imc CANSASfit UTI-6

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

The UTI-6 module belonging to the imc CANSAS*fit* series is a 6-channel measurement amplifier which captures analog physical measurement variables, digitizes them and outputs the data via CAN-bus.

Individually isolated, configurable differential channels capturing:

- Voltage (25 mV to 60 V)
- Current (20 mA sensors)
- Temperature (PT100, PT1000)
- Resistance (e.g. NTC)

CANFT/UTI-6-SUP
(Fig. similar)

Highlights

- Per-channel isolated measurement inputs, individual filtering and ADCs
- Sensor supply (e.g. for active voltage-fed sensors), individually isolated and adjustable
- 400 Hz bandwidth at max. 1 kSps/channel sampling rate (CAN output rate)
- Measurement ranges and sampling rates individually selectable (in steps of 1, 2, 5)
- 24-bit digitization and internal processing
  CAN-output format selectable: 16-bit or FLOAT (24-bit mantissa)

- High temperature durability
  Operating temperature: -40°C to +125°C
- Sealed against dust and moisture as per IP65
- Robust, compact and miniaturized
- Click mechanism providing both mechanical and electrical coupling

Typical applications

Robust test measurement for mobile applications at high temperatures and in rugged environments. Particularly on-board vehicles such as in drive tests, under the engine hood.

- General voltage signals, including vehicle battery voltage (up to 60 V) and current measurements at external shunts (down to 25 mV)
- Active voltage-fed sensors
- Industrial sensors (20 mA) for arbitrary physical variables
- Temperature measurement with resistance-based sensors (PTxx, NTC)

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, the resistance to extreme environmental conditions 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.

imc CANSAS*fit* modules can be mechanically and electrically attached to each other by means of a click mechanism. When the module connectors are open, this is accomplished without the need for tools and without additional connecting cables.

Application fields

- Ideal for vehicle testing and road trials
- 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

Operating conditions:

- Operating temperature: -40°C to +125°C, condensation allowed
- Ingress protection rating: IP65
- Pollution degree (internally): 2; according to IEC 61010-1:2010
- Shock resistance in accordance with MIL STD810F

CAN-Bus:

- Configurable Baud-rate (max. 1 Mbit/s)
- Default configuration ex-factory: Baud rate=500 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 12
- 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* modules connected in a block (click mechanism)

Latching mechanism and protective cover for click mechanism

Software

Configuration:

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

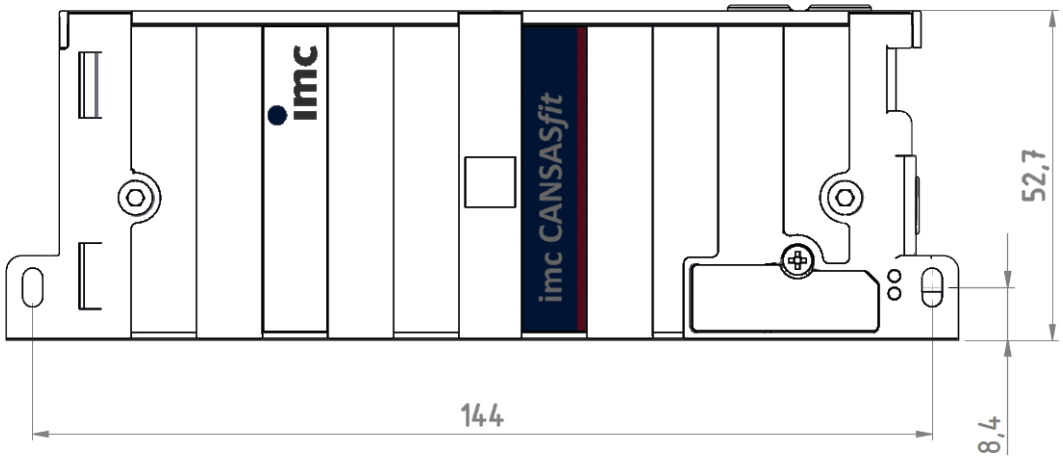
Measurement operation:

- Data logger operation:
  - Software: imc STUDIO
  - Hardware: imc ARGUS*fit*
    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

