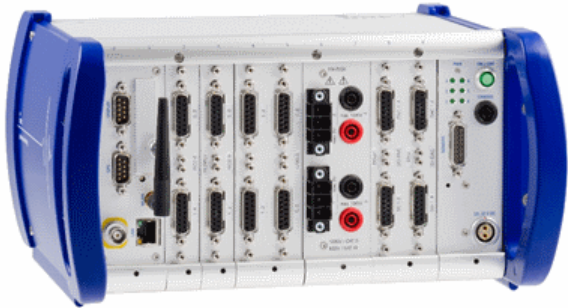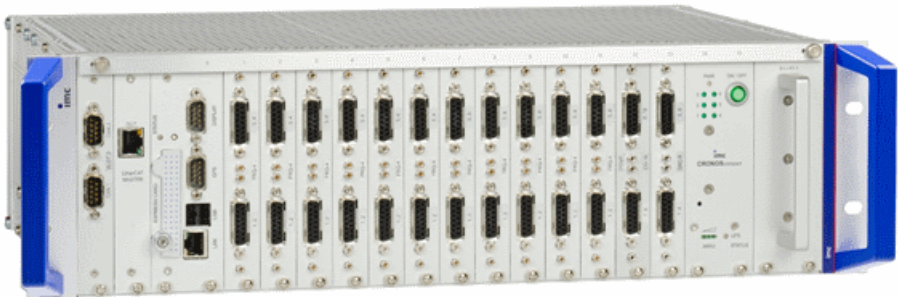# imc CRONOScompact (CRC)

Adaptable measurement and control system - universal, flexible, versatile

imc CRONOS*compact* (CRC) is a modular and compact measurement system which is available in a variety of housing sizes and designs. It consists of a base system in the form of a portable or 19" rack housing which can be equipped by the user with plug-in amplifier and/or conditioning modules to achieve quick and easy modifications.

imc CRONOS*compact*: CRC-400-08 portable housing

imc CRONOS*compact*: CRC-400-AC-RACK 19" Rack

The associated operating software imc STUDIO is an integrated test and measurement package that provides an exceptionally versatile functionality. It is not only limited to serve as an interactive operating software but can also achieve complete turnkey solutions.

Device designs and varieties imc CRONOS*compact*

Parameter	400(GP)-08	400(GP)-11	400(GP)-13	400(GP)-17	400(GP)-AC-RACK	400(GP)-DC-RACK
Housing type	portable housing				19" rack chassis (3 U / 84 HP)	
Module slots	8	11	13	17	16	17
Fieldbus slots	7					
Modularly configurable	modules: by user, fieldbus modules: order option ex factory					
Max. sampling rate	400 kS/s with internal CRC modules					
Expandable with CRFX-interface	option available for "400GP" devices only (occupies one slot) (such extended device type also refered to as "CRC-2000GP")					
Max. sampling rate (with CRFX-interface)	2000 kS/s device type "CRC-2000GP": internal CRC modules + external CRFX modules					
Dimension in mm W x H x D	291 155 264	353 155 264	393 155 264	474 155 264	426.7 133.35 310	
Weight (ca.)	9 kg	10.5 kg	12.5 kg	14.5 kg	9..12 kg	

AGT Absolute Gauge Technologies

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Special features of the "GP" series

"✓" standard;   "O" optional;   "-" not available

Parameter	CRC-400	CRC-400GP	Remarks
Ethernet TCP/IP	100 MBit	1 GBit	
Option CRFX-Interface	-	O	operation with external flex-modules (CRFX, EtherCAT)
Max. sampling rate	400 kS/s	400 kS/s	data rate of channels originating from internal CRC-modules
Max. sampling rate in conjunction with CRFX-Interface (device type CRC-2000GP)		2000 kS/s	total: internal CRC-modules + external CRFX-modules
Flash removable storage	CF-Card slot	CFast-Card slot	
USB 2.0 (Host)	-	✓	for data storage media
PTP synchronization	-	✓	suitable switch required
Internal WiFi-adaptor	O	O	802.11g, 54 MBit/s, 2.4 GHz
Dual Band WiFi option (WLAN)	-	O	802.11n, 300 MBit/s, 2.4 / 5 GHz
Enhanced performance		✓	for Multi-Monitoring, Web-Server, high-speed fieldbus modules

Device type "CRC-2000G(P)"

Devices belonging to the "GP" series can additionally be equipped with a "CRFX-Interface" (extension module "CRC/CRFX"). It operates as an EtherCAT master, interfacing to external CRONOS*flex* modules (amplifiers). These modules can be distributed in a decentralized setup, can be powered either individually or via Power-over-EtherCAT (PoEC), and with their channels they increase the system's total aggregate sampling rate to up to 2000 kHz.

