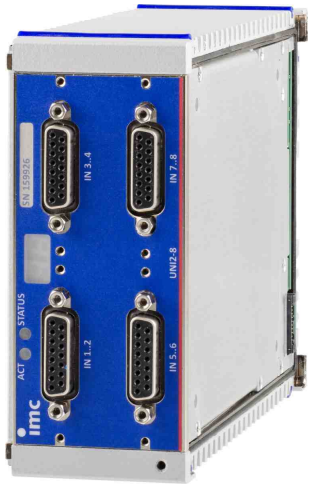
UNI2-8 for imc CRONOS-XT (CRXT/UNI2-8)

8-channel, high-performance universal measurement amplifier

The UNI2-8 is a universal measurement amplifier. With 8 differential analog inputs, it is capable of measuring:

- Voltage and current (20 mA)
- Temperature (thermocouple and PT100)
- Bridge and strain gauge (quarter-, half and full-bridge)
- IEPE/ICP-sensors (via the optional DSUB terminal connector)

For powering external sensors or bridge measurements, a software selectable sensor supply is integrated.



CRXT/UNI2-8

Highlights

- An amplifier for all relevant measurement quantities
- Very high signal bandwidth of up to 48 kHz
- Finely adjustable input voltage range (±5 mV to ±50 V)
- Each channel with its own adjustable filter (e.g., anti-aliasing filter) and simultaneous A/D converter
- Graphical configuration wizard to setup strain gauge bridges
- Software selectable quarter bridge completion 120 and 350 Ω
- Supports imc Plug & Measure (Transducer Electronic Data Sheets (IEEE 1451)

Typical applications

- Provides maximum flexibility for changing measurement and sensor requirements

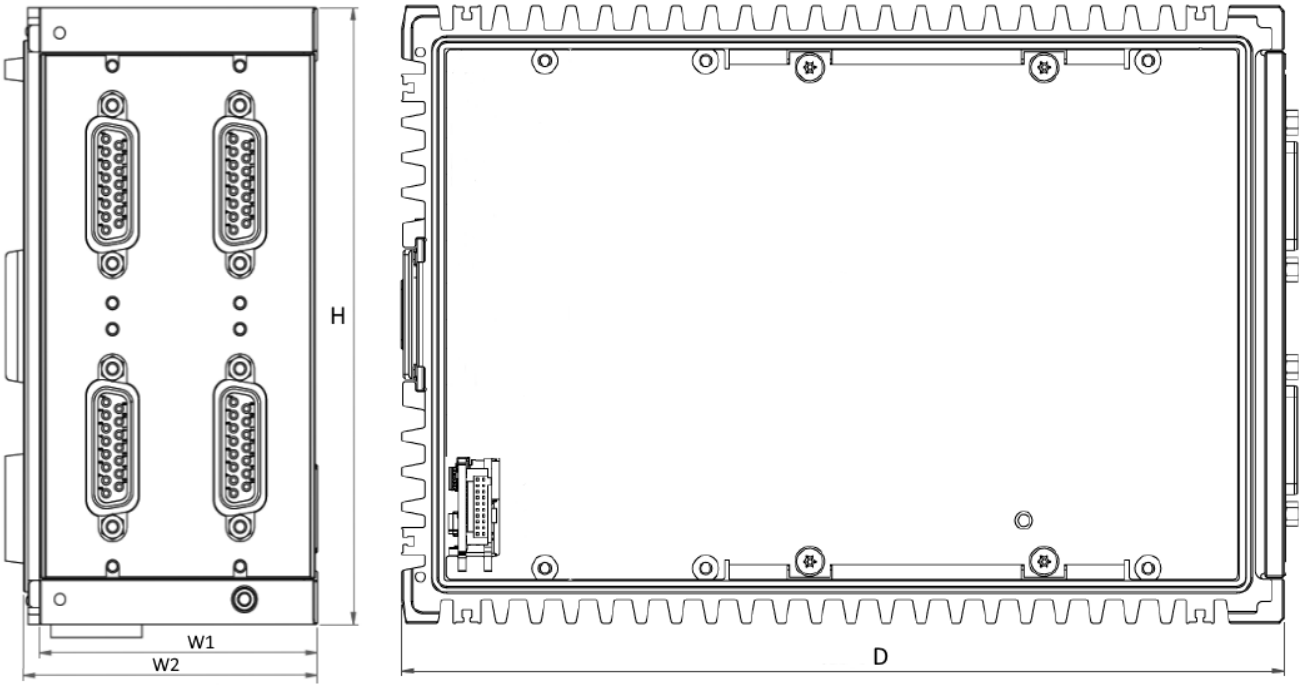
imc CRONOS-XT - Maximizes flexible modularity

