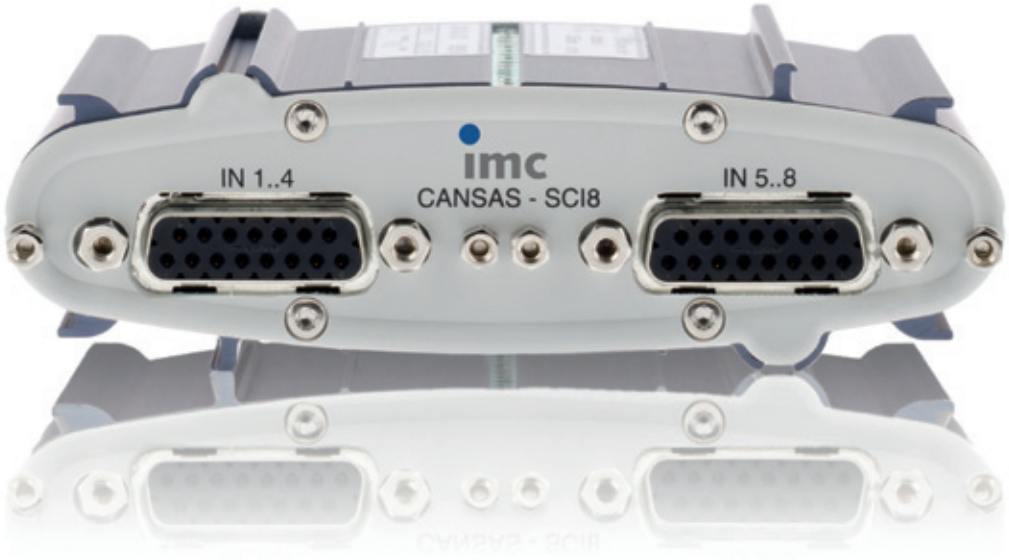
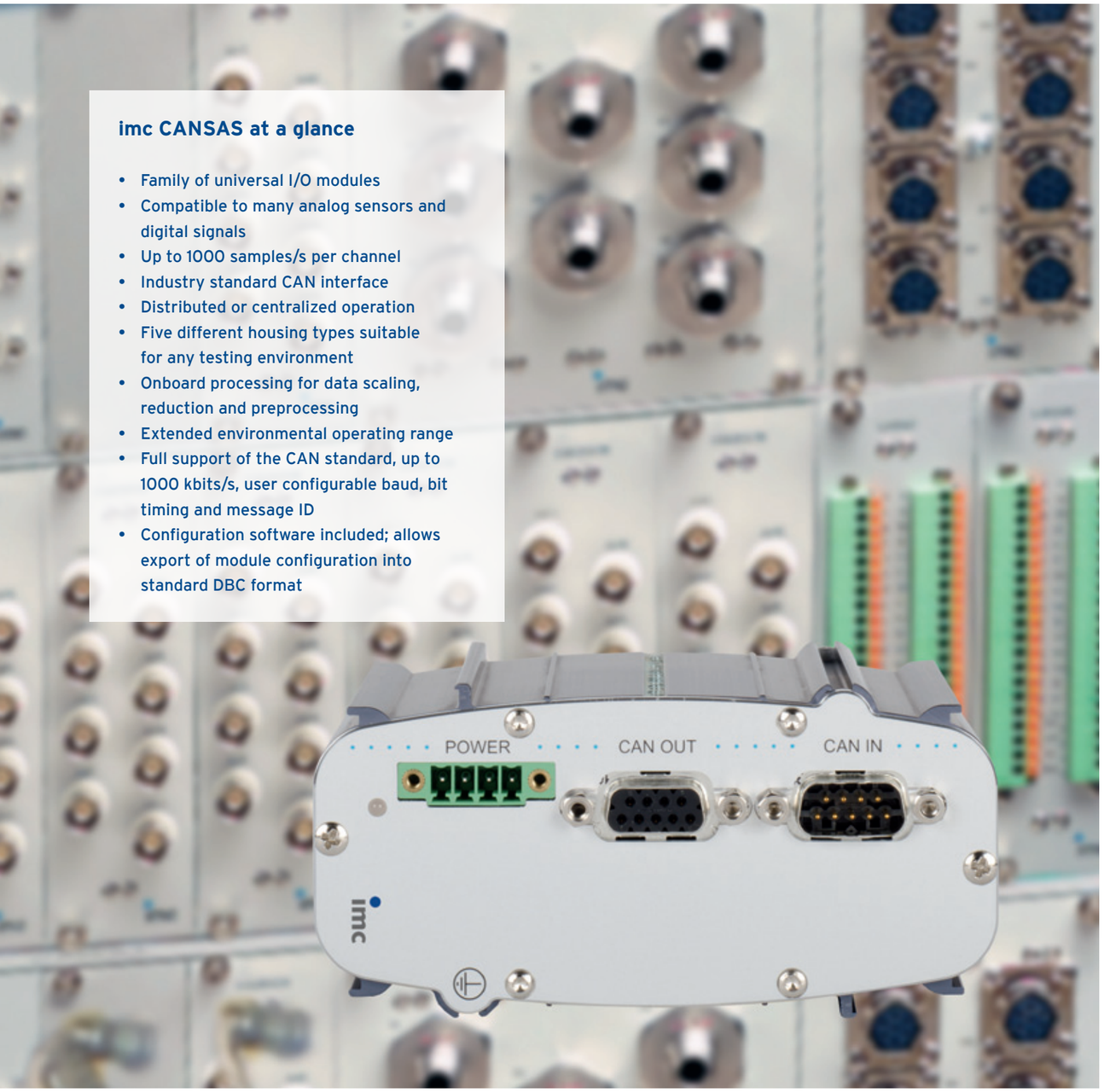
imc CANSAS