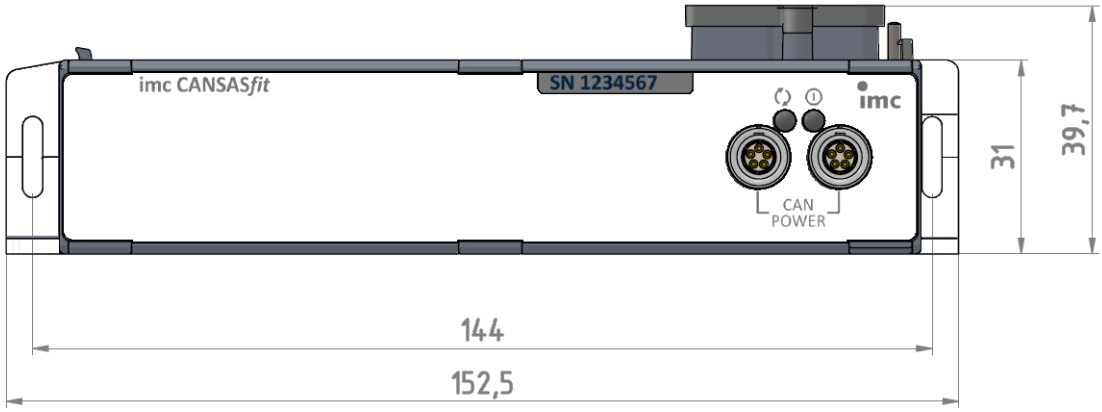
Available variants of imc CANSAS*fit* UTI-6

Order Code	Signal connection	CAN connection	Option/extra	article no.
CANFT/UTI-6-SUP	LEMO.1B.307	LEMO.0B.305	sensor supply (bipolar)	12100002
CANFT/UTI-6-TEDS	LEMO.1B.307	LEMO.0B.305	with TEDS and sensor supply (unipolar)	12100035

Mechanical drawings with dimensions



Module shown in standard operating position (terminal connections upwards)



Included accessories

Documents
Getting started with imc CANSAS*fit* (one copy per delivery)
Device certificate

Miscellaneous
6x ACC/CAP-LEMO.1B, 13500233 (protective cover for LEMO.1B sockets)
2x ACC/CAP-LEMO.0B, 13500232 (protective cover for LEMO.0B sockets)

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

Connector: signals		
ACC/FGG.1B.307.CLAD62ZN	plug for the signal connection (FGG series[1])	13500096
ACC/FEG.1B.307.CLAD62ZN	plug for the signal connection (FEG series[1]), IP54	13500262
ACC/GMF.1B.062.072.EN	protective IP65 cover for the LEMO 1B plug (FGG series)	13500098

CAN: cable [1] and connector		
ACC/FGG.0B.305.CLAD56ZN	plug for the CAN connection (FGG series [2])	13500245
ACC/GMF.0B.035.060.EN	protective IP65 cover for LEMO 0B plug (FGG series [2])	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-LEMO-1B	CAN + Power cable LEMO.0B/DSUB power supply via LEMO.1B.302 for the 15V/24V power adaptor (e.g. CRPL/AC-ADAPTER-60W): G-coded	13500368
ACC/CABLE-LEMO-DSUB-LEMO-1BE	CAN + Power cable LEMO.0B/DSUB power supply via LEMO.1B.302 for 48 V power adaptor (ACC/AC-ADAP-48-150-1B): E-coded	13500296
ACC/CABLE-LEMO-LEMO-PWR-0M5	CAN + Power cable 2xLEMO.0B 0.5 m, with power supply for separate segments via banana jacks	13500324
ACC/CAP-LEMO.0B	protective IP65 cover for the LEMO 0B socket	13500232
ACC/CAP-LEMO.1B	protective IP65 cover for the LEMO 1B socket	13500233
ACC/CANFT-TERMI	CAN Terminator 120 Ω, LEMO.0B plug	13500242
ACC/CANFT-RESET	CAN Reset plug, manual reset via click connector	13500421

Mounting accessories		
CANFT/BRACKET-DIN	Mounting on DIN-Rail (top hat rail) imc CANSAS*fit*	12100029
CANFT/BRACKET-MAG	Mounting with magnet system for imc CANSAS*fit*	12100030

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	

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). Further detailed instructions for handling can be found in "Getting Started" and in the manual for imc CANSAS modules.

