iE Convert CU8

4921270008A

Control unit for 8 power stacks

Data sheet

Improve Tomorrow

1. CU8 Control unit

1.1 About the CU8

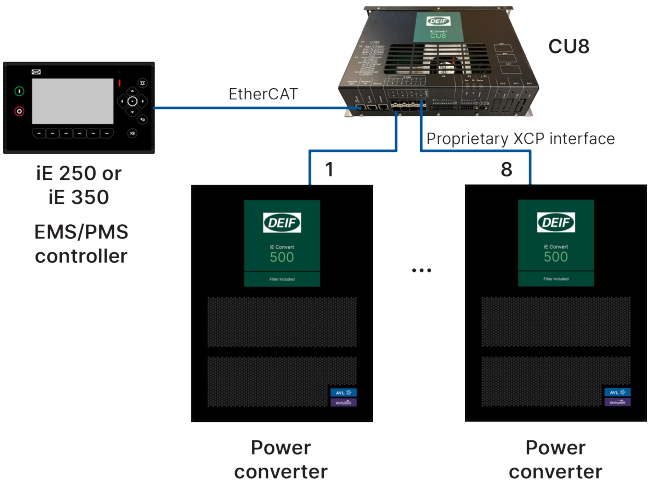
The CU8 is a discrete control unit to control iE Convert power converters. One CU8 controller controls up to eight power converter building blocks.

The eight power converter building blocks can arranged in two groups with different applications. The CU8 controller allows the power converters in the same group to run in parallel, for higher power capacity.

Running more than 8 power blocks in parallel requires another CU8 and synchronisation. Synchronisation can be done using an SFP+ or EtherCAT connection.

