

UNI2-8 for imc CRONOScompact (CRC/UNI2-8)

8-channel All-purpose Amplifier

UNI2-8 is an all-purpose amplifier with eight channels for the measurement of:

- voltage, current, temperature (thermocouple and PT100)
- bridges and strain gauges (quarter-, half- and full bridge)
- IEPE/ICP-sensors (using an optional available DSUB plug for 2 channels)

A sensor supply with selectable ranges is included in order to supply external sensors or bridge measurements.



CRC/UNI2-8

Highlights

- Flexible application for acquisition of up to eight channels
- Signal bandwidth up to 48 kHz
- Software selectable quarter bridge completion 120 Ω and 350 Ω
- Supports imc's *Plug & Measure* (TEDS)

imc CRONOScompact - modular measurement system

imc CRONOScompact is a modular and reconfigurable hardware a "rack"-based series of devices available in a variety of housing sizes and device frames. imc CRONOScompact (CRC) plug-in-modules can be inserted into the system (CRC-400GP).

Once the modules are plugged into a portable or rack-based housing, they are electrically connected to the CRC-system and are supplied by the system with power. The data storage will be managed by the CRC-system.

Rack-based modules ("-R") differ from the standard modules only in terms of the front panel's attachment mechanism.



imc CRONOScompact plug-in-modules



imc CRONOScompact portable housing

Overview of the available variants

Standard version		ET Version *	
Order Code:	article no.	article no.	Remarks
CRC/UNI2-8	11700016	11710015	for imc CRONOScompact
CRC/UNI2-8-R	11700106	11710065	for imc CRONOScompact RACK
CRC/UNI2-8-L	11700198	117100xx	variant with LEMO sockets
CRC/UNI2-8-L-R	11700199	117100xx	with LEMO sockets for CRC RACK

* ET: Version in extended temperature range

Included accessories

DSUB-15 plug		
ACC/DSUBM-UNI2	DSUB-15 plug with screw terminals for 2-channel voltage, current ¹ and bridge measurement, as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC)	13500169
Documents		
Getting started with imc CRONOScompact (one copy per delivery / system)		
Device certificate		

Optional accessories

DSUB-15 plugs

- ACC/DSUBM-TEDS-UNI2 version with TEDS support, according to IEEE 1451 for use with imc Plug & Measure 13500188
- 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 for use with imc Plug & Measure 13500193
- ACC/DSUBM-ICP2I-BNC-S DSUB-15 plug for 2 IEPE/ICP sensors, BNC connection, isolated, slow 13500293
- ACC/DSUBM-ICP2I-BNC-F DSUB-15 plug for 2 IEPE/ICP sensors, BNC connection, isolated, fast 13500294

LEMO plug

- ACC/TH-LEM-150 LEMO.1B plug for thermocouple measurement with built-in cold-junction compensation (CJC) via PT100 13500086

Mounting brackets for fixed installations of imc CRONOScompact devices (CRC)

- CRC/BRACKET-CON mounting bracket 90° 11700153
- CRC/BRACKET-90 mounting bracket for DIN-Rail 11700152
- CRC/BRACKET-BACK mounting bracket for DIN-Rail 11700154

¹ single end current measurement, for differential measurement an external shunt or the appropriate connector (ACC/DSUBM-I2) is necessary

Technical Specs - CRC/UNI2-8

Inputs, measurement modes, terminal connection		
Parameter	Value	Remarks
Inputs	8	
Measurement modes DSUB-15	voltage measurement current measurement bridge sensor strain gauge thermocouple measurement PT100 (3- and 4-wire configuration) current-fed sensors (IEPE/ICP)	ACC/DSUBM-UNI2 Single-ended (internal shunt) or shunt plug ACC/DSUBM-I2 full, half, quarter bridge with DSUB-15 expansion plug: (ACC/DSUB-ICP2, not isolated ACC/DSUBM-ICP2I-BNC-S/-F, isolated)
Measurement modes LEMO	voltage measurement current measurement thermocouple measurement bridge sensor strain gauge PT100 (3- and 4-wire configuration)	LEMO plug with built-in cold-junction compensation (CJC) ACC/TH-LEM-150 full, half, quarter bridge
Terminal connection DSUB-15 LEMO	4x DSUB-15 8x LEMO.1B.307	2 channels per plug 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 30 kHz 0 Hz to 10 Hz	-3 dB -0.1 dB -3 dB for temperature measurement
Filter (digital) cut-off frequency characteristic type and order	10 Hz to 20 kHz	Butterworth, Bessel low pass or high pass filter: 8th order band pass: LP 4th and HP 4th order Anti-aliasing filter: Cauer 8th order with $f_{\text{cutoff}} = 0.4 f_s$
Resolution	16 Bit	internal processing 24 Bit
TEDS Transducer Electronic Data Sheets	conforming to IEEE 1451.4 Class II MMI	esp. with ACC/DSUBM-TEDS-xx (DS2433) not supported: DS2431 (typ. IEPE/ICP sensor)

