

CANSAS-UNI8

Universal amplifier module with 8 channels for voltage, current, thermocouples, Pt100, measurement bridges, strain gauge and resistance measurement

Version 1.5



CANSAS-L-UNI8

The **CANSAS-UNI8** family of modules provides 8 powerful all-purpose channels which can each be filtered, amplified and digitalized separately. In this way, **CANSAS-UNI8** covers a wide range of physical measurement technology, from temperatures to current and voltage, all the way to acquisition of measurement bridge and strain gauge signals. The module supports *imc Plug & Measure* (Transducer Electronic Data Sheets (IEEE 1451)).

Order code:

CANSAS-L-UNI8
 CANSAS-K-UNI8
 CANSAS-SL-UNI8-L
 CANSAS-SL-UNI8-D
 CANSAS-SL-UNI8-D-PROTECT

4 different models available:

CANSAS-L-UNI8

Fan-less extruded aluminum housing (Long model, ITT Veam signal terminals)
 75 x 111 x 145 (W x H x D in mm)
 with built-in sensor supply

CANSAS-K-UNI8

Fan-less cassette, 3U/16HP (Cassette model, ITT Veam signal terminals)
 for installation in the imc 19" subrack
 CAN-Bus and supply are connected to the module via the 19" subrack
 with built-in sensor supply

CANSAS-SL-UNI8-L

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-UNI8-D / CANSAS-SL-UNI8-D-PROTECT

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)
 with built-in sensor supply

Refer also to the document "*CANSAS Installation and Assembly*" for information on the models and module racks.

Connections at standard L extruded aluminum housing and cassette modules

- CAN-Bus connected via 2x DSUB-9 terminals; CAN IN (male), CAN OUT (female)¹
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)
- Voltage supply via Phoenix (MC1, 5/4STF-3,81) socket (CAN/Power-Plug)¹, alternatively via CAN connection
- Signal terminal at module 8x 7-pin ITT Veam sockets per MIL-C-26482 (per channel)²
- On request: the modules are available with DSUB or LEMO connection terminals.

Connections at SL extruded aluminum housing

CANSAS-SL-UNI8-D-PROTECT

With the protect variant an increased robustness versus ESD and transient overvoltages is ensured. In this variant the shunt calibration is disabled.

CANSAS-SL-UNI8-D

- CAN-Bus connected via 2x DSUB-9 terminals; CAN IN (male), CAN OUT (female)
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)
- Voltage supply via 6-pin LEMO 1B (HGA.1B.306) connector, alternatively via CAN connection
 - Signal terminal at module: 4x DSUB-15 with 2 channels per DSUB-15 connector

CANSAS-SL-UNI8-L

- CAN-Bus connected via 2x 10-pin LEMO 1B (HGA.1B.310) connectors, CAN IN and CAN OUT
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)
- Voltage supply via 6-pin LEMO 1B (HGA.1B.306) connector, alternatively via CAN connection
 - Signal terminal at module: 8x 7 pin LEMO 1B (HGG.1B.307); for different measurement modes see table

Power supply for standard L extruded aluminum housing and cassette modules

- Supply voltage: 10 V to 50 V DC³ via 4-pin PHOENIX connector or via CAN-Bus plug
- Automatic startup upon applying supply voltage
- Power consumption 8 W to 20 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 8 W to 20 W

Operating conditions for standard L 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

¹ Not with Cassette model

² LEMO interconnections available upon request for the Cassette model

³ modules build before April 2011: 9 V to 32 V, see specification label

Included accessories

- Calibration certificate per DIN EN ISO 9001
- User's instructions
- 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 UNI8 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 properties

- Sampling rate adjustable in steps of 1, 2, 5 to a maximum of 1 kHz
- 200 Hz analog bandwidth
- 16-bit resolution (with internal 24-bit processing)
- Built-in DSP for online signal processing: data reduction, filtering, scaling, statistics etc.
- Power supply for external sensors built into module

Measurement channels

- 8 differential analog channels for measurement of: voltage, current, thermocouples⁴, measurement bridges, strain gauge and resistance measurement
- Synchronized sampling of all measurement channels
- Synchronized sampling with measurement systems or other appropriate modules possible both with additional synchronization lines and via CAN-bus only.

