

imc SPARTAN

configurable • conditioned • capable



Beyond logging to active monitoring, from the lab to the field



imc SPARTAN at a glance

- Cost effective solution goes beyond logging
- Isolated temperature and voltage/current, plus bridge/strain gauge options
- Multiple sample rates and synchronous data processing
- Simultaneous recording of analog, digital, and fieldbus/vehicle bus (e.g., CAN) data
- Up to 500 S/s per channel
- 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 capabilities for analysis, data reduction and control
- Stand-alone, remote or interactive operation (via Ethernet TCP/IP connection)
- Comprehensive configuration and operation software

imc SPARTAN

Mixed signal testing demands more than just logging

Designed for test engineers, imc SPARTAN integrates many of the elements that are frequently used in conjunction with data loggers to create a complete test platform.

Going beyond data logging means that you have immediate access to integrated signal conditioning, multiple sample rates and trigger conditions, and real-time calculations for synchronous virtual channels.

With its simplified setup and ease of use, imc SPARTAN is ideal across all user levels. By providing an integrated solution with comprehensive provisions, it eliminates the challenges of interfacing and maintaining multiple incompatible systems.

With up to 500 Samples/second per channel, imc SPARTAN offers a dynamic range, well-suited for most physical and mechanical signals. In addition, integrated filtering ensures that high-frequency electrical noise does not interfere with your measurements.

But high quality, precision inputs are only the beginning. The imc SPARTAN system provides onboard storage and stand-alone operations, including integrated backup power and auto-start capability for unattended operations and long-duration measurements.

The optional real-time processing and control capabilities offer yet another time-saving integrated option in the imc SPARTAN system. Ideal for long-duration, autonomous testing, results may be calculated immediately, with a variety of options for measurement dependent output signals, including full implementation of PID control loops.

When operated interactively, imc SPARTAN utilizes 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.

imc SPARTAN - a proven measurement system for a wide range of applications



When options matter

One of the constants of the world of test and measurement is the ever present need for more data: more measurement channels; more testing modes and conditions; more samples.

Fortunately, you can rely on imc SPARTAN - a single system that integrates more capabilities - to take your testing from simple logging, all the way to automated test systems incorporating voltage, temperature, and strain gauge sensors, pulse counters and incremental encoders, digital I/O and CAN signals.

The imc SPARTAN system is constructed to meet your specification. The mainframe system including the base control unit is available in a number of different housing sizes and types. One or more I/O options may be selected when ordering, including a variety of isolated and non-isolated analog inputs, the multi-I/O interface incorporating digital I/O, encoder/counter inputs and analog outputs, as well as optional CAN and field bus interfaces.

Whatever your testing environment requires, imc SPARTAN is designed to give you the options you need.



Giving you control

The design of imc SPARTAN takes you beyond the confines of simple data loggers; this system also gives you test control capability - without the need for an extra control system. Extensive triggering and optional real-time process control, including closed-loop PID controllers, plus optional analog outputs, are integrated into the system with user level control through the imc STUDIO software for interactive display, test sequencing and even complete automation.

And since control is integral to all imc SPARTAN systems, synchronization of all measurement channels, processing and control signals is assured.

For a quarter century, imc has been on the leading edge of advances in mechanical test and measurement technology, continuously adapting to the changing demands on the testing engineer. As our most cost-effective multi-purpose system, imc SPARTAN takes you beyond data logging to a whole new world of integrated test and measurement, and testing productivity.



Productive testing with imc SPARTAN



Integrated conditioners are always ready to go

- Integrated signal conditioning offers the convenience of a one-box solution
- Support for all standard process sensors, including temperature (thermocouple, PT100), voltage, current loop (4 - 20 mA), and measurement bridges / strain gauges (full, half and quarter bridge)
- All-in-one design ensures the essential I/O is always ready for your testing
- Software-based configurations are easily stored, loaded and modified to meet 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 your test requires
- Fast transition between measurement setups



Saving your money with a comprehensive solution

- Integrated amplifiers provide a complete solution, incorporating signal conditioning, filtering and digitizers for most static and 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 automatic sensor recognition, and add-on TEDS from imc
- Expandable via distributed synchronous CAN-based measurement modules