Devices equipped with a "CRFX-Interface" are also referred to as "CRC-2000G(P)" such as in the manual and technical documentation. However, such systems are not listed as a particular sales item but rather they can be assembled from CRC-400GP devices of any model or size plus the additional "CRFX-Interface" (only available for order as a factory option), as desired.

Overview of available variants: CRC-400 series

Standard version		ET version *	
Order code	article no.	article no.	properties
Portable housing: CRC-400 series			
CRC-400-08	11700216	11710119	8 free slots
CRC-400-11	11700217	11710120	11 free slots
CRC-400-13	11700218	11710121	13 free slots
CRC-400-17	11700219	11710122	17 free slots
19" rack CRC-400 series			
CRC-400-DCRACK	11700221	not available	17 free slots
CRC-400-ACRACK	11700220	not available	16 free slots

* ET: Version in extended temperature range

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

Data Sheet Version 4.9 - 2023-02-01

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Page   2

Overview of available variants: CRC-400GP series (Gigabit, PTP, CFast, USB)

Standard version		ET version	
Order code	article no.	article no.	properties
CRC-400GP series (Gigabit, PTP, CFast, USB)			
CRC-400GP-08	11700255	117101xx	8 free slots
CRC-400GP-11	11700256	117101xx	11 free slots
CRC-400GP-13	11700257	117101xx	13 free slots
CRC-400GP-17	11700245	117101xx	17 free slots
19" rack CRC-400GP series			
CRC-400GP-DCRACK	11700259	not available	17 free slots
CRC-400GP-ACRACK	11700258	not available	16 free slots

Extra options (factory order options)

- CRFX-Interface (EtherCAT Master for external imc CRONOS*flex* modules)
- Internal WiFi-adaptor
- HDD / SSD
- Li-Ion UPS (see optional accessories [7] or technical specs of the smart batteries [15])
- Fieldbus modules (including CAN, CAN FD, EtherCAT Slave, XCPoE etc.), see separate data sheet

Modules for imc CRONOS*compact*

There is a distinction between modules for CRC portable housing and CRC rack chassis ("-R"), which differ slightly in terms of the mechanical front panel design. Depending on the type, they require either one or multiple slots.

So-called conditioner modules can be interchanged by the user and allow flexible assembly of the overall system. These comprise:

- analog measurement amplifiers
- analog outputs
- digital inputs/outputs

By contrast, the fieldbus expansion modules can only be ordered as a factory option and are installed permanently. The following fixed ex-factory options are available:

- Fieldbus modules
- Application module (CRC/APPMOD)
- Controller module and synthesizer/signal generator (CRC/SYNTH)
- High voltage modules such as HV2-4U, HV2-2U2I (for reasons of safety)
- CRC/CRFX-Interface (EtherCAT Master for external CRFX measurement modules)

Further information and technical details are included in separate data sheets.

Software minimum requirements:

Operation of imc CRONOS*compact* "GP" series requires operating software of the following group:
imc STUDIO 5.0 R5 associated with firmware and driver package imc DEVICES 2.9.

© 2023 imc Test & Measurement GmbH

Errors and changes excepted

Data Sheet Version 4.9 - 2023-02-01

Page 3

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Overview of the available extension modules (fixed configuration ex-factory) *

