Installation guide

Instructions d’installation

EPC SERIES
Bidirectional DC-DC converter



epic power

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1. PREFACE

1.1. IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS – THIS MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS

This manual contains important instructions for Models EPC 3k5 648i / EPC 5k5 648i / EPC 2k2 348i / EPC 2k2 624i / EPC 2k2 324i / EPC 1k1 612i / EPC 2k2 612i / EPC 1k1 312i / EPC 2k2 312i / EPC 4k8 6125i / EPC 7k 670i/ EPC 8k 8380i that shall be followed during installation and maintenance of the converter.

All electrical installations must be carried out in accordance with the local electrical standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSAC22.1. This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. Epic Power assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product. The product contains no user-serviceable parts. Before installing or using the product, read all of the instructions, cautions, and warnings in this manual. This connection must be made only by qualified personnel. Wiring of the product must be made by qualified personnel only.

1.2. INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ

CONSERVER CES INSTRUCTIONS. CETTE NOTICE CONTIENT DES INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ

Toutes les installations électriques doivent être réalisées conformément aux normes électriques en vigueur sur le site et au National Electrical Code® ANSI/NFPA 70 ou au Canadian Electrical Code® CSA C22.1. Ce document ne remplace pas et n'a pas pour objet de remplacer les législations, prescriptions ou normes régionales, territoriales, provinciales, nationales ou fédérales s'appliquant à l'installation et à l'utilisation du produit, notamment les normes en vigueur relatives à la sécurité électrique. L'installation doit être réalisée conformément aux législations, dispositions, prescriptions et normes en vigueur sur place. Epic Power décline toute responsabilité pour la conformité ou non-conformité à ces législations ou dispositions en relation avec l'installation du produit. Le produit ne contient aucun composant devant faire l'objet de mesures de maintenance par l'opérateur. Avant l'installation et l'utilisation du produit, lisez toutes les instructions et mises en garde figurant dans les présentes instructions. Ce raccordement doit uniquement être réalisé par du personnel qualifié. Le câblage du produit doit être effectué uniquement par du personnel qualifié.

1.3. ABOUT THIS MANUAL

This manual gives you the necessary information about the installation, commissioning, and operation of EPC Series Bidirectional DC-DC converter. We encourage that you carefully read these instructions before the first power-up of the unit.

If you have any doubts regarding any procedure, please contact immediately with the support team of Epic Power Converters.

2. SAFETY

This manual contains warning and cautions, which are identified with safety symbols. The warnings and cautions give important information on how to prevent not only injury and damage to the equipment or your system but also personal injuries.

Read the warnings and cautions carefully and obey their instructions.

Safety precautions are classified into the following two categories in this manual.

 **WARNING**	This symbol indicates information that, if ignored, lead to dangerous conditions , personal injuries or even death due to incorrect handling.
 **CAUTION**	This symbol indicates information that, if ignored, lead to dangerous conditions , personal injuries, or physical damage due to incorrect handling.

2.1. SAFETY PRECAUTIONS

Installation and application

 **CAUTION**	The converter should be attached to a vertical surface, with the fans pointing upwards in a dry area with no condensation.
 **CAUTION**	Make room in front of both ventilation grills, at least 250 mm.
 **CAUTION**	The system has been designed for pollution level 2. Consult epic power in any other circumstances.

 **WARNING**	It is essential to strictly follow installation and/or maintenance steps in order. Failure to do so may result in overvoltage or overcurrent occurrence, increasing the risk of shock or causing damage to the drive.
 **CAUTION**	In case of malfunction, or doubt, contact epic power. **NEVER OPEN EPC**. It is an extremely complex electronic system. Reparation must only be undertaken by epic power. Any unskilled handling may damage the system or may cause a serious accident.

Wiring

 **WARNING**	Before wiring the system, ensure that the main switch of the converter is switched off during the installation.
 **CAUTION**	Connection cable must have bullet style connectors, to prevent wires from fraying.
 **WARNING**	In case of deliberate electric supply disruption, the "ENABLE" connection must be opened, disabling EPC power conversion. If not, HVDC link will keep being supplied, and maintenance staff may receive an electrical shock.

Earthing

 **WARNING**	Ensure that earth is connected in both available connections (see page 16) with a conductor of minimum 2.5 mm^2 section before energizing the converter.
 **WARNING**	The protective conductor connection (PE) must not be removed since the protection against electric shock provided by the converter would be lost.
 **WARNING**	The protective conductor connection (PE) must be low-inductance and as short as possible.

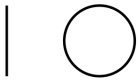
High Voltage Side

 **WARNING**	Supply must be shut down, and HVDC link must be disconnected from three-phase mains or any source of energy before making any connections. Failure to do so creates risk of electrocution for the operator. The EPC system may also become damaged.
 **WARNING**	Before starting high side connection of the VVVF, ensure that there is no voltage left in the nodes about to be handled.
 **WARNING**	**DO NOT TOUCH THE HVDC LINK WITHOUT BEING SURE EPC SYSTEM IS SHUT DOWN, CONNECTOR (5) UNPLUGGED AND PROTECTIVE DEVICES OPENED.**

Low Voltage Side

 **WARNING**	Low side connection MUST be protected in both conductors. Keep the protective device opened during wiring operation.

3. SYMBOLS ON THE PRODUCT

Symbol	Explanation
	Beware of electrical voltage, risk of electric shock The product operates at high voltages. All work on the device must only be performed as described in this document.
	WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Beware of hot surface The product can get hot during operation
	Direct current This symbol indicates that the current on the device is direct current.
	On and off This symbol indicates when the device is powered on (left symbol) or powered off (right symbol)
	Equipment Grounding Terminal This symbol indicates the position for the connection of an equipment grounding conductor.

4. SÉCURITÉ

Une mise en garde décrit un danger entraînant des blessures corporelles ou dommages matériels. La mise en garde indique une action qui risqué les blessures corporelles ou les dommages matériels aux produits.

 **WARNING**	AVERTISSEMENT – indique une consigne de sécurité dont le non-respect entraîne des blessures corporelles graves, voire la mort.
 **CAUTION**	ATTENTION indique une consigne de sécurité dont le non-respect peut entraîner des blessures corporelles légères ou de moyenne gravitée.

4.1. PRÉCAUTIONS DE SÉCURITÉ

Installation et application

 **CAUTION**	Le convertisseur doit être fixé sur une surface verticale, les ventilateurs pointant vers le haut dans un endroit sec et sans condensation.
 **CAUTION**	Faites de la place devant les deux grilles de ventilation, d'au moins 250 mm.
 **CAUTION**	Le système a été conçu pour le niveau de pollution 2. Consulter epic power en toute autre circonstance.
 **WARNING**	Il est essentiel de suivre strictement les étapes d'installation et / ou de maintenance dans l'ordre. Ne pas le faire peut entraîner une surtension ou une surintensité, augmentant le risque de choc ou endommageant le variateur.
 **CAUTION**	En cas de dysfonctionnement ou de doute, contactez epic power. **JAMAIS OUVERT EPC**. Il s'agit d'un système électronique extrêmement complexe. La réparation ne doit être effectuée que par epic power. Toute manipulation non qualifiée peut endommager le système ou provoquer un accident grave.

Câblage

 **WARNING**	Avant de câbler le système, assurez-vous que l'interrupteur principal du convertisseur est éteint pendant l'installation.
 **CAUTION**	Le câble de connexion doit avoir des connecteurs de type balle pour éviter que les fils ne s'effilochent.
 **WARNING**	En cas de coupure délibérée de l'alimentation électrique, la connexion «ENABLE» doit être ouverte, désactivant la conversion de puissance EPC. Si ce n'est pas le cas, la liaison HVDC continuera à être fournie et le personnel de maintenance pourrait recevoir un choc électrique.

Mise à la terre

 **WARNING**	Assurez-vous que la terre est connectée dans les deux connexions disponibles (voir page 16) avec un conducteur de section minimale de 2,5 mm2 avant de mettre le convertisseur sous tension.
 **WARNING**	La connexion du conducteur de protection (PE) ne doit pas être retirée car la protection contre les chocs électriques fournie par le convertisseur serait perdue.
 **WARNING**	La connexion du conducteur de protection (PE) doit être à faible inductance et aussi courte que possible.

Côté haute tension

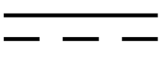
 **WARNING**	L'alimentation doit être coupée et la liaison HVDC doit être déconnectée du secteur triphasé ou de toute autre source d'énergie avant d'effectuer toute connexion. Ne pas le faire crée un risque d'électrocution pour l'opérateur. Le système EPC peut également être endommagé.

 **WARNING**	Avant de commencer la connexion côté haut du VVVF, assurez-vous qu'il ne reste plus de tension dans les nœuds sur le point d'être manipulés.
 **WARNING**	**NE PAS TOUCHER LA LIAISON HVDC SANS S'ASSURER QUE LE SYSTÈME EPC EST ARRÊTÉ, LE CONNECTEUR (5) DÉBRANCHÉ ET LES DISPOSITIFS DE PROTECTION OUVERTS.**

Côté basse tension

 **WARNING**	La connexion côté bas DOIT être protégée dans les deux conducteurs. Gardez le dispositif de protection ouvert pendant le câblage.

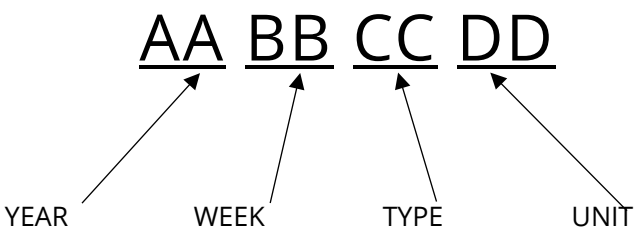
5. MARQUAGE DU PRODUIT

Symbol	Explication
	Avertissement de tension électrique dangereuse Le produit fonctionne avec de hautes tensions. Tous les travaux sur le produit doivent uniquement être effectués comme décrit dans la documentation du produit.
	AVERTISSEMENT Indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner la mort ou des blessures graves.
	Attention, surface chaude Le produit peut devenir chaud lors de son fonctionnement. Ne touchez pas le produit lors de son fonctionnement.
	Courant continu Ce symbole indique que le courant sur l'appareil est un courant continu.

