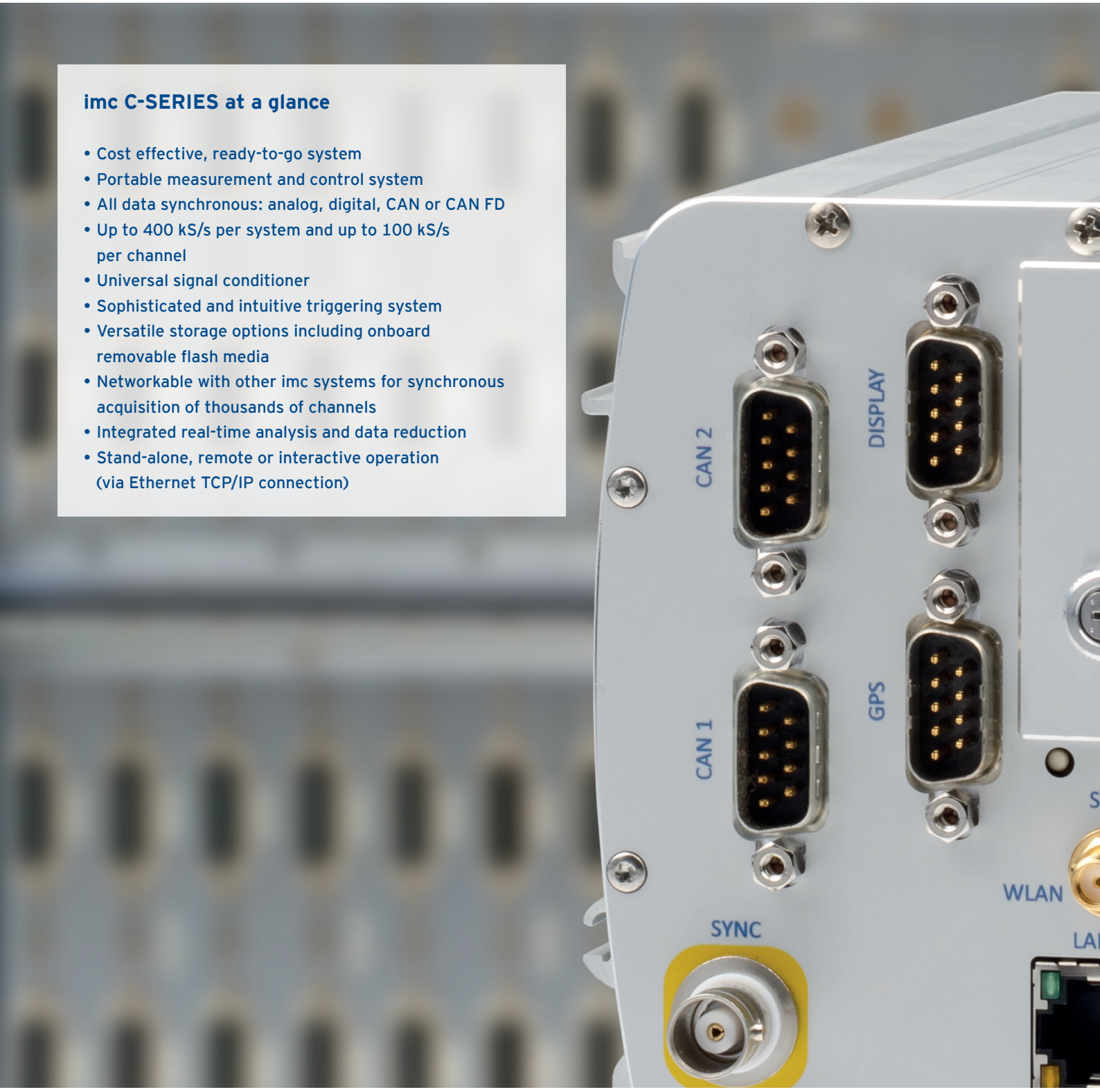
imc C-SERIES

complete • versatile • portable

Handy all-in-one data acquisition system for electromechanical testing

imc C-SERIES at a glance

- Cost effective, ready-to-go system
- Portable measurement and control system
- All data synchronous: analog, digital, CAN or CAN FD
- Up to 400 kS/s per system and up to 100 kS/s per channel
- Universal signal conditioner
- Sophisticated and intuitive triggering system
- Versatile storage options including onboard removable flash media
- Networkable with other imc systems for synchronous acquisition of thousands of channels
- Integrated real-time analysis and data reduction
- Stand-alone, remote or interactive operation (via Ethernet TCP/IP connection)



imc C-SERIES

Bring your test system wherever you need it

Sized to be easily portable, yet surprisingly versatile, the imc C-SERIES is also a powerhouse of capability: from the analog inputs with integrated signal conditioning, to the digital I/O, counter inputs, analog outputs, CAN FD I/O, and included real-time imc Online FAMOS data processing and control system – everything you need to set up a quick test is, literally, in the palm of your hand!

