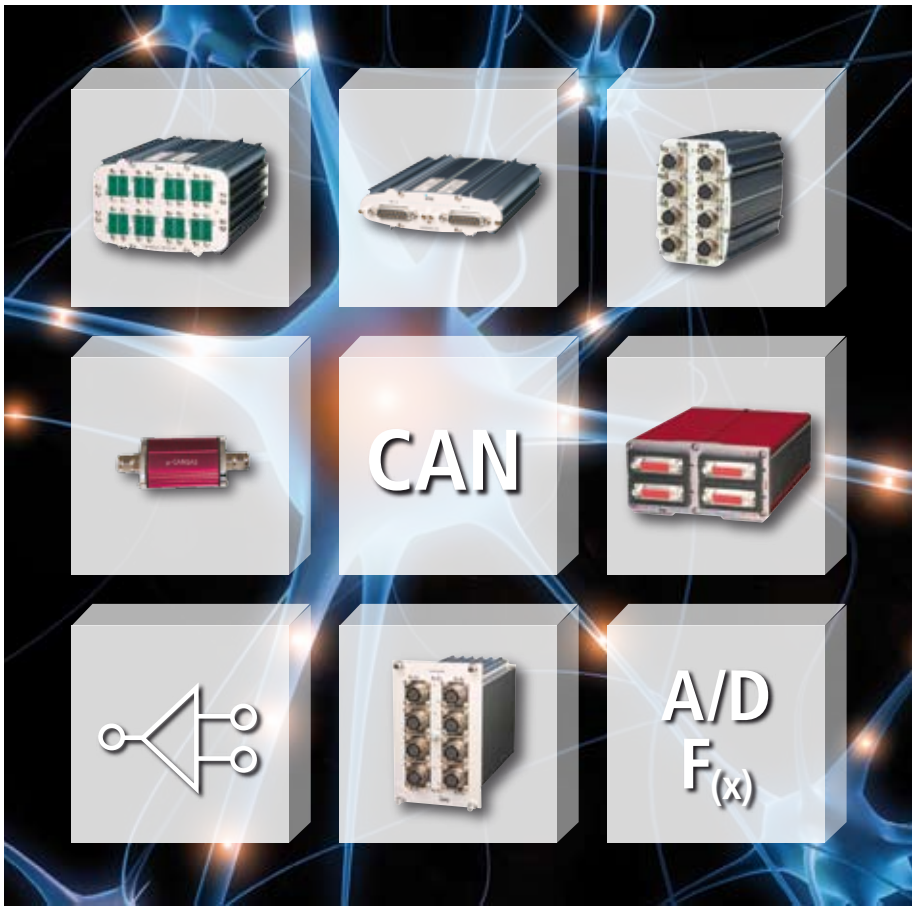
www.instrumentation.it
INSTRUMENTATION DEVICES SRL
Via Acquanera 29, 22100 COMO (Italy) tel. +39.031.525391 - fax +39.031.507984 - info@instrumentation.it

imc
integrated measurement & control

CANSAS

Intelligent, CAN-Bus capable measurement and control modules

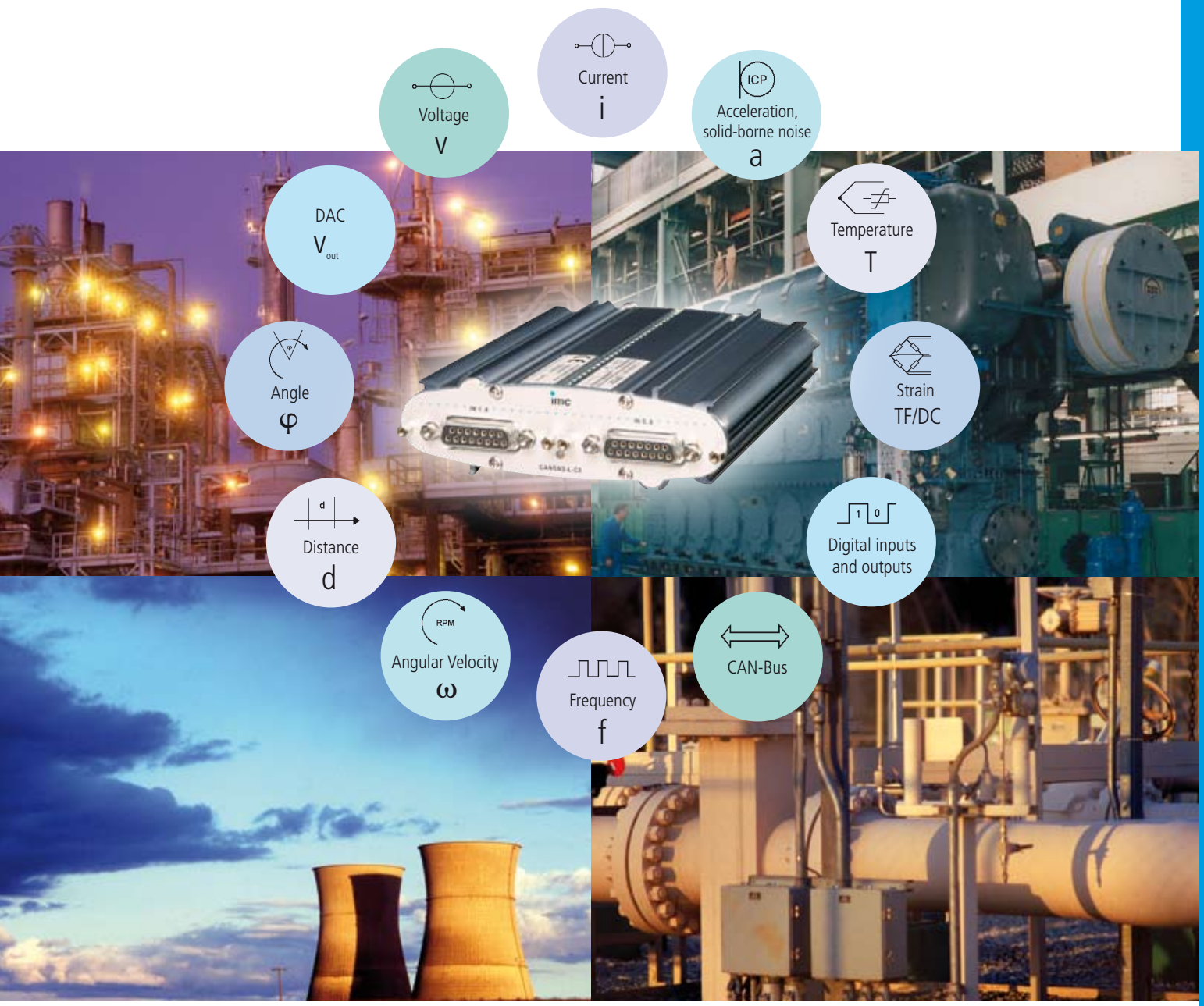


High-performance CAN measurement modules for applications in test stands, in-vehicle and industrial environments

CANSAS is a revolutionary concept for the decentralized capture of physical measurement data. It is made for applications in which analog signals must be connected, dynamically recorded and transmitted near their sensor sources.

Each module includes high-performance, synchronizable measurement amplifiers, optionally providing the necessary sensor excitation supply. Integrated signal processors provide the capability for real-time computations, and reduction of the bus load. The digitized measurement signals are sent as CAN messages in accordance with ISO 11898, or optionally as CANopen messages. These universal formats can be input by any measurement devices having a CAN-interface or also by automation systems, machine control units, etc.

CANSAS can also be used in inaccessible sites and rough environments. As long as the supply voltage is applied, the modules continuously send data. No user intervention is required in response to a power outage. The modules start automatically and send the data according to their pre-defined configuration.



Application areas

CANSAS is ideal for any environment demanding decentralized arrangement with measurements taken close to the measured processes. Additionally, it can operate in rugged conditions, enduring temperatures ranging from -40° C to +120° C, or strong vibration and shock, and in anything from high humidity to splashed water.

- Test Stands
- Machine Monitoring
- Vehicle Measurements
- Factory Automation
- Building Controls

Advantages

- Universal measurement amplifier with sensor supply
- On-site setup in harsh environments
- Secure connection and easy configuration
- Short signal lines and interference-free transfer of data
- Smart measurement with on-board processing
- Synchronized, dynamic capture of measurements on many channels

Decentralized measurement networks with CAN- and Ethernet components

On-site setup, even in rough conditions

CANSAS modules are used to create decentralized measurement networks, stationed at different locations near the processes being measured. Depending on the overall channel count, this can be accomplished with stand-alone modules or, for instance, in racks within test rigs.

In especially harsh conditions, the setup will include the CANSAS-SL modules or µ-CANSAS. These can operate in a broad range of ambient temperatures, withstand strong shock (MIL STD810F) and feature a high protection water resistance (IP65).

