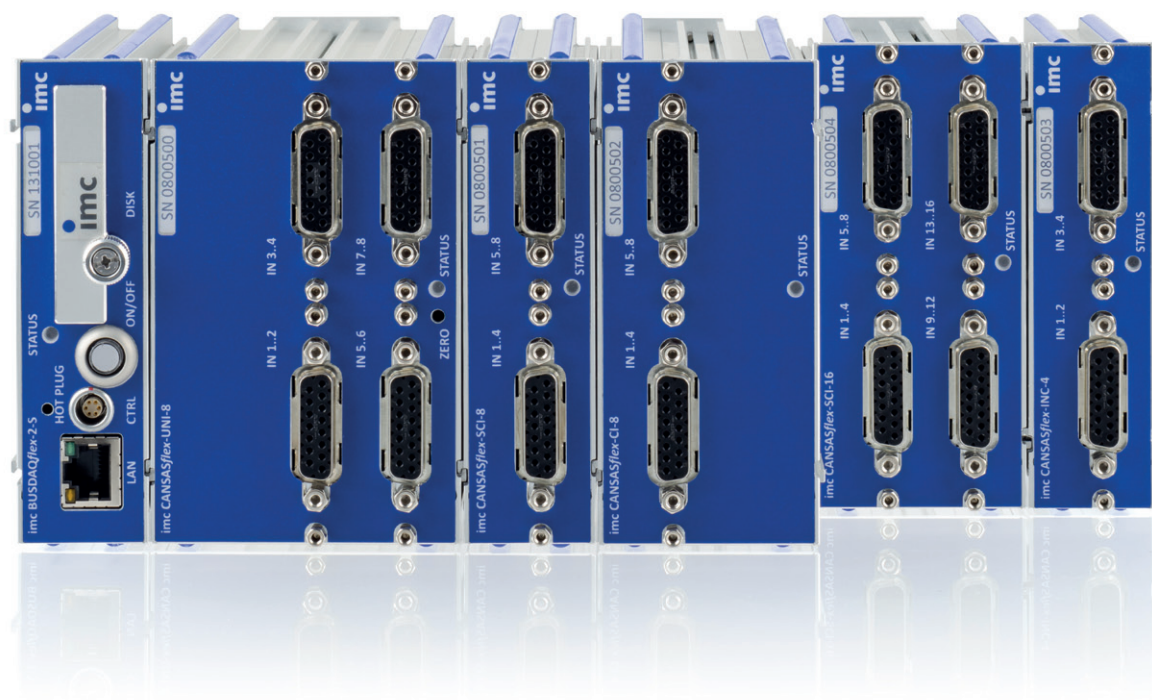


# imc CANSAS

flexible • networkable • universal



Intelligent measurement modules for test stands and mobile applications



### imc CANSAS at a glance

- Universal measurement and I/O modules for all relevant sensors and signals in mechatronics
- Distributed or centralized operation
- Click mechanism connects modules electrically and mechanically
- Easily integrates into every CAN-based testing thanks to a standard CAN interface
- Configuration software included: allows to export the module configuration in standard DBC format
- Three different module series: suitable types for every environment and application
- imc CANSASflex enables precise synchronization across multiple modules, as well as immediate result calculation and data reduction in the measurement module
- imc CANSASflex offers varieties of connector solutions: DSUB, LEMO, ITT Veam, BNC, thermo-couple, ...
- imc CANSASfit: suitable for extreme environmental conditions





# imc CANSAS

## CAN modules for test stand, vehicle and industrial applications

Whether test stand, on-board vehicle application or industrial environment – when time synchronous, dynamic or decentralized acquisition of large channel counts is required: imc CANSAS modules are ideal. Equipped with high-precision measurement amplifiers, imc CANSAS modules allow for direct connection to all typical sensors and signals in the mechatronic environment. The digitized measurement signals are output as CAN messages and can be read and recorded by any measurement, automation or control system with a CAN interface. imc BUSDAQflex is the perfect choice for CAN data logging: it can directly be connected with a simple click.

### Central or distributed installation

In test stands or industrial environments, a centralized installation of the measurement system is often desired. imc CANSASflex modules are designed to fit into a special 19" subrack solution.

