

## imc CANSASflex-HISO8

### High voltage isolated CAN modules for the measurement of thermocouples PT100/1000 and voltages

The CAN-Bus measurement module imc CANSASflex-HISO8-xx allows safe and precise measurement with 8 thermocouples (type K) which are mounted on high-voltage components with common mode voltage levels of up to 800 V, or the measurement of PT100/1000 respectively voltages. It is particularly suited for applications in the field of eMobility.

### Highlights

- Individually isolated measurement of temperatures (type K thermocouples) at a high common mode voltage level
- Module variants for PT100/1000 and voltages
- Isolation: 800 V, 300 V CAT II (according to safety standard DIN EN 61010)
- High-voltage-proof special connectors (LEMO):
  - 2x TE common plug (LEMO.2P 8-pin) or
  - 8x TE single plug (LEMO.2P 2-pin) or
  - 4x PTx/voltage single plug (LEMO.2P 8-pin) or
  - 8x PTx/voltage single plug (LEMO.1P 5-pin)
- Channel individual internal cold junction compensation

### Typical applications

- 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 CANSASflex-HISO8-T-2L



imc CANSASflex-HISO8-T-8L



imc CANSASflex-HISO8-L

## imc CANSASflex - General Functions and Specifications

As a CAN-bus-based measurement engineering tool, the imc CANSASflex series offers a wide selection of measurement modules which process and digitize sensor signals and output these as CAN-messages.

The modules of the imc CANSASflex series (CANFX) can be joined together mechanically and electrically by means of a latching ("click") mechanism, without the use of any tools nor the need for any extra cables, and also allows the CAN-logger imc BUSDAQflex (BUSFX) to dock on directly. Depending on the module type, they are available in either long (L-), short, or both housing versions.

Besides fixed installations or operation on a laboratory bench, the modules are also designed to fit in a special 19" subrack to provide a convenient solution in test station settings.

### Fields of application

- For test rigs, vehicle testing, road trials and all-purpose measurement applications
- Deployable both in decentralized, distributed and in centralized measurement setups
- Operable with CAN-interfaces and CAN-data loggers from either imc or 3rd-party manufacturers

### Properties and capabilities

#### Operating conditions:

- Shock resistance: 50 g (pk over 5 ms)
- Ingress Protection: IP40 (only with optional protective cover on top of the locking slider, otherwise IP20)

#### 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
- Built-in terminator resistance, manually switchable

#### Sampling rates and synchronization:

- Configurable CAN data rate
- Simultaneous sampling of all module's channels, as well as across multiple modules
- Synchronization of multiple modules as well as to a global CAN-logger: based on CAN messages (no Sync-signal required)

#### Power supply:

- Galvanically isolated power supply input
- DC 10 V to 50 V
- LEMO.0B connector (2-pin); alternative power supply via CAN connector (DSUB-9)

#### On-board signal processing:

- "Virtual channels": integrated signal processor (DSP) for online processing. Data reduction, filtering, scaling, calculations, threshold monitoring, etc.
- Programmable multi-functional status-LED, supporting linkage to virtual channels

#### 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)

#### FindMe:

- Identification of a module by means of selective LED flashing (via configuration software; does not occupy any additional CAN messages)

### flex-Series: flexible granulation, topology and block assemblies

#### Click-mechanism:

- Modules joinable to module-blocks: mechanically and electrically connected (CAN and power supply)
- No tools or additional cabling required
- With guide grooves, magnetic catches and locking slider
- Both short and long housing versions joinable:  
with electrical connection: align on rear side; mechanically only: align on front side
- Direct connection of compatible CAN-logger: imc BUSDAQflex

#### 19" rack solution (subrack):

- Modules designed for insertion into special 19" frames ("boom-box") for installation in test stations
- Rack backplane accommodates the power supply, CAN and slot information (automatically read out configuration information for use in automation software)

#### Mounting:

- Mountable by means of recessed threaded holes (M3), either individually or jointly as a block
- Rubber bumper rails providing secure placement in laboratory settings
- Various brackets and handles, and DIN top-hat rail mounting kit available as accessories



imc CANSASflex modules connected (Click-mechanism) in a block with imc BUSDAQflex Logger (left)



rear view of this block:  
CAN, Power supply, Terminator, Locking slider

## Software

#### Configuration:

- Using imc CANSAS software (free of charge), including dbc-export
- Autostart with saved configuration; also pre-configurable at factory
- The module's current configuration can be read out and exported by the software; For transfer of configuration via physical transport of the module; for back tracing and recovery.
- Supports the CANopen® protocol according "CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2"; 4 TPDOs (Transmit Process Data Objects) in INT16, INT32 and FLOAT.  
See "CANSAS CANopen®" for a detailed description of the supported features and settings.