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.

Optional accessories

Connection plug: (ITT Veam signal connectors)⁵

- **M.1050059**; ITT Veam type connector for 1 channel, all measurement type; cable diameter 3 mm
- **M.1050060**; ITT Veam type connector for 1 channel, all measurement type; cable diameter 6 mm
- **M.1050120**; (solderable) Pt100 sensor for ITT Veam type connector for cold junction compensation directly within the connector pod, for measuring rapidly fluctuating temperature conditions

⁴ UNI-8 comes with internal cold junction compensation for temperature measurement with thermocouples. For measurement of rapidly fluctuating temperature conditions, it's possible to install additional PT100 sensors directly into the connector pod (in other words at the contact point). Not for CANSAS-SL-UNI8-L.

⁵ If a 350 Ω resistor is selected as the internal quarter-bridge completion, current measurement can be performed with only one external resistor. For connecting the signal with the DSUB clamp terminal, a connector with a built-in resistor is available.

Connection terminal: (signal connection: DSUB plug)

- **ACC/DSUB-UNI2**; 15-pin DSUB terminal for each pair of channels. Suitable for current-⁶, voltage-, resistance- and bridge measurement, as well as Pt100 and thermocouple measurement (with built-in cold junction compensation)⁴
- **ACC/DSUB-I2**; 15-pin DSUB connector for each channel pair (50 Ω shunt). For measurement of currents up to 50 mA (scaling factor 0.02 A/V)
- **ACC/DSUB-U2-BNC**; 15-pin DSUB connector for each channel pair; signal connection via BNC; to measure voltages up to 60 V.
- **ACC/DSUB-TEDS-UNI2**; 15-pin DSUB terminals for each channel pair. Suitable for current-⁵, voltage-, resistance- and bridge measurement, as well as Pt100 and thermocouple measurement (with built-in cold junction compensation)⁴, according to IEEE 1451.4 for use with *imc Plug & Measure*
- **ACC/DSUB-TEDS-I2**; 15-pin DSUB connector for each channel pair (50 Ω shunt). For measurement of currents up to 50 mA (scaling factor 0.02 A/V), according to IEEE 1451.4 for use with *imc Plug & Measure*
- **ACC/DSUB-UNI2-IP65**; 15-pin DSUB terminals for each channel pair adapted for CANSAS-SL. Suitable for current-, voltage-, resistance- and bridge measurement, as well as Pt100 and thermocouple measurement (with built-in cold junction compensation)⁴
- **ACC/DSUB-I2-IP65**; 15-pin DSUB connector for each channel pair (50 Ω shunt) adapted for CANSAS-SL. For measurement of currents up to 50 mA (scaling factor 0.02 A / V)
- **ACC/DSUB-TEDS-UNI2-IP65**; 15-pin DSUB terminals for each channel pair adapted for CANSAS-SL. Suitable for current-, voltage-, resistance- and bridge measurement, as well as Pt100 and thermocouple measurement (with built-in cold junction compensation)⁴, according to IEEE 1451.4 for use with *imc Plug & Measure*
- **ACC/DSUB-TEDS-I2-IP65**; 15-pin DSUB connector for each channel pair (50 Ω shunt) adapted for CANSAS-SL. For measurement of currents up to 50 mA (scaling factor 0.02 A/V), according to IEEE 1451.4 for use with *imc Plug & Measure*

⁶ single-end current measurement, for differential measurement an external shunt or the appropriate connector (ACC/DSUB-I2) is necessary

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*".
- According to standard there is an auxiliary resistance of 120 Ω for bridge measurement. An internal 350 Ω auxiliary resistance for quarter bridge measurement is alternatively possible.