General			
Parameter	Value typ.	min. / max	Remarks
Overvoltage protection		±80 V ±50 V	permanent, differential input range >±10 V or device off input range ≤±10 V
Input coupling	DC		
Input configuration	differential		
Input impedance	1 MΩ 20 MΩ		range >±10 V range ≤±10 V
Auxiliary supply			for IEPE/ICP-expansion plug
voltage	+5 V	±5 %	independent of integrated
available current	0.26 A	0.2 A	sensor supply, short-circuit protected
internal resistance	1.0 Ω	<1.2 Ω	power per DSUB-plug
Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input range	±50 V, ±25 V, ±10 V, ±5 V, ±2.5 V, ±1 V to ±5 mV		
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS; input range ≤±10 V
Gain error	0.02 %	0.05 %	of the measured value, at 25 °C
Gain drift	10 ppm/K·ΔT _a	30 ppm/K·ΔT _a	ΔT _a = T _a - 25°C ; with T _a = ambient temperature
Offset error	0.02 %	≤0.05 % ≤0.06 % ≤0.15 %	of the range, at 25 °C range >±50 mV range ≤±50 mV range ≤±10 mV
Offset drift	±40 μV/K·ΔT _a ±0.7 μV/K·ΔT _a ±0.1 μV/K·ΔT _a	±200 μV/K·ΔT _a ±6 μV/K·ΔT _a ±1.1 μV/K·ΔT _a	range >±10 V range ±10 V to ±0.25 V range ≤±0.1 V ΔT _a = T _a - 25°C ; with T _a = ambient temperature
Non-linearity	30 ppm	90 ppm	
CMRR (common mode rejection ratio)	80 dB 110 dB 138 dB	>70 dB >90 dB >132 dB	DC and f≤60 Hz range ±50 V to ±25 V range ±10 V to ±50 mV range ±25 mV to ±5 mV
Noise	3.6 μV _{rms} 0.6 μV _{rms} 0.14 μV _{rms}	5.5 μV _{rms} 1.0 μV _{rms} 0.26 μV _{rms}	range 0.1 Hz to 50 kHz range 0.1 Hz to 1 kHz range 0.1 Hz to 10 Hz

Current measurement with shunt plug			
Parameter	Value typ.	min. / max.	Remarks
Input range	±50 mA, ±20 mA, ±10 mA, ±5 mA, ±2 mA, ±1 mA		
Shunt impedance	50 Ω		external plug ACC/DSUBM-I2
Over load protection		±60 mA	permanent
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS
Input configuration	differential		
Gain error	0.02 %	0.06 % 0.1 %	of the reading, at 25 °C additional error of 50 Ω in plug
Gain drift	15 ppm/K·ΔT _a	55 ppm/K·ΔT _a	ΔT _a = T _a -25°C ; with T _a = ambient temperature
Offset error	0.02 %	0.05 %	of the range, at 25 °C
Noise	40 nA _{rms} 0.7 nA _{rms} 0.17 nA _{rms}	70 nA _{rms} 12 nA _{rms} 0.3 nA _{rms}	Bandwidth: 0.1 Hz to 50 kHz 0.1 Hz to 1 kHz 0.1 Hz to 10 Hz
Current measurement with internal shunt			
Parameter	Value typ.	min. / max.	Remarks
Input range	±50 mA, ±20 mA, ±10 mA, ±5 mA, ±2 mA, ±1 mA		
Shunt impedance	120 Ω		internal
Over load protection		±60 mA	permanent
Maximum input voltage		-11 V to +15 V	between ±IN and CHASSIS
Input configuration	Single-ended		internal current sink to -VB
Gain error	0.02 %	0.06 %	of the reading, at 25 °C
Gain drift	15 ppm/K·ΔT _a	55 ppm/K·ΔT _a	ΔT _a = T _a -25°C ; with T _a = ambient temperature
Offset error	0.02 %	0.05 %	of the range, at 25 °C
Noise	40 nA _{rms} 0.7 nA _{rms} 0.17 nA _{rms}	70 nA _{rms} 12 nA _{rms} 0.3 nA _{rms}	Bandwidth: 0.1 Hz to 50 kHz 0.1 Hz to 1 kHz 0.1 Hz to 10 Hz