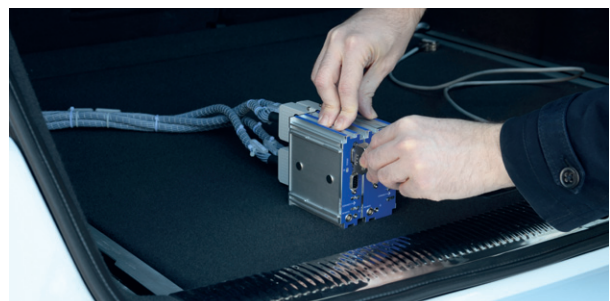
For widely distributed sensor assessment, the ability to capture and digitize signals near the sensor is quite advantageous. imc CANSAS modules can be placed directly next to the sensor and connected to a network with standard CAN cable – up to 1000m away. Important

for mobile applications: imc CANSAS modules operate reliably in extended temperature ranges and withstand severe shock and vibration. imc CANSASfit is particularly suited for harsh environments. With an IP65 rating, they are resistant to dirt, dust and splashing water.

### Intelligent functions make the difference

All imc CANSASflex modules are equipped with integrated signal processors that enable local real-time calculations of results, yielding data reduction and reduced bus load for highly productive testing. imc CANSASflex guarantees precise synchronization for all channels even across multiple modules: using CAN-based clock-synchronization, imc CANSAS accomplishes sync without additional signal lines – just the standard CAN bus cable. Thanks to integrated sensor recognition (TEDS), a secure sensor connection and flawless configuration are guaranteed.

With the heartbeat function, the bus master, such as a control or automation system, can constantly monitor all involved modules. You will know whether the module is still connected, is working with the correct configuration and whether the modules with automatic sensor recognition are connected with the right sensor.



Voltage & high voltage



Current



Temperature



Strain gauge



Pressure



Frequency



Digital input/output



PWM output



Analog output

## Productive testing with imc CANSAS

### Universal signal connections

- Direct connection of all typical signals and sensors in electromechanical testing
- Integrated signal conditioning, anti-aliasing filter and optional sensor supply
- Precise digitization with 24 bit A/D converters
- imc CANSASflex supports automatic sensor recognition (TEDS)
- imc CANSASflex offers internal real-time calculation and data reduction

### The perfect fit for every application

- Three module series, suited for different applications and test environments: from installation in an engine compartment at 125°C up to permanently installed test stand equipment
- Extended temperature range with condensation allowed: imc CANSASfit from -40 to +125°C and imc CANSASflex from -40 to +85 °C
- Compact module design allows for near-sensor placement and reduces potential electrical interference

### Easy configuration

- Configurable with Software imc CANSAS, via imc STUDIO or via CANopen

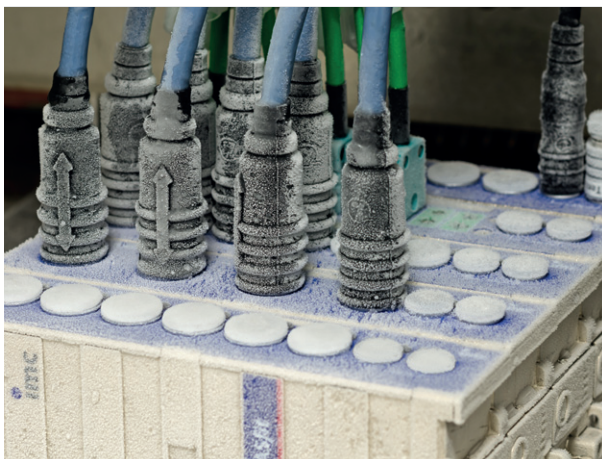
- Direct access to all relevant CAN parameters (baud rate, ID type, message ID, etc.)
- Configuration of real-time calculations in the module to be output as virtual channels
- Configuration is saved onboard and loaded upon power-up

### Easy integration

- Fully supports CAN specification (ISO 11898)
- Extensive configuration options for user-specific CAN settings
- Optional heartbeat function for unattended operation in CAN networks
- Import and export of module configurations using industry standard DBC

### Always in sync

- imc CANSASflex offers CAN-based synchronization for precise sample timing across multiple modules
- No additional cables or signals required

