imc CC-STG-8

Compact and intelligent measurement system for strain gauge and bridge measurements

device type: CC-STG-8, 8 analog measurement inputs

The CC-STG-8 model of the imc C-SERIES is an 8-channel measurement system equipped with bridge amplifiers for strain gauge measurements. They can be configured via software for quarter-, half and full-bridge mode and directly convert acquired signals for the various setups into stress and strain.

imc C-SERIES - complete, compact and portable measurement devices

The imc C-SERIES is a family of device models each having a fixed hardware configuration. These measurement systems can operate in conjunction with a connected PC (via Ethernet) for setup, data storage and visualization, or in autarkic stand alone mode. In case of power outages, full data integrity on the built-in Flash removable memory volume is ensured by means of UPS buffering, which ensures the safe termination and storage of all open measurement data files.

Highlights

- Real-time signal processing and closed loop control and test automation with imc Online FAMOS
- Data storage to onboard flash media (CF card) or network harddrive (NAS etc.)
- Complex triggering system, PC independent
- Optional internal WiFi (WLAN) adaptor
- Supports platform independent remote access via standard interner browser
  (optionally integrated imc REMOTE Webserver)
- Networking (TCP/IP) and synchronizable with other imc measurement systems via:
  - isolated Sync-Signal (DCF-77, IRIG-B)
  - network based via NTP
  - GPS
- In conjunction with the operating software imc STUDIO the devices are immediately ready to take measurements with all functionality supported.

Extra option (factory order option)

- Internal WiFi-adaptor

Mechanical drawings with dimensions

CS device shown in standard operating orientation.
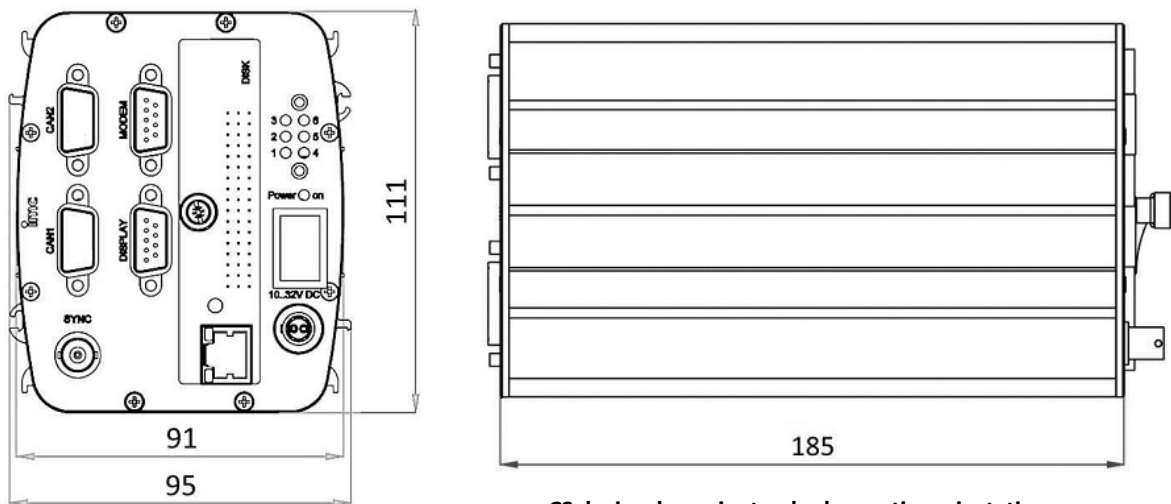
Software minimum requirements

Operation of the devices requires operating software of the following group: imc STUDIO 5.0 R9 associated with firmware and driver package imc DEVICES 2.9 R6.