Regardless of where your testing takes you – from the field to the lab – the all-in-one concept of the imc C-SERIES systems means that you will always have everything you need at your fingertips. And since onboard flash storage gives you the freedom to run interactively or stand-alone, you can easily setup an overnight test and won't have to worry about leaving your laptop behind. Furthermore, the UPS battery backup ensures safe operations and data integrity, even if the power is less than reliable at your testing site. In-vehicle testing is also an area where the feature packed imc C-SERIES can really offer a boost to your testing productivity. Incorporating a synchronous, dual-node CAN I/O interface in the standard design, the CAN and CAN FD capabilities may be extended to include direct ECU communication, utilizing a variety of standardized ECU protocols, such as KWP 2000, CCP, OBD-2, etc.

When operated interactively, the imc C-SERIES systems utilize the imc STUDIO operating and configuration software. This not only gives you live measurement displays, but optionally provides full test stand automation capabilities, while ensuring compatibility with all other imc data acquisition systems.

While it may be small, don't let the size mislead you: the imc C-SERIES is packed with capability. Think of it as your multi-tool for the test and measurement world.

Voltage | Current | Temperature | Strain gauge | Frequency speed/angle | Digital input/output | IEPE/ICP acceleration | Audio | Analog output

CS version: up to 16 analog measurement inputs depending on model

CL version: up to 32 analog measurement inputs depending on model

Productive testing with imc C-SERIES

Portable design goes wherever you go

- All-in-one design ensures the essential I/O is always ready for your testing
- Integrated signal conditioning means the convenience of a one-box solution
- Supports all electromechanical sensors in mixed-signal measurements
- Software based configurations are easily stored, loaded, and modified to meet test demands

Maximize your test efficiency

- Real-time data processing while the test is running; so results are immediately available
- Intuitive trigger system stores only the important data for easier post-processing
- Easily switch between interactive, remote, or stand-alone operation as tests require
- Standardized hardware addresses all your testing needs

Saving your money

- Universal amplifiers incorporate signal conditioning for most sensors types, from static to highly dynamic measurements
- Synchronous recording of analog, digital and CAN-based signals in one system
- Future-proof: also supports the new fast CAN FD standard
- imc's unique breakout connectors provide quick connections for any existing sensor
- Supports sensor-based automatic sensor recognition, and add-on TEDS from imc
- Expandable via distributed synchronous CAN I/O modules

Gaining your independence

- Measurement and real-time control in one unit
- Portable design goes from field to test bench as your testing requires
- Stand-alone operation with the flip of a software switch when the PC cannot be used
- Includes power-up self-start and internal storage

Securing your investment

- Robust and reliable wide range DC power supply
- Guaranteed data integrity even upon power outage: integrated Super-Cap ensures safe termination of onboard storage
- Redundant data storage options: to local flash media in addition to parallel storage on PC or network drive (NAS)

In Practice

Troubleshooting even in the field

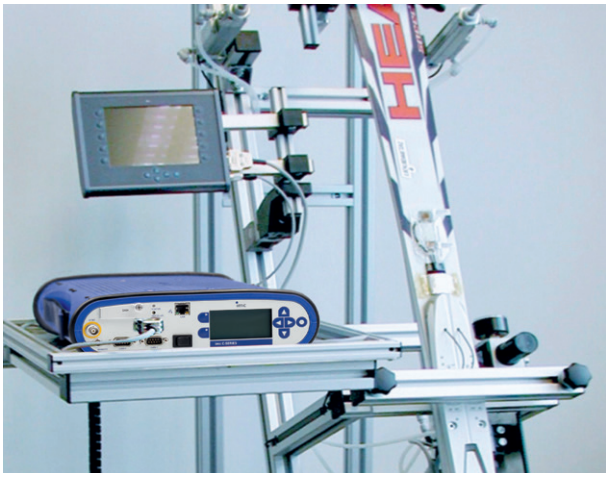
You never know quite what you're going to face when going into the field to diagnose a customer's concern. Troubleshooting is tough enough without also having to fight the limitations of your tools. That is why the imc C-SERIES systems are so ideally suited to tackling the unknown. "With a pocketful of sensors, I know my imc C-SERIES can connect quickly and easily to whatever I need to measure." The handy imc screw terminal connectors ensure that any connector is compatible. This is especially important when you are travelling away from home base for the troubleshooting work.

