

ICPU2-8 for imc CRONOSflex (CRFX/ICPU2-8)

8-channel IEPE/ICP-Measurement Module

The ICPU2-8 is a broadband measurement amplifier for the measurement of:

- IEPE/ICP sensors (current-fed 4 mA)
- Voltage (AC and DC coupling)

Direct connection of ICP-compatible sensors (ICP™, DELTATRON®, PIEZOTRON® sensors) takes place via BNC.

Highlights

- High signal bandwidth of up to 48 kHz
- Finely adjustable input voltage range (from ±5 mV to ±50 V)
- Input coupling switchable via software: DC, AC, AC with current supply
- Each channel with its own adjustable filter (e.g., anti-aliasing filter) and simultaneous A/D converter
- Supports imc Plug & Measure conforming to IEEE 1451.4 (Class I mixed mode interface)



imc CRONOSflex IEPE/ICP Measurement Module (CRFX/ICPU2-8)

Typical applications

- Ideal for noise and vibration analysis and acceleration measurements

imc CRONOSflex - Frameless expansion, flexible modularity

The imc Click Mechanism and extruded aluminum case provide a firm mechanical and electrical connection. As a result, no mainframe or rack is needed.

An imc CRONOSflex system uses EtherCAT as an "internal" system bus for connecting various modules to the main base unit (CRFX-400 / CRFX-2000G). With the system bus, all imc CRONOSflex modules are guaranteed to be synchronized with each other. This allows various modules to be either connected in one central block or connected via standard network cable in a spatially distributed system.

Alternatively, connection can be made by means of standard Ethernet cables (RJ45, CAT5), thus creating a spatially distributed system.



imc Click Mechanism



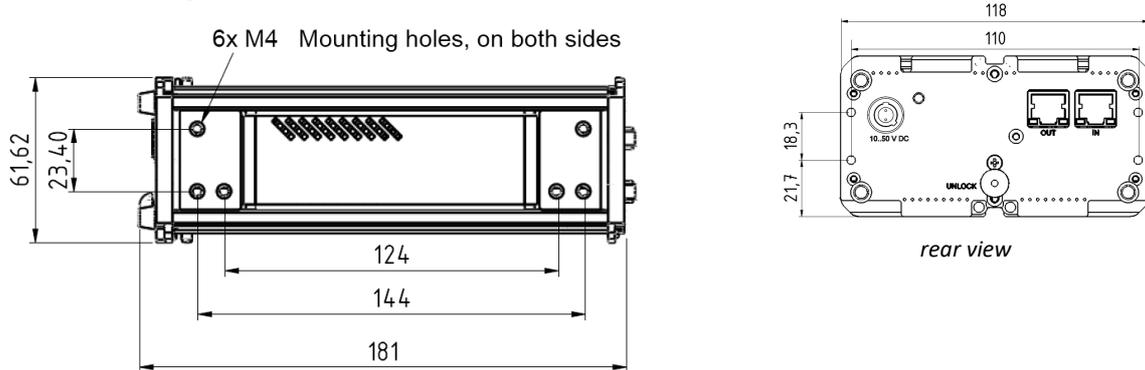
CRFX distributed system

Overview of the available variants

Standard version		ET version *	
Order code	article no.	article no.	remarks
CRFX/ICPU2-8	11900039	11910042	with BNC connectors
CRFX/ICPU2-8-70mHz	11900230	11910141	special version: 0.07 Hz cut-off frequency
CRFX/ICPU2-8-D-70mHz	119001xx	11910146	DSUB-variant with 0.07 Hz cut-off frequency

* ET: Version in extended temperature range

Mechanical drawings with dimensions



Module power supply options

- Direct connection (LEMO.EGE.1B.302 power socket)
- Adjacent module (module connector / imc Click Mechanism)
- EtherCAT network cable: Power over EtherCAT (PoEC)

For further details refer to the power options documentation.

Included accessories

DSUB-15 plug only for the variant with DSUB sockets		
2x ACC/DSUBM-U4	DSUB-15 plug with screw terminals for 4-channel voltage measurement	13500166
Documents		
Getting started with imc CRONOSflex (one copy per delivery)		
Device certificate		

Optional accessories

AC/DC power adaptor 110-230 VAC 50-60 Hz (with appropriate LEMO.1B.302 plug)		article no.
48 V DC / 150 W	ACC/AC-ADAP-48-150-1B	13500148
24 V DC / 60 W	CRPL/AC-ADAPTER-60W-1B	10800066
Power plugs		
ACC/POWER-PLUG-5	Power plug for DC supply LEMO.FGE.1B.302 plug (male, E-coded: 2 coding keys)	13500150
CRFX/MODUL-PP-90	Power plug for DC supply 90° angular LEMO.FHE.1B.302 plug (male, E-coded: 2 coding keys)	11900074
Supply module (Power Handle)		article no.
CRFX/HANDLE-POWER-L	Handle with system power supply 50 V 100 W, without UPS	11900058
CRFX/HANDLE-NIMH-L	Handle with system power supply 50 V 100 W, UPS with NiMH battery	11900273
CRFX/HANDLE-LI-IO-L	Handle with system power supply 50 V 100 W, UPS with Li-Ion battery	11900010

Passive-Handle		
CRFX/HANDLE-L	standard unpowered left handle	11900008
CRFX/HANDLE-R	standard unpowered right handle	11900007
Mounting bracket for increased stability (recommended for lifetime and robustness)		
CRFX/BRACKET-CON	assembly element for 2 modules	11900071
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/RACK	19" RACK for imc CRONOSflex 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
<p>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.</p>		