Errors and changes excepted
For more information, contact:
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Accessories and Connectors

Included accessories

- Calibration certificate with test equipment verification as per ISO 9001 (manufacturer's calibration certificate)
- Instruction manual: "Getting started with devices of the C-SERIES"
- 1x Ethernet network cable with latch protection (uncrossed, 2 m)
- 1x LEMO.1B plug (ACC/POWER-PLUG1)

AC/DC power adaptor 110-230V AC (with appropriate LEMO plug)		
CRPL/AC-ADAP-60W-1B	24 V DC, 60 W, LEMO.1B.302	1080066

DSUB-15 plug		
4x ACC/DSUB-B2	DSUB-15 plug with screw terminals for 2-channel measurement of strain gauges, bridges and voltage	1350170
1x ACC/DSUB-DI4-8	DSUB-15 plug for 8 digital inputs	1350174
1x ACC/DSUB-DO4	DSUB-15 plug for 8 digital outputs	1350173
1x ACC/DSUB-ENC4	DSUB-15 plug for 4 incremental inputs	1350171
1x ACC/DSUB-DAC4	DSUB-15 plug for 4 analog outputs	1350177

Optional accessories

DSUB-15 plug		
ACC/DSUBM-I2	DSUB-15 plug for 2-channel current measurement (20 mA)	1350180
ACC/DSUBM-ICP2I-BNC	DSUB-15 plug for 2 IEPE/ICP sensors, BNC connection, isolated	1350199

Mounting brackets for fixed installations		
C/CS-BRACKET-90	mounting bracket 90°; mounting CS devices on a flat surface	1400064
C/CS-19"-RACK	19" RACK for up to 4 CS devices	1400091

Miscellaneous		
C/CAL-P	Calibration report set for imc C-SERIES Report set with manufacturer's calibration certificate and individual readings, as well as list of test equipment used. Meets requirements of DIN EN ISO 17025.	1400035

Further accessories (see separate price list of the accessories)

- recommended and verified removable flash storage media
- external display (via DSUB-9)
- GPS-receiver (with DSUB-9 connection)

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General Technical Specs

Terminal connection		
Parameter	**Value**	**Remarks**
Terminal connection	4x DSUB-15	8 analog inputs
Further terminal connection	RJ45 CF-Card Slot DSUB-9 DSUB-9 BNC LEMO FGG.1B.302	Ethernet (100 MBit), PC/network removable storage external display external GPS module synchronization supply
Weight	ca. 2 kg	
Dimensions (WxHxD) in mm	95 x 111 x 185	

Power supply	**Value**	**Remarks**
Power supply	10 V to 32 V DC	
Isolation of supply input	non-isolated	
AC/DC adaptor	110 V to 230 V AC	external adaptor included in delivery
Auto start upon power up	configurable	automatic start of measurement

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
UPS	integrated	Super-Caps
Charging time of the Super-Caps	6 min.	minimum required active operation for full UPS functionality
UPS coverage	entire device	
UPS delay per power outage	1 sec	"buffer time constant": required duration of a continuous outage that will trigger auto shutdown procedure fix parameter: not changeable in device configuration!
Effective buffer capacity	100 mWh	sufficient for auto-stop (max. 12 sec.); with fully charged Super-Caps (after minimum operating duration)

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Data acquisition, trigger		
Parameter	**Value**	**Remarks**
Max. aggregate sampling rate	400 kS/s	
Channel individual sampling rates	selectable in 1–2–5 steps	
Number of sampling rates: analog channels, DI and counter	2	usable simultaneously in one configuration
Number of sampling rates: fieldbus channels	arbitrary	
Number of sampling rates: virtual channels	arbitrary	data rates generated via imc Online FAMOS (e.g. via reduction)
Monitor channels	√ for all channels of the types:	doubled channels with independent sampling and trigger settings
Intelligent trigger functions	√	e.g. logical combination of multiple channel events (threshold, edge) to create triggers that start and stop acquisition of assigned channels
Multi.triggered data acquisition	√	multiple trigger-machines and multi-shot
Independent trigger-machines	48	start/stop, arbitrary channel assignment
Direct onboard data reduction: arithmetic mean, min, max.	√	
Extensive real-time calculation and control functions	√	included in standard delivery (via imc Online FAMOS)
External GPS signal receiver	O	
Internal WiFi (WLAN) adaptor	O IEEE 802.11g (1 antenna) max. 54 MBit/s	

Storage, signal processing		
Parameter	**Value**	**Remarks**
Internal flash storage	CF-card	removable cover for the CF slot
Removable flash storage media	CF	recommended media available at imc; the specified operating temperature range of the media is relevant
Storage on NAS (network storage)	√	alternatively to onboard Flash storage
Arbitrary memory depth with pre- and post trigger	√	maximum pretrigger limited by size of Circular Buffer RAM; posttrigger only limited by available mass storage (Flash)
Circular buffer mode	√	cyclic overwrite of circular buffer memory on mass storage media
Synchronization	DCF 77	Master / Slave
	GPS	via external GPS-receiver
	IRIG-B	TTL
	NTP	via network

