

# EPC Bidirectional DC/DC

converters by  epic power

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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. Additionally, the EPC Series measures all the main relevant operation parameters (voltages, currents, power...) that are available through CAN communication.

## KEY FEATURES

- Bidirectional DC to DC power conversion
- Wide input and output voltage range
- Advanced digital voltage and current control
- Soft start from 0 V with polarity protection
- High efficiency
- Galvanic isolation
- Power scalable. Just connect in parallel
- Protections (Overcurrent, overvoltage, overtemperature)
- Communications (Digital IO's, CAN)
- Customized versions available on request

## TYPICAL APPLICATIONS

- Power supply
- Smart grids
- Energy storage systems
- Energy recovery

## ELECTRICAL SPECIFICATIONS

Model	EPC-2k2-324	EPC-2k2-624	EPC-3k5-648	EPC-5k5-648	EPC-4k8-6125
Peak power	2.6 kW	2.6 kW	4.2 kW	6.5 kW	4.8 kW
Maximum continuous power	2.2 kW	2.2 kW	3.5 kW	5.5 kW	4.8 kW
High side voltage	290 to 450 Vdc	510 to 830 Vdc	510 to 800 Vdc	510 to 800 Vdc	490 to 800 Vdc
Maximum high side current	7.5 A	4 A	7.5 A	12 A	9 A
Low side voltage	21 to 29 Vdc	21 to 29 Vdc	42 to 58 Vdc	42 to 58 Vdc	110 to 165 Vdc
Size	Size 1	Size 1	Size 1	Size 2	Size 1
Maximum low side current	100 A	100 A	110 A	160 A	45 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 %				
Control	Digital control self-powered from high or low voltage side (low side prioritized)				
Stand-by	<3 W				

## TECHNICAL INFORMATION

Dimensions (WxHxD)	Size 1: 211x335x159 mm    Size 2: 211x425x159 mm				
Weight	6.05 kg	6.15 kg	6.05 kg	8.95 kg	6.70 kg
Operating temperature	-10 to 40 °C				
Enclosure	IP 20				
Cooling	Air cooled (Fans only ON when needed)				
MTBF	TELCORDIA SR-332, Issue 3: >350400 hours (PRELIMINARY)				
Maintenance	No electrolytic capacitors in DC links (Long life FILM capacitors) Fan replacement >70000 h				
Standards	This equipment has been designed and manufactured in accordance with the following standards: EN 50178:1998, EN 62109-1:2010, EN 60664-1:2007, EN 60664-4:2006, EN62477-1:2012, EN 61000-6-1:2001, EN 61000-6-3:2007, EN61000-6-4:2007, EN 12015:2004, EN12016:2004 And conforms to the relevant safety provisions of the Low Voltage Directive (2014/35/EC), EMC Directive 2014/30/EU and RoHS Directive 2011/65/EU				

## CONTROL MODES

Depending on the application, several kind of controls are available. Charging direction moves the energy from High Voltage DC side (HVDC) to Low Voltage DC side (LVDC). Discharging direction moves the energy from LVDC to HVDC.

### 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:

Parameter	Description	Example default value for EPC-3k5-648
<b>Mode</b>	This parameter lets the user choose between Autonomous Mode and Current Controlled Mode	Autonomous Mode
<b>Charge ON voltage</b>	Target voltage when the load connected to EPC generates energy	655 V
<b>Discharge ON voltage</b>	Target voltage when the load connected to EPC consumes energy	600 V
<b>Max. charge current</b>	Maximum allowable HVDC current in charging direction	6 A
<b>Max. discharge current</b>	Maximum allowable HVDC current in discharging direction	7.5 A

<b>Power direction</b>	<p>This parameter allows to configure the power direction. There are three possibilities:</p> <ul style="list-style-type: none"> <li>• Bidirectional: Energy is able to flow in charging and discharging direction</li> <li>• Charging direction: Energy is able to flow only in charging direction</li> <li>• Discharging direction: Energy is able to flow only in discharging direction</li> </ul>	Bidirectional
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### 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.