	On and off Ce symbole indique lorsque l'appareil est allumé (symbole de gauche) ou éteint (symbole de droite).
	Borne de mise à la terre de l'équipement Ce symbole signale l'emplacement du raccordement d'un conducteur de mise à la terre de l'équipement.

6. DATE OF MANUFACTURING

Serial number of the device contains the manufacturing date using the following criteria:



Where:

AA: Year of manufacture abbreviated using last two ciphers

BB: Week of manufacturing

CC: Type of converter

DD: Number of the unit in the batch of production

7. EPC GENERAL DESCRIPTION

The EPC is a new generation of DC/DC Converters with a wide range of voltage levels in both sides. The system is capable of managing power in both directions. As an application example, you can connect the low side voltage to batteries and feed any drive (VVVF) directly through the DC link. It can also be used for off-grid applications where there is no three-phase mains available or, for example, in automatic warehouses where shuttles/AGVs are moving off-grid. Different supply sources (solar, wind, etc.) can be connected to have multiple generator systems.





8. EPC EXTERNAL DESCRIPTION

Size 1

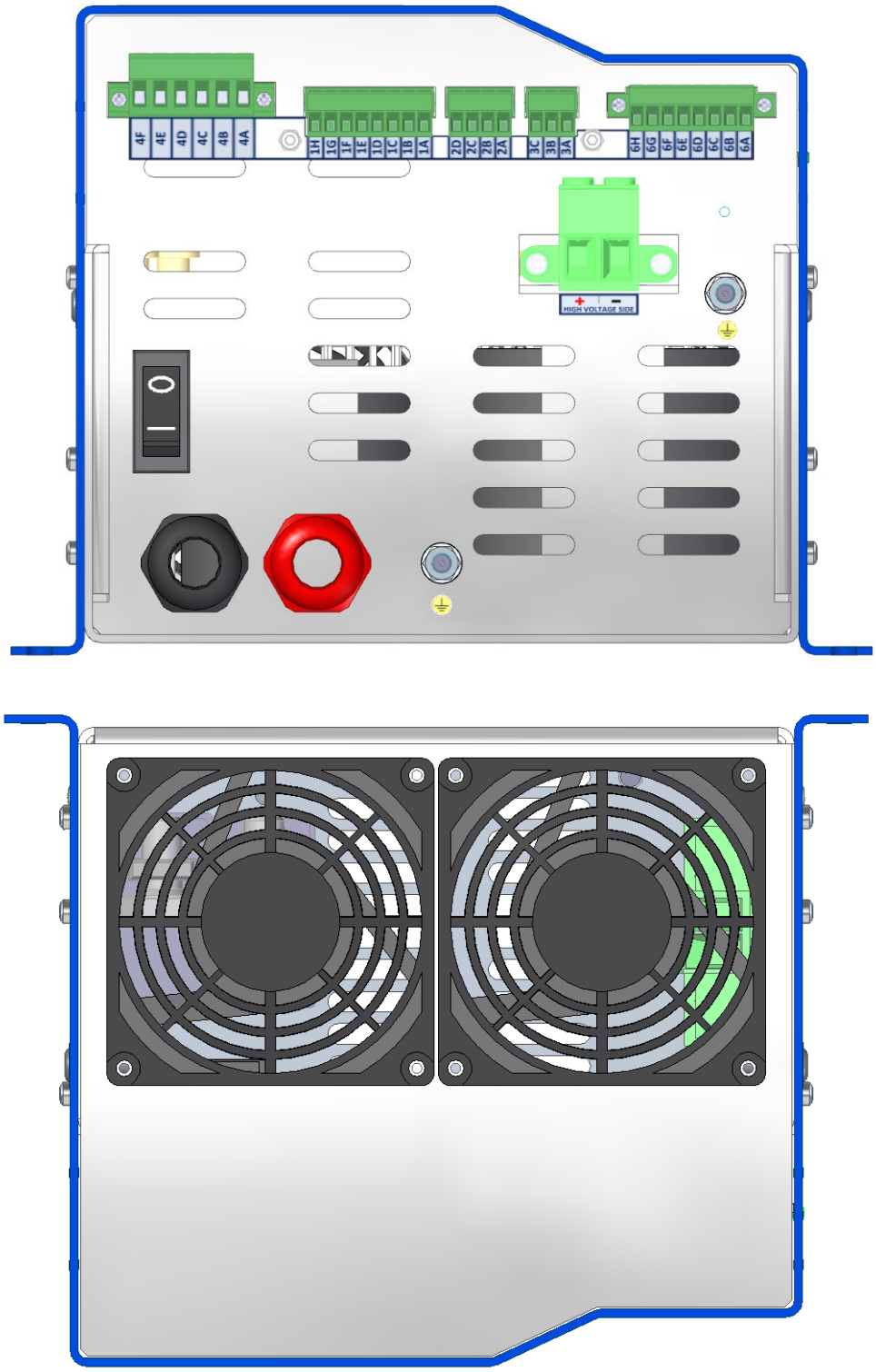


Fig. 1 DC/DC converter Size 1

Size 2

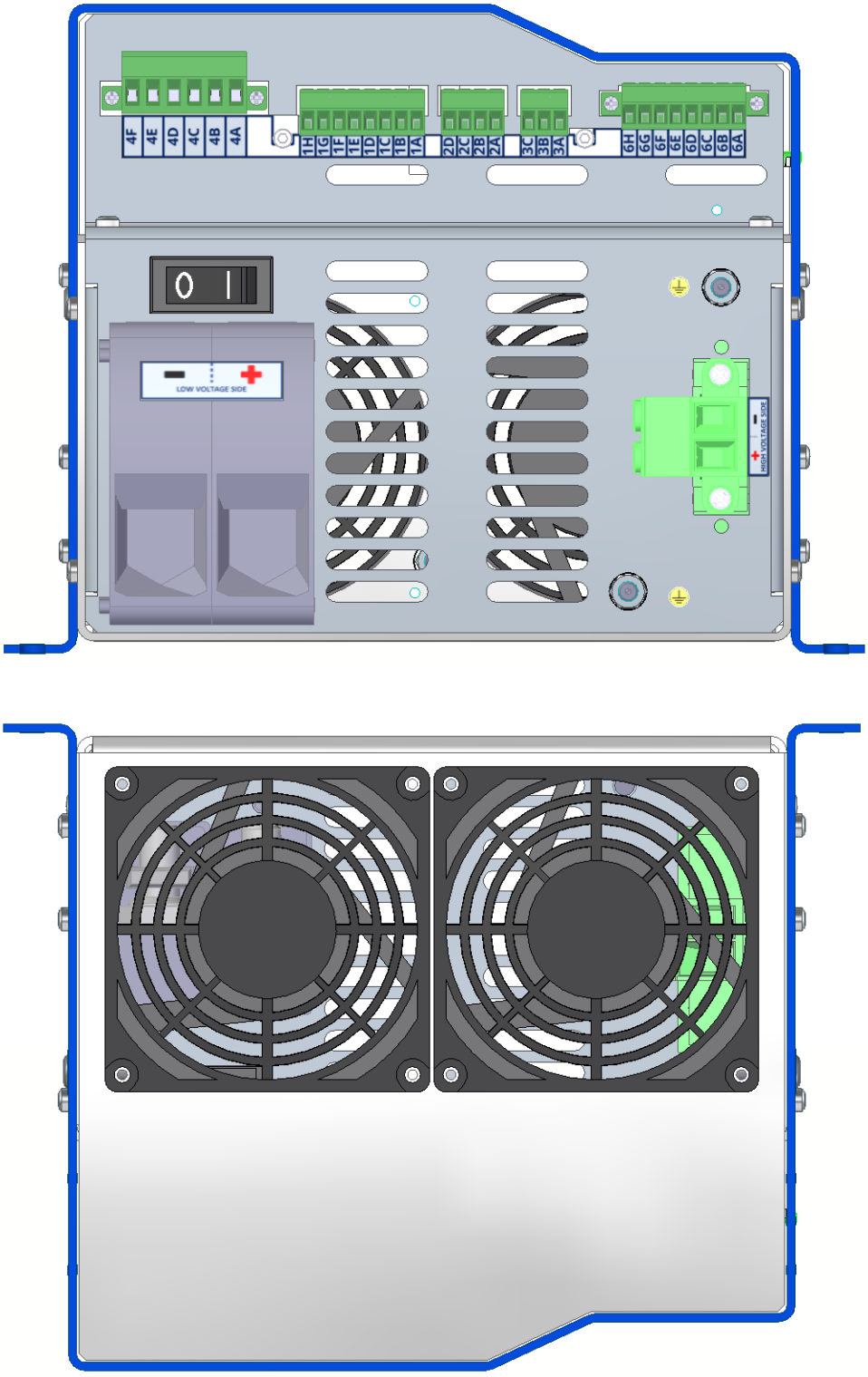


Fig. 2 DC/DC converter Size 2

Size 3

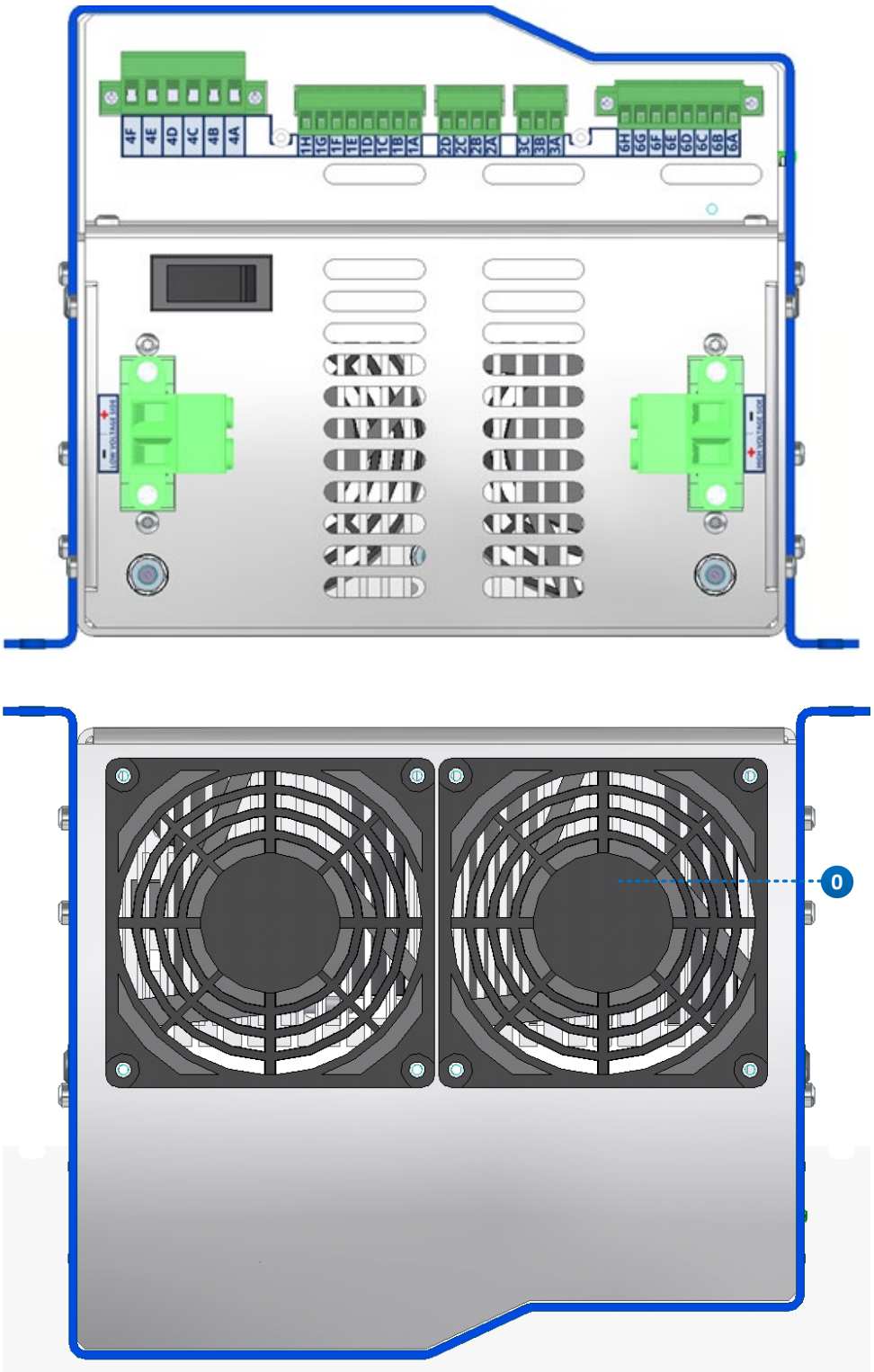
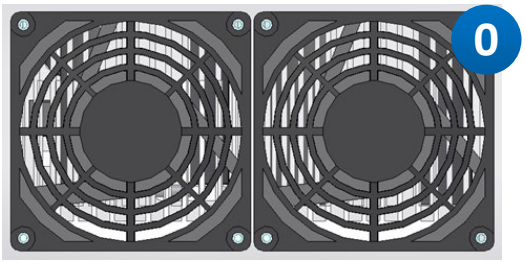


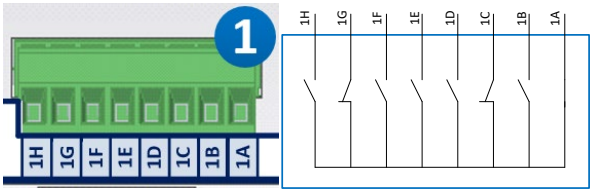
Fig. 3 DC/DC converter Size 3

8.1. COOLING FANS



8.2. CONNECTOR 1

OUTPUTS TO CONTROLLER



This connector has potential-free relay contacts.

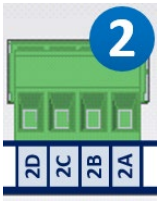
Output	Type*	Description
1A	[CM]	**Common**
1B	[NO]	**STATUS OK:** When this terminal is short-circuited, it indicates that the DC/DC converter is in operation.
1C	[NC]	**TEMPERATURE WARNING NC:** Open circuit indicates that there is a warning due to high temperature inside the converter.
1D	[NO]	**TEMPERATURE WARNING NO:** Short-circuit indicates that there is a warning due to high temperature inside the converter.
1E	[NO]	**Reserved**
1F	[NO]	**Reserved**
1G	[NC]	**Reserved**
1H	[NO]	**Reserved**
(*) [CM] = Common; [NO] = Normally open; [NC] = Normally close		

CAUTION	These outputs should never withstand voltages higher than 24VDC or 250VAC and currents higher than 3A, otherwise, the converter may result damaged.

8.3. CONNECTOR 2

CONTROL OUTPUTS

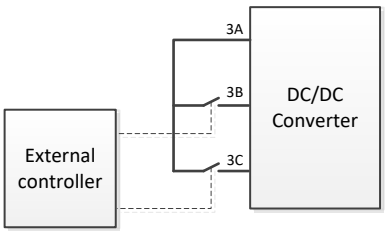
Output	Type*	Description
2A	Relay [CM]	**Reserved**
2B	Relay [NO]	**Reserved**
2C	Opto [+]	**RC Charger + (Optional)**
2D	Opto [-]	**RC Charger – (Optional)**
(*) [CM] = Common; [NO] = Normally open; Opto = Opto-isolated output		



8.4. CONNECTOR 3

INPUTS FROM CONTROLLER



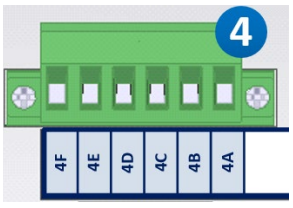


