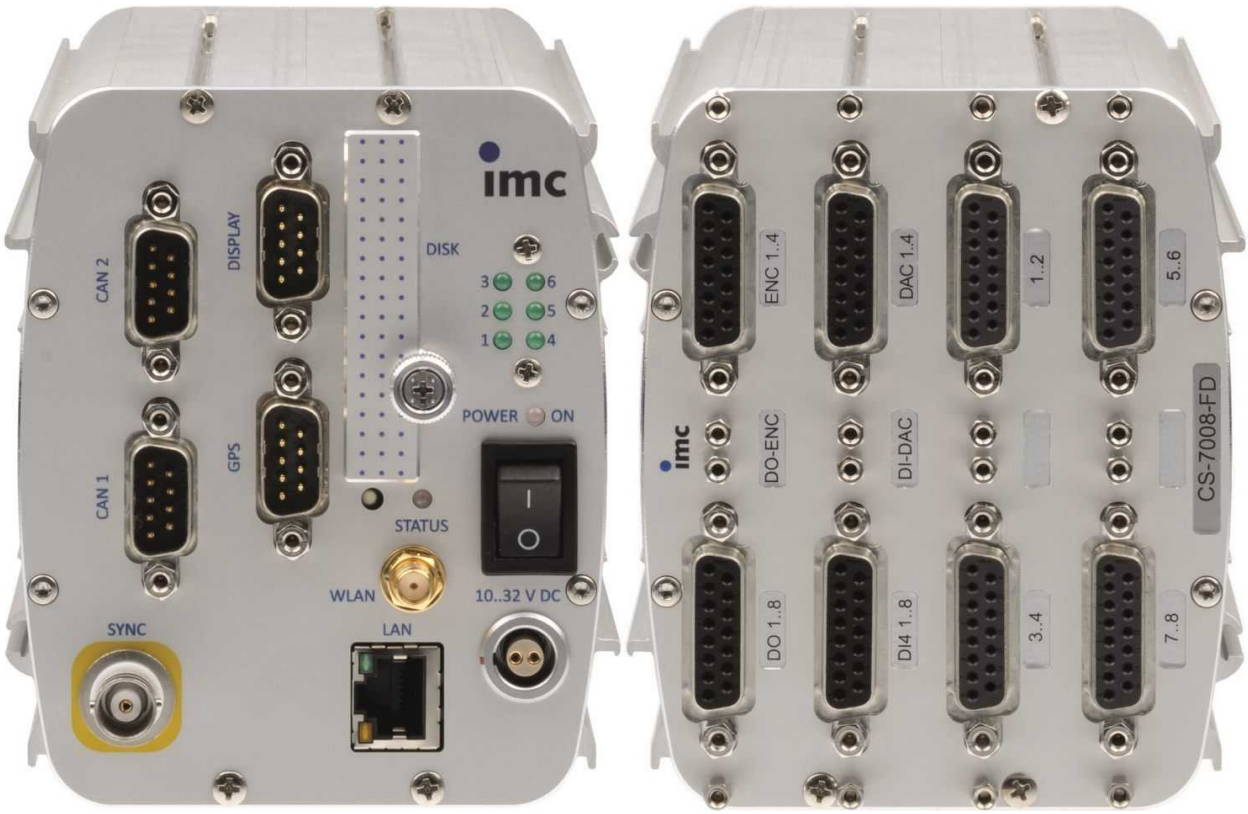
imc C-SERIES: CS-7008-FD

Universal and powerful compact measurement system



device type: CS-7008-FD, 8 analog measurement inputs

The CS-7008 model of the imc C-SERIES is an 8-channel universal measurement system, ideal for direct connection of bridge type sensors and strain gauges, voltage- and current signals, thermocouples and PT100.

Additional pulse counter inputs support direct measurement of RPM, velocity or displacement or event counting. Two integrated CAN FD nodes allows communication with control units (ECUs) and acquisition of vehicle or machine data, CAN based sensors or additional CAN measurement modules of the imc CANSAS series.

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.

All C-SERIES-FD devices come standard with two CAN interfaces, which can be operated both in standard-CAN mode and in extended CAN FD configuration (FD: flexible Data Rate with an extended data rate of up to 8 MBaud). Since the operation mode can be software-configured separately for each node, the user benefits from a maximum flexibility and 100% backward compatibility with predecessor models such as the C-SERIES-N.