Goes places other systems cannot

High voltage vehicle testing can present its own unique challenges. "When testing the prototype of an electric train, we unexpectedly had to investigate vibrations on the 15 kV pantograph." But equipment isolated to this level isn't necessary. "By strapping the small imc C-SERIES and car battery directly to the pantograph, it could safely ride on this high potential and monitor a couple of strain gauges and accelerometers." After configuring the system via its integrated WLAN network link from a safe distance, it could perform the test run measurement autonomously, saving data to onboard flash memory.

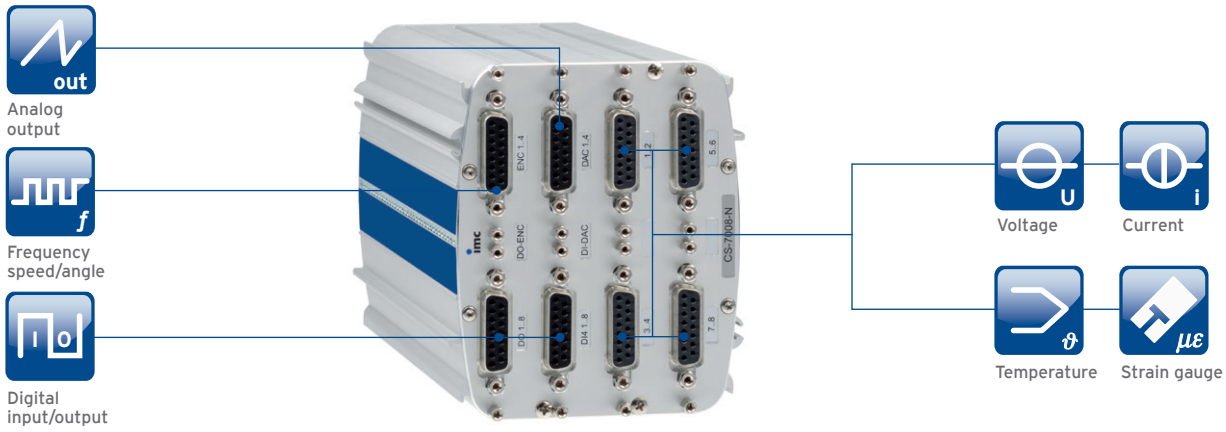
Integrated test bench automation

The small size of the imc C-SERIES hides the fact that this system is fully equipped for even the big jobs of test stand automation, thanks to its included real-time data processing and control capabilities. Structural and fatigue testing are common in a variety of fields, including the development of advanced downhill skis. "In this dynamic stress test, we could easily create a closed-loop simulation of a variety of extreme conditions, simultaneously collecting data from both the test actuators, load cells and a variety of strain gauges located across the ski's surface."

