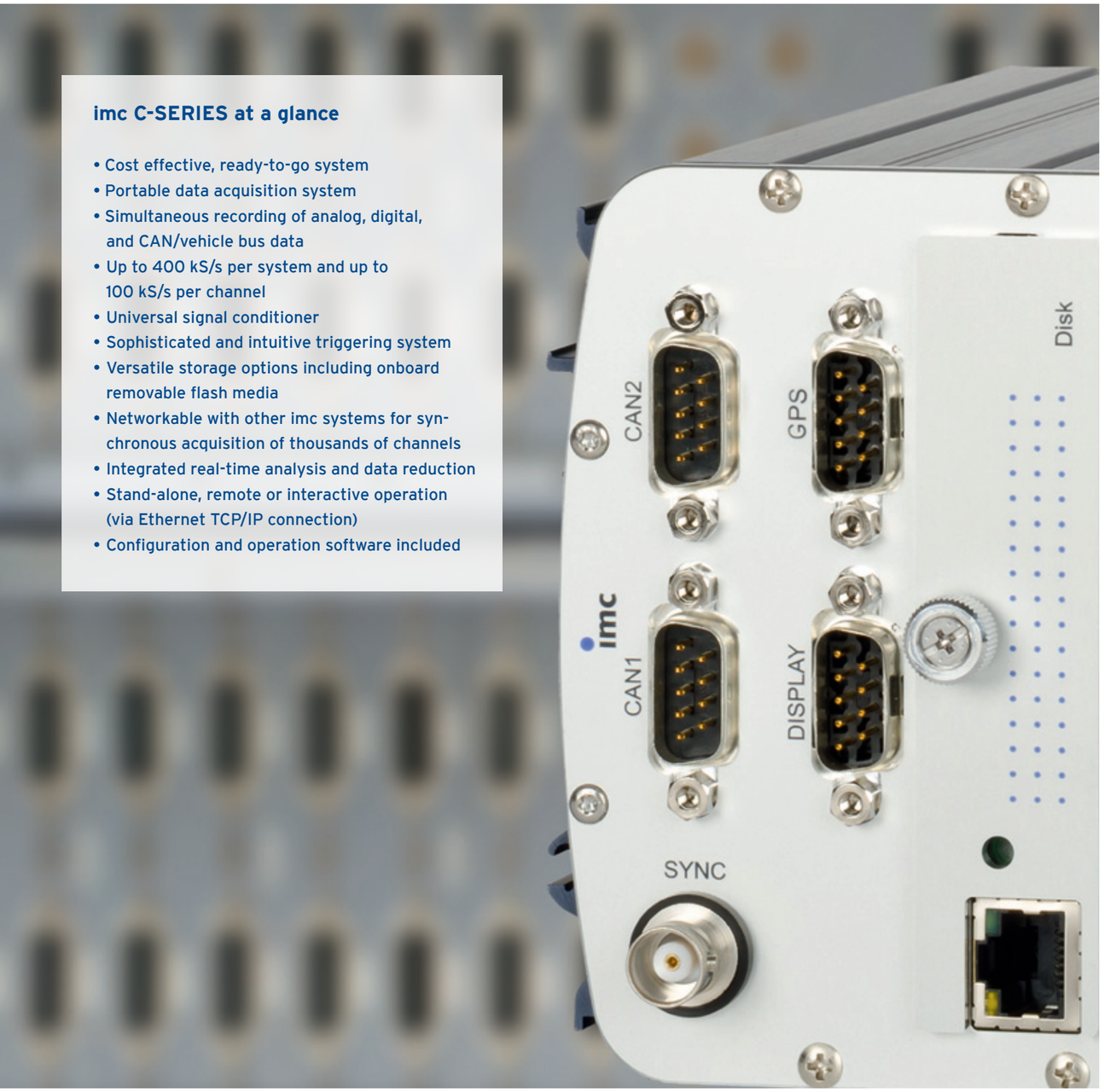
imc C-SERIES

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 data acquisition system
- Simultaneous recording of analog, digital, and CAN/vehicle bus data
- 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)
- Configuration and operation software included