Reliable connections and easy configuration

Integration of sensor recognition (TEDS and Plug & Measure) in the cable or connector terminal, in conjunction with universal measurement amplifier modules, as well as the use of modules with CANopen outputs significantly simplify the connection of sensors. This completely eliminates the possibility of incorrect sensor connection and the need for configuration by software interface.

Short measurement leads and interference-free transmission of measured data

Networking by means of the CAN-Bus eliminates the need for long measurement lines and ensures noise-free digital format data transmission.

Smart measurements: reduction of the bus load by signal processing within the measurement module

The CAN-bus is ill suited for transmitting high-speed measurements (≥ kHz range). Reduction of highly dynamic data to a reasonable bus load can be achieved if incoming data is pre-processed within the module.

The CANSAS configuration software is used to set the parameters of the processing functions. The associated computational instructions are part of the setup saved in the measurement module.

Channel-specific calculations are performed by the digital signal processors on board of the module. Along with basic arithmetical operations and extensive mathematical functions, logical operations and comparison functions, as well as statistics functions, filter- and conversion functions are provided, all of which are performed in real time.

High-speed measurement signals can be synchronously captured using measurement networks connected via Ethernet components (e.g. CRONOS-PL).

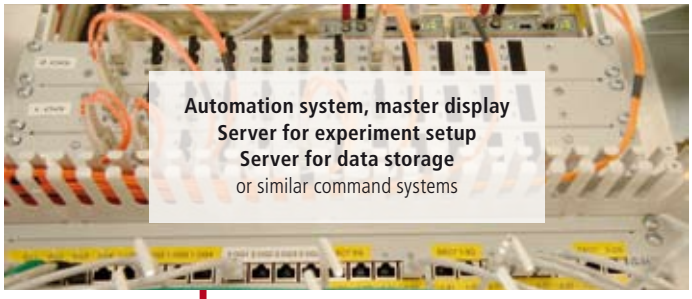
Synchronized capture of multi-channel CAN messages

The CANSAS modules transform analog signals to/from CAN messages, which can be exported to a digital measurement instrument (e.g. busDAQ). The CAN messages from different sources are interpreted as measured data, in engineering units, according to their scaling and encoding. The encoded data are synchronized and can be triggered and processed in real time. The data are stored as a measurement signal which can be displayed and analyzed on a PC during or after the measurement. busDAQ and CRONOS-PL can collect up to 512 fully-synchronized CAN messages (measurement channels) from up to 8 CAN nodes.

Simultaneous capture of analog and digital signals

For synchronized acquisition of analog signals and CAN messages, a network connection with a measurement system which comes with both analog measurement amplifiers and a CAN interface is ideal (e.g. CRONOS-PL or the C-Series).

The CAN interface receives inputs of measured data and status information from the CAN-bus, and records these jointly and in synchronization with the values captured by the analog measurement amplifiers.



Automation system, master display
Server for experiment setup
Server for data storage
or similar command systems

Ethernet (TCP/IP)

CRONOS-PL-8
Measurement device
with CAN interface
for synchronized acquisition of measured analog signals and CAN messages

PC
for setting parameters, visualization and optionally for data storage

busDAQ-2
CAN data collector
for synchronized acquisition of CAN messages, special measured data and status information

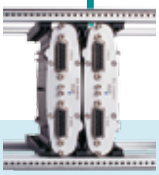
CAN-Bus

High-speed analog signals

CANSAS Pressure Module
with built-in pressure sensor
Positioned on-location,
e.g. on machinery

CANSAS Measurement Modules
on-site, centralized or decentralized setups, even in rough environments

CANSAS Measurement Modules
on-site centralized or decentralized setups, including complex facilities



CANSAS Module Racks
for centralized setups with CANSAS measurement modules as in test stands

PROCESS

Direct connection of any analog signals and sensors

ω RPM	f	d d	a ICP	p	v	i		T	1 0
Velocity	Frequency	Distance	Acceleration, solid-borne noise	Pressure absolute, relative	Voltage	Current	Strain/Bridges	Temperature	Digital inputs and outputs

CANSAS proves its worth in wide ranging conditions

CANSAS standard versions – for all around application

CANSAS can be employed in a wide variety of settings. To meet the requirements of different measurements, there exist models of different heights and lengths, all with extruded aluminum housings and no internal fans.

Standard extruded aluminum housing in short and long model varieties

Single, stacked, on a top-hat rail or in module racks

The shape and design of the CANSAS housing is adapted to its function. The sealed housing serves simultaneously as a heat sink and as a mounting fixture. Multiple CANSAS modules can be attached together without the need for tools, by means of the tongue and groove stacking mechanism, or inserted into a module rack. The modules can be assembled on mounting platforms, or assembled on DIN-type mounting rails.

Two modules stacked

DIN mounting with standard modules

Only DSUB-15 offers the full range of functionality

The standard DSUB-15 terminal is very robust and is used throughout the CANSAS line to connect signal lines.

The Phoenix screw terminals inside enable any signals and sensors to be quickly connected. Unconnected signal lead contacts are easily screwed into a terminal providing strain-relief. The connector enclosure has complete metallic coating, ensuring optimal electrical shielding.

Special thermo- and ICP-connector varieties provide the necessary signal conditioning reference point, or a shunt, respectively, and support connection of a variety of thermocouples and ICP-sensors.

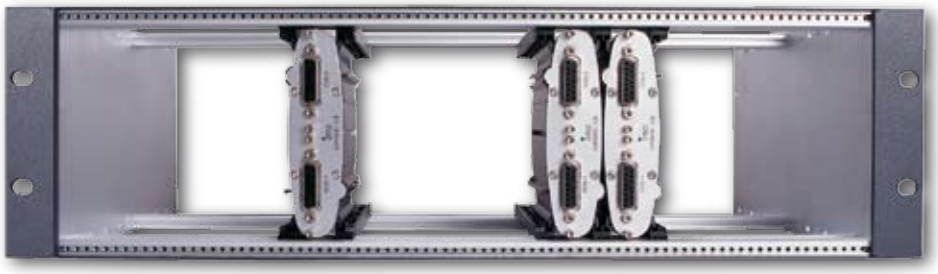
DSUB connection terminal

Ambient conditions

Standard and cassette modules

Operating temperature: [1]	-40° C … +85° C
Condensation:	allowed (0 - 100% RH)
Shock resistance:	50 g pk over 5 ms
Supply voltage:	9 - 32 V DC

[1] P8 = -15° C … +60° C



Standard CANSAS module rack, for high density and centralized channel arrangement

Ambient conditions

SL Versions

Operating temperature:	-40° C … +85° C
Condensation:	allowed (0 - 100% RH)
Protection rating:	IP65
Shock resistance:	MIL STD810F
Supply voltage:	9 … 32 V DC

CANSAS cassette versions – for permanent installation

In test rigs and production installations, or wherever multiple CANSAS modules are connected in a centralized setup, the cassette model is ideal.

It applies the universal DSUB-15 standard interconnections, too. The design of the cassette modules, however, allows custom connectors to be constructed easily to the user's specification.

Cassette module with ITT Veam interconnections

Customized interconnections

Additionally, custom solutions for the user's interconnection requirements can be constructed. This is most easily accomplished with cable end adaptors for the standard DSUB-15 terminals.

CANSAS-SL versions for extreme conditions

The CANSAS-SL versions are especially robust. They meet MIL STD810F standards, among the most stringent for resistance to temperature, vibration, contamination and shock.

They are ideal to employ in off-road vehicles, other exposed machinery, and anywhere that normal electronics can not go.

As with the standard modules, the design reflects the function. The housing serves simultaneously as a heat sink and as a mounting fixture. Multiple CANSAS modules can be attached together without the need for tools, by means of the tongue and groove principle, or inserted into a module rack. The modules can be assembled on mounting platforms for assembly on DIN rails. The smooth surface makes it easy to clean following exposure to contaminants.

CANSAS-SL can be attached in stacks without tools

DSUB-15 connector
with BNC cable ends

CANSAS-module with custom interconnections. The use of thermocouple sockets restricts connection to thermocouples, of a user specified type, as seen here.

Here, too, standard DSUB-15 interconnections are used, but in a splash-proof IP65 model.

Thermo-plug
Type K thermocouple,
water-proof as per IP65

Module racks with cassette style modules

µ-CANSAS – connecting the measurement module directly with the sensor …

In existing R&D and test cells, where a large number of analog sensors and measurement cables already exist and cannot be replaced, the advantages of up-to-date Smart Sensor technology can be easily added thanks to analog sensors retrofitted with µ-CANSAS.

Combined calibration of sensor, measurement amplifier and signal digitization

µ-CANSAS turns any analog sensor into an intelligent and readily identified digital Smart Sensor.

