imc CANSASflex-DCB8

8 channel bridge measurement amplifier for voltage, bridge and strain gauge measurements

The CAN-Bus measurement module imc CANSAS*flex*-DCB8 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 10 V)
- Bridge and strain gauge measurements (full-, half- and quarter bridge (120 Ω, optional 350 Ω)
- Current (20 mA, via shunt-plug)

For the supply of external sensors and bridge measurement a sensor supply with adjustable voltages 2.5 V to 24 V is included.

imc CANSASflex-DCB8
(Fig. similar)

Highlights

- Support of all configurations for bridge and strain gauge measurements including internal quarter bridge completion
- Internal switchable shunt impedance for a comfortable check of the measurement chain (shunt calibration)
- Bridge offset balancing and shunt calibration upon push of a button, via CAN bus or automatically upon power-up
- 200 Hz bandwidth with max. 1 kSps/channel sampling rate
- Measurement range and sampling rates can be set per channel in steps of 1, 2, 5
- 24 Bit digitization and internal handling, CAN-output format: 16 Bit
- Support of imc Plug & Measure: TEDS (Transducer Electronic Data Sheets, IEEE 1451.4)

Typical applications

Strain gauges, load cells, pressure sensors, voltage measurements

imc CANSASflex-DCB8
Technical Data Sheet

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:

- 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*-DCB8

Order Code	signal connection	option/extra	housing	article no.
CANFX/L-DCB8	DSUB-15		L2	12500035
CANFX/L-DCB8-L	LEMO.1B (7-pin)			12500063
CANFX/L-DCB8-350	DSUB-15	350 Ω internal		12500036
CANFX/L-DCB8-350-PROTECT	DSUB-15	350 Ω internal, transient- and ESD protection		12500009

With the "protected" variant an **increased robustness versus ESD** and **transient overvoltage** is ensured. In this variant the shunt calibration is disabled.
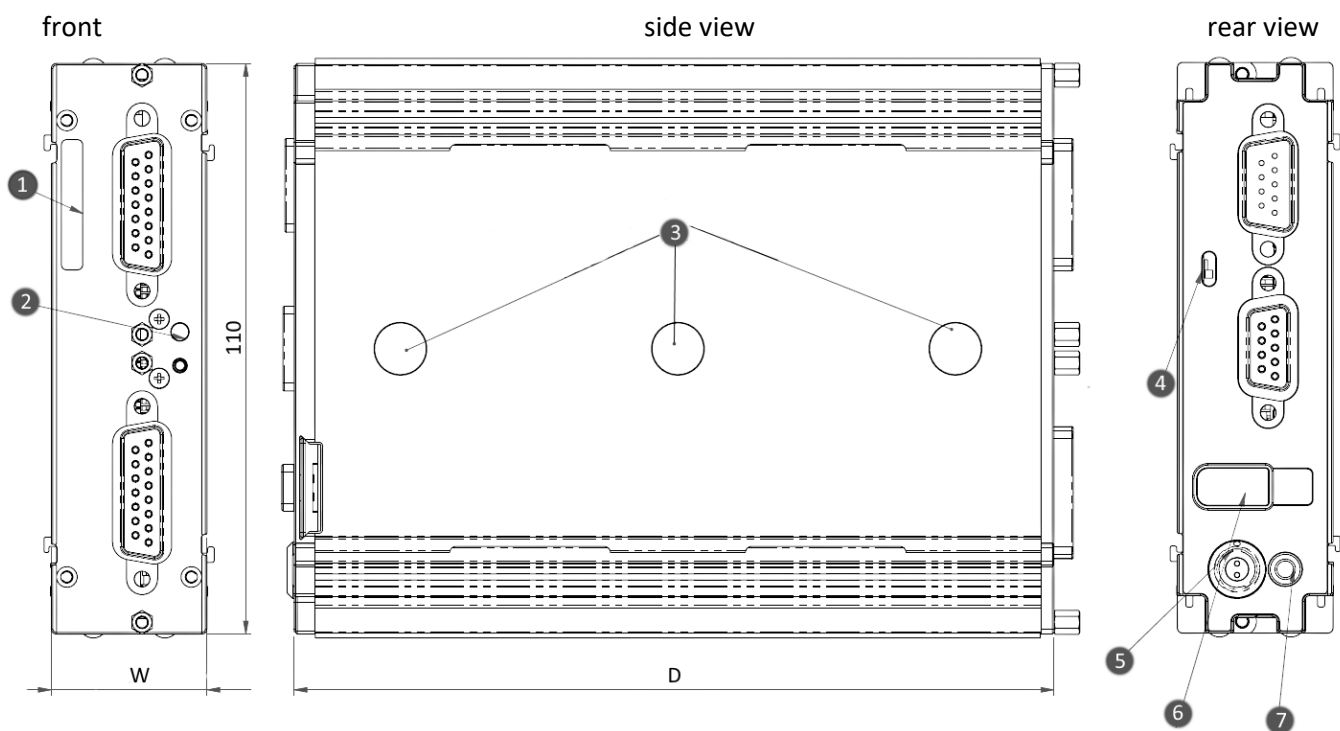
Shown in standard operating orientation: housing type L0; width (W) = 30 mm.