Technical Specs - CRFX/ICPU2-8

Inputs, measurement modes, terminal connection		
Parameter	Value	Remarks
Inputs	8	
Measurement modes	voltage measurement IEPE-sensor with current-fed	

Sampling rate, Bandwidth, Filter, TEDS			
Parameter	Value typ.	min. / max.	Remarks
Sampling rate	≤100 kHz		per channel, max system throughput of all module channels: 800 kHz including monitor channels
Bandwidth	0 Hz to 48 kHz 0 Hz to 30 kHz		-3 dB -0.1 dB
Filter (digital) cut-off frequency characteristic 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 8.order with $f_{cutoff} = 0.4 f_s$
Filter cut-off frequency (high pass, 3 rd order, -3 dB)	0.43 Hz 1.06 Hz 0.07 Hz 0.13 Hz		ICPU2-8 standard version ICP, ranges ≤±10 V ICP, ranges >±10 V special version CRFX/ICPU2-8(-D)-70mHz * ICP, ranges ≤±10 V ICP, ranges >±10 V
Resolution	16 Bit 24 Bit		output format is selectable for each channel individually: a) 16 Bit Integer b) 32 Bit Float (24 Bit Mantissa)
TEDS	conforming to IEEE 1451.4 Class I Mixed Mode Interface		
Characteristic curve linearization	user defined (max. 1023 supporting points)		

* The special versions are available on request. However, they should only be used when actually needed, as the settling times are correspondingly extended (up to the minute range).

General			
Parameter	Value typ.	min. / max.	Remarks
Overvoltage protection		±50 V	continuous channel to chassis
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS; input range ≤±10 V
Input coupling	AC, DC, AC with current feed (ICP)		
Input configuration	differential Single-ended		software-configurable
Input impedance range >±10 V	333 kΩ 0.67 MΩ 1 MΩ		at DC-voltage resp. 50 Hz ICP (Single-ended) AC (differential) DC (differential)
range ≤±10 V	908 kΩ 1.82 MΩ 20 MΩ		ICP (Single-ended) AC (differential) DC (differential)
Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	±50 V, ±25 V, ±10 V, ±5 V, ±2.5 V, ±1 V, ..., ±5 mV		
Gain error	0.02%	≤0.05%	of the reading, at 25°C
Gain drift	(+20 ppm/K)·ΔT _a	(+80 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 input range, at 25°C >±50 mV ≤±50 mV ≤±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	ranges >±10 V range ±10 V bis ±0.25 V ranges ≤±0.1 V
CMRR (common mode rejection ratio)			common mode voltage (DC..60 Hz):
Input ranges: ±50 V to ±10 V	62 dB	>46 dB	±50 V
Input ranges: ±5 V to ±50 mV	92 dB	>84 dB	±10 V
Input ranges: ±25 mV to ±5 mV	120 dB	>100 dB	±10 V
Noise	14 nV/√Hz 0.4 μV _{rms}		DC coupling 1 kHz bandwidth 0.1 Hz to 1 kHz
Constant current supply			
Parameter	Value typ.	min. / max.	Remarks
ICP current sources	4.2 mA/channel	±10%	
Compliance voltage	25 V	>24 V	
Source impedance	280 kΩ	>100 kΩ	

Block isolation		
Parameter	Value	Remarks
Block isolation	60 V	all internal electronics isolated (incl. ICP current sources) from the housing (CHASSIS, PE)
Isolation impedance	500 kΩ 1 nF	
Internal reference ground	-IN	all channels with one common, galvanically connected reference ground: in ICP-mode: -IN as reference for current source, In voltage-mode not externally accessible
External reference ground	CHASSIS, metal housing	internal electronics as an entity, galvanically isolated from housing

Block isolation for improved suppression of ground loops and related interference. Does not constitute channel-wise individual isolation. Not rated nor intended for safety of equipment and personnel.

Devices or modules purchased before ca. 2012 do not feature block isolation.

Power supply (CRFX)		
Parameter	Value	Remarks
Input supply voltage	10 V to 50 V DC	
Power consumption	7.4 W	10 V to 50 V DC
Isolation	60 V	nominal isolation specification of the supply input
Power-over EtherCAT (PoEC)	42 V to 50 V DC	supply via EtherCAT network cable

Terminal connections of the module		
Parameter	Value	Remarks
EtherCAT connection	2x RJ45	system bus for distributed imc CRONOSflex components
Input supply plug (female)	LEMO.EGE.1B.302	multicoded 2 notches for optional individually power supply
Module connector	2x 20 pin	direct connection of modules (click) supply and system bus

Pass through power limits	
Directly connected (clicked) imc CRONOSflex Modules	3.1 A (maximum current) Equivalent power with chosen DC power input: <ul style="list-style-type: none"> • 149 W @ 48 V DC (e.g. AC/DC line adaptor) • 37 W @ 12 V DC (typical vehicle supplied DC input)
Power-over EtherCAT (PoEC) for remote imc CRONOSflex Modules	350 mA (maximum current, corresponding to IEEE 802.3) Equivalent power with chosen DC power input: <ul style="list-style-type: none"> • 17.5 W @ 50 V DC (e.g. Power Handle) • 16.8 W @ 48 V DC (e.g. AC/DC line adaptor) • 14.7 W @ 42 V DC (minimum voltage for PoEC) Note: minimum system power of 42 V DC required for PoEC

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 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
Dimensions	62 x 118 x 186 mm	W x H x D
Weight	1 kg	