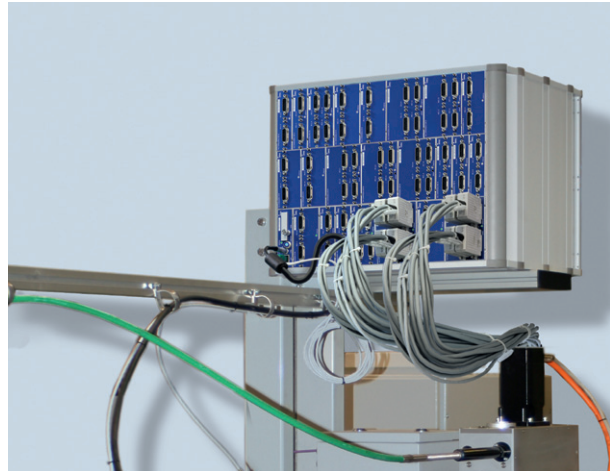




# In Practice

## Flexible in test stand applications

On test stands, adaptable and easy to integrate measurement hardware is required. The flexible, modular design of imc CANSAS is the ideal solution. From universal modules that can measure voltage, current, temperature or strain, up to special modules for pressure, high voltage or high isolation - the choice is yours. Depending on the task, the chosen measurement module can easily be plugged into the rack. This automatically powers the module and connects it to the CAN bus. Hot-Plugging allows modules to be added or replaced, even during operation.



## Robust in mobile applications

Even under harsh environmental conditions in mobile applications, imc CANSAS modules measure precisely throughout a wide temperature range and can tolerate condensation from passing through the dew point. For operations in the engine compartment, the particularly compact and robust imc CANSASfit modules are well-suited and can work from  $-40^{\circ}$  to  $+125^{\circ}\text{C}$ . These modules are built according to IP65 and MIL-STD-810F and tolerate dirt, splashing water, vibrations and shocks. Once configured, imc CANSAS systems automatically provide data when power is applied.

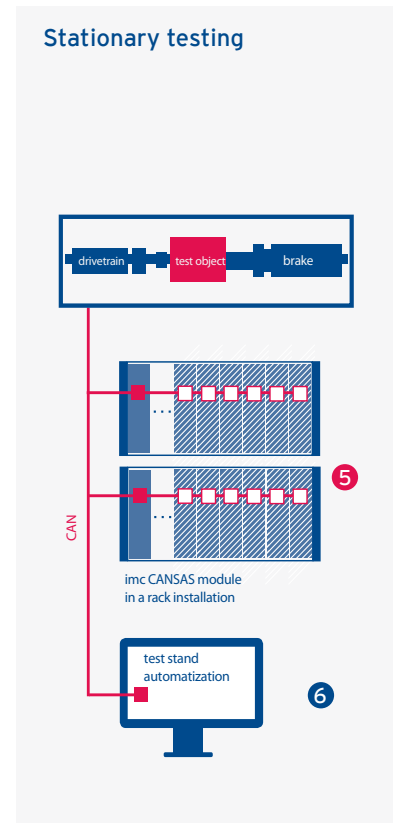
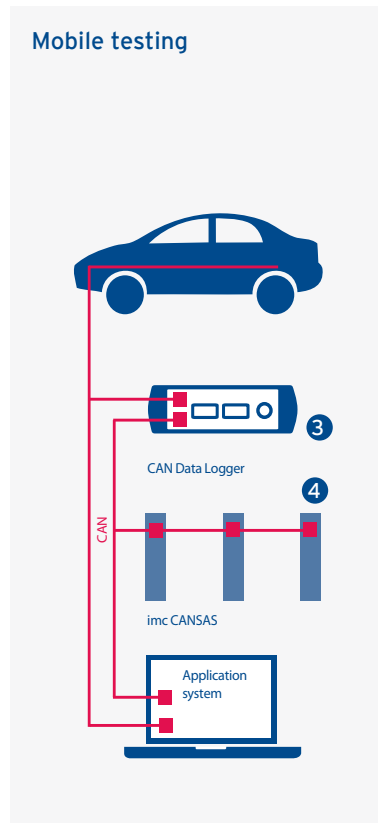
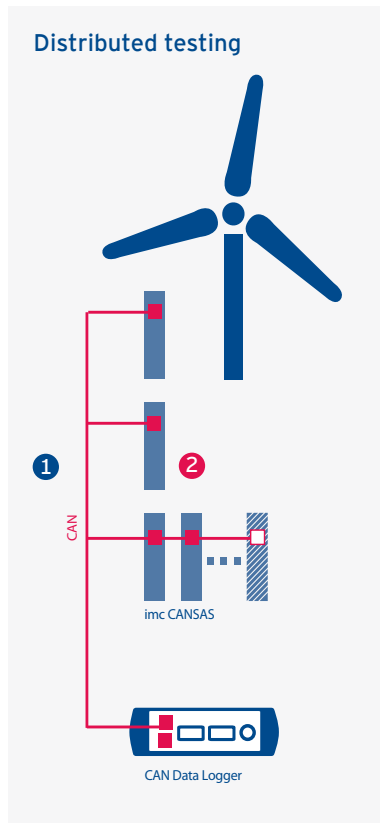


