

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:

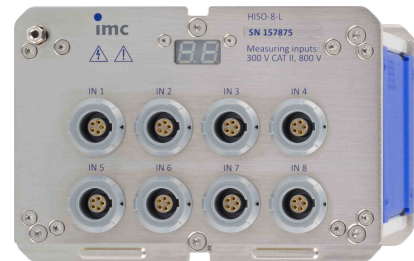
- Voltage (± 50 mV to ± 60 V)
- Current (20 mA)
- PT100, PT1000 temperature sensors
- Thermocouple

Highlights

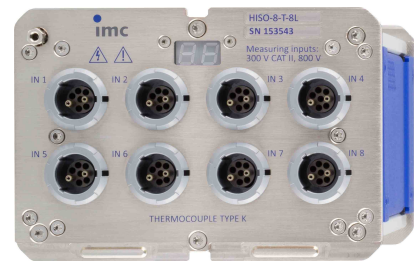
- Channel-wise isolated, galvanically-separated inputs
- High common mode isolation up to 800 V
- Overvoltage protection ± 600 V (differential)
- High signal bandwidth of up to 11 kHz
- Each channel with its own adjustable filter (e.g., anti-aliasing filter) and simultaneous A/D converter

Typical applications

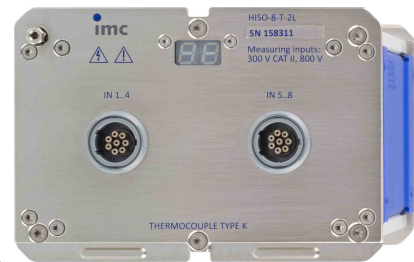
- Testing in e-mobility environments (e.g., electric and hybrid vehicles)
- Tests where full personal safety must be guaranteed even in case of hazards
- Measurements on high-voltage components, such as batteries, power electronics components and power supply circuits; low-voltages, including signals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



CRFX/HISO-8-L



CRFX/HISO-8-T-8L



CRFX/HISO-8-T-2L

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

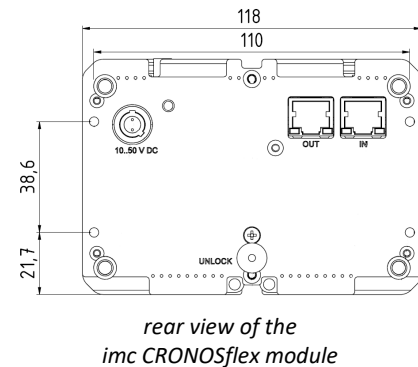
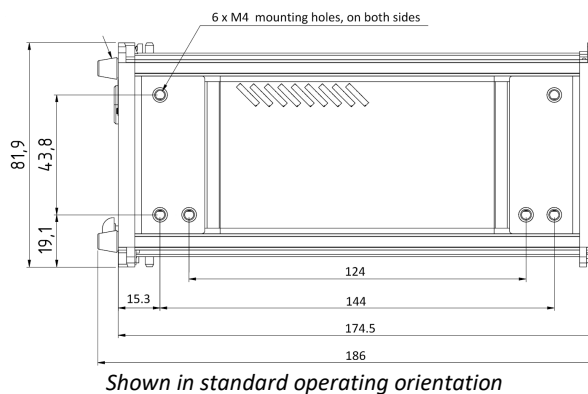


CRFX distributed system

Overview of 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



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

Miscellaneous
Calibration certificate with test equipment verification as per DIN EN ISO 9001 (manufacturer's calibration certificate, PDF)
Getting started with imc CRONOSflex (one copy per delivery)

Optional accessories

LEMO.1P (Redel) 5-pin		
ACC/LEMO.1P-5	sensor plug for high voltages (HV)	1350319
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	1350317
ACC/SENSORCABLE-HV-L1P-3M	5-lead cable with open ends, cable length 3 m	1350318
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	1350281

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	1350284
ACC/SENSORCABLE-4HV-T-L-XS-3M	cable length 3 m, extra slim, the upper part of the cable (40 cm) is unprotected	1350323
ACC/SENSORCABLE-4x1HV-T-L-3M	cable length 3 m, common plug with 4 individual, outgoing cables	1350322
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	1350353
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-UPS-L	Handle with system power supply 50 V 100 W, UPS with lead-gel battery	11900043
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
Miscellaneous		
CRFX/CAL-P Calibration report set for each device	Report set with manufacturer's calibration certificate and individual readings, as well as list of test equipment used (PDF). Meets requirements of ISO 17025	11900051

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 type characteristic cut-off frequency order anti-aliasing filter (AAF)	low-, high-, band pass, AAF Butterworth, Bessel 20 Hz to 5 kHz 8th order 4th + 4th order low pass Cauer 8th order with $f_{\text{cutoff}} = 0.4 f_s$	digital filter 1 - 2 - 5 steps low pass, high pass band pass: low- and high pass 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		impulse according ISO 7637-2
additional transient over voltage	500 V		
Main power supply measurement categories assessment voltage	CAT II 300 V		
General pollution degree test voltage against system ground	2 3000 V		1 min
Overvoltage protection	±100 V ±600 V ESD 2 kV		differential measurement input permanent transient e.g. automotive load dump human body model
CMRR (common mode rejection ratio) / IMR	>105 dB (50 Hz) >65 dB (5 kHz) >70 dB (50 Hz) >30 dB (5 kHz)		ranges ≤±2 V ranges ≥±5 V $R_{source} = 0 \Omega$
Input coupling	DC		
Input configuration	differential, isolated		galvanically isolated to System-GND (case, CHASSIS)
Input impedance	6.7 MΩ 1 MΩ 50 Ω		ranges ≤±2 V ranges ≥±5 V and with device deactivated current input
Input current normal operation in case of overvoltage		1 nA 1 mA	bias for operating conditions $ 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		<±0.5 K	
Drift of cold junction temperature	±0.001 K/K·ΔT _a		ΔT _a = T _a - 25°C ambient temperature T _a

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	ΔT _a = T _a -25°C 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 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 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	82 x 118 x 186 mm	W x H x D
Weight	1.2 kg	