imc CANSASfit HISO-T-8-2L

High voltage isolated 8-channel CAN-based measurement module for thermocouples

CANFT/HISO-T-8-2L

Within the imc CANSAS*fit* (CANFT) module series, the HISO series offers particularly highly isolated types that are specially designed for use in high voltage environments.

The model T-8 supports temperature measurement on 8 channels with thermocouples (type K), which are on a high common mode level or in environments with up to 1000 V voltage:

- Temperature with thermocouples type K

Highlights

- Isolation: 1000 V (according to safety standard DIN EN 61010)
- High-voltage-proof special connectors
  "2L": 2 x LEMO.2P as common socket (4 channels at each 8-pin socket)
- Per-channel isolated measurement inputs, individual filtering and ADCs
- Channel individual internal cold junction compensation

- 24-bit digitization and internal processing
  CAN-output format selectable: 16-bit or FLOAT (24-bit mantissa)
- Click mechanism providing both mechanical and electrical coupling

Typical applications

- Testing in e-mobility environments (e.g., electric and hybrid vehicles)
- Temperature measurement on high-voltage components of hybrid and electric vehicles, such as batteries, fuel cells and supply systems
- Environments where personnel safety has to be ensured

imc CANSAS*fit* general functionalities and specifications

As a CAN-Bus-based test and measurement tool, the imc CANSAS*fit* series offers a selection of measurement modules which precondition and digitize sensor signals and output these as CAN-messages. Their design and the supported sensors and signals make them particularly suited for applications in the fields of automotive engineering, vehicle testing, road trials and measurements on mobile machines.

In deviation from the generally valid specification, no degree of protection (IP code) is defined for the CANFT/HISO products.

imc CANSAS*fit* modules can be mechanically and electrically attached to each other by means of a click mechanism, without the need for any tools or additional connection cabling.

Application fields

- Ideal for vehicle testing and road trials (above the maximum water depth/restricted degree of protection)
- Deployable in both distributed installations and centralized measurement setups
- Operable with CAN interfaces and CAN data loggers from either imc or third-party suppliers

Properties and capabilities

CAN-Bus:

- Configurable Baud-rate (max. 1 Mbit/s)
- Default configuration ex-factory: Baud rate=125 kbit/s and IDs: Master=2, Slave=3
- Galvanically isolated

Sampling rates and synchronization:

- Configurable CAN data rate
- Simultaneous sampling of all module's channels

Power supply:

- Wide range supply voltage, see technical specs
- LEMO.0B.305 sockets (IN / OUT) in conjunction with CAN-Bus signals

Onboard signal processing (depending on module type):

- Low pass filter
- Anti-Aliasing Filter (AAF) automatically adapted to the output rate
- Averaging filter
- Multi functional status LED, global or channel-wise (depending on module type)

Heartbeat-message:

- Configurable with cyclical "life-sign", e.g. for integrity check purposes in test rigs
- Contains checksum for configuration and serial number, e.g. for consistency monitoring (checking of whether the correct module is still being used, for instance in installations undergoing maintenance)

fit-series: versatile, click-together module block assemblies

Click mechanism:

- Multiple modules connected in a central block: mechanically and electrically (CAN and power supply)
- No need for tools or additional connection cables
- To maintain the degree of protection, the assembly of a complete system consisting of several modules must be carried out in a controlled environment (e.g. also sealing cap for click connectors).

Mounting options:

- Fastening eyelets provided for installation with cable ties, srews or bolts

imc CANSAS*fit* HISO connected with further imc CANSAS*fit* Modules

Latching mechanism and protective cover for click mechanism

- The HISO module series differs from the other imc CANSAS*fit* modules by its size (slightly raised and double width) and the degree of protection.

Software

Configuration:

- Using imc CANSAS software (free of charge), including dbc-export
- Autostart with saved configuration; also pre-configurable at factory

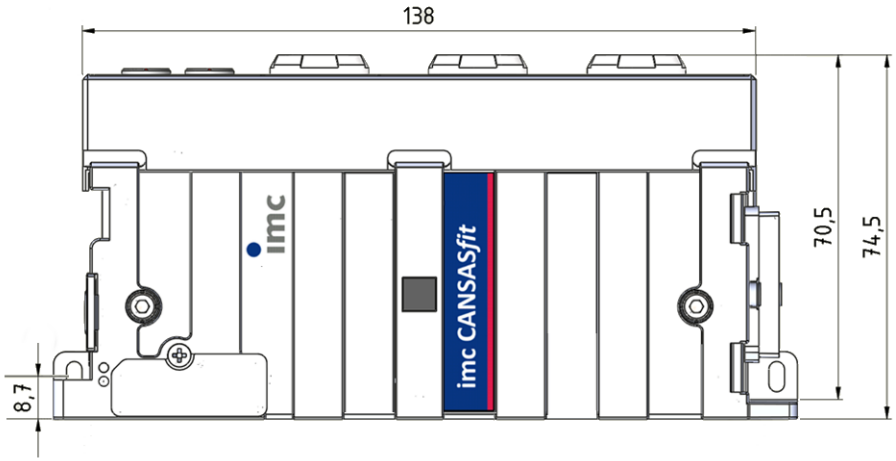
Measurement operation:

