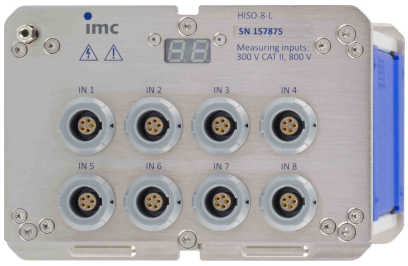
HISO-8 for imc CRONOSflex (CRFX/HISO-8)

8-channel, high voltage isolated measurement amplifier for voltage and temperature

The HISO-8 is an isolated, differential measurement amplifier with 8 analog inputs for measuring small voltage signals with high common mode isolation up to 800 V. The following signals and sensors are supported, depending on the chosen variant:

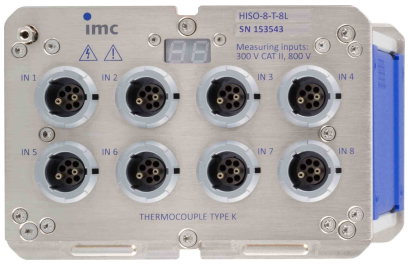
- Voltage (±50 mV to ±60 V)
- Current (20 mA)
- PT100, PT1000 temperature sensors
- Thermocouple



CRFX/HISO-8-L

Highlights

- Channel-wise isolated, galvanically-separated inputs
- High common mode isolation up to 800 V
- Overvoltage protection ±600 V (differential)
- High signal bandwidth of up to 11 kHz
- Each channel with its own adjustable filter (e.g., anti-aliasing filter) and simultaneous A/D converter



CRFX/HISO-8-T-8L

Typical applications

- Testing in e-mobility environments (e.g., electric and hybrid vehicles)
- Tests where full personal safety must be guaranteed even in case of hazards
- Measurements on high-voltage components, such as batteries, power electronics components and power supply circuits; low-voltages, including signals on external current measurement shunts

CRFX/HISO-8-T-2L

imc CRONOS*flex* - 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.


imc Click Mechanism

An imc CRONOS*flex* 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 CRONOS*flex* 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.


CRFX distributed system

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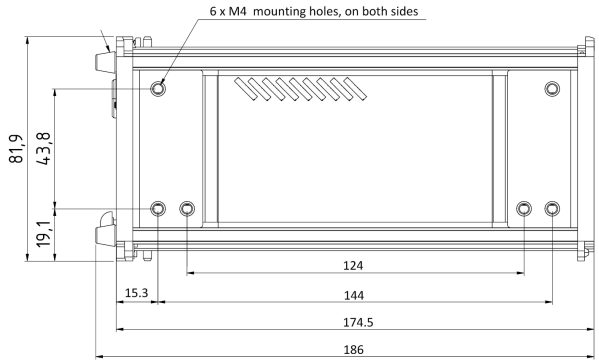
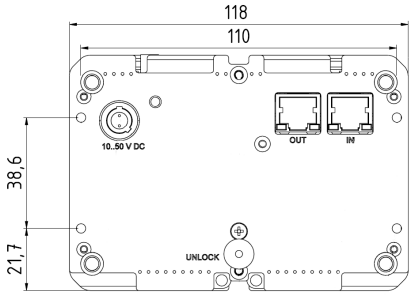
Overview of available variants

Order code	article no.	remarks
CRFX/HISO-8-L	11900168	8x LEMO.1P (5-pin), universal measurement modes: U, I, PT
CRFX/HISO-8-T-8L	11900169	8x LEMO.2P (2-pin), thermocouple mode TC
CRFX/HISO-8-T-2L	11900231	2x LEMO.2P (8-pin), thermocouple mode TC
CRFX/HISO-8-T-2L-OR	11900232	module variant in orange, with 2x LEMO.2P (8-pin), thermocouple mode TC

Mechanical drawings with dimensions



Shown in standard operating orientation



rear view of the imc CRONOSflex module

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

Documents
Getting started with imc CRONOS*flex* (one copy per delivery)
Device certificate

Optional accessories

LEMO.1P (Redel) 5-pin		
ACC/LEMO.1P-5	sensor plug for high voltages (HV)	13500319

