

imc CANSASfit HISO-UT-6-3L

High voltage isolated 6-channel CAN-based measurement module for voltage, temperature (RTD) and resistance (NTC)

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

The model UT-6 allows the measurement of low voltages as well as temperature sensors on 6 channels, which are on a high common mode level or in environments with up to 1000 V voltage:

- Voltage (25 mV to 100 V)
- Temperature (PT100, PT1000)
- Resistance (e.g. NTC)
- MEMS accelerometers (5 V sensor supply)



CANFT/HISO-UT-6-3L

Highlights

- Isolation: 1000 V (according to safety standard DIN EN 61010)
- High-voltage-proof special connectors
"3L": 3 x LEMO.2P as common socket (2 channels at each 8-pin socket)
- 5 V sensor supply per-channel (8 mA), suited for MEMS accelerometers (imc AC series)
- Per-channel isolated measurement inputs, individual filtering and ADCs
- 400 Hz bandwidth at max. 1 kSps/channel sampling rate (CAN output rate)

- 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 (esp. PT100/PT1000) on high voltage components in electrical and hybrid vehicles, such as fuel cells and supply circuits
- Measurement of low voltages such as single battery cells and battery modules
- Current measurement shunts on HV level
- Detection of mechanical loads and vibrations on high-voltage batteries
- Environments in which full personal safety must be guaranteed even in the event of faults.

imc CANSASfit general functionalities and specifications

As a CAN-Bus-based test and measurement tool, the imc CANSASfit 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 CANSASfit 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, screws or bolts



imc CANSASfit HISO connected with further imc CANSASfit Modules



Latching mechanism and protective cover for click mechanism

- The HISO module series differs from the other imc CANSASfit 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

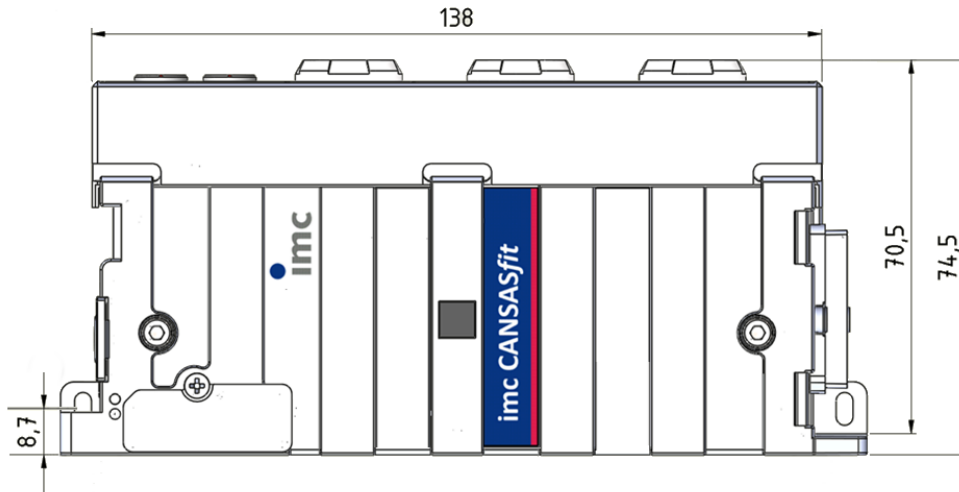
Measurement operation:

- 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

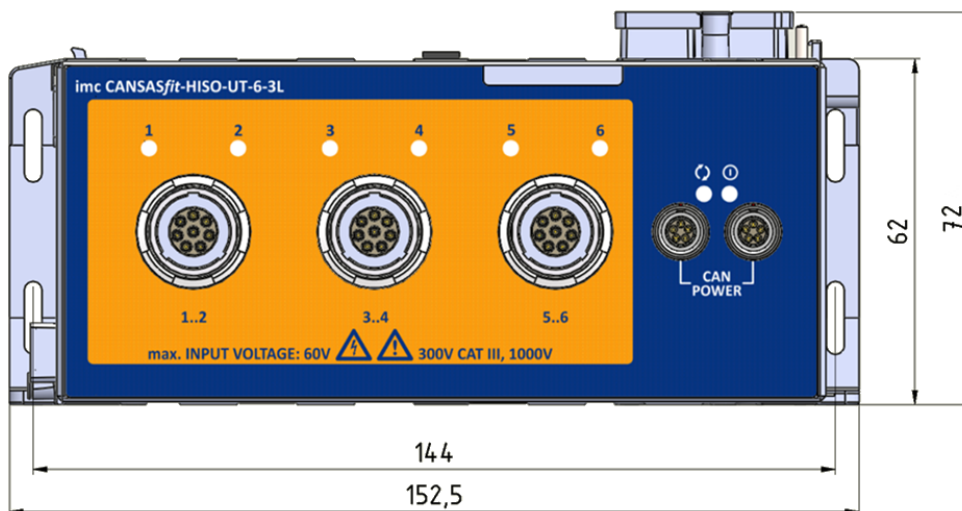
Available variants of imc CANSASfit HISO-UT-6