For this purpose, µ-CANSAS is integrated into the sensor connection cable or into its terminal connector. This provides handy and economical integration of every measurement chain's three components: sensor, measurement amplifier, and digitization, plus sensor recognition (TEDS, Transducer Electronic Datasheet as per IEEE 1451). As a result, these elements can also be calibrated together, for a true end-to-end verified measurement.

Short setup time, reliable measurement

Enhancing conventional analog sensors with µ-CANSAS means that the sensor's analog raw signal is conditioned, digitized and is available as a CAN- or CANopen signal output.

In conjunction with µ-CANSAS, the analog sensor is transformed into a Smart Sensor. Its unique identity is recorded and universally recognizable. When used with a TEDS-capable data logger (e.g. CRONOS-PL, C-Series, busDAQ), no manual adjustment or parameterization is needed whatsoever. It is no longer possible to accidently misconnect channels. A complete description of the sensor plus the complete measurement configuration and parameters are saved in the µ-CANSAS.

Even complex measurements can be performed without the need for high skills in measurement engineering.

The whole measurement chain is electrically protected and can work in a temperature range of -40° C to +120 ° C. This enables it to be employed as a stand-alone measurement module, e.g. in test vehicles and at sites with harsh conditions and high ambient temperatures.

CANopen – a standardized and widely-used CAN-based protocol

CANopen allows automated configuration of a CAN-network of up to 111 nodes and up to 127 logical devices per node. Even now, this protocol is employed in a range of different fields.

While it once was used primarily for drive-controlled machines, it is now found in off-road vehicles, medical equipment and even building automation. By means of standardized communication objects for real-time data and configuration data, as well as additional communication objects, developers can avoid performing time-consuming implementation and specification work for the CAN-Bus.

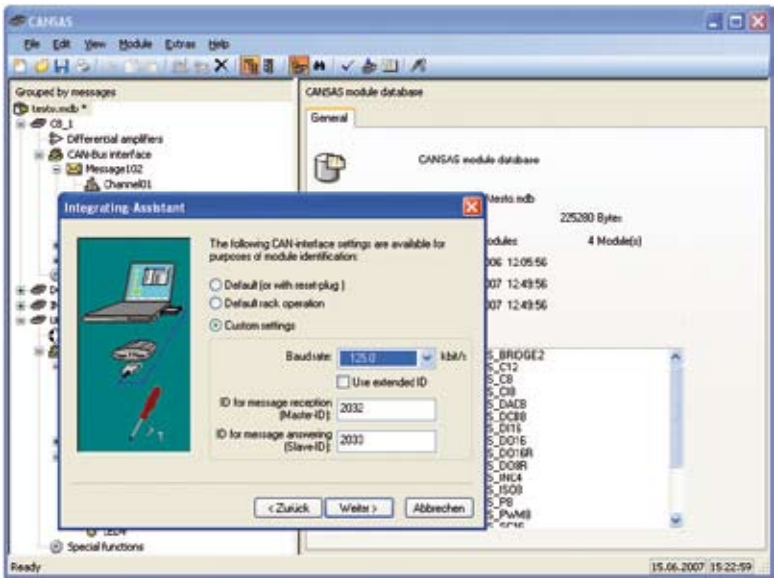
Uniform access to all device parameters is thus made possible. All protocol properties of CANopen technology are supported by the super-compact µ-CANSAS modules or the CANSAS-CI8.

Benefits of CANopen

- Convenient access to all device parameters
- Device synchronization
- Cyclical and event-driven processing of data traffic
- Simultaneous import and export of data
- Supports SYNC-object
- Output data formats:
  16-bit Integer, 32-bit Integer, 32-bit IEEE-Float
- CANSAS-CI8: supports 4 TPDOs
  (sending-process data objects)
- µ-CANSAS: supports 1 TPDO
- Signal pre-processing with mean value
  and 4th order anti-aliasing filter
  with adjustable cutoff frequency

System integration

- Assignment of the node-ID and setting of the Baud rate by LSS-protocol (layer setting service)
- EDS-file (Electronic Datasheet) with configuration options for automatic integration into a CANopen network
- Quick and easy module configuration
- Easy decoding of the CAN measurement data



Quick and easy module integration

CANSAS configuration software

PC-configurable and self-activation

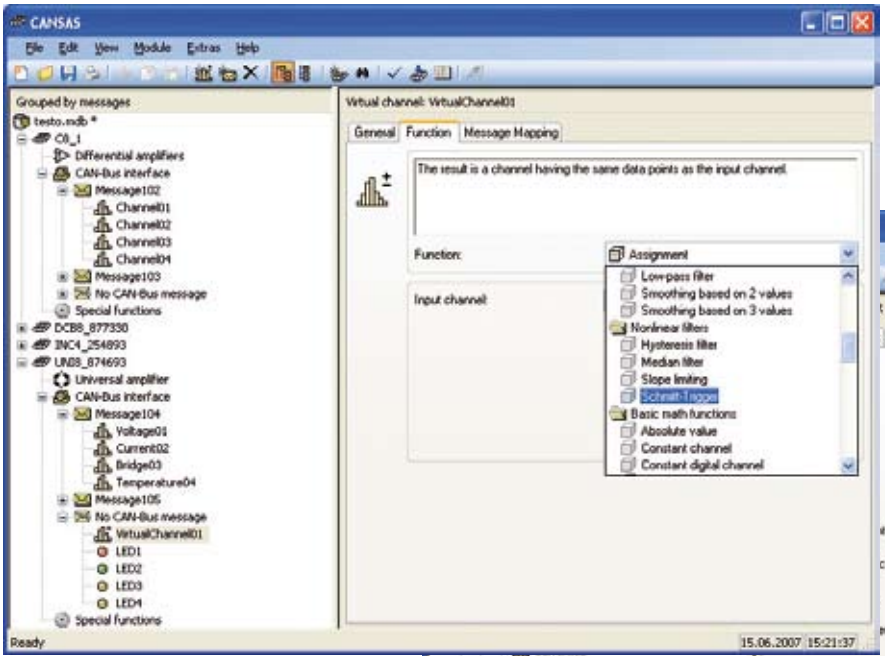
The complete configuration of the CANSAS module and measurement amplifier is set by means of the PC interface program and permanently saved in the module. This is performed using a PC having a CANBus interface and the CANSAS software. It is easy to operated and presents all its functions in a clear overview.

Once configured, CANSAS remembers it settings. Whenever power is applied, the module starts automatically and sends data continually and securely via it's bus connections.

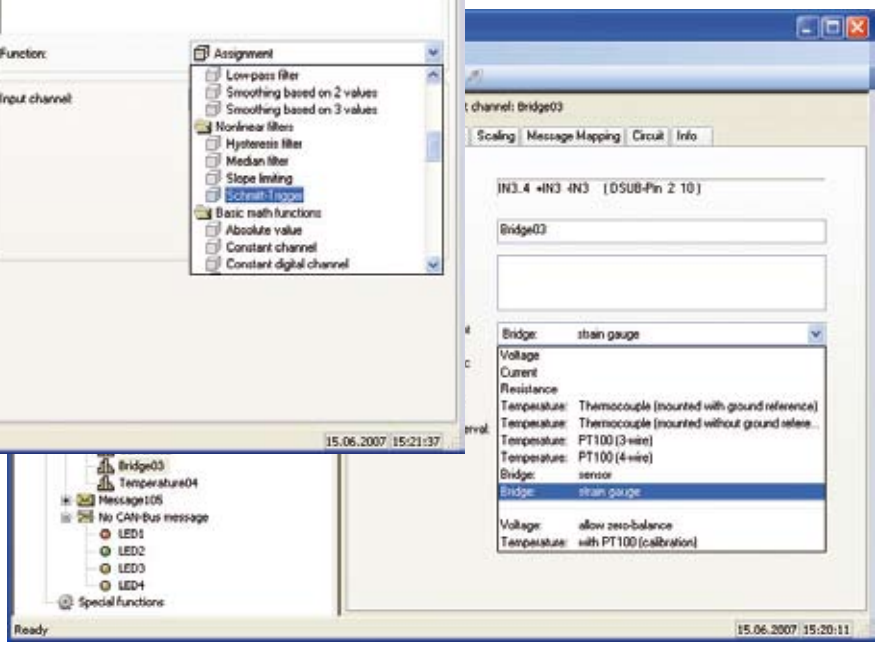
If the module's intended function is as a sensor and its configuration is to be permanent, misadjustments and human error in configuration are eliminated.

Properties

- Clearly structured
- Intuitive operation
- Simple module integration
- Automatic feasibility check for the configuration
- Processing of sensor information from external database (imc Sensors)
- Regulation of bus load
- Import from and export to TEDS



Universal applications, PC-configurable



With signal processor intelligence

Efficient system integration with COM™, .NET or LabVIEW™

In test stand and other dedicated test environments, system integration enables access to special measurement properties, measurement setup control, communication with outside devices and a specialized user interface.

