Digital in- and outputs for imc CRONOSflex

DIO modules for digital signals and control applications

This family of modules provides in- and output of digital signals and extend imc CRONOS*flex* systems with the capability to control measurement environments such as test stands. The digital inputs (DI2-xx) allow sampling of digital signals having TTL/CMOS or 24 V logic levels.

Highlights DI2-xx

- Galvanically isolated 4 Bit groups
- Configurable for 5 V or 24 V level (of 8 Bit groups)

The digital outputs (DO-xx-HC) provide isolated control signals with high output current capabilities. The signals' states can be generated by imc Online FAMOS as the result of live calculations or be assigned to states of the trigger machine.

imc CRONOSflex Module (CRFX/DI2-32)

Highlights DO-xx-HC

- Galvanically isolated 8 Bit groups
- compatible with 5 V and 24 V Volt output level
- Configurable driver modes (Open Drain / Open Source / Totem Pole)
- 0.7 A / Bit drive current (sink and source)

16-channel modules provide 16 Bit of the same type (DI or DO).

32-channel modules can be chosen as pure DO or DI type modules or as a combined one (16+16). Those modules are implemented as "Double-modules" acting as two logical modules with their respective IDs displayed on two 7-segment displays.

imc CRONOS*flex* - 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.


imc Click Mechanism

An imc CRONOS*flex* 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 CRONOS*flex* 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.


CRFX distributed system

Overview of the available variants

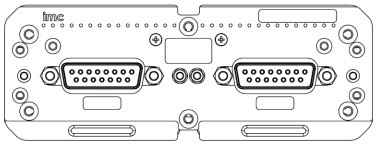
Order Code	DI	DO	properties	article no.
CRFX/DI2-16	16	-	Single-module	11900083
CRFX/DI2-16-ET	16	-	extended environmental range	11910047
CRFX/DI2-32	32	-	Double-module	11900099
CRFX/DI2-32-ET	32	-	extended environmental range	11910061
CRFX/DO-16-HC	-	16	Single-module	11900089
CRFX/DO-16-HC-ET	-	16	extended environmental range	11910048
CRFX/DO-32-HC	-	32	Double-module	11900100
CRFX/DO-32-HC-ET	-	32	extended environmental range	11910062
CRFX/DI2-16-DO-16-HC	16	16	Double-module	11900101
CRFX/DI2-16-DO-16-HC-ET	16	16	extended environmental range	11910063

Terminal connection

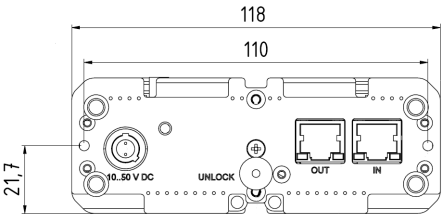
- In- and outputs: DSUB-15
- System bus (EtherCAT): 2x network plugs RJ45
- Power supply: LEMO.EGE.1B.302 (female) multicoded
- Module connector: 2x 20 pin (System bus and power supply)

Mechanical drawings with dimensions

- Single-module

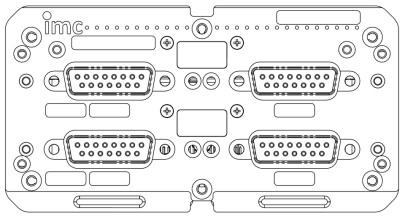


front view

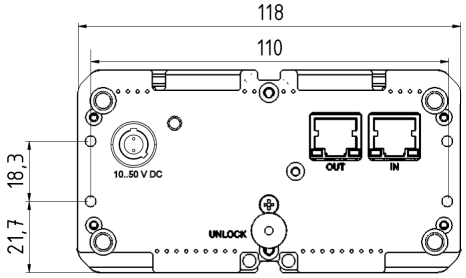


rear view

- Double-module



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

for DI2-16 and DI2-32

- ACC/DSUBM-DI4-8 — DSUB-15 plug with screw terminals for each 8 Bit — 13500174

for DO-16-HC and DO-32-HC

- ACC/DSUBM-DO-HC-8 — DSUB-15 plug with screw terminals for each 8 Bit — 13500198

for DI2-16-DO-16-HC

- ACC/DSUBM-DI4-8 — DSUB-15 plug with screw terminals for each 8 Bit — 13500174
- ACC/DSUBM-DO-HC-8 — DSUB-15 plug with screw terminals for each 8 Bit — 13500198

Complete set of plugs for each module provided

Documents
Getting started with imc CRONOS*flex* (one copy per delivery)
Device certificate

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-NIMH-L	Handle with system power supply 50 V 100 W, UPS with NiMH battery	11900273
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 CRONOS*flex* Modules	11900066
CRFX/BRACKET-RACK	mounting element in the RACK	11900072