configurable • distributable • universal



CAN-based measurement and control I/O for electromechanical testing



imc CANSAS at a glance

- Family of universal I/O modules
- Compatible to many analog sensors and digital signals
- Up to 1000 samples/s per channel
- Industry standard CAN interface
- Distributed or centralized operation
- Five different housing types suitable for any testing environment
- Onboard processing for data scaling, reduction and preprocessing
- Extended environmental operating range
- Full support of the CAN standard, up to 1000 kbits/s, user configurable baud, bit timing and message ID
- Configuration software included; allows export of module configuration into standard DBC format

imc CANSAS

Universal systems for your CAN-based testing tasks

The imc CANSAS family is comprised of a variety of CAN-based measurement and control I/O modules, generally designed for the decentralized capture of physical sensor signals close to the point of measurement.

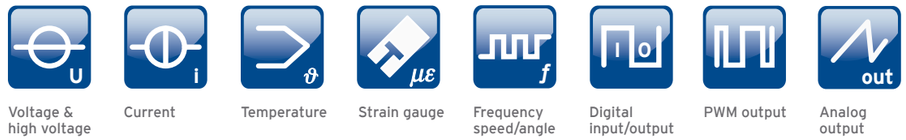
The modular design of the imc CANSAS family is also beneficial in centralized (e.g., test stand) environments, where users benefit from the truly universal signal conditioning modules, combined with digital I/O, counter (incremental encoder) inputs, as well as analog and PWM outputs, to create complete modular front end interfaces for automation and test control systems.

Regardless of the test arrangement, by utilizing a variety of different imc CANSAS modules, users may quickly create a high-quality front end for their CAN-based measurement and control system. Tailored to meet the requirements of virtually every sensor, the imc CANSAS modules are compatible with any CAN-interface equipped data collection system.

Designed for any test environment

imc CANSAS modules are available in five fanless housing types, each optimized for a specific testing environment: beyond the two standard aluminum profile housings, there are compact, rack-mountable cassette types available, and even a rugged splash proof IP65 sealed line, the imc CANSAS-SL. In addition, the imc µ-CANSAS series offers 120°C underhood rated, extremly compact constructed single and quad channel units.

Regardless of the test environment and conditions, each member of the imc CANSAS family includes industry leading capabilities designed to improve your testing productivity: CAN-based synchronization for precise network-wide timing of every channel; CAN-based "heart beat" to detect system or network failures; on-board real-time calculation to preprocess data, reducing CAN bus load; and TEDS (IEEE 1451) smart sensor recognition, simplifying connection and configuration.



