imc CANSASflex-INC4

4 channel CAN-based measurement module for pulse signals and incremental encoders

The CAN-Bus measurement module
imc CANSAS*flex*-INC4 is a 4 channel pulse counter unit, suited to measure RPM, based on incremental encoder signals. It is generally capable to interface with any type of sensors that deliver pulse signals and can derive output values such as:

imc CANSAS*flex*-INC4

- RPM, speed
- angle, displacement
- frequency, time
- events.

Those calculated and scaled measurement values will be output via CAN-Bus. The sensor signals are subjected to analog signal conditioning with differential amplifiers, filters and configurable detection thresholds, in order to derive reliable and robust digital signals.

Highlights

- Per-channel differential amplifier and filter, adjustable thresholds and hysteresis
- Two-track processing of quadrature encoders with and without index
- Processed values based on resolution time measurements with 32 MHz

Typical applications

- Incremental encoder (one or two-track encoder)
- Sensors with complementary digital outputs (e.g. RS485)
- Passive inductive transducers with analog output signal
- RPM measurement with magnetic pickup coupling, toothed wheel and missing teeth
- Light barrier

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 rating: 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:

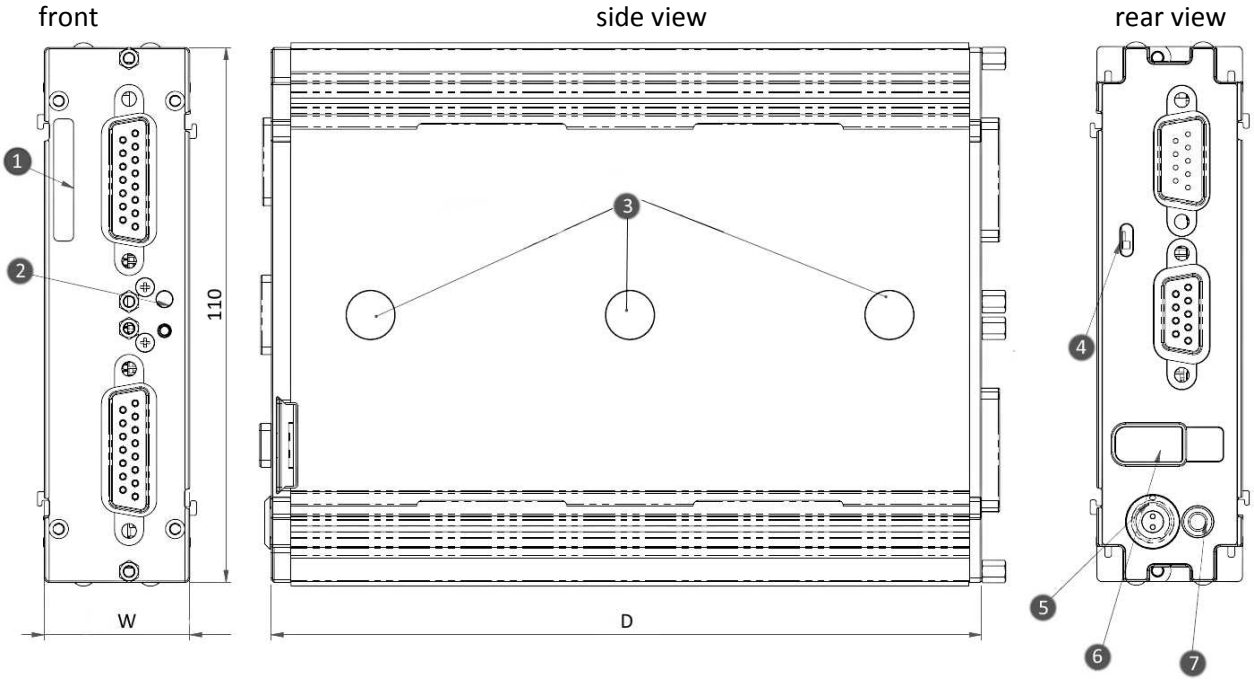
- Data logger operation:
  Software: imc STUDIO
  Hardware: imc measurement system with CAN-Interface, e.g.
  imc BUSDAQ, imc C-SERIE, imc SPARTAN
  imc CRONOS device family (CRFX, CRC, CRSL, CRPL)
- Basic measurement operation with imc CANSAS*pro*
- With any desired CAN-interfaces and CAN-loggers from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

Models and Options

Overview of the available variants for imc CANSASflex-INC4

Order Code	signal connection	option/extra	housing	article number
CANFX/L-INC4	DSUB-15		L0	1250015

Mechanical drawings with 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 M4

Accessories and Connectors

Included accessories

- Calibration certificate with test equipment verification as per ISO 9001 (manufacturer's calibration certificate)

