imc EOS U-4

The fast compact measurement instrument for direct connection of IEPE sensors and voltage signals

The EOS U-4 model of the imc EOS series is a 4-channel measurement instrument for applications in the fields of noise and vibration, materials testing and component testing, ballistics and e-mobility. It is equipped with high bandwidth amplifiers to which any IEPE/ICP™ sensors can be connected directly via BNC, such as DeltaTron® accelerometers and microphones as well as piezoelectric sensors for dynamic measurements (AC) of force and pressure.

imc EOS – 4 MS/s fast, compact and portable measurement instruments

The EOS U-4 system of the imc EOS device series has a fixed configuration. The measurement instruments work computer-aided via network connection to a PC. As standard equipment, all devices have fully conditioned input channels and a large internal data memory.

imc EOS can be cascaded and synchronized with other imc systems. Maximum flexibility is guaranteed as the operating mode can be configured individually and via software for each system.

imc EOS U-4 device, 4 analog channels

imc EOS – Cascading of several devices and in combination with further components of the imc CRONOS*flex* device series

imc EOS systems can be easily connected mechanically by means of the robust imc click mechanism, whereby a common supply voltage is electrically coupled at the same time. A PTP-compatible network switch, a buffered UPS solution and a sensor supply for current transducers are also offered in these housings which are compatible with the imc CRONOS*flex* family.

https://www.imc-tm.com

U-4 for imc EOS (EOS/U-4)
Technical Data Sheet

Highlights

- Data storage on on-board flash memory or on network drive (NAS etc.: in preparation)
- Trigger functionality system-wide and PC independent
- With internal WiFi (WLAN) adaptor (Wireless Network), optional
- Can be networked via Ethernet TCP/IP and synchronized with other imc measurement devices via:
  - isolated sync signal (IRIG-B)
  - network based via NTP
  - PTP in preparation
- Measurement channel extension by direct networking with further imc EOS systems or devices of other imc product series.
- Immediately ready for measurement with uniform operating software imc STUDIO that provides access to all functionalities

Typical applications:

Automotive

- Vibrations in engines, transmissions, turbochargers
- Injection systems, indexing systems, ignition voltages
- Piezo actuators
- Airbags, crash test data recordings

E-Mobility and Power

- eMotors up to 48 V
- Hybrid vehicles, eBikes, eScooters
- Maglev trains
- Power tools
- Converter, charger, switching elements
- Power measurement

Aerospace, Military

- Turbine test (power generation, jet aircraft)
- Ballistics, explosion processes
- Blasting, shooting, drop tower

Overview of available variants

Order Code	Signal inputs	article no.
EOS/U-4	LEMO.1B.307 & BNC	12800001
EOS/U-4-SUPPLY	with additional sensor supply (SUPPLY)	12800000

Extra options (factory order options)

Order Code	internal Onboard Flash Storage for imc EOS	article no.
EOS/FLASH-480GB	480 GB TLC, industrial (-40 °C to +85 °C)	12800002
EOS/FLASH-960GB	960 GB TLC, industrial (-40 °C to +85 °C)	12800003

Order Code		article no.
EOS/WLAN-I	internal WiFi (WLAN) adaptor: Dual Band (802.11n) (-20 °C to +85 °C)	12800004

Mechanical drawing with dimensions
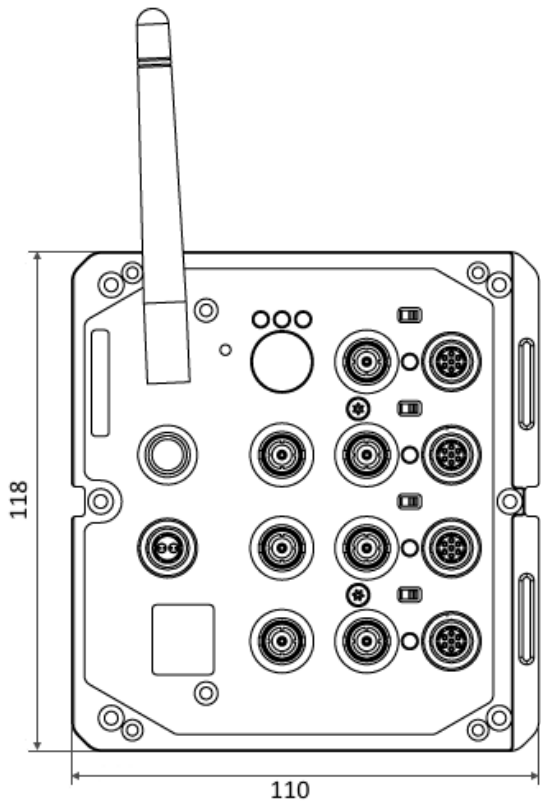
Device is shown in standard operating orientation.

