EPC Bidirectional DC/DC converters

isolated series

The EPC is a family of bidirectional DC to DC power converters that can be used in a broad number of applications. They provide ultra-high efficiency in both directions with galvanic isolation. Standalone configuration with Soft-Start and wide voltage ranges allow fast and easy setup. Several converters can be connected in parallel in order to reach higher power. CAN communication can be used to implement voltage or current control and measures all the main relevant operation parameters.

KEY FEATURES

- Wide voltage range
- Voltage and current control
- Soft start from 0 V
- High efficiency
- Galvanic isolation
- Power scalable. Paralleling.
- Protections (Overcurrent, overvoltage, overtemperature)
- CAN communication
- Custom design under request
- MPPT from PV

TYPICAL APPLICATIONS

- Power supply
- Smart grids
- Battery charger
- Energy storage systems
- Energy recovery
- Hydrogen generation
- Battery hybridation
- Solar panels - MPPT

ELECTRICAL SPECIFICATIONS

Model	EPC 3k5 648i	EPC 5k5 648i	EPC 2k2 624i	EPC 348 2k2i	EPC 2k2 324i	EPC 4k8 6125i	EPC 8k 8380i
Peak power	4.2 kW	6.5 kW	2.6 kW	2.6 kW	2.6 kW	4.8 kW	10kW
Nominal power	3.5 kW	5.5 kW	2.2 kW	2.2 kW	2.2 kW	4.8 kW	8kW
High side voltage	510 to 830 Vdc			280 to 400 Vdc	290 to 450 Vdc	430 to 830 Vdc	650 to-800Vdc
High side current (max)	6 A (8.2 A)	10 A (12 A)	4 A (5 A)	7 A (9.3 A)	6 A (7.5 A)	9 A	8 A (10 A)
Low side voltage	40 to 59 Vdc		20 to 29 Vdc	38 to 59 Vdc	20 to 29 Vdc	110 to 165 Vdc	280 to 600 Vdc
Low side current (max)	80 A (115 A)	125 A (180 A)	80 A (100 A)	50 A (76 A)	80 A (100 A)	45 A	21 A (33 A)
Isolation	High to Low side: 2.5 kV; High side to earth: 4kV; Low side to earth: 1.5 kV (2.5 kV for EPC-4k8-6125) Low side to user signals: 3kV (5 kV for EPC-4k8-6125)						
Max. efficiency	98 %						
Stand-by	<3 W						
Control	Digital control self-powered from high or low voltage side (low side prioritized)						

GENERAL SPECIFICATIONS

Item	Description
Operating temperature	-10 to 40 ºC
Storage temperature	-10 to 70 ºC
Cooling	Air cooled (Fans only ON when needed)
Communication protocol	CAN 2.0B: Bus speed typical 125kbps (min 125kbps, max 500kbps) Messages period: Default value: 250ms; Minimum value: 50m; Maximum value: 1000ms
MTBF	TELCORDIA SR-332, Issue 3: >350400 hours (PRELIMINARY)
Maintenance	No electrolytic capacitors in DC links (Long life FILM capacitors) Fan replacement >70000 h