## Distributed tests and measurements

For widely distributed measurement equipment, such as on trains, ships, aircraft, cranes, wind turbines or construction sites, the cost of sensor wiring is high. In addition, long, multi-core test cables are expensive and prone to interference and signal noise. Here, imc CANSAS shows its advantages. Thanks to the compact housing and autarkic operation and supply design, each measurement module can be placed close to the sensor. The acquired signals are transmitted digitally and galvanically-isolated via CAN (up to 1000m) and are synchronously recorded with, e.g., an imc data acquisition system.



Ideal for centralized and distributed measurements  
in mobile or stationary testing



1 CAN network up to 1000m

2 Spatially-distributed imc CANSAS modules

3 CAN data logger (e.g., imc BUSDAQ) for autarkic data acquisition without a PC

4 Individual modules can be powered via CAN

5 imc CANSAS 19" rack with integrated CAN-backplane for power supply and data communication

6 Connects to all data acquisition systems or automation systems with CAN interface





# System design

## The imc CANSAS product family

imc CANSAS is designed for test and measurement tasks on test stands, industrial installations, vehicles and buildings. A variety of input and output modules cover the full range of electromechanical testing requirements. With three different module series and numerous specialty modules available, there is a suitable imc CANSAS product for every application and environment.

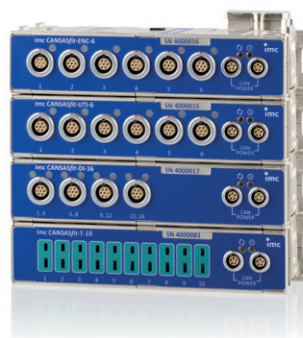
### The versatile imc CANSAS*flex* series

The imc CANSAS*flex* series offers a wide selection of measurement modules, which cover all typical sensors and signals from heavy machinery, installations and vehicles. The modules can be installed in both a spatially-distributed arrangement or as a central unit. Combining modules couldn't be easier: with the innovative imc click mechanism, the modules are electrically and mechanically connected to each other - without the need for tools or cabling. On test stands, in factories or plants, wherever multiple modules are permanently installed as one central unit for long-term testing, the use of a 19" rack is often recommended. This allows modules to be conveniently inserted with automatic supply and connection to the CAN bus.



### The compact imc CANSAS*fit* series

The imc CANSAS*fit* series is distinguished by its particularly compact design and robust housing which provides reliable protection against splashes, dust and vibration. The module's wide temperature range from -40° to +125°C, allows for outdoor operation, as well as testing performed in climate chambers. Due to its small form factor, imc CANSAS*fit* is ideal for testing in confined spaces, such as in the engine compartment or under a vehicle's interior trim. The modules acquire typical analog signals such as temperature and voltage, but also rpm, displacement or velocity, as well as digital status information.



### The classic imc CANSAS series

The classic series offers a wide range of modules for use with all typical measurement and control signals on the test bench, in vehicles and in industrial settings. With different housing designs, imc CANSAS can be optimally adapted to various testing environments: whether using a standard variant in a vehicle or a cassette module on a test stand or stationary structure.