Standard version		ET version	
Order Code	article no.	article no.	properties
Fieldbus modules			
CRC/CAN	11700010	11710011	2 CAN nodes
CRC/CAN-FD	11700251	11710145	2 CAN FD nodes
CRC/LIN	11700011	11710012	2 LIN nodes
CRC/ARINC-8RX-4TX	11700177	11710xxx	ARINC Bus, 8x Receive, 4x Transmit
CRC/FLEXRAY2	11700048	11710048	1 FlexRay node
CRC/XCPOE2-MASTER	11700265	11710049	XCPoE Master
CRC/XCPOE2-SLAVE [1]	11700266	11710151	XCPoE Slave
CRC/ECAT-SLAVE [1]	11700026	11710023	EtherCAT Slave
CRC/MVB-EMD	11700269	11710xxx	MVB-Bus (type EMD)
CRC/MVB-ESD	11700xxx	11710xxx	MVB-Bus (type ESD+)
CRC/MODBUS	11700286	11710xxx	Modbus RTU (RS485 and Modbus TCP (Ethernet)
CRC/IPTCOM	11700xxx	11710xxx	IPTCom Interface
CRC/PROFINET-IRT [1]	11700046	11710xxx	Profinet-IRT Interface
Interface for external imc CRONOS*flex* modules ("CRC-2000GP")			
CRC/CRFX	11700253	11710147	"CRFX-Interface" for external CRFX modules
Special expansions			
CRC/ROADYN	11700150	11710136	Kistler RoaDyn 2000
CRC/APPMOD-NET-COM	11700242	11710xxx	Ethernet, RS232/422/485
CRC/SYNTH-8	11700068	11710042	PID controller, synthesizer
CRC/HIL	11700028	not available	Hardware in the Loop
WiFi (WLAN)			
CRC/WLAN-I	11700040	11710047	WiFi, 2.4 GHz
CRC/2000G-WLAN-I	11700234	11710102	Dual Band (2.4 / 5 GHz)
Additional device software (upgrade options)			
CRC/OFA-UP	11700004		update from imc Online FAMOS to OFA-Professional
CRC/VEC-DATB	11700007		vector data base interface
CRC/imc-REMOTE	11700200		imc REMOTE
CRC/ECU-P	11700008		ECU protocols for the CAN Interface

* listed: versions for portable housing
The order code of the module version for the RACK housing is expanded with the suffix: "-R"
and have different article numbers.

1 For full functionality (especially pv and sending functions) imc Online FAMOS Professional OFA Pro (additional license) is required.

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Overview of available conditioning modules (plug-in and retrofit)

CRC/	Slot	Channels	Bandwidth / Remarks	
AUDIO2-4	1	4	48 kHz	IEPE/ICP, voltage
AUDIO2-4-MIC	2	4	48 kHz	IEPE/ICP, microphone, voltage
BR2-4	1	4	8.6 kHz	strain gauges, LVDT (CF), voltage, ACC/ICP
B(C)-8	2 (1)	8	48 kHz	strain gauges, voltage, ACC/ICP
C-8	1	8	20 Hz	voltage, temperature, current (20 mA)
DCB(C)2-8	2 (1)	8	5 kHz	strain gauges, voltage, ACC/ICP
HISO-8	2	8	11 kHz	high isolated: voltage, current (20 mA), temperature
HV2-2U2I/-4U	2	4	48 kHz	high isolated: high voltage, current probe
ICPU2-8	2	8	48 kHz	voltage, IEPE/ICP
ICPU-16	4	16	6.6 kHz	voltage, IEPE/ICP
ISO2-8	1	8	11 kHz	isolated: voltage, current (20 mA), temperature, ACC/ICP
ISOF-8	1	8	48 kHz	isolated: voltage, current (20 mA), temperature, ACC/ICP
LV-16	2	16	6.6 kHz	voltage, current (20 mA), ACC/ICP
LV3-8	1	8	48 kHz	voltage, current (20 mA), ACC/ICP
OSC-16	2	16	1 Hz	isolated: voltage, current (20 mA), temperature
SC2-32	4	32	20 kHz	voltage, current (20 mA), ACC/ICP
UNI2-8	2	8	48 kHz	voltage, current (20 mA), temperature, strain gauges, ACC/ICP
DAC-8	1	8	50 kHz	analog output
DI2-16	1	16	30 kHz	isolated: digital input
DO-16	1	16	10 kHz	isolated: digital output
HRENC-4	1	4	500 kHz	pulse signals and incremental encoder
DI16(8)-DO8-ENC4-DAC4	2	16(8)/8 8/4/4	10 kHz / 500 kHz	isolated: digital inputs/outputs incremental encoder, pulse signals, analog output
FRQ-4	1	4	500 kHz	frequency modulated signals

ACC/ICP: extension plug for IEPE/ICP measurement

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

AGT Absolute Gauge Technologies

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Data Sheet Version 4.9 - 2023-02-01
Page 5

