BR2-4 for imc CRONOS-XT (CRXT/BR2-4)

4-channel high performance bridge measurement amplifier

The BR2-4 is a universal DC and CF bridge measurement amplifier for 4 channels and can also be used as a DC differential amplifier. It is capable of measuring:

- 4 strain gauges, with selectable DC or CF (AC) excitation
- LVDT
- Voltage and current (20 mA)
- IEPE/ICP sensors (with optional DSUB-15 plug)

CRXT/BR2-4
(Fig. similar)

Highlights

- Carrier frequency excitation (5 kHz) for bridges and LVDT
- Single and dual sense line configurations are supported (e.g., 5/6-wire connection with full bridge)
- Symmetric bridge supply of 1 V, 2.5 V, 5 V with DC as well as with CF (AC) mode
- broken wire detection
- Integrated calibration resistor for shunt calibration
- Software selectable quarter-bridge completion 120 and 350 Ω
- Graphical configuration wizard to set strain gauge bridges

Typical applications

- Ideal for bridge measurements in CF mode with elevated requirements for noise suppression and stability, as well as LVDT and inductive displacement sensors.

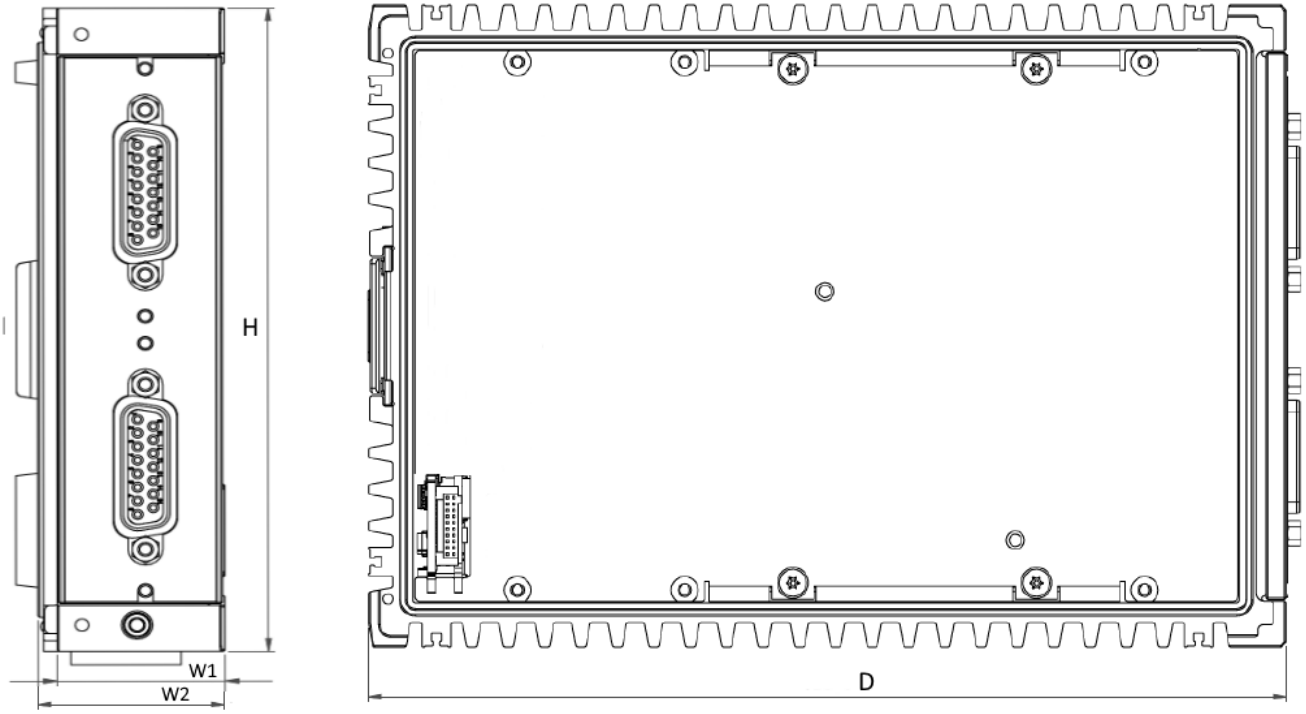
imc CRONOS-XT - Maximizes flexible modularity

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/BR2-4	DSUB-15	9.3 W	0.7 kg	XT1	11100075

Dimensions



Shown in standard operating orientation: housing type XT1

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).

