

## SENT for imc CANSASflex (CANFX/SENT)

### Measurement module for sensors with a digital SENT-Interface

The CAN-Bus measurement module imc CANSASflex-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.



*imc CANSASflex-SENT*

### 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 CANSASflex 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:

- 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 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:

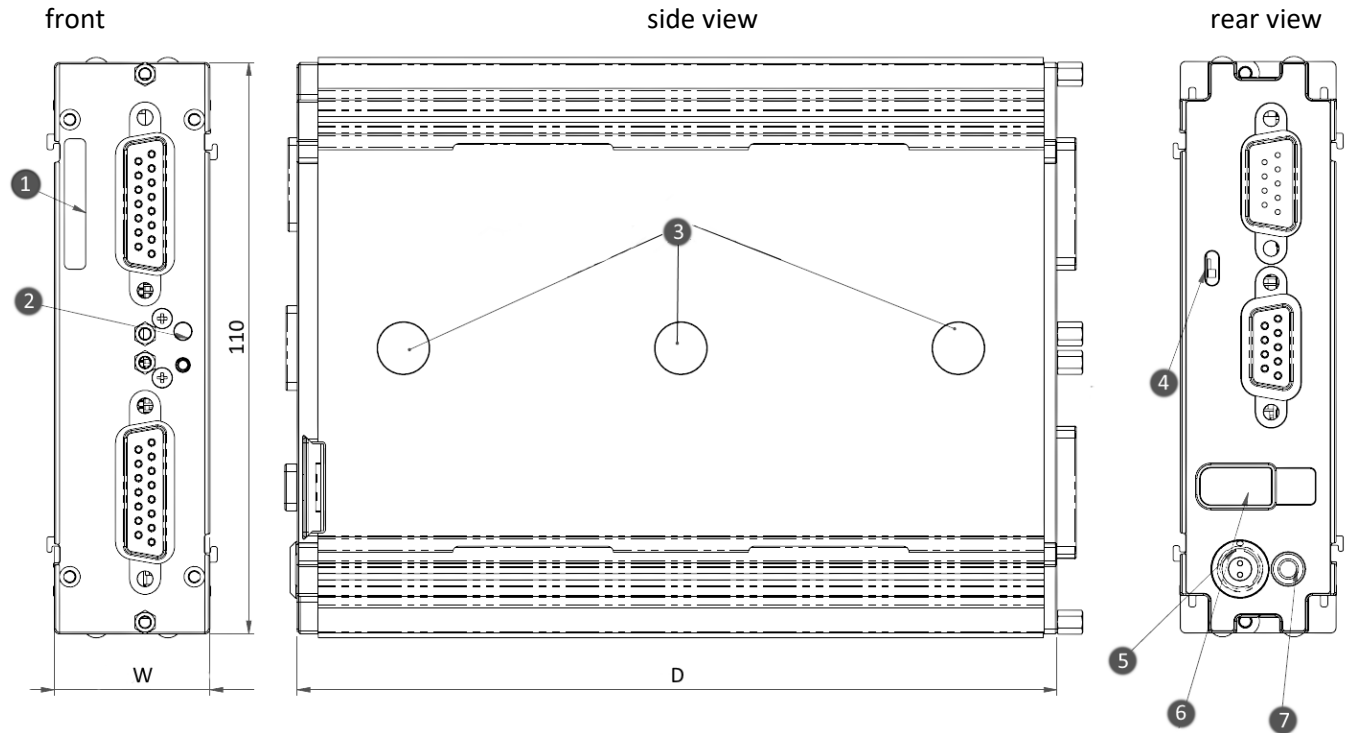
- Data logger operation:  
Software: imc STUDIO  
Hardware: imc measurement system with CAN-Interface, e.g. imc BUSDAQ, imc C-SERIES, imc SPARTAN and imc CRONOS device family (CRFX, CRXT, CRC, CRSL)
- With any desired CAN-interfaces and CAN-loggers from 3rd-party manufacturers

## Models and Options

### Overview of the available variants for imc CANSASflex-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
<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<br>(depending on model) | 5: supply socket (LEMO)      |
| 2: Status LED (blue / red) | 4: adjustable CAN terminator      | 6: locking slider CAN/supply |
|                            |                                   | 7: ground connection M3      |

## Accessories and Connectors

### Included accessories

Documents		
Getting started with imc CANSAS (one copy per delivery)		
Device certificate		
Miscellaneous		
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).		

### 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 <sup>2</sup>	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		
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

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 - CANFX/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	$\pm 60$ V $\pm 60$ V		to system ground nominal; tested 300 V (10 s) nominal; tested 300 V (10 s)
Overvoltage protection of the SENT input	$\pm 60$ 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 $\mu$ s	resolution in steps of 0.1 $\mu$ s
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 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