Software-Options

Software product	Functionality	License model	included
Operating Software			
imc STUDIO Standard	Operating software, integrated test & measurement suite	PC	o
imc STUDIO Professional / Developer	Customized operation, scripting, application development	PC	o
imc DEVICES	Firmware and driver package	Device	●
imc CANSAS	In-situ configuration of imc CANSAS modules		●
imc SENSORS	Sensor data base	PC	o
Real-time Data Analysis			
imc Online FAMOS	Real-time calculations, immediate results	Device	●
imc Online FAMOS Professional	Real-time control extensions, PID control etc.	Device	o
imc Online FAMOS Kits	Class counting (fatigue analysis), order tracking	Device	o
Post Processing			
imc FAMOS Reader	Data visualisation	PC	●
imc FAMOS Standard / Professional	Data visualisation, analysis, reporting, scripting	PC	o
imc FAMOS Enterprise	incl. class counting. Order tracking, ASAM-ODS Browser	PC	o
Remote Access			
imc LINK	Remote device access, automatic data transfer	PC	o
imc REMOTE	Web Server, secure https device access	Device	o
CAN			
Vector database	Vector database interface	Device	●
ECU protocols	for CAN interface: KWP 2000, CCP, OBD-2	Device	o
Development			
LabView™ VI's	LabView VI components		●
imc COM	ActiveX programming interface (API)	PC	o
imc API	.NET programming interface (API) for imc STUDIO	PC	o

Accessories and Connectors

Included accessories

AC/DC power adaptor 110-230V AC (with appropriate LEMO plug)		
CRPL/AC-ADAPTER-150W	24 V DC, 150 W, LEMO.2B	10800029

Documents
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*compact* (one copy per delivery / system)

Miscellaneous
1x Ethernet network cable with latch protection (uncrossed, 2 m)

AGT Absolute Gauge Technologies™

Optional accessories

Power connector		
ACC/POWER-PLUG2	DC supply plug LEMO FGG.2B.302, with solder contact, AWG17 (1 mm²)	13500024

Device outfit		
CRC/B-Li-IO-1	Battery set Li-IO-1: extended UPS in Li-Ion Technology 95 Wh, for CRC-400x-8, CRC-400x-11 only ex-factory, -10°C..+60°C, not available for extended operating temperature range (ET)	11700079
CRC/B-Li-IO-2	Battery set Li-IO-2: extended UPS in Li-Ion Technology 190 Wh, for CRC-400x-13, CRC-400x-17 only ex-factory, -10°C..+60°C, not available for extended operating temperature range (ET)	11700080

Mounting brackets for fixed installations		
CRC/BRACKET-CON	Mounting bracket 180°; coupling of two devices on top of each other	11700153
CRC/BRACKET-90	Mounting bracket 90°; mounting imc CRONOS*compact* devices on a flat surface	11700152
CRC/BRACKET-BACK	back panel mounting bracket	11700154

Miscellaneous		
ACC/SYNC-FIBRE	optical synchronization adaptor, for extended temperature range	13500156
ACC/Color Display	Graphical hand held terminal (color) for PC-independent operation and visualization of measured data	13500271
CRC/GPS-MOUSE-5Hz	External GPS receiver (5 Hz, high-sensitivity, RS232,DSUB-9, including 5 m connection cable)	11700042

imc CRONOScompact (CRC)