The solution for such specialized needs is to develop custom test control or hardware interface software, ideally built on standard software components. The efficiency of the programming, long term supportability, and the speed at which a software project proceeds are the main issues. System maintenance updates and expansions should be made available at a rapid pace and low cost.

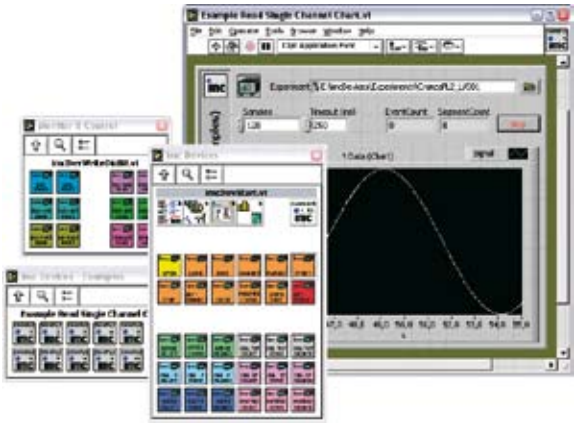
The CANSAS programming interface offers the ability to apply imc hardware and software functions very efficiently. The system integrator is always free to choose the programming language.

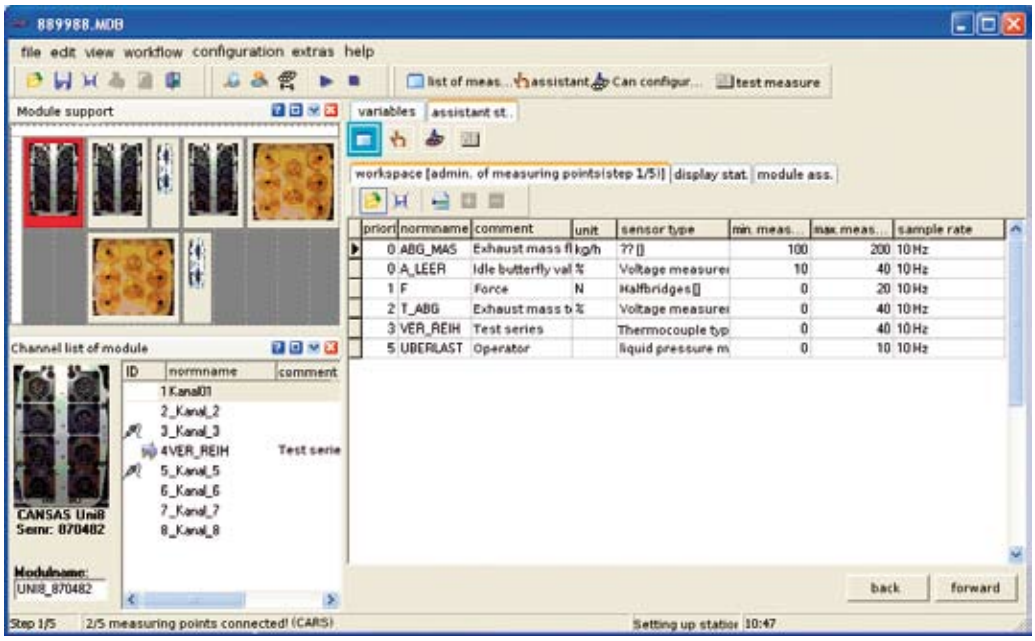
COM and .NET interface

This interface provides a class library having a remarkable range of functions tailored to the particular device being used. There is no restriction on the choice of programming languages. COM- and .NET-capable programming languages include Visual Basic, VB.NET, C++, C# etc.

LabView™ Interface

LabVIEW™ is a widely prevalent programming environment in measurement engineering. The user can appreciate the graphical programming language G™, because it uses syntax similar to circuit diagrams as well as functions packaged in VIs. imc offers a number of VIs and sample implementations which are directly accessible via the LabVIEW™ functions palette. With these VIs™, devices can be configured, started/ stopped, controlled (e.g. DAC, DO,...), and measurement data can be acquired.





An example of a customized CANSAS configuration project

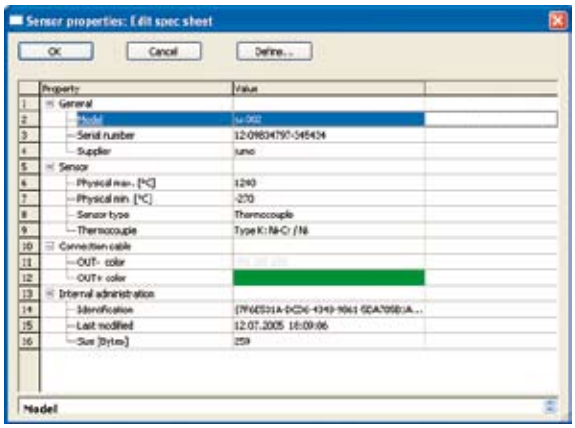
Plug & Measure – The logical consequence of the TEDS sensor recognition standards

Plug & Measure – Complex measurements as child's play

imc Plug & Measure is based on the TEDS technology set out in IEEE 1451.4. It fulfills the vision of quick and error-free measurement even by inexperienced users.

A TEDS sensor or a conventional sensor equipped with a sensor recognition memory unit is connected to the device. The sensor recognition contains a record of the sensor's calibration data and the measurement device settings.

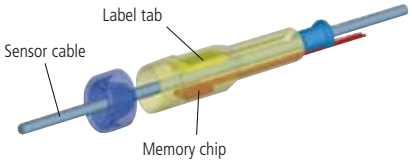
CANSAS reads this info and sets itself accordingly. In the future, an incorrectly measurement channel is then recognized automatically.



Excerpt of the description of a sensor connected at the measurement channel of a CANSAS-P8 module. The data are saved as XML texts in the TEDS and can be called at any time. Along with sensor-specific data, the required channel-specific data such as the sampling rate, are all recorded.

Particular advantages and applications

- Quick and error-free measurement setup
- Reduction of routine work
- Recordable measurement channel parameter recommendations (sampling rate, filter settings, etc.)
- Standardization of channel designations for particular sensors used
- Verification of calibration data and their validity
- Quick and unambiguous traceability of calibration data in compliance with ISO900X
- Monitoring of calibration intervals
- Measurement device-independent sensor administration



The solution in stand-alone or test cell administration of multiple sensors

Sensor administration database

In the storage, maintenance, and application of sensor information, the user is supported by imc Sensors – the sensor database from imc.

Along with the import of information from TEDS, parameter values can also be transferred from the sensor database to the device by means of Drag & Drop.

Via the measurement device software, sensor information can be transferred from the sensor database to the sensor recognition (TEDS) and vice versa.

For more extensive sensor administration, the sensor database supports barcode readers. imc Sensors makes the use and administration of many different sensors quick, easy and economical through the use of TEDS and imc Plug & Measure.

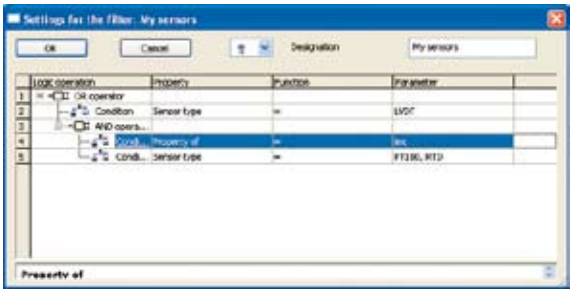
imc Sensors is a software expansion for CANSAS and imcDevices. But Plug & Measure also functions as a stand-alone application. imc Sensors is designed to make sensor data available, quickly and comprehensively.

imc Sensors makes it possible to:

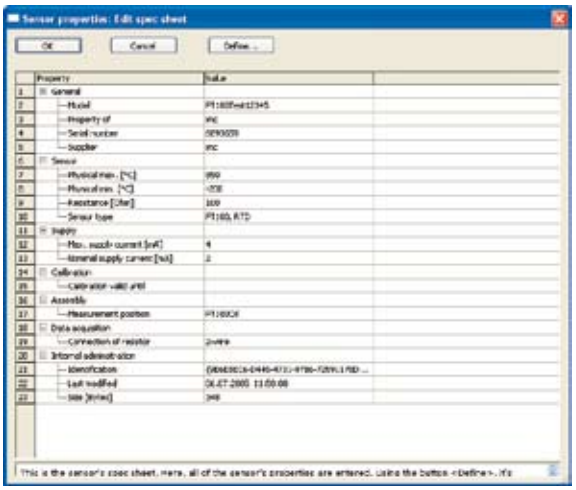
- administer sensors in a central database
- parameterize a CRONOS-PL or CANSAS channel
- trace the calibration history
- inspect the spec sheet

In conjunction with TEDS-capable measurement amplifiers for CRONOS-PL, imc Sensors supports modern TEDS sensors in accordance with IEEE 1451.4.