LEMO.1P (Redel) 5-pin, 1-channel sensor cable for HV modules: HISO8-L		
ACC/SENSORCABLE-HV-L1P-PT100-3M	5-lead cable with assembled PT100 (class A) on capton foil, cable length 1 m	13500317
ACC/SENSORCABLE-HV-L1P-3M	5-lead cable with open ends, cable length 3 m	13500318

LEMO.2P (Redel) 2-pin, 1-channel sensor cable thermo couple type K for HV modules: HISO8-T-8L		
ACC/SENSORCABLE-HV-T-L-3M	cable length 3 m	13500281

LEMO.2P (Redel) 8-pin, 4-channel sensor cable thermo couple type K for HV modules: HISO8-T-2L		
ACC/SENSORCABLE-4HV-T-L-3M	cable length 3 m	13500284
ACC/SENSORCABLE-4HV-T-L-XS-3M	cable length 3 m, extra slim, the upper part of the cable (40 cm) is unprotected	13500323
ACC/SENSORCABLE-4x1HV-T-L-3M	cable length 3 m, common plug with 4 individual, outgoing cables	13500322

LEMO.2P (Redel) connection box for high voltage (HV) modules		
ACC/HVBOX-8-T-10M	4-channel HV connection box for 4 thermocouple type K with 10 m HV compatible cable for HISO8-T-2L	13500353

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 CRONOS*flex* Modules	11900066
CRFX/BRACKET-RACK	mounting element in the RACK	11900072

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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 - CRFX/HISO-8

Inputs, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Inputs	8	
Measurement modes CRFX/HISO-8-L	voltage measurement current measurement (20 mA) PT100, PT1000 measurement	all measurement modes isolated individually
Measurement modes CRFX/HISO-8-T-8L and CRFX/HISO-8-T-2L(-OR)	thermocouple measurement type K	
Terminal connection	8x LEMO.1P REDEL (5-pin) high-voltage proof plug 8x LEMO.2P REDEL (2-pin) high-voltage proof plug 2x LEMO.2P REDEL (8-pin) high-voltage proof plug	1 channel per plug / HISO-8-L 1 channel per plug / HISO-8-T-8L 4 channels per plug / HISO-8-T-2L(-OR)

Sampling rate, Bandwidth, Filter, TEDS		
Parameter	**Value**	**Remarks**
Sampling rate	≤100 kHz	per channel, max system throughput of all module channels: 800 kHz including monitor channels
Bandwidth	0 Hz to 11 kHz 0 Hz to 8 kHz	-3 dB -0.2 dB
Filter		digital filter
type	low-, high-, band pass, AAF	
characteristic	Butterworth, Bessel	
cut-off frequency	20 Hz to 5 kHz	1 - 2 - 5 steps
order	8th order 4th + 4th order	low pass, high pass band pass: low- and high pass
anti-aliasing filter (AAF)	low pass Cauer 8th order with $f_{cutoff} = 0.4\ f_s$	automatically adapted to selected sampling rate f_s
Resolution	 16 Bit 24 Bit	output format is selectable for each channel individually: a) 16 Bit Integer b) 32 Bit Float (24 Bit Mantissa)

General				
Parameter	**Value typ.**	**min. / max.**	**Remarks**	
Isolation strength (common mode)			per IEC (EN) 61010-1:2001	
Automotive				
operating voltage	800 V			
additional transient over voltage	500 V		impulse according ISO 7637-2	
Main power supply				
measurement categories	CAT II			
assessment voltage	300 V			
General				
pollution degree	2			
test voltage against system ground	3000 V		1 min	
Overvoltage protection			differential measurement input	
	±100 V		permanent	
	±600 V		transient e.g.automotive load dump	
	ESD 2 kV		human body model	
CMRR (common mode rejection ratio) / IMR	>105 dB (50 Hz) >65 dB (5 kHz)		ranges ≤±2 V	R_{source} = 0 Ω
	>70 dB (50 Hz) >30 dB (5 kHz)		ranges ≥±5 V	
Input coupling	DC			
Input configuration	differential, isolated		galvanically isolated to System-GND (case, CHASSIS)	
Input impedance	6.7 MΩ		ranges ≤±2 V	
	1 MΩ		ranges ≥±5 V and with device deactivated	
	50 Ω		current input	
Input current			bias	
normal operation		1 nA	for operating conditions	
in case of overvoltage		1 mA	$\|V_{in}\|$ >5 V for ranges <±5 V or deactivated	