imc C-SERIES

Bring your test system wherever you need it

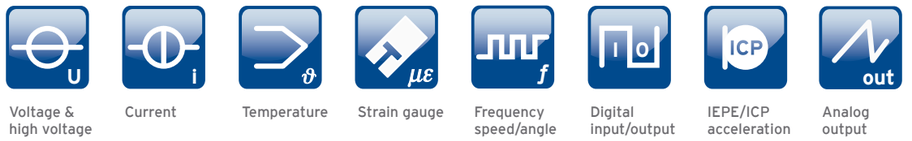
Sized to be easily portable, yet surprisingly versatile, the imc C-SERIES is also a powerhouse of capability: from the analog inputs with integrated signal conditioning, to the digital I/O, counter inputs, analog outputs, CAN I/O, and included real-time imc Online FAMOS data processing and control system – 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, 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 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, included with every system. 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 & high voltage | Current | Temperature | Strain gauge | Frequency speed/angle | Digital input/output | IEPE/ICP acceleration | Analog output

CS version: up to 8 analog measurement inputs depending on model

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

When size is a key factor

What do you do when you aren't sure what you will be measuring tomorrow? Every day, test engineers are called on to measure, monitor, record and process data. Sometimes the testing is well planned out in advance; and other times it has to be figured out along the way.

This is why many test engineers around the world turn to the imc C-SERIES universal data acquisition system. Its compact design and all-in-one approach, combined with the included configuration and operation environment imc STUDIO, are benefical for a wide range of applications, such as vehicle testing, civil engineering or in aerospace and aviation.

Most common sensors available for mechanical and electromechanical measurements may be directly connected to the imc C-SERIES system, with universal support for simultaneous use of voltage, acceleration, temperature, and strain gauge sensors, plus incremental encoders, digital I/O and CAN signals.

Giving you control

But the imc C-SERIES is more than just 8 – 32 analog inputs: with 4 built-in inputs for pulse counter/encoder signals, including quadrature encoders, plus 8 digital level inputs, and 2 independent, synchronous CAN interfaces, the imc C-SERIES easily replaces several discrete external devices.

The design also gives you test control capability, without needing an extra control system. Extensive triggering and real-time process control including closed-loop PID controllers, plus 4 analog outputs, standard within the system, are integrated. User level control is provided through the included imc STUDIO software for interactive display, test sequencing and even complete automation.

For a quarter century, imc has been on the leading edge of advances in mechanical test and measurement, persistently adapting and updating to the changing demands of test engineers. As our most portable universal product, the imc C-SERIES represents the ideal system for quick tests, field or diagnostic work, and simply goes where larger systems cannot go.

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 multi-channel, 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
- 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

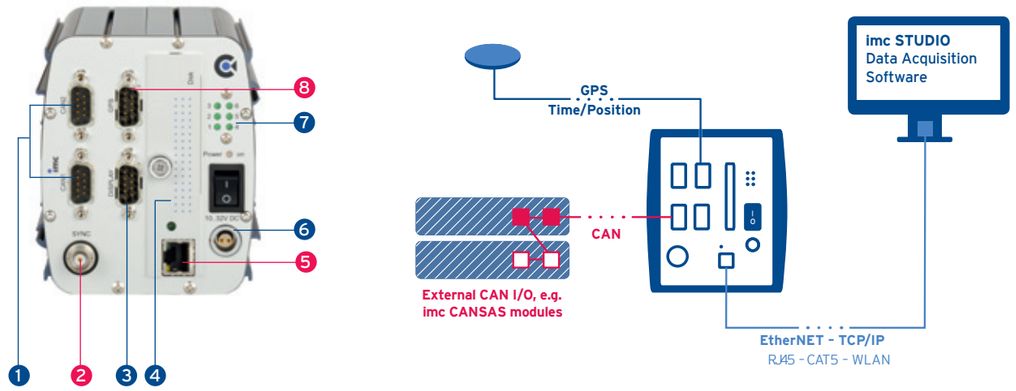
Securing your investment

- Robust power supply with backup power for uninterrupted operation
- Reliable operation assures data integrity
- Redundant data storage to local drive in parallel with network storage