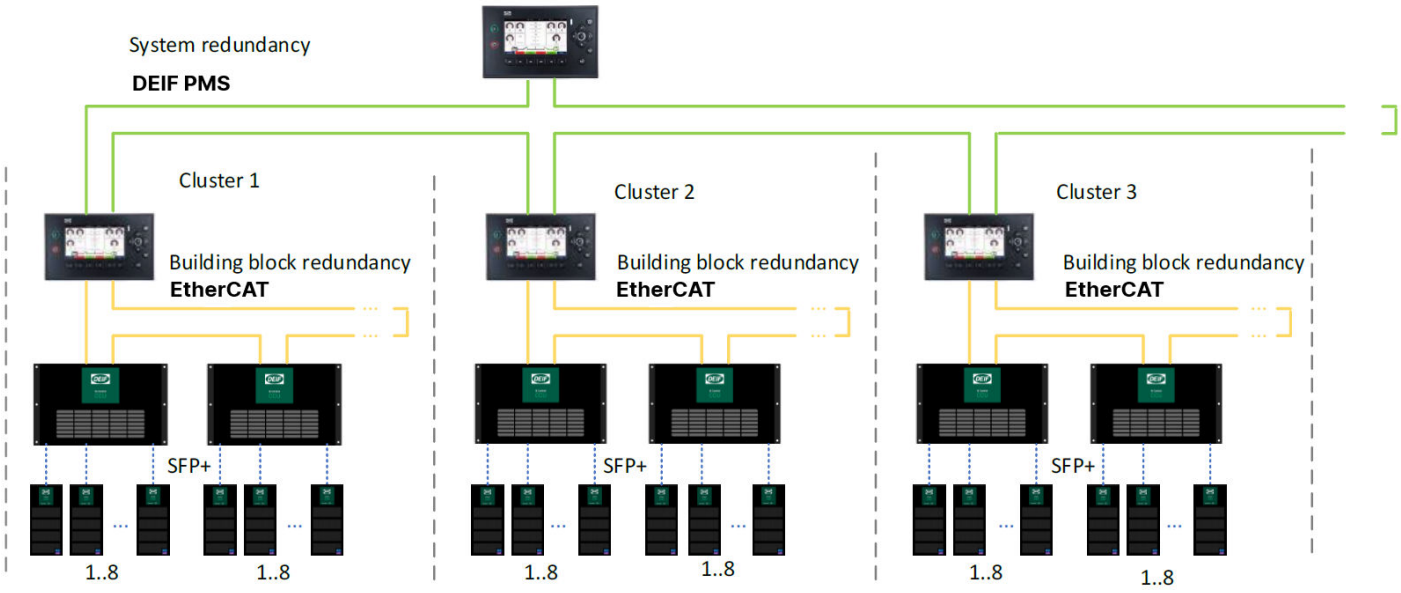
Controllers for CU8

The CU8 standard EtherCAT interface allows easy connectivity between the CU8 and other DEIF controllers and PLCs, such as the iE 250, iE 350, or iE 650. This enables scalability and easy integration of a variety of power sources, loads, and storage.



Complex solutions with redundancy

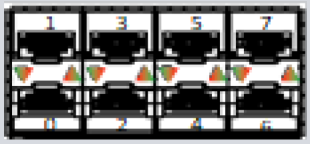
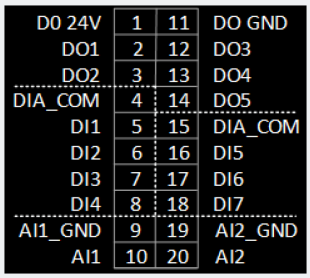
The controllers/PLCs, CU8s, and power converter building blocks can be combined to form energy systems. This includes flexible and complex solutions. The controllers/PLCs provide advanced cybersecurity capabilities, system redundancy, and efficient energy and power management (EMS/PMS).

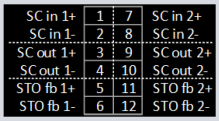
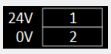


2. Technical specifications

2.1 Communication architecture

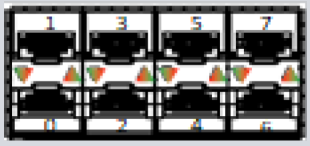
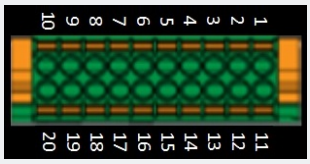
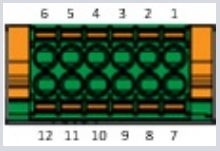
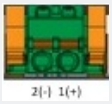
Communication

Connection	Diagram	Details
EtherCAT	H1100 	**1 RJ45** 10/100Mb, Port 0 – IN, Master Non-isolated **1 RJ45** 10/100Mb, Port 1 – OUT, Follower Non-isolated
Ethernet	H1200 	**1 RJ45** 10/100Mb The Ethernet port is only for SW download or local display connection. It cannot be used as a control input (due to cybersecurity requirements). Functionally isolated, isolation voltage: 550 V
iE stack	X1500 	**8 SFP+** 3.75 GHz, the interface to the power building blocks Non-isolated
X3		**5 Digital outputs** Digital outputs (terminals 2,3,12,13,14) Supply voltage: 24 V DC nominal Continuous output current (per channel): 0.5 A Short circuit protection >0.7 A Load dump protected by TVS diodes Functionally isolated in 1 group, isolation voltage: 500 V **7 Digital bipolar inputs** Digital bipolar inputs (terminals 5,6,7,8,16,17,18) Sourcing (24 V on common), or Sinking (GND on common) ON: -36 to -8 V DC, and 8 to 36 V DC Working voltage: 24 V Minimum pulse length: 50 ms Impedance: 4.7 kΩ Voltage withstand: ±36 V DC Functionally isolated in 2 groups, isolation voltage: 550 V **2 Analogue inputs** Analogue inputs (terminals 10,12), configurable Voltage inputs: -10 V DC/0 to 10 V DC Current inputs: 0 to 20 mA, or 4 to 20 mA