Input	Description
3A	**GND**: Common ground for 3B and 3C
3B	**ENABLE/DISABLE DC/DC:** - **ENABLE**: DC/DC Converter enabling is done by short-circuiting terminals 3A and 3B - **DISABLE**: DC/DC Converter is disabled by opening terminals 3A and 3B.
3C	**Safety disconnection:** - **ACTIVATE**: DC/DC Converter will stop immediately if 3C input is left open. - **DEACTIVATE**: Short-circuiting terminals 3A and 3C will enable the converter.
Note: Safety disconnection has priority over the rest of the signals of the converter. In order to have the converter in a ready to operate state, safety disconnection must be deactivated.	

8.5. CONNECTOR 4

LVDC LINK ACCESS FOR OPTIONAL ACCESSORIES

Terminal	Description
4A	**Load +** (Optional) (Reserved in Size 3 and EPC 4k8 6125i)
4B	**Load –** (Optional) (Reserved in Size 3 and EPC 4k8 6125i)
4C	**AC + Charger** (Optional) (Reserved in Size 3 and EPC 4k8 6125i)
4D	**AC – Charger** (Optional) (Reserved in Size 3 and EPC 4k8 6125i)
4E	**Solar charger +** (Optional) (Reserved in Size 3 and EPC 4k8 6125i)
4F	**Solar charger –** (Optional) (Reserved in Size 3 and EPC 4k8 6125i)



WARNING	These outputs are connected to the LVDC link. Maximum current of each terminal is **20 Amp**. External protective devices such as fuses must be used. Failure to do so creates risk of electrocution for the operator and/or the EPC converter may become damaged.

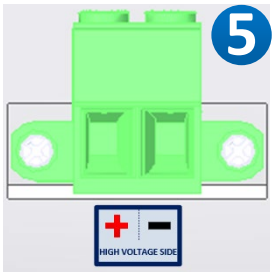
8.6. CONNECTOR 5

HIGH VOLTAGE SIDE POWER CONNECTION

Output to the High Side of DC bus

- Overcurrent internally protected.
- The impedance between DC+ and EARTH is approx. 170 kΩ[1]
- The impedance between DC- and EARTH is approx. 170 kΩ[1]

[1] Impedance can be removed at factory if desired by customer

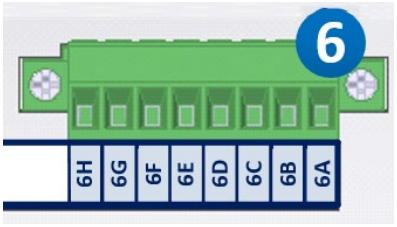


WARNING	Minimum wire section is specified in technical data in page 46. Failure to do so creates risk of electrocution for the operator, risk of fire in the installation and/or the EPC converter may become damaged.

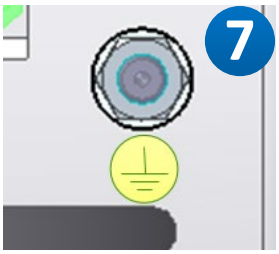
8.7. CONNECTOR 6

COMMUNICATIONS PORT

CAN Bus interface available through the EPC CAN Interface accessory.



8.8. EARTH CONNECTIONS (See page 48)





8.9. TERMINAL 9

LOW VOLTAGE DC SIDE (LVDC) CONNECTION

Size 1: Cables with cable gland connection.
Size 2: Terminal block available for wiring
Size 3: Pluggable connector available for wiring



Fig. 4 LVDC link Size 1



Fig. 5 LVDC link Size 2



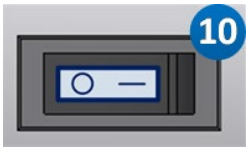
Fig. 6 LVDC link Size 3

8.10. SWITCH

ON/OFF SWITCH

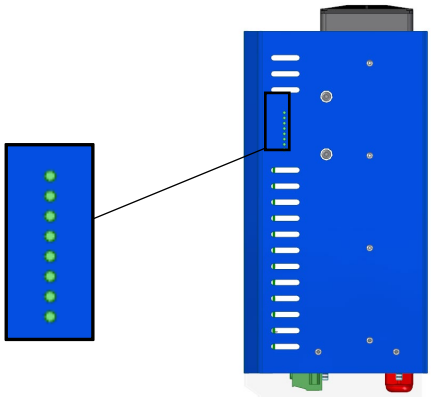
Main switch of DC/DC converter (available only on sizes 1 and 2)

Note: if the converter has the control power input from both sides (optional), this switch operates only on the low side input.