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Highlights

- Integrated CAN FD-Interface
- Real-time signal processing and closed loop control and test automation with imc Online FAMOS
- Counter inputs (measurement of RPM, speed, angle, time, events etc.)
- Digital inputs and outputs
- Analog outputs (DAC)
- 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
- Measurement channel extension via direct connection of CAN based measurement modules of the imc CANSAS series
- In conjunction with the operating software imc STUDIO the devices are immediately ready to take measurements with all functionality supported.

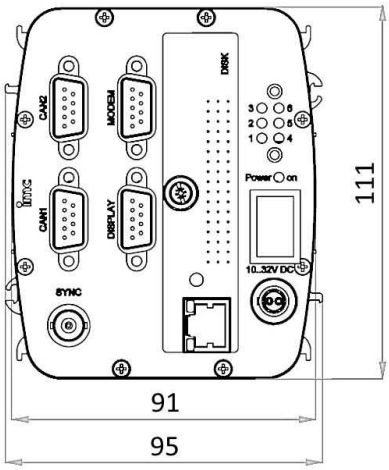
Overview of the available CS-7008 devices

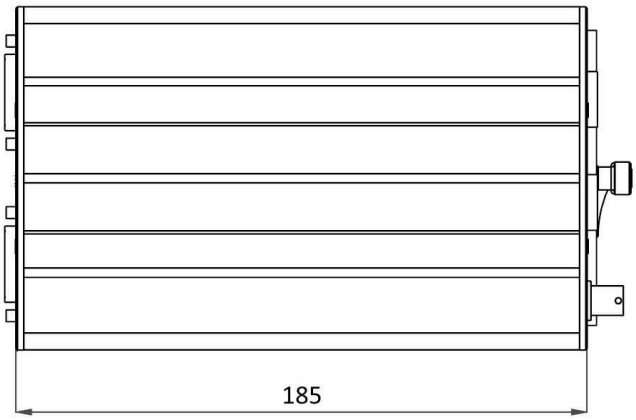
Order code	article no.	housing	analog channels	properties
CS-7008-FD	14000118	CS alu profile	8	CAN FD and Super-Cap UPS
CS-7008-FD-ET	14100053			for extended temperature range

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

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Included accessories

AC/DC power adaptor 110-230V AC (with appropriate LEMO plug)		article no.
CRPL/AC-ADAP-60W-1B	24 V DC, 60 W, LEMO.1B.302	10800066
DSUB-15 plug		
4x ACC/DSUBM-UNI2	DSUB-15 plug with screw terminals for 2-channel current- [1], voltage- and bridge measurement as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC)	13500169
1x ACC/DSUBM-DI4-8	DSUB-15 plug for 8 digital inputs	13500174
1x ACC/DSUBM-DO8	DSUB-15 plug for 8 digital outputs	13500173
1x ACC/DSUBM-ENC4	DSUB-15 plug for 4 incremental inputs	13500171
1x ACC/DSUBM-DAC4	DSUB-15 plug for 4 analog outputs	13500177
Documents		
Getting started with imc C-SERIES (one copy per delivery)		
Device certificate		
Miscellaneous		
1x Ethernet network cable with latch protection (uncrossed, 2 m)		
1x LEMO.1B plug (ACC/POWER-PLUG1)		

Optional accessories

DSUB-15 plug		
ACC/DSUBM-I2	DSUB-15 plug for 2-channel current measurement (20 mA)	13500180
ACC/DSUBM-ICP2I-BNC-S	DSUB-15 plug for 2 IEPE/ICP sensors, BNC connection, isolated, **slow**	13500293
ACC/DSUBM-ICP2I-BNC-F	DSUB-15 plug for 2 IEPE/ICP sensors, BNC connection, isolated, **fast**	13500294
Mounting brackets for fixed installations		
C/CS-BRACKET-90	mounting bracket 90°; mounting CS devices on a flat surface	14000064
C/CS-19"-RACK	19" RACK for up to 4 CS devices	14000091
Documents		
SERV/CAL-PROT	Calibration protocol per amplifier imc manufacturer calibration certificate with measurement values and list of calibration equipment used (pdf).	150000566
SERV/CAL-PROT-PAPER	Calibration protocol per amplifier (paper print) imc manufacturer calibration certificate with measurement values and list of calibration equipment used with signature and seal.	150000578
Device certificates and calibration protocols: Detailed information on certificates supplied, the specific contents, underlying standards (e.g. ISO 9001 / ISO 17025) and available media (pdf etc.) can be found on our website, or you can contact us directly.		