Gaining your independence

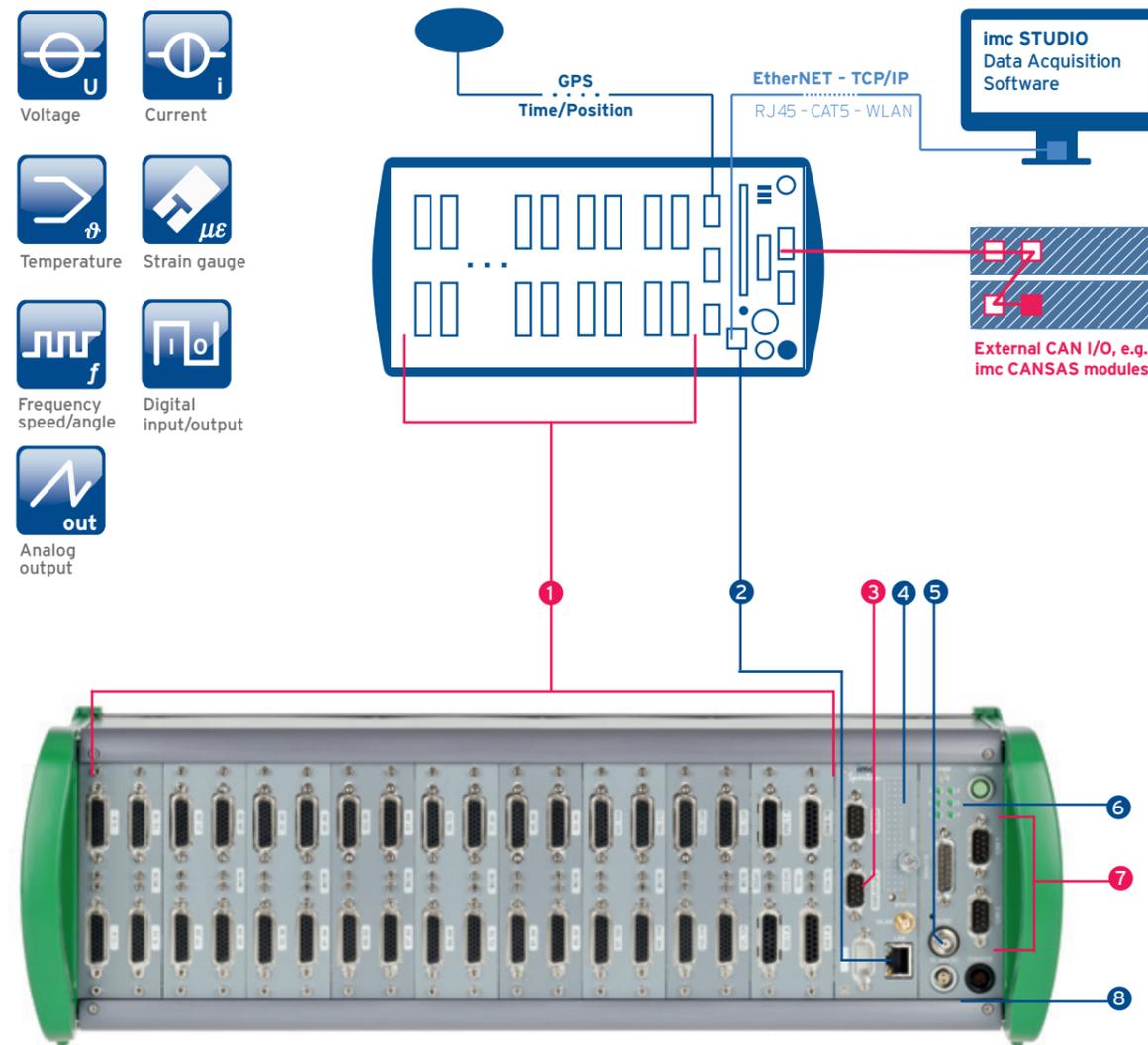
- Measurement and real-time control in one unit
- Portable design goes from field to test bench as your test requires
- Stand-alone operation with the flip of a software switch when the PC cannot be used
- Includes power-up self-start and internal storage



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
- Operates optionally in an extreme temperature range (-40 to 85 °C, condensation allowed)

Comprehensive measurement and test control system



- | | |
|---|--|
| <p>1 Fully conditioned analog inputs, arranged in groups of 16 channels (4 or 8 connectors)</p> <p>2 Ethernet LAN / optional WLAN</p> <p>3 GPS/external display connections</p> <p>4 Onboard removable CF flash storage (covered)</p> | <p>5 Directly synchronize multiple imc systems of any type, for virtually unlimited expansion</p> <p>6 User configurable status LEDs</p> <p>7 CAN I/O for expansion and integration</p> <p>8 Smart power supply (10 - 32 VDC) with UPS</p> |
|---|--|

In Practice

Trouble free long-term remote monitoring

The ultimate challenge for any product is its ability to perform throughout its projected lifetime under actual field conditions. This couldn't be more true than for structural testing in civil engineering, where data collection can continue for years. Fortunately, the imc SPARTAN system is well-suited for autonomous operations, including backup power, self-start capability, and onboard data storage. Onboard data processing allows the real-time reduction of stored data including max./min., class counting, statistics or critical event records. This not only preserves storage space, but when used in conjunction with imc LINK for remote data access, it significantly reduces data upload times and bandwidth usage.