Beyond basic data acquisition and control

Owing to the imc CANSAS modules' reconfigurability, modularity takes on an entirely new dimension. From strain gauges on an experimental wind turbine blade, to thermocouples mounted in each cell of a prototype 800V electric vehicle battery, imc CANSAS allows you to directly connect and digitize a vast range of sensors and signals.

Thanks to onboard processing and easy access to the entire CAN communication standard, imc CANSAS is your solution for precise analog signal capturing and control I/O.

When data from many signal channels need to be captured near their sensors, or where isolated measurement sites are spread out over a large area, imc CANSAS is the ideal tool for achieving cost effective, high precision decentralized measurements and control.

High channel count, centralized systems also benefit from the imc CANSAS design: rack mountable, parallel acquisition and easy module interchangeability are key features which make imc CANSAS popular for system integrators and test cell development.
Across a wide spectrum of industries and test conditions, imc CANSAS is a welcome addition to the test engineer's toolbox.

CAN compatibility and beyond

Data digitized by imc CANSAS modules are transmitted, in accordance with the CAN specifications (ISO 11898). This ensures noise-free, low cost single cable installation of the modules along a CAN network, up to 1000 meters from end to end.

CAN, its compatible SAE standard J1939 and other in-vehicle variants, are already commonly used in the automotive, on- and off-highway commercial vehicle, and maritime industries. It is also widely established in automation systems, e.g., on the factory floor and in power stations.

But CAN compatibility is only the first step towards ensuring time-saving efficiencies in test deployment. The imc CANSAS modules truly differentiate themselves when it comes to integration into existing CAN-based test and measurement environments. To facilitate this, every imc CANSAS includes:

- User configurable CAN settings
- Heart beat to monitor system integrity
- Real-time preprocessing of raw signal data, reducing bus load and simplifying integration
- Export of configuration information into the industry standard DBC format, for smooth system integration with 3rd party tools

Productive testing with imc CANSAS

Universal connectivity optimally utilizes existing sensor resources

- Direct capture and in-module conditioning of virtually any physical sensor and signal: voltage (up to +/-60V, or 800V CAT I in high voltage module), current (20 mA), temperature, bridge/strain gauge, digital I/O, and counter/RPM
- Simplifies test configuration by eliminating separate conditioners and amplifiers
- Direct readout of TEDS equipped sensors

Minimize installation efforts with housings ready for your testing environment

- Five available housing types are mechanically adapted to test environments – from under-the-hood to rack-mounted test stand installations
- Most modules rated from -40° to +85°C, and up to 100% RH, including condensation; IP65 sealed options and -40° to +120°C temperature range for selected modules
- Digitize signals close to the sensor, reducing the impact of electrical interference

Capitalize your investment with easy adaptability

- Configure via imc STUDIO, imc CANSAS or 3rd party CANopen controller
- Onboard virtual channels allow both raw and processed CAN data stream
- Configuration is stored onboard and loaded with module power-up

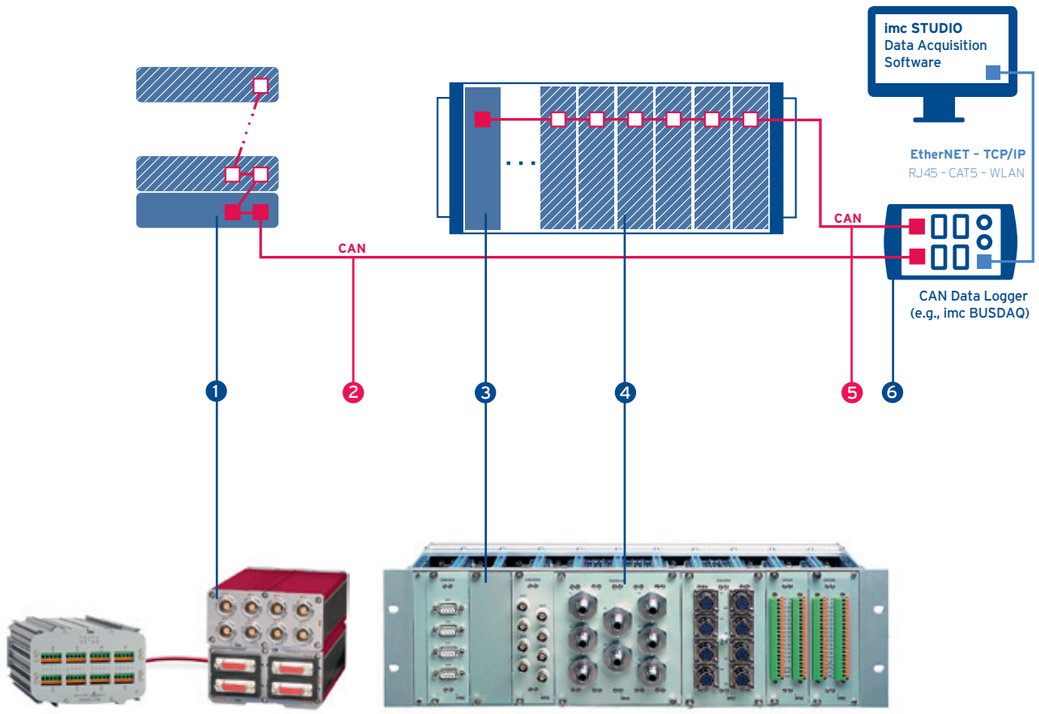
Compatibility with your existing CAN systems

