imc CRONOS-SL

Ultra robust data acquisition system

imc CRONOS-SL is a compact and extremely robust data acquisition system (DAQ) for applications in harsh environments. It complies with the MIL STD810F standard and is suitable for the harshest operating conditions in terms of temperature, humidity, dirt, shock and vibration. Signal conditioning, AD conversion, online processing and data storage are integral components of the measuring system. This makes imc CRONOS-SL ideal for measurement tasks involving long-term testing and monitoring: e.g. on board vehicles, machines or outdoors, where conventional measuring devices are often unable to cope with the ambient conditions.

At a glance

- Extremely robust measuring system: Vibration and shock-resistant (MIL STD810F standard) and works in the extended temperature range
- Works independently and without a PC
- GPS functions for position detection and synchronization
- Data can be stored either in the measuring device and/or in the PC
- Universal precision measuring amplifier for all relevant sensors
- High sampling rates for dynamic measurements
- Configuration and operation with the imc STUDIO measurement software
- Comprehensive data analysis and reports with the imc FAMOS software

Housing variants

Order code	article no.	properties
CRSL-2-NIMH	11800151	freely configurable measuring system for extreme ambient conditions (IP65) can be equipped ex works with 2 conditioning modules
CRSL-4-NIMH	11800150	can be equipped with 4 conditioning modules ex works

Overview of available conditioning modules

Order code	article no.	properties
CRSL/UNI2-8-L	11800076	8-channel universal amplifier: voltage, current (20 mA), temperature, strain gauge measuring bridges
CRSL/DCB2-8-L	11800078	can be equipped with 4 conditioning modules ex works: Strain gauge measuring bridges, voltage

Additional options (order code ex works)

Order code	article no.	properties
CRSL/CAN-FD	11800134	CAN FD interface with 2 nodes (CAN FD and classical CAN bus), incl. DBC interface
CRSL/DI16-DO8-ENC4-D	11800038	DIO-ENC multifunction module: 16 digital inputs, 8 digital outputs, 4 incremental inputs (counter)

Overview of the software options

Software options	functions	license	
	● : included ○ : optional	license model	inclusive
Operating software			
imc STUDIO Standard	operating software, integrated test and measurement software	PC	○
imc STUDIO Professional / Developer	individual customizations, scripting, application development	PC	○
imc CANSAS	configuration of the 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 functions, PID controller etc.	device	○
imc Online FAMOS Kits	classification (strength analysis), order analysis	device	○
Post-Processing			
imc FAMOS Reader	data visualization	PC	●
imc FAMOS Standard / Professional	data visualization, analysis, reports, scripting	PC	○
imc FAMOS Enterprise	incl. classification, order analysis, ASAM-ODS Browser	PC	○
Remote Access			
imc LINK	remote access and data transfer	PC	○
imc REMOTE	Web server, secure https access to devices	device	○
CAN			
Vektor data base (*.dbc import)	Vector database connection	device	●
ECU protocols	for CAN interface: KWP 2000, CCP, OBD-2	device	○
Application development			
imc API	.NET programming interface (API) for imc STUDIO	PC	○

General technical specs

Normal position		
Housing	imc CRONOS-SL-2	imc CRONOS-SL-4
Housing type	portable housing	portable housing
IP-degree of protection (#1)	IP65	IP65
Dimension (WxHxD in mm) with handles, feet and interconnections	286 x 80 x 352 (#2)	286 x 116 x 352 (#2)
Weight (kg)	6.5	8
Free module slots (#3)	2	4
Modular expansion	✔	✔
Max. number of channels (#4)	16	32

(#1) when used with IP65 plugs respectively with protective cover for not used sockets the socket is IP65 certified even without protective cover (special fabrication)

(#2) without base and handholds (D in mm 280)

(#3) DI16-DO8-ENC4 needs no additional slot

(#4) The maximum number of channels depends on the amplifier configuration; please contact us for detailed consultation.

