imc CANSASflex-C8

8-channel CAN measurement module for voltage, current (20 mA) and temperature

The CAN-Bus measurement module imc CANSAS*flex*-C8 is an analog input module with 8 channels which are individually filtered, amplified and digitized; the module is ideal for the measurement of:

- Voltage (5 mV to 60 V)
- Current (20 mA sensors)
- Temperature (Thermocouples, PT100)

imc CANSASflex-C8
(Fig. similar)

The module is available in both short and long housing.

Highlights

- 20 Hz bandwidth with max. 100 Hz/channel sampling rate
- Measurement range and sampling rates can be set per channel in steps of 1, 2, 5
- 24 Bit digitization and internal processing
  CAN-output format: 16 Bit
- Optional: adjustable sensor supply (e.g. for active voltage fed sensors)

Typical applications

- General voltage signals, including vehicle battery voltages (up to 60 V) and current measurements at external shunts (down to 5 mV)
- Temperature measurement in test station applications as well as in drive testing
- Industrial sensors (standard 20 mA interface) for arbitrary physical variables

General imc CANSAS*flex* functions and specifications

As a CAN-bus-based measurement engineering tool, the imc CANSAS*flex* 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 CANSAS*flex* 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 BUSDAQ*flex* (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:

- Operating temperature: -40°C to +85°C, condensation allowed
- 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 BUSDAQ*flex*

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 CANSAS*flex* modules connected (Click-mechanism)
in a block with imc BUSDAQ*flex* 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, CRXT, CRC, CRSL)
- With any desired CAN-interfaces and CAN-loggers from 3rd-party manufacturers

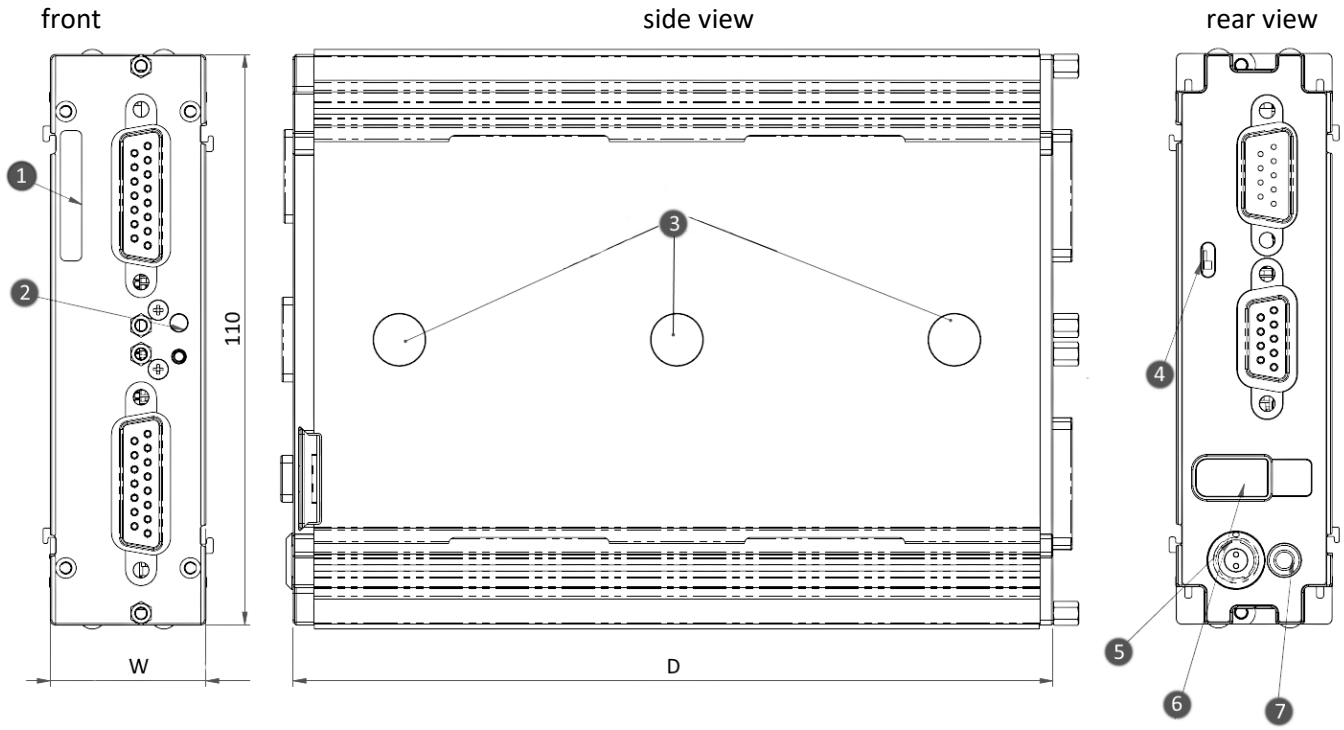
Models and Options

Overview of the available variants for imc CANSAS*flex*-C8

Order Code	signal connection	option/extra	housing	article no.
CANFX/C8	DSUB-15		S0	12500037
CANFX/L-C8	DSUB-15		L0	12500038
CANFX/L-C8-SUPPLY	DSUB-15	Sensor supply	L1	12500077
CANFX/L-C8-2T	thermocouple terminal connector	type K	L1	12500104
CANFX/L-C8-2T-Y	thermocouple terminal connector	type K ANSI coding (yellow)	L1	12500070
CANFX/L-C8-BNC	BNC		L1	12500071