# imc CANSAS module types

Suitable modules for every task

## Universal

Measurement modules for universal testing

- Voltage and current
- Thermocouples
- PT100
- Strain gauge / bridges
- Resistance

## Strain gauges & measurement bridges

Precision strain testing

- Quarter-, half- and full-bridge
- 120 Ohm or 350 Ohm quarter bridge completion
- Integrated sensor supply

## Digital inputs & outputs

Detect and set conditions

- 16 galvanically-isolated inputs and outputs
- Inputs configurable for 24 V and 5V logic levels (TTL/CMOS)
- Outputs can be configured as open-drain or totem-pole
- Output current max. 0.7A
- Alternative: relay contacts

## Outputs

Open- and closed-loop control

- Analog outputs +/- 10 V, 0 ... 20 mA
- Integrated function generator for, e.g., square wave, sawtooth, etc.
- PWM outputs with TTL and open-drain output stage

## Counter inputs

Incremental encoder measurements for determining:

- Frequency
- RPM
- Velocity
- Position and angle
- Time

## Gateways

Digital interfaces over CAN

- RS232 gateway for conversion to CAN
- SENT gateway with 8 inputs to connect SENT sensors and output their data to CAN



## Specialty modules

### Temperature (HV)

#### Highly-isolated temperature measuring

- Thermocouples on high common-mode voltage levels of up to 800 V
- E-mobility and hybrid applications
- Individual HV-suited sockets



### Pressure

#### Integrated pressure sensors

- 8 pressure inputs of different types
- Absolute and relative pressure measurements
- Gases and liquids



### High isolation

#### Testing with high potentials

- Isolation: 800 V CAT I, 300 V CAT II
- Measure low voltages and temperatures on high common-mode levels
- High-voltage measurement up to 800 V



### Quiescent & operating currents

#### Auto-Range measurement from 50 nA to 50 A

- Two independent, isolated channels for current measurement with automatic range switching
- Wide measuring range up to 50 A
- High resolution down to 50 nA and 30 Bit effective range dynamics



### Rack

#### For test stands and stationary installations



### Miniature measurement modules

#### imc $\mu$ -CANSAS

- 1 and 4 channel modules for measuring voltage, temperature or strain
- Wide temperature range up to 120 °C
- Particularly light-weight and robust



# imc CANSAS family

## General specifications and functions

| Function                       |                                                    | <i>flex / classic</i>                  | <i>fit</i>                         |
|--------------------------------|----------------------------------------------------|----------------------------------------|------------------------------------|
| main features                  |                                                    | full flexibility<br>universal, special | vehicle tests,<br>„under the hood“ |
| <b>Application</b>             |                                                    |                                        |                                    |
| mobile testing                 |                                                    | ★ ★                                    | ★ ★ ★                              |
| test stand                     |                                                    | ★ ★ ★                                  | ★                                  |
| laboratory                     |                                                    | ★ ★ ★                                  | ★                                  |
| mobile machinery               |                                                    | ★ ★                                    | ★ ★ ★                              |
| <b>System</b>                  |                                                    |                                        |                                    |
| clickable                      |                                                    | ●                                      | ●                                  |
| mechanically compatible logger |                                                    | ●                                      |                                    |
| 19" rack                       | with slot detection                                | ●                                      |                                    |
| DIN-rail                       | mounting kit                                       | ●                                      |                                    |
| CAN terminator                 | internal, switchable                               | ●                                      |                                    |
| desktop compatible             | rubber buffer                                      | ●                                      |                                    |
| <b>Signal processing</b>       |                                                    |                                        |                                    |
| ADC, processing                | 24 Bit                                             | ●                                      | ●                                  |
| CAN messages                   | 16 Bit integer                                     | ●                                      | ●                                  |
|                                | 32 Bit float                                       |                                        | ●                                  |
| virtual channels               | min/max/mean, linearization<br>math, filter, logic | ●                                      |                                    |
| sync                           |                                                    | ●                                      |                                    |
| heartbeat                      |                                                    | ●                                      |                                    |
| CANopen                        |                                                    | ●                                      |                                    |
| FindMe                         |                                                    | ●                                      |                                    |
| configuration read-back        |                                                    | ●                                      |                                    |
| user status LED                | freely programmable                                | ●                                      |                                    |
| <b>Operating conditions</b>    |                                                    |                                        |                                    |
| high temperature               |                                                    | 85°C                                   | 125°C                              |
| sealed                         |                                                    | IP40                                   | IP65                               |
| shock & vibration resitant     | MIL Standard                                       |                                        | MIL810                             |
| DC supply                      | automotive                                         | 10..50 V                               | 7..50 V                            |
|                                | isolated                                           | ●                                      | ●                                  |
| <b>Connectors</b>              |                                                    |                                        |                                    |
| I/O connectors                 | DSUB-15                                            | ●                                      |                                    |
|                                | LEMO.1B                                            | ●                                      | ●                                  |
|                                | custom (BNC, ITT-Veam...)                          | ●                                      |                                    |
| CAN + supply                   | combi socket                                       | DSUB-9                                 | LEMO.0B                            |
| supply                         | separate                                           | LEMO.0B.302                            |                                    |
| <b>Portfolio</b>               |                                                    |                                        |                                    |
| diversity                      | module types                                       | ★ ★ ★                                  | ★                                  |
| isolation                      | isolated I/O                                       | ★ ★                                    | ★ ★ ★                              |
| HV modules                     |                                                    | ●                                      |                                    |
| TEDS                           | plug & measure                                     | ●                                      |                                    |
| temperature                    |                                                    | ●                                      | ●                                  |
| current, 20 mA                 |                                                    | ●                                      | ●                                  |
| bridge, strain gauge           |                                                    | ●                                      | ○                                  |
| pulse counter                  |                                                    | ●                                      | ●                                  |
| DI                             |                                                    | ●                                      | ●                                  |
| DO                             |                                                    | ●                                      | ●                                  |
| analog out (DAC, PWM)          |                                                    | ●                                      | ○                                  |
| IEPE / ICP                     |                                                    |                                        | ○                                  |
| pressure                       |                                                    | ●                                      |                                    |
| SENT                           |                                                    | ●                                      |                                    |