"✓" standard;   "O" optional;   "-" not available

Parameter	CRC-400	CRC-400GP	Remarks
Max. aggregate sampling rate	400 kS/s	400 kS/s	data rate of channels of the internal CRC modules
Max. aggregate sampling rate in conjunction with CRFX-Interface (device type "CRC-2000G(P)")		400 kS/s 2000 kS/s	via internal CRC modules data rate analog channels [1], total: internal CRC modules + external CRFX modules
Terminal connections			
PC / network Ethernet TCP/IP	RJ45 100 MBit	RJ45 1 GBit	max. 100 m cable with 100 MBit (according to IEEE 802.3)
Option CRFX-Interface: system bus for external *flex*-modules (CRFX, EtherCAT)	-	O RJ45	device type: "CRC-2000GP", max. 100 m cable between 2 modules
Flash removable storage	CF-Card slot	CFast-Card slot	can also be read out via network
USB 2.0 (Host)	-	✓	for alternative storage media instead of CFast: such as ext. HDD, USB stick etc.
Internal hard drive (HDD)	O	O	option, only ex factory: SSD or magnetic; 400 kS/s data storage achievable with 16 bit / sample
Internal WiFi (WLAN) adaptor (optional)	1 antenna IEEE 802.11g max. 54 MBit/s 2.4 GHz	2 antennas IEEE 802.11n max. 300 MBit/s dual band (2.4 / 5 GHz)	
Sync	BNC		isolated (marked with yellow ring)
External display	DSUB-9		
External GPS module	DSUB-9		
Power supply	type LEMO.2B (2-pin)		compatible with LEMO.FGG.2B.302
Remote (remote controlled main power switch)	DSUB-15		
Programmable status indicator	6 LED (green)		triggering via imc Online FAMOS
Measurement inputs	depending on actual system configuration		typically DSUB-15

[1]   2000 kS/s achievable with deactivated process vector, without trigger and in 16 Bit mode only.

When using the process vector a maximum of 128 active analog channels (monitor channels do count as well) at 2 kS/s per channel plus one fieldbus interface are possible. Each additional fieldbus interface might reduce the aggregate sampling rate of analog channels by a maximum of 200 kS/s.

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

AGT Absolute Gauge Technologies™

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Data Sheet Version 4.9 - 2023-02-01
Page 8

Power supply	CRC-xxx	CRC-AC-RACK	Remarks
DC supply input	✓	✓	galvanically isolated of housing (CHASSIS)
AC/DC power adaptor	✓ 24 V DC, 150 W 110-230V AC 50-60 Hz	-	included in delivery
AC power supply	-	✓ 85-250 V AC 50-60 Hz	internal AC/DC power adaptor, standard AC mains inlet (Appliance coupler IEC-60320 C14)
UPS	✓	✓	
Optional Li-Ion UPS	O	-	extended battery capacity
DC supply voltage	10 V to 32 V DC		
Power-on threshold (typ.)	10.9 V		min. input voltage required for power-on (open circuit)
Shutdown threshold (typ.)	9.8 V		input voltage at which internal UPS buffering is activated respectively the delayed automatic deactivation is triggered
Power consumption	<130 W		depending on model and equipment

UPS and Data integrity	Value	Remarks
Autarkic operation without PC	✓	
Self start (Automatic data acquisition operation)	configurable	timer, absolute time, automatic start when power supply is available
Auto data-saving upon power outage	✓	buffering (UPS) with "auto-stop": auto-stop of measurement, data storage and automatic shutdown
UPS	integrated	with automatic charge control
UPS coverage	complete system including plug-in modules (amplifier)	
Shutdown delay with power outage	30 s (default), configurable	"buffer-time constant": required duration of a continuous outage that will trigger auto shutdown procedure
Minimum charging time for 1 min. buffer duration	≤10 min.	typ., 23°C, for empty battery
Charging time ratio: charging- and discharging duration	buffer time * (total power / 12 W)	worst case example: total power consumption of system 100 W, buffer duration 1 min., resulting charging time ≤ 48 min. (charging ratio 48:1)

UPS batteries	portable device	19" rack chassis	Remarks
Battery type	NiMH	lead-gel	portable devices (housing) delivery since Q4/2017: NiMH batteries before: lead-gel batteries [2] 19" rack is always with lead-gel batteries
Effective buffer capacity	≥55 Wh	≥15 Wh	typ., 23°C, battery fully charged
Max. buffer duration	>30 min.	>8 min.	total buffer duration depending on device variant total power consumption ≤110 W
Charging time for complete battery recovery	36 h	6 h	device activated
UPS-takeover threshold (typ.)	9.8 V 11.1 V		takeover internal buffer battery switch back to external supply

2   see reference to lead batteries on device identification plate

Data acquisition, trigger	Value	Remarks
Channel individual sampling rates	selectable in 1–2–5 steps	
Number of sampling rates: analog channels, DI and counter	2	usable simultaneously in one configuration
Number of sampling rates: fieldbus channels	arbitrary	
Number of sampling rates: virtual channels	arbitrary	data rates generated via imc Online FAMOS (e.g. via reduction)
Monitor channels	✓ for all channels of the types: analog, DI and counter (incremental counter) and CAN	doubled channels with independent sampling and trigger settings
Intelligent trigger functions	✓	e.g. logical combination of multiple channel events (threshold, transition) to create triggers that start and stop acquisition of assigned channels
Multi.triggered data acquisition	✓	multiple trigger-machines and multi-shot
Independent trigger-machines	48	start/stop, arbitrary channel assignment