Especially appropriate for this purpose is the UNI-8 all-purpose amplifier, to which a wide variety of sensors can be connected directly.



Strain gauge rosette in the database



Properties dialog

All-in-one solution

✓✓ = especially suited
✓ = default
o = optional
– = not available

Universal measurement amplifier

CANSAS-Module Type / Description	UNI8	C8	CI8	SCI8	SC16	SCI16
	Multi-purpose and high-performance	High-precision temperature measurement	High-end, isolated measurement inputs	Economical, isolated measure-ment inputs	Multi-channel & cost-efficient	Economical, isolated measure-ment inputs
Channel count	8	8	8	8	16	16
U	✓	✓	✓	✓	✓	✓
I	✓	✓	✓	✓	✓	✓
Thermocouples	✓	✓✓	✓✓	✓	✓	✓
PT100	✓	✓✓	✓✓	✓	✓	✓
Strain gauges	✓	–	–	–	–	–
ICP	–	–	✓	–	–	–
Pressure (absolute, relative)	–	–	–	–	–	–
Sensor supply	✓	o	o	o	o	o
TEDS	✓	–	✓	✓	✓	✓
Voltage input ranges	±5 mV ... ±60 V	±5 mV ... ±60 V	±20 mV ... ±60 V	±100 mV ... ±60 V	±100m V ... ±60 V	±100m V ... ±60 V
Current input ranges	±1 mA ... ±50 mA	–	±10 mA, ±20 mA	±2 mA ... ±40 mA	±2 mA ... ±40 mA	±2 mA ... ±40 mA
Strain gauge input ranges	±0,5 mV/V ... ±1000 mV/V	–	–	–	–	–
Input coupling	differential	differential	isolated	isolated	differential	isolated
Bandwidth	190 Hz	20 Hz	440 Hz	42 Hz	28 Hz	23 Hz
Sampling frequency per channel	1 kHz	100 Hz	1 kHz	1 kHz	500 Hz	500 Hz
Noise voltage (RMS)	0.4 µV	51 nV	7.2 µV	5 µV	5 µV	5 µV
CANopen	–	–	✓	–	–	–

Digital Input/Output modules

	DO8R	DO16R	DO16	DI16
	8 Digital relay outputs	16 Digital relay outputs	16 Digital outputs for TTL & 24 V logic	16 Digitalinputs for TTL CMOS & 24 V logic
Output level	–	–	5 V (int. vers.) 30 V (ext. vers.)	–
Input level	–	–	–	TTL / CMOS or 24 V logic
Switching current	1 A @ 30 VDC (max) 0.3 A @ 125 VAC (max)	1 A @ 30 VDC (max) 0.3 A @ 125 VAC (max)	–	–
Switching power	30 W (max) 37.5 VA (max)	30 W (max) 37.5 VA (max)	–	–
Switching voltage	110 VDC 125 VAC	110 VDC 125 VAC	–	–
Response time	< 4 ms	< 4 ms	100 µs	–
Input / load current	–	–	–	max. 500 µA
Input- / output configuration	–	–	totem pole or open drain	differential
Sampling rate	–	–	–	10 kHz

Additional Specialized modules

PWM8
The output module CANSAS PWM8 generates pulse-width-modulated signals, either from values sent by the CAN-Bus, or from internally computed values. Pulsewidth-modulated signals of up to 10 kHz can be outputted with TTL-level (5 V), or using an external supply at up to 30 V.

DAC8
CANSAS DAC8 outputs the user's choice of current or voltage signals on 8 analog outputs. The desired output signals can either be extracted directly from a CAN message or derived from received CAN-messages or specified functions (e.g. squarewave, sawtooth etc.) by means of the module's computational capacities.

INC4
CANSAS-INC4 offers four differential channels for direct connection of all types of incremental and frequency output sensors. The switching threshold and hysteresis are configured by software. Event counting, time measurement or some combination of the two are used to derive quantities such as displacement, angle, event, time, frequency, velocity and RPM.

SUPPLY
Optional for many input modules and already built-in with CANSAS-UNI8 and CANSAS-DCB8: the sensor excitation module SUPPLY. This provides 7 output voltages ranging from +2.5 V ... +24 V, which can also be constructed with isolation, upon request. A bipolar output voltage of ±15 V is also available upon request. Thus, reliable supply of every kind of sensor is integrated with the module.

GPS-Signal Receiver – Processing GPS-data on the CAN-bus
With the help of a GPS system, additional analysis of measured data can be performed with processing of data on local conditions. The navigation data are captured and saved in synchronization with other measurement data.

Special applications

Special measurement amplifiers for bridge and pressure measurement

CANSAS modules Type / Description	DCB8	P8
	Economical, quasi-static bridge measurement	Absolute / relative pressure measurement
Channel count	8	8
U	✓	–
I	–	–
Thermocouples	–	–
PT100	–	–
Strain gauges	✓	–
ICP	–	–
Pressure (absolute, relative)	–	✓✓
Sensor supply	✓	–
TEDS	✓	✓
Voltage input ranges	±5 mV ... ±10 V	–
Pressure input ranges	–	0 ... +9 bar (rel.) 0 ... +10 bar (abs.)
Strain gauge input ranges	±0.5 mV/V ... ±1000 mV/V	–
Input coupling	differential	–
Bandwidth	220 Hz	–
Sampling frequency per channel	1 kHz	1 kHz
Noise voltage (RMS)	0.4 µV	1.2 mbar
CANopen	–	–

µ-CANSAS

µ-CANSAS-T1	µ-CANSAS-U1
Temperature measurement in extreme conditions	Voltage measurement in extreme conditions
1	1
–	✓
–	–
✓	–
–	–
–	–
–	–
–	–
–	✓
–	–
–	±100 mV … ±60 V
–	–
–	–
differential	differential
–	–
100 Hz	2 kHz
–	1 µV
✓	✓

Model- and connector varieties

Module type	Standard	Cassette	SL
CANSAS-L-DCB8	4 x DSUB-15 **	4 x DSUB-15 **	4 x DSUB-15 ** 8 x LEMO **
CANSAS-C8	2 x DSUB-15		
CANSAS-L-C8	2 x DSUB-15 *	2 x DSUB-15 * 8 x BNC 8 x Thermocouple K-socket ***	2 x DSUB-15 * 8 x LEMO *
CANSAS-L-CI8	2 x DSUB-15 *		2 x DSUB-15 * 8 x LEMO *
CANSAS-DAC8	2 x DSUB-15		
CANSAS-L-DAC8	2 x DSUB-15 8 x ITT Veam	2 x DSUB-15 8 x BNC 8 x ITT Veam	2 x DSUB-15 8 x LEMO
CANSAS-DI16	2 x DSUB-15		
CANSAS-L-DI16	2 x DSUB-15 8 x ITT Veam	Phoenix terminal strip	2 x DSUB-15 16 x LEMO
CANSAS-DO8R	2 x DSUB-15		
CANSAS-L-DO8R	8 x ITT Veam		2 x DSUB-15 8 x LEMO
CANSAS-L-DO16R	4 x DSUB-15	4 x DSUB-15	4 x DSUB-15 16 x LEMO
CANSAS-DO16	2 x DSUB-15	Phoenix terminal strip	2 x DSUB-15 16 x LEMO
CANSAS-INC4	2 x DSUB-15		
CANSAS-L-INC4	2 x DSUB-15 4 x ITT Veam	2 x DSUB-15	2 x DSUB-15 4 x LEMO
CANSAS-PWM8	2 x DSUB-15	2 x DSUB-15	2 x DSUB-15 8 x LEMO
CANSAS-L-P8	tube nipple terminal	tube nipple terminal	tube nipple terminal
CANSAS-SCI8/SCI16	2/4 x DSUB-15 *		
CANSAS-L-SCI8/SCI16	2/4 x DSUB-15 * 8/16 x 2-pin thermocouple K-socket ***	2/4 x DSUB-15 * 8/16 x BNC 8/16 x 2-pin thermocouple K-socket ***	2/4 x DSUB-15 * 8/16 x LEMO *
CANSAS-SC16	4 x DSUB-15		
CANSAS-L-SC16	4 x DSUB-15 * 16 x 2-pin thermocouple K-socket ***	4 x DSUB-15 *	4 x DSUB-15 * 16 x LEMO *
CANSAS-L-UNI8	4 x DSUB-15 ** 8 x ITT Veam **	4 x DSUB-15 ** 8 x ITT Veam **	4 x DSUB-15 ** 8 x LEMO **
GPS-Signal Receiver	2 x DSUB-9		2 x DSUB-15 2 x LEMO

* Sensor supply optionally available
** Sensor supply integrated into module
*** only for temperature measurement with Type K thermocouple

✓✓ = especially suited
✓ = default
o = optional
– = not available

Mobile CANSAS applications for in-vehicle measurements

One measurement system for both test stand and test drive

In few other industries is the time lag between concept and marketable product as short as in the automotive industry. The economic loss due to delayed market launch is incalculable. For this reason, all effort is directed to keeping the number of steps from the drawing board to serial production as small as possible. One of these steps is the necessary testing of prototypes, both on the road and in test stands. Test drives and test stations traditionally use different measurement equipment, specially adapted to the requirements of the respective setting. Incompatible raw data and long setup times in the vehicle (when switching between test drives and test cells) are an unfortunate consequence. Besides this, the test technician or engineer must have skill in two different measurement systems, which increases the likelihood of operator error and doubles the resources needed for training.