Incremental encoder module:  
imc CANSASflex series



UNI-8 module: imc CANSASflex series



Measurement system with data logger  
imc BUSDAQflex and imc CANSASflex



temperature module of the  
imc CANSASfit series



UTI-6 module of the  
imc CANSASfit series

#### 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.

Legend: ● standard, ○ optional, (●) limited

★★★ ideally suited ★★ well suited ★ suited

### Analog measurement modules: imc CANSASflex / imc CANSASfit

| type                                     | series                 |                       |               | I/O connector options |                   |                       |         |         |        |     | speed    |                                     | iso                        | voltage mode          |                           |                   | current              | temp                | aux             | bridge mode  |       |               |             |             |                        |                        |
|------------------------------------------|------------------------|-----------------------|---------------|-----------------------|-------------------|-----------------------|---------|---------|--------|-----|----------|-------------------------------------|----------------------------|-----------------------|---------------------------|-------------------|----------------------|---------------------|-----------------|--------------|-------|---------------|-------------|-------------|------------------------|------------------------|
| module name:<br>CANFX-xxxx<br>CANFT-xxxx | imc CANSASflex (short) | imc CANSASflex (long) | imc CANSASfit | channels              | connector variant | TEDS (bei DSUB, LEMO) | DSUB-15 | LEMO.1B | Thermo | BNC | ITT-Veam | max. sampling rate<br>(per channel) | signal bandwidth<br>(~3dB) | individually isolated | min. voltage rate<br>(mV) | voltage up to 10V | voltage up to 50/60V | 20mA internal shunt | 20mA shunt plug | thermocouple | PT100 | sensor supply | full bridge | half bridge | quarter bridge 120 Ohm | quarter bridge 350 Ohm |
| temperature measurement                  |                        |                       |               |                       |                   |                       |         |         |        |     |          |                                     |                            |                       |                           |                   |                      |                     |                 |              |       |               |             |             |                        |                        |
| C8-2T                                    |                        | ●                     |               | 8                     | thermo            |                       |         |         | ●      |     |          | 100 Hz                              | 20 Hz                      |                       |                           |                   |                      |                     |                 | ●            |       |               |             |             |                        |                        |
| CI8-2T                                   |                        | ●                     |               | 8                     | thermo            |                       |         |         | ●      |     |          | 1000 Hz                             | 440 Hz                     | ●                     |                           |                   |                      |                     |                 | ●            |       |               |             |             |                        |                        |
| SC16-2T                                  |                        | ●                     |               | 16                    | thermo            |                       |         |         | ●      |     |          | 1 Hz                                | 0,5 Hz                     |                       |                           |                   |                      |                     |                 | ●            |       |               |             |             |                        |                        |
| SCI8-2T                                  |                        | ●                     |               | 8                     | thermo            |                       |         |         | ●      |     |          | 2 Hz                                | 1 Hz                       | ●                     |                           |                   |                      |                     |                 | ●            |       |               |             |             |                        |                        |
| SCI16-2T                                 |                        | ●                     |               | 16                    | thermo            |                       |         |         | ●      |     |          | 1 Hz                                | 0,5 Hz                     | ●                     |                           |                   |                      |                     |                 | ●            |       |               |             |             |                        |                        |
| T-10                                     |                        |                       | ●             | 10                    | thermo            |                       |         |         | ●      |     |          | 100 Hz                              | 20 Hz                      | ●                     |                           |                   |                      |                     |                 | ●            |       |               |             |             |                        |                        |