REGULATIONS

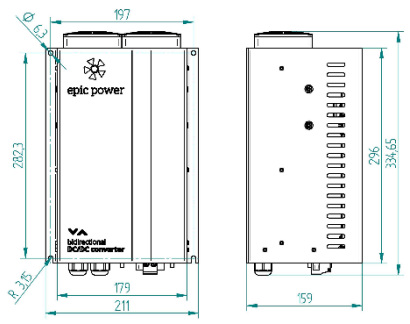
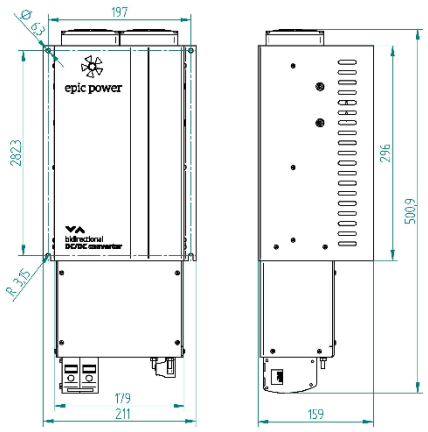
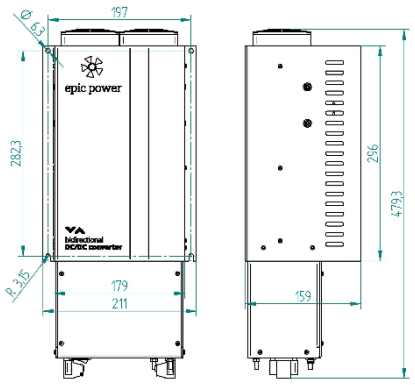
Directive	Standards
Low Voltage Regulations (LVD): European directive 2014/35/UE	UNE-EN 50178:1998. Electronic equipment for use in power installations UNE-EN 60204-1:2010. Safety of machinery - Electrical equipment of machines UNE-EN 60529:2018. Degrees of protection provided by enclosures UNE-EN 60664-1:2008. Insulation coordination for equipment within low-voltage systems UNE-EN 60664-4:2006. Insulation coordination for equipment within low-voltage systems UNE-EN 61293:2002. Marking of electrical equipment with ratings related to electrical supply - Safety requirements. UNE-EN 62109-1:2011. Safety of power converters for use in photovoltaic power systems UNE-EN 62477-1:2012. Safety requirements for power electronic converter systems and equipment
Electromagnetic Compatibility Regulations (EMC): European directive 2014/30/UE,	UNE-EN 61000-6-1:2007. Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards UNE-EN 61000-6-2:2006. Electromagnetic compatibility (EMC) -- Part 6-2: UNE-EN 61000-6-4:2007. Electromagnetic compatibility (EMC) -- Part 6-4 UNE-EN 12015:2005. Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks – Emission UNE-EN 12016:2014. Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks – Immunity
Restriction of hazardous substances: European directive 2011/65/UE	UNE-EN 50581:2012. Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

MECHANICAL SPECIFICATIONS

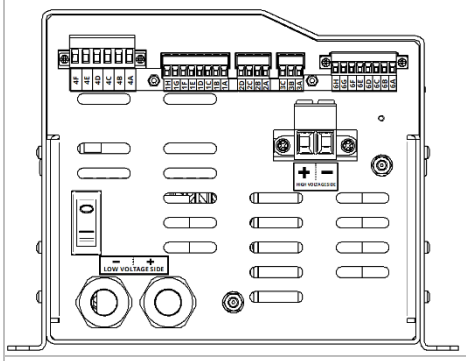
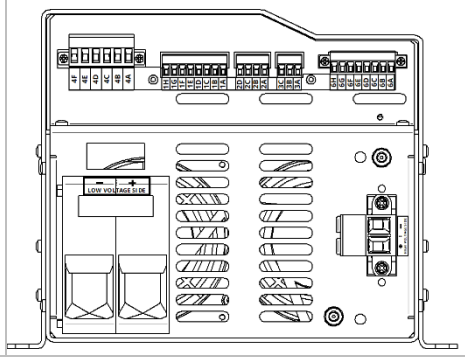
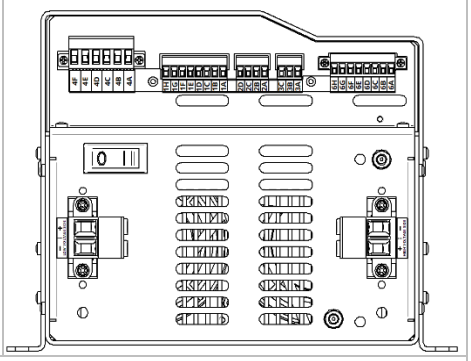
Model	EPC 3k5 648i	EPC 5k5 648i	EPC 2k2 624i	EPC 348 2k2i	EPC 2k2 324i	EPC 4k8 6125i	EPC 8k 8380i
Size	Size 1*	Size 2*	Size 1*	Size 1*	Size 1*	Size 1*	Size 3*
Weight	6.05 kg	8.95 kg	6.15 kg	6.00 kg	6.05 kg	6.7 kg	9.23 kg
Enclosure	IP 20						