Order Code	Signal connection	CAN connection	Extra	article no.
CANFT/HISO-UT-6-3L	3x LEMO.2P	LEMO.0B.305		12100036

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 CANSASfit 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

Stecker: Signale		
ACC/FGG.1B.307.CLAD62ZN	Stecker für den Signalanschluss (FGG Serie ¹)	13500096
ACC/FEG.1B.307.CLAD62ZN	Stecker für den Signalanschluss (FEG Serie ¹), IP54	13500262
ACC/GMF.1B.062.072.EN	Schutztülle für den LEMO 1B Stecker (FGG Serie), IP65	13500098

LEMO.2P (Redel) 8 pin, 2 channel sensor cable		
ACC/SENSORCABLE-2HV-L2P-PT-3M	8 wire cable with 2 connected PT100 (class A) cable length 3 m	13500355
ACC/SENSORCABLE-2HV-LP2-3M	8 wire cable with open ends, cable length 3 m	13500356
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-8-10M	2 channel HV connection box for e.g. two PT100 sensors with 10 m HV capable cable	13500354

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 supply via banana, 2.5 m	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

- 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).

CAN: cable and plugs		
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/CANFT-TERMI	CAN Terminator 120 Ω, LEMO.0B plug	13500242

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

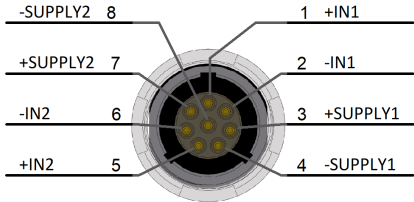
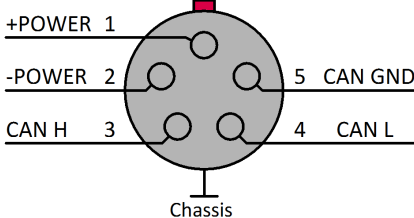
imc CANSASfit configuration package (USB)		
CANFT/USB-P		12100018
USB-CAN interface (CAN: DSUB-9, USB 2.0); AC/DC power adaptor, 24 V DC, 60 W, connection via PHOENIX; CAN and power cable LEMO.0B/DSUB Power supply via PHOENIX, 2.5 m; CAN Terminator 120 Ω, LEMO.0B; gender changer (DSUB-9) with integrated 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		
Appropriate MEMS accelerometers (5 V supply) are available as accessories (imc AC series)		

MEMS accelerometers		
SEN/ACC-AC1A010	accelerometers MEMS 10 g uniaxial	13900026
SEN/ACC-AC1A050	accelerometers MEMS 50 g uniaxial	13900027

Technical Specs - CANFT/HISO-UT-6-3L



General

Inputs, measurement mode		
Parameter	Value	Remarks
Inputs	6	differential, analog
Measurement mode	voltage measurement voltage measurement active sensors (5 V) resistance measurement temperature sensor PT100/PT1000	e.g. MEMS acceleration sensors series imc AC 4-wire
Connector / socket CAN / power supply Grounding / potential compensation Measuring input	compatible socket type LEMO.0B 5-pin M4 LEMO Redel 2P, 8-pin, Code C	recommended plug FEG.0B.305
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	≤ 1 kHz	CAN output data rate; configurable, individually per channel
Bandwidth	0 Hz to 400 Hz	-3 dB; CAN output data rate = 1 kHz; anti-aliasing filter (AAF)
Filter	Moving average, Butterworth, Bessel, anti-aliasing filter	digital filter
Characteristic		individual selectable; averaging and AAF: adapted automatically, according to selected output rate
Cut-off frequency	1 Hz to 200 Hz	-3 dB, in 1 - 2 - 5 steps
Order	2 nd and 8 th	selectable low pass filter
Anti-aliasing filter	Cauer 8 th order with $f_{\text{cut-off}} = 0.4 \cdot f_s$	f_s : CAN output data rate $f_s \geq 1$ Hz
Resolution	24 Bit	data output: 32 Bit Float or 16 Bit Integer