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

AGT Absolute Gauge Technologies™

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Data Sheet Version 4.9 - 2023-02-01

Page 11

Maximum channel count per device		
Active channels	512	Active channels of the current configuration: Total sum of analog, digital, fieldbus and virtual channels as well as possible monitor channels
Active analog channels	198 [1]	Activated analog channels of the current configuration (sum of primary channels and possibly monitor channels) (1): 128 with imc CRONOS*flex* (CRFX) and imc CRONOS-XT (CRXT), incl. output channels of type DAC-8 and DIO-Ports of type DI / DO, incl. 18 channels per CRFX/WFT-2 input
Fieldbus channels	1000	Number of defined channels (active and passive); Currently activated channels are limited by the total number of activated channels (512).
Process vector variables	800	Single-value variables, each containing the latest current measured values. A process vector variable is automatically created for each channel.

Channel type	determined by	without monitor channels				with monitor channels				
		limit (aktive+passive)		activated	total activated	limit (aktive+passive)			activated	total activated
Analog channels	system-expansion	Channel	240	198	512	Channel	240		198	512
						Monitor	240			
Incremental counter	system-expansion	Channel	16	16		Channel	16		16	
						Monitor	16		16	
DIO/DAC-Ports	system-expansion	Port	16	16		Port	16		16	
						Monitor	16		16	
Fieldbus channels	flexible	Channel	1000	512		Channel	1000		512	
						Monitor				
Virtual channels (OFA)	flexible	-	-	512		-	-		512	

Occupancy for ports (examples):

- one DO module (e.g. DO-16) occupies 1 port
- one DI8-DO8-ENC4-DAC4 module occupies 3 ports
- one DAC module (e.g. DAC-8 or DAC-4) occupies 1 port

Monitor-ports: DI-ports (respectively channels) have monitor-ports, DO/DAC-ports in contrary do not have monitor-ports

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

AGT Absolute Gauge Technologies™

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Data Sheet Version 4.9 - 2023-02-01
Page   12

Storage, signal processing

Parameter	Value	Remarks
Removable flash storage	CF (CRC-xxx) CFast, USB (CRC-xxxGP)	recommended media available at imc; the specified operating temperature range of the media is relevant
Storage on NAS (network storage)	✓	alternatively to onboard Flash storage
Arbitrary memory depth with pre- and post trigger	✓	maximum pretrigger limited by size of Circular Buffer RAM; posttrigger only limited by available mass storage (Flash)
Circular buffer mode	✓	cyclic overwrite of circular buffer memory on mass storage media
Synchronization	DCF 77 GPS IRIG-B NTP PTP	Master / Slave via external GPS-receiver TTL via network for CRC-xxxGP devices
Extensive real-time analysis and control functions	✓ imc Online FAMOS included in standard delivery	device-option, licensed via activation code

Operating conditions

Parameter	Value	Remarks
Operating environment	dry, non corrosive environment within specified operating temperature range	
Rel. humidity	80% up to 31°C, above 31°C: linear declining to 50%	according IEC 61010-1
Ingress protection rating	IP20	
Pollution degree	2	
Operating temperature (Standard)	-10°C to +55°C	without condensation
Operating temperature (extended: "-ET" version)	-40°C to +85°C	condensation temporarily allowed
Shock- and vibration resistance	IEC 61373, IEC 60068-2-27 IEC 60062-2-64 category 1, class A and B MIL-STD-810 Rail Cargo Vibration Exposure U.S. Highway Truck Vibration Exposure	
Extended shock- and vibration resistance	upon request	specific tests or certifications upon request

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

AGT Absolute Gauge Technologies™

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Data Sheet Version 4.9 - 2023-02-01
Page   13

Synchronization and time base

Time base of individual device without external synchronization			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Accuracy RTC		±50 ppm 1 µs (1 ppm)	not calibrated (standard devices), at 25°C calibrated devices (upon request), at 25°C
Drift	±20 ppm	±50 ppm	-40°C to +85°C operating temperature
Ageing		±10 ppm	at 25°C; 10 years