Connection	Diagram	Details
		Impedance: 200 kΩ Functionally isolated in 1 group, isolation voltage: 550 V
X2		**2 SC in** Safety Chain in (terminals 1,2,7,8) Used to interface with safety PLC, emergency stop and other safety devices. Working voltage: 24 V High: 9 to 36 V or -9 to -36 V with reference to common. Low: 5 to -5 V with reference to common. Impedance: 4 kΩ. Functionally isolated in 2 groups, isolation voltage: 550 V **2 SC out** Safety Chain out (terminals 3,4,9,10) • To maintain the STO (Safe Torque Off) inputs for a self-controlled safety system. • Feedback when an active safety device is in the system. Solid-state relay. Digital relay output: 24 V, maximum 1 A (resistive) PLe – Performance Level e, category 3 according to EN 13849 SIL 3 - Safety Integrity Level 3 according to IEC 61508:2011 Reaction time: 20 ms Probability of failure (dangerous) per hour: PFHd: 2.5∗10-8 1/h Mean time to failure (dangerous): MTTFd: 498.1 a Worst case calculated combined safety classification per channel (Sistema calculation for 60 °C) Functionally isolated in 2 groups, isolation voltage: 550 V **2 STO feedback** Safe Torque Off feedback (terminals 5,6,11,12) To be used as feedback when there is no active safety device in the system. Working voltage: 24 V Functionally isolated in 1 group, isolation voltage: 550 V
X1		**Power in** Nominal voltage: 24 V DC (operating range: 18 to 36 V DC) Power: 23 W Protected by a 4 A fuse
Ext [1 to 3]	Extension slots	**3 extension slots** The extension slots allow interfaces using a secure serial connection (CAN, RS-485, and so on). • 2 interfaces can be connected directly to the FPGA • 1 interface can be connected to the FPGA and MCU Customers need DEIF's assistance to add extension modules, because these require a firmware update and proper isolation.

Connections

Connection	Diagram	Controller side	Connector side
EtherCAT	H1100 	RJ45 with mag	-
Ethernet	H1200 	RJ45 with mag	-
iE stack	X1500	2 x 4 SFP+ cage, from Amphenol®	-

Connection	Diagram	Controller side	Connector side
			
X3		10 pos DMC PCB-base 3,50 Phoenix Contact	DFMC 1,5/10-ST-3,5-LR Phoenix Contact
X2		6 pos DMC PCB-base 3,50 Phoenix Contact	DFMC 1,5/6-ST-3,5-LR Phoenix Contact
X1		CC2,5/2-GF-5,08-LR P26THR Phoenix Contact	FKC 2,5/2-ST-5,08-LR Phoenix Contact
Ext [1 to 3]	-	-	-

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2.2 Human-machine interface (HMI)

Name	Function
Controller front	
Status LED	Green: Status OK
Safety chain LED	Green: Safety chain in okay, and RCM okay. Orange: Safety chain in okay, and RCM not okay. Orange: Safety chain in not okay, and RCM not okay.
EtherCAT status	Green: Okay Green and orange flashing: Transmission error Red: Not okay OFF: Initialising
EtherCAT	Red: Transmission error
Communication connections	
EtherCAT connection (RJ45)	Green: Connection OK
Ethernet connection (RJ45)	Green: Connection OK Yellow: Activity
SFP+ connection (Enhanced small form-factor pluggable)	Green Red

Display with cybersecurity

If you connect iE 250, iE 350 or iE 650 to the CU8, you can use the iE 7 (the display for iE 250, iE 350, or iE 650) to view the operation of the power converter(s). This configuration fulfils cybersecurity requirements.

Display without cybersecurity

You can connect a display directly to the CU8. This configuration does not fulfil cybersecurity requirements.