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)

1 Single-ended current measurement, for differential measurement an external shunt or the appropriate connector (ACC/DSUBM-I2) is necessary

General Technical Specs

Terminal connection		
Parameter	**Value**	**Remarks**
Terminal connection	4x DSUB-15	8 analog inputs
Terminal connection DI, DO, INC, DAC	1x DSUB-15 1x DSUB-15 1x DSUB-15 1x DSUB-15	8 digital inputs 8 digital outputs 4 counter inputs 4 analog outputs
Further terminal connection	RJ45 CF-Card Slot 2x DSUB-9 DSUB-9 DSUB-9 BNC LEMO FGG.1B.302	Ethernet (100 Mbit), PC/network removable storage two CAN FD nodes external display external GPS module synchronization supply
Weight	approx. 2 kg	
Dimensions (WxHxD) in mm	95 x 111 x 185	

Power supply	Value	Remarks
Power supply	10 V to 32 V DC	
Max. power consumption	<25 W	
Isolation of supply input	not-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	360 s	minimum required active operation for full UPS functionality
UPS coverage	complete system	
UPS delay per power outage	1 s	"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 s); with fully charged Super-Caps (after minimum operating duration)

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	✔ of the types: analog, DI and counter (incremental counter) and CAN	doubled channels with independent sampling and trigger settings
Intelligent trigger functions	✔	e.g. logical combination of multiple channel events (threshold, transition) 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	

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

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 GPS IRIG-B NTP	Master / Slave via external GPS-receiver TTL via network

Operating conditions		
Parameter	**Value**	**Remarks**
Operating environment	dry, non corrosive environment within specified operating temperature range	
Rel. humidity	80% up to 31°C, above 31°C: linear declining to 50%	according IEC 61010-1
Ingress protection rating	IP20	
Pollution degree	2	
Operating temperature (Standard)	-10°C to +55°C	without condensation
Operating temperature (extended: "-ET" version)	-40°C to +85°C	condensation temporarily allowed
Shock- and vibration resistance	IEC 61373, IEC 60068-2-27 IEC 60068-2-64 category 1, class A and B MIL-STD-810 Rail Cargo Vibration Exposure U.S. Highway Truck Vibration Exposure	
Extended shock- and vibration resistance	upon request	specific tests or certifications upon request

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

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CS-7008-FD analog inputs

Inputs, measurement modes		
Parameter	**Value**	**Remarks**
Inputs	8	
Measurement modes	voltage measurement	ACC/DSUBM-UNI2
	current measurement	Single-ended (internal shunt) or shunt plug ACC/DSUBM-I2
	thermocouple measurement PT100 (3- and 4-wire configuration)	
	bridge sensor	
	strain gauge	full, half, quarter bridge
	current-fed sensors (IEPE/ICP)	with DSUB-15 expansion plug: (ACC/DSUB-ICP2, not isolated ACC/DSUBM-ICP2I-BNC-S/-F, isolated)

Sampling rate, Bandwidth, Filter, TEDS		
Parameter	**Value**	**Remarks**
Sampling rate	≤100 kHz	per channel
Bandwidth	0 Hz to 48 kHz 0 Hz to 30 kHz 0 Hz to 10 Hz	-3 dB -0.1 dB -3 dB for temperature measurement
Filter (digital) cut-off frequency characteristic type and order	10 Hz to 20 kHz	 Butterworth, Bessel low pass or high pass filter: 8th order band pass: LP 4th and HP 4th order Anti-aliasing filter: Cauer 8th order with f_{cutoff} = 0.4 f_s
Resolution	16 Bit	internal processing 24 Bit
TEDS Transducer Electronic Data Sheets	conforming to IEEE 1451.4 Class II MMI	esp. with ACC/DSUBM-TEDS-xx (DS2433) not supported: DS2431 (typ. IEPE/ICP sensor)