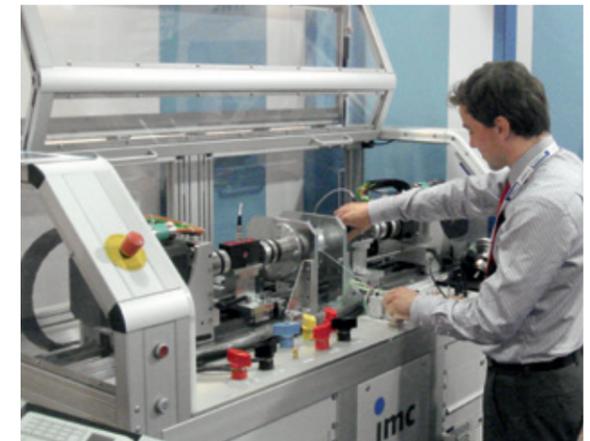
Thermal mapping for heat exchanger efficiency

As the demands on the component manufacturer continue to drive increases in manufacturing precision, the need for accurate and thorough data during product development becomes even more important. "In creating stress and thermal maps of new heat exchanger designs, we needed to be able to quickly process a large number of channels into meaningful results." The ability of the imc SPARTAN to synchronously record all of your strain gauges and thermocouples, plus wind speed and ECU information, provides a tremendous productivity advantage; "plus, imc STUDIO automatically controls test cycles and creates all test reports in real-time."



Process monitoring and alarms

When it comes to maximizing the data collection capability in most 3rd party "turnkey" test stands, it often helps to have a dedicated data acquisition system to record signals beyond the limited scope of the test stand controller. The imc SPARTAN is a perfect monitoring system: not only recording the data from your analog, digital, and, if needed, CAN-based signals, but also providing critical output signals and alarms if conditions exceed testing tolerances. All the while, real-time processing of data and automatic test report generation ensure a quick and easy test analysis.



Maximum precision

imc SPARTAN provides you with the convenience of a single system for all your I/O requirements. This is first apparent in the signal conditioning options which are integrated into the filtering and digitizing analog front end of the system.

imc SPARTAN offers options for isolated temperature and voltage inputs (up to +/-60V range) as well as combined voltage and bridge modules. These support strain gauge, bridge sensors and even LVDTs by providing both DC and AC (carrier frequency) mode and include internal completion of half and quarter bridge configurations.

These comprehensive systems are also well-suited to interact with the test environment, by providing discrete digital input and outputs, as well as analog outputs (e.g., for proportional control) and optional CAN I/O.

The integrated design of the imc SPARTAN allows it to be located wherever it is convenient - Ethernet connectivity means that only one standard cable or wireless connection is needed - across the table, or across thousands of miles.



Distributed expansion

When equipped with the optional CAN interface, a single imc SPARTAN may be expanded up to 512 channels via external imc CANSAS modules - from a single module to a satellite module stack - easily creating a spatially distributed, synchronous and easily expandable system. New possibilities are opened up in distributed and hybrid centralized/distributed system topologies for in-vehicle test and measurement, test bench and any other space- or distance-challenged testing environment.

imc STUDIO software environment

The imc SPARTAN utilizes imc STUDIO - the same intuitive software imc 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 and manage 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 SPARTAN architecture

The imc SPARTAN consists of the mainframe chassis with the base unit (available in 5 different sizes), plus one or more factory installed I/O options; the system is shipped to you ready-to-go.



Base system capability

The core of the imc SPARTAN system 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
- Optional real-time signal processor 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 SPARTAN is capable of handling an aggregate data collection rate of 400 kSample/s, with a maximum per channel sample rate of up to 500 Samples/s. This acquisition rate is shared by the active channels in measurement, and the integrated conditioner modules are configurable on a per channel basis.

Input options designed for efficiency

Two basic multi-purpose signal conditioning options exist in the imc SPARTAN system: isolated voltage and temperature and combined voltage and bridge mode/strain gauge with software selectable DC or switchable AC/DC excitations. Each comes in

16 channel blocks, with a variety of available standard connectors. Because of its conditioners, the imc SPARTAN is ready for almost any dynamic signal sensor and integrates sensor conditioning, filtering and digitizing for up to 128 synchronous channels.

In addition, all imc SPARTAN systems may be equipped with one or more fieldbus interfaces, such as CAN, as well as imc's multi-I/O card, offering digital inputs, encoder/counter inputs and both analog and digital outputs.

Real-time functionality at your fingertips

One of the core concepts of all imc data acquisition and control systems is integrated synchronous control and an extensive array of real-time functionality.

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 imc SPARTAN, and are easily accessed through the included configuration and operation software imc STUDIO.

For advanced real-time analysis and control, imc Online FAMOS is optionally available as well, providing 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. Virtual channels are computed on the fly, in real time.