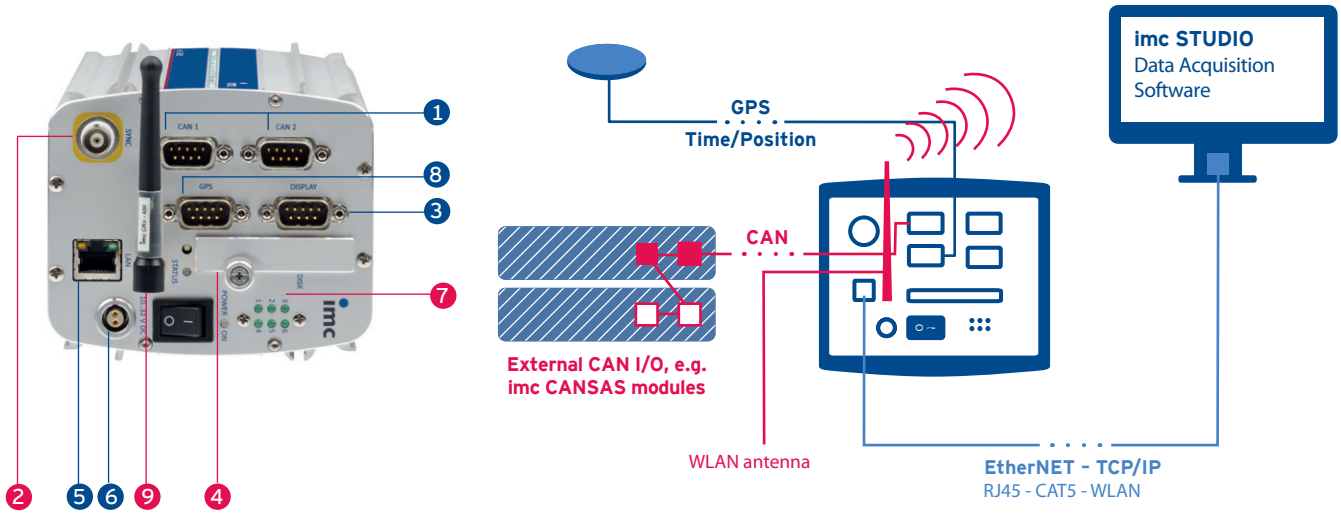


Handy all-in-one test system

imc C-SERIES CS front side: signal



imc C-SERIES CS back side: system



1 CAN-FD I/O for expansion and integration	6 Smart power supply for 9 – 32 VDC, with integrated short-term UPS
2 Directly synchronize multiple imc systems of any type, for virtually unlimited expansion	7 User configurable status LEDs
3 External handheld display connection	8 Direct input for GPS position / time sync
4 Onboard removable display connection (CS only)	9 WLAN connectivity
5 Ethernet connectivity	

Design Concept

imc C-SERIES architecture

The core of the imc C-SERIES systems is designed around the singular concept of putting everything you need into one place:

- TCP/IP Ethernet interface for system configuration and interactive data collection
- Onboard flash storage (CF card)
- Real-time signal processing and test control with imc Online FAMOS
- GPS (for time and/or position information) and external display connectivity
- Stand-alone startup and power-failure control logic

imc C-SERIES with plugs

Platform capability

imc C-SERIES is capable of a 400 kSample/s data collection rate. This acquisition rate is shared by the active channels in measurement, and is configurable on a per channel basis for up to two independent sample rates per system.

In addition, all imc C-SERIES systems are equipped with both a dual-node CAN-FD interface and imc's comprehensive multi-I/O, providing digital inputs, encoder/counter inputs, and both analog and digital outputs.

Models designed for effectiveness

With up to 100 kSample/s per channel, and integrated signal conditioning and sensor power supplies, the imc C-SERIES systems are up to the toughest data acquisition challenges. In addition to the universal CS-7008 and CL-7016 models, compatible with virtually every physical sensor and signal type, there are more imc C-SERIES derivative models to suit specific sensor types and applications. All systems not only integrate sensor signal conditioning, but also filtering and synchronous digitizing for up to 32 channels.

Real-time functionality at your fingertips

One of the core concepts of all imc data acquisition systems is integrated synchronous control: an extensive array of real-time functionalities, including both signal processing and control (feedback) loop management.

The imc C-SERIES, like the members of the imc CRONOS family, is well-suited to interact with the test environment, including discrete digital input and outputs (compatible with both TTL/5V and 24V logic), as well as analog outputs, and CAN-FD I/O.

Control signals and simple logic are often handled without the need for any programming, directly through imc's powerful trigger engine. The trigger logic capabilities are a standard part of all imc data acquisition systems, including the imc C-SERIES, and are easily accessed through the imc STUDIO configuration and operation software.

For advanced real-time analysis and control, imc Online FAMOS is included. This standard feature of the imc C-SERIES systems provides the capability of handling tasks ranging from basic statistical operations, such as min./max., average, and RMS, to more demanding calculations, such as FFT spectral analysis, signal classification (fatigue analysis), and order tracking. These virtual channels provide computed information on the fly, in real-time.

In addition, imc Online FAMOS extends the capability of your system to easily create PLC-like control functionality with minimal specialized knowledge and without requiring any skills of programming languages. This includes everything from basic digital I/O and open-loop control, to closed-loop PID control with analog, digital or CAN I/O satisfying hard real-time requirements.