- Data logger operation:
  Software: with imc STUDIO 5.0R2 / imc DEVICES 2.9 R9 or higher
  Hardware: imc measurement system with CAN-Interface, e.g.
  imc BUSDAQ, imc C-SERIES, imc SPARTAN
  imc CRONOS device family (CRFX, CRC, CRXT, CRSL)
- With any desired CAN-interfaces and CAN-loggers from 3rd-party suppliers

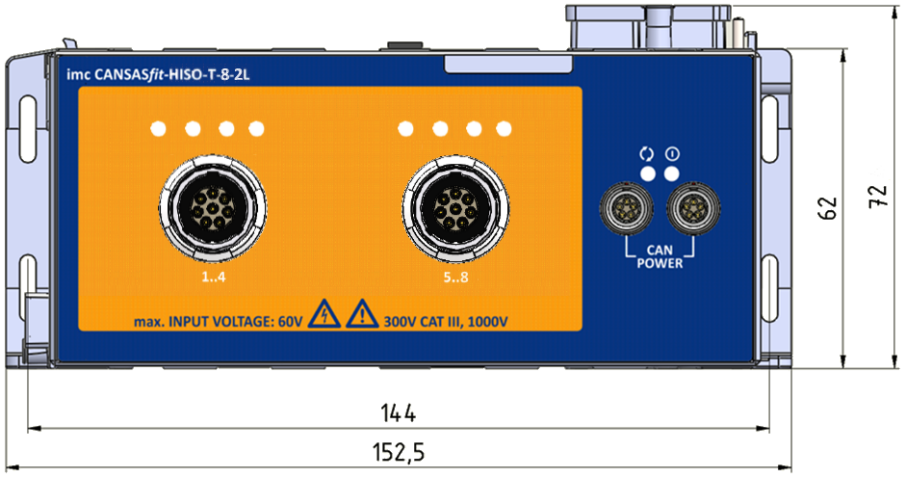
Available variants of imc CANSAS*fit* HISO-T-8

Order Code	Signal connection	CAN connection	extra	article no.
CANFT/HISO-T-8-2L	2x LEMO Redel 2P sockets	LEMO.0B.305		12100037

Mechanical drawings



This representation of the module (with the connections facing upwards) is the preferred position for use.



Attention

- CANFT/HISO may only be operated in closed condition (click connector closed).
- The two protective covers must be mounted on the module connection ports when the modules are not coupled together.
- The resistance to mechanical stress is specified according to IK07 (robust against 2 J impact energy).

Included accessories

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

Optional accessories

Power supply: AC/DC power adaptor (imc CANSAS*fit* power set)		
CANFT/POWER-P	AC/DC power adaptor, 24 V DC, 60 W, PHOENIX, cable for CAN and power supply, LEMO.0B to DSUB-9, power supply via PHOENIX	12100023

LEMO.2P (Redel) 8 pin, 4 channel sensor cable thermocouple type K for HV modules HISO-T-8-2L		
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 stripped part of the cable (upper 40 cm) is not protected against contact	13500323
ACC/SENSORCABLE-4x1HV-T-L-3M	cable length 3 m, special socket with 4 individual, outgoing cable	13500322
Only safe measuring cables suitable for HV applications may be used. Please always observe the specifications of the cables!		

LEMO.2P (Redel) 8 pin, connection box for High voltage modules (HV)		
ACC/HVBOX-8-T-10M	4 channel HV connection box for 4 thermocouples type K with 10 m HV capable cable	13500353