Operating conditions		
Operating environment (Standard)	dry, non corrosive environment within specified temperature range	
Ingress Protection	IP20	
Operating temperature (Standard)	-10°C to 55°C	without condensation
Rel. humidity	80% up to 31°C, above 31°C: linear declining to 50%, according DIN EN61010-1	
Operating altitude	up to 2000 m	
Shock and vibration resistance	IEC 60068-2-27, IEC 60068-2-64 IEC 61373 category 1, class A and B	
Extended shock and vibration resistance (Upon request)	MIL-STD-810 Rail Cargo Vibration Exposure U.S. Highway Truck Vibration Exposure	

Synchronization and time base

Time base of individual device without external synchronization			
Parameter	Value typ.	min. / max.	Remarks
Accuracy RTC		±50 ppm	not calibrated (standard devices), at 25°C
		1 µs (1 ppm)	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) 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

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(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

CC-STG-8 analog inputs

Channels, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Inputs	8	
Measurement modes	voltage measurement	
	current measurement	ACC/DSUBM-I2 shunt-plug or Single-ended (internal shunt)
	bridge sensor	ACC/DSUBM-B2
	strain gauges	full, half, quarter bridge
	current-fed sensors (IEPE/ICP)	with DSUB-15 extension plug: ACC/DSUBM-ICP2I-BNC, isolated

Sampling rate, Bandwidth, Filter, TEDS		
Parameter	**Value**	**Remarks**
Sampling rate	≤ 100 kHz	per channel
Bandwidth	0 Hz to 5 kHz	-3 dB

Filter (digital)
  cut-off frequency
  characteristic
  order
	1 Hz to 2 kHz	Butterworth, Bessel (digital)
		low pass or high pass filter 8th order
		band pass, LP 4th and HP 4th order
		
		Anti-aliasing filter: Cauer 8.order
		with $f_{cutoff} = 0.4\, f_s$

Resolution	16 Bit	internal processing 24 Bit
TEDS only with DCB2-8	conforming IEEE 1451.4 Class II MMI	ACC/DSUBM-TEDS-xx
Characteristic curve linearization	user defined (max. 1023 supporting points)	

General			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Overvoltage protection		±40 V	permanent
Input coupling	DC		
Input configuration	differential		
Input impedance	20 MΩ	±1%	

Auxiliary supply
  voltage
  available current
  internal resistance
	
	+5 V
	0.26 A
	1.0 Ω
		
		±5%
		0.2 A
		<1.2 Ω
			for IEPE/ICP-extension plug
			independent of integrated
			sensor supply, short-circuit protected
			power per DSUB-plug

Voltage measurement

Parameter	Value typ.	min. / max.	Remarks
Input range	±10 V, ±5 V, ±2.5 V, ±1 V... ±5 mV		
Gain error	0.02%	0.05%	of the measured value, at 25°C
Gain drift	10 ppm/K·ΔT_a	30 ppm/K·ΔT_a	$\Delta T_a = |T_a -25°C|$; ambient temperature T_a
Offset error	0.02%	0.05% 0.06%	of the range at 25°C range > ±50 mV range ≤ ±50 mV
Offset drift	±0.7 µV/K·ΔT_a ±0.1 µV/K·ΔT_a	±6 µV/K·ΔT_a ±1.1 µV/K·ΔT_a	range ±10 V to ±0.25 V range ≤ ±0.1 V $\Delta T_a = |T_a -25°C|$; ambient temperature T_a
Nonlinearity	10 ppm	50 ppm	
CMRR (common mode rejection ratio)	110 dB 138 dB	>90 dB >132 dB	DC and f ≤ 60 Hz range ±10 V to ±50 mV range ±25 mV to ±5 mV
Noise (RTI)	0.6 µV$_{RMS}$ 0.14 µV$_{RMS}$	1.0 µV$_{RMS}$ 0.26 µV$_{RMS}$	bandwidth 0.1 Hz to 1 kHz bandwidth 0.1 Hz to 10 Hz