One software for the entire testing process

imc STUDIO – the modular software for measurement, control and automation

Whether you want to use your imc C-SERIES in a „black box“ configuration for easy data acquisition, or you want to set up Live-Monitoring on hundreds of channels during prototype testing, or you want to create a complete test stand automation routine with its own control panel – with imc STUDIO, you have full control over the entire measurement process.

Configuration & measurement
imc STUDIO Setup

- Simple measurement device selection
- Clear configuration of all hardware settings
- Intelligent trigger machine
- Flexible, real-time calculations
- Structured project management

Visualization & displays
imc STUDIO Panel (Standard)

- Versatile imc Curve Window configurations (2D/3D)
- Display live video
- Freely customize control & display elements per drag & drop
- Create reports
- Data browser for navigating through large volumes of data

Testing sequences
imc STUDIO Sequencer

- Automation of test and evaluation procedures
- Configuration per Drag & Drop
- From sequence control to automated data evaluation and report creation
- imc FAMOS & MATLAB interface

User interface
imc STUDIO Panel (Professional)

- Intelligent instruments (Widgets) and control elements
- Individually customizable GUIs
- Additional application-oriented components for user interfaces
- Full-screen display
- User rights management

Test stand automation
imc STUDIO Automation

- Real-time automation platform
- Graphical design environment for test stands and test setups per Drag & Drop or notation
- imc hardware provides the necessary deterministic timing
- Threshold monitoring in the background

Efficient system integration

- Integration of DLLs
- Scripting engine (.Net)
- Integrated workbench
- Connection to 3rd-party devices
- Implement your own data-stream analysis
- LabVIEW interface (VI's)
- DIAdem interface

imc STUDIO Standard

imc STUDIO Professional

imc STUDIO Developer

Live data analysis
imc Online FAMOS / imc Inline FAMOS

- Analyze and calculate live data streams
- "Immediate results" during the running measurement
- Autarkic in the device (imc Online FAMOS)
- PC-based with scalable performance (imc Inline FAMOS)
- Simple syntax

Analysis & documentation
imc FAMOS

- Powerful data analysis and documentation
- Full range of pre-defined calculation functions
- Create multi-layer macros
- Create user-defined GUIs
- Control large amounts of data

Video integration
imc STUDIO Video

- Time-synchronized video and measurement data acquisition
- Pre-trigger function
- Up to 4 simultaneous video cameras
- 2 redundant channels per camera with independent sampling and trigger settings (monitor channels)

Webserver
imc REMOTE

- Configurable homepage for displaying and operating imc measurement devices
- Platform-independent device access with standard internet browser
- Web Design Wizard for creating individual web pages
- Supports https (SSL) for secure connection

Sensor management
imc SENSORS

- Management of any sensor
- Measurement channel configuration from sensor database per Drag & Drop
- Descriptions from TEDS

Remote Testing
imc LINK / imc WEBDEVICES

- Remote connection for imc measurement systems via WiFi or mobile radio
- Automatic measurement data transfer to the PC or server
- Automated evaluations
- GPS data on map background
- Turnkey solutions including IT and service

imc STUDIO Plug-In

Additional software

imc C-SERIES Details

imc C-SERIES housing types

	CS	CL
General		
Aggregate sampling rate	400 kSps	
Housing type	alu profile	portable polymer
Weight	2 kg	3.5 kg
Operating conditions		
Standard operating temp. range	●	●
Extended temp. range (incl. condensation)	○	○
Shock and vibration rating	MIL 810F (40g)	
Connectivity		
Ethernet	●	●
WLAN (WiFi) internal	○	○
GPS connection port	●	●
Display connection port	●	
Display integrated		●
Remote controlled main switch		●
Synchronization signal	BNC	BNC
Isolated SYNC signal	●	●
Programmable status feedback (LEDs)	●	
Data storage		
CF card slot (Compact Flash)	●	●
Storage on PC / network drive	●	●
Hard disk (internal)		○
Stand-alone capabilities		
PC independent complex trigger functionality	●	●
Onboard real-time data analysis (imc Online FAMOS)	●	●
Autarkic PC-less operation, self start	●	●
Synchronization & clock		
Master-Slave between different systems	●	●
NTP network based synchronization	●	●
Via external GPS signal	●	●
Via externem IRIG-B & DCF-77 signal	●	●
Field bus extensions		
CAN (2 nodes) incl. CAN FD (max. 8 MBaud)	●	●
Pulse counter and process control (digital I/O, analog out)		
8 bit digital in, 8 bit digital out	●	●
4 pulse counter (2 chan quadrature mode)	●	●
4 channel analog out (DAC)	●	●
Power supply		
DC input 10V to 32V	●	●
AC/DC adaptor (110 to 230VAC)	●	●
Data integrity upon power fail	●	●
Short-term UPS	Supercaps	NiMH
Automatic shutdown after power failure	1 s	30 s
Isolated power supply input		●
Software		
imc STUDIO test & measurement software	○	○
imc REMOTE WebServer	○	○