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

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-B2	DSUB-15 plug with screw terminals for 2-channel measurement of strain gauges, bridges and voltage	13500170
ACC/DSUBM-TEDS-B2	Version mit TEDS Unterstützung, gemäß IEEE 1451.4 für eine Nutzung mit imc Plug & Measure	13500191
ACC/DSUBM-I2	DSUB-15 plug with screw terminals for 2-channel current measurement of up to 50 mA (50 Ω shunt, scaling factor: 0.02A/V)	13500180
ACC/DSUBM-TEDS-I2	version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure	13500193

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

Mounting brackets for fixed installations		
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-L2	CANFX DIN Rail mounting bracket - Type L2	12500026

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

protective cover left (labeled with "L")

set consisting of left and right protective cover

Technical Specs - DCB8

Inputs, Measurement modes

Parameter	Value	Remarks
Inputs	8	
Measurement modes	voltage measurement	
DSUB	current measurement	ACC/DSUBM-I2
	bridge measurement	
	strain gauge	half-, quarter- and full bridge
LEMO	voltage measurement	
	current measurement	
	bridge measurement	
	strain gauge	half-, quarter- and full bridge

Sampling rate, Bandwidth, Filter

Parameter	Value	Remarks
Sampling rate	≤1 kHz	per channel, output rate on the CAN-Bus
Bandwidth	200 Hz	-3 dB; Filter OFF
	190 Hz	-3 dB; with AAF-filter
Resolution	16 Bit	internal 24 bit processing output rate: 16 bit Integer
CANopen® mode	"CiA® DS 301 V4.0.2" and "CiA® DS 404V1.2" supports 4 PDOs in INT16, INT32, and FLOAT	
TEDS - Transducer Electronic Data Sheets	conformant to IEEE 1451	ACC/DSUBM-TEDS-xxx

General

Parameter	Value typ.	min. / max.	Remarks
Isolation:			to case (CHASSIS)
CAN-Bus	±60 V		nominal; testing: 300 V (10 s)
power supply input	±60 V		nominal; testing: 300 V (10 s)
analog inputs	no isolation		analog reference ground: CHASSIS
Overvoltage protection	±40 V		long term
Input coupling	DC		
Input configuration	differential		
Input impedance	20 MΩ 9.5 MΩ	±1%	differential when Power OFF

Voltage measurement

Parameter	Value typ.	min. / max.	Remarks
Input range	±10 V, ±5 V, ±2 V, ±1 V... ±5 mV		
Gain error	0.02%	≤0.05%	of reading
Gain drift	+20 ppm/K·ΔT_a	+80 ppm/K·ΔT_a	$\Delta T_a=|T_a-25°C|$ ambient temperature T_a
Offset error	0.02%	≤0.05% ≤0.1% ≥0.15%	of range, in ranges: >±50 mV ≤±50 mV ±5 mV
Offset drift	±0.06 µV/K·ΔT_a	±0.3 µV/K·ΔT_a	$\Delta T_a=|T_a-25°C|$ ambient temperature T_a
Common mode rejection ranges ±10 V to ±50mV ±20 mV to ±5mV	92 dB 120 dB	>84 dB >100 dB	common mode test voltage: ± 10 V=
Noise (RTI)	0.4 µV$_{rms}$ 14 nV/√Hz		bandwidth 0.1Hz to 200 Hz (RTI)