CAN: cable [1] and plugs		
ACC/FGG.0B.305.CLAD56ZN	plug for the CAN connection (FGG series [2])	13500245
ACC/GMF.0B.035.060.EN	protective cover for the LEMO 0B plug (FGG series [2]), IP65	13500272
ACC/CABLE-LEMO-LEMO-2M5	CAN + Power cable 2x LEMO.0B 2.5 m	13500229
ACC/CABLE-LEMO-DSUB-2M5	CAN + Power cable LEMO.0B/DSUB 2.5 m	13500230
ACC/CABLE-LEMO-DSUB-BAN-2M5	CAN + Power cable LEMO.0B/DSUB/PWR power via banana	13500231
ACC/CABLE-LEMO-DSUB-PHOE-2M5	CAN + Power cable LEMO.0B/DSUB/PWR power via PHOENIX	13500261
ACC/CABLE-LEMO-DSUB-LEMO-1B	CAN + Power cable LEMO.0B/DSUB power supply via LEMO.1B.302 for 15V/24V power adaptor	13500368
ACC/CABLE-LEMO-DSUB-LEMO-1BE	CAN + Power cable LEMO.0B/DSUB power supply via LEMO.1B.302 E-coded for 48 V power adaptor	13500296
ACC/CABLE-LEMO-LEMO-PWR-0M5	CAN + Power cable 2xLEMO.0B 0.5 m, with power supply for separate segments via banana	13500324
ACC/CAP-LEMO.0B	protective cover for the LEMO 0B socket	13500232
ACC/CAP-LEMO.1B	protective cover for the LEMO 1B socket	13500233
ACC/CANFT-TERMI	CAN Terminator 120 Ω, LEMO.0B plug	13500242

1 other cable lengths available

2 The LEMO plug series FGG and the FEG series are both compatible with the module's terminals.
The FEG plug model has an additional sealing lip which ensures an IP54 grade seal when connected. The protection rating provided by the FGG model when connected is IP50. The FGG plug could additionally be equipped with a protection grommet (e.g. 13500098).

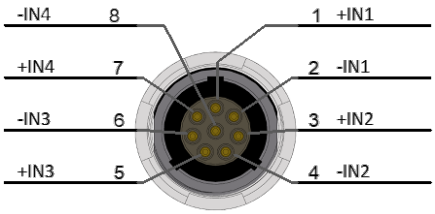
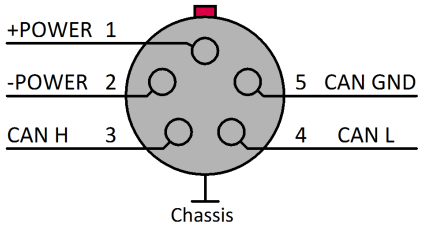
Mounting accessories		
CANFT/BRACKET-DIN-XW	DIN Rail Mounting kit - extra-wide: for HISO types	12100039
CANFT/BRACKET-MAG-XW	Magnetic mounting kit - extra-wide: for HISO types	12100040

imc CANSAS*fit* configuration package (USB)	
CANFT/USB-P	12100018
USB-CAN interface (CAN: DSUB-9, USB 2.0); AC/DC power adaptor, 24 V DC, 60 W, connection via PHOENIX; CAN and power cable LEMO.0B/DSUB Power supply via PHOENIX, 2.5 m; CAN Terminator 120 Ω, LEMO.0B; gender changer (DSUB-9) with integrated CAN terminator; imc CANSAS configuration software (download), including COM library and LabVIEW (TM) VI	

Miscellaneous
Extended calibration report set (PDF) for each device with individual readings, as well as list of test equipment used (meets requirements of ISO 17025).
Protocol Verification of the device safety test

Technical Specs - CANFT/HISO-T-8-2L

General

Parameter	Value	Remarks
Inputs	8	
Measurement mode	temperature measurement by thermocouple	
Supported sensors	Thermocouple type K	
Connector / socket	compatible socket type	recommended plug
CAN / power supply	LEMO.0B 5-pin	FEG.0B.305
Grounding / potential compensation	M4	
Measuring input	LEMO Redel 2P, 8-pin, Code B	
LEMO pin configuration	measurement input: 	CAN and power supply: 
Module connector	Click-connection (protected)	for the supply and system bus (CAN) of directly connected modules without further cables

Sampling rate, Bandwidth, Filter		
Parameter	**Value**	**Remarks**
Sampling rate	≤100 Hz	configurable, individually per channel
Bandwidth	33 Hz	-3 dB; CAN output data rate = 1 kHz; anti-aliasing filter (AAF)
Filter		digital Filter
Type	low pass	
Characteristic	Butterworth, Bessel, Moving averaging (sinc), anti-aliasing filter	individual selectable; averaging and AAF: adapted automatically, according to selected output rate
Cut-off frequency	1 Hz to 200 Hz	
Order	2^{nd} and 8^{th}	selectable low pass filter
Anti-aliasing filter	Cauer 8^{th} order with $f_{cut\text{-}off} = 0.4 \cdot f_s$	f_s: CAN output data rate and $f_s \geq 1$ Hz
Resolution	24 Bit	data output: 32 Bit FLOAT or 16 Bit INT