| voltage and temperature measurement      |                        |                       |               |                       |                   |                       |         |         |        |     |          |                                     |                            |                       |                           |                   |                      |                     |                 |              |       |               |             |             |                        |                        |
| C8                                       | ●                      | ●                     |               | 8                     | options           | ●                     | ●       | ●       |        | ●   |          | 100 Hz                              | 20 Hz                      |                       | 2,5 mV                    | ●                 | ●                    |                     | ●               | ●            | ●     | ○             |             |             |                        |                        |
| CI8                                      |                        | ●                     |               | 8                     | options           | ●                     | ●       | ●       |        | ●   | ●        | 1000 Hz                             | 440 Hz                     | ●                     | 20 mV                     | ●                 | ●                    |                     | ●               | ●            | ●     | ○             |             |             |                        |                        |
| SC16                                     | ●                      | ●                     |               | 16                    | options           | ●                     | ●       | ●       |        |     |          | 500 Hz                              | 28 Hz                      |                       | 100 mV                    | ●                 | ●                    | ●                   | ●               | ●            | ○     |               |             |             |                        |                        |
| SCI8                                     | ●                      | ●                     |               | 8                     | options           | ●                     | ●       | ●       |        | ●   |          | 1000 Hz                             | 42 Hz                      | ●                     | 100 mV                    | ●                 | ●                    |                     | ●               | ●            | ●     | ○             |             |             |                        |                        |
| SCI16                                    | ●                      | ●                     |               | 16                    | options           | ●                     | ●       | ●       |        | ●   |          | 500 Hz                              | 23 Hz                      | ●                     | 100 mV                    | ●                 | ●                    |                     | ●               | ●            | ●     | ○             |             |             |                        |                        |
| UTI-6                                    |                        |                       | ●             | 6                     | LEMO.1B           |                       |         | ●       |        |     |          | 1000 Hz                             | 400 Hz                     | ●                     | 25 mV                     | ●                 | ●                    | ●                   | ●               | ●            | ●     | ○             |             |             |                        |                        |
| bridge & strain gauge measurement        |                        |                       |               |                       |                   |                       |         |         |        |     |          |                                     |                            |                       |                           |                   |                      |                     |                 |              |       |               |             |             |                        |                        |
| DCB8                                     |                        | ●                     |               | 8                     | options           | ●                     | ●       | ●       |        |     |          | 1000 Hz                             | 200 Hz                     |                       | 5 mV                      | ●                 |                      | ●                   | ●               |              |       | ●             | ●           | ●           | ●                      | ○                      |
| for universal use                        |                        |                       |               |                       |                   |                       |         |         |        |     |          |                                     |                            |                       |                           |                   |                      |                     |                 |              |       |               |             |             |                        |                        |
| UNI8                                     |                        | ●                     |               | 8                     | options           | ●                     | ●       | ●       |        |     |          | 1000 Hz                             | 200 Hz                     |                       | 5 mV                      | ●                 | ●                    | ●                   | ●               | ●            | ●     | ●             | ●           | ●           | ●                      | ○                      |