8.11. LED STICK

Located on the side of the converter:

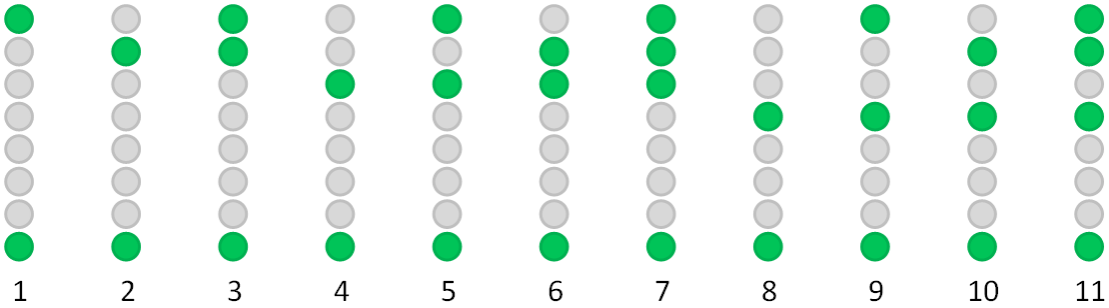


	Power per LED
EPC 1k1-XXX	160 W
EPC 2k2-XXX	315 W
EPC 3k5-XXX	500 W
EPC 5k5-XXX	800 W
EPC-4k8-XXXX	600 W
EPC-7k-XXXX	1000 W
EPC-8k-XXXX	1250 W

This LED stick will show different codes depending on the state of the converter

- If the DC/DC converter is **disabled**, the LEDs blink from bottom to top and from top to bottom.
- If the DC/DC converter is **enabled** and it is transferring energy, they show transferred power.
  - In case of Low Side to High Side, the LED stick fills up from bottom to top.
  - In case of High Side to Low Side, the LED stick fills up from top to bottom.

If an error occurs, the LED stick will show one of the following code:



Error number	Description
1	HVDC link voltage error detected by software
2	LVDC link voltage error detected by software
3	HVDC link overcurrent detected by software
4	Internal error 1
5	Overheating error
6	Error when HVDC link is switched ON (for Autonomous Mode)
7	Earth fault in HVDC link
8	Internal error 2
9	HVDC link voltage error detected by hardware
10	LVDC link voltage error detected by hardware
11	HVDC link overcurrent detected by hardware

8.12. CAN INTERFACE MODULE (OPTIONAL)

CONNECTOR 7

CAN Bus #1: Reserved for custom applications

Terminal	Description
7A	GND
7B	CAN Low signal
7C	CAN High signal
7D	5V 0.1A Output

CONNECTOR 8

CAN Bus #2: Connection with external controller

Terminal	Description
8A	GND
8B	CAN Low signal
8C	CAN High signal
8D	5V 0.1A Output

Note: CAN 1 and CAN 2 are electrically isolated.

9. EPC CONTROL MODES

EPC converter can be controlled in several modes. These modes are selectable through CAN communication explained in *"10.COMMUNICATIONS" (Page 21).*

9.1. AUTONOMOUS MODE (AMODE)

In this mode, the DCDC converter is able to supply a load in the HVDC link side.

An example load is a VVVF (Variable Voltage Variable Frequency motor drive). The EPC converter performs a "Soft Start" with a current-controlled ramp-up from 0V to the HVDC target voltage. If the HVDC side is connected incorrectly (HVDC plus and minus wrongly connected or under short-circuit), current-controlled soft start will provide between 1.5 to 2 A and will stop showing an error.

When the load/motor consumes energy, the EPC provides power to the DC link. If the motor generates energy and LVDC is within the limits (*), EPC will transfer exceeding energy to the LVDC (i.e., charge batteries).

(*) contact with epic power if you need further information

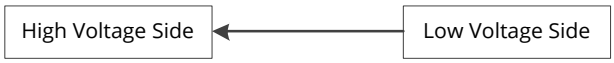
9.2. CURRENT CONTROLLED MODE (CCMODE)

In this mode, the external controller will set the current reference for the High Voltage DC side (HVDC side) or de Low Voltage DC side (LVDC side).

- **Positive current**: is defined as transferring energy from High Voltage DC side (HVDC side) to Low Voltage DC side (LVDC side). It is also called charging direction.



- **Negative current:** is defined as transferring energy from Low Voltage DC side (LVDC side) to HVDC side. It is also called discharging direction.



In order to avoid errors during transfer process, there is a security signal that has to be sent to set the current direction.

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

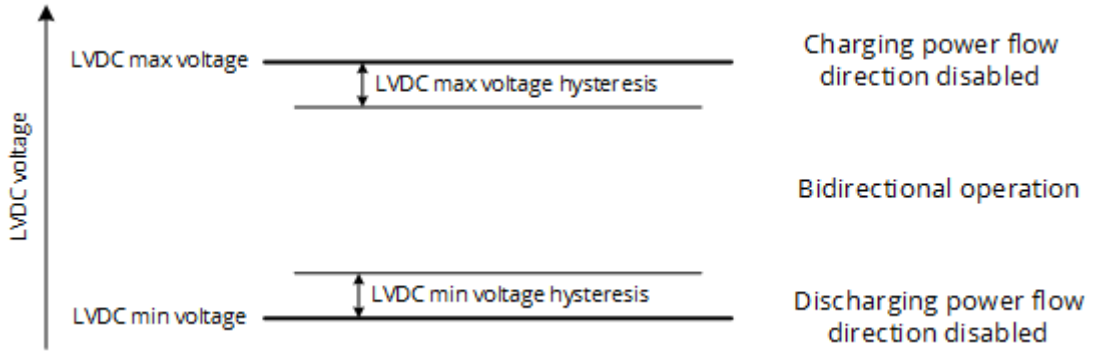
9.3. HIGH SIDE VOLTAGE CONTROLLED MODE (HSVCMODE)

This control mode is designed to work with batteries, meaning with highly capacitive loads such as batteries and supercapacitors, for example. Therefore, this control mode will not function correctly with resistive loads and/or those with low capacity.

In this mode, the external controller will set the voltage reference for the High Voltage DC side (HVDC side). Power and current limits can be configured.

EPC will manage the power flow aiming to maintain the high side voltage reference. The external controller is able to choose bidirectional operation or unidirectional in any direction thanks to "Power Flow Direction" signal.

Some limits in the LVDC can be configured to protect the energy source connected to the LVDC. If LVDC voltage goes above "LVDC max voltage", charging power flow direction is disabled. When the voltage goes below "LVDC max voltage" minus "LVDC max voltage hysteresis" charging power flow direction is enabled. If LVDC voltage goes below "LVDC min voltage", discharging power flow direction is disabled. When the voltage goes above "LVDC min voltage" plus "LVDC min voltage hysteresis" discharging power flow direction is enabled.



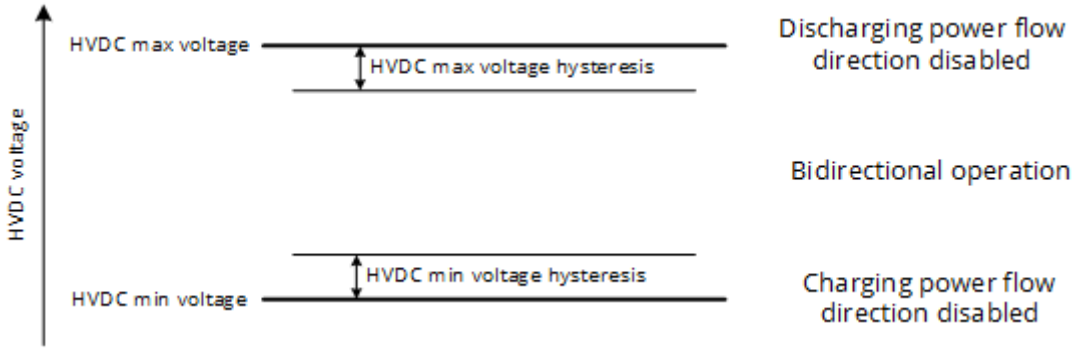
9.4. LOW SIDE VOLTAGE CONTROLLED MODE (LSVCMODE)

This control mode is designed to work with batteries, meaning with highly capacitive loads such as batteries and supercapacitors, for example. Therefore, this control mode will not function correctly with resistive loads and/or those with low capacity.

In this mode, the external controller will set the voltage reference for the Low Voltage DC side (LVDC side). Power and current limits can be configured.

EPC will manage the power flow aiming to maintain the low side voltage reference. The external controller is able to choose bidirectional operation or unidirectional in any direction thanks to "Power Flow Direction" signal.

Some limits in the HVDC can be configured to protect the energy source connected to the HVDC. If HVDC voltage goes above "HVDC max voltage", discharging power flow direction is disabled. When the voltage goes below "HVDC max voltage" minus "HVDC max voltage hysteresis" discharging power flow direction is enabled. If HVDC voltage goes below "HVDC min voltage", charging power flow direction is disabled. When the voltage goes above "HVDC min voltage" plus "HVDC min voltage hysteresis" charging power flow direction is enabled.



9.5. HIGH SIDE PHOTOVOLTAIC MODE (HSPVMODE)

In this mode, the EPC converter performs MPPT tracking algorithm in the HVDC side and is intended to be used when solar panels are connected to the HVDC side.

External controller may configure the following parameters:

- Voltage reference for the LVDC side
- Current and power limits
- HVDC voltage limits (must be configured as in LSVCMode.)

Only charging direction is available: energy is transferred from HVDC to LVDC side.

IMPORTANT NOTICE: PV Modules and panels shall comply with UL1703

9.6. LOW SIDE PHOTOVOLTAIC MODE (LSPVMODE)

In this mode, the EPC converter performs MPPT tracking algorithm in the LVDC side and is intended to be used when solar panels are connected to the LVDC side.

External controller may configure the following parameters:

- Voltage reference for the HVDC side
- Current and power limits
- LVDC voltage limits (must be configured as in HSVCMode.)

Only discharging direction is available: energy is transferred from LVDC to HVDC side.

IMPORTANT NOTICE: PV Modules and panels shall comply with UL1703

10. COMMUNICATIONS

EPC must be controlled via CAN communication to change the control mode. If no CAN communication is stablished, Autonomous Mode is selected by default.