1 other cable lengths available

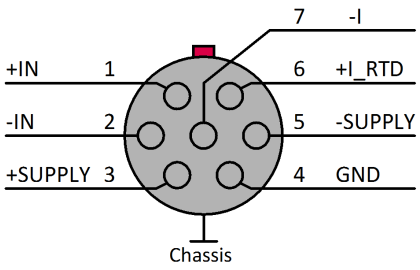
2 The LEMO plug series FGG and the FEG series are both compatible with the module's terminals.
The FEG plug model has an additional sealing lip which ensures an IP54 grade seal when connected. The protection rating provided by the FGG model when connected is IP50. The measurement module's protection rating remains at IP65. The FGG plug could additionally be equipped with a protection grommet (e.g. 13500098) to achieve the protection rating IP65 when connected.

Documents		
SERV/CAL-PROT	Calibration protocol per amplifier imc manufacturer calibration certificate with measurement values and list of calibration equipment used (pdf).	150000566
SERV/CAL-PROT-PAPER	Calibration protocol per amplifier (paper print) imc manufacturer calibration certificate with measurement values and list of calibration equipment used with signature and seal.	150000578
Device certificates and calibration protocols: Detailed information on certificates supplied, the specific contents, underlying standards (e.g. ISO 9001 / ISO 17025) and available media (pdf etc.) can be found on our website, or you can contact us directly.		

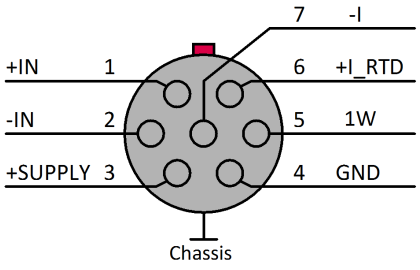
Technical Specs - CANFT/UTI-6

General

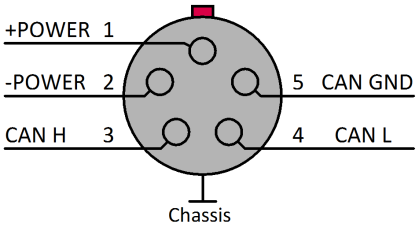
Inputs, measurement mode			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Inputs	6		
Measurement mode	voltage measurement current measurement resistance measurement temperature measurement PT100/PT1000		 4-wire
Connector / socket	compatible socket type		recommended plug
CAN / power supply	LEMO.0B 5-pin		FEG.0B.305
Measuring input	LEMO.1B 7-pin		FEG.1B.307
LEMO pin configuration	measuring input		CAN / power supply
Module connector	Click-connection (covering caps)		for the supply and system bus (CAN) of directly connected modules without further cables
TUID Transducer Unique Identifier	similar to IEEE 1451.1 TEDS		with CANFT/UTI-6-TEDS; read only single wire interface: 1W



UTI-6-SUP



UTI-6-TEDS



Sampling rate, Bandwidth, Filter			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Sampling rate		≤1 kHz	CAN output rate of the CAN-Bus data, individually per channel
Bandwidth	0 Hz to 400 Hz		CAN output rate: 1 kHz, AAF Filter
Filter			
Type	low pass		
Characteristic	Butterworth, Bessel, averaging filter (sinc), AAF		individual selectable; mean and AAF: adapted automatically, according to selected output rate
Cut-off frequency	1 Hz to 200 Hz		-3 dB, 1 - 2 - 5 steps
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: output rate, for $f_s \geq 1$ Hz
Resolution	24 Bit		output: 32 Bit Float or 16 Bit Integer

Isolation		
Parameter	**Value**	**Remarks**
Isolation		against housing
CAN-Bus	±60 V	test voltage: ±300 V (10 s)
power supply input	±60 V	test voltage: ±300 V (10 s)
Analog input channels	±60 V	analog input and sensor supply
Channel-to-channel	±60 V	

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

Status-LED		
Parameter	**Value**	**Remarks**
Power-LED	bicolor	
green	power active	
red	reverse polarity fault	
Status-LED	multicolor	global 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 / green alternating	over-range error	>5 % over nominal range
red	error	see manual for detailed information