Software minimum requirements

Operation requires operating software of the following group:
imc STUDIO 5.2 R23 associated with firmware and driver package imc DEVICEcore 3.3 R7.
Recommendation imc STUDIO 2022 R2 or higher.

Accessories and Connectors

Included accessories

AC/DC power adaptor 110-230V AC (with appropriate LEMO plug)		
ACC/AC-ADAP-48-150-1B	48 V DC / 150 W LEMO.1B.302	13500148

Power plug		
ACC/POWER-PLUG5	DC supply plug LEMO FGG.1B.302, with solder contact, max. 0.34 mm^2	13500150

Documents		
Device certificate		

Miscellaneous		
1x Ethernet network cable with latch protection (uncrossed, 2 m)		

Optional accessories

Supply module in left handle ("Power-Handle")		
CRFX/HANDLE-POWER-L	handle with system power supply 50 V 100 W, without UPS	11900058
CRFX/HANDLE-UPS-L	handle with system power supply 50 V 100 W, USV with lead-gel battery	11900043
CRFX/HANDLE-LI-IO-L	handle with system power supply 50 V 100 W, USV with Li-Ion battery	11900010

Plug		
ACC/REMOTE-1B	Remote plug, LEMO.1B.306	13500153
ACC/REMOTE-1B-12	Remote plug CRFX/HANDLE, with bridged contacts (pin 1-2). Required to power on and off a combination of EOS and CRFX/HANDLE.	13500370

Passive handle		
CRFX/HANDLE-L	standard unpowered left handle	11900008
CRFX/HANDLE-R	standard unpowered right handle	11900007

Mounting brackets for fixed installations		
CRFX/BRACKET-90	mounting bracket 90°	11900068
CRFX/BRACKET-180	mounting bracket 180°	11900069
CRFX/BRACKET-BACK	rear panel mounting element	11900070
CRFX/BRACKET-CON	assembly element for two modules	11900071
CRFX/RACK	19" RACK for imc CRONOS*flex* modules	11900066
CRFX/BRACKET-RACK	mounting element in the RACK	11900072

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.		

Technical Specs - imc EOS U-4

Terminal connections		
Parameter	**Value**	**Remarks**
Analog inputs	4 x BNC 4 x LEMO.1B (7-pin)	voltage / IEPE alternatively: voltage recommended plug: FGG/FEG.1B.307
PC / network Ethernet TCP/IP	RJ45 Gigabit Ethernet	PC/network, NAS-storage synchronization
Synchronization	BNC	IRIG-B, isolated
External trigger	2 x BNC	In / Out differential / isolated
Action-Button	"START"	manual start of the measurement, trigger
Power supply	LEMO.1B (2-pin)	compatible with LEMO.EGE.1B.302 multicoded 2 notches compatible with plugs FGG.1B.302 (standard) or FGE.1B.302 (E-coded, 48 V)
Module connector	2 x 20-pin compatible with imc CRONOS*flex*	mechanical coupling common DC power supply, expandable by UPS module
Internal WiFi (WLAN) adaptor	802.11 g/n/ac (1 antenna)	optional equipment, software support in preparation
Weight	approx. 1.57 kg	
Dimensions (B x H x T)	110 x 118 x 180 mm	

Power supply		
Parameter	**Value**	**Remarks**
Power supply	10 V to 50 V DC	
Power-on threshold (typ.)	9.2 V	min. input voltage required for power-on (open circuit)
Shutdown threshold (typ.)	8.0 V	input voltage at which the automatic deactivation is triggered (data backup protected by internal UPS buffering)
Power consumption	30 W	
Isolation	60 V	
AC/DC power adaptor	110 V to 230 V AC	included in delivery

Power outage and Data integrity		
Parameter	**Value**	**Remarks**
Auto data-saving upon power outage	✔	buffering (short time UPS) with following "auto-shutdown" auto-stop of measurement, data storage and automatic shutdown
Buffering during data-saving (short time UPS)	integrated	Super-Caps
Charging time of the Super-Caps	<60 s	minimum required active operation for full buffer functionality
Response time in case of power outage	0 s	"buffer time constant": required duration of a continuous outage that will trigger auto shutdown procedure fix parameter: not changeable in device configuration!

