

HV2-2U2I / HV2-4U for imc CRONOScompact

Module for direct measurement of high voltage and current

With the **HV2-2U2I** four-channel amplifier, two channels are available for measuring voltages up to 1000 V, and two channels to measure with current clamps and current transducers. With the **HV2-4U** four-channel amplifier, four channels are available for measuring voltages up to 1000 V.

Highlights

- Measurement ranges from 1000 V_{RMS} to 2.5 V_{RMS}, selectable per channel to access voltages of 1000 V_{RMS} / 1414 V_{PK}
- 48 kHz analog bandwidth (-3 dB)
- Measurement of current clamps, current transducers respectively low voltage signals
- Direct support for use of Rogowski coils

Typical Applications

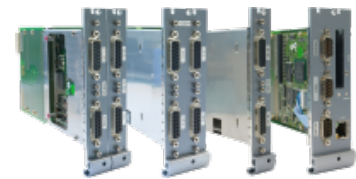
- Power measurements, measurements on electric motors, batteries, fuel cells, etc.

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 available variants

Standard version		ET version *	
Order Code	article no.	article no.	remarks
CRC/HV2-2U2I	11700194	11710109	for installation in an imc CRONOScompact housing
CRC/HV2-2U2I-R	11700195	11710110	for installation in an imc CRONOScompact RACK
CRC/HV2-4U	11700196	11710111	for installation in an imc CRONOScompact housing
CRC/HV2-4U-R	11700197	11710112	for installation in an imc CRONOScompact RACK

* ET: Version in extended temperature range

Included accessories

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

Optional accessories

AC Rogowski coils for HV		article no.
SEN/ROGOWSKI-25CM	Flexible current transducer (Rogowski), max. 10 kA AC, 1000 V CAT III, 25 cm (Chauvin Arnoux MiniFLEX), 3 m cable	13950025
SEN/ROGOWSKI-45CM	Flexible current transducer (Rogowski), max. 10 kA AC, 1000 V CAT III, 45 cm (Chauvin Arnoux AmpFLEX), 3 m cable	13950026
SEN/ROGOWSKI-50CM	Flexible current transducer (Rogowski), max. 10 kA AC, 1000 V CAT III, 50 cm (Chauvin Arnoux AmpFLEX), cable: individual 0.5 m to 10 m	13950031
SEN/ROGOWSKI-80CM	Flexible current transducer (Rogowski), max. 10 kA AC, 1000 V CAT III, 80 cm (Chauvin Arnoux AmpFLEX), cable: individual 3 m	13950027

AC Current clamps for HV		article no.
SEN/PROBE-AC-10A-MN71	Current clamp 10 A AC, 600 V CAT III, 20 mm (Chauvin Arnoux MN71)	13950032
SEN/PROBE-AC-200A-MN73	Current clamp 200 A AC, 600 V CAT III, 20 mm (Chauvin Arnoux MN73)	13950033

AC/DC Current transducer (Fluxgate-principle, with additional sensor supply module)		article no.
SEN/LEM-IT65	LEM Fluxgate current transducer 65 A, including calibrated cable for CRFX/SEN-SUPPLY	13950024
SEN/LEM-IT205	LEM Fluxgate current transducer 200 A, including calibrated cable for CRFX/SEN-SUPPLY	13950003
SEN/LEM-IT405	LEM Fluxgate current transducer 400 A, including calibrated cable for CRFX/SEN-SUPPLY	13950018
SEN/LEM-IT1000	LEM Fluxgate current transducer 1000 A, including calibrated cable for CRFX/SEN-SUPPLY	13950021
SEN/DANI-DS50ID	DANISENSE Fluxgate current transducer 50 A, ASPC-Protection, including calibrated cable for CRFX/SEN-SUPPLY	13950022
SEN/DANI-DS600ID	DANISENSE Fluxgate current transducer 600 A, ASPC-Protection, including calibrated cable for CRFX/SEN-SUPPLY	13950023

High voltage safety measuring cord		article no.
ACC/KABEL-CATIII-SW	safety measurement cable, black 2 m IEC 1010, 1000 V CAT III, 4 mm banana plug	13500022
ACC/KABEL-CATIII-ROT	safety measurement cable, red 2 m IEC 1010, 1000 V CAT III, 4 mm banana plug	13500021

Documents		
SERV/CAL-PROT	Calibration protocol per amplifier imc manufacturer calibration certificate with measurement values and list of calibration equipment used (pdf).	150000566
SERV/CAL-PROT-PAPER	Calibration protocol per amplifier (paper print) imc manufacturer calibration certificate with measurement values and list of calibration equipment used with signature and seal.	150000578
Device 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.		