- Supports complete CAN specification (ISO 11898), and fully user configurable CAN settings
- Direct access to CAN parameters (baud, ID type, message ID, etc.) for advanced setup
- Heart beat broadcast to help controller assess network status
- Export of module configuration into the industry standard DBC format

Extend your reach by distributed data acquisition

- Use any CAN data logger to create a distributed data acquisition system
- Phase alignment of sample clocks via CAN-based synchronization signal
- No extra cables – a single cable carries power and data
- Supports the entire range of the CAN specification (up to 1 km)

Designed for both centralized and distributed operations



1. Distributed measurement and control modules
2. Individual modules powered via CAN cable
3. imc CANSAS K-type 19" subrack with integrated CAN backplane for data and power distribution
4. imc CANSAS-K rack mounted modules
5. CAN network cable distributed up to 1000 m
6. Connect to any CAN-based equipment, such as the imc BUSDAQ running imc STUDIO software

In Practice

Compatible test stand expansion

When designing test stands, the ability to easily exchange and adapt compatible test stand hardware can save days of engineering downtime. Since imc CANSAS modules communicate via industry standard CAN, you can mix and match your I/O modules with existing 3rd party CAN equipment as the test requirements demand. Due to universal input capability and onboard processing, imc CANSAS modules can be easily substituted for components subsystems which are missing or unavailable during testing, resulting in test configuration productivity gains.

Additional channels whenever needed

"I knew from the start we were going to need more channels. But the budget wouldn't allow it in the initial test equipment specification." It's an all too common story, especially when older equipment needs to be replaced in order to meet new testing requirements. With the low entry price, there's no need for a large chassis or unnecessary modules "just in case". When the time comes to expand I/O capabilities, everything you've already invested in your CAN-based acquisition and control system can still be leveraged. With per-module prices well below complete system prices, you can always expand without breaking the budget.

Distributed systems eliminate analog noise

When your sensors need to be separated from your data acquisition and control system, the problem of signal noise and interference due to long analog signal cables is easily solved with point-of-measurement modules, such as imc CANSAS. Data collection and synchronization via the CAN data bus allows you to place the components of your system where it makes the most sense for their function. Modules can be daisy-chained and distributed (up to 1000 m) noise-free via standard CAN cable. This allows you to locate inputs and digitizers close to the signal source, especially when working in "noisy" environments, like offshore wind energy installations.

Centralized configuration
The imc CANSAS modules in the cassette and long standard housings are mechanically designed to slide into a dedicated standard 19“ imc rack. Providing a backplane for power and CAN communication, it simplifies installation and exchange of modules.

The centralized rack may then be located wherever it is convenient – only one CAN cable is needed to connect an entire rack of signals to your CAN-based controller or data acquisition system.

Distributed configuration
Since both power and communication may exist on a single CAN cable, the imc CANSAS modules are perfectly suited for distributed operation: from a single module to a satellite module stack, easily creating a spatially distributed, expandable I/O system. This allows the imc CANSAS modules to be placed close to the sensor, significantly reducing cabling costs and electromagnetic signal interference. When used with an imc data acquisition system, data may be collected synchronously across the entire CAN bus.