Handy all-in-one test system

imc C-SERIES CS front side: signal

imc C-SERIES CS back side: system



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

In Practice

Troubleshooting even in the field

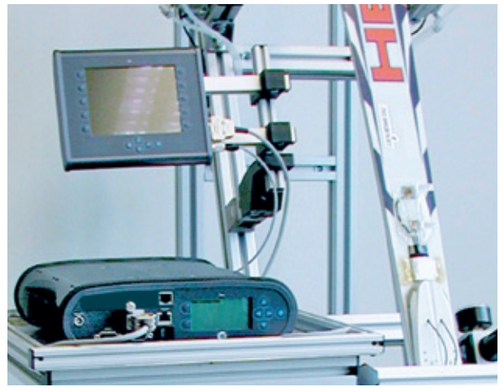
You never know quite what you're going to face when going into the field to diagnose a customer's concern. Troubleshooting is tough enough without also having to fight the limitations of your tools. That is why the imc C-SERIES systems are so ideally suited to tackling the unknown. "With a pocketful 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.

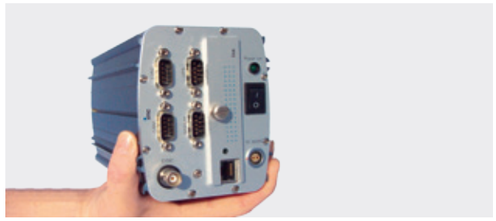
Integrated test bench automation

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."



Powerful capabilities you take everywhere
The imc C-SERIES is far more than just portable; it is simply the most capable integrated system you can buy in a portable form factor.

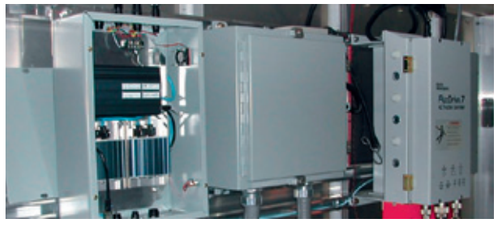
With up to 100 kSamples/s per channel at your disposal, universal signal conditioners, and a system total 400 kSamples/s capture capability, even the most dynamic of mechanical and electromechanical signals can be easily captured by your imc C-SERIES system.



In-vehicle solutions
With its modest size, integrated conditioners, GPS time/position and wide-range DC power inputs, the imc C-SERIES systems are ideal for in-vehicle testing. In addition, the integrated CAN with optional ECU I/O provides a seamless way to synchronously record everything within a vehicle.

From automobiles to motorcycles, trucks to airliners – any testing program where size and simplicity of installation matter will benefit from the imc C-SERIES.

Plus, imc C-SERIES systems are easily expandable with distributed imc CANSAS modules. This provides a great way of integrating huge numbers of analog inputs into even the tightest spaces.



Field diagnostics
The toughest challenge for test engineers is testing in the field, especially diagnostic and troubleshooting work. However, the imc C-SERIES with universal amplifiers is perfectly suited for such tasks. Supporting virtually any type of sensor on each of its 8 or 16 analog inputs, there's no need to bring along extra conditioners. Furthermore, with extensive real-time processing, triggering, and equipped for interactive or stand-alone operations, even stubborn intermittent problems can be easily solved.

imc STUDIO software environment
The imc C-SERIES is operated by imc STUDIO – the same intuitive software users know from all other imc data acquisition systems.

Whether preparing a system for stand-alone "black box" in-vehicle operation; monitoring live analog and CAN signals for a prototype evaluation; or providing a complete operator panel interface for test stand control, imc STUDIO is the versatile, scalable solution that allows you to design, control, manage and automate your entire test and measurement workflow.

imc STUDIO offers a number of different user levels, adapting the user experience to varying skills and working situations. In addition, imc STUDIO integrates with other imc software environments, including imc FAMOS for analysis and imc LINK for remote data management.

For more information on imc STUDIO, refer to www.imc-studio.com

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 and optional hard drive data storage
- 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

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 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, there is an imc C-SERIES derivative model compatible with virtually every physical sensor and signal type. 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 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 included imc STUDIO configuration and operation software.