UNI8

Datasheet Version 1.5 (8 differential analog inputs)

Parameter	Value (typ. / max)	Remarks
Inputs	8	differential, separate inputs
Measurement modes (DSUB):	<ul style="list-style-type: none"> - voltage measurement - voltage measurement with adjusted supply - current measurement - Resistor - thermocouples (mounted with and without contact to GND) - Pt100 in 3- and 4-wire configuration - bridge-sensor - bridge: strain gauge 	with shunt connector (ACC/DSUB-I2) or single ended
Measurement modes (LEMO):	<ul style="list-style-type: none"> - voltage measurement - voltage measurement with adjusted supply - current measurement - thermocouples (mounted with and without contact to GND) - Resistor - Pt100 in 3- and 4-wire configuration - bridge-sensor - bridge: strain gauge 	single-ended or with external shunt
Connection terminals	8x round plugs ITT VEAM: CAN/UNIST-7-3 or CAN/UNIST-7-6 or 4x DSUB-15 2x DSUB-9 PHOENIX (MC 1.5/4STF-3.81)	Inputs, CANSAS-K-UNI8 and -L-UNI8 3 mm core 6 mm core ACC/DSUB-UNI2 CAN (in / out), supply (alternatively) power supply
Connection terminals for SL inputs	4 plug DSUB-15, 2 channels per plug 2x DSUB- 9	ACC/DSUB-B2-IP65 only with CANSAS-SL-UNI8-D power supply (alternatively)
CAN (in/out) inputs	8x 7 pin LEMO (HGG.1B.307)	only with CANSAS-SL-UNI8-L power supply (alternatively)
CAN (in/out) inputs	2x 10-pin LEMO (HGA.1B.310)	only with CANSAS-SL-UNI8-L power supply (alternatively)
DC power supply	1x 6-pin LEMO (HGA.1B.306)	for all SL models
Sampling rate/channel		≤1 kHz
Resolution	16 bit	
Bandwidth	0 Hz to 200 Hz	-3 dB; Filter OFF
	0 Hz to 190 Hz	-3 dB; with AAF-filter

Voltage measurement		
Parameter	Value (typ. / max)	Remarks
Voltage input ranges	± 60 V, ± 20 V, ± 10 V, ± 5 V, ± 2 V, ± 1 V... ± 5m V	
Input configuration	DC, differential	
Overvoltage protection		±80 V permanent channel to chassis
Input impedance	1 MΩ 20 MΩ	differential >± 10 V ≤± 10 V

Voltage measurement			
Parameter	Value (typ. / max)		Remarks
Gain: uncertainty	0.02 %	≤0.05 %	of reading
Drift	+20 ppm/K·ΔT _a	+80 ppm/K·ΔT _a	ΔT _a = T _a -25°C ; ambient temp: T _a
Offset:	0.02 %	≤0.05 % ≤0.06 %	of range, in ranges: >± 50 mV ≤± 50 mV
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 temp: T _a
Common mode rejection ranges ±60V...±20V ±10V...±50mV ±20mV...±5mV	62 dB 92 dB 120 dB	>46 dB >84 dB >100 dB	common mode test voltage: ± 50 V ± 10 V ± 10 V
Noise	0.4 μV _{rms} 14 nV/√Hz		bandwidth 0,1 Hz to 220Hz (RTI)

Current measurement			
Input ranges	±50 mA, ±20 mA, ±10 mA, ..., ±1 mA		shunt: 120 Ω internally or 50 Ω shunt in terminal plug
Over load protection		±60 mA	permanent
Input configuration	single-ended differential		120Ω interner Bürdenwiderstand 50Ω im Stecker
Gain: uncertainty	0.02 %	≤0.06% ≤0.1%	of reading plus uncertainty of 50Ω shunt
Drift	+20 ppm/K·ΔT _a	+95 ppm/K·ΔT _a	ΔT _a = T _a -25°C ; ambient temp: T _a
Offset: uncertainty	0.02 %	≤0.05 %	of range
Drift	±0.05 nA/K·ΔT _a	±0.5 nA/K·ΔT _a	ΔT _a = T _a -25°C ; ambient temp: T _a