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		
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
Calibration certificate with test equipment verification as per ISO 9001 (manufacturer's calibration certificate, PDF)
Getting started with imc CRONOS-XT (one copy per delivery)

Optional accessories

DSUB-15 plug (IP65)		
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 plug (solder) IP67		
CRXT/DSUB15M-IP67	IP67 DSUB-15 plug male	11100073

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 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

Dust protection caps		
ACC/CAP-DSUB-15	dust protection cap for DSUB-15	13500339

Miscellaneous		
CRXT/CAL-P Calibration report set for each device	Report set with manufacturer's calibration certificate and individual readings, as well as list of test equipment used (PDF). Meets requirements of ISO 17025	11100071
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 - BR2-4

Inputs, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Inputs	4	
Measurement modes	bridge sensor strain gauge LVDT voltage measurement current measurement current-fed sensors IEPE/ICP	ACC/DSUBM-B2 full-, half- and quarter bridge inductive transducers (CF) voltage or bridge mode globally selected for all four channels with current plug: ACC/DSUBM-I2 with IEPE/ICP expansion plug (DSUB-15): CRXT/DSUB-ICP2-IP65, not isolated or ACC/DSUBM-ICP2I-BNC-S/-F [1], isolated
Terminal connection	2x DSUB-15	2 channels per plug

Sampling rate, Bandwidth, Filter, TEDS		
Parameter	**Value**	**Remarks**
Sampling rate	≤100 kHz	per channel
Bandwidth	8.6 kHz (DC) 3.9 kHz (CF)	-3 dB -3 dB
Filter cut-off frequency characteristic order	2 Hz to 5 kHz	 Butterworth, Bessel low pass filter 8. 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) not supported: DS2431 (typ. IEPE/ICP sensor)
Characteristic curve linearization	user defined (max. 1023 supporting points)	

General	Value typ.	min. / max	Remarks
Overvoltage protection		±50 V ±80 V	long term(differential- and SENSE-inputs) short-term
Input impedance	10 MΩ 1 MΩ		range ±5 mV to ±2 V range ±5 V to ±50 V and for deactivated device
Input current		40 nA	
Input capacitance	300 pF		
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 proof power per DSUB-plug

1 Only the IEPE base functionality is supported by this module, see also TD ACC/DSUBM-ICP2I-BNC.

Voltage measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Input ranges	±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		
Gain error	0.02 %	≤0.05 %	of reading (measurement value)
Gain drift	60 ppm / K	<100 ppm / K	
Offset drift	0.02 %	≤0.0 5% ≤0.1 % ≤0.2 %	of measurement range range ≥±25 mV range = ±10 mV range = ±5 mV
Input offset-drift	0.05 µV / K	0.3 µV / K	DC voltage measurement
Non-linearity	<200 ppm		
Common mode voltage (max.)	±50 V ±2.8 V		ranges ±50 V to ±5 V ranges ±2 V to ±5 mV
Common mode rejection ratio (CMRR) range: ±5 mV to ±25 mV ±50 mV to ±100 mV ±250 mV to ±2 V ±5 V to ±50 V		 >120 dB >110 dB 95 dB >54 dB	DC
±5 mV to ±2 V ±5 V to ±50 V	>100 dB >68 dB	>90 dB >54 dB	f ≤ 50 Hz
all ranges		>50 dB	f = 5 kHz
SNR (signal to noise ratio)	>90 dB >88 dB >82 dB >75 dB >69 dB		full-scale / rms-noise full bandwidth ranges ±100 mV to ±50 V range ±50 mV range ±25 mV range ±10 mV range ±5 mV
Input noise, voltage (RTI)	16 $nV/\sqrt{Hz}_{rms}$ 16 μV_{pk-pk} 2 μV_{rms} 0.6 μV_{pk-pk}		DC-Mode (range ±5 mV) spectral noise density 1 kHz 0 Hz to 10 kHz 0 Hz to 10 kHz 0.1 Hz to 10 Hz

