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

8-channel, high insulation 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-T-8L

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

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.

In addition, when a module is added it is automatically recognized by the software displaying its dynamically assigned ID on the front of the module.

imc CRONOS*flex* distributed system

Alternatively, connection can be made by means of standard Ethernet cables (RJ45, CAT5), thus creating a spatially distributed system. imc CRONOS*flex* Modules can be operated without the base unit when used as components within an EtherCAT-based automation system operating as EtherCAT slaves with full CANopen over EtherCAT (CoE) support.

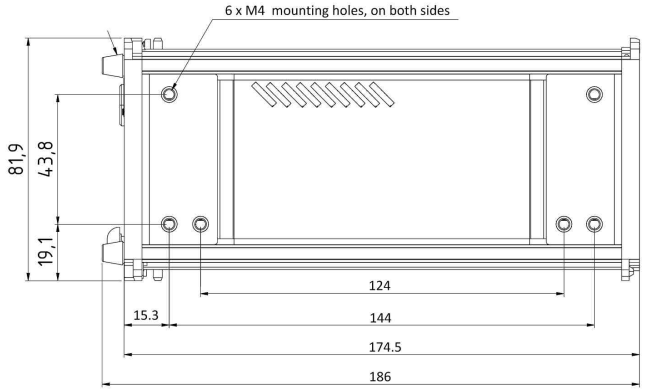
Overview of available variants

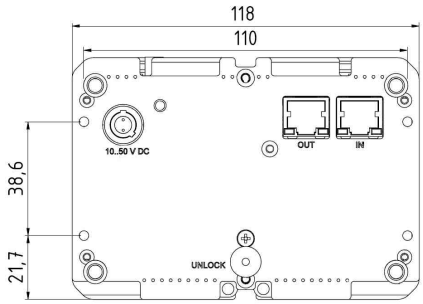
Order code		article number
CRFX/HISO-8-L	with LEMO.1P (5-pin), universal measurement modes: U, I, PT	1190168
CRFX/HISO-8-T-8L	with LEMO.2P (2-pin), thermocouple mode TC	1190169

Terminal connections

- Measurement inputs: LEMO P-series
- System bus (EtherCAT): 2x RJ45 sockets
- Power supply plug: LEMO.EGE.1B.302 (female) multicoded
- Module connector: 2x 20 pin (System bus and power supply))

Mechanical drawings with dimensions





rear view of the imc CRONOS*flex* 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 (PoE)

For further details refer to the power options documentation.

Optional accessories

AC/DC power adapter 110-230 VAC 50-60 Hz (with appropriate LEMO.1B.302 plug)

• 24 V DC / 60 W	CRPL/AC-ADAPTER-60W-1B	1080066
• 24 V DC / 150 W	ACC/AC-ADAPTER-150W-1B	1350139
• 48 V DC / 150 W	ACC/AC-ADAP-48-150-1B	1350148

Power connectors

• ACC/POWER-PLUG-5	Power connector for DC supply LEMO FGE.1B.302 plug (male, E-coded: 2 coding keys)	1350150
• CRFX/MODUL-PP-90	Power connector for DC supply 90° angular LEMO.FHE.1B.302 plug (male, E-coded: 2 coding keys)	1190074

Supply module (Power Handle)

• CRFX/HANDLE-POWER-L	Handle with system power supply 50 V 100 W, without UPS	1190058
• CRFX/HANDLE-UPS-L	Handle with system power supply 50 V 100 W, UPS with lead-gel battery	1190043
• CRFX/HANDLE-LI-IO-L	Handle with system power supply 50 V 100 W, UPS with Li-Ion battery	1190010

Passive-Handle

• CRFX/HANDLE-L	standard unpowered left handle	1190008
• CRFX/HANDLE-R	standard unpowered right handle	1190007

Technical Specs - CRFX/HISO-8

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

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	24 Bit	output data format selectable for each channel: 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			
measurement categories	CAT I		
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				
Parameter	**Value typ.**	**min. / max.**	**Remarks**	
General pollution degree test voltage against system ground	2 3000 V		1 min	
Overvoltage strength (differential)	±600 V ESD 2 kV transient protection: automotive load dump ISO 7637, test impulse 6		diff. input voltage, 1 min. human body model test impulse 6 R_i=30 Ω, t_d=300 µs, t_r<60 µs	
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 Ω
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	
Offset drift		1 µV/K	over entire temperature range	
Linearity error	<120 ppm		±10 V input range	
Noise voltage (RTI)	2.5 μV_{rms} 12 μV_{pkpk}		Bandwidth: 0.1 kHz 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%	<0.06%	of the measured value, at 25°C
Offset error	0.02%	≤0.05%	of range
Linearity error	<120 ppm		
Offset drift		20 nA/K	over entire temperature range

Temperature measurement - Thermocouples (HISO-8-T-8L only)			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Measurement mode	type K		
Input ranges	-270°C to 1370°C -270°C to 1100°C		
Resolution	0.063 K (1/16 K)		
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

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	
Resolution	0.063 K (1/16 K)	
Bandwidth	0 Hz to 1 kHz	
Measurement error	<±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 of the CRONOS*flex* module		
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 (PoE)	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: • 148.8 W @ 48 V DC (e.g. AC/DC line adapter) • 74.4 W @ 24 V DC (e.g. AC/DC line adapter) • 37.2 W @ 12 V DC (typical vehicle supplied DC input)
Power over EtherCAT (PoE) 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 adapter) • 14.7 W @ 42 V DC (minimum voltage for PoE) Note: minimum system power of 42 V DC required for PoE

Operating conditions	
Operating environment	dry, non corrosive environment within specified temperature range
Pollution degree	2
Ingress Protection Rating	IP20
Operating temperature range	-10°C to +55°C no condensation
Shock- and Vibration resistance	IEC 60068-2-27, IEC 61373 Category 1, Class A and B
Dimensions (W x H x D)	81.9 x 118 x 186 mm