Data acquisition, trigger		
Parameter	**Value**	**Remarks**
Max. aggregate sampling rate	4 MS/s	Sum of the sampling rates of all active channels
Channel individual sampling rates	selectable in 1–2–5 steps	max. 4 MS/s
Number of sampling rates per system	arbitrary	
Intelligent trigger functions	✔	logical combination of multiple channel events (threshold, transition) to create triggers that start and stop acquisition of assigned channels
Multi triggered data acquisition	✔	Multi-shot (with automatic re-arming of the measuring system). A global device trigger with configurable start and stop condition.
Multi trigger	max. 8	independent trigger definitions with arbitrary channel assignments (start/stop)
Trigger definitions	as logical AND/OR combinations of events	events: threshold value, edge, range

Storage, signal processing

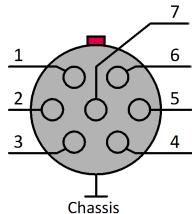| Parameter	Value	Remarks
Onboard Flash mass storage	480 GByte ... 960 GByte (equipment options)	not changeable Status-LED "STORAGE"
Storage on NAS (network storage)	✔	in preparation: alternatively to onboard Flash storage With data streaming, high-speed networks with 1Gbit / 10 Gbit are recommended.
Arbitrary memory depth with pre- and post trigger	✔	pretrigger limited by the RAM of device: up to 30 s @ 4 MS/s posttrigger only limited by available mass storage (Flash)
Synchronization	IRIG-B NTP (PTP)	TTL via LAN IEEE 1588 PTPv2 (in preparation) Hardware PTP-ready, future software updates

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 to50%	according IEC 61010-1
Ingress protection rating	IP20	
Pollution degree	2	
Operating temperature (standard)	-10 °C to +55 °C	without condensation
Shock- and vibration resistance	IEC 61373, IEC 60068-2-27 IEC 60062-2-64 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: single 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

External synchronization			
Parameter	**IRIG-B**	**NTP**	**PTP (in preparation)**
Supported formats	B002, B006	Version ≤4	Version 2
Precision	<1 µs	<5 ms after aprox. 12 h [1]	<1 µs
Jitter (rms) [2]	<100 ns	---	<100 ns after 2 min
Input connection	BNC "SYNC" (isolated)	RJ45 "LAN"	RJ45 "LAN"

Synchronization via multiple devices with IRIG-B (Master/Slave)			
Parameter	**Value (typ.)**	**min. / max.**	**Remarks**
Common mode SYNC isolated		max. 50 V	BNC socket: isolated; for reliable operation even with different voltage level (ground loops).
Voltage level		5 V TTL level	
Input impedance		20 kΩ	

Ext. Trigger (in/out)		
Parameter	**Value**	**Remarks**
Socket	2 x BNC direct connection	2 sockets for an easier connection without T-coupling
Level	TTL, isolated	bidirectional

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1   Max. value, concerning the following condition: first-synchronization

2   Statistical mean variation. Also dependent on signal quality with IRIG-B (e.g. direct connection to imc master device) respectively the specific network configuration with PTP (e.g. point-to-point connection via PTP-capable network switch such as imc NET-SWITCH-5).

Measurement inputs imc EOS U-4

Measurement channels		
Parameter	**Value**	**Remarks**
Analog inputs	4	
Isolation	yes	channel - channel; channel - chassis
	60 V	nominal working voltage
Measurement modes	voltage measurement	via BNC or LEMO (connected in parallel)
	IEPE sensors (AC with current feed)	via BNC
Pin configuration LEMO.1B	1 +IN 2 -IN 3 +SUPPLY 4 -SUPPLY 5 reserved 6 GND (Signal) 7 GND (Supply)	

Sampling rate, bandwidth, filter		
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Sampling rate	1 kS/s to 4 MS/s		individually selectable per channel (intermediate settings in 1, 2, 5 steps) max. aggregate sampling rate: 4 MS/s for entire device
Bandwidth	DC/ 0 Hz to 1.8 MHz 3 Hz to 1.8 MHz 3 Hz to 1.8 MHz		-3 dB, for DC voltage measurement -3 dB, for AC voltage measurement -3 dB, for IEPE measurement