Isolation		
Parameter	**Value**	**Remarks**
Isolation	galvanically isolated	to system ground (CHASSIS)
CAN-Bus	60 V	
power supply input	60 V	
channel	1000 V	channel to channel, channel to CHASSIS, channel to CAN-Bus, channel to module power supply
measurement category	1000 V CAT I 300 V CAT III	working voltage according EN 61010 pollution degree 2 (macro environment)
Test voltage	4.4 kV AC_{rms}	channel to channel, channel to CHASSIS, channel to CAN-Bus, channel to module power supply

Coupling		
Parameter	**Value**	**Remarks**
Input coupling	DC	
Input configuration	isolated	differential

Status-LED		
Parameter	**Value**	**Remarks**
Power-LED	bicolor	
green	power active	
Status-LED	multicolor	overall status of module
green	operating, run	
blue	init, firmware update etc.	
yellow	prepare configuration	
red	error	
Channel-Status-LED	bicolor	status for each channel
off	channel passive	
green	channel active	
red	over-range or error	signal exeeding nominal range by 5 % see manual for detailed information

Measurement Mode

Thermocouple measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Sensor	Thermocouple type K		DIN EN 60854 [1]
Input range	-200 °C to 1300 °C -100 °C to 250 °C		output format: 16 Bit INT or FLOAT output format: 16 Bit INT
Overvoltage protection	±200 V		
Measurement error -200 °C to -150 °C -150 °C to -50 °C **-50 °C to 500 °C** 500 °C to 1300 °C Impact of the sensor impedance	 0,4 K 0,2 K **0,1 K** 0,3 K 0.0002 % / Ω · R_{TC}	 ±1,3 K ±0,7 K **±0,7 K** ±0,9 K	 of reading; resistance of sensor R_{TC} [2]
Drift	+ 0.0009 %/K · ΔT_a 0.02 K/K · ΔT_a		T = -150 °C to 1300 °C T_a = -20 °C to 90 °C of reading $\Delta T_a = \lvert T_a - 25\ °C \rvert$
IMRR (Isolation mode rejection ratio)	0.003 K/V		50 V; 50 Hz; R_{TC} = 100 Ω thermocouple
Noise	0.01 K_{rms}		average filter 100 ms output format: FLOAT; -100 °C to 250 °C

Operating and environmental conditions

Parameter	Value	Remarks
Operating temperature range	-40°C to +105°C	internal condensation temporarily allowed (pollution degree 2)
Pollution degree	2	according DIN EN 61010-1, DIN EN 60664-1
External mechanical stress	IK07	
Shock- and vibration resistance	IEC 61373, IEC 60068-2-27 IEC 60062-2-64 category 1, class A and B	
Dimensions (L x W x H)	approx. 153 x 70 x 75 mm	including mounting flanges and click
Weight	approx. 0.7 kg	

1 Based on "International Temperature Scale of 1990" (ITS-90) For reasons of compatibility with older products, the range in the user interface is -270°C to 1370°C.

2 The specific cable resistance of NiCr/Ni (IEC-Standard) is approx. 0.5 Ω · mm^2/m.
(e.g. diameter = 0.8 mm; length = 3 m; resistance = 6 Ω)

Power supply of the module			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input supply voltage		7 V to 50 V DC 9.5 V to 50 V DC	after power up upon power up
Power consumption	1.3 W	<2.2 W	
Power supply options	CAN/Power cable or via adjacent module		LEMO.0B, 5-pin module connector (click mechanism)

Max. number of modules for direct coupling (block size with click mechanism)		
Parameter	**Value**	**Remarks**
Max. number of modules	8	limited by termination of internal CAN-Bus backbone (click junction)
Pass through power limits for directly connected modules (click-mechanism)		
Parameter	**Value**	**Remarks**
Max. current	4 A	at 25 °C current rating of click connector
	-20 mA/K·ΔT_a	derating with higher operating temperatures T_a ΔT_a=T_a -25 °C
Max. power	48 W at 12 V DC 96 W at 24 V DC	equivalent pass through power at 25 °C typ. DC vehicle voltage AC/DC power adaptor and installations
	24 W at 12 V DC 48 W at 24 V DC	at +105 °C

Available power for supply of additional modules via CAN-cable (LEMO.0B, "down stream")		
Parameter	**Value**	**Remarks**
Max. current	6.5 A	at 25 °C current rating of LEMO.0B connection (CAN-IN, CAN-OUT); assuming adequate wire cross section!
	-15 mA/K·ΔT_a	derating with higher operating temperatures T_a ΔT_a=T_a -25 °C
Max. power	78 W at 12 V DC 156 W at 24 V DC	equivalent pass through power at 25 °C typ. DC vehicle voltage AC/DC power adaptor and installations
	60 W at 12 V DC 120 W at 24 V DC	at +105 °C