FRQ2-4 for imc CRONOSflex (CRFX/FRQ2-4)

4 channel amplifier for frequency modulated signals

This amplifier is especially designed for sensors that are able to convert electrical, physical dimensions in frequency. These sensors spent in a "state of rest" (input parameter = 0) a frequency not equal zero. The physical dimension combined with the scaling factor has to be entered into the basis card.

By means of taring in the dialog 'amplifier adjustment' this state of rest is tared as a zero position. Frequencies that are smaller than that state of rest will be notified as negative physical values.

CRFX/FRQ2-4
(Fig. similar)

imc CRONOSflex - Frameless expansion, flexible modularity

The imc Click Mechanism and extruded aluminum case provide a firm mechanical and electrical connection. As a result, no mainframe or rack is needed.

An imc CRONOSflex system uses EtherCAT as an "internal" system bus for connecting various modules to the main base unit (CRFX-400 / CRFX-2000G). With the system bus, all imc CRONOSflex modules are guaranteed to be synchronized with each other. This allows various modules to be either connected in one central block or connected via standard network cable in a spatially distributed system.

Alternatively, connection can be made by means of standard Ethernet cables (RJ45, CAT5), thus creating a spatially distributed system.
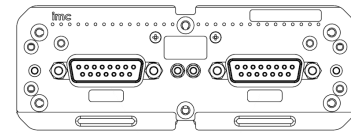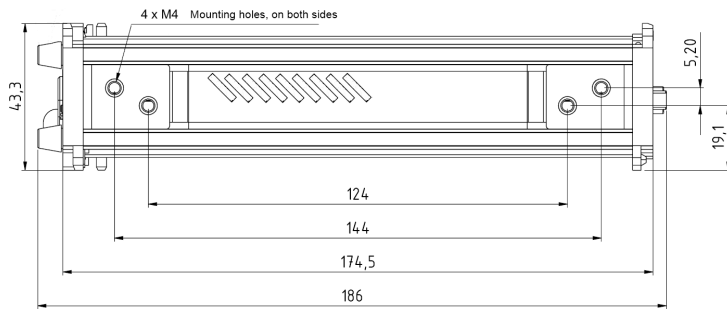

imc Click Mechanism

CRFX distributed system

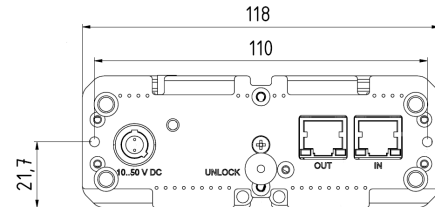## Overview of available variants

Standard version		ET-version *	
Order Code:	article no.	article no.	remarks
CRFX/FRQ2-4	11900157	11910091	with DSUB-15 sockets

* ET: Version for an extended temperature range

Mechanical drawings with dimensions

front view

rear view

Module power supply options

- Direct connection (LEMO.EGE.1B.302 power socket)
- Adjacent module (module connector / imc Click Mechanism)
- EtherCAT network cable: Power over EtherCAT (PoEC)

For further details refer to the power options documentation.

Included accessories

DSUB-15 plug		
ACC/DSUBM-FRQ2	DSUB-15 plug with screw terminals for frequency modulated signals As standard channel 1 **+INA** and **-INA** and channel 2 is **+INC** and **-INC** and **+5 V** is realized via DSUB pin 14, see ACC/DSUBM-ENC4 pin configuration in the manual or getting started.	13500210

Miscellaneous
Test certificate
Getting started witch imc CRONOS*flex* (one copy per delivery)

Optional accessories

AC/DC power adaptor 110-230 VAC 50-60 Hz (with appropriate LEMO.1B.302 plug)		article no.
48 V DC / 150 W	ACC/AC-ADAP-48-150-1B	13500148
24 V DC / 60 W	CRPL/AC-ADAPTER-60W-1B	10800066

Power plugs		
ACC/POWER-PLUG-5	Power plug for DC supply LEMO.FGE.1B.302 plug (male, E-coded: 2 coding keys)	13500150
CRFX/MODUL-PP-90	Power plug for DC supply 90° angular LEMO.FHE.1B.302 plug (male, E-coded: 2 coding keys)	11900074

Supply module (Power Handle)		article no.
CRFX/HANDLE-POWER-L	Handle with system power supply 50 V 100 W, without UPS	11900058
CRFX/HANDLE-UPS-L	Handle with system power supply 50 V 100 W, UPS with lead-gel battery	11900043
CRFX/HANDLE-LI-IO-L	Handle with system power supply 50 V 100 W, UPS with Li-Ion battery	11900010