Current measurement with shunt plug

Parameter	Value typ.	min. / max	Remarks
Input range	±50 mA, ±20 mA, ±10 mA, ±5 mA, ±2 mA, ±1 mA		
Shunt impedance	50 Ω		external plug ACC/DSUBM-I2
Over load protection		±60 mA	permanent
Input configuration	differential		
Gain error	0.02%	0.06% 0.1%	of reading, at 25°C plus error of 50 Ω shunt
Gain drift	15 ppm/K·ΔT_a	55 ppm/K·ΔT_a	$\Delta T_a = |T_a -25°C|$ ambient temperature T_a
Offset error	0.02%	0.05%	of range, at 25°C
Noise (current)	0.6 nA$_{eff}$ 0.15 nA$_{eff}$	10 nA$_{eff}$ 0.25 nA$_{eff}$	bandwidth 0.1 Hz to 1 kHz bandwidth 0.1 Hz to 10 Hz

Current measurement with internal shunt

Parameter	Value typ.	min. / max	Remarks
Input range	±50 mA, ±20 mA, ±10 mA, ±5 mA, ±2 mA, ±1 mA		
Over load protection		±60 mA	permanent
Input configuration	Single-ended		internal current backflow to -VB
Gain error	0.02%	0.06%	of reading, at 25°C
Gain drift	15 ppm/K·ΔT_a	55 ppm/K·ΔT_a	$\Delta T_a = |T_a -25°C|$ ambient temperature T_a
Offset error	0.02%	0.05%	of range, at 25°C
Noise (current)	0.6 nA$_{eff}$ 0.15 nA$_{eff}$	10 nA$_{eff}$ 0.25 nA$_{eff}$	bandwidth 0.1 Hz to 1 kHz bandwidth 0.1 Hz to 10 Hz

Bridge measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Mode	DC		
Measurement modes	full-, half-, quarter bridge		bridge supply ≤5 V with quarter bridge
Input ranges	±1000 mV/V, ±500 mV/V, ±200 mV/V, ±100 mV/V		
bridge supply: 10 V	… ±0.5 mV/V		
bridge supply: 5 V	… ±1 mV/V		
bridge supply: 2.5 V	… ±2 mV/V		(as an option)
bridge supply: 1 V	… ±5 mV/V		(as an option)
Bridge excitation voltage	10 V	±0.5%	The actual value will be dynamically captured and compensated for in bridge mode.
(as an option)	5 V (2.5 V and 1 V)	±0.5%	
Min. bridge impedance	120 Ω, 10 mH full bridge 60 Ω, 10 mH half bridge		
Max. bridge impedance	5 kΩ		
Internal quarter bridge completion	120 Ω, 350 Ω		internal, switchable per software
Input impedance	20 MΩ	±1 %	differential, full bridge
Gain error	0.02%	0.05%	of reading
Offset error	0.01%	0.02%	of input range after automatic bridge balancing
automatic shunt calibration	0.5 mV/V	±0.2%	for 120 Ω and 350 Ω
Cable resistance for bridges (without return line)	<6 Ω <12 Ω		10 V excitation 120 Ω 5 V excitation 120 Ω

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Sensor supply			
Parameter	**Value**		**Remarks**
Configuration options	5 selectable settings		The sensor supply module always has 5 selectable voltage settings. default selection: +5 V to +24 V
Output voltage	Voltage (+1 V) (+2.5 V) +5.0 V +10 V +12 V +15 V +24 V (±15 V)	Current Power 580 mA 0.6 W 580 mA 1.5 W 580 mA 2.9 W 300 mA 3.0 W 250 mA 3.0 W 200 mA 3.0 W 120 mA 2.9 W 190 mA 3.0 W	set jointly for all eight channels optional, special order: +12 V or +15 V can be replaced by +2.5 V possible ranges with 2.5 V option: +2.5 V, +5.0 V, +10 V, +12 V, +24 V optional, special order: +15 V can be replaced by ±15 V. This eliminates the internal current- and quarter bridge measurement.
Short-circuit protection	unlimited duration		to output voltage reference ground: "-VB"
Accuracy of output voltage	<0.25% (typ.) / <0.5% (max.) <0.9% (max.)		at terminals, no load at 25°C over entire temperature range
compensation of cable resistances	3-wire adjustment: SENSE line on return line (−VB: supply ground		calculated compensated with bridges
Max. capacitive load	>4000 µF >1000 µF >300 µF		2.5 V to 10 V 12 V, 15 V 24 V