Hybrid configurations
Because a distance of up to 1000 meters is possible from end to end of a CAN network, new possibilities are opened up in distributed and hybrid centralized/ distributed system topologies for in-vehicle test and measurement, test bench and any other space- or distance-challenged testing environment. Thanks to the ability to route power over the CAN cable, single distributed modules can be powered directly by the base system for the unparalleled convenience of single cable connectivity.

imc CANSAS configuration
The imc CANSAS modules save their configuration in an onboard non-volatile memory. Once configured, the measurement will start according to its respective setting - automatically upon power up.

Initial configuration (or subsequent reconfiguration) is done via the CAN connection and one of three configuration methods:

1. imc CANSAS Configuration Software connected via a compatible PC-to-CAN interface, such as the imc CAN-USB interface.
2. CANopen controller which has been configured with the basic module type information.
3. imc STUDIO data acquisition and control software, utilizing any CAN equipped imc data acquisition system.

Utilizing imc STUDIO – unified versatile and scalable software solution for all imc systems – permits a seamless integration of the imc CANSAS modules into an imc based measurement and control environment. With its virtually unlimited possibilities it allows you to design, control, manage and automate your entire test and measurement workflow.

More information on imc STUDIO:
www.imc-studio.com

Design Concept

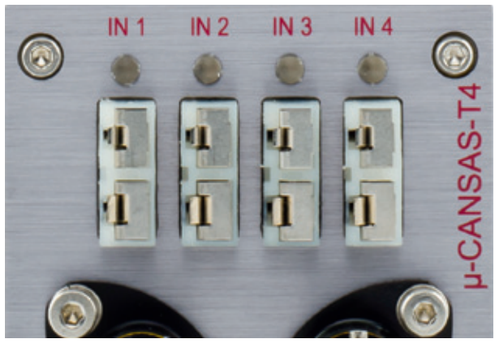
imc CANSAS family of modules

The imc CANSAS modules are designed to cover the full range of physical test & measurement I/O. This includes input modules for

- Analog inputs (universal, differential / isolated voltage, high voltage, strain / bridge, IEPE / ICP, temperature, 20 mA current)
- Digital input (TTL and 24V logic)
- Frequency / counter (incremental encoder)

as well as output modules

- Digital output and power stages
- Analog output +/-10V
- Pulse width modulated output (PWM)



Housing options
imc CANSAS modules are available in five different fanless housing types, offering a wide range of module choices suitable for virtually any testing environment:

- The standard aluminium profile housing with a 90 x 111 mm footprint, oval faced, stackable and (optionally) DIN-rail mountable modules.
- Similar in the face of the unit and its stack and DIN-rail mounting options, the CANSAS-L is a longer version of the standard housing (145 x 111mm); the long housing modules additionally offer rack mounting capabilities like the imc CANSAS-K.
- In standardized rack mounted installations, imc CANSAS-K casette housing modules offer the most compact design. In conjunction with a 19“ rack, this housing type offers convenient module insertion and exchange by providing a backplane based assembly scheme for power CAN and slot identification. Most modules are available with predetermined I/O connectors best suited for your application, or can be special ordered with custom connectors.
- The imc CANSAS-SL housing is ideal for use in harsh environmental conditions. It has an IP65 protection rating, MIL 810F vibration rating and comes equipped with sealed LEMO or DSUB connectors.
- Ultimately, the imc µ-CANSAS series is suited for both IP65 and extreme temperatures up to 120°C. A perfect fit for under-the-hood vehicle measurements.

Connectors: signals and CAN
The standard connectors for all modules are 15-pin DSUB for signal I/O and 9-pin DSUB for CAN connections.