CAN communication does not override enable input. If communication with the external controller is lost, DCDC converter can be disabled through the enable input.

EPC CAN communication specifications:

- CAN 2.0B compatible hardware
- Data rate: 125 kbps
- Frame format: extended frame (29 bits)
- Endianness: Little Endian

10.1. MESSAGE IDENTIFIERS

In order to let parallel connection of several EPC in the same CAN network, it is possible to configure the identifiers of the unit. A number between 0 and 15 can be chosen to modify the identifiers. This number will be used instead of the "X" in the message descriptions. For example, the 0xEBX0 message will be 0xEB00 for unit 0, 0xEB80 for unit 8, or 0xEBB0 for unit 11.

10.1.1. Message identifiers configuration

The number of unit used to modify message identifiers will be recorded in the unit. The EPC will keep this number when the unit is switched OFF and ON.

Unit number 0 is the factory setting. To modify the number of unit the procedure of "*11.4. MESSAGE IDENTIFIERS CONFIGURATION*" must be followed.

10.2. MESSAGE DESCRIPTION

10.2.1. Messages from external controller to EPC

Message ID: 0xEBX0; Message Name: EPC control; Message length: 5 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Enable	0	1	-	unsigned	This signal enables the EPC to charge or discharge power from/to the HVDC (High Voltage DC) bus connected 0 = EPC disabled 1 = EPC enabled Default value (all models except EPC 8k 8380i): 1 Default value for EPC 8k 8380i: 0
Power direction	1	1	-	unsigned	This signal sets the current direction in CCMode 0 = Charge 1 = Discharge Default value: 1
Current reference High Side	8	16	0.1A/1	signed	HVDC current reference in CCMode Minimum value: -200 = -20.0 A Maximum value: 200 = 20.0 A Default value: 0.0 A
Current reference Low Side	24	16	1A/1	signed	LVDC current reference in CCMode (all models except EPC 8k 8380i) Minimum value: -200 = -200 A Maximum value: 200 = 200 A Default value: 0.0 A
			0.1 A/1	signed	LVDC current reference in CCMode for EPC 8k 8380i model Minimum value: -320 = -32.0 A Maximum value: 320 = 32.0 A Default value: 0.0 A

Notes:

- Each time the external controller sends a 0xEBX0 message, EPC will answer with 0xFBX0 and 0xFBX4 messages.
- If the EPC bus is disabled (through CAN or hardware enable) errors are cleared.
- To transfer energy from HVDC to LVDC, *Enable* must be 1, *Power direction* must be 0 and *Current reference* must be positive.
- To transfer energy from LVDC to HVDC, *Enable* must be 1, *Power direction* must be 1 and *Current reference* must be negative.
- Only one current reference can be used at the same time, the other MUST be 0.

Message ID: 0xEBX1; Message Name: EPC configuration; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Mode	0	2	-	unsigned	With this signal, control modes can be chosen: 0 = Autonomous Mode (AMode) 1 = Current Controlled Mode (CCMode) 2 = Reserved 3 = Extended Modes Default value (all models except EPC 8k 8380i): 0 Default value for EPC 8k 8380i: 1 This signal can be changed only if *Enable* signal of *EPC control* message is 0.
High side maximum voltage**	2	10	1V/1	unsigned	Default value for EPC-XkX-3XX models: 450 = 450 V Default value for EPC-XkX-6XX models: 800 = 800 V Minimum value*: 0 = 0 V / Maximum value*: 900 = 900 V
High side minimum voltage**	12	10	1V/1	unsigned	Default value for EPC-XkX-3XX models: 290 = 290 V Default value for EPC-XkX-6XX models: 510 = 510 V Minimum value*: 0 = 0 V / Maximum value*: 900 = 900 V
Low side maximum voltage**	22	10	0.1V/1	unsigned	Default value for EPC-XkX-X24 models: 291 = 29.1 V Default value for EPC-XkX-X48 models: 592 = 59.2 V Minimum value*: 0 = 0.0 V / Maximum value*: 800 = 80.0 V
			1 V/1	unsigned	Default value for EPC 8k 8380i model: 650 = 650 V Default value for EPC 4k8 6125i model: 165 = 165 V Minimum value EPC 8k 8380i*: 280 = 280 V Minimum value EPC 4k8 6125i*: 40 = 40 V Maximum value EPC 8k 8380i*: 650 = 650 V Maximum value EPC 4k8 6125i*: 170 = 170V
Low side minimum voltage**	32	10	0.1V/1	unsigned	Default value for EPC-XkX-X24 models: 210 = 21.0 V Default value for EPC-XkX-X48 models: 420 = 42.0 V Minimum value*: 0 = 0.0 V / Maximum value*: 800 = 80.0 V
			1 V/1	unsigned	Default value for EPC 8k 8380i model: 270 = 270 V Default value for EPC 4k8 6125i model: 42 = 42 V Minimum value EPC 8k 8380i *: 260 = 260 V Minimum value EPC 4k8 6125i *: 160 = 160 V Maximum value EPC 8k 8380i *: 600 = 600 V Maximum value EPC 4k8 6125i *: 20 = 20 V
Charge power limit	42	10	10W/1	unsigned	Default value for EPC-2k2-XXX models: 260 = 2600 W Default value for EPC-3k5-XXX models: 420 = 4200 W Default value for EPC-4k8-XXX models: 480 = 4800 W Default value for EPC-5k5-XXX models: 650 = 6500 W Default value for EPC-8k-8380i model: 1000 = 10000 W
Discharge power limit	52	10	10W/1	unsigned	Default value for EPC-2k2-XXX models: 260 = 2600 W Default value for EPC-3k5-XXX models: 420 = 4200 W Default value for EPC-4k8-XXX models: 480 = 4800 W Default value for EPC-5k5-XXX models: 650 = 6500 W Default value for EPC-8k-8380i model: 1000 = 10000 W

Notes:

- Each time the external controller sends a 0xEBX1 message, EPC will answer with a 0xFBX3 message.
- The power limits configured in this message apply to all control modes
- If current reference in CCMode is configured with the maximum value, "Charge power limit" and "Discharge power limit" signals can be used to perform a controlled power mode control. Power is measured and limited in HVDC side.
- (*) Maximum and minimum value that can be sent through the CAN bus; the EPC will saturate to its maximum specified in its datasheet.
- (**) These values are only used in Current Controlled Mode

Message ID: 0xEBX2; Message Name: EPC measurements configuration; Message length: 3 bytes					
Variable Name	Start bit	Bit length	Scaling		Description
Enable 0xFB01 and 0xFB02 messages	0	1	-		If this signal is 1, EPC will send 0xFB01 and 0xFB02 messages with the period defined in "0xFB01 and 0xFB02 message period" signal. Default value: 0
0xFB01 and 0xFB02 messages period	8	16	1ms/1		This signal defines the period within the messages 0xFB01 and 0xFB02 will be sent. Default value: 250 ms Minimum value: 50 = 50ms Maximum value: 1000 = 1000 ms

Message ID: 0xEBX3; Message Name: EPC extended configuration; Message length: 2 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Extended Mode	0	6	-	unsigned	With this signal extended control modes can be chosen: 0 = Autonomous Mode. No extended mode selected 1 = High Side Voltage Control Mode (HSVCMode) 2 = Low Side Voltage Control Mode (LSVCMode) 3 = Ultracap Module for Energy Recovery Mode (UMERMode) 4 = Reserved 5 = Reserved 6 = High Side Photovoltaic Mode (HSPVMode) 7 = Low Side Photovoltaic Mode (LSPVMode) Default value: 0 This signal can be changed only if *Enable* signal of *EPC control* message is 0. This signal cares only if "Mode" parameter in 0xEBX1 message is 3.
Power flow direction	6	2	-	unsigned	With this signal, power flow is limited to: 0 = Bidirectional 1 = Unidirectional in charging direction. Energy goes to LVDC from HVDC 2 = Unidirectional in discharging direction. Energy goes to HVDC from LVDC Default value: 0
CAN network check mode	8	4			This signal configures the check mode of the CAN network 0 = No check mode selected. EPC will keep the last CAN commands if there are no new CAN messages. 1 = EPC checks CAN network every 100 ms. If there is no any valid message from the external controller during 100 ms, EPC will stop power transfer. 2 = EPC checks CAN network every 1 s. If there is no any valid message from the external controller during 1 s, EPC will stop power transfer. 3 = EPC checks CAN network every 10 s. If there is no any valid message from the external controller during 10 s, EPC will stop power transfer. Default value: 0

Notes:

- Each time the external controller sends a 0xEBX3 message, EPC will answer with a 0xFBX5 message.
- Power flow direction applies to all control modes

Message ID: 0xEBX4; Message Name: EPC current limits configuration; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
HVDC charge current limit	0	16	0.01A/1	unsigned	This parameter configures the HVDC max current in charging direction Default value for EPC-2k2-3XX models: 930 = 9.30 A Default value for EPC-2k2-6XX models: 500 = 5.00 A Default value for EPC-3k5-6XX models: 750 = 7.50 A Default value for EPC-4k8-6XX models: 900 = 9.00 A Default value for EPC-5k5-6XX models: 1200 = 12.00 A Default value for EPC 8k 8380i model: 1500 = 15.00 A
HVDC discharge current limit	16	16	0.01A/1	unsigned	This parameter configures the HVDC max current in discharging direction Default value for EPC-2k2-3XX models: 930 = 9.30 A Default value for EPC-2k2-6XX models: 500 = 5.00 A Default value for EPC-3k5-6XX models: 750 = 7.50 A Default value for EPC-4k8-6XX models: 900 = 9.00 A Default value for EPC-5k5-6XX models: 1200 = 12.00 A Default value for EPC 8k 8380i model: 1500 = 15.00 A
LVDC charge current limit	32	16	0.1A/1	unsigned	This parameter configures the LVDC max current in charging direction Default value for EPC-2k2-X24i models: 1400 = 140.0 A Default value for EPC-2k2-X48i models: 700 = 70.0 A Default value for EPC-3k5-X48i models: 1150 = 115.0 A Default value for EPC-4k8-X125i models: 450 = 45.0 A Default value for EPC-5k5-X48i models: 1800 = 180.0 A
			0.01A/1	unsigned	This parameter configures the LVDC max current in charging direction for EPC 8k 8380i model Default value for EPC 8k 8380i model: 3200 = 32.00 A
LVDC discharge current limit	48	16	0.1A/1	unsigned	This parameter configures the LVDC max current in discharging direction Default value for EPC-2k2-X24i models: 1400 = 140.0 A Default value for EPC-2k2-X48i models: 700 = 70.0 A Default value for EPC-3k5-X48i models: 1150 = 115.0 A Default value for EPC-4k8-X125i models: 450 = 45.0 A Default value for EPC-5k5-X48i models: 1800 = 180.0 A
			0.01A/1	unsigned	This parameter configures the LVDC max current in discharging direction for EPC 8k 8380i model Default value for EPC 8k 8380i model: 3200 = 32.00 A