In addition, imc Online FAMOS extends the capability of your system to easily create PLC-like control logic with minimal specialized knowledge. Incorporating responsive real-time and closed-loop control (incl. PID), the system can thus handle complete test stand automation.

imc SPARTAN Details

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

imc SPARTAN general specs and housing types

	imc SPARTAN -1/2/4/6/8	imc SPARTAN-R
General		
Aggregate sampling rate	400 kSps	
Max. channel sampling rate	500 Sps / chan	
Housing type	portable	19" rack
Max. number of channels configurable	16/32/64/96/128	128
Configurable module slots (1 slot = 4 HP)	2/4/8/12/16	16
Operating conditions		
Standard operating temp. range	●	●
Extended temp. range (incl. condensation)	○	○
Shock and vibration rating	30g pk (3 ms)	
Connectivity		
Ethernet	100 MBit	
W-LAN (WiFi)	○	○
Wireless UMTS, 3G, 4G	○	○
WLAN / wireless router	○	○
GPS connection port	●	●
Display connection port	●	●
Remote controlled main switch	●	●
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 DCF-77	●	●
Via external IRIG-B & DCF-77 signal		●
Pulse counter and process control (digital I/O)		
16 Bit digital in, 8 Bit digital out	●	●
4 pulse counter (2 chan quadrature mode)	●	●
Fieldbus extensions		
CAN	○	○
LIN	○	○
FlexRay	○	○
ARINC	○	○
XCPoE	○	○
Power supply		
DC input 10V to 32V	●	●
Isolated power supply input	(●)	●
AC/DC adaptor (110 to 230VAC)	●	●
Data integrity upon power fail	●	●
UPS (lead gel battery)	●	●
UPS (extended capacity Li-Ion)	○	○
Software		
imc STUDIO Standard	●	●
imc REMOTE WebServer	○	○



imc SPARTAN-1 with 2 CAN nodes and standard equipment of pulse counter and digital I/O



imc SPARTAN-2



imc SPARTAN-4



imc SPARTAN-6



imc SPARTAN-8 with thermocouple connectors (type K, green) with 2 CAN nodes and standard equipment of pulse counter and digital I/O



imc SPARTAN module with DSUB-15 connectors



imc SPARTAN module with thermocouple connectors

imc SPARTAN analog amplifier modules

module name SPAR/xxx	size		connector		speed		voltage mode		mA	temp	ICP, supply		bridge mode											
	channels	slots (1 slot = 4 HP)	standard connector	TEDS	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	20 mA shunt plug	Thermocouple (TC)	RTD (PT100)	ICP plug	Charge plug	sensor supply	full bridge	half bridge	quarter bridge	DC excitation	AC excitation (CF)	single SENSE	double SENSE	
Voltage & temperature measurement																								
T16	16	2	DSUB-15	●	5 Hz	1 Hz	●	50	●	●	●	●	●	○										
T16-TC-K	16	2	Thermo		5 Hz	1 Hz	●					●												
U16	16	2	DSUB-15	●	500 Hz	200 Hz	●	50	●	●	●	●	○		○									
U16-TC-K	16	2	Thermo		500 Hz	200 Hz	●					●												
Bridge & strain gauge measurements																								
B16	16	4	DSUB-15	●	500 Hz	200 Hz		5	●		●			○	○	●	●	●	●	●	●	●	●	●
BC16	16	2	DSUB-26-HD		500 Hz	200 Hz		5	●		(★)					●	●	●	●	●	●	●	●	●
BCF16	16	4	DSUB-15	●	500 Hz	200 Hz		5	●	●	●			○	○	(●)	●	●	●	●	●	●	●	●

imc SPARTAN DIO, counter, DAC modules

module name SPAR/xxx	size		connector		digital I/O		DAC		pulse counter	
	slots (1 slot = 4 HP)	standard connector	input Bits	output Bits	analog outputs	counter inputs	quadrature mode chan	counter frequency		
Multi functional modules										
DI16-DO8-ENC4	2	DSUB-15	16	8		4	2	32 MHz		
DI8-DO8-ENC4-DAC4	2	DSUB-15	8	8	4	4	2	32 MHz		
Digital I/O modules										
DI-16	1	DSUB-15	16							
DO-16	1	DSUB-15		16						
Analog out modules (DAC)										
DAC-8	1	DSUB-15			8					

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

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

TEDS support
(Transducer Electronic Data Sheet)
imc SPARTAN support direct read/write of TEDS sensors, including imc's TEDS Clip.
Connectors: TEDS interfaces require either the ACC/DSUBTEDS-x variants of our connectors

imc SPARTAN software options

Software product	Features	Licensing	
		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	○
Development			
LabView™ VIs	LabView VI components		●
imc COM	ActiveX programming interface (API)	PC	○



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