For applications that require specialized thermo contacts, selected modules are available with individual plugs or alternative connectors. Such options include LEMO, ITT Litton-Veam, PHOENIX pluggable terminal blocks, push-in spring cage, BNC or mini-thermocouple connectors.

imc µ-CANSAS utilizes sealed DEUTSCH Autosport connectors for CAN connections, and require specialized Teflon cabling for signal and bus connections in extreme temperature environments.

imc CANSAS Details

imc CANSAS general specs and features

CAN	
CAN bus (CiA® Draft Standard 102 Version 2.0)	●
Software selectable baud rate (max. 1 Mbit/s)	●
Galvanically isolated CAN interface	●
Stand-alone capabilities	
Onboard data processing and reduction (virtual channels)	●
Heartbeat messaging	●
Autostart with stored configuration	●
Synchronization & clock	
Master slave via CAN messages	●
Power supply	
DC input 10V to 50V	●
AC/DC adaptor (110 to 230VAC)	○
Alternative power input via CAN connector	●
Galvanically isolated power supply input	●
Configuration software	
imc CANSAS software included	●
CANopen supported (CiA® DS 301 V4.0.2 / DS 404V1.2)	●
imc Plug and Measure (TEDS, IEEE 1451.4)	●
Configuration via PC CAN-interface (USB, PCI etc.)	●
Configuration via an imc device's CAN-interface (imc STUDIO)	●
Configuration via module readout	●
Preconfigurable by order	○
Operation and measurement software	
imc CANSAS*pro* (via CAN-USB interface)	○
imc STUDIO (via imc BUSDAQ, imc CRONOS etc.)	○
Operation with 3rd party CAN logger	○

imc CANSAS housing types

	CANSAS [-L]	CANSAS-K	CANSAS-SL
General			
Housing type	alu profile	cassette	sealed
Size (W x H x D, mm)	W x 111 x 90[145]	W x 128 x 145	W x 113 x 152
Weight (typical: UNI8)	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 vibration rating	50g pk (5 ms)	50g pk (5 ms)	MIL STD810F
IP rating	IP40	IP20	IP65
Connectivity			
CAN connector (in / out)	2 x DSUB-9	2 x DSUB-9	2 x DSUB-9
Power input connector	PHOENIX	PHOENIX	LEMO.1B
Control LED (front)	●	●	●


Standard aluminum profile housing (short)
Variant with DSUB-15 connectors shown

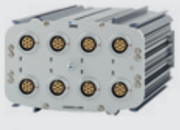

Standard aluminum profile housing (long)
Variant with thermocouple (type K)
connectors shown


Cassette module for 19" subrack mounting
Variant with PHOENIX terminal blocks shown


Sealed waterproof (IP65) SL-housing
Variant with LEMO.1B connectors shown

19" subrack for mounting of cassette type imc CANSAS modules: Backplane mainframe for user-configurable plug-in of modules with automatic slot recognition

Example of connector variants: High voltage HVCI8 module with push-in (spring cage) terminals for direct thermocouple connection and banana jacks for voltage measurements



Example of connector variants: universal UNI8 module with individual LEMO.1B connectors

TEDS Support (Transducer Electronic Data Sheet)
imc CANSAS devices support direct read/write of TEDS sensors, including imc's TEDS Clip. TEDS interfaces require either the ACC/DSUB-TEDS-x variants of our connectors (2-wire TEDS), or per-channel connectors such as Lemo or ITT-VEAM.

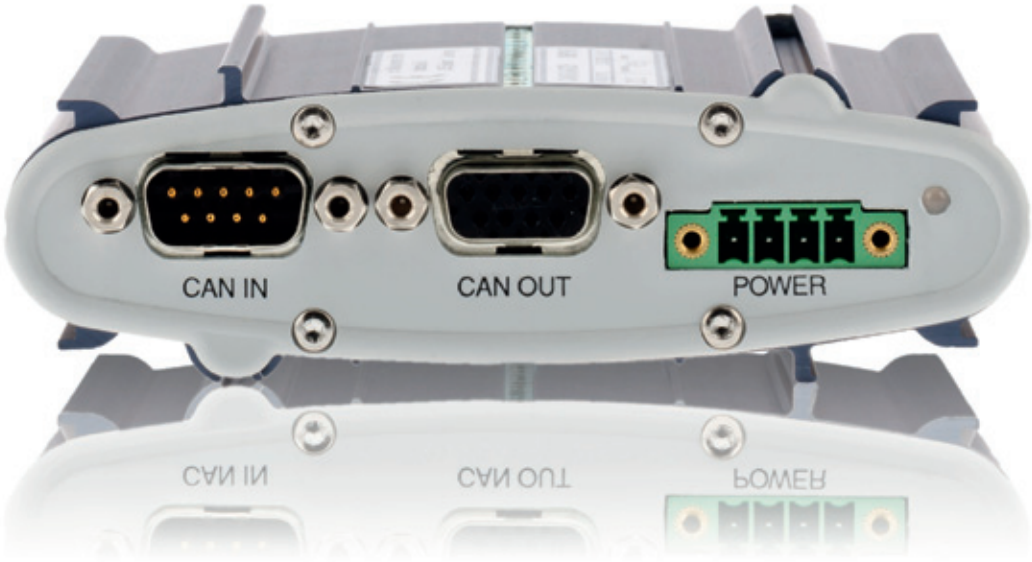
Key: ● Default, ○ Optional, (●) Restricted