Terminal connection	imc CRONOS-SL-2	imc CRONOS-SL-4
PC connector: Ethernet TCP/IP	10/100 MBit, approvable cable length for 100 MBit Ethernet max. 100 m according IEEE 802	
CF-card slot	1	
Synchronization of multiple devices	BNC	
GPS connection	DSUB-9	
Hand-held terminal connection	DSUB-9	
Remote connection	DSUB-15	
Measurement signal terminals	appropriately equipped with signal conditioning, typically DSUB connectors	

Current supply	imc CRONOS-SL-2	imc CRONOS-SL-4
Power supply	10 V to 32 V DC	
LEMO plug	FGG.1B.302 CLAD62ZN	
DC-input isolated	✔	
Power consumption (with UPS battery fully charged)	depending on amplifier (typ. 50 W)	depending on amplifier (typ. 60 W)

"✔" standard; "O" optional; "-" not available

Operating conditions	imc CRONOS-SL-2	imc CRONOS-SL-4
Operating temperature	-40°C to 85°C with condensation	
Storage temperature	-40°C to 85°C	
Shock resistance	MIL-STD-810F 60 g, 11 ms half sine IEC 60068-2-27, IEC 61373, Cat.2 300 m/s² (approx. 30 g), 18 ms half sine	MIL-STD-810F 60 g, 6 ms half sine IEC 60068-2-27, IEC 61373, Cat.2 300 m/s² (approx. 30 g), 18 ms half sine
Vibration resistance	MIL-STD-810F Rail Cargo Vibration Exposure U.S. Highway Truck Vibration Exposure IEC 60068-2-64, IEC 61373, Cat.2	
Condensation protection	✔	

UPS and Data integrity	Value	Remarks
Autarkic operation without PC	✔	
Self start (automatic data acquisition operation)	configurable	timer, absolute time, automatic start when power supply is available
Auto data-saving upon power outage	✔	buffering (UPS) with "auto-stop": auto-stop of measurement, data storage and automatic shutdown
Battery buffering / UPS	integrated	with automatic charge control
UPS coverage	complete system including plug-in modules (amplifier)	
UPS delay per power outage	30 s (Default), configurable	"buffer time constant": required duration of a continuous outage that will trigger auto shutdown procedure
Minimum charge duration for 1 min. buffer duration	≤53 min.	typ., 23°C, with discharged battery
Additional power consumption during charging time	3.5 W (max.)	device activated
Charging power (netto)	2.5 W (typ.)	device activated
Charging time ratio: charge / discharge	buffer time · 1.2 · (total power / 2.5 W)	worst case example: total power consumption of system 100 W, buffer duration 1 min., resulting charging time ≤ 48 min. (charging time ratio 48:1)
Charging time for complete battery recovery	36 h	device activated
UPS batteries	**Value**	**Remarks**
Battery type	NiMH	
Effective buffer capacity	≥55 Wh	typ., 23°C, battery fully charged
Max. buffer duration	>30 min.	total buffer duration depending on device variant, total power consumption ≤110 W
UPS takeover threshold (typ.)	9.8 V 11.1 V	takeover internal backup battery switch back to external supply

Data acquisition, trigger	Value	Remarks
Max. aggregate sampling rate	400 kS/s	
Channel individual rates	adjustable in 1-, 2-, 5 steps	
Number of sampling rates: analog channels, DI, counter	2	usable simultaneously in one configuration
Number of sampling rates: virtual channels	arbitrary	data rates generated via imc Online FAMOS (e.g. via reduction)
Monitor channels	✔ for all channels of type: analog, DI and counter (ENC)	doubled channels with independent sampling and trigger settings
Intelligent trigger functions	✔	e.g. logical combination of multiple channel events (threshold, transition) to create start and stop triggers
Multi.triggered data acquisition	✔	multiple trigger-machines and multi-shot
Independent trigger-machines	48	start/stop, arbitrary channel assignment