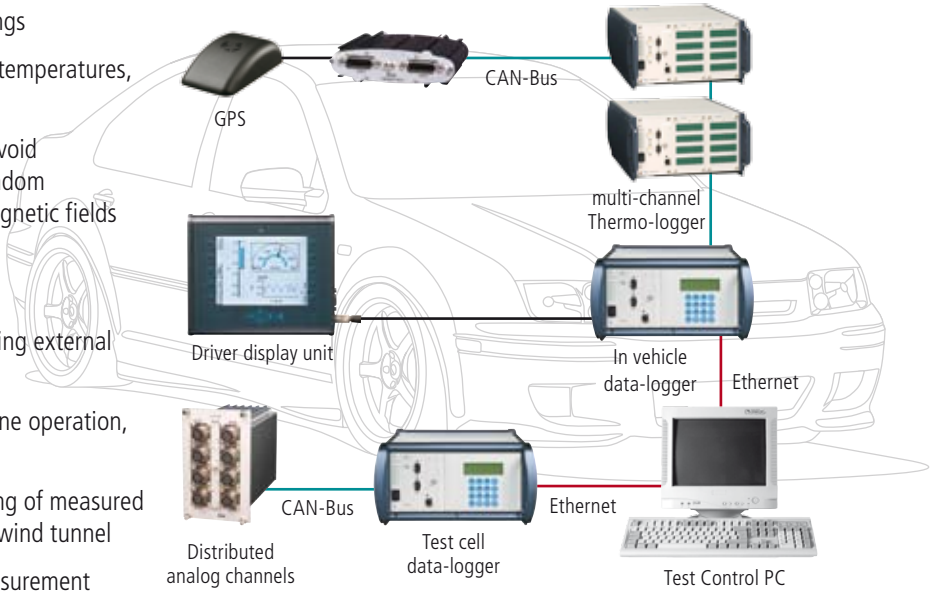
Test Demands

- Decentralized measurement setup within a vehicle
- PC-less operation in mobile settings
- Use of identical measurement equipment for both mobile and stationary settings
- Measurement of currents, voltages, temperatures, velocities, RPM etc.
- Isolated measurement channels to avoid in-vehicle interference caused by random grounding offsets and electric or magnetic fields
- Unlimited, modular integration of measurement channels
- Automatic and manual triggering using external display unit, by means of virtual bits
- Access to trigger values in stand-alone operation, using external display unit
- Freely-configured real-time processing of measured results in test drives and test cell or wind tunnel
- Requires minimal knowledge of measurement system to operate

Flexible measurement network with unlimited expandability

The solution for this kind of task involves a measurement network setup consisting of CANSAS modules in conjunction with data loggers of the CRONOS-PL or C-Series, or the Field-bus data logger busDAQ. The CANSAS modules are used for capture of any signals for which sampling rates of up to 2 kHz are sufficient.

In this case, CANSAS-CI8 modules, whose measurement amplifier channels are isolated, are recommended due to the undefined local ground potentials at the measurement locations. Measurement signals such as voltage, current, PT100, thermocouples and current-fed sensors (ICP) located at ground differentials of up to 300 V can be measured directly with the CANSAS-CI8. If further signals are to be measured which require channel sampling rates of up to 100 kHz, devices from the CRONOS-PL or C-Series are used. Their CAN-bus interface enables data to be captured in synchronization with the data from the CAN-bus, and can be saved on the user's choice of the internal Flash memory, any network drive and/or the PC. The connection to the PC is either via Ethernet or WLAN.



Decentralized CANSAS applications for rail and marine vessel testing

Diesel motor test stand – a high-speed and reliable decentralized measurement system

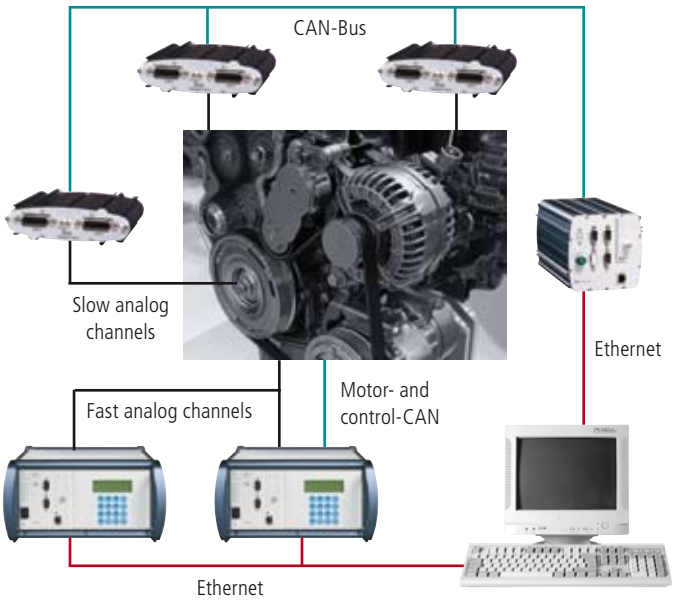
Measurement systems used in the fields of rail vehicles and shipping, such as test stations for diesel motors, must be highly flexible and versatile. The distances between the measurement sites dispersed around the train or ship mean that there is great expense involved with the cabling, and long setup times. To use analog measurement lines over these distances would not only incur great cost but would leave the measurement network vulnerable to interference and signal degradation. The measurement system for the diesel motor test station must meet the following requirements:

Test Demands

- Short setup times
- Protection from signal interference by means of short leads and placement of measurement modules near the sensors
- Synchronized storage of analog and CAN-bus signals
- Expansion to any number of measurement channels
- Isolated measurement channels to avoid in-vehicle interference caused by random grounding fluctuations
- Capture of signals from the test station's control units and the motor, as well as from external sites (e.g. installation for measurement of fuel or power consumption)
- Measurement of temperatures, pressures, forces, torques, RPMs, acceleration, flow rate, etc.
- Real-time calculation of online results such as instantaneous mechanical power
- Transmission of online results to the control unit

Synchronized data despite the use of the CAN-bus interface

In the measurement of slow signals, where channel sampling rates of up to 2 kHz are adequate, such as temperatures or flow rates, the advantages of CANSAS modules become clear. Their compact size enables them to be positioned near the measurement site, and their isolated measurement amplifier channels can be used even in locations with ground differentials of up to 300 V. High-speed measurement signals requiring channel sampling rates of up to 100 kHz, such as vibrations, noise or high-frequency voltages and currents, are also captured with devices from the CRONOS-PL series. Data from the CANSAS modules are captured and saved in synchronization with data from the data logger. For additional CAN-bus nodes and extra real-time calculation power, Field-bus data loggers from the busDAQ series can be used. With Online FAMOS, the data loggers' real-time computation tool, measured data from both the CAN-bus and the CRONOS-PL data loggers are processed online, and the results of the instantaneous values are transmitted to the test station's control unit.