Technical Specs - HV2-2U2I / HV2-4U

General

Measurement modes and categories		
Parameter	Value	Remarks
Inputs	4	HV2-2U2I: 2 inputs for voltage 2 inputs for current measurement HV2-4U: 4 inputs for voltage
Measurement modes	voltage measurement current measurement	only with HV2-2U2I: e.g. current probes, rogowski coil
Measurement categories	600 V _{RMS} (CAT III) / 1000 V _{RMS} (CAT II)	conformant to EN 61010-1, EN 61010-2-030
Pollution Degree	2	according to EN 60664
Terminal connection HV2-2U2I	2x safety banana jacks 2x 3-pin Phoenix terminals	KGG-PC 4/3-F BK
HV2-4U	4x safety banana jacks	

Sampling rate, Bandwidth, Filter			
Parameter	Value typ.	min. / max.	Remarks
Sampling rate	≤100 kHz		per channel
Bandwidth	0 Hz to 48 kHz		-3 dB
Filter	low pass, high pass, band pass, AAF		digital filter
type	Butterworth, Bessel and Cauer		
characteristic	10 Hz to 20 kHz		in steps of 1, 2, 5
cut-off frequency	8th order		low pass, high pass
order	4. + 4. order		band pass: high- and low pass
Anti-aliasing filter (AAF)	low pass Cauer 8th order with $f_{\text{cutoff}} = 0.4 \cdot f_s$		
Isolation strength		5.4 kV _{RMS}	50 Hz, test voltage

Measurement modes

Voltage measurement			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 1000\text{ V}$, $\pm 500\text{ V}$, $\pm 250\text{ V}$, ..., $\pm 2.5\text{ V}$ $1000\text{ V}_{\text{RMS}}$, $500\text{ V}_{\text{RMS}}$, $250\text{ V}_{\text{RMS}}$, ..., $2.5\text{ V}_{\text{RMS}}$ $\pm 1414\text{ V}_{\text{PK}}$, $\pm 707\text{ V}_{\text{PK}}$, $\pm 354\text{ V}_{\text{PK}}$, ..., $\pm 3.4\text{ V}_{\text{PK}}$		nominal RMS continuous peak measurement range (valid measurements): $\geq \text{nominal range} \cdot \sqrt{2}$
Max. Overvoltage protection		$\pm 1450\text{ V}$	differential, continuous with operating temperature up to 70°C
Input impedance	2 MΩ		
Input coupling	DC		isolated
Gain error	0.02%	$\leq 0.05\%$	of the reading, at 25°C
Gain drift	$\pm 25\text{ ppm/K} \cdot \Delta T_a$	$\pm 60\text{ ppm/K} \cdot \Delta T_a$	$\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature
Offset error	0.02%	$\leq 0.05\%$ $\leq 0.1\%$	of range ranges $> \pm 5\text{ V}$ range $\pm 5\text{ V}$
	0.04%	$\leq 0.2\%$	range $\pm 2.5\text{ V}$
Offset drift	$\pm 20\text{ mV/K} \cdot \Delta T_a$ $\pm 2.0\text{ mV/K} \cdot \Delta T_a$ $\pm 0.1\text{ mV/K} \cdot \Delta T_a$	$\pm 35\text{ mV/K} \cdot \Delta T_a$ $\pm 3.5\text{ mV/K} \cdot \Delta T_a$ $\pm 0.5\text{ mV/K} \cdot \Delta T_a$	range $> \pm 100\text{ V}$ range $\leq \pm 100\text{ V}$ range $\leq \pm 10\text{ V}$ $\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature
IMRR (isolation mode rejection ratio)	160 dB 80 dB 54 dB	130 dB 70 dB 44 dB	DC 50 Hz 1 kHz
Bandwidth	0 Hz to 30 kHz	0 Hz to 48 kHz	$< \pm 0.03\text{ dB}$ -3 dB
Phase error		$< \pm 1^\circ$	0 Hz to 20 kHz
Signal noise	$3.8\text{ mV}_{\text{RMS}}$ $0.6\text{ mV}_{\text{RMS}}$		bandwidth: 0.2 Hz to 48 kHz range $\pm 250\text{ V}$ range $\pm 2.5\text{ V}$