General			
Parameter	**Value typ.**	**min. / max**	**Remarks**
Overvoltage protection		±80 V ±50 V	permanent, differential input range >±10 V or device off input range ≤±10 V
Input coupling	DC		
Input configuration	differential		
Input impedance	1 MΩ 20 MΩ		range >±10 V range ≤±10 V
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-expansion plug independent of integrated sensor supply, short-circuit protected power per DSUB-plug

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Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	±50 V, ±25 V, ±10 V, ±5 V, ±2.5 V, ±1 V to ±5 mV		
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS; input range ≤±10 V
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	ΔT_a= |T_a-25°C|; with T_a = ambient temperature
Offset error	0.02 %	≤0.05 % ≤0.06 % ≤0.15 %	of the range, at 25 °C range >±50 mV range ≤±50 mV range ≤±10 mV
Offset drift	±40 µV/K·ΔT_a ±0.7 µV/K·ΔT_a ±0.1 µV/K·ΔT_a	±200 µV/K·ΔT_a ±6 µV/K·ΔT_a ±1.1 µV/K·ΔT_a	range >±10 V range ±10 V to ±0.25 V range ≤±0.1 V ΔT_a= |T_a-25°C|; with T_a = ambient temperature
Non-linearity	30 ppm	90 ppm	
CMRR (common mode rejection ratio)	80 dB 110 dB 138 dB	>70 dB >90 dB >132 dB	DC and f≤60 Hz range ±50 V to ±25 V range ±10 V to ±50 mV range ±25 mV to ±5 mV
Noise	3.6 μV_{rms} 0.6 μV_{rms} 0.14 μV_{rms}	5.5 μV_{rms} 1.0 μV_{rms} 0.26 μV_{rms}	range 0.1 Hz to 50 kHz range 0.1 Hz to 1 kHz range 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
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS
Input configuration	differential		
Gain error	0.02 %	0.06 % 0.1 %	of the reading, at 25 °C additional error of 50 Ω in plug
Gain drift	15 ppm/K·ΔT_a	55 ppm/K·ΔT_a	ΔT_a= |T_a-25°C|; with T_a = ambient temperature
Offset error	0.02 %	0.05 %	of the range, at 25 °C
Noise	40 nA_{rms} 0.7 nA_{rms} 0.17 nA_{rms}	70 nA_{rms} 12 nA_{rms} 0.3 nA_{rms}	Bandwidth: 0.1 Hz to 50 kHz 0.1 Hz to 1 kHz 0.1 Hz to 10 Hz

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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		
Shunt impedance	120 Ω		internal
Over load protection		±60 mA	permanent
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS
Input configuration	Single-ended		internal current sink to -VB
Gain error	0.02 %	0.06 %	of the reading, at 25 °C
Gain drift	15 ppm/K·ΔT_a	55 ppm/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$; with T_a = ambient temperature
Offset error	0.02 %	0.05 %	of the range, at 25 °C
Noise	40 nA_{rms} 0.7 nA_{rms} 0.17 nA_{rms}	70 nA_{rms} 12 nA_{rms} 0.3 nA_{rms}	Bandwidth: 0.1 Hz to 50 kHz 0.1 Hz to 1 kHz 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 range with bridge supply: 10 V with bridge supply: 5 V with bridge supply: 2.5 V with bridge supply: 1 V	±1000 mV/V, ±500 mV/V, ±200 mV/V, ±100 mV/V ... ... ±0,5 mV/V ... ±1 mV/V ... ±2 mV/V ... ±5 mV/V		 (as an option) (as an option)
Bridge supply (as an option)	10 V 5 V 2.5 V and 1 V	±0.5 % ±0.5 %	The actual value will be dynamically captured and compensated for in bridge mode.
Minimum bridge impedance Maximum bridge impedance	120 Ω full bridge 60 Ω half bridge 5 kΩ		
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 the reading, at 25 °C
Gain drift	20 ppm/K·ΔT_a	50 ppm/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$; with T_a = ambient temperature
Offset error	0.01 %	0.02 %	of input range, at 25°C, after automatic bridge balancing
Automatic shunt-calibration (calibration jump)	0.5 mV/V	±0.2 %	for 120 Ω and 350 Ω