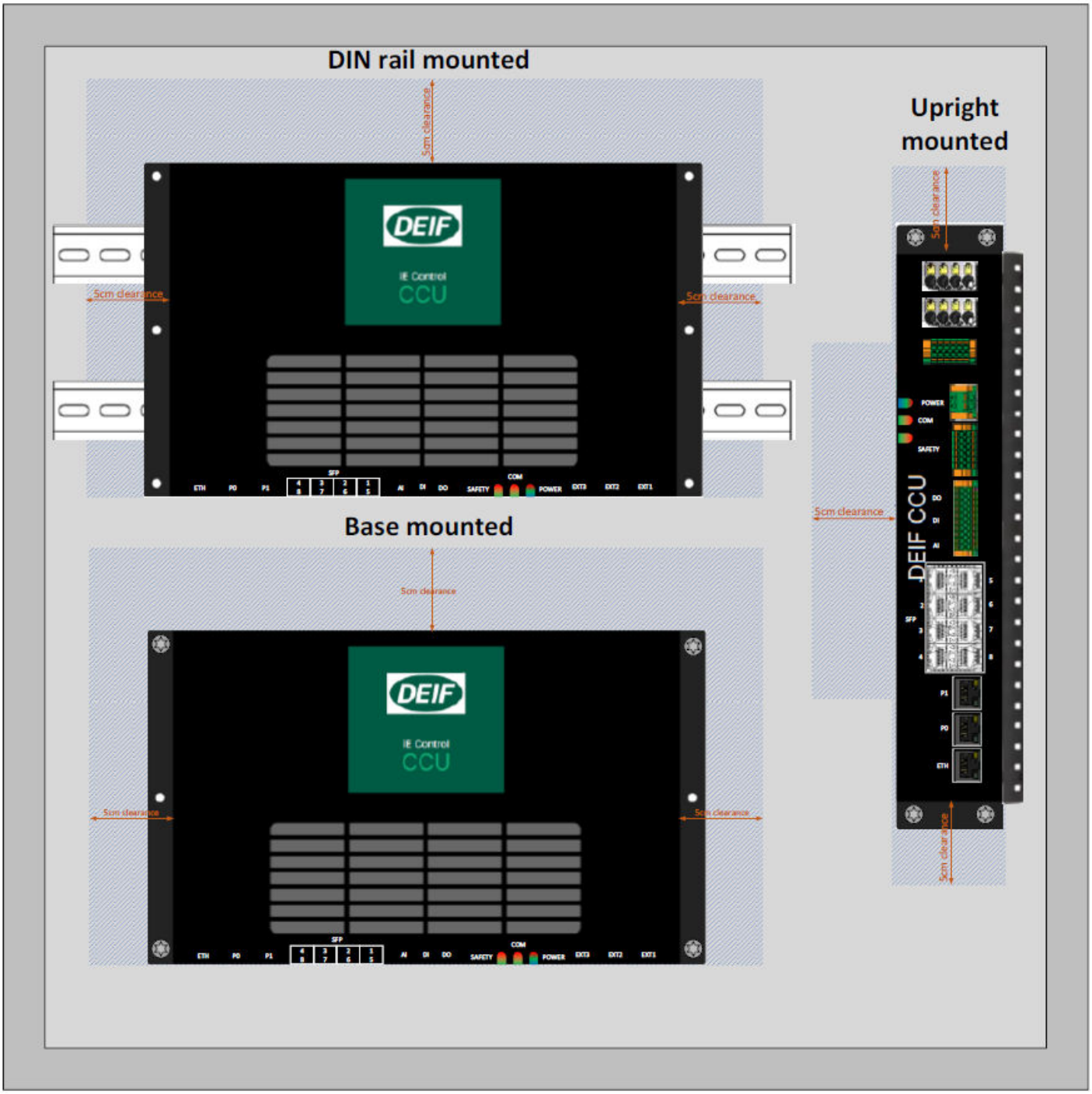
2.3 Dimensions and weight

Dimensions and weight	
CU8 (W x H x D)	335 mm x 66 mm x 201 mm
Weight	~2 kg

2.4 Mounting

The CU8 can be mounted:

- On a DIN rail
- Base mounted
- Upright



The clearance at the air inlet and outlet should be at least 5 cm.

