

ISOF-8 for imc CRONOS-SL (CRSL/ISOF-8)

8-channel fast isolation amplifier

The **ISOF-8** module is an eight channel module for isolated measurement of voltage, current, temperature and IEPE (ICP)-sensors.

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

Overview of available variants

Order code	article no.	remarks
CRSL/ISOF-8-D	11800120	with DSUB sockets
CRSL/ISOF-8-D-SUP	11800119	with DSUB sockets and sensor supply

Included accessories

Documents
Getting started with imc CRONOScompact & imc CRONOS-SL (one copy per delivery / system)
Device certificate

Integrated sensor supply

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

Optional accessories

DSUB-15 plugs

- | | | |
|-------------------------|---|----------|
| • ACC/DSUBM-TEDS-T4 | version with TEDS support, according to IEEE 1451.4 for use with imc Plug & Measure | 13500190 |
| • ACC/DSUB-T4-IP65 | sealed version, suitable for ET series | 13500057 |
| • ACC/DSUBM-U4 | DSUB-15 plug with screw terminals for 4-channel voltage measurement | 13500166 |
| • ACC/DSUB-U4-IP65 | sealed version, suitable for ET series | 13500056 |
| • ACC/DSUBM-TEDS-U4 | DSUB-15 plug with screw terminals for 4-channel voltage measurement | 13500189 |
| • ACC/DSUB-TEDS-U4-IP65 | sealed TEDS version | 13500066 |

• ACC/DSUBM-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)	13500168
• ACC/DSUB-I4-IP65	sealed version, suitable for ET series	13500058
• ACC/DSUBM-TEDS-I4	version with TEDS support, according to IEEE 1451 for use with imc Plug & Measure	13500192
• ACC/DSUB-TEDS-I4-IP65	sealed TEDS version	13500068
• ACC/DSUB-ICP4	DSUB-15 plug with screw terminals for conditioning of 4 IEPE/ICP inputs	13500032

Technical Specs - CRSL/ISOF-8

Inputs, measurement modes, terminal connection		
Parameter	Value	Remarks
Inputs	8	
Measurement modes DSUB-15	voltage measurement current measurement thermocouple, RTD (PT100) current fed sensors IEPE/ICP	shunt plug (ACC/DSUBM-I4) thermo plug (ACC/DSUBM-T4) IEPE/ICP expansion plug (ACC/DSUB-ICP4, not isolated ACC/DSUBM-ICP2I-BNC-S/-F ¹ , isolated)
Measurement modes LEMO	voltage measurement current measurement RTD (PT100)	differential (internal shunt)
Terminal connection Standard	2x DSUB-15 or	4 channels per plug
LEMO	8x LEMO.1B.307	1 channel 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	conforming to IEEE 1451 Class II MMI	esp. with ACC/DSUBM-TEDS-xx (DS2433) not supported DS2431 (typ. IEPE/ICP sensor)

- When using the two-channel IEPE plug in combination with the analog inputs, which provide four channels per socket, only channels 1 and 3 can be used. Only the IEPE base functionality is supported by this module, see also TD ACC/DSUBM-ICP2I-BNC.

General			
Parameter	Value typ.	min. / max.	Remarks
Isolation	galvanically isolated		channel-to-channel and against system ground (housing, CHASSIS), as well as against common reference of all PT100 current sources and TEDS.
nominal rating	±60 V		Isolation with IEPE/ICP connector: depends on plug type
test voltage	±300 V (10 sec.)		

General			
Parameter	Value typ.	min. / max.	Remarks
Overvoltage protection	± 100 V ESD 2 kV transient protection: automotive load dump ISO 7637		differential input voltage (continuous) human body model $R_f=30 \Omega$, $t_d=300 \mu s$, $t_r<60 \mu s$
Input coupling	DC		
Input configuration	differential, isolated		
Input impedance	6,7 M Ω 1 M Ω 50 Ω		range $\leq \pm 2$ V or temperature mode range $\geq \pm 5$ V or device powered down current mode (shunt-plug) (ACC/DSUBM-I4)
Input current operating conditions on overvoltage condition	1 mA	2.4 nA	for operation $ V_{in} > 5$ V on ranges $< \pm 5$ V or device powered-down
Auxiliary supply voltage available current internal impedance	5 V > 0.26 A 1.0 Ω	$\pm 5\%$ > 0.2 A $< 1.2 \Omega$	for IEPE/ICP 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 error	$< 0.025\%$	$< 0.05\%$	of the measured value, at 25°C
Gain drift		30 ppm/K $\cdot\Delta T_a$ 60 ppm/K $\cdot\Delta T_a$	ranges $\leq \pm 2$ V ranges $\geq \pm 5$ V over full temperature range
Offset error	0.02 %	< 0.05 %	of the range
Offset drift		2.5 ppm/K $\cdot\Delta T_a$	over entire temperature range $\Delta T_a = T_a - 25^\circ C $; with T_a = ambient temperature
Nonlinearity	< 120 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 / \sqrt{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 $\leq \pm 2$ V ranges $\geq \pm 5$ V $R_{source} = 0 \Omega$
Channel isolation	> 1 G Ω , < 40 pF		channel-to-ground / CHASSIS (case)
	> 1 G Ω , < 10 pF		channel-to-channel
Channel isolation (crosstalk)	> 155 dB (50 Hz) > 92 dB (50 Hz)		ranges $\leq \pm 2$ V ranges $\geq \pm 5$ V $R_{source} \leq 100 \Omega$