imc CANSAS analog measurement modules

	size		connector	housing variants				speed		voltage mode					current		temp		supply		bridge mode					
module name CANSAS-(-L/K/SL)-xxx	channels	width (1 = 8 HP)	Connector variant	TEDS	Standard short	Standard long	Cassette	SL-Series	max. sampling rate (per channel)	signal bandwidth (-3dB)	isolated voltage mode	min. voltage range (mV)	voltage up to 10 V	voltage up to 50/60 V	voltage up to 800 V	20 mA internal shunt	20mA shunt plug	Thermocouple (TC)	RTD (PT100)	ICP plug	sensor supply	full bridge	half bridge	quarter bridge 120 Ohm	quarter bridge 350 Ohm	
Voltage & temperature measurement																										
C8	8	1	DSUB-15	●	●	●	●	●	100 Hz	20 Hz		2.5	●	●			●	●	●		○					
C8-2T	8	1	Thermo			●	●		100 Hz	20 Hz								●								
C8-BNC	8	1	BNC			●	●		100 Hz	20 Hz		2.5	●	●												
C8-L	8	1	LEMO.1B	●				●	100 Hz	20 Hz		2.5	●	●			(●)		●		○					
CI8	8	1	DSUB-15	●		●	●	●	1000 Hz	440 Hz	●	20	●	●			●	●	●	○	○					
CI8-2T	8	1	Thermo			●			1000 Hz	440 Hz	●							●								
CI8-L	8	1	LEMO.1B	●				●	1000 Hz	440 Hz	●	20	●	●			(●)		●		○					
CI8-V	8	1	ITT-Veam	●		●		●	1000 Hz	440 Hz	●	20	●	●			(●)		●		○					
CI8-BNC	8	1	BNC				●		1000 Hz	440 Hz	●	20	●	●												
CI8-PH	8	1	Terminal blocks				●		1000 Hz	440 Hz	●	20	●	●					●							
SCI16	16	2	DSUB-15	●	●	●	●	●	500 Hz	28 Hz		100	●	(●)			●	●	●		○					
SCI16-2T [-3T]	16	2	Thermo			●	●		1 Hz	0.5 Hz								●								
SCI16-L	16	2	LEMO.1B	●				●	500 Hz	28 Hz		100	●				(●)		●		○					
SCI8	8	1	DSUB-15	●	●	●	●	●	1000 Hz	42 Hz	●	100	●	●			●	●	●		○○					
SCI16	16	2	DSUB-15	●	●	●	●	●	500 Hz	23 Hz	●	100	●	●			●	●	●		○					
SCI8-2T	8	1	Thermo			●	●	●	2 Hz	1 Hz	●							●								
SCI16-2T	16	2	Thermo			●	●	●	1 Hz	0.5 Hz	●							●								
SCI8-L	8	1	LEMO.1B	●				●	1000 Hz	42 Hz	●	100	●	●			(●)		●		○					
SCI16-L	16	2	LEMO.1B	●				●	500 Hz	23 Hz	●	100	●	●			(●)		●		○					
SCI8-BNC	8	1	BNC				●		1000 Hz	42 Hz	●	100	●	●												
SCI16-BNC	16	2	BNC				●		500 Hz	23 Hz	●	100	●	●												
High isolating 800V CAT I, 300V CAT II																										
HCI8	8	2	Push-in			●			1000 Hz	440 Hz	●	20	●	●		●		●	●							
HVCI8	4	2	Push-in			●			1000 Hz	440 Hz	●	20	●	●		●		●	●							
	4		Banana								●	10 V	●	●	●											
Bridge & strain gauge measurements																										
DCB8	8	2	DSUB-15	●		●	●	●	1000 Hz	200 Hz		5	●			(●)	●			○	●	●	●	●	○	
DCB8-L	8	2	LEMO.1B	●				●	1000 Hz	200 Hz		5	●			(●)	(●)				●	●	●	●	○	
BRIDGE2	2	1	DSUB-15		●		●		5000 Hz	1000 Hz											●	●	●	●	●	
For universal use																										
UNI8	8	2	DSUB-15	●		●	●	●	1000 Hz	200 Hz		5	●	●		(●)	●	●	●	○	●	●	●	●	●	○
UNI8-V	8	2	ITT-VEAM	●		●	●		1000 Hz	200 Hz		5	●	●		(●)	(●)	●	●		●	●	●	●	●	○
UNI8-L	8	2	LEMO.1B	●				●	1000 Hz	200 Hz		5	●	●		(●)	(●)	●	●		●	●	●	●	●	○