### Process control & specialties: imc CANSASflex / imc CANSASfit

| series                                |                        |                       |               | I/O connector variant |                   |         |         |     | speed                                 |                                     |                          |                       |                 |                                                                                         |
|---------------------------------------|------------------------|-----------------------|---------------|-----------------------|-------------------|---------|---------|-----|---------------------------------------|-------------------------------------|--------------------------|-----------------------|-----------------|-----------------------------------------------------------------------------------------|
| module name<br>CANFX-xxx<br>CANFT-xxx | imc CANSASflex (short) | imc CANSASflex (long) | imc CANSASfit | channels / Bits       | connector variant | DSUB-15 | LEMO.1B | BNC | connector blocks, Push-In<br>ITT-Veam | max.<br>sampling rate (per channel) | signal band width (~3dB) | galvanically isolated | isolated groups |                                                                                         |
| pulse counter                         |                        |                       |               |                       |                   |         |         |     |                                       |                                     |                          |                       |                 |                                                                                         |
| INC4                                  | ●                      | ●                     |               | 4                     | options           | ●       | ●       |     | ●                                     | 1000 Hz                             | 500 kHz                  |                       |                 | Modes: displacement, angle, time, frequency, speed, RPM; Input: diff, filter, threshold |
| ENC-6                                 |                        |                       | ●             | 6                     | LEMO.1B           |         | ●       |     |                                       | 1000 Hz                             | 2 MHz                    | ●                     | 2               | Modes: displacement, angle, time, frequency, speed, RPM; Input: diff, filter, threshold |
| digital I/O                           |                        |                       |               |                       |                   |         |         |     |                                       |                                     |                          |                       |                 |                                                                                         |
| DI16                                  | ●                      | ●                     |               | 16                    | options           | ●       |         |     | ● ●                                   | 10 kHz                              |                          | ●                     | 2               | Digital input: 2 x 8 Bit, config: 24V / 5V (TTL/CMOS) level                             |
| DO16                                  | ●                      |                       |               | 16                    | options           | ●       |         |     | ●                                     | 10 kHz                              |                          | ●                     | 2               | Digital output: 2 x 8 Bit, config: open-drain / totem pole, max. 0.7A                   |
| DO8R                                  | ●                      |                       |               | 8                     | options           | ●       |         |     | ●                                     | 10 kHz                              |                          | ●                     | 8               | Relais output: changeover contacts, 1A @30VDC, 0.3A @125VAC                             |
| DO16R                                 | ●                      |                       |               | 16                    | options           | ●       |         |     | ●                                     | 10 kHz                              |                          | ●                     | 16              | Relais output: changeover contacts, 1A @30VDC, 0.3A @125VAC                             |
| DI-16                                 |                        |                       | ●             | 16                    | LEMO.1B           |         | ●       |     |                                       | 1000 Hz                             |                          | ●                     | 4               | Digital input: 4 x 4 Bit, config: 24V / 5V (TTL/CMOS) level                             |
| DO-16                                 |                        |                       | ●             | 16                    | LEMO.1B           |         | ●       |     |                                       | 1000 Hz                             |                          | ●                     | 4               | Digital output: 4 x 4 Bit, config: open-drain / totem pole, max. 0.7A                   |
| analog out, PWM                       |                        |                       |               |                       |                   |         |         |     |                                       |                                     |                          |                       |                 |                                                                                         |
| DAC8                                  | ●                      | ●                     |               | 8                     | options           | ●       |         | ●   | ●                                     | 5 kHz                               | 5 kHz                    |                       |                 | Analog outputs: voltage/current (10V/20mA) individually configurable                    |
| PWM8                                  | ●                      | ●                     |               | 8                     | options           | ●       |         |     | ●                                     | 10 kHz                              |                          | ●                     | 2               | PWM outputs: 2 galvanically isolated groups of 4 channels                               |
| DAC-6                                 |                        |                       | ●             | 6                     | LEMO.1B           |         | ●       |     |                                       | 1000 Hz                             | 200 Hz                   | ●                     | 6               | Analog outputs: voltage/current (10V/20mA) individually configurable                    |
| PWM-6                                 |                        |                       | ●             | 6                     | LEMO.1B           |         | ●       |     |                                       | 1000 Hz                             |                          | ●                     | 4               | PWM outputs: 4 galvanically isolated groups of 2 channels                               |
| SENT digital sensors, GPS             |                        |                       |               |                       |                   |         |         |     |                                       |                                     |                          |                       |                 |                                                                                         |
| SENT                                  | ●                      |                       |               | 8                     | DSUB-15           | ●       |         |     |                                       |                                     |                          | ●                     | 8               | SENT-CAN gateway: (SAE J2716), individually isolated channels                           |
| GPS                                   |                        |                       |               | 1                     | DSUB-9            |         |         |     |                                       |                                     |                          |                       |                 | GPS receiver - CAN converter: for RS232 GPS mouse                                       |





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