#### Measurement operation:

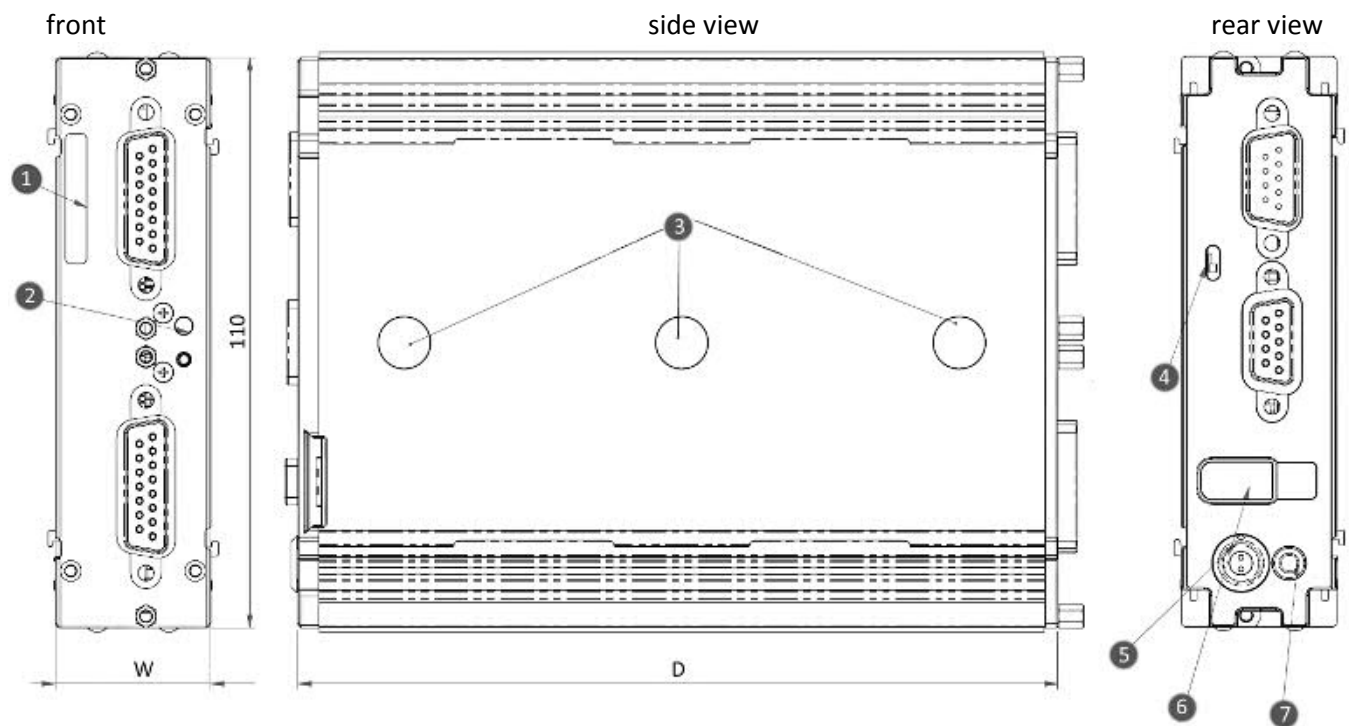
- Data logger operation:  
Software: imc STUDIO  
Hardware: imc measurement system with CAN-Interface, e.g. imc BUSDAQ, imc C-SERIES, imc SPARTAN and imc CRONOS device family (CRFX, CRC, CRSL, CRPL)
- Basic measurement operation with imc CANSASpro
- With any desired CAN-interfaces and CAN-loggers from 3rd-party manufacturers

## Models and Options

### Overview of the available variants for imc CANSASflex-HISO8

Order Code	signal connection	measurement modes	housing	article no.
CANFX/L-HISO8-L	8x 5-pin LEMO.1P	voltage, PT100/PT1000, resistance	L2	1250082
CANFX/L-HISO8-4L	4x 8-pin LEMO.2P	voltage, PT100/PT1000, resistance	L2	1250101
CANFX/L-HISO8-T-8L	8x 2-pin LEMO.2P	TC type K	L2	1250084
CANFX/L-HISO8-T-2L	2x 8-pin LEMO.2P	TC type K	L2	1250086

### Mechanical drawings with dimensions



Shown in standard operating orientation: housing type L0; width (W) = 30 mm.