Filter (digital)
  cut-off frequency
  type
  characteristic
  order
  Anti-aliasing Filter
	100 Hz to 500 kHz
	low pass or deactivated
	Butterworth, Bessel, AAF
	low pass 8th order
	Cauer 8th order
			with $f_{cutoff} = 0.4\ f_s$

Resolution	24 Bit		output format: 32 Bit (24 Bit Mantissa)

General		
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Overvoltage protection		±200 V ±100 V	transient static (continuous)
	transient protection: ESD 2 kV automotive load dump ISO 7637		human body model
Input coupling	DC AC IEPE		AC with current feed
Input configuration	differential, isolated		

Input impedance
  range: ≤±10 V
  range: >±10 V
	1 MΩ / 140 pF
	480 kΩ / 60 pF
			AC /DC (differential)

U-4 for imc EOS (EOS/U-4)
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Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Voltage input ranges	±60 V, ±50 V, ±25 V, ±10 V, ±5 V, ±2.5 V, ±1 V, ±0.5 V, ±0.25 V, ±0.1 mV		for ±60 V range setting the following applies: nominal working voltage: 60 V (according to the low voltage directive SELV) linear operation and valid measured values: up to 100 V
Gain error	0.02 %	0.05 %	of the measured value, at 25 °C, with DC
Gain drift	30 ppm/K·ΔT_a	50 ppm/K·ΔT_a	$\Delta T_a=|T_a -25\,°C|$; with T_a = ambient temperature
Offset error	0.02 %	0.05 % 0.07%	of the range, at 25 °C range ±60 V to ±0.5 V range ≤±0,25 V
Offset drift range = 60 V ranges >±10 V ranges ≤±10 V	±0.5 µV/K·ΔT_a ±(100 µV + 4 ppm · range)/K·ΔT_a ±(1 µV + 8 ppm · range)/K·ΔT_a	±1.3 µV/K·ΔT_a ±(250 µV + 10 ppm · range)/K·ΔT_a ±(4 µV + 14 ppm · range)/K·ΔT_a	example: max. ±500 µV/K·ΔT_a in range 25 V example: max. ±18 µV/K·ΔT_a in range 1 V $\Delta T_a=|T_a -25\,°C|$; with T_a = ambient temperature
Non linearity	50 ppm 30 ppm	100 ppm 60 ppm	ranges ±5 V and ±10 V all the other ranges
IMR (isolation mode rejection) ranges ≤±10 V ranges >≤±10 V		>100 dB >80 dB >75 dB >55 dB	10 kHz 100 kHz 10 kHz 100 kHz

Signal noise (SNR)	1 MSps	100 kSps	10 kSps	at specified sampling rate (with AAF)
50 V range	-90 dB	-100 dB	-107 dB	(all typ. values)
10 V range	-98 dB	-107 dB	-112 dB	
1 V range	-95 dB	-105 dB	-111 dB	
0.1 V range	-79 dB	-88 dB	-95 dB	

Crosstalk		95 dB 65 dB	100 kHz ≤±10 V >±10 V
Phase matching between channels	<10 ns		

IEPE/ICP Sensor			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
IEPE-current source	4 mA, 8 mA, 12 mA, 16 mA	±10 %	channel individually selectable
Voltage swing	25 V	>24 V	
Source impedance	>100 kΩ >40 kΩ		4 mA other IEPE-current source settings

Sensor supply EOS/U-4-SUPPLY			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Output voltage	±15 V, ±12 V, ±10 V, ±7,5 V, ±5 V, ±4 V, ±3.5 V, ±3.3 V, ±3 V, ±2.5 V		channel individually selectable and isolated
Short-circuit protection	unlimited duration		
Overvoltage protection	±50 V		
Error of output voltage	±2 %		
Power of output voltage per channel	typ. 1.5 W max. 300 mA		e.g. unipolar 3 V, 300 mA, 0.9 W unipolar 5 V, 300 mA, 1.5 W unipolar 12 V, 125 mA, 1.5 W bipolar ±5 V, 150 mA, 1.5 W bipolar ±15 V, 50 mA, 1.5 W
Output impedance	0.3 Ω		

Contact imc

An Axiometrix Solutions Brand

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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.

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

International partners

You will find the contact person responsible for you in our overview list of imc partners:

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