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	1350246
Power connector		
ACC/POWER-PLUG3	Power connector for DC supply LEMO FGG.0B.302, solder contact, max. 0.34 mm^2	1350033
ACC/CABLE-LEMO-BAN-2M5	Power supply cable LEMO/banana 2.5 m	13500xx
DSUB-9 connector (CAN)		
CAN/RESET	Reset-plug	1050025
CAN/KABEL-TYP2	CAN-Bus connection cable 2x DSUB-9 1:1, 2 m length	1050027
DSUB-15 connector (measurement inputs)		
ACC/DSUBM-ENC4	DSUB-15 plug for incremental inputs	1350171
ACC/DSUBM-ENC4-IP65	IP65 sealed version of the plug	1350219
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
Mounting brackets for DIN Rail		
CANFX/BRACKET-DIN-L0	CANFX DIN Rail mounting bracket - Type L0	1250024
Miscellaneous		
Calibration report set for each device	Report set with manufacturer's calibration certificate and individual readings, as well as list of test equipment used. Meets requirements of DIN EN ISO 17025	
Instruction manual	Getting started with imc CANSAS	
CANFX/RUBBER-1M	silicone strip blue 1 m	1250029

Technical Specs - INC4

Input, measurement mode		
Parameter	**Value**	**Remarks**
Inputs	4 + 1 (9 tracks)	4 channels with 2 tracks (X, Y) each 1 index channel all fully conditioned inputs isolated from CAN-Bus and supply, but not mutually
Measurement modes	RPM (rotational speed) angle velocity displacement time frequency PWM event-counter	 differential, integrated, absolute (0°..360°) differential, integrated between selectable edges duty cycle differential, integrated
Signal encoder types	signal-track-encoder	without direction detection; with / without zero-pulse; usable on inputs 1 to 4; all relevant modes
	two-track-encoder	with direction detection; with / without zero-pulse; 4-slope evaluation (quadrature) usable on inputs 1Y & 4Y
Zero-pulse (reference position)	separate index signal	fully conditioned index track commonly used for 4 channels
Signal conditioning	differential amplifier filter detection threshold hysteresis	individually for all channels

Sampling rate, bandwidth, CAN-Bus		
Parameter	**Value**	**Remarks**
Sampling rate (CAN output)	1 kHz / channel (max.)	
Time resolution	33 ns 32 MHz clock	clock frequency of the counter for primary time measurement
Stability of primary oscillator	<100 ppm aging <5 ppm / year	
Resolution of data	16 bit	
CAN-Bus	defined by ISO 11898	
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 PDOs in INT16, INT32, and FLOAT	

General		
Parameter	**Value**	**Remarks**
Isolation		to CHASSIS
CAN-Bus	±60 V	nominal; testing: 300 V (10 s)
power supply input	±60 V	nominal; testing: 300 V (10 s)
analog input	no isolation	analog reference ground: CHASSIS
Sensor supply	+5 V, ±200 mA, 20 mA	Reference: GND

Analog signal conditioning		
Parameter	**Value**	**Remarks**
Input configuration	differential single-end	all x- and y-tracks index-track
Input voltage range (differential)	±10 V ±30 V	linear range maximum, outside of linear range: max. non-linearity error: 300 ns
Overvoltage protection	±60 V	permanently
Input impedance	100 kΩ	
Common mode input voltage	max. ±30 V	
CMRR	70 dB (typ.), 50 dB (min.) 60 dB (typ.), 50 dB (min.)	DC, 50 Hz 10 kHz
Analog bandwidth	500 kHz	-3 dB (full power)
Analog filter	bypass (without filter), 20 kHz, 2 kHz, 200 Hz	configurable (globally for all channels) Butterworth, 2nd order
Switching threshold	-8 V to +10 V	globally configurable in 0.1 V steps
Hysteresis	0.3 V to 4 V	globally configurable in 0.1 V steps
Gain error	<1%	
Offset	<1%	

Power supply		
Parameter	**Value**	**Remarks**
Input supply voltage	10 V to 50 V DC	
Power consumption	4 W	
Module power supply options	power socket (LEMO) CAN socket (DSUB-9) adjacent module	direct connection imc CANSAS*flex* or imc BUSDAQ*flex*

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

Terminal connections		
Parameter	**Value**	**Remarks**
CAN Bus	2x DSUB-9	CAN and supply IN / OUT (male / female)
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)
Module connector	via locking slider	for power supply and networking (CAN) of directly connected modules (Click-mechanism) without further cables

Pass through power limits for directly connected modules (Click-mechanism)		
Parameter	**Value**	**Remarks**
Max. Current	8 A	current rating of the module connector
Max. Power	 96 W at 12 V DC 192 W at 24 V DC 384 W at 48 V DC	equivalent pass through power typ. DC vehicle voltage AC/DC power adaptor optional AC/DC adaptor