Bridge measurement

Parameter	Value typ.	min. / max.	Remarks
Bridge measurement modes	full-, half bridge quarter bridge		5 V bridge excitation voltage only
Bridge input ranges	±1000 mV/V, ±500 mV/V, ±200 mV/V, ±100 mV/V ... ±0.5 mV/V ... ±1 mV/V ... ±2 mV/V		bridge excitation voltage: 10 V 5 V 2.5 V
Gain error	0.02%	≤0.05%	of reading
drift	+20 ppm/K·ΔT_a	+80 ppm/K·ΔT_a	$\Delta T_a=|T_a-25°C|$ ambient temperature T_a
Offset	0.01%	≤0.02%	of input range after automatic bridge balancing
drift	+16 nV/V/K·ΔT_a	+0.2 µV/V/K·ΔT_a	$\Delta T_a=|T_a-25°C|$ ambient temperature T_a
Bridge excitation voltage	10 V 5 V 2.5 V		not with quarter bridge measure
min. bridge impedance max. bridge impedance	120 Ω, 10 mH full bridge 60 Ω, 5 mH half bridge 5 kΩ		
Internal quarter-bridge completion	120 Ω		optional 350 Ω
Cable resistance for bridges (without return line)	<6 Ω <12 Ω <24 Ω		10 V excitation 120 Ω 5 V excitation 120 Ω 2.5 V excitation 120 Ω

Built-in DCB8 Sensor Supply

Parameter	Value			Remarks
Configurations options	7 ranges			
Output voltage	Voltage	Current	Net power	set globally
	+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	
Short circuit protection	unlimited duration			to reference ground of the output voltage
Output voltage accuracy [1]	<0.25% (typ.) <0.5% (max.) <0.9% (max.)			at terminal plugs, no load 25°C; 2.5 V to 24 V 25°C; 2.5 V to 24 V over entire temperature range

Compensation of cable resistances	measurement mode:
	bridge measurement, strain gauge
	
	3-wire circuit:
	single sense wire:
	sensing of return line only
	(−VB: supply ground)
	voltage drops dynamically monitored
	and numerically compensated
				provided for 2.5 V, 5 V and 10 V.
				
				prerequisites:
				1) symmetrical feed and return lines
				   differing cable length for
				   individual channels allowed

Compensation of cable resistances	measurement mode: voltage measurement with adjusted supply 3-wire circuit: single sense wire: sensing of return line only (−VB: supply ground) physical adjustment of voltage (+VB)			provided for 5 V prerequisites: 1) symmetrical feed and return lines, 2) identical wires for all channels, 3) representative measurement at channel 1 special operation mode: only for an operation with special sensors with a sensitivity depends in a certain extent on the exact value of the supply (especially "Nippon DENSO")
Efficiency	min. 40% typ. 55% typ. 50%			2.5 V 5 V, ..15 V 24 V
Max. capacitive load	>4000 µF >1000 µF >300 µF			2.5 V to 10 V 12 V, 15 V 24 V

[1] The precision of the bridge measurement is not affected by actual precision of the bridge supply. The current value of the bridge supply is continuously monitored and compensated.

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 W	8 W	
		14 W	including supply for external sensors (over total temperature range)
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 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	typ. DC vehicle voltage
	192 W at 24V DC	AC/DC power adaptor or cabinets
	60 W at 12 V DC	at +85°C
	120 W at 24V DC	

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	typ. DC vehicle voltage
	144 W at 24 V DC	AC/DC power adaptor or cabinets
	50 W at 12 V DC	at +85°C
	100 W at 24 V DC	