CANSAS applications heavy manufacturing and industrial environments

Test facility for exhaust systems – centralized monitoring and control of all test stands

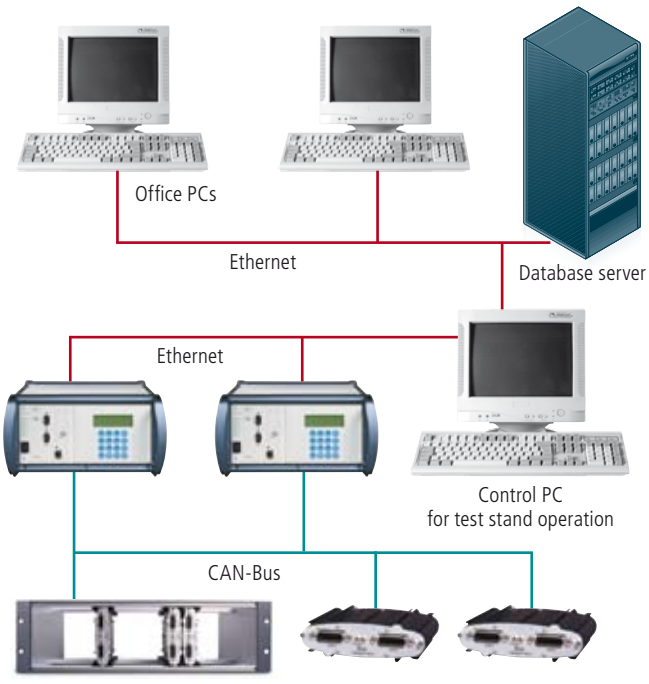
For a test facility where parallel tests, such as exhaust systems, are subjected to a variety of tests at different test stations, a modular measurement system is needed which can be easily monitored despite extending over a large area. If multiples test stations are running simultaneously, it is easy to lose track of individual modules and their current status. Especially in the large areas taken up by exhaust system test facilities, in which the main object is to monitor slowly changing temperature data for adherence to specified value boundaries, module malfunction may remain undetected for long periods. Besides being able to solve this problem, the equipment for the test facility must meet the following requirements.

Test Demands:

- Centralized monitoring of test stands
- Automation and capture of measured data in a single system
- Real-time control of the testing process
- Measurement of temperatures, pressures, RPM
- Value limit monitoring
- Uniform alarm system
- Rapid detection of module outages
- Freely defined real-time calculations, e.g. determination of exhaust temperature differentials, etc.
- Ease of operation and quick configuration
- Quick adoption of one test station's program by other test stations

The test facility's measurement system, which simplifies verification of measured values and which makes any changes in the exhaust system's behavior clearly identifiable quickly and easily, consists of CANSAS modules in combination with data loggers from the CRONOS-PL series.

All measurement quantities for which sampling rates of up to 1 kHz are sufficient, such as temperature and pressure, are captured using CANSAS-UNI8 modules. The CANSAS modules are often installed in 19'' module racks, for which the cassette model is specially designed. A module's position within the module rack is recognized automatically by the control PC.



CANSAS applications in test stations

Customized test stand software for modular expansion

Capture of measurement signals having sampling rates of up to 100 kHz, plus elements of the test station control, are handled by the measurement system CRONOS-PL. During testing, a digital signal processor performs the on-line computations as well as the control of the test process.

The testing procedure is governed by customized, modular test stand software, which can be expanded as desired with any amount of testing or analysis modules.

In automated operation, the test mechanisms run predefined RPM-profiles. Once the test object and test program have been selected, the measurement system is configured in accordance with the test program, the test object's profile and the channel connections are configured. Execution of the test program is performed in real-time within the CRONOS-PL unit.

Along with global specifications and the test routine, the test program also contains instructions on the quantities to be measured and data value limits to be monitored.

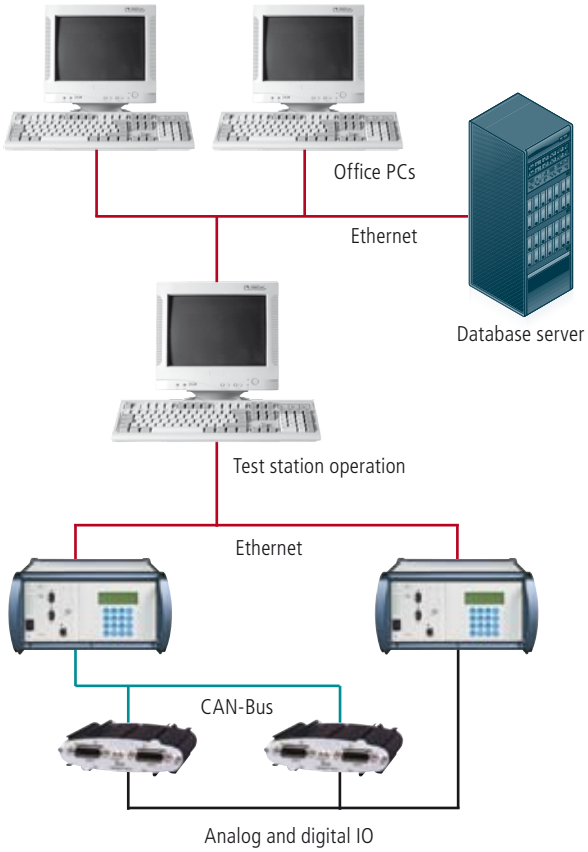
Module monitoring by means of the Heartbeat function

For reliable operation in test rig settings, the modules must constantly demonstrate that they are operational. Module failures must be detected quickly and the automation system notified.

For this purpose, CANSAS modules come with a **Heartbeat function**. The output modules for digital and analog quantities emit a cyclical signal on the CAN-Bus. Subordinate monitoring and automation system thus detect component failures and can respond appropriately.

Using the same technology, the modules can also monitor the overall automation system to which they belong.

If this system suffers an outage, the output modules are able to detect this and to go into a pre-defined standby state in response, in order to prevent the installation from any possible resulting problems. In sum, the combination of real-time control and automation capability, in conjunction with simultaneous capture of analog and digital signals both via the CAN-bus and directly from the data loggers, succeeds in meeting the high demands of the application.



Quality Service
Support – Training – Contract Measurements

High operational availability through adapted system maintenance

The purpose of our system maintenance is to optimize the operation of our products and thus to protect the value of your investment for years to come. Tailored system maintenance enables trouble-free operation at minimal cost.

Just start measuring

To obtain the best results at work, it's necessary to be well familiar with all of the measurement system's functions. The quickest way to achieve this is to order an official commissioning with system instruction along with your system purchase.

Standard, special and topical training sessions

New customers value our intensive introductory training sessions, and use them to save time and money. Experienced users appreciate our customized training sessions and specialized workshops on a wide range of measurement engineering topics.

And for cases of insufficient personnel or for tricky jobs…

Just call us and we'll send an experienced measurement technician to you.

Problems with the device, the software, or the testing application?

We maintain a competent and reliable Hotline for handling your problems. And if the problem can't be solved over the phone, we can attempt remote maintenance over the Internet, or will arrange an in-person service call.

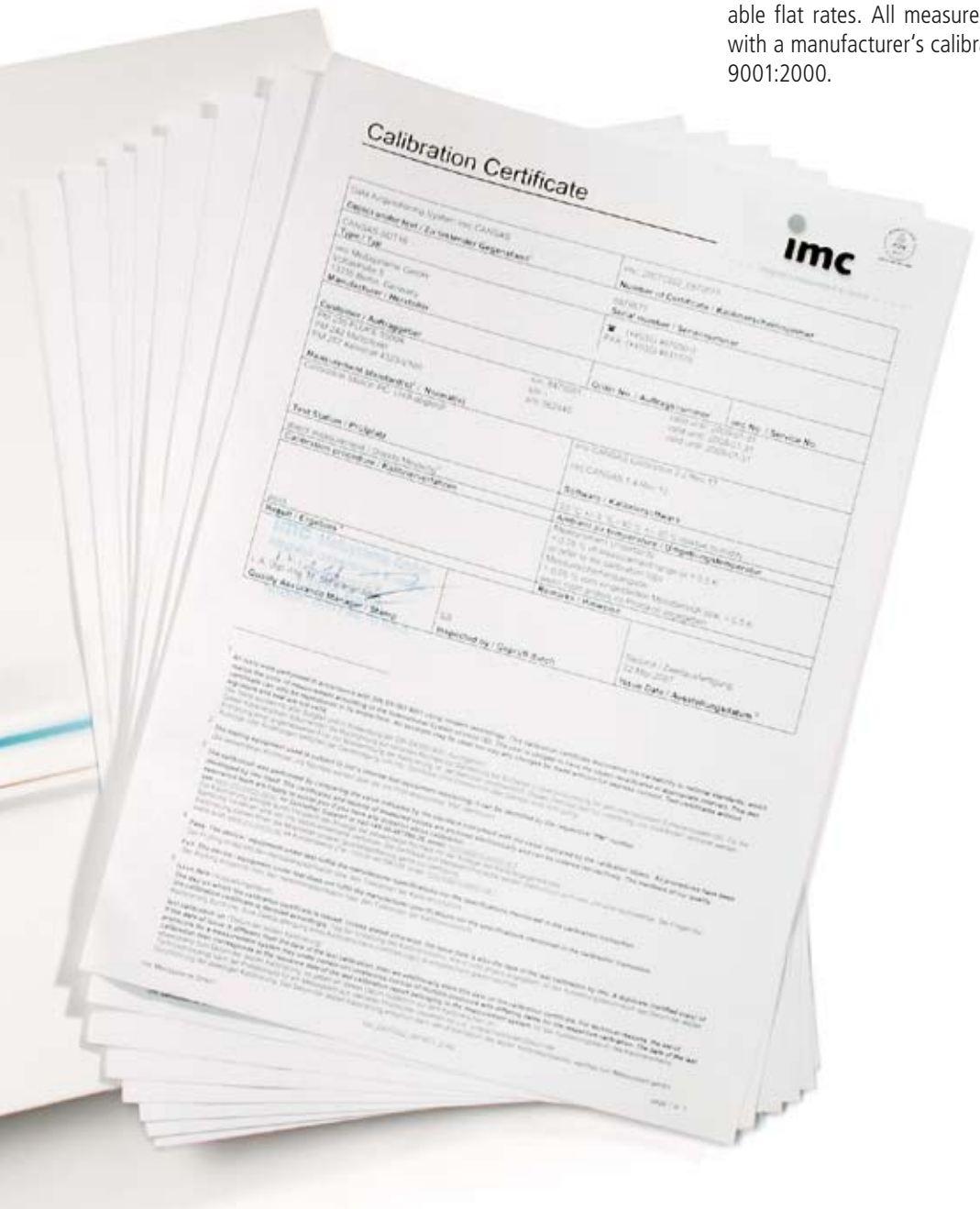
Freely selectable system maintenance components