Voltage measurement				
Parameter	**Value typ.**	**min. / max.**	**Remarks**	
Input ranges	±60 V, ±50 V, ±25 V, ±10 V, ±5 V, ±2 V, ±1 V, ±500 mV, ±250 mV, ±100 mV, ±50 mV			
Gain error	<0.02%	<0.05%	of the measured value, at 25°C	
Gain drift		15 ppm/K 50 ppm/K	ranges ≤±2 V ranges ≥±5 V	over entire temperature range
Offset error	0.02%	≤0.05%	of the range, at 25°C	
Offset drift	0.3 µV/K·ΔT_a 10 µV/K·ΔT_a	0.6 µV/K·ΔT_a 30 µV/K·ΔT_a	ranges ≤±2 V ranges ≥±5 V ΔT_a= |T_a -25°C| ambient temperature T_a	
Linearity error	<120 ppm		±10 V input range	
Noise voltage (RTI)	2.5 μV_{rms} 12 μV_{pkpk}		Bandwidth: 0.1 Hz to 1 kHz	
Channel isolation	>1 GΩ, <40 pF >1 GΩ, <10 pF		to system ground channel-to-channel	
Crosstalk	>165 dB (50 Hz) >92 dB (50 Hz)		ranges ≤±2 V ranges ≥±5 V	R_{source} ≤100 Ω

Current measurement with internal shunt			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input ranges	±10 mA, ±20 mA, ±40 mA		
Shunt resistor	50 Ω		internal
Gain error	<0.02%	<0.05%	of the measured value, at 25°C
Offset error	0.02%	≤0.05%	of range
Offset drift	6 nA/K·ΔT_a	12 nA/K·ΔT_a	ΔT_a=|T_a-25°C| ambient temperature T_a
Linearity error	<120 ppm		

Temperature measurement - Thermocouples			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Measurement mode	type K		
Input ranges	-270°C to 1370°C -270°C to 1100°C		
Resolution	1/16 K (0.0625 K) 32 bit float (24 Bit mantissa)		with selected data type / output format: a) 16-Bit integer b) Float (24-Bit mode)
Bandwidth	0 Hz to 1 kHz		
Measurement error		<±0.6 K <±1.0 K	type K, range: -150°C to 1200°C otherwise
Temperature drift	±0.02 K/K·ΔT_a		ΔT_a= |T_a -25°C| ambient temperature T_a
Error of the cold junction temperature Drift of cold junction temperature	±0.001 K/K·ΔT_a	<±0.5 K	ΔT_a= |T_a -25°C| ambient temperature T_a

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Temperature measurement – PT100, PT1000		
Parameter	**Value**	**Remarks**
Measurement mode	PT100, PT1000	4-wire configuration individual current sources, isolated
Input ranges	-200°C to +850°C -200°C to +250°C	
Bandwidth	0 Hz to 1 kHz	
Measurement error offset gain	 <±0.25 K <±0.05 %	-200°C to +850°C, four-wire measurement of measured value (corresponding resistance)
Temperature drift	±0.01 K/K· ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$ ambient temperature T_a
Excitation current (PT100)	250 µA	

Power supply		
Parameter	**Value**	**Remarks**
Input supply voltage	10 V to 50 V DC	
Power consumption	7.3 W	10 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 connection		
Parameter	**Value**	**Remarks**
EtherCAT connection	2x RJ45	system bus for expanded imc CRONOS*flex* 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 CRONOS*flex* Modules	3.1 A (maximum current) Equivalent power with chosen DC power input: • 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 CRONOS*flex* Modules	350 mA (maximum current corresponding IEEE 802.3) Equivalent power with chosen DC power input: • 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

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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
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	82 x 118 x 186 mm	W x H x D
Weight	1.2 kg	