Housing type	S0	S1	S2	L0	L1	L2
<b>W: Width</b>	30 mm	50.3 mm	70.6 mm	30 mm	50.3 mm	70.6 mm
<b>D: Depth</b>	93 mm, with two magnets			146.5 mm, with three magnets		

#### Legend:

- |                            |                              |                              |
|----------------------------|------------------------------|------------------------------|
| 1: Serial number label     | 3: magnet                    | 5: supply socket (LEMO)      |
| 2: Status LED (blue / red) | (depending on model)         | 6: locking slider CAN/supply |
|                            | 4: adjustable CAN terminator | 7: ground connection M3      |

## Accessories and Connectors

### Included accessories

- Calibration certificate (PDF) with test equipment verification as per DIN EN ISO 9001 (manufacturer's calibration certificate)
- Grounding set consisting of: a spring washer S3 (stainless steel), a flat washer (A3.2 DIN 433 A2) and a pan-head screw M3x8 (mounted on the rear panel).
- Instruction manual, getting started with imc CANSAS (one copy per delivery)

### Optional accessories

<b>AC/DC power adaptor 110-230V AC (with appropriate LEMO plug)</b>		
ACC/AC-ADAP-24-60-0B	24 V DC, 60 W, LEMO.0B.302	1350246
<b>Power connector</b>		
ACC/POWER-PLUG3	Power connector for DC supply LEMO FGG.0B.302, solder contact, max. 0.34 mm <sup>2</sup>	1350033
ACC/CABLE-LEMO-0B-BAN-2M5	Power supply cable LEMO/banana 2.5 m	1350276
<b>LEMO.1P (Redel) 5-pin</b>		
ACC/LEMO.1P-5	sensor plug for high voltages (HV)	1350319
<b>LEMO.1P (Redel) 5-pin, 1-channel sensor cable for HV modules: HISO8-L</b>		
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
<b>LEMO.2P (Redel) 8-pin, 2-channel sensor cable with RTD (PT100) for HV modules: HISO8-4L</b>		
ACC/SENSORCABLE-2HV-L2P-PT-3M	8-lead cable with 2 assembled PT100 (class A) on capton foil, cable length 1 m	1350355
ACC/SENSORCABLE-2HV-L2P-3M	8-lead cable with open ends, cable length 3 m	1350356
<b>LEMO.2P (Redel) 2-pin, 1-channel sensor cable thermo couple type K for HV modules: HISO8-T-8L</b>		
ACC/SENSORCABLE-HV-T-L-3M	cable length 3 m	1350281
<b>LEMO.2P (Redel) 8-pin, 4-channel sensor cable thermo couple type K for HV modules: HISO8-T-2L</b>		
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
<b>LEMO.2P (Redel) connection box for high voltage (HV) modules</b>		
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
ACC/HVBOX-8-10M	2-channel HV connection box for e.g. 2 PT100 sensors with 10 m HV compatible cable for HISO8-4L	1350354

Handle		
CANFX/HANDLE-L	CANFX handle kit (left and right) - long (L)	1250028
Mounting brackets for fixed installations		
CANFX/BRACKET-CON-L	CANFX connection bracket long	1250020
CANFX/RACK	19" subrack	1250094
Mounting brackets for DIN Rail		
CANFX/BRACKET-DIN-L2	CANFX DIN Rail mounting bracket - Type L2	1250026
Miscellaneous		
CAN/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 DIN EN ISO 17025	1050048
CANFX/RUBBER-1M	silicone strip blue 1 m	1250029
CANFX/COVER-IP40	protective cover on top of the locking slider in compliance with IP40 ingress protection class	1250069
CANFX/USB-P	USB-CAN interface (CAN: DSUB-9, USB 2.0); AC/DC power adaptor, 24 V DC, 60 W, with LEMO.0B plug; CAN cable, DSUB-9 (F, terminated) - DSUB-9 (M, terminated); CAN reset plug; data medium with imc CANSAS configuration software, including COM libraries and LabVIEW (TM) VI	1250043



protective cover left (labeled with "L")