DI2-xx

Parameter	Value typ.	min. / max.	Remarks
Channels	16 or 32		groups of 4 Bit with common ground reference, galvanic isolation between groups
Input voltage level	TTL 24 V		configurable globally for 8 Bit at DSUB using the "LEVEL" pin: "LEVEL": Jumper to "LCOM" "LEVEL": unconnected
Max input voltage	5.5 V 30 V		TTL mode 24 V mode
Input configuration	differential		groups of 4 Bit galvanic isolation between groups of 4 Bit
Isolation strength	±150 V		to system ground (housing, CHASSIS, PE) and between groups of 4 Bit (tested ±200 V)
Switching time HIGH-LOW LOW-HIGH	 34 µs 3 µs	 130 µs 30 µs	edge detection; over entire temperature range
Additional system delay	typ. 400 µs ±100 µs		delay from input transition to changing state available in imc Online FAMOS
Input current		max. 500 µA	
Switching threshold TTL (5 V) 24 V	 V_{Lmax} = 0.8 V V_{Lmax} = 5.0 V	 V_{Hmin} = 2.0 V V_{Hmin} = 8.0 V	
Internal supply voltage, available at user pin "HCOM"	5 V max. 100 mA		isolated reference ground of both "HCOM" and "LEVEL" is "LCOM"
Terminal connection	DSUB-15 / 8 Bit		ACC/DSUBM-DI4-8

DO-xx-HC

Parameter	Value		Remarks
Channels	16 or 32		groups of 8 Bit, isolated, common reference potential ("LCOM") for each group
Isolation strength	±50 V		to system ground (housing, CHASSIS, PE) and between groups of 8 Bit
Output configuration	Totem Pole (push-pull) Open Drain (LowSide) Open Source (HighSide)		configurable at DSUB with "OPDRN" - pin: "OPDRN": wire jumper to "LCOM" "OPDRN": open "OPDRN": 10 kΩ-resistor to “LCOM”
Output level	max. U_{ext} = 8 V to 28 V *or* TTL / CMOS 5 V *or* Open-Drain (max. 28 V)		connection of an external supply voltage U_{ext} to "HCOM", (Totem Pole or Open-Source) by means of internal isolated supply voltage and external pull-up-resistors (with 5 V, only Open-Drain configuration supported, no Totem-Pole / push-pull) external supply not required for Open-Drain operation
Max. output current (typ.) Totem Pole (8 V to 28 V) Open Source (8 V to 28 V) Open Drain (max. 28 V) open-drain with internal 5 V supply	<u>HIGH</u> 0.7 A 0.7 A --- 	<u>LOW</u> 0.7 A --- 0.7 A 20 mA	no external clamping diode required for inductive load switching
Output impedance	0.5 Ω		sink and source
Output voltage	<u>HIGH</u> U_{ext} -0.5 Ω · I_{high}	<u>LOW</u> 0.5 Ω · I_{low}	with load current: I_{high} and I_{low} ≤0.7 A
Internal supply voltage, available at user pin "HCOM"	5 V, 160 mA isolated		per 8-bit group; VCC_int = 5 V, decoupled from U_{ext} by diodes on HCOM
Protection mechanisms	short circuit thermal overload capacitive load (surge) inductive load (load dump)		quick response current limiting: 1.4 A (typ.), 2 A (max.) unlimited duration current limiting voltage limiting
State upon system power-up Activation of the output stage Connection of internal 5 V supply to contacts	high impedance (High-Z) upon preparation of measurement upon preparation of measurement		Independent of output configuration with selectable initial states (High / Low) in the selected output configuration VCC_int = 5 V via diodes at HCOM
Switching time	<300 µs		
Additional system delay	typ. 400 µs ±100 µs		Delay, until the value (imc Online FAMOS) is available for output
Terminal connection	DSUB-15		ACC/DSUBM-DO-HC-8 with high current capacity wiring recommended (HCOM / LCOM!)

General technical data

Power supply of the module			
Parameter	**Value (typ.)**	**min. / max.**	**Remarks**
Input supply voltage	10 V to 50 V DC		
Power consumption	3.5 W 4 W	6 W 8 W	CRFX/DO-16-HC CRFX/DO-32-HC
Isolation	60 V		nominal isolation specification of the supply input
Power-over EtherCAT (PoEC)	minimal 42 V DC necessary		supply via EtherCAT network cable

Terminal connections		
EtherCAT connection	2x RJ45	system bus for distributed imc CRONOS*flex* components
Input supply plug	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 CRONOS*flex* 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 CRONOS*flex* Modules	350 mA (maximum current) 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 (W x H x D)	single module: 43.3 x 118 x 186 mm double module: 61.6 x 118 x 186 mm	