Time base of individual device with external synchronization				
Parameter	**GPS**	**DCF77**	**IRIG-B**	**NTP**	**PTP** [4]
Supported formats	NMEA / PPS [1]		B000, B001, B002, B003 [2]	Version ≤4	Version 2
Precision		±1 µs		<5 ms after ca. 12 h [3]	<1 µs under good conditions
Jitter (max.)		±8 µs		---	
Voltage level	TTL (PPS [1]) RS232 (NMEA)	5 V TTL Pegel		---	
Input impedance	1 kΩ (pull up)	20 kΩ (pull up)		---	
Input connection	DSUB-9 "GPS" not isolated	BNC "SYNC" (isolated) (test voltage 300 V, 1 min.)		RJ45 "LAN"	
Cable shield connection		BNC: isolated Signal-GND (marked with a yellow ring)		---	

Synchronization of multiple devices via DCF (Master/Slave)			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Max. cable length		200 m	BNC cable type RG58 (propagation delay of cable needs to be considered)
Max. number of devices		20	only slaves
Common mode SYNC not-isolated	0 V		with non-isolated BNC connector: devices must have the same ground voltage level, otherwise signal integrity issues (signal artifacts and noise) may result. Available optional external isolation: see ISOSYNC
SYNC isolated		max. 50 V	with isolated BNC connector: SYNC-signal is already internally isolated, for reliable operation even with different ground voltage level (ground loops)
Voltage level	5 V		
DCF input/output	"SYNC" connection		BNC

ISOSYNC (optional external device for an isolated decoupling of the SYNC signal)			
Isolation strength	1000 V		1 minute (test voltage)
Delay	5 µs		@ 25°C
Temperature range		-35°C to +80°C	

(1) PPS (Pulse per second): signal with an impulse >5 ms is required	(2) Using BCD information only

(3) Max. value, concerning the following condition: first-synchronization

(4) Only available for devices with "-**GP**" suffix and in conjunction with imc STUDIO 5.0 R5 or higher. Please read the Software manual for detailed information of the PTP synchronization (chapter: "External clock: PTP").

Specs of Li-Ion UPS-module

Li-Ion Smart Battery (included in CRC/B-Li-IO-1 and CRC/B-Li-IO-2)		
Parameter	**Value**	**Remarks**
Charging time for complete battery recovery	3 h	device must be switched on
Capacity of each Li-ion battery	98 Wh [4]	Nominal ratings at 21°C The available effective capacity depends on load and temperature. At temperatures below 0°C the usable capacity is reduced to a fraction of nominal values at 21°C. Example (at approx. 40 W load): approx. 85% at -10°C approx. 55% at -20°C
Operating temperature range Operation (discharge)	 -20°C to +69°C	operational temperature range of UPS buffering functionality To protect the batteries at temperatures above 60°C the UPS buffer time constant is reduced to 15 seconds, regardless of configured setting
	-10°C to +50°C	specified temperature range as rated by Smart Battery manufacturer! Manufacturers of the individual Li-ion cells used in the Smart Battery, specify a discharging temperature range of -20°C to +60°C
	+75°C ± 5°C	battery disconnect: internal protection circuitry of the Smart Batteries prevent discharge
Charge	0°C to +45°C	above +45°C a charge of the batteries is inhibited (green charge level indicator LED stops flashing)
Storage	-20°C to +60°C	
Passive temperature fuse	+93°C (tolerance: +0°C, -5°C)	Once triggered, the passive temperature fuse cannot be reset thus irreversibly rendering the battery useless!
Relative Humidity	≤80%	

<u>Note:</u> Due to the inevitable leakage and self-discharge of the Smart Batteries we recommend a regular recharging cycle at least every 3 months that a device has not been in use (device must be switched on for charging).

---

(4)   As of delivery date FEB-2019, before that 69 Wh

© 2023 imc Test & Measurement GmbH
Errors and changes excepted

AGT Absolute Gauge Technologies™

Presented by: Absolute Gauge Technologies
sales@absolutegauge.com; www.absolutegauge.com,
Toronto: 416 754 3168, Montreal: 514 695 5147, Toll Free: 1 888 754 7008

Data Sheet Version 4.9 - 2023-02-01

Page   15