CS housing: front and backside

CL housing: front and backside

Key: ● standard, ○ optional

imc C-SERIES device models analog channels

	size		connector	speed		voltage mode				current		temp		ICP, supply			bridge mode		
device name	housing	channels	connectors	max.sampling rate (per channel)	signal bandwidth (-3dB)	isolated voltage mode	min. voltage range (mV)	voltage up to 10V	voltage up to 50/60V	20mA internal shunt	20mA shunt plug	thermocouple (TC)	RTD (PT100)	ICP mode integrated	ICP plug	sensor supply	full bridge	half bridge	quarter bridge
Voltage measurement				(Cx-1xxx)															
CS-1016	S	16	DSUB-15	20 kHz	6.6 kHz		250	●			●				○	○			
CS-1208	S	8	DSUB-15	100 kHz	48 kHz		5	●	●		●				○	○			
Voltage & temperature measurement				(Cx-41xx)															
CS-4108	S	8	DSUB-15	100 kHz	11 kHz	●	50	●	●		●	●	●		○	○			
CL-4124	L	24	DSUB-15	100 kHz	11 kHz	●	50	●	●		●	●	●		○	○			
Audio & vibration				(Cx-30xx)															
CS-3008	S	8	BNC	100 kHz	48 kHz		5	●	●					●					
Bridge & strain gauge				(Cx-50xx)															
CS-5008	S	8	DSUB-15	100 kHz	5 kHz		5	●		●	●				○	●	●	●	●
CL-5016	L	16	DSUB-15	100 kHz	5 kHz		5	●		●	●				○	●	●	●	●
For universal use				(Cx-70xx)															
CS-7008	S	8	DSUB-15	100 kHz	48 kHz		5	●	●	●	●	●	●		○	●	●	●	●
CL-7016	L	16	DSUB-15	100 kHz	48 kHz		5	●	●	●	●	●	●		○	●	●	●	●

imc C-SERIES software options

	Features	Licensing	
Software product	Functionality	License model	inclu-ded
Operating software			
imc STUDIO Standard	Operating software, integrated test & measurement suite	PC	○
imc STUDIO Professional / Developer	Customized operation, scripting, application development	PC	○
imc SENSORS	Sensor data base	PC	○
Real-time data analysis			
imc Online FAMOS	Real-time calculations, "immediate results"	Device	●
imc Online FAMOS Professional	Real-time control extensions, PID control etc.	Device	○
imc Online FAMOS Kits	Class counting (fatigue analysis), order tracking	Device	○
Post processing			
imc FAMOS Reader	Data visualization	PC	●
imc FAMOS Standard / Professional / Enterprise	Data visualization, analysis, reporting, scripting	PC	○
Remote access			
imc LINK	Remote device access, automatic data transfer	PC	○
imc REMOTE	Web Server, secure https device access	Device	○
CAN			
Vector data base	Vector data base	Device	○
ECU protocols	ECU protocol support (KWP 2000, CCP, OBD-2) for CAN interface	Device	○
Development			
LabVIEW™ VI's	LabVIEW VI components		●
imc API	.net programming interface	PC	○

TEDS support
(Transducer Electronic Data Sheet)
imc C-SERIES supports direct read/write of TEDS sensors, including imc's TEDS Clip.

Connectors: TEDS interfaces require the ACC/DSUB-TEDS-x variants of our connectors.
"IEPE" type TEDS is supported in audio modules with direct BNC input connectors.

Digital I/O
galvanically isolated,
configurable to 24V/5V (TTL/CMOS)
Level, output: 0.7A sink, high current: sink and source 0.7A

Pulse counter
full analog input conditioning:
500 kHz analog bandwidth, differential input, analog filter, software adjustable threshold levels
Modes: event counter, time, frequency, speed, RPM, differential and absolute angle and displacement

DSUB-15 screw terminal plug

Expansion plug for IEPE/ICP

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