An imc CRONOS-XT system is composed of a base unit and one or more imc CRONOS-XT modules. The imc click mechanism offers a mechanically strong connection between several imc CRONOS-XT modules. At the same time, the "click" establishes an electrical connection to the system bus and the power supply.

Overview of available variants

Order Code	Signal connections	power consumption	weight	housing	article no.
CRXT/UNI2-8	DSUB-15	10.1 W	1.1 kg	XT2	11100015
CRXT/UNI2-8-L	LEMO.1B (7-pin)	10.1 W	1.1 kg	XT2	11100074
CRXT/UNI2-8-PROTECT	DSUB-15	10,1 W	1,1 kg	XT2	11100081

Dimensions



Shown in standard operating orientation: housing type XT2

Housing type:	XT1	XT2	XT3	XT4	Remarks
W: Width in mm	30.5	61	91.5	116.9	W1: modular spacing (effective stacking width)
	34	64.5	95	120.4	W2: complete width
H: Height in mm	130				
D: Depth in mm	186.5				

Sealing, IP rating and environmental specs

A single CRXT slice cannot achieve an IP protection level at first because it is functionally open at the side. The specified specifications are always only valid for a complete in a controlled environment clicked (closed) CRXT system. Only after it has been combined with a CRXT base unit (plus power module), CRXT slices if applicable, and the final handles to form a CRXT system can an evaluation be made. The specification for shock, vibration and IP degree of protection applicable to the entire device is then derived from the weakest specification of the CRXT slices used in this combination. They assume that the individual CRXT slices are each mounted in conjunction with the additional stabilizing interconnect brackets (included in the standard accessories supplied).

The module variants with LEMO sockets are equipped with LEMO.1B connection sockets, which meet the IP65 degree of protection. This determines the upper limits for the sealing of the complete system equipped with it.

According to IEC 60529 the Ingress Protection (IP) rating refer to protection classes provided by a housing, the protection of the electrical parts within the housing shell. If all functionally accessible contacts of the sockets are also to be protected, the corresponding plugs must be connected to all sockets. In many cases, a protective cover can also be used alternatively on unused sockets.

Included accessories

Sealing Caps and mounting accessories		
4x ACC/CAP-DSUB-15-IP67	Sealing Cap IP67 for DSUB-15 sockets	13500342
2x CRXT/BRACKET-CON	interconnect brackets, intended for increased stability	11100040

Miscellaneous
Certificates and calibration protocols: Detailed information on certificates supplied, the specific contents, underlying standards (e.g. ISO 9001 / ISO 17025) and available media (pdf etc.) can be found on our website, or you can contact us directly.
Getting started with imc CRONOS-XT (one copy per delivery)

Optional accessories

DSUB-15 plug (solder) IP67		
CRXT/DSUB15M-IP67	IP67 DSUB-15 plug male	11100073

DSUB-15 plug (IP65)		
ACC/DSUBM-UNI2-IP65	IP65 DSUB-15 plug with screw terminals for 2-channel voltage, and bridge measurement as well as temperatures with PT100 and thermocouples with integrated cold junction compensation (CJC)	13500215
ACC/DSUBM-TEDS-UNI2-IP65	wasserdichte IP65 TEDS Version	13500222
ACC/DSUBM-B2-IP65	IP65 DSUB-15 plug with screw terminals for 2-channel measurement of strain gauges, bridges and voltage	13500218
ACC/DSUBM-TEDS-B2-IP65	sealed IP65 TEDS version	13500331
ACC/DSUBM-I2-IP65	IP65 DSUB-15 plug with screw terminals for 2-channel current measurement of up to 50 mA (50 Ω shunt, scaling factor: 0.02A/V)	13500329
ACC/DSUBM-TEDS-I2-IP65	sealed IP65 TEDS version	13500334