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

Sensor supply			
Parameter	Value typ.	min. / max.	Remarks
Output voltage		+5 V	arbitrary for each channel
Error of output voltage		-2 % to +10 %	
Output current	8 mA	>7 mA	
Output power per channel		34 mW	
Capacitive load	0 to 1 mF		
Output impedance	30 Ω		

Measurement modes

Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input range	±100 V, ±50 V, ±25 V, ±10 V, ±5 V, ..., ±25 mV		
Max. Over Voltage		±200 V	differential input voltage
Input impedance	1 MΩ 20 MΩ	±1% ±1%	measurement ranges ≥±5 V measurement ranges ≤±2.5 V
Gain error		0.02% + 0.002%/K·ΔT _a	of reading ΔT _a = T _a - 25°C
Offset error		0.02% or 10 μV + 0.001%/K·ΔT _a	of range, sensor supply voltage = 0 V whichever is greater ΔT _a = T _a - 25°C
IMRR (Isolation mode rejection ratio)	-125 dB -152 dB		50 Hz measurement ranges ≥±5 V measurement ranges ≤±2.5 V
Noise	75 μV _{rms} 1.6 μV _{rms} 1 μV _{rms} 0.7 μV _{rms}		sampling rate = 1 kHz; filter = AAF; resolution = 32 bit float; ranges: 100 V, ..., 5 V 2.5 V 1 V 500 mV, ..., 25 mV

Resistance measurement			
Parameter	Value typ.	min. / max.	Remarks
Input range	100 kΩ, 50 kΩ, 25 kΩ, 10 kΩ, ..., 100 Ω		50 Ω .. 10 Ω on request
Gain error		0.02% 0.002%/K·ΔT _a	of the measured value ΔT _a = T _a -25°C
Offset error		0.01% 0.003%/K·ΔT _a	of range range = 100 kΩ to 100 Ω ΔT _a = T _a -25°C
SNR	-82 dB -100 dB -104 dB		bandwidth = 400 Hz; filter = AAF range = 100 kΩ; signal: 1%..100% of range range = 10 kΩ; signal: 1%..100% of range range = 1 kΩ

RTD measurement			
Parameter	Value typ.	min. / max.	Remarks
Temperature sensors	Resistance Temperature Detectors (RTDs) PT100, PT1000		4-wire configuration
Input range	-200°C to 850°C -50°C to 150°C		output format: 16 Bit INT or FLOAT output format: 16 Bit INT
Overvoltage protection	±60 V		
Supply Current	0.88 mA 0.7 mA		PT100; P _{dis} <0.3 mW PT1000; P _{dis} <1.9 mW
Measurement error	-200°C to 0°C 0°C to 100°C 100°C to 300°C 300°C to 500°C 500°C to 850°C	0.001 K 0.001 K 0.002 K 0.003 K 0.006 K	0.05 K 0.1 K 0.18 K 0.25 K 0.4 K
Noise, SNR	0.005 K _{rms} <1 LSB		average filter 100 ms output format: Float; 850°C output format: 16 Bit Integer; 850°C

Operating conditions

Parameter	Value	Remarks
Operating temperature range	-40°C to +85°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 mechanism
Weight	approx. 0.7 kg	

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	1.6 W	<2.9 W	without sensor supply with sensor supply
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
	$-20 \text{ mA/K} \cdot \Delta T_a$	derating with higher operating temperatures T_a $\Delta T_a = T_a - 25 \text{ °C}$
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 +85 °C

Available power for supply of additional modules via CAN-cable (LEMO.0B)		
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!
	$-15 \text{ mA/K} \cdot \Delta T_a$	derating with higher operating temperatures T_a $\Delta T_a = T_a - 25 \text{ °C}$
Max. power	78 W at 12 V DC	equivalent pass through power at 25 °C
	156 W at 24 V DC	typ. DC vehicle voltage AC/DC power adaptor and installations
	60 W at 12 V DC 120 W at 24 V DC	at +85 °C