Bridge measurement			
Parameter	Value typ.	min. / max.	Remarks
Mode	DC		
Measurement modes	full, half, quarter bridge		bridge supply ≤ 5 V with quarter bridge
Input range	± 1000 mV/V, ± 500 mV/V, ± 200 mV/V, ± 100 mV/V ... with bridge supply: 10 V ... $\pm 0,5$ mV/V with bridge supply: 5 V ... ± 1 mV/V with bridge supply: 2.5 V ... ± 2 mV/V with bridge supply: 1 V ... ± 5 mV/V		(as an option) (as an option)
Bridge supply (as an option)	10 V 5 V 2.5 V and 1 V	± 0.5 % ± 0.5 %	The actual value will be dynamically captured and compensated for in bridge mode.
Minimum bridge impedance	120 Ω full bridge 60 Ω half bridge		
Maximum bridge impedance	5 k Ω		
Quarter bridge completion	120 Ω , 350 Ω		internal, switchable per software
Input impedance	20 M Ω	± 1 %	differential, full bridge
Gain error	0.02 %	0.05 %	of the reading, at 25 °C
Gain drift	20 ppm/K $\cdot\Delta T_a$	50 ppm/K $\cdot\Delta T_a$	$\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature
Offset error	0.01 %	0.02 %	of input range, at 25°C, after automatic bridge balancing
Automatic shunt-calibration (calibration jump)	0.5 mV/V	± 0.2 %	for 120 Ω and 350 Ω

Temperature measurement - Thermocouples			
Parameter	Value typ.	min./ max.	Remarks
Measurement mode	J, T, K, E, N, S, R, B		
Measurement range	-270 °C to 1370 °C -270 °C to 1100 °C -270 °C to 500 °C		type K
Resolution	0.063 K (1/16 K)		16-Bit integer
Measurement error		0.06 % 0.05 %	type K of measurement range, at 25 °C of reading (total uncertainty min. 0.85 K)
Drift	0.02 K/K $\cdot\Delta T_a$	0.05 K/K $\cdot\Delta T_a$	$\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature
Error of cold junction compensation		± 0.15 K	with ACC/DSUBM-UNI2, at 25 °C
Cold junction drift	± 0.001 K/K $\cdot\Delta T_a$		$\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature

RTD (PT100)			
Parameter	Value typ.	min. / max.	Remarks
Input range		-200 °C to 850 °C -200 °C to 250 °C	
Resolution	0.063 K		
Measurement error			
4-wire measurement		0.25 K +0.02 %	-200 °C to 850 °C of measured value of resistance
3-wire measurement		0.1 K +0.02 % 0.42 K +0.03 % 0.38 K +0.02%	-200 °C to 250 °C of measured value of resistance -200 °C to 850 °C of measured value of resistance -200 °C to 250 °C of measured value of resistance Precision for 3-wire mode: with individual adjustment, only (special version upon request)
Drift		0.01 K/K·ΔT _a	ΔT _a = T _a -25°C ; with T _a = ambient temperature
Sensor feed (PT100)	1.25 mA		

Sensor supply			
Parameter	Value typ.	max.	Remarks
Configuration options	5 selectable settings		always 5 selectable voltage settings default selection: +5 V to +24 V
Output voltage	Voltage (+1 V) (+2.5 V) +5.0 V +10 V +12 V +15 V +24 V (±15 V)	Current 580 mA 580 mA 580 mA 300 mA 250 mA 200 mA 120 mA 190 mA	Power 0.6 W 1.5 W 2.9 W 3.0 W 3.0 W 3.0 W 2.9 W 3.0 W
Isolation	non isolated		output to case (CHASSIS)
Short-circuit protection	unlimited duration		to output voltage reference ground: "-VB"
Compensation of cable resistances	3-line control: SENSE line as refeed (-VB: supply ground)		calculated compensation with bridges
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