*. See mechanical dimensions

MECHANICAL DIMENSIONS

SIZE 1	SIZE 2	SIZE 3
		
SIZE 1	SIZE 2	SIZE 3

Electrical connections

Size 1	Size 2	Size 3
		

Size 1 & Size 2 & Size 3: peripherical connectors

Outputs to controller	
1A	Common
1B	Status OK (NO)
1C	Temperature warning (NC)
1D	Temperature warning (NO)
1E	Reserved (NO)
1F	Reserved (NO)
1G	Earth Leakage detection (NO)
1H	Reserved (NO)

Reserved	
2A	Reserved
2B	Reserved
2C	RC Charger + (Optional)
2D	RC Charger – (Optional)

Inputs from controller	
3A	Common
3B	Enable DC/DC
3C	Safety Disconnection

LVDC link access to accessories	
4A	Load + (optional)
4B	Load - (optional)
4C	AC + Charger (optional)
4D	AC - Charger (optional)
4E	Solar charger + (optional)
4F	Solar charger – (optional)

Connector 1: Potential-free relay contacts. Max Voltage 24Vdc / 250Vac. Max Current 3A
Connector 4: Max current of each terminal is 20A. Place gR 25A external fuses
Connector 6: Connection to optional EPC CAN Interface. See Manual EPC Series

Size 1: Power connectors	Size 2: Power connectors	Size 3: Power connectors
High voltage side: Phoenix Contact - PC 6/ 2-STF-10,16 - Low Voltage DC link: 2 x Cable gland	High voltage side: Phoenix Contact - PC 6/ 2-STF-10,16 - Low Voltage DC link: Phoenix Contact - UW 95-POT/S	High voltage side: Phoenix Contact - PC 6/ 2-STF-10,16 - Low Voltage DC link: Phoenix Contact - PC 6/ 2-STF-10,16 -

Control modes

Depending on the application, several kinds of controls are available.

Autonomous Mode (AM)

In this mode, the EPC feed the load within a voltage range with a sophisticated control loop that is able to supply or regenerate energy when needed with no added communications.

In this mode, voltage is regulated in the HVDC if LVDC is within the usable voltage range. This mode is used to supply standard motor drives or inverters. Via CAN communication configuration is available.

Current Controlled Mode (CCM)

In this mode, the external controller will set the current reference for the HVDC side. Positive current is defined as charging current. Negative current is defined as discharging current. In order to avoid errors during charging and discharging processes, there is another signal that sets the current direction.

If the voltage (in high or low side) goes beyond the limits, DCDC converter will stop and show an error. Once the voltage comes back to the nominal range and reset is performed, current control is re-established. When the EPC is disabled through CAN or hardware enable input, reset of errors is performed.

Autonomous Mode		
Parameter	**Description**	**Default value: EPC-3k5-648**
Mode	Change between Autonomous Mode and Current Controlled Mode	Autonomous Mode
Power direction	Configure the power flow: 1) Bidirectional 2) Charging direction 3) Discharging direction	Bidirectional
Charge ON voltage	Target voltage when the load connected to EPC generates energy	655 V
Discharge ON voltage	Target voltage when the load connected to EPC consumes energy	600 V
Max. charge current	Maximum allowable HVDC current in charging direction	6 A
Max. discharge current	Maximum allowable HVDC current in discharging direction	7.5 A

*Note: For more info please refer to EPC Installation Guide

Current Control Mode		
Parameter	**Description**	**Default value: EPC-3k5-648**
Mode	Change between Autonomous Mode and Current Controlled Mode	Autonomous Mode
Power direction	Configure the power flow: 1) Bidirectional 2) Charging direction 3) Discharging direction	Bidirectional
HVDC max voltage	Maximum allowable HVDC voltage	800 V
HVDC min voltage	Minimum allowable HVDC voltage	510 V
LVDC max voltage	Maximum allowable HVDC voltage	59.2 V
LVDC min voltage	Minimum allowable HVDC voltage	42.0 V
Max. charge current	Maximum allowable HVDC current in charging direction	6 A