set consisting of left and right protective cover

## Technical Specs - HISO8

Parameter	Value	Remarks
Channels	8	isolated analog channels with high common mode voltage
Measurement modes HISO8-L	voltage measurement current measurement (20 mA) PT100, PT1000 measurement resistance measurement	
HISO8-4L	voltage measurement PT100, PT1000 measurement resistance measurement	
HISO8-T-8L and HISO8-T-2L	thermocouples type-K	
Terminal connection	high-voltage proof connectors	assembled, ready-made plugs and cables, both suitable and high voltage proof, available upon request
inputs	8x 5-pin LEMO.1P REDEL 4x 8-pin LEMO.2P REDEL 2x 8-pin LEMO.2P REDEL 8x 2-pin LEMO.2P REDEL	1 channel per plug, HISO8-L 2 channels per plug HISO8-4L 4 channels per plug, HISO8-T-2L 1 channel per plug, HISO8-T-8L

### Sampling rate, bandwidth, filter

Parameter	Value	Remarks
Sampling rate	$\leq 1$ kHz	per channel
Bandwidth	440 Hz	-3 dB
Filter type characteristics HISO8-L  HISO8-T-2L/-8L	low pass  Butterworth and Bessel 2nd order, 1st to 4th order, averaging filter averaging filter	digital filter  individually selectable; cut-off frequency = 1/6 of the sampling rate
CANopen <sup>®</sup> mode	"CiA <sup>®</sup> DS 301 V4.0.2" and "CiA <sup>®</sup> DS 404V1.2"	support of 4 TPDOs in INT16, INT32, and FLOAT

### Temperature measurement - Thermocouples

Parameter	Value typ.	min. / max.	Remarks
Mode	thermocouples type K		
Measurement ranges	-50°C to 150°C -50°C to 400°C -270°C to 1370°C		
Resolution	0.025 K		16-bit
Measurement error		$\pm 0.5$ K	type K, range -150°C to the upper limit of the measurement range, at 25°C
Temperature drift	$\pm 0.02$ K/K $\cdot\Delta T_a$		$\Delta T_a =  T_a - 25^\circ\text{C} $ ambient temperature $T_a$
Error of cold junction compensation Drift of cold junction compensation	$\pm 0.001$ K/K $\cdot\Delta T_j$	$< \pm 0.5$ K	HISO8-T-2L/-8L $\Delta T_j =  T_j - 25^\circ\text{C} $ cold junction temp. $T_j$

Temperature measurement - PT100, PT1000			
Parameter	Value typ.	min. / max.	Remarks
Measurement ranges	-200°C to +850°C -50°C to +150°C		individual current supply, isolated
Resolution	0.016 K 0.003 K		range -200°C to +850°C (16-bit) range -50°C to +150°C (16-bit)
Measurement error	<±0.25 K <±0.05%		range -200°C to +850°C, 4-wire config. additionally the resistance value of the displayed temperature
Temperature drift	±0.01 K/K·ΔT <sub>a</sub>		ΔT <sub>a</sub> = T <sub>a</sub> -25°C  ambient temp. T <sub>a</sub>
Sensor feed	250 μA		

Voltage measurement	Value typ.	min. / max.	Remarks
Measurement ranges	±100 V, ±50 V, ±20 V, ±10 V, ±5 V, ±2 V, ±1 V, ±500 mV, ±200 mV, ±100 mV, ±50 mV, ±20 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 full temperature range
Offset error	0.02%	≤0.05% ≤0.08%	of range, at 25°C ranges >±50 mV ranges ≤±50 mV
Offset drift	0.3 μV/K·ΔT <sub>a</sub> 10 μV/K·ΔT <sub>a</sub>	0.6 μV/K·ΔT <sub>a</sub> 30 μV/K·ΔT <sub>a</sub>	ranges ≤±2 V ranges ≥±5 V ΔT <sub>a</sub> = T <sub>a</sub> -ambient temp T <sub>a</sub>
Non-linearity	<120 ppm		±10 V input range
Signal noise		2 μV <sub>rms</sub> 12 μV <sub>pkpk</sub>	bandwidth 0.1 Hz to 440 Hz range ±20 mV R <sub>source</sub> = 0 Ω
Channel isolation	>1 GΩ, <40 pF >1 GΩ, <10 pF		to system ground / case channel-to-channel

Current measurement with internal shunt			
Parameter	Value typ.	min. / max.	Remarks
Measurement ranges	±10 mA, ±20 mA		
Shunt-resistance	50 Ω		internal
Gain error	<0.07%	<0.15%	of the measured value, at 25°C
Offset error	0.02%	≤0.05%	of range
Non-linearity	<120 ppm		