Parameter	Description	Example default value for EPC-3k5-648
<b>Mode</b>	This parameter lets the user choose between Autonomous Mode and Current Controlled Mode	Autonomous Mode
<b>Power direction</b>	<p>This parameter allows to configure the power direction. There are three possibilities:</p> <ul style="list-style-type: none"> <li>• Bidirectional: Energy is able to flow in charging and discharging direction</li> <li>• Charging direction: Energy is able to flow only in charging direction</li> <li>• Discharging direction: Energy is able to flow only in discharging direction</li> </ul>	Bidirectional
<b>HVDC max voltage</b>	Maximum allowable HVDC voltage	800 V
<b>HVDC min voltage</b>	Minimum allowable HVDC voltage	510 V
<b>LVDC max voltage</b>	Maximum allowable HVDC voltage	59.2 V
<b>LVDC min voltage</b>	Minimum allowable HVDC voltage	42.0 V
<b>Max. charge current</b>	Maximum allowable HVDC current in charging direction	6 A
<b>Max. discharge current</b>	Maximum allowable HVDC current in discharging direction	7.5 A

For more info please refer to EPC Installation Guide.

# APPLICATION EXAMPLE

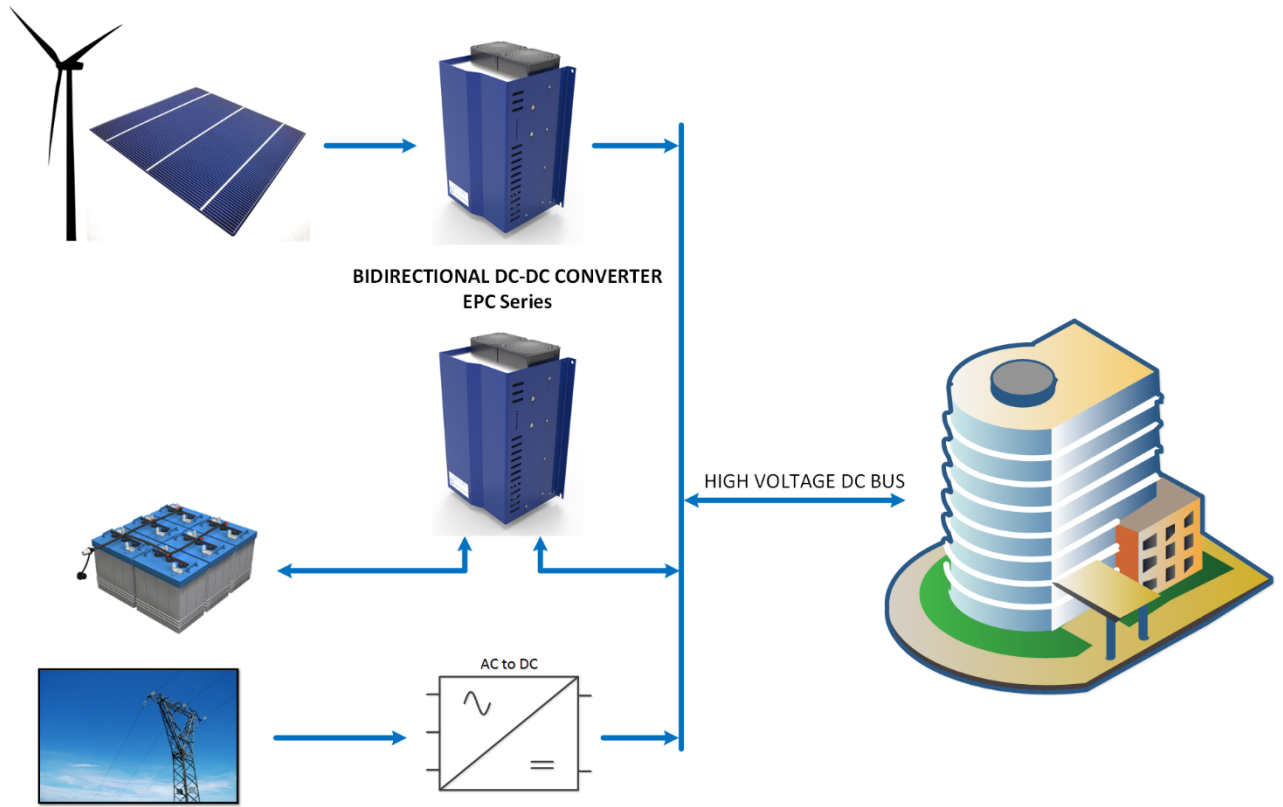


FIG. 1 SMART GRID APPLICATION EXAMPLE