Bridge measurement			
Parameter	Value (typ. / max)		Remarks
Bridge measurement modes:	full bridge half bridge quarter bridge		2,5V and 5V bridge excitation voltage only
Input ranges	±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 bridge excitation voltage: 5 V bridge excitation voltage: 2,5 V
Input impedance	20 MΩ	±1 %	differential, full bridge
Gain: uncertainty	0.02 %	≤0.05 %	of reading
Drift	+20 ppm/K·ΔT _a	+80 ppm/K·ΔT _a	ΔT _a = T _a -25°C ; ambient temp: T _a
Offset: uncertainty	0.01 %	≤0.02 %	of input range after automatic bridge balancing
Drift	+16 nV/V/K·ΔT _a	+0.2 μV/V/K·ΔT _a	ΔT _a = T _a -25°C ; ambient temp: T _a
Bridge excitation voltage	10 V 5 V	±0.5 %	Not for quarter bridge measurement
Cable impedance for bridges (without return line)		<8 Ω <16 Ω	10 V bridge voltage 120 Ω 5 V bridge voltage 120 Ω

Temperature measurement			
Thermocouple measurement			
Parameter	Value (typ. / max)		Remarks
Input ranges	J, T, K, E, N, S, R, B, L nach IEC 584		resolution: ca. 0.1K
Uncertainty	$\leq \pm 1$ K		sensor type K at 20°C over total temperature range (Pt100 inside of connector)
Input impedance	20 M Ω	± 1 %	differential
RTD-measurement			
Input range	-200°C to 850°C		resolution: ca. 0.016 K
Uncertainty		≤ 0.2 K +0.02 % +0.01 K/K $\cdot\Delta T_a$	4-wire measurement of reading $\Delta T_a = T_a - 25^\circ\text{C} $; ambient temp: T_a
Sensor current	1.23 mA		

Parameter	Value (typ. / max)		Remarks
Resistor measurement			
Input range	0 Ω to 800 Ω		

General technical specs			
Parameter	Value (typ. / max)		Remarks
Isolation: CAN-bus power supply input analog inputs	± 60 V ± 60 V no isolation		to housing (CHASSIS) nominal; testing:300 V (10 s) nominal; testing:300 V (10 s) analog reference ground: CHASSIS
Supply voltage	10 V to 50 V DC		DC
Power consumption:	8 W (typ.) 15 W (typ.)	10 W (max.) 20 W (max.)	24 V, over total temp. range for externally supplied sensors
Operating temperature	-30°C to 85°C		
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-UNI8, -L-UNI8-DSUB, -L-UNI8-LEMO CANSAS-K-UNI8, -K-UNI8 -DSUB CANSAS-SL-UNI8-D; -PROTECT, -SL-UNI8-L
Weight	ca. 900 g		

A model variant of UNI8 can be ordered which is equipped with a 350 Ω resistor instead of the 120 Ω resistor (internal quarter bridge completion). In that case, the resistance in a quarter bridge measurement can be as low as 350 Ω . However, this makes current measurement via the internal resistor impossible. Current measurement is then only possible with the help of an externally connected 50 Ω resistor.

For the model with DSUB plugs, a connector with a built-in 50 Ω resistor for current measurement is available.

Sensor supply				
Parameter	Value (typ. / max)			Remarks
Configurations options	8 ranges			
Output voltage	Voltage	Current	Net power	set globally, isolated on request
	+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 ¹ (only without isolation)
Short circuit protection	unlimited duration			to reference ground of the output voltage
Precision of output voltage	<0.25 % (typ.) <0.5 % (max.) <0.9 % (max.) <1 % (max.)			at the connection terminals, no load 25°C; 2.5 V to 24 V 25°C; 2.5 V to 24 V over entire temperature range ² ±15 V
Adjustment of cable resistances with UNI8	3-line adjustment: SENSE line at return line (-VB: supply-ground)			Provided for 5 V and 10 V. Prerequisites: 1) symmetrical feed and return lines, 2) identical lines for all channels, 3) representative measurement at Channel1
Efficiency	min. 40 % typ. 55 % typ. 50 % typ. 70 %			2,5 V 5 V, ..15 V 24 V ±15 V
Max. capacitive load	>4000 µF >1000 µF >300 µF			2.5 V, ..10 V, ±15 V 12 V, 15 V 24 V

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 ± 15V instead of one other range, however all voltage ranges not isolated (not for SL with LEMO-connectors)

¹ With option ±15V the quarter bridge can't be measured, because the ¼ bridge pin is used for -15V. Also the ground referenced current measurement no longer applies

² Precision has no effect of the accuracy of the bridge measurement for UNI8.