Channels for current measurement with current probes			
Parameter	Value typ.	min. / max.	Remarks
Input ranges	$\pm 5\text{ V}, \pm 2.5\text{ V}, \pm 1\text{ V}, \dots, \pm 50\text{ mV}$		modulation range $\geq \text{range} \cdot \sqrt{2}$
Overvoltage protection	$\pm 100\text{ V}$		long-term
Input impedance	20 M Ω		isolated
Gain error	0.02%	$\leq 0.05\%$	of the reading
Gain drift	$\pm 10\text{ ppm/K} \cdot \Delta T_a$	$\pm 25\text{ ppm/K} \cdot \Delta T_a$	$\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature
Offset error	0.02%	$\leq 0.05\%$	of the measurement range
Offset drift	$\pm 10\text{ }\mu\text{V / K} \cdot \Delta T_a$ $\pm 50\text{ }\mu\text{V / K} \cdot \Delta T_a$	$\pm 100\text{ }\mu\text{V / K} \cdot \Delta T_a$ $\pm 20\text{ }\mu\text{V / K} \cdot \Delta T_a$	range $> \pm 0.5\text{ V}$ range $\leq \pm 0.5\text{ V}$ $\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature
IMRR (isolation mode rejection ratio)	160 dB 145 dB 125 dB	160 dB 126 dB 100 dB	DC 50 Hz 1 kHz
Bandwidth	0 Hz to 30 kHz	0 Hz to 48 kHz	$< \pm 0.03\text{ dB}$ -3 dB
Phase error		$< \pm 1^\circ$	0 Hz to 4 kHz
Signal noise	$1\text{ }\mu\text{V}_{\text{RMS}}$	LSB	bandwidth: 0.1 Hz to 48 kHz

Current measurement with AC current clamp			
Parameter	Value typ.	min. / max.	Remarks
Input range	$10\text{ A}_{\sim}, 5\text{ A}_{\sim}, \dots, 2.5\text{ A}_{\sim}$		RMS-values, crest factor up to $\sqrt{2}$
Measurement error	0.3%	$\leq 0.8\%$ $\pm 1\text{ mA}$	50 Hz, sine, line centered
Bandwidth	40 Hz to 2 kHz		$< \pm 0.1\%$
Phase error	$\pm 1^\circ$	$< \pm 3^\circ$	40 Hz to 1 kHz

Channels for current measurement with Rogowski coil (AC)			
Parameter	Value typ.	min. / max.	Remarks
Measurement principle	time-based integrating		Internal signal conditioning includes integrator stage
Usable sensors (Rogowski coil)	50 $\mu\text{V}/\text{A}$ at 50 Hz		Current probes without active signal conditioning (no batteries required)
Input range	500 (A/s)/V, 1 (kA/s)/V, 2.5 (kA/s)/V, ... , 50 (kA/s)/V		the GUI display this value as an integrated value
Overload protection		$\pm 55\text{ V}$	long-term
Gain error	0.02%	$\leq 0.08\%$	of the reading at 50 Hz plus error of the sensor
Gain drift	$\pm 40\text{ ppm}/\text{K}\cdot\Delta T_a$	$\pm 100\text{ ppm}/\text{K}\cdot\Delta T_a$	$\Delta T_a = T_a - 25^\circ\text{C} $; with T_a = ambient temperature plus error of the sensor
Bandwidth	0.5 Hz to 30 kHz	0.1 Hz to 48 kHz	$< \pm 0,1\%$ -3 dB
Current measurement with Rogowski coil			
Parameter	Value typ.	min. / max.	Remarks
Sensor (accessory)	flexible current transducer		
Input range	5 kA_{\approx} , 2,5 A_{\approx} , ... , 50 A_{\approx}		RMS-values, crest factor < 1.5
Overload protection		$\leq 60\text{ kA}_{\approx}$ $\leq 1\text{ kA}_{\approx}$	long-term, crest factor < 1.5 $f \leq 1\text{ kHz}$ $f \leq 50\text{ kHz}$
Measurement error	0.3%	$\leq 1\%$ $\pm 1\text{ A}$	See manual for recommended application of Rogowski coil