Notes:

- Each time the external controller sends a 0xEBX4 message, EPC will answer with a 0xFBX6 message.
- The current limits configured in this message apply to all control modes

Message ID: 0xEBX5; Message Name: EPC HSVCMode and LSPVMode control; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
High Side Voltage Reference	0	16	0.1V/1	unsigned	This parameter sets the voltage reference for HVDC in HSVCMode and/or LSPVMode control
LVDC max voltage	16	16	0.01V/1	unsigned	This parameter limits the maximum LVDC voltage in charging direction for all models except EPC 8k 8380i. If LVDC voltage goes above "LVDC max voltage" charging power flow is disabled. It does not care in LSPVMode
			0.1V/1	unsigned	This parameter limits the maximum LVDC voltage in charging direction for EPC 8k 8380i model. If LVDC voltage goes above "LVDC max voltage" charging power flow is disabled. It does not care in LSPVMode
LVDC min voltage	32	16	0.01V/1	unsigned	This parameter limits the minimum LVDC voltage in discharging direction for all models except EPC 8k 8380i. If LVDC voltage goes below "LVDC min voltage" discharging power flow is disabled
			0.1V/1	unsigned	This parameter limits the minimum LVDC voltage in discharging direction for EPC 8k 8380i model. If LVDC voltage goes below "LVDC min voltage" discharging power flow is disabled
LVDC max voltage hysteresis	48	8	0.1V/1	unsigned	If LVDC voltage goes below "LVDC max voltage" minus "LVDC max voltage hysteresis" charging power flow is enabled. It does not care in LSPVMode (scaling for all models except EPC 8k 8380i)
			1V/1	unsigned	If LVDC voltage goes below "LVDC max voltage" minus "LVDC max voltage hysteresis" charging power flow is enabled. It does not care in LSPVMode (scaling for EPC 8k 8380i model)
LVDC min voltage hysteresis	56	8	0.1V/1	unsigned	If LVDC voltage goes above "LVDC min voltage" plus "LVDC min voltage hysteresis" discharging power flow is enabled (scaling for all models except EPC 8k 8380i
			1V/1	unsigned	If LVDC voltage goes above "LVDC min voltage" plus "LVDC min voltage hysteresis" discharging power flow is enabled (scaling for EPC 8k 8380i model

Notes:

- Each time the external controller sends a 0xEBX5 message, EPC will answer with a 0xFBX7 message.
- To enter in HSVCMode or LSPVMode control, at least one 0xEBX5 message must be received by the EPC

Message ID: 0xEBX6; Message Name: EPC LSVCMode and HSPVMode control; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Low Side Voltage Reference	0	16	0.01V/1	unsigned	This parameter sets the voltage reference for LVDC in LSVCMode and/or HSPVMode control for all models except EPC 8k 8380i
			0.1V/1	unsigned	This parameter sets the voltage reference for LVDC in LSVCMode and/or HSPVMode control for EPC 8k 8380i model
HVDC max voltage	16	16	0.1V/1	unsigned	If HVDC voltage goes above “HVDC max voltage” discharging power flow is disabled. It does not care in HSPVMode
HVDC min voltage	32	16	0.1V/1	unsigned	If HVDC voltage goes below “HVDC min voltage” charging power flow is disabled
HVDC max voltage hysteresis	48	8	1V/1	unsigned	If HVDC voltage goes below “HVDC max voltage” minus “HVDC max voltage hysteresis” discharging power flow is enabled. It does not care in HSPVMode
HVDC min voltage hysteresis	56	8	1V/1	unsigned	If HVDC voltage goes above “HVDC min voltage” plus “HVDC min voltage hysteresis” charging power flow is enabled

Notes:

- Each time the external controller sends a 0xEBX6 message, EPC will answer with a 0xFBX8 message.
- To enter in LSVCMode or HSPVMode control, at least one 0xEBX6 message must be received by the EPC

Message ID: 0xEFXE; Message Name: EPC info request; Message length: 1 byte					
Variable Name	Start bit	Bit length	Scaling	Type	Description
EPC info request	0	6	-	unsigned	If a 0xEFXE message is received with the number 51 in decimal value, EPC answers with a 0xFFXE message If a 0xEFXE message is received with the number 54 in decimal value, EPC answers with 0xFBX0, 0xFBX3, 0xFBX4, 0xFBX5, 0xFBX6, 0xFBX7 and 0xFBX8 messages

10.2.2. Messages from EPC to external controller

Message ID: 0xFBX0; Message Name:EPC status; Message length: 6 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
VVVF status (AMode)	0	2	-	unsigned	0 = HVDC link OFF 1 = HVDC link ON with no overcharge 2 = HVDC link ON with overcharge (power > nominal power) 3 = HVDC link ON with overcharge (< 2 sec. to revert to nominal) It shows 0 when Current Controlled Mode is selected
Enable hardware echo	2	1	-	unsigned	0 = Hardware input between pin 3A and 3B disabled 1 = Hardware input between pin 3A and 3B enabled
Safety Disconnection hardware echo	3	1	-	unsigned	0 = Hardware input between pin 3A and 3C disabled 1 = Hardware input between pin 3A and 3C enabled
Warning codes	16	8	-	unsigned	0 = No warning
Error codes	24	8	-	unsigned	0 = No error 1 = HVDC link voltage error detected by software (voltage out of limits) 2 = LVDC link voltage error detected by software (voltage out of limits) 3 = HVDC link overcurrent detected by software 4 = Internal error 1 5 = Overheating error 6 = Error when HVDC link is switched ON (for Autonomous Mode) 7 = Earth fault in HVDC link 8 = Internal error 2 9 = HVDC link voltage error detected by hardware 10 = LVDC link voltage error detected by hardware 11 = HVDC link overcurrent detected by hardware
Error value	32	16	-	signed	This signal contains the variable that triggers the error. When error code = 0, it displays 0 When error code = 1, it displays DC link voltage [1V/1] When error code = 2, it displays battery voltage [0.1V/1] When error code = 3, it displays DC link current [0.1A/1] When error code = 4, it displays 0 When error code = 5, it displays the internal temperature [°C] When error code = 6, it displays DC link voltage [1V/1] When error code = 7, it displays 0 When error code = 8, it displays 0 When error code = 9, it displays DC link voltage [1V/1] When error code = 10, it displays battery voltage [0.1V/1] When error code = 11, it displays DC link current [0.1A/1]

Notes:

- 0xFBX0 message is sent if some variable included in the message has changed or 0xEB00 message has been received.

Message ID: 0xFBX1; Message Name: EPC measurements 1; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
LVDC link voltage	0	16	0.01V/1	unsigned	LVDC link voltage for all models except EPC 8k 8380i Minimum value: 0 = 0.00 V Maximum value: 10000 = 100.00 V
			0.1V/1	unsigned	LVDC link voltage for EPC 8k 8380i model Minimum value: 0 = 0.0 V Maximum value: 10000 = 1000.0 V
LVDC link current (average of current during time defined in *"0xFB01 and 0xFB02 messages period"*)	16	16	0.1A/1	signed	Minimum value: -256 A Maximum value: +255 A Positive current transfers from high side to low side Negative current transfers from low side to high side
HVDC link power (average of power during time defined in *"0xFB01 and 0xFB02 messages period"*)	32	16	1W/1	signed	Minimum value: -10000 W Maximum value: +10000 W Negative power when the energy is transferred from low side to high side Positive power when the energy is transferred from high side to low side.
HVDC link voltage	48	16	1V/1	unsigned	HVDC link voltage for all models except EPC 8k 8380i Minimum value: 0 V Maximum value: 1000 V
			0.1V/1	unsigned	HVDC link voltage for EPC 8k 8380i model Minimum value: 0 = 0.0 V Maximum value: 10000 = 1000.0 V

Message ID: 0xFBX2; Message Name: EPC measurements 2; Message length: 4 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
HVDC link current (average of current during time defined in *"0xFB01 and 0xFB02 messages period"*)	0	8	0.1A/1	signed	HVDC link current in all models except EPC 8k 8380i Minimum value: -128 = -12.8 A Maximum value: +127 = +12.7 A Negative current when the energy is transferred from low side to high side Positive current when the energy is transferred from high side to low side.
		16	0.1A/1	signed	HVDC link current in EPC 8k 8380i model Minimum value: -256 = -25.6 A Maximum value: +255 = +25.5 A Negative current when the energy is transferred from low side to high side Positive current when the energy is transferred from high side to low side.
Output current of optional load 4A4B connection	8	8	0.1A/1	unsigned	Minimum value: 0 = 0 A Maximum value: 255 = 25.5 A Not used in EPC 8k 8380i model
Input current of optional charger 4C4D connection	16	8	0.1A/1	unsigned	Minimum value: 0 = 0 A Maximum value: 255 = 25.5 A Not used in EPC 8k 8380i model
Input current of optional solar charger 4E4F connection	24	8	0.1A/1	unsigned	Minimum value: 0 = 0 A Maximum value: 255 = 25.5 A Not used in EPC 8k 8380i model

Message ID: 0xFBX3; Message Name: EPC configuration answer; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Mode	0	2	-	unsigned	0 = Autonomous Mode 1 = Current Controlled Mode 3 = Extended Modes
High side maximum voltage	2	10	1V/1	unsigned	Selected HVDC maximum voltage
High side minimum voltage	12	10	1V/1	unsigned	Selected HVDC minimum voltage
Low side maximum voltage	22	10	0.1V/1	unsigned	Selected LVDC maximum voltage for all models except EPC 8k 8380i and EPC 4k8 6125i
			1V/1	unsigned	Selected LVDC maximum voltage for EPC 8k 8380i model and EPC 4k8 6125i
Low side minimum voltage	32	10	0.1V/1	unsigned	Selected LVDC minimum voltage for all models except EPC 8k 8380i and EPC 4k8 6125i
			1V/1	unsigned	Selected LVDC minimum voltage for EPC 8k 8380i model and EPC 4k8 6125i
Charge power limit	42	10	10W/1	unsigned	Selected charge power limit
Discharge power limit	52	10	10W/1	unsigned	Selected discharge power limit

Notes:

- 0xFBX3 message is sent if 0xEBX1 message has been received, or when requested "Mode" signal takes effect when EPC is disabled.