Passive-Handle		
CRFX/HANDLE-L	standard unpowered left handle	11900008
CRFX/HANDLE-R	standard unpowered right handle	11900007

Mounting bracket for increased stability (recommended for lifetime and robustness)		
CRFX/BRACKET-CON	assembly element for 2 modules	11900071

Mounting brackets for fixed installations		
CRFX/BRACKET-90	mounting bracket 90°	11900068
CRFX/BRACKET-180	mounting bracket 180°	11900069
CRFX/BRACKET-BACK	rear panel mounting element	11900070
CRFX/RACK	19" RACK for imc CRONOSflex Modules	11900066
CRFX/BRACKET-RACK	mounting element in the RACK	11900072

Miscellaneous	
Report set of function test for each device	

Technical Specs - CRFX/FRQ2-4

Inputs, measurement modes, terminal connection		
Parameter	**Value**	**Remarks**
Inputs	4	for frequency modulated signals
Measurement mode	frequency measurement	
Terminal connections	2x DSUB-15	

General			
Parameter	**Value**		**Remarks**
Input range	measurement range ±	center frequency	The center frequency will be provided by imc software after selection of the measurement range.
	3 kHz, 5 kHz, 12 kHz, 30 kHz, 50 kHz, 120 kHz	6 kHz, 10 kHz, 24 kHz, 60 kHz, 100 kHz, 240 kHz	
Sampling rate	≤50 kHz		per channel
Filter (digital) Frequency	50 Hz to 20 kHz		filtering of output data stream (frequency values)
Time resolution of the frequency measurement	3.9 ns		primary oszillator for frequency measurement: 256 MHz
Frequency stability of the primary oszillator	<100 ppm aging <±5 ppm / year		
Resolution	16 Bit integer 32-Bit float (24 bit mantissa)		With selected data type / output format: a) 16-Bit integer b) Float (24-Bit mode)

Differential-inputs		
Parameter	**Value**	**Remarks**
Input configuration	differential	
Input voltage range	TTL	treshold respectively hysteresis: 0.8 .. 1.4 V
Input impedance	50 kΩ	
Common mode input voltage	max. ±30 V	
CMRR	70 dB (typ.), 50 dB (min.) 60 dB (typ.), 50 dB (min.)	DC, 50 Hz 10 kHz
Overvoltage protection	±50 V	long-term

Parameter	**Value**	**Remarks**
Sensor supply	+5 V, 300 mA / module	block isolated from housing (CHASSIS, PE), reference: GND

Block isolation

Parameter	Value	Remarks
Block isolation	60 V	all internal electronics isolated from the housing (CHASSIS, PE)
Isolation impedance	500 kΩ || 1 nF	
Internal reference ground	GND	all channels with one common, galvanically connected reference ground
External reference ground	CHASSIS, metal housing	internal electronics as an entity, galvanically isolated from housing

Block isolation for improved suppression of ground loops and related interference. Does not constitute channel-wise individual isolation. Not rated nor intended for safety of equipment and personnel.

Power supply of the imc CRONOSflex module

Parameter	Value	Remarks
Input supply voltage	10 V to 50 V DC	
Power consumption	9 W	10 to 50 V DC
Isolation	60 V	nominal isolation specification of the supply input
Power-over EtherCAT (PoEC)	42 V to 50 V DC	supply via EtherCAT network cable

Terminal connection of the module

Parameter	Value	Remarks
EtherCAT connection	2x RJ45	system bus for distributed imc CRONOSflex components
Input supply plug (female)	LEMO.EGE.1B.302	multicoded 2 notches, for optional individually power supply
Module connector	2x 20-pin	direct connection of modules (click) supply and system bus

Pass through power limits

Directly connected (clicked) imc CRONOSflex Modules	3.1 A (maximum current) Equivalent power with chosen DC power input: • 149 W @ 48 V DC (e.g. AC/DC line adaptor) • 37 W @ 12 V DC (typical vehicle supplied DC input)
Power over EtherCAT (PoEC) for remote imc CRONOSflex Modules	350 mA (maximum current, corresponding to IEEE 802.3) Equivalent power with chosen DC power input: • 17.5 W @ 50 V DC (e.g. Power Handle) • 16.8 W @ 48 V DC (e.g. AC/DC line adaptor) • 14.7 W @ 42 V DC (minimum voltage for PoEC) Note: minimum system power of 42 V DC required for PoEC

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 to50%	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
Dimensions	43.3 x 118 x 186 mm	W x H x D
Weight	740 g	