UNI-4 for imc CRONOS-XT (CRXT/UNI-4)

4-channel, high-performance universal measurement amplifier

The UNI-4 is the most universal measurement amplifier in the portfolio.
With 4 differential analog inputs, it is capable of measuring:

- Voltage and current (isolated measurement)
- Temperature (thermocouple, isolated measurements)
- PT100, PT1000
- Bridge and strain gauge (quarter-, half- and full-bridge)
- IEPE/ICP sensors (via the optional DSUB terminal connector)

CRXT/UNI-4
(Fig. similar)

Channel-wise, independently configurable supply voltages (non-isolated) between 0.25 V to 24 V are available for supplying external sensors
or bridge measurements.

The channels are individually, galvanically isolated for voltage, current and thermocouple measurements. Each channel is equipped with its own simultaneous A/D converter and adjustable filter
(e.g., anti-aliasing filter).

Highlights

- Individual, galvanically isolated measurement of voltage, current and thermocouples
- Channel-wise, individually configurable sensor and bridge supply
- PT100 and PT1000 supported
- High signal bandwidth of up to 48 kHz
- Internal quarter-bridge completion of 120, 350 and 1 kΩ
- Double or single sense wire schemes supported with bridge supply
- Broken wire sensor error detection
- Integrated shunt calibration for bridge mode
- Supports imc Plug& Measure(Transducer Electronic Data Sheets)

Typical applications

- Provides maximum flexibility for changing measurement and sensor requirements, including channel-wise, individual sensor supplies.

imc CRONOS-XT - Maximizes flexible modularity

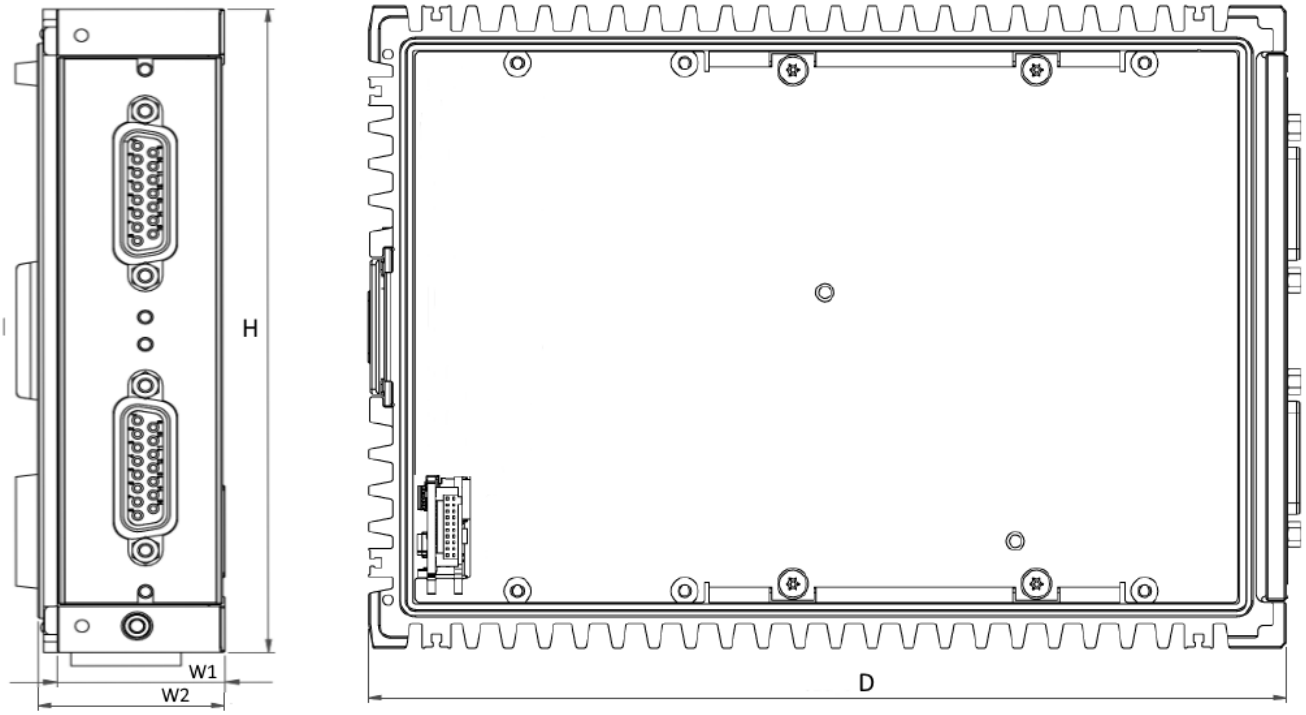
An imc CRONOS-XT system is composed of a base unit and one or more imc CRONOS-XT modules. The imc click mechanism offers a mechanically strong connection between several imc CRONOS-XT modules. At the same time, the "click" establishes an electrical connection to the system bus and the power supply.