DSUB-15 extension plug for two IEPE transducers (IP65)		
CRXT/DSUB-ICP2-IP65	IP65 DSUB-15 plug with 2 PG for cable with diameter 2.5 to 3 mm^2	11100064

DSUB-15 extension plugs for two IEPE/ICP transducers (no IP65 rating)		
ACC/DSUBM-ICP2I-BNC-S	ICP2I (isolated, 2x BNC), slow	13500293
ACC/DSUBM-ICP2I-BNC-F	ICP2I (isolated, 2x BNC), fast	13500294

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

Sealing caps		
ACC/CAP-DSUB-15	dust protection cap for DSUB-15	1350339

Miscellaneous		
ACC/DSUBM-LOCKING-BOLT-L	extended length locking bolts (2 pcs) For the slices with DSUB-15 sockets, the sealed terminal plugs ACC/DSUBM-xxx-IP65 must be used - regardless of the sealing properties: The simple standard plug (ACC/DSUBM-xxx without suffix [-IP65]) have shorter locking screws and therefore cannot be fixed to CRXT slices. However, they can be retrofitted with the long bolts. With long bolts: only for CRXT, with short standard bolts: only for CRFX, CRC, C-SERIE etc.	13500327

Technical Specs - 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 $f_{cutoff} = 0.4\ f_s$
Resolution	 16 Bit 24 Bit	output format is selectable for each channel individually: a) 16 Bit Integer b) 32 Bit Float (24 Bit Mantissa)
TEDS Transducer Electronic Data Sheets	conforming to IEEE 1451.4 Class II MMI	esp. with ACC/DSUBM-TEDS-xx (DS2433) supports also: DS2431 (typ. IEPE/ICP sensor)
Characteristic curve linearization	user defined (max. 1023 supporting points)	

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 voltage available current internal resistance	 +5 V 0.26 A 1.0 Ω	 ±5 % 0.2 A <1.2 Ω	for IEPE/ICP-expansion plug independent of integrated sensor supply, short-circuit protected 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	$\Delta T_a = \lvert T_a - 25°C \rvert$; 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 $\Delta T_a = \lvert T_a - 25°C \rvert$; 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	$\Delta T_a = \lvert T_a - 25°C \rvert$; 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	$\Delta T_a = \lvert T_a - 25°C \rvert$; 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 with bridge supply: 10 V with bridge supply: 5 V with bridge supply: 2.5 V with bridge supply: 1 V	±1000 mV/V, ±500 mV/V, ±200 mV/V, ±100 mV/V ... ... ±0,5 mV/V ... ±1 mV/V ... ±2 mV/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 Maximum bridge impedance	120 Ω full bridge 60 Ω half bridge 5 kΩ		
Quarter bridge completion	120 Ω, 350 Ω		internal, switchable per software
Input impedance	20 MΩ	±1 %	differential, full bridge
Gain error	0.02 %	0.05 %	of the reading, at 25 °C
Gain drift	20 ppm/K·ΔT_a	50 ppm/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$; 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·ΔT_a	0.05 K/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$; 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·ΔT_a		$\Delta T_a = \lvert T_a - 25°C \rvert$; 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 % 0.1 K +0.02 %	-200 °C to 850 °C of measured value of resistance -200 °C to 250 °C of measured value of resistance
3-wire measurement		0.42 K +0.03 % 0.38 K +0.02%	-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	$\Delta T_a = \lvert T_a - 25°C \rvert$; 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	set jointly for all eight channels upon request, also 2.5 V and 1 V settings are available, for example by replacing the +12 V or +15 V setting. An arbitrary set of 5 setting can be chosen preferred selections: +24 V, +12 V, +10 V, +5.0 V, +2.5 V +15 V, +10 V, +5.0 V, +2.5 V, +1 V upon request, special order: +15 V can be replaced by ±15 V. This eliminates the internal current- and quarter bridge measurement.
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