ISOF-8 for imc CRONOScompact (CRC/ISOF-8)

8-channel fast isolation amplifier

Data Sheet Version 1.2

This imc CRONOS*compact* module is an eight channel module for isolated measurement of voltage, current, temperature and IEPE (ICP)-sensors.

imc CRONOS*compact* module (example picture: CRC/ISO2-8)

Highlights

- Isolated channels allow for robust operation under conditions of common mode voltage (undefined, high level or noisy)
- High signal bandwidth of up to 48 kHz

imc CRONOS*compact* - modular measurement system

imc CRONOS*compact* is a modular and reconfigurable hardware a "rack"-based series of devices available in different housing sizes and device frames.

imc CRONOS*compact* (CRC) plug-in-modules can be plugged in imc CRONOS*compact* System (CRC-400 / CRC-2000G). This assembly of such a system can be adapted fast and easily.

imc CRONOS*compact* plug-in-modules

Once the modules are built-in a portable or rack-based housing, the modules will electrically connected to the imc CRONOS*compact* (CRC) system and they will also be supplied by the system. The data storage will also be managed by CRC.

The front panel of the rack-based modules ("-R") is different to the front panel of the portable housing. The properties of both types is the same.

imc CRONOS*compact* portable housing

Overview of available variants

Order code:	article number	remarks
CRC/ISOF-8	1170186	for installation in portable housing, occupying one slot
CRC/ISOF-8-ET	1171xxx	extended environmental range
CRC/ISOF-8-SUPPLY	1170xxx	version with sensor supply module, one slot
CRC/ISOF-8-SUPPLY-ET	1171xxx	extended environmental range
CRC/ISOF-8-R	1170xxx	for installation in the rack based series, one slot
CRC/ISOF-8-R-ET	1171xxx	extended environmental range
CRC/ISOF-8-SUPPLY-R	1170xxx	version with sensor supply module
CRC/ISOF-8-SUPPLY-R-ET	1171xxx	extended environmental range

Integrated sensor supply

- Version with an integrated sensor supply (ISOF-8-SUPPLY), requires no extra module expansion. With adjustable supply voltages (globally selectable for 8 channels), output on reserved pins of DSUB terminal.

Required software version

- Supported by imc STUDIO version 4.0R1, or later and imc DEVICES version 2.8R3 SP4, or later

Included accessories

DSUB-15 connector

- **ACC/DSUB(M)-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).

Optional accessories

DSUB-15 connectors

- **ACC/DSUB(M)-TEDS-T4** version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure
- **ACC/DSUB(M)-U4** DSUB-15 plug with screw terminals for 4-channel voltage measurement
- **ACC/DSUB(M)-TEDS-U4** DSUB-15 plug with screw terminals for 4-channel voltage measurement
- **ACC/DSUB(M)-I4** DSUB-15 plug with screw terminals for 4-channel current measurement of up to 50 mA (50 Ω shunt, scaling factor: 0.02 A/V)
- **ACC/DSUB(M)-TEDS-I4** version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure
- **ACC/DSUB-ICP4** DSUB-15 plug with screw terminals for conditioning of 4 IEPE/ICP inputs

Technical Specs - CRC/ISOF-8

Data Sheet Version 1.2

Channels, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Channels	8	
Measurement modes	voltage measurement current measurement thermocouple, RTD (Pt100) current fed sensors IEPE/ICP	 shunt plug (ACC/DSUB(M)-I4) thermo plug (ACC/DSUB(M)-T4) IEPE/ICP plug (ACC/DSUB-ICP4)
Terminal connection	2x DSUB-15	4 channels per plug

Sampling rate, bandwidth, filter, TEDS		
Parameter	**Value**	**Remarks**
Sampling rate	≤100 kHz	per channel
Bandwidth	0 Hz to 48 kHz 0 Hz to 46 kHz	-3 dB -0.2 dB
Filter (digital) cut-off frequency characteristic order	10 Hz to 20 kHz	 Butterworth, Bessel low pass filter: 8th order high pass filter: 4th order band pass: LP 4th and HP 4th order Anti-aliasing filter: Cauer 8.order with f_{cutoff} = 0.4 f_a
Resolution	16 Bit	internal processing 24 Bit
TEDS - Transducer Electronic Data Sheets	conform IEEE 1451.4 Class II MMI	ACC/DSUB(M)-TEDS-xx

General			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Isolation	galvanically isolated		channel to case (housing, CHASSIS,PE) and channel-to-channel not with IEPE/ICP plug
nominal rating	±60 V		channel to case
test voltage	±300 V (10 sec.)		
Overvoltage protection	±100 V ESD 2 kV transient protection: automotive load dump ISO 7637, Test impulse 6		differential input voltage (continuous) human body model test pulse 6 with max. -250 V R_i=30 Ω, t_d=300 µs, t_r<60 µs
Input coupling	DC		
Input configuration	differential, isolated		galvanically isolated to system-GND (case, CHASSIS, PE)

General			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input impedance	10 MΩ 1 MΩ 50 Ω		range ≤±2 V or temperature mode range ≥±5 V or device powered down current mode (shunt-plug) (ACC/DSUB(M)-I4)
Input current operating conditions on overvoltage condition	 1 mA	 2.4 nA	 for operation $\|V_{in}\|$ >5 V on ranges <±5 V or device powered-down
Auxiliary supply voltage available current internal impedance	 5 V >0.26 A 1.0 Ω	 ±5% >0.2 A <1.2 Ω	for IEPE (ICP)-extension plug independent of optional sensor supply, short circuit proof power per DSUB-plug