- Commissioning
- System instruction
- System inspection
- System revision
- System update
- Guarantee extension
- Express repairs
- Remote maintenance
- On-site visits
- Training, and much more

Contact your local distributor for availability and pricing.

Calibration in the framework of measurement equipment monitoring

Test equipment monitoring, as per ISO 900X, requires regular calibration of all test equipment used. This calibration can be performed by the customer, by an accredited inspection laboratory or by the manufacturer. For greatest convenience, however, imc offers system inspections (including system maintenance and updates) at affordable flat rates. All measurement systems come standard with a manufacturer's calibration certificate as per EN ISO 9001:2000.



Quick Seminars and Training Sessions

Quick Seminars

In order to familiarize you with the amazing capabilities of the CANSAS, we offer practical, application-focused Quick Seminars. Owners and prospective buyers of the system receive news on current measurement technology topics in a relaxed setting. After 60 minutes of theory and 60 min of practice, there is ample time afterwards to exchange ideas and experience with our application specialists.

Our Quick Seminar topics:

- CANSAS modules in stationary and mobile settings
- System integration with LabView, COM and .NET
- Strain gauge measurement engineering

Training sessions

The only way to succeed under the time pressure facing the whole modern world is simply more know-how. Competent use of complex products is the key to more effective working and to success. High-quality training sessions are available to accompany users of our products from the initial commissioning all the way to the stage of using highly complex custom applications.

Working with CANSAS modules at the test station and in the lab

Starting with configuration of the modules, we go on the introduce the possibilities for integrating the modules into an automated system. Emphasis is placed on module functions regarding communication (Watchdog, Heartbeat), as well as installation and assembly of systems.

Working with CANSAS modules on board vehicles

Along with module configuration, we practice connecting the sensors to conform to the special conditions prevalent in mobile applications. Additionally, we explore techniques for saving time in the processes of setting parameters, connecting signals, and integrating the measurement equipment into the data acquisition system.

Analysis and presentation of measured data with imc FAMOS

Introduction to measurement data analysis, sequences and function applications. Learn the most important fundamentals for practical work with imc FAMOS.

Extracting measured data from the CAN-Bus

Here you will obtain an overview of the possibilities which the CAN-bus offers. The theoretical foundations are explained in depth and practiced on the basis of real-world examples.

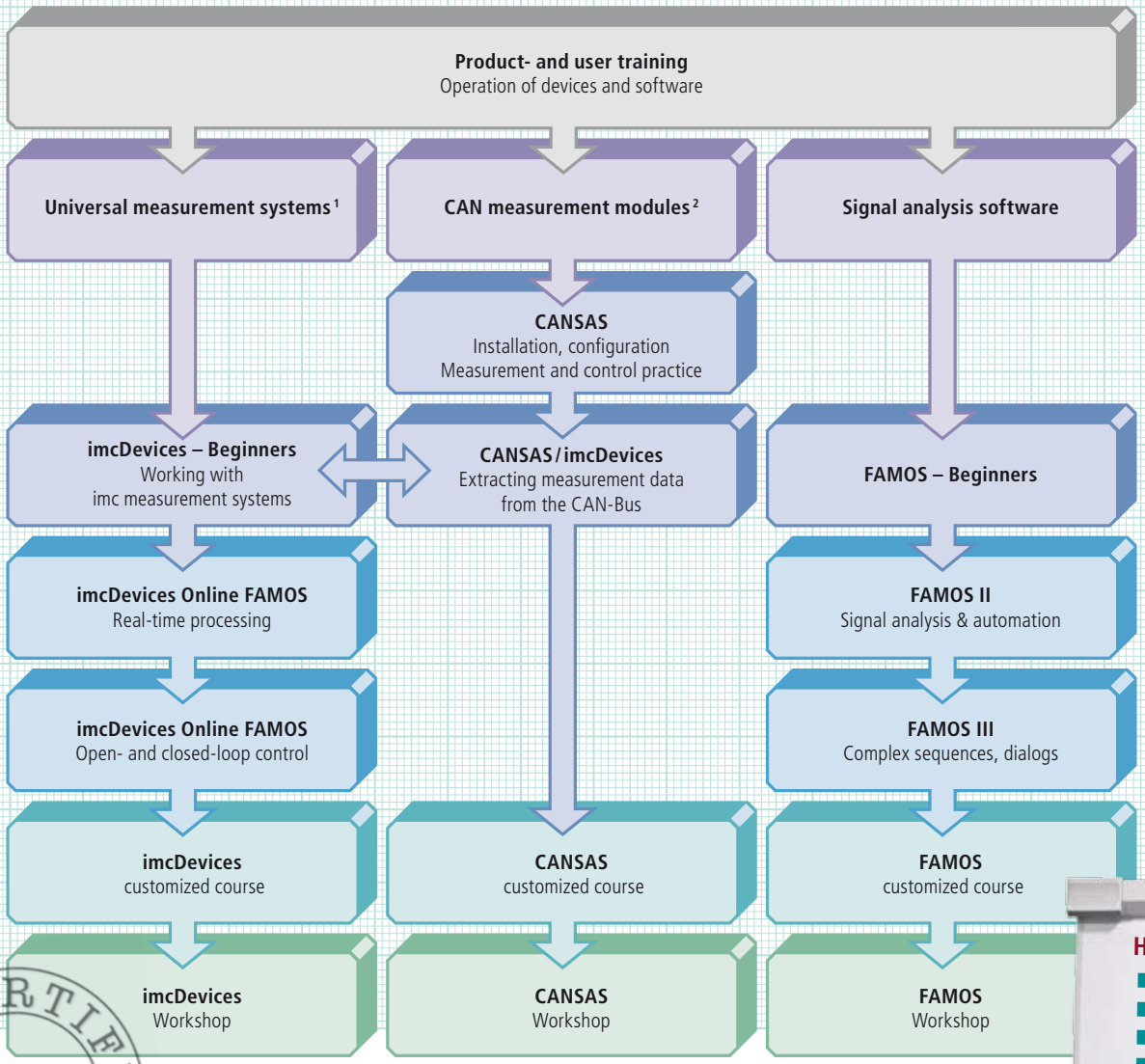
Personalized workshops

Besides our schedule of regular training programs taking place at Friedrichsdorf and Berlin, we can also offer tailored solutions which we design in special topical workshops together with you, on-location.

Training session dates

Product training sessions and sessions for beginners are held at regular intervals in Berlin and through worldwide partners.

For more information, contact your local imc partner.



Training Program Overview

One-day introductory session

- **For beginners or advanced users**
- **On-site or at our training facilities**

Application and operation of the imc products are practiced. The training sessions are conducted in small groups. Progress is ensured by the working of exercises and intensive coaching.

The aim of introductory training sessions is to gain familiarity with the basics rapidly.

More detailed and specialized skills are promoted in advanced training courses. A "train the trainer" course culminates with certification as an "imc Certified Trainer".

The course material is a proven, standardized program based on our trainers' many years of experience. This means that the training is consistently of high quality and is offered inexpensively.

Target participant

Technicians and engineers in the fields of R&D and testing, who use our products.

[1] All imc measurement systems are run with the uniform operating software imcDevices (CRONOS-PL, CRONOS-SL, C-Series, µ-MUSYCS, SPARTAN, busDAQ)
[2] The CANSAS measurement modules are run with the CANSAS configuration software

imc Meßsysteme GmbH
Voltastraße 5
D-13355 Berlin
Phone +49 (0) 30-46 70 90-0
Fax +49 (0) 30-4 63 15 76
E-Mail: hotline@imc-berlin.de
www.imc-berlin.com

integrated measurement & control