Message ID: 0xFBX4; Message Name: EPC control answer; Message length: 5 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Enable	0	1	-	unsigned	0 = EPC disabled 1 = EPC enabled
Power direction	1	1	-	unsigned	This signal sets the current direction in CCMode 0 = Charge 1 = Discharge
Current reference High Side	8	16	0.1A/1	signed	Selected HVDC current reference in CCMode
Current reference Low Side	24	16	1A/1	signed	Selected LVDC current reference in CCMode for all models except EPC 8k 8380i
			0.1A/1	signed	Selected LVDC current reference in CCMode for EPC 8k 8380i model

Notes:

- 0xFBX4 message is sent if 0xEBX0 message has been received.

Message ID: 0xFBX5; Message Name: EPC extended configuration answer; Message length: 2 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Extended Mode	0	6	-	unsigned	0 = Autonomous Mode. No extended mode selected 1 = High Side Voltage Control Mode (HSVCMode) 2 = Low Side Voltage Control Mode (LSVCMode) 3 = Ultracap Module for Energy Recovery Mode (UMERMode) 4 = Adaptative High Side Autonomous Mode (AHSAMode) 5 = Adaptative Low Side Autonomous Mode (ALSAMode) 6 = High Side Photovoltaic Mode (HSPVMode) 7 = Low Side Photovoltaic Mode (LSPVMode)
Power flow direction	6	2	-	unsigned	0 = Bidirectional 1 = Unidirectional in charging direction. Energy goes to LVDC from HVDC 2 = Unidirectional in discharging direction. Energy goes to HVDC from LVDC
CAN network check mode	8	4			0 = No check mode selected 1 = Check CAN network every 100 ms 2 = Check CAN network every 1 s 3 = Check CAN network every 10 s

Notes:

- 0xFBX5 message is sent if 0xEBX3 message has been received.

Message ID: 0xFBX6; Message Name: EPC current limits configuration answer; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
HVDC charge current limit	0	16	0.01A/1	unsigned	Selected HVDC charge current limit
HVDC discharge current limit	16	16	0.01A/1	unsigned	Selected HVDC disccharge current limit
LVDC charge current limit	32	16	0.1A/1	unsigned	Selected LVDC charge current limit for all models except EPC 8k 8380i
			0.01A/1	unsigned	Selected LVDC charge current limit for EPC 8k 8380i model
LVDC discharge current limit	48	16	0.1A/1	unsigned	Selected LVDC discharge current limit for all models except EPC 8k 8380i
			0.01A/1	unsigned	Selected LVDC discharge current limit for EPC 8k 8380i model

Notes:

- 0xFBX6 message is sent if 0xEBX4 message has been received.

Message ID: 0xFBX7; Message Name: EPC HSVCMode and LSPVMode control answer; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
High Side Voltage Reference	0	16	0.1V/1	unsigned	Selected HVDC voltage reference for HSVCMode/LSPVMode
LVDC max voltage	16	16	0.01V/1	unsigned	Selected LVDC max voltage for HSVCMode for all models except EPC 8k 8380i
			0.1V/1	unsigned	Selected LVDC max voltage for HSVCMode for EPC 8k 8380i model
LVDC min voltage	32	16	0.01V/1	unsigned	Selected LVDC min voltage for HSVCMode/LSPVMode for all models except EPC 8k 8380i
			0.1V/1	unsigned	Selected LVDC min voltage for HSVCMode/LSPVMode for EPC 8k 8380i model
LVDC max voltage hysteresis	48	8	0.1V/1	unsigned	Selected LVDC max voltage hysteresis for HSVCMode for all models except EPC 8k 8380i
			1V/1	unsigned	Selected LVDC max voltage hysteresis for HSVCMode for EPC 8k 8380i model
LVDC min voltage hysteresis	56	8	0.1V/1	unsigned	Selected LVDC min voltage hysteresis for HSVCMode/LSPVMode for all models except EPC 8k 8380i
			1V/1	unsigned	Selected LVDC min voltage hysteresis for HSVCMode/LSPVMode for EPC 8k 8380i model

Notes:

- 0xFBX7 message is sent if 0xEBX5 message has been received.

Message ID: 0xFBX8; Message Name: EPC LSVCMode and HSPVMode control answer; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Low Side Voltage Reference	0	16	0.01V/1	unsigned	Selected LVDC voltage reference for LSVCMode/HSPVMode for all models except EPC 8k 8380i
			0.1V/1	unsigned	Selected LVDC voltage reference for LSVCMode/HSPVMode for EPC 8k 8380i model
HVDC max voltage	16	16	0.1V/1	unsigned	Selected HVDC max voltage for LSVCMode
HVDC min voltage	32	16	0.1V/1	unsigned	Selected HVDC min voltage for LSVCMode/HSPVMode
HVDC max voltage hysteresis	48	8	1V/1	unsigned	Selected HVDC max voltage hysteresis for LSVCMode
HVDC min voltage hysteresis	56	8	1V/1	unsigned	Selected HVDC min voltage hysteresis for LSVCMode/HSPVMode

Notes:

- 0xFBX8 message is sent if 0xEBX6 message has been received.

Message ID: 0xFFXE; Message Name: EPC info; Message length: 8 bytes					
Variable Name	Start bit	Bit length	Scaling	Type	Description
EPC type	0	8	-	unsigned	Type of EPC converter 0x0E for EPC 2k2 624i 0x1E for EPC 2k2 348i 0x2E for EPC 3k5 648i 0x3E for EPC 5k5 648i 0x4E for EPC 4k8 6125i 0x5E for EPC 8k 8380i 0x6E for EPC 2k2 324i
Firmware version	12	20	-	unsigned	
Serial Number	32	32	-	unsigned	

Notes:

- 0xFFXE message is sent if 0xEFXE message with the correct key has been received.

11. INSTALLATION

Before beginning the installation, make sure that you have unplugged the connector 3



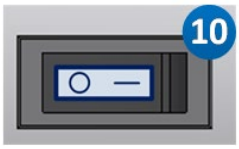
11.1. INSTALLATION PROCEDURE

1. Fixing and attaching EPC to the installation:

To prevent EPC system from water splashes or dust, choose a vertical surface on which to hang it. Be sure that the installation place is a dry area with no condensation.

 **CAUTION**	The converter should be attached to a vertical surface, with the fans pointing upwards in a dry area with no condensation.
 **CAUTION**	Make room in front of both ventilation grills, at least 250 mm.
 **CAUTION**	The system has been designed for pollution level 2. Consult epic power in any other circumstances.
	This unit is to be installed so that it is not expected to be contacted by persons.

2. Wiring EPC:

 **WARNING**	Before wiring the system, ensure that the main switch of the converter (if available) is switched off during the installation. 

a. Earth connection

 **WARNING**	Ensure that earth is connected in both available connections 7 and 8 with a conductor of minimum 2.5 mm^2 section before energizing the converter.
 **WARNING**	The protective conductor connection (PE) must not be removed since the protection against electric shock provided by the converter would be lost.
 **WARNING**	The protective conductor connection (PE) must be low-inductance and as short as possible.

b. Low side voltage wiring:

 **WARNING**	Low side connection MUST be protected in both conductors. Keep the protective device opened and during wiring operation.

Protective devices may be one of the following:

- Fuses with fuseholders (recommended gR curve) for rated nominal current.
- Switch breaker
- Any Regulations & Standards compliant protective device for your application.

If in doubt, please contact epic power

i. Connect DC/DC converter 9 terminal to positive terminal of Low Voltage DC link.

ii. Connect DC/DC converter 9 connector to negative terminal of Low Voltage DC link.

 **CAUTION**	Observe polarity at DC/DC converter 9 cable. A reverse polarity connection may cause permanent damage to the unit and should be sent back to epic power for repair.

c. High side voltage wiring:

Use the connector 5 ("High Voltage Side") to wire to the HVDC link. The female connector is located on the underside of DC/DC converter. The cable must have the supplied male connector.

 **WARNING**	Ensure that there is no voltage left in the nodes about to be handled.
 **WARNING**	DC/DC converter "ON OFF" switch 10 must be in "OFF" position, and "ENABLE DC/DC" must be disabled (not short-circuit 3B and 3A).
 **WARNING**	High side connection MUST be protected in both conductors. Keep the protective device opened and during wiring operation.

Protective devices may be one of the following:

- Fuses with fuseholders (recommended gR curve) for rated nominal current.
- Switch breaker
- Any Regulations & Standards compliant protective device for your application.

If in doubt, please contact epic power

NOTE ABOUT "ENABLE" CONNECTION IN AUTONOMOUS MODE

- The controller can decide to turn off the HVDC link for a period of time, with the purpose of saving standby consumption through "ENABLE DC/DC" terminal. This leads to a drastic reduction in energy consumption.
  - ◊ Closed contact, the HVDC link is energized.
  - ◊ Open contact, the HVDC link is not energized (HVDC link is turned off).
- The DC/DC converter accomplishes a soft-start of the HVDC link, so the lifespan of the DC-link capacitor and associated devices will be lengthened.
- When the controller closes the contact again to energize the HVDC link, the DC/DC converter will turn on the HVDC (time depends on HVDC link capacitance) with a controlled-current ramp. In less than 1 second, the HVDC link return to nominal voltage.

IMPORTANT NOTE:

This device can be used in a wide range of applications; the customer is responsible for complying with all regulations that may apply in their final installation, in particular with protective devices. Epic Power Converters is not responsible for any loss or damage caused by the improper installation and/or failure to satisfy required regulations.