Voltage measurement				
Parameter	**Value typ.**	**min. / max.**	**Remarks**	
Input ranges	±60 V / ±50 V / ±25 V / ±10 V ±5 V / ±2 V / ±1 V ±500 mV / ±250 mV ±100 mV / ±50 mV / ±25 mV			
Gain uncertainty	<0.025%	<0.05%	of the measured value, at 25°C	
Gain drift		30 ppm/K · ΔT_a 60 ppm/K · ΔT_a	ranges ≤±2 V ranges ≥±5 V	over full temperature range
Offset uncertainty	0.02%	<0.05%	of the range	
Offset drift		2.5 ppm/K · ΔT_a	over entire temperature range ΔT_a= $\|T_a$ -25°C$\|$ ambient temperature T_a	
Nonlinearity	<40 ppm			
Input voltage noise	 2.6 μV_{rms} / 22 μV_{pkpk} 0.5 μV_{rms} / 3.5 μV_{pkpk} 0.1 μV_{pkpk} 14 nV / √Hz		range ±25 mV bandwidth 0.1 Hz to 48 kHz bandwidth 0.1 Hz to 1 kHz bandwidth 0.1 Hz to 10 Hz spectral noise density	
CMRR (common mode rejection ratio) / IMR	>145 dB (50 Hz) >80 dB (50 Hz)		ranges ≤ ±2 V ranges ≥ ±5 V	R_{source} = 0 Ω
Channel isolation	>1 GΩ, < 40 pF		channel-to-ground / CHASSIS (case)	
	>1 GΩ, < 10 pF		channel-to-channel	
Channel isolation (crosstalk)	>165 dB (50 Hz) >92 dB (50 Hz)		ranges ≤±2 V ranges ≥±5 V	R_{source} ≤100 Ω

Current measurement with shunt plug				
Parameter	**Value typ.**	**min. / max.**	**Remarks**	
Input ranges	±40 mA / ±20 mA / ±10 mA			
Shunt impedance	50 Ω		external plug ACC/DSUB(M)-I4	
Gain uncertainty	<0.07%	<0.15%	of the measured value, at 25°C	
Gain drift		30 ppm/K $\cdot\Delta T_a$ 60 ppm/K $\cdot\Delta T_a$	ranges ≤± 2 V ranges ≥± 5 V	over full temperature range
Offset uncertainty	10 µV		range ±25 mV	
Offset drift	0.7 µV/K$\cdot\Delta T_a$		range ± 25 mV ΔT_a= |T_a -25°C| ambient temperature T_a	

Temperature measurement - thermocouples			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Measurement mode	R, S, B, J, T, E, K, L, N		according IEC 584
Measurement range	-270°C bis 1370°C -270°C bis 1100°C -270°C bis 500°C		type K
Resolution	0.063 K (1/16 K)		
Measurement uncertainty (gain + offset)		<±0.6 K <±1.0 K	type K, value -150°C to 1100°C else
Drift (gain + offset)		±0.02 K/K$\cdot\Delta T_a$ ±0.05 K/K$\cdot\Delta T_a$	type K, range -270°C to 1100°C type K, range -270°C to 1370°C ΔT_a=|T_a-25°C| ambient temperature T_a
Uncertainty of cold junction compensation		<±0.15 K	with ACC/DSUB(M)-T4
Cold junction drift	±0.001 K/K$\cdot\Delta T_a$		ΔT_a = |T_a -25°C| ambient temperature T_a

Temperature measurement – PT100		
Parameter	**Value**	**Remarks**
Measurement range	-200°C to +850°C -200°C to +250°C	
Resolution	0.063 K (1/16 K)	
Measurement uncertainty	<±0.05%	of the measured value
Offset uncertainty	<±0.2 K	4-wire connection
Offset drift	±0.01 K/K$\cdot\Delta T_a$ ±0.02 K/K$\cdot\Delta T_a$	range -200°C to 250°C range -200°C to 850°C ΔT_a=|T_a-25°C| ambient temperature T_a
Sensor feed (PT100)	250 µA	not isolated

Sensor supply (ISOF-8-SUPPLY)				
Parameter	**Value**			**Remarks**
Configuration options	5 selectable settings			5 settings only Default ranges: +5 V to +24 V
Output voltage	Voltage (+2.5 V) +5.0 V +10 V +12 V +15 V +24 V (±15 V)	Current 580 mA 580 mA 300 mA 250 mA 200 mA 120 mA 190 mA	Netpower 1.5 W 2.9 W 3.0 W 3.0 W 3.0 W 2.9 W 3.0 W	set globally for all channels of a module special order, +12 V or 15 V can be replaced by +2.5 V; default selection with 2.5 V: +2.5 V, +5.0 V, +10 V, +12 V, +24 V special order, +15 V can be replaced by ±15 V
Isolation standard: option, upon request:	non isolated isolated			output to case (CHASSIS, PE) nominal rating: 50V, test voltage (10sec.): 300 V, not available with option ±15 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 at 25°C 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