Temperature measurement - Thermocouples			
Parameter	**Value typ.**	**min./ max.**	**Remarks**
Measurement mode	J, T, K, E, N, S, R, B		
Measurement range	-270 °C to 1370 °C -270 °C to 1100 °C -270 °C to 500 °C		type K
Resolution	0.063 K (1/16 K)		16-Bit integer
Measurement error		0.06 % 0.05 %	type K of measurement range, at 25 °C of reading (total uncertainty min. 0.85 K)
Drift	0.02 K/K·ΔT_a	0.05 K/K·ΔT_a	ΔT_a= |T_a-25°C|; with T_a = ambient temperature
Error of cold junction compensation		±0.15 K	with ACC/DSUBM-UNI2, at 25 °C
Cold junction drift	±0.001 K/K·ΔT_a		ΔT_a= |T_a-25°C|; with T_a = ambient temperature

RTD (PT100)			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	-200 °C to 850 °C -200 °C to 250 °C		
Resolution	0.063 K		
Measurement error			
4-wire measurement		0.25 K +0.02 % 0.1 K +0.02 %	-200 °C to 850 °C of measured value of resistance -200 °C to 250 °C of measured value of resistance
3-wire measurement		0.42 K +0.03 % 0.38 K +0.02%	-200 °C to 850 °C of measured value of resistance -200 °C to 250 °C of measured value of resistance Precision for 3-wire mode: with individual adjustment, only (special version upon request)
Drift		0.01 K/K·ΔT_a	ΔT_a= |T_a-25°C|; with T_a = ambient temperature
Sensor feed (PT100)	1.25 mA		

Sensor supply				
Parameter	**Value typ.**		**max.**	**Remarks**
Configuration options	5 selectable settings			always 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 580 mA 580 mA 580 mA 300 mA 250 mA 200 mA 120 mA 190 mA	Power 0.6 W 1.5 W 2.9 W 3.0 W 3.0 W 3.0 W 2.9 W 3.0 W	set jointly for all eight channels upon request, also 2.5 V and 1 V settings are available, for example by replacing the +12 V or +15 V setting. An arbitrary set of 5 setting can be chosen preferred selections: +24 V, +12 V, +10 V, +5.0 V, +2.5 V +15 V, +10 V, +5.0 V, +2.5 V, +1 V upon request, 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"
Compensation of cable resistances	3-line control: SENSE line as refeed (-VB: supply ground)			calculated compensation with bridges
Accuracy of output voltage	<0.25 %		0.5 % 0.9 % 1.5 %	at terminals, no load at 25°C over entire temperature range plus with optional bipolar output voltage
Max. capacitive load			>4000 µF >1000 µF >300 µF	2.5 V to 10 V 12 V, 15 V 24 V

Technical Specs DI / DO / ENC / DAC

Digital Inputs

Parameter	Value	Remarks
Channels	8	common ground reference for each 4-channel group, isolated from the other input group
Configuration options	TTL or 24 V input voltage range	configurable at the DSUB globally for 8 Bits: • jumper from LCOM to LEVEL: activates TTL-mode • LEVEL unconnected: activates 24 V-mode
Sampling rate	≤10 kHz	
Isolation strength	±50 V	tested ±200 V isolated to system ground, supply and channel-to-channel
Input configuration	differential	
Input current	max. 500 µA	
Switching threshold	1.5 V (±200 mV) 8 V (±300 mV)	5 V level 24 V level
Switching time	<20 µs	
Supply HCOM	5 V max. 100 mA	electrically isolated from system (case), Configuration signal "LEVEL" is referenced to HCOM, LCOM
Terminal connection	DSUB-15	ACC/DSUBM-DI4-8

Digital outputs

Parameter	Value		Remarks
Channels / bits	8 bit		Group of 8 bits, galvanically isolated; common reference potential ("LCOM") for each group
Isolation strength	±50 V		to system ground (case, CHASSIS)
Output configuration	totem pole (push-pull) or open-drain		configurable at the DSUB globally for 8 Bits: • jumper from OPDRN to LCOM: totem pole • OPDRN unconnected: open-drain
Output level	TTL or max. U_{ext} -0.8 V		internal, galvanically isolated supply voltage by connecting an external supply voltage U_{ext} with "HCOM", U_{ext} = 5 V to 30 V
State upon system power up	high impedance (High-Z)		Independent of output configuration (OPDRN-pin)!
Activation of the output stage following system start	upon first preparation of measurement		with initial states which can be selected in the experiment (High / Low) in the selected output configuration (OPDRN-pin)
Max. output current (typ.)	HIGH	LOW	
TTL 24 V-logic open-drain	15 mA 22 mA ---	0.7 A 0.7 A 0.7 A	external clamp diode needed for inductive load
open-drain with intern. 5 V supply		160 mA	for all outputs
Output voltage	HIGH	LOW	for load current:
TTL	>3.5 V	≤0.4 V	I_{high} = 15 mA, I_{low} ≤0.7 A
24 V-logic (U_{ext} = 24 V)	>23 V	≤0.4 V	I_{high} = 22 mA, I_{low} ≤0.7 A
Internal supply voltage	5 V, 160 mA (isolated)		available at terminals
Switching time	<100 µs		
Terminal connection	DSUB-15		ACC/DSUBM-DO8