imc CANSAS process control modules and specialties

	size		connector	housing variants				speed		features and operation mode	
module name CANSAS-xxx	channels	width (1= 8 HP)	Connector variant	Standard short	Standard long	Cassette	SL-Series	max. sampling rate (per channel)	signal band-width (-3dB)	isolation	
Pulse counter											
INC4	4	1	DSUB-15	●	●	●	●	1000 Hz	500 kHz		Modes: displacement, angle, events, time, frequency, velocity, RPM
INC4-V	4	1	ITT-VEAM		●			1000 Hz	500 kHz		Analog input conditioning (differential input, analog filter, adjustable threshold)
INC4-L	4	1	LEMO.1B				●	1000 Hz	500 kHz		x/y tracks + index = 9 tracks, 32 Mhz / 33 ns counter, optional supply
Digital I/O											
DI16	16	1	DSUB-15	●	●	●	●	10 kHz		●	Digital input: 2 galvanically isolated groups of 8 Bit
DI16-V	16	1	ITT-VEAM		●			10 kHz		●	configurable to 24 V / 5 V (TTL/CMOS) Level
DI16-PH	16	1	Terminal blocks		●	●		10 kHz		●	max. 500 µA input current
DO16	16	1	DSUB-15	●				10 kHz		●	Digital output: 2 galvanically isolated groups of 8 Bit
DO16-PH	16	1	Terminal blocks		●			10 kHz		●	configurable to open drain / totem pole mode, max. 0.7 A sink current
DO8R	8	1	DSUB-15	●				10 kHz		●	Relais output: Single-Pole-Double-Throw switches (SPDT)
DO8-V	8	1	ITT-VEAM		●			10 kHz		●	1 A @30 VDC, 0.3 A @125 VAC
DO16	16	2	DSUB-15					10 kHz		●	
DO16-PH	16	2	Terminal blocks	●		●		10 kHz		●	
Analog out, PWM											
DAC8	8	1	DSUB-15	●	●	●	●	5 kHz	5 kHz		Analog output: voltage/current (10V/20mA) individually configurable
DAC8-V	8	1	ITT-VEAM		●	●		5 kHz	5 kHz		Output based on CAN messages or standard functions (square, sine, saw etc.)
DAC8-BNC	8	1	BNC			●		5 kHz	5 kHz		and/or onboard calculations
PWM8	8	1	DSUB-15	●	●	●		10 kHz		●	PWM output: 2 galvanically isolated groups of 4 channels
PWM8-V	8	1	ITT-VEAM		●			10 kHz		●	30Hz .. 10 kHz PWM, open drain (30V_ext, 0.7A) and TTL out parallel outputs
SENT digital sensors, direct pressure, GPS											
SENT	8	1	DSUB-15	●						●	SENT-CAN Gateway: (SAE J2716), individually isolated channels
P8	8	1	Tube		●	●	●	1 kHz			Integrated pressure transducers: absolute/relative, gas/liquid
GPS	1	1	DSUB-9	●							GPS Receiver - CAN converter: for RS232 GPS mouse



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