For advanced real-time analysis and control, imc Online FAMOS is included. Optional on other imc systems, 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.

imc C-SERIES Details

Key: ● Default, ○ Optional, (●) Restricted, (★) In preparation

imc C-SERIES housing types

	CS	CL
General		
Aggregate sampling rate	400 kSps	
Housing type	alu profile	portable plastic
Weight	1.8 kg	3.5 kg
Operating conditions		
Standard operating temp. range	●	●
Extended temp. range (incl. condensation)	○	○
Shock and vibration rating	MIL 810F (40g)	
Connectivity		
Ethernet	●	●
W-LAN (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 (timer, absolute time)	●	●
Synchronization & clock		
Master-slave between different imc systems	●	●
NTP network based synchronization	●	●
Via external GPS signal	●	●
Via external IRIG-B & DCF-77 signal	●	●
Field bus extensions		
CAN (2 nodes)	●	●
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	●	●
UPS	●	●
Automatic shutdown after power failure	1 s	30 s
Isolated power supply input	●	●
Software		
imc STUDIO Standard included	●	●
imc REMOTE WebServer	○	○

CS housing

CL housing

CS housing

CL housing

imc C-SERIES device models analog channels

	size		connector	speed		voltage mode				current		temp		ICP, charge, 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 10 V	voltage up to 50 / 60 V	voltage up to 1000 V	20 mA internal shunt	20mA shunt plug	Thermocouple (TC)	RTD (PT100)	ICP mode integrated	ICP plug	Charge plug	sensor supply	full bridge	half bridge	quarter bridge	DC excitation	AC excitation (CF)	single SENSE	double SENSE
Voltage measurement				(Cx-1xxx)																					
CS-1016	S	16	DSUB-15	20 kHz	6.6 kHz		250	●				●				○		○							
CL-1032	L	32	DSUB-15	20 kHz	6.6 kHz		250	●				●				○		○							
CS-1208	S	8	DSUB-15	100 kHz	48 kHz		5	●	●			●				○	(★)	○							
CL-1224	L	24	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	●	●			●	●	●		○	(★)	○							
Power measurement (600V CAT III)				(Cx-21xx)																					
CL-2108	L	4	Banana	100 kHz	14 kHz	●	2,500	●	●	●															
		4	Terminal blocks			●	250	(●)																	
Audio & vibration measurements				(Cx-30xx)																					
CS-3008	S	8	BNC	100 kHz	48 kHz		5	●	●						●										
CL-3016	L	16	BNC	100 kHz	48 kHz		5	●	●						●										
CL-3024	L	24	BNC	100 kHz	48 kHz		5	●	●						●										
Noise & vibration (imc WAVE)				(Cx-80xx)																					
CS-8008	S	8	BNC	50 kHz	22.4 kHz		25	●	●						●										
Bridge & strain gauge measurements				(Cx-50xx, Cx-60xx)																					
CS-5008	S	8	DSUB-15	100 kHz	5 kHz		5	●			●	●				○	○	●	●	●	●	●		●	
CL-5016	L	16	DSUB-15	100 kHz	5 kHz		5	●			●	●				○	○	●	●	●	●	●		●	
CX-5032	X	32	DSUB-15	100 kHz	5 kHz		5	●			●	●				○	○	●	●	●	●	●		●	
CS-6004	S	4	DSUB-15	20 kHz	8.6 kHz		5	●	●			●				○	○	(●)	●	●	●	●	●	●	●
CL-6012	L	12	DSUB-15	20 kHz	8.6 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	included
Operating software			
imc STUDIO Standard	Operating software, integrated test & measurement suite	PC	●
imc STUDIO Professional / Developer	Customized operation, scripting, application development	PC	○
imc DEVICES	Alternative operating software	Device	●
imc CANSAS	In-situ configuration of imc CANSAS modules		●
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 visualisation	PC	●
imc FAMOS Standard / Professional / Enterprise	Data visualisation, 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 database	Vector database interface	Device	○
ECU protocols	ECU protocol support (KWP 2000, CCP, OBD-2) for CAN interface	Device	○
Noise and vibration analysis			
imc WAVE	Complete noise and vibration workstation (esp. for CS-8008)	PC	○
Power quality analysis			
imc POLARES	Complete power quality package (EN 50160, esp. for CL-2108)	PC	○
Development			
LabView™ VI's	LabView VI components		●
imc COM	ActiveX programming interface (API)	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 either the ACC/DSUBTEDS-x variants of our connectors or per-channel connectors such as Lemo. "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

imc Meßsysteme GmbH
Voltastraße 5
13355 Berlin
Germany

Tel.: +49 (0)30-46 70 90 26
Fax: +49 (0)30-463 15 76
hotline@imc-berlin.de
www.imc-berlin.com
www.imc-berlin.com/distributors