Sensor supply			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Output voltage UTI-6-SUP	±15 V, ±12 V, ±10 V, ±7.5 V, ±5 V, ±4 V, ±3.5 V, ±3.3 V, ±3 V, ±2.5 V		referenced to GND; arbitrary for each channel
Output voltage UTI-6-TEDS	+15 V, +12 V, +10 V, +7.5 V, +5 V, +4 V, +3.5 V, +3.3 V, +3 V, +2.5 V		referenced to GND; arbitrary for each channel
Short-Circuit-Proof	unlimited duration		protection for module and each channel
Overvoltage protection	±50 V		voltages are referenced to GND
Error of output voltage		±2% 0.01%/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$; with T_a = ambient temperature
Output power per channel per module		 0.5 W 0.4 W 2 W	 bipolar supply with symmetric load unipolar supply or asymmetric load
Output impedance	0.6 Ω		

Measurement modes

Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	±60 V, ±50 V, ±25 V, ±10 V, ±5 V, ±2.5 V, ±1 V to ±25 mV		
Max. Over Voltage	±200 V		differential input voltage
Input impedance	1 MΩ 20 MΩ	±1% ±1%	measurement ranges ≥±5 V or device off measurement ranges ≤±2.5 V
Gain error	0.008% + 0.0004%/K·ΔT_a	0.02% + 0.001%/K·ΔT_a	of reading ΔT_a=|T_a -25°C|; with T_a = ambient temperature
Offset error	0.003% + 0.00006%/K·ΔT_a	0.02% or 10 µV + 0.001%/K·ΔT_a	of range whichever is greater ΔT_a=|T_a -25°C|; with T_a = ambient temperature
Noise	75 μV_{rms} 1.8 μV_{rms} 1.2 μV_{rms} 0.8 μV_{rms}		sampling rate = 1 kHz; filter = AAF; resolution = 32 bit float; ranges: 60 V, ..., 5 V 2.5 V 1 V 500 mV, ..., 25 mV

Current measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	±20 mA		±10 mA, ±5 mA, ±2 mA, ±1 mA on request
Overload	±100 mA		
Input impedance	25 Ω	±1%	
Gain error		0.02% + 0.002%/K·ΔT_a	of the measured value ΔT_a=|T_a -25°C|; with T_a = ambient temperature
Offset error		2 µA + 4 nA/K·ΔT_a	of range ΔT_a=|T_a -25°C|; with T_a = ambient temperature
Noise	30 nA_{rms}		bandwidth = 400 Hz; filter = AAF

Resistance measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	100 kΩ, 50 kΩ, 25 kΩ, 10 kΩ, ..., 100 Ω		
Overvoltage protection	±30 V		
Gain error		0.02% + 0.002%/K·ΔT_a	of the measured value $\Delta T_a = \lvert T_a - 25°C \rvert$; with T_a = ambient temperature
Offset error		0.01% + 0.003%/K·ΔT_a	of range $\Delta T_a = \lvert T_a - 25°C \rvert$; with T_a = ambient temperature

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 PT100, PT1000			
-200°C to 0°C	0.001 K	0.05 K	
0°C to 100°C	0.001 K	0.1 K	
100°C to 300°C	0.002 K	0.18 K	
300°C to 500°C	0.003 K	0.25 K	
500°C to 850°C	0.006 K	0.4 K	
Noise, SNR	0.005 K_{pk-pk} -117 dB <1 LSB		100 ms sampling rate, average filter output format: Float; 850°C output format: 16 Bit Integer; 850°C

Operating conditions

Operating conditions		
Parameter	**Value**	**Remarks**
Ingress protection class	IP65	dust- and splash water proof
Operating temperature range	-40 °C to +125 °C	internal condensation temporarily allowed
Pollution degree	2	
Dimensions (L x W x H)	153 x 40 x 53 mm	including mounting flanges and click mechanism
Weight	0.33 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 under conditions of IP65 (humidity): max. 35 V
Power consumption	1.8 W @ 12 V 6 W @ 12 V	 <7.3 W	sensor supply not loaded sensor supply loaded
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; $\Delta T_a = T_a$ -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 125 °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; $\Delta T_a = T_a$ -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 +125 °C