	0.01%	0.02%	of input range after automatic bridge balancing
Offset drift	16 nV/V/K·ΔT_a	0.2 µV/V/K·ΔT_a	ΔT_a=|T_a -25°C|; ambient temperature T_a
Allowable cable impedance "one way" not including return line		<8 Ω <16 Ω <24 Ω	10 V bridge voltage 120 Ω 5 V bridge voltage 120 Ω 2.5 V bridge voltage 120 Ω

Temperature measurement - Thermocouples			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input ranges	J, T, K, E, N, S, R, B, L		resolution: approx. 0.1 K
Error	≤1 K		sensor type K at 20°C over total temperature range
Input impedance	20 MΩ	±1%	differential

Temperature measurement - RTD-measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	-200°C to 850°C		resolution: approx. 0.02 K
Error		<±0.2 K <±0.05% +0.01 K/K·ΔT_a	4-wire measurement of reading (corresponding resistance) $\Delta T_a = \lvert T_a - 25°C \rvert$; ambient temp: T_a
Sensor feed	1.23 mA		

Resistance measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	0 Ω to 800 Ω		
Gain error		≤0.15%	of the measured value, at 25°C
Offset error		≤0.05%	of measurement range

Built-in UNI8 Sensor Supply				
Parameter	**Value**			**Remarks**
Configurations options	7 ranges			
Output voltage	Voltage	Current	Net power	set globally
	+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	
Short circuit protection	unlimited duration			to reference ground of the output voltage
Output voltage accuracy [1]	<0.25% (typ.) <0.5% (max.) <0.9% (max.)			at terminal plugs, no load 25°C; 2.5 V to 24 V 25°C; 2.5 V to 24 V over entire temperature range
Compensation of cable resistances	measurement mode: bridge measurement, strain gauge 3-wire circuit: single sense wire: sensing of return line only (–VB: supply ground) voltage drops dynamically monitored and numerically compensated			provided for 2.5 V, 5 V and 10 V. prerequisites: 1) symmetrical feed and return lines differing cable length for individual channels allowed
Compensation of cable resistances	measurement mode: voltage measurement with adjusted supply 3-wire circuit: single sense wire: sensing of return line only (–VB: supply ground) physical adjustment of voltage (+VB)			provided for 5 V. prerequisites: 1) symmetrical feed and return lines, 2) identical wires for all channels, 3) representative measurement at Channel 1 special operation mode: only for an operation with special sensors with a sensitivity depends in a certain extent on the exact value of the supply (especially "Nippon DENSO")
Efficiency	min. 40% typ. 55% typ. 50%			2,5 V 5 V, ..15 V 24 V
Max. capacitive load	>4000 µF >1000 µF >300 µF			2.5 V, ..10 V 12 V, 15 V 24 V

[1] The precision of the bridge measurement is not affected by actual precision of the bridge supply. The current value of the bridge supply is continuously monitored and compensated.

Power supply of the module			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Supply voltage	10 V to 50 V DC		
Power consumption	5 W (typ.)	8 W (max.) 14 W (max.)	 including supply for external sensors (over total temperature range)
Operating temperature	-40°C to 85°C		

Terminal connections		
Parameter	**Value**	**Remarks**
Terminal connection CANSAS-K, -L	8x 7-pin ITT VEAM or 8x 7-pin LEMO or 4x DSUB-15	2 channels per plug
	2x DSUB-9	CAN (in / out), supply (alternatively)
	PHOENIX (MC 1.5/4STF-3.81)	power supply
Terminal connection CANSAS-SL	8x 7-pin ITT VEAM or 8x 7-pin LEMO (HGG.1B.307) or 4x DSUB-15	2 channels per plug
	2x DSUB- 9 or 2x 10-pin LEMO (HGA.1B.310)	CAN (in / out), supply (alternatively) CAN (in / out), supply (alternatively)
	1x 6-pin LEMO (HGA.1B.306)	power supply
Dimensions (W x H x D)	 75 x 111 x 145 mm 81 x 128.4 x 145 mm 58 x 112.5 x 152 mm	without plugs CANSAS-L CANSAS-K CANSAS-SL
Weight	approx. 900 g	