Current measurement with shunt plug			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 40 \text{ mA} / \pm 20 \text{ mA} / \pm 10 \text{ mA}$		
Shunt impedance	50 Ω		external plug ACC/DSUBM-I4
Gain error	<0.07 %	<0.15 %	of the measured value, at 25 °C
Gain drift		30 ppm/K· ΔT_a 60 ppm/K· ΔT_a	ranges $\leq \pm 2 \text{ V}$ ranges $\geq \pm 5 \text{ V}$ over full temperature range
Offset error	10 μV		range $\pm 25 \text{ mV}$
Offset drift	0.7 $\mu\text{V}/\text{K} \cdot \Delta T_a$		range $\pm 25 \text{ mV}$ $\Delta T_a = T_a - 25^\circ\text{C} $; with $T_a =$ ambient temperature

Current measurement with internal shunt (variant with round connector etc.)			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 40 \text{ mA} / \pm 20 \text{ mA} / \pm 10 \text{ mA}$		
Shunt impedance	50 Ω		internal
Input configuration	differential		
Gain error	<0.02 %	<0.05 %	of the measured value, with 25°C
Gain drift		40 ppm/K· ΔT_a	over entire temperature range
Offset error	0.02 %	<0.05 %	of the measurement range
Offset drift		2.5 ppm/K · ΔT_a	over entire temperature range $\Delta T_a = T_a - 25^\circ\text{C} $; with $T_a =$ ambient temperature

Temperature measurement - thermocouples			
Parameter	Value typ.	min. / max.	Remarks
Measurement mode	R, S, B, J, T, E, K, L, N		
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)		16-Bit integer
Measurement error (gain + offset)		$< \pm 0.6 \text{ K}$ $< \pm 1.0 \text{ K}$	type K, value -150°C to 1100°C else
Drift (gain + offset)		$\pm 0.02 \text{ K}/\text{K} \cdot \Delta T_a$ $\pm 0.05 \text{ K}/\text{K} \cdot \Delta T_a$	type K, range -270°C to 1100°C type K, range -270°C to 1370°C $\Delta T_a = T_a - 25^\circ\text{C} $; with $T_a =$ ambient temperature
Error of cold junction compensation		$< \pm 0.15 \text{ K}$	with ACC/DSUBM-T4
Cold junction drift	$\pm 0.001 \text{ K}/\text{K} \cdot \Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $; with $T_a =$ ambient temperature

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)	16-Bit integer
Measurement error	<±0.05%	of the measured value
Offset error	<±0.2 K	4-wire connection
Offset drift	±0.01 K/K·ΔT _a ±0.02 K/K·ΔT _a	range -200°C to 250°C range -200°C to 850°C ΔT _a = T _a -25°C ; with T _a = ambient temperature
Sensor feed (PT100)	250 μA	non-isolated

Sensor supply (ISOF-8-SUPPLY, ISOF-8-L-SUPPLY)				
Parameter	Value typ.		max.	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. With the LEMO variant, TEDS support is omitted with this choice, LEMO pin 5 (TEDS) is then GND, pin 3 is +15 V and pin 4 - 15 V, see manual.
Isolation standard: option, upon request:	non isolated isolated			output to case (CHASSIS, PE) nominal rating: 50 V, test voltage (10 sec.): 300 V, not available with option ±15 V
Short-circuit protection	unlimited duration			to output voltage reference ground
Accuracy of output voltage	<0.25 %		0.5 % 0.9 % 1.5 %	at terminals, no load at 25 °C over entire temperature range plus with optional bipolar output voltage
Max. capacitive load	>4000 μF >1000 μF >300 μF			2.5 V to 10 V 12 V, 15 V 24 V