ENC4: Pulse counter for incremental encoder

Parameter	Value		Remarks
Channels	4 + 1 (5 tracks)		four single-tracks or two two-track channels one index track
Measurement modes	Displacement (abs), Displacement (diff), Angle (abs), Angle (diff), Event, Frequency, Speed, Velocity, Time and Puls Time Measurement		only if the sampling rate is ≤ 1 ms
Sampling rate	≤50 kHz		per channel only one sampling rate for all 4 channels allowed
Time resolution of measurement	31.25 ns		counter frequency: 32 MHz
Data resolution	16 bits		
Input configuration	differential		
Input impedance	100 kΩ		
Input voltage range	±10 V		differential
Common mode input range	min. -11 V	max. +25 V	
Switching threshold	-10 V to +10 V		detection level selectable per channel
Hysteresis	min. 100 mV		selectable per channel
Analog bandwidth	500 kHz		-3 dB (full power)
Analog filter	Bypass (no Filter), 20 kHz, 2 kHz, 200 Hz		selectable (per-channel) 2nd order Butterworth
Switching delay	500 ns		signal: 100 mV squarewave
CMRR	70 dB 60 dB	50 dB 50 dB	DC, 50 Hz 10 kHz
Gain error	<1 %		of input voltage range @ 25 °C
Offset error	<1 %		of input voltage range @ 25 °C
Overvoltage strength	±50 V		to system ground
Sensor supply	+5 V, 300 mA		not isolated (reference: GND, CHASSIS)
Terminal connection	DSUB-15		ACC/DSUBM-ENC4

Analog outputs

Parameter	Value typ.	min. / max.	Remarks
Channels	4		
Output level	±10 V		
Load current	max. ±10 mA / channel		
Resolution	16-bit		15-bit, no missing codes
Non-linearity	±2 LSB	±3 LSB	
Max. output frequency	50 kHz		
Analog bandwidth	50 kHz		-3 dB, low pass 2nd order
Gain error	<±5 mV	<±10 mV	-40 °C to 85 °C
Offset error	<±2 mV	<±4 mV	-40 °C to 85 °C
Terminal connection	DSUB-15		ACC/DSUBM-DAC4

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Errors and changes excepted

CAN FD Bus Interface

Parameter	Value	Remarks
Number of CAN-nodes	2	one galvanically isolated node per connector
Terminal connection	2x DSUB-9	
Topology	bus	
Transfer protocol	configurable per software: CAN FD (ISO Standard) (max. 8 MBaud) non-ISO CAN FD (Draft) (max. 8 MBaud) CAN High Speed (max. 1 MBaud) CAN Low Speed (max. 125 KBaud)	individually for each node current standard according ISO 11898-1:2015 former draft (Bosch) according ISO 11898 according ISO 11519
Operating principle	Multi Master principle	
Direction of data flow	sending and receiving	
Baud rate	5 kbit/s to 8 Mbit/s	configurable via software; maximum is depending on selected protocol (FD/High/Low Speed)
Termination	120 Ω	switchable by software for each node
Isolation strength	±60 V	to system ground and case
Direct access for configuration of imc CANSAS modules	yes	via the CAN node of the device with imc STUDIO (CAN High Speed Mode only)

Note Remote Frame

imc devices actually does not support Remote Frames (RTR) according to CAN specification.

Contact imc

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Tech support

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imc ACADEMY - Training center

The safe handling of measurement devices requires a good knowledge of the system. At our training center, experienced specialists are here to share their knowledge.

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Internet: https://www.imc-tm.com/service-training/imc-academy

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