imc CANSASflex-SENT

Measurement module for sensors with a digital SENT-Interface

The CAN-Bus measurement module imc CANSAS*flex*-SENT has inputs to accommodate eight SENT sensors. The SENT signals are captured, decoded and output to CAN. This means that the module represents a multiple gateway from SENT to CAN bus.

The device conforms to the standard SAE J2716 of 2007, 2008 and 2010, which specifies the SENT protocol. SENT (Single Edge Nibble Transmission) is a digital protocol mainly used in the automotive industry.

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Highlights

- Ideal with any sensor having a SENT output. In automotive for example: hall sensors, pressure sensors, steering angle sensors, throttle valve position sensors and mass air flow sensors
- Integration of SENT sensors into an existing CAN-bus measurement setup, especially in test stands, on board test vehicles and in sensor testing
- The 8 SENT inputs are isolated channel to channel and channel to ground. Each input is designed for connection of a SENT sensor. The sensor's power is supplied in conformity to SAE J2716 (5V with max. 20 mA)
- One particularly special feature of the imc CANSAS-SENT is "passive monitoring". Wired parallel to the existing setup between a SENT sensor and a control device (e.g., ECU), the imc CANSAS-SENT module not only provides the gateway (conversion) to a CAN signal output, but it also won't interfere with the existing communications of the test object.
- Individual status-LED for each input and an additional LED for a power indicator
- Read out sensor information and data streams. Write to a sensor via SENT is not supported
- Parameterization of the module is accomplished via the CAN bus using imc CANSAS software as of Version 1.8. Each of the 8 SENT inputs can be configured separately. The CAN bus configuration, as with all imc CANSAS modules, can also be freely configured.

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)

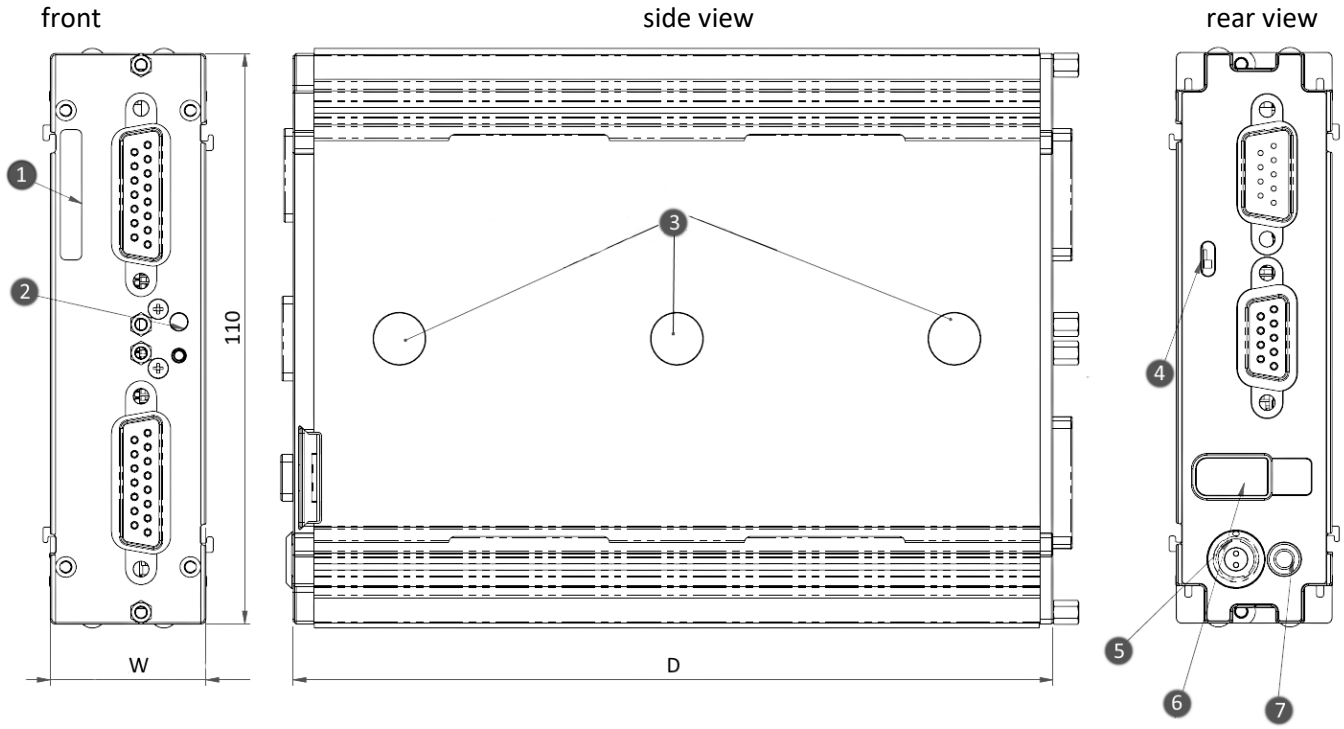
- With any desired CAN-interfaces and CAN-loggers from 3rd-party manufacturers

Models and Options

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

Order Code	signal connection	option/extra	housing	article number
CANFX/SENT	DSUB-15		S0	12500045
CANFX/L-SENT	DSUB-15		L0	12500046

Dimensions



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

- Function Test 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-SENT4	DSUB-15 plug with screw terminals for 4 SENT inputs	1350182

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

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, 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)	12500043

Technical Specs - SENT

Parameter	Value typ.	min. / max.	Remarks
SENT standard	SAE J2716 (2007, 2008, 2010, 2016)		completely compatible
SENT input	8 respectively for pins V_{Supply}, signal input (SIG) and GND		Isolated individually from each other and from CHASSIS
Supply voltage for the SENT sensor	5 V	4.85 V to 5.15 V	at 20°C individually for each sensor no general short-circuit protection. However, one supply may be short-circuited for a short time.
Supply current of the SENT sensor		20 mA	according SENT-Norm I_{out} (Receiver power supply requirements)
CAN bus	defined in accordance with ISO 11898 up to 1 Mbit/s		terminal connection isolated to power supply / CHASSIS of the CANSAS module; as per CiA® Draft Standard 102 Version 2.0
LEDs	8 1		Status indicator Power
Isolation CAN bus SENT-inputs	 ±60 V ±60 V		to system ground nominal; tested 300 V (10 s) nominal; tested 300 V (10 s)
Overvoltage protection of the SENT input	±60 V	 -0.3 V to 0.3 V + V_{Supply}	signal input (SIG) to GND transient overvoltage pulses long-term, continuous

SENT-input configuration options			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Serial protocol	short enhanced (12 bit) enhanced (16 bit) without protocol		
Clock Tick length		1 to 90 µs	resolution in steps of 0.1 µs
Number of data nibbles		1 to 6	
Pause Pulse Option	npp: no pause pulse pp: pause pulse ppc: pause pulse with constant frame length		
Pause pulse frame length		147 to 922 Ticks	expressed in clock ticks
CRC	✓		is verified
Reduction		1 to 100	A number of FAST channel samples will create and output one single CAN message.
Number of FAST-channels		1 to 4	per SENT-inputs
Nibble order	MSN first LSN first		set separately for each FAST-channel
Start bit position		0 to 23	set separately for each FAST-channel
Number of bits		1 to 16	set separately for each FAST-channel
Data type	signed integer unsigned integer		set separately for each FAST-channel
Scaling	linear scaling possible		
Status-Channel	4+4+1 bit		CRC, communication-nibble, CRC-Valid bit
Passive monitoring	yes / no		Parameterized separately for each input; tapped without power supply or feedback
CAN-message rate		5000 / s	fully compatible

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		<5.5 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