Additional-Option (Order option ex-factory)

- Variants with integrated sensor supply, requires no extra module expansion, configurable voltage settings



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

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

Legend:

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

Accessories and Connectors

Included accessories

- Calibration certificate (PDF) with test equipment verification as per 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).
- Getting started with imc CANSAS (one copy per delivery)

Optional accessories

AC/DC power adaptor 110-230V AC (with appropriate LEMO plug)		
ACC/AC-ADAP-24-60-0B	24 V DC, 60 W, LEMO.0B.302	13500246

Power plug		
ACC/POWER-PLUG3	Power connector for DC supply LEMO FGG.0B.302, solder contact, max. 0.34 mm^2	13500033
ACC/CABLE-LEMO-0B-BAN-2 M5	Power supply cable LEMO/banana 2.5 m	13500276

DSUB-9 plug (CAN)		
CAN/RESET	Reset-plug (DSUB-9 female)	10500025
CAN/KABEL-TYP2	CAN-Bus connection cable 2x DSUB-9 1:1, 2 m length	10500027

DSUB-15 plug		
ACC/DSUBM-U4	DSUB-15 plug with screw terminals for 4-channel voltage measurement.	13500166
ACC/DSUBM-I4	DSUB-15 plug with screw terminals for 4-channel current measurement of up to 50 mA (shunt 50 Ω, scaling factor 0.02 A/V)	13500168
ACC/DSUBM-T4	DSUB-15 plug with screw terminals for 4-channel measurement of voltages as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC).	13500167

Handle		
CANFX/HANDLE-S	CANFX handle kit (left and right) - short (S)	12500027
CANFX/HANDLE-L	CANFX handle kit (left and right) - long (L)	12500028

Mounting brackets for fixed installations		
CANFX/BRACKET-CON-S	CANFX connection bracket short	12500019
CANFX/BRACKET-CON-L	CANFX connection bracket long	12500020
CANFX/RACK	19" Rack	12500094
CANFX/RACK-BLOCK	19" Rack frame for entire block CANFX/BUSFX	12500103

Mounting brackets for DIN Rail		
CANFX/BRACKET-DIN-S0	CANFX DIN Rail mounting bracket - Type S0	12500021
CANFX/BRACKET-DIN-L0	CANFX DIN Rail mounting bracket - Type L0	12500024
CANFX/BRACKET-DIN-L1	CANFX DIN Rail mounting bracket - Type L1	12500025

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 ISO 17025	10500048
CANFX/RUBBER-1M	silicone strip blue 1 m	12500029
CANFX/COVER-IP40	protective cover on top of the locking slider in compliance with IP40 ingress protection class	12500069
CANFX/USB-P	USB-CAN interface (CAN: DSUB-9, USB 2.0); AC/DC power adaptor,	12500043
24 V DC, 60 W, with LEMO.0B plug; CAN cable, DSUB-9 (F, terminated) - DSUB-9 (M, terminated); CAN reset plug; imc CANSAS configuration software (download)		

Technical Specs - C8

Channels, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Inputs	8	
Measurement modes DSUB	voltage measurement current measurement temperature measurement thermocouples PT100	voltage plug (ACC/DSUBM-U4) shunt plug (ACC/DSUBM-I4) thermo plug (ACC/DSUBM-T4)
Measurement mode Thermocouple terminal socket (-2T)	thermocouple type-K	miniature thermocouple terminal
Measurement mode BNC (-BNC)	voltage measurement	

Sampling rate, bandwidth		
Parameter	**Value**	**Remarks**
Sampling rate	≤100 Hz	per channel
Bandwidth	20 Hz 10 Hz	-3 dB (voltage measurement) -3 dB (temperature measurement)

General			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Isolation CAN-Bus power supply input analog input	 ±60 V ±60 V no isolation		output to case (CHASSIS) nominal; testing voltage:300 V (10 s) nominal; testing voltage:300 V (10 s) analog reference ground:CHASSIS
Overvoltage protection	 ±250 V	±80 V	permanent channel to chassis <1 ms

Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input range	±60 V, ±20 V, ±10 V, ±5 V, ±2 V, ±1 V, ±500 mV, ±200 mV, ±100 mV … ±5 mV		
Input impedance	 1 MΩ 492 kΩ 79 kΩ	 ±1% >135 kΩ >75 kΩ	differential ±60 V to ±2 V ±1 V to ±50 mV ±20 mV to ±5 mV
Gain error	 0.01%	 ≤0.05% ≤0.02% ≤0.05%	of reading ±60 V to ±200 mV ±100 mV to ±20 mV ±10 mV to ±5 mV
Gain drift	5 ppm/K·ΔT_a	±20 ppm/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$; ambient temperature T_a
Offset error	 0.005% 0.005% 0.02%	 ≤0.05% ≤0.01% ≤0.06%	of input range ±60 V to ±200 mV ±100 mV to ±20 mV ±10 mV to ±5 mV

Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Offset drift	±4 µV/K ±0.07 µV/K	<±12 µV/K <±0.16 µV/K	±60 V to ±2 V ±1 V to ±5 mV
Common mode voltage ±50 V to ±2 V ±1 V to ±5 mV	 50 V 2 V	 <30 V <1 V	with differential input voltage: ±50 V ±1 V
Common mode rejection ratio (CMRR) ±60 V to ±2 V ±1 V to ±5 mV ±1 V to ±5 mV	 70 dB 120 dB 100 dB	 >54 dB >100 dB	common mode test voltage ±50 V ±1 V with C8-BNC variant
Noise	51 nV_{rms} 305 nV_{pkpk}		range ±5 mV, sampling rate 100 Hz, R_{source} = 50 Ω

Temperature measurement - thermocouples			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Measurement mode	J, T, K, E, N, S, R, B		
Measurement range	-50°C to 400°C -50°C to 150°C -270°C to 1370°C		type K
Resolution	0.025 K 0.0031 K		type K -270°C to 1370°C -50°C to 150°C
Error thermocouples	±0.2 K	<±0.5 K	types J, T, K, E, L (for all other types, the voltage measurement error applies)
drift	±0.02 K/K·ΔT_a		ΔT_a= |T_a -25°C| ambient temperature T_a
Error of cold junction compensation		<±0.15 K <±0.5 K	 C8-2T
Drift of cold junction	±0.001 K/K·ΔT_j		ΔT_j = |T_j -25°C| ; cold junction T_j
Input impedance	100 kΩ		differential
Signal-noise ratio		>85 dB	bandwidth 10 Hz

Temperature measurement - RTD (PT100)			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Measurement range	-200°C to 850°C, -50°C to 150°C		resolution: ≈0.016 K,≈0.003 K
Error		<±0.2 K <±0.1 K <±0.05%	-200°C to 850°C, four-wire connection -50°C to 150°C, four-wire connection corresponding resistance
Drift		±0.01 K/K·ΔT_a	ΔT_a=|T_a -25°C| ambient temperature T_a
PT100 sensor feed	625 µA		
Input impedance	20 MΩ	±1%	differential

Optional sensor supply (CANFX/xx-SUPPLY)				
Parameter	**Value**			**Remarks**
Configuration options	7 selectable settings			
Output voltage	voltage	current	net power	set globally for all channels of a module
	+2.5 V	580 mA	1.5 W	
	+5.0 V	580 mA	2.9 W	
	+7.5 V	400 mA	3.0 W	
	+10 V	300 mA	3.0 W	
	+12 V	250 mA	3.0 W	
	+15 V	200 mA	3.0 W	
	+24 V	120 mA	2.9 W	
Isolation standard optional, upon request	non isolated isolated			output to case (CHASSIS) nominal rating: 50 V, test voltage (10 sec): 300 V
Short-circuit protection	unlimited duration			to output voltage reference ground
Accuracy of output voltage	<0.25% (typ.) / <0.5% (max.) <0.9% (max.)			at terminals, no load 25°C; 2.5 V to 24 V over entire temperature range
Max. capacitive load	>4000 µF >1000 µF >300 µF			2.5 V to 10 V 12 V, 15 V 24 V

Power supply			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Supply voltage	10 V to 50 V DC		
Power consumption		<2.5 W	

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		<2.5 W	
Module power supply options	power socket (LEMO) CAN socket (DSUB-9) adjacent module		direct connection imc CANSAS*flex* or imc BUSDAQ*flex*

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 mA/K·ΔT_a	Derating with higher operating temperatures T_a, $\Delta T_a = T_a$ –25°C
Max. power		Equivalent pass through power at 25°C
	96 W at 12 V DC 192 W at 24V DC	typ. DC vehicle voltage 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 mA/K·ΔT_a	Derating with higher operating temperatures T_a, $\Delta T_a = T_a$ –25°C
Max. power		Equivalent pass through power at 25°C
	72 W at 12 V DC 144 W at 24 V DC	typ. DC vehicle voltage AC/DC power adaptor or cabinets
	50 W at 12 V DC 100 W at 24 V DC	at +85°C