2.5 Approvals

Area	Standards
Application	Land and Marine
CE marking	EN 61800-3 Adjustable speed electrical power EN 62477-1 Power converters – electrical safety
Marine approval	IACS (DNV, ABS, BV, CRS, CCS, ClassNK, IRClass, KRS, LR, RINA, PRS, TL)
UL approval	UL 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control, and Lab Use UL 6200 Controllers for Use in Power Production

Area	Standards
	UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
Cybersecurity	IEC 62443 (this is ensured by a connected DEIF controller/ PLC)
Machinery directive	2006/42/EC
Ecodesign directive	2009/125/EC

3. Compatible products

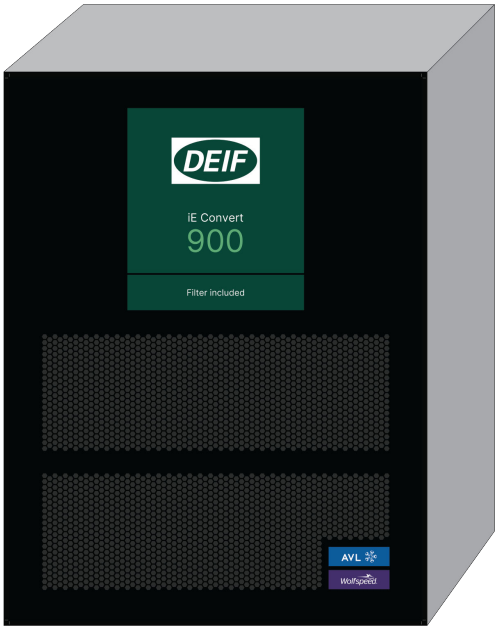
3.1 iE Convert power converters

iE Convert power converters are available for a range of specifications and applications.

Modules

iE 125

iE 500



iE 900

Applications

AC/DC
AFE

DC//DC
Galvanically isolated

AC/DC
Drive

DC/DC
Buck/boost

Voltage ratings

Maximum 850 V DC		Maximum 1500 V DC	
350 to 850 V DC	208 to 520 V AC	850 to 1500 V DC	400 to 690 V AC

3.2 Compatible equipment

Controllers with power management and cybersecurity

- iE 250 www.deif.com/products/ie-250
- iE 350 www.deif.com/products/ie-350
- iE 250 Marine www.deif.com/products/ie-250-marine
- iE 350 Marine www.deif.com/products/ie-350-marine

Controllers with power management

- iE 150 www.deif.com/products/ie-150
- iE 150 Marine www.deif.com/products/ie-150-marine
- AGC 150 www.deif.com/products/agc-150-generator

- AGC-4 Mk II www.deif.com/products/agc-4-mk-ii

PLCs with cybersecurity

- iE 250 PLC www.deif.com/products/ie-250-plc/
- iE 350 PLC www.deif.com/products/ie-350-plc/
- iE 650 PLC www.deif.com/products/ie-650-plc/

Isolation monitoring

- DC networks, ADL-111Q96 www.deif.com/products/adl-111q96
- AC networks, AAL-2 www.deif.com/products/aal-2

DC voltage measurement

iE Measure

Protection relays

Medium voltage relays, MVR-200 series www.deif.com/products/mvr-200-series/

Other equipment

DEIF has a wide variety of other equipment that is compatible. Here are some examples:

- **Synchroscopes**
  - **CSQ-3** (www.deif.com/products/csq-3)
- **Battery chargers/power supplies**
  - **DBC-1** (www.deif.com/products/dbc-1)
- **Current transformers**
  - **ASK** (www.deif.com/products/ask-asr)
  - **KBU** (www.deif.com/products/kbu)
- **Transducers**
  - **MTR-4** (www.deif.com/products/mtr-4)

4. Legal information

4.1 Disclaimer and copyright

Preliminary information

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