Models and Options

Overview of available variants

Order Code	Signal connections	power consumption	weight	housing	article no.
CRXT/UNI-4	DSUB-15	10.8 W	0.7 kg	XT1	11100055

Dimensions



Shown in standard operating orientation: housing type XT1

Housing type:	XT1	XT2	XT3	XT4	Remarks
W: Width in mm	30.5 34	61 64.5	91.5 95	116.9 120.4	W1: modular spacing (effective stacking width) 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).

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.

Accessories and Connectors

Included accessories

Sealing Caps and mounting accessories		
2x 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	sealed 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

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 - UNI-4

Inputs, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Inputs	4	
Measurement modes		ACC/DSUBM-UNI2 for all modes
isolated measurement modes:	voltage measurement (differential) current measurement thermocouple measurement	 with Shunt-plug (ACC/DSUBM-I2)
non-isolated measurement modes:	voltage measurement (single-end) current measurement bridge-sensor strain gauges PT100/PT1000 (3- and 4-wire connection) current fed sensors (IEPE/ICP)	 with internal Shunt with DSUB-15 extension plug ACC/DSUBM-ICP2I-BNC-S/-F, isolated
Terminal connections	2x DSUB-15	2 channels per plug

Individual Sensor- and Bridge supply		
Parameter	**Value**	**Remarks**
Output-Voltage	channel-wise individually configurable 15 V, 12 V, 10 V, 5 V, 2,5 V	 5 possible settings standard version
	5 settings configurable out of: 24 V, 15 V, 12 V, 10 V, 5 V, 2.5 V, 1 V, 0.5 V, 0.25 V	special version, special order
Short circuit protection	unlimited duration	
Output power	0.5 W / channel 0.2 W / channel	≥5 V ≤2.5 V
Accuracy	±0.2%	At the amplifier terminals, no load. Does not affect the accuracy in bridge mode (live software compensation of actual value and of additional cable loss via SENSE)

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 cut-off frequency characteristic 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 8.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 DataSheets	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**	**Remarks**
Isolation of voltage channels	channel-wise galvanically-isolated	voltage channels isolated against each other and against system ground (housing, CHASSIS, PE), as well as against common reference and all bridge excitation voltages "-VB" Isolation with IEPE/ICP plug: depends on plug type
Bridge excitation voltage isolation	not channel-wise isolated	isolated against additional electronics (all sensor power supplies, bridge and input wiring, TEDS, etc.) with common reference ground “–VB” Block-isolated against system ground (housing, CHASSIS, PE)
Max common mode voltage isolated mode tested:	±60 V 300 V (10 sec.)	against internal reference ground “–VB”, against system ground (housing, CHASSIS, PE)
Max common mode voltage non-isolated mode	±10 V	against internal reference ground “–VB” Also for “non-isolated” mode, there is an additional global block-isolation of the entire internal measurement electronics from the housing (CHASSIS, PE)

General			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Overvoltage protection (inputs +IN, -IN)	±100 V ESD 2 kV transient protection: automotive load dump ISO 7636		differential input voltage (continuous) human body model R_i=30 Ω, t_d=300 µs, t_r<60 µs
Input coupling	DC		
Input impedance	10 MΩ 1 MΩ		voltage mode (range ≤±2 V), temperature mode voltage mode (range ≥±5 V)
Input current operating conditions on overvoltage condition	1 mA	2.4 nA	 $\|V_{in}\|$ >5 V on ranges <±2 V
Input noise	2.2 μV_{rms} / 15 μV_{pkpk} 0.3 μV_{rms} / 2.1 μV_{pkpk} 0.1 μV_{pkpk} 10 nV / √Hz		range ≤±25 mV bandwidth 0.1 to 48 kHz bandwidth 0.1 to 1 kHz bandwidth 0.1 to 10 Hz spectral noise density (at 1 kHz)
CMRR (common mode rejection ratio) / IMR	>145 dB (50 Hz) >80 dB (50 Hz)		range ≤±2 V range ≥±5 V R_{source} = 0 Ω
Spurious free dynamic range (SFDR)	>80 dB (10 kHz) >95 dB (1 kHz) >84 dB (10 kHz) >100 dB (1 kHz)		range ≤±2 V range ≥±5 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-extension plug independent of integrated sensor supply, short-circuit protected power per DSUB-plug

Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Voltage input range	±60 V, ±50 V, ±25 V, ±10 V, ±5 V, ±2 V, ±1 V, ±500 mV, ±250 mV, ±100 mV, ±50 mV, ±25 mV, ±10 mV, ±5 mV, ±2.5 mV		with single-end mode: max. ±10 V
Input configuration	differential / single-end		
Gain error	<0.02%	<0.05%	of the measured value, at 25°C
Gain drift		20 ppm/K·ΔT_a 60 ppm/K·ΔT_a	range ≤±2 V range ≥±5 V ΔT_a=|T_a -25°C| ambient temperature T_a
Offset error		 0.01% 10 µV	of the range range ≥± 50 mV range ≤ ± 25 mV
Offset drift	0.7 µV/K·ΔT_a		range ≤±25 mV ΔT_a=|T_a –25°C| ambient temperature T_a

Current measurement with Shunt-Plug			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Current input range	±40 mA, ±20 mA, ±10 mA		
Shunt-Resistor	50 Ω		external plug ACC/DSUBM-I2
Input configuration	differential		isolated
Gain error	<0.02%	<0.05% <0.1%	of the measured value, at 25°C additional error of 50 Ω in plug
Gain drift	10 ppm/K·ΔT_a	30 ppm/K·ΔT_a	ΔT_a=|T_a-25°C| ambient temperature T_a
Offset error		<0.01%	of the range, at 25°C

Current measurement with internal shunt			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Current input range	±50 mA, ±20 mA, ±10 mA, ±5 mA, ±2 mA, ±1 mA		
Shunt-Resistor	120 Ω		internal
Input configuration	single-end		not isolated
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| ambient temperature T_a
Offset error		<0.01%	of the range, at 25°C

Bridge measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Mode	DC		
Measurement modes	full, half, quarter bridge		
Measurement range bridge supply: 10 V bridge supply: 5 V bridge supply: 2.5 V (bridge supply: 1 V) (bridge supply: 0.5 V) (bridge supply: 0.25 V)	 ±1000 mV/V, ±500 mV/V, ±200 mV/V, ±100 mV/V, ±50 mV/V, ±25 mV/V, ... ±0.5 mV/V, ±0.25 mV/V ±1000 mV/V, ±400 mV/V, ±200 mV/V, ±100 mV/V, ±50 mV/V ... ±1 mV/V, ±0.5 mV/V ±800 mV/V, ±400 mV/V, ±200 mV/V, ±100 mV/V, ... ±2 mV/V, ±1 mV/V ±1000 mV/V, ... , ±2.5 mV/V ±1000 mV/V, ... , ±5 mV/V ±800 mV/V, ... , ±10 mV/V		 special order special order special order
Bridge supply	0.25 V to 10 V		selectable for each channel possible options: see above
Minimum bridge impedance	200 Ω 50 Ω 32 Ω		bridge supply = 10 V bridge supply = 5 V bridge supply = 2.5 V
Cable-Compensation full bridge / half bridge quarter bridge	 4-wire-technique 3-wire-technique with shunt-calibration full compensation in 3-wire-technique		 any cable for symmetric (similar) cables one-time non-adaptive compensation including Gain-Correction!
Quarter bridge completion	120 Ω, 350 Ω, 1 kΩ		switched per software / bridge supply ≤5 V
Automatic shunt-calibration (calibration step)	0.5 mV/V		with 120 Ω and 350 Ω
Input impedance	6.7 MΩ	±1%	differential, full bridge
Gain error	<0.02%	<0.05%	of the reading, at 25°C
Gain drift		20 ppm/K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$ ambient temperature T_a
Offset error	within residual noise band		
Offset drift		0.14 µV/V /K·ΔT_a	$\Delta T_a = \lvert T_a - 25°C \rvert$ ambient temperature T_a
Drift half bridge	0.5 µV/V / °C	1 µV/V / °C	additional drift of internal half bridge completion
Bridge offset balancing range	≥100% of measurement range ≥±4 mV / V		 valid for the entire meas. range
Cable resistance max cable length (simple)	<60 Ω <460 m		120 Ω bridge 0.14 mm², 130 mΩ / m

Temperature measurement			
Thermocouple	**Value typ.**	**min. / max.**	**Remarks**
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 (gain + offset)		 <±0.6 K <±1.0 K	with type K range -150°C to 1100°C else
Drift (gain + offset)		±0.02 K/K·ΔT_a ±0.05 K/K·ΔT_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
Error of cold junction compensation		<±0.15 K	with ACC/DSUBM-UNI2
Cold junction drift	±0.001 K/K·ΔT_a		ΔT_a=|T_a-25°C| ambient temperature T_a

Temperature measurement			
PT100 / PT1000	**Value typ.**	**min. / max.**	**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		<±0.1 K	4-wire connection
Offset drift		+0.01 K/K·ΔT_a	ΔT_a=|T_a -25°C| ambient temperature T_a
Sensor feed	250 µA		