Current measurement with shunt plug		
Parameter	**Value**	**Remarks**
Input ranges	±40 mA / ±20 mA / ±10 mA ±5 mA / ±2 mA / ±1 mA ±400 mA / ±200 µA / ±100 mA	
Shunt impedance	50 Ω	ACC/DSUBM-I2 (shunt plug)

Bridge measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Mode	DC, CF		
Sensors	LVDT, strain gauge: full-, half-, quarter bridge piezo-resistive bridge transducer potentiometer		directly connectable
Measurement mode	full-, half-, quarter bridge		
Input ranges	±1 mV/V to ±400 mV/V ±2 mV/V to ±800 mV/V ±5 mV/V to ±2000 mV/V		for bridge voltage: 5 V 2.5 V 1 V
Bridge supply DC CF (5 kHz)	1 V; 2.5 V; 5 V (symmetric) 1 V; 2.5 V; 5 V (peak)		set globally for 4-channel groups corresponding to ±0.5 V, ±1.25 V, ±2.5 V corresponding to RMS: 0.7 V; 1.8 V; 3.5 V
Internal quarter-bridge completion	120 Ω, 350 Ω		selectable
Min. bridge impedance Bridge impedance (max.)	120 Ω, 10 mH full bridge 60 Ω, 5 mH half bridge 5 kΩ		bridge supply = 1 V to 5 V, $I_{load} \leq 42$ mA
Gain error	<0.05 %		of measurement value at 25°C
Offset after bridge balance	<0.02 %		of the range at 25°C
Input offset-drift	0.01 µV/V / K	0.06 µV/V / K	DC full bridge (Bridge supply=5 V, 1 mV/V range) without ext. bridge offset
Drift of bridge balance Equivalent offset drift corresponding to balanced ext. bridge offset	50 ppm/K 0.05 µV/V/K	<90 ppm/K 0.09 µV/V/K	of compensated offset value full bridge (DC or CF), ext. bridge offset = 1 mV/V 1 mV/V input range
Half-bridge drift (int. half-bridge)	0.05 µV/V/K	1 µV/V/K	DC or CF
Bridge balancing range	≥measurement range not less than: ≥±5 mV/V ≥±10 mV/V ≥±25 mV/V		 for bridge supply = 5 V for bridge supply = 2.5 V for bridge supply = 1 V
Cable length (max.)	500 m (one-way length)		A = 0.14 mm², R = 130 mΩ/m, 65 Ω

Bridge measurement			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Cable-Compensation			
full bridge / half bridge	4-wire-technique 3-wire-technique with shunt-calibration		any cable for symmetric (similar) cables one-time non-adaptive compensation
quarter bridge	full compensation in 3-wire-technique		including Gain-Correction!
Automatic shunt-calibration	0.5 mV/V		for 120 Ω and 350 Ω bridges
Input noise (bridge)			range: 1 µV/V (bridge voltage = 5 V)
DC full bridge	3 $\mu V/V_{pkpk}$, 0.39 $\mu V/V_{rms}$		0 Hz to 10 kHz
	0.9 $\mu V/V_{pkpk}$, 0.12 $\mu V/V_{rms}$		1 kHz, lowpass filter
	0.3 $\mu V/V_{pkpk}$, 0.04 $\mu V/V_{rms}$		100 Hz, lowpass filter
	0.1 $\mu V/V_{pkpk}$		10 Hz, lowpass filter
DC half-/quarter bridge	3.3 $\mu V/V_{pkpk}$, 0.45 $\mu V/V_{rms}$		0 Hz to 10 kHz
	1.1 $\mu V/V_{pkpk}$, 0.15 $\mu V/V_{rms}$		1 kHz, lowpass filter
	0.35 $\mu V/V_{pkpk}$, 0.05 $\mu V/V_{rms}$		100 Hz, lowpass filter
	0.3 $\mu V/V_{pkpk}$		10 Hz, lowpass filter
CF full bridge, half bridge	3.5 $\mu V/V_{pkpk}$, 0.47 $\mu V/V_{rms}$		0 Hz to 10 kHz
	1.7 $\mu V/V_{pkpk}$, 0.22 $\mu V/V_{rms}$		1 kHz, lowpass filter
	0.6 $\mu V/V_{pkpk}$, 0.07 $\mu V/V_{rms}$		100 Hz, lowpass filter
	0.3 $\mu V/V_{pkpk}$		10 Hz, lowpass filter