Resistance measurement	Value	Remarks
Measurement range	0 Ω to 1000 Ω, 0 Ω to 500Ω, 0 Ω to 250 Ω, 0 Ω to 150 Ω	individual current supply, isolated
Measurement error	0.06 Ω <0.05%	4-wire measurement plus of reading
Temperature drift	±0.004 Ω/K·ΔT <sub>a</sub>	ΔT <sub>a</sub> = T <sub>a</sub> -25°C ; ambient temp. T <sub>a</sub>



General			
Parameter	Value typ.	min. / max.	Remarks
Isolation: (common mode)			conforming DIN EN 61010-1:2010-07 and DIN EN 61010-2-030:2011-07 channel / channel channel / CAN channel / supply channel / housing
General			
Pollution degree		2	
test voltage to system ground and between channels		3000 V	1 min
Automotive			
Working voltage		800 V 1131 V	AC/DC peak
Additional transient, overvoltage		500 V	
Main power supply grid			
Measurement category		CAT II	
Assessment voltage		300 V	
Overvoltage protection		±100 V ±600 V  ESD 2 kV	differential input permanent transient e.g. automotive load dump  human body model
IMR (isolation mode rejection)		>140 dB (50 Hz) >90 dB (50 Hz)	ranges ≤±2 V ranges ≥±5 V  R <sub>source</sub> = 0 Ω
Channel isolation		>1 GΩ, <40 pF >1 GΩ, <10 pF	against system ground / housing channel-to-channel
Crosstalk		>165 dB (50 Hz) >90 dB (50 Hz)	ranges ≤±2 V ranges ≥±5 V  R <sub>source</sub> ≤100 Ω
Input coupling		DC	
Input configuration		differential, isolated	isolated from system ground (housing, CHASSIS, function ground)
Input impedance		6.7 MΩ 1 MΩ	ranges ≤±2 V ranges ≥±5 V
Input current			
normal		1 nA	under operating conditions
at overload		1 mA	V <sub>in</sub>   >5 V or deactivated

Terminal connections		
Parameter	Value	Remarks
Supply input	type: LEMO.0B (2-pin)	compatible with LEMO.EGE.0B.302 multicoded 2 notches for optional individually power supply compatible with connectors FGG.0B.302 (Standard) or FGE.0B.302 (E-coded, 48 V) pin configuration: (1)+SUPPLY, (2)-SUPPLY
Module connector	via locking slider	for power supply and networking (CAN) of directly connected modules (Click-mechanism) without further cables
CAN bus	2x DSUB-9	CAN and power supply CAN_IN (male) bzw. CAN_OUT (female) all signals on both DSUB-9 directly 1:1 connected

Operating conditions		
Parameter	Value	Remarks
Ingress protection class	IP40	only with optional protective cover (CANFX/COVER-IP40) on top of the locking slider, otherwise IP20
Operating temperature range	-40°C to 85°C	internal condensation temporarily allowed

Power supply			
Parameter	Value typ.	min. / max.	Remarks
Input supply voltage	10 V to 50 V DC		
Power consumption	4 W	5.5 W	
Module power supply options	power socket (LEMO) CAN socket (DSUB-9) adjacent module		direct connection  imc CANSASflex or imc BUSDAQflex

Pass through power limits for directly connected modules (Click-mechanism)		
Parameter	Value	Remarks
Max. current	8 A	at 25°C current rating of the click connector
	$-50 \text{ mA/K} \cdot \Delta T_a$	Derating with higher operating temperatures $T_a$ , $\Delta T_a = T_a - 25^\circ\text{C}$
Max. power	96 W at 12 V DC	Equivalent pass through power at 25°C typ. DC vehicle voltage
	192 W at 24V DC	AC/DC power adaptor or cabinets
	60 W at 12 V DC 120 W at 24V DC	at +85°C

Available power for supply of additional modules via CAN-cable (DSUB-9, "down stream")		
Parameter	Value	Remarks
Max. current	6 A	at 25°C current rating of DSUB-9 connection (CAN-IN, CAN-OUT); assuming adequate wire cross section!
	$-30 \text{ mA/K} \cdot \Delta T_a$	Derating with higher operating temperatures $T_a$ , $\Delta T_a = T_a - 25^\circ\text{C}$
Max. power	72 W at 12 V DC	Equivalent pass through power at 25°C typ. DC vehicle voltage
	144 W at 24 V DC	AC/DC power adaptor or cabinets
	50 W at 12 V DC 100 W at 24 V DC	at +85°C