Maximum channel count per device		
Active channels	512	active channels of the current configuration: Total sum of analog, digital, fieldbus and virtual channels as well as possible monitor channels
Fieldbus channels	1000	Number of defined channels (active and passive); Currently activated channels are limited by the total number of activated channels (512).
Process vector variables	800	The process vector is a collection of single-value variables, each containing the latest current measured values. A process vector variable is automatically created for each channel.

		without monitor channels			with monitor channels			
Channel type	determined by	limit (aktive+passive)	activated	total activated	limit (aktive+passive)		activated	total activated
Analog channels	depending device type	8..24	8..24	512	Channel	8..24	16..48	512
					Monitor	8..24		
Incremental counter	standard	4	4		Channel	4	4	
					Monitor	4	4	
Digital DI-Ports	standard	1	1		Port	1	1	
					Monitor	1	1	
Digital DO/DAC-Ports	standard	2	2		Port	2	2	
Fieldbus-channels	definable (dbc)	1000	512		Channel	1000	512	
					Monitor			
Virtual channels (OFA)	definable (OFA)	-	512		-	-	512	

DI-ports (respectively channels) have monitor-ports, DO/DAC-ports in contrary do not have monitor-ports

Synchronization and time base

Time base of individual device without external synchronization			
Parameter	Value typ.	min. / max.	Remarks
Accuracy RTC		±50 ppm 1 µs (1 ppm)	not calibrated (standard devices), at 25°C calibrated devices (upon request), at 25°C
Drift	±20 ppm	±50 ppm	-40°C to +85°C operating temperature
Ageing		±10 ppm	at 25°C; 10 years

Time base of individual device with external synchronization signal				
Parameter	GPS	DCF77	IRIG-B	NTP
Supported formats	NMEA / PPS(1)		B000, B001 B002, B003(2)	Version ≤4
Precision	±1 µs			<5 ms after ca. 12 h(3)
Jitter (max.)	±8 µs			
Voltage level	TTL (PPS (1)) RS232 (NMEA)	5 V TTL level		---
Input impedance	1 kΩ (pull up)	20 kΩ (pull up)		---
Input connection	DSUB-9 "GPS" not isolated	BNC "SYNC" (isolated) (test voltage: 300 V, 1 min.)		RJ45 "LAN"
Cable shield connection		BNC: isolated Signal-GND (marked with yellow ring)		---

Synchronization of multiple devices via DCF (Master/Slave)			
Parameter	Value typ.	min. / max.	Remarks
Max. cable length		200 m	BNC cable type RG58 (propagation delay of cable needs to be considered)
Max. number of devices		20	only slaves
Common mode SYNC not-isolated	0 V		with non-isolated BNC connector: devices must have the same ground voltage level, otherwise signal integrity issues (signal artifacts and noise) may result
SYNC isolated		max. 50 V	with isolated BNC connector: SYNC-signal is already internally isolated, for reliable operation even with different ground voltage level (ground loops)
Voltage level	5 V		
DCF input/output	"SYNC" connection		BNC

(1) PPS (Pulse per second): signal with an impulse >5 ms is necessary
(2) using BCD information only
(3) Max. value, concerning the following condition: first-synchronization

Contact imc

An Axiometrix Solutions Brand

Adresse

imc Test & Measurement GmbH
Voltastr. 5
13355 Berlin

Telefon: +49 30 467090-0
E-Mail: info@imc-tm.de
Internet: https://www.imc-tm.com

Technischer Support

Zur technischen Unterstützung steht Ihnen unser technischer Support zur Verfügung:

Telefon: +49 30 467090-26
E-Mail: hotline@imc-tm.de
Internet: https://www.imc-tm.com/service-training/

Service und Wartung

Für Service- und Wartungsanfragen steht Ihnen unser Serviceteam zur Verfügung:

E-Mail: service@imc-tm.de
Internet: https://www.imc-tm.com/service

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E-Mail: schulung@imc-tm.de
Internet: https://www.imc-tm.com/service-training/imc-academy

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