At this point, *EPC* system is already installed and ready for the first start up.

11.2. MINIMUM REQUIRED DC LINK CAPACITANCE

A minimum DC link capacitance is required to guarantee the correct operation of the EPC converter. The capacitance required depends on the devices used in the HVDC link, If equivalent capacitance is less than the required in the Technical Data (page 44), further capacitance must be added.

A standard capacitance is available from epic power with SKU number F.1001.0009.

11.3. CAN INTERFACE MODULE (OPTIONAL)

If CAN communication is required, a CAN interface module is available with SKU number F.1003.1002.

Before installing the interface module, ensure the EPC is disconnected, the main switch is switched off, the fuse holders of LVDC link are open and connector 5 is disconnected.

The following steps should be carried out by qualified personnel:

11.3.1. Installation

The 8 ways connector of Fig. 7 should be connected to connector 6 of the EPC (only one position is possible). After connecting the module, it must be secured using the M3 screw in the hole specified in Fig. 8.



Fig. 7 Optional CAN interface to EPC connector

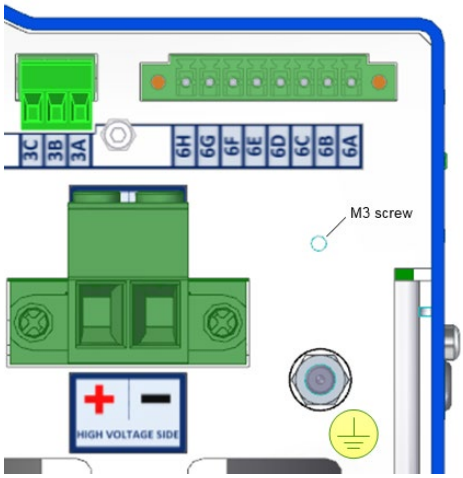


Fig. 8 EPC connector 6

11.3.2. Wiring

External controller should be connected to connector 8 as defined in *"8.12 CAN INTERFACE MODULE (OPTIONAL)".* Following this, the module is ready for CAN communication.

11.4. MESSAGE IDENTIFIERS CONFIGURATION

As explained in *"10.1 MESSAGE IDENTIFIERS"*, the EPC converter can be configured with a different identification number that modifies the message identifiers of the CAN network. This is useful if several EPC converters are connected to the same CAN network.

In this stage, it is highly recommended to remove any other CAN node from the CAN network. Only EPC to be configured and the external controller should be interconnected

After the installation procedure, perform the following steps:



1. Disconnect the converter from any power source
2. Disable connections 3A-3B and 3A-3C (open circuit)
3. Power up the unit (HVDC link or LVDC link to correct levels depending on the model)
4. Switch ON the unit
5. Make sure that during the following step that supply of the unit is not interrupted
6. Send the following message:

Message ID: 0xFAFA; Message Name: EPC identifiers config; Message length: 1 byte					
Variable Name	Start bit	Bit length	Scaling	Type	Description
Number of unit	0	8	-	unsigned	Minimum value: 0 Maximum value: 15 (decimal) Default value = 0

The LED stick will show the new number of unit in binary code. When programming is performed (after a few seconds), they will move again as in step 4.

7. Wait until LED's are moving again
8. Identifiers are configured with the new number of the unit.

12. UNINSTALLATION

A correct EPC shutdown, as well as ensuring there is no supply in both power ports.

 **WARNING**	Supply must be shut down, and HVDC link must be disconnected from any source of energy before handling any connection. Failure to do so creates risk of electrocution for the operator. The EPC system may also become damaged.
 **WARNING**	Supply must be shut down, and LVDC link must be disconnected from any source of energy before handling any connection. Failure to do so creates risk of electrocution for the operator. The EPC system may also become damaged.
 **WARNING**	Make sure, using a multimeter or similar instrument, that both High and Low Side voltage has dropped to a safe level (+25 Vdc or below) before touching any part.

Follow the next steps for disconnecting the EPC converter:

1. Turn off EPC system by switching OFF with the Switch 10 and unplugging "ENABLE CONNECTOR" 3 .This way, EPC system will be disabled.
2. HVDC and LVDC link should not be fed by the converter after the previous step. You must ensure that there is no voltage left due to another power supply connected to the HVDC and/or LVDC link.
3. Open protective devices in the LVDC and HVDC link .
4. Wait until HVDC and LVDC bus voltage lowers to safe level (+25 Vdc or below), for as long as needed.
5. Unplug DC/DC converter 5 connector.
6. Remove LVDC and HVDC wiring.
7. **The EPC Converter is now disconnected.**

13. MAINTENANCE AND INSPECTION

Perform periodic inspections to avoid trouble and keep reliable operation of the converter.

13.1. PERIODIC INSPECTION

Before starting periodic inspection:

- Switch off any device connected to connector 4.
- Switch off the EPC converter
- Open the low and high voltage circuit using switch disconnectors or any other protective installed device.

 **WARNING**	Make sure, using a multimeter or a similar instrument, that both the High Side and Low side voltage has dropped to the safe level (+25 Vdc or below).

Check part	Check item	How to inspect	Evaluation criteria
Environment	Check the ambient temperature, humidity, vibration and atmosphere	Check visually or measure using the right instrument.	Standard specifications must be satisfied
	Check that any foreign material or dangerous objects are not left around the equipment or clogging the fans.	Visual inspection	No foreign or dangerous objects are left or clogging the fans.
Structure and mounting	Check for deformation and breakage of the equipment	Visual inspection	No abnormalities
	Check for fixing loose bolts	Retighten	No abnormalities
Conductors and wires	Check conductors for discoloration and distortion caused by overheat	Visual inspection	No abnormalities
	Check the sheath of the wires for cracks and discoloration	Visual inspection	No abnormalities
Terminal blocks	Check that the terminal blocks are not damaged	Visual inspection	No abnormalities
	Check for loose screws	Retighten	No abnormalities

Cooling system must be checked by following these steps:

- Close the low voltage circuit using the switch disconnector or any other protective device installed.
- Switch on the EPC converter
- At the time of switching on the converter, fans will blow between 3~5 seconds; ensure that both fans are blowing air; if not, a replacement is mandatory.

13.2. PERIODIC REPLACEMENT PARTS

The EPC converter has been manufactured to avoid replacement parts; however, the cooling system must be replaced for preventive maintenance.

Part name	Standard replacement intervals
Cooling fans	7 years

Notes:

These replacement intervals are based on the EPC converter service life estimated at an ambient temperature of 40ºC and a load factor of 90%. Replacement intervals may be shorter due to ambient factors.

Standard replacement intervals mentioned above are only a guide for replacement, and not a guaranteed service life.

 **WARNING**	**NEVER OPEN EPC**. It is an extremely complex electronic system. Reparation must only be undertaken by epic power. Any unskilled handling may damage the system or may cause a serious accident

14. TECHNICAL DATA, ENVIRONMENT, DIMENSIONS AND WEIGHTS

14.1. TECHNICAL DATA

Model	EPC-3k5-648i	EPC-5k5-648i	EPC-2k2-624i	EPC-2k2-348i	EPC-2k2-324i	EPC-4k8-6125i
Peak power	4.2 kW	6.5 kW	2.6 kW	2.6 kW	2.6 kW	4.8 kW
Max. continuous power	3.5 kW	5.5 kW	2.2 kW	2.2 kW	2.2 kW	4.8 kW
High side voltage (Vdc)	510 to 848 V			280 to 450 V	430 to 830 V	
High side current (max)	6 A (7.5 A)	10 A (12 A)	4 A (5 A)	7 A (9.3 A)	7 A (9.3 A)	9 A
Low side voltage (Vdc)	38 to 59 V (optional from 0 V)		19 to 30 V (optional from 0 V)	38 to 59 V (optional from 0 V)	19 to 30 V (optional from 0 V)	0 to 165 V (optional from 0 V)
Low side current (max)	75 A (115 A)	115 A (180 A)	92 A (130 A)	50 A (70 A)	92 A (130 A)	45 A
Size	Size 1	Size 2	Size 1	Size 1	Size 1	Size 1
Minimum high side load capacitance	200 µF	400 µF	200 µF	200 µF	200 µF	200 µF
Internal low side capacitance	88 µF	286 µF	88 µF	88 µF	88 µF	40 µF
Internal high side capacitance	25 µF	50 µF	25 µF	25 µF	25 µF	25 µF
Isolation (withstand voltage)	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 %					
Digital control self-powered from	Low Side Voltage (optional version from Low and High side: EPC 3k5 648iHL	Low Side Voltage (optional version from Low and High side: EPC 5k5 648iHL)	Low Side Voltage (optional version from Low and High side: EPC 2k2 624iHL)	Low Side Voltage (optional version from Low and High side: EPC 2k2 348iHL)	Low Side Voltage (optional version from Low and High side: EPC 2k2 324iHL)	Low Side Voltage (optional version from Low and High side: EPC 4k8 6125iHL)
Stand-by	<3 W					
Weight	6.05 kg	8.95 kg	6.15 kg	6.00 kg	6.05 kg	6.70 kg
Dimensions (WxHxD)	Size 1: 211x335x160 mm | Size 2: 211x506x160 mm | Size 3: 211x480x160 mm					
Enclosure	IP 20					
Cooling	Air cooled (Fans only ON when needed)					
Max Input short circuit current	5000 A (DC)					

Model	EPC-1k1-612i	EPC-2k2-612i	EPC-1k1-312i	EPC-2k2-312i	EPC-7k-670i	EPC-8k-8380i
Peak power	**1.3 kW**	**2.6 kW**	**1.3 kW**	**2.6 kW**	**7.5 kW**	**10.0 kW**
Max. continuous power	**1.1 kW**	**2.2 kW**	**1.1 kW**	**2.2 kW**	**7.0 kW**	**8.0 kW**
High side voltage (Vdc)	**510 to 848 V**		**280 to 450 V**		**510 to 848 V**	**650 to 848 V**
High side current (max)	**1.8 A (2.55 A)**	**3.7 A (5 A)**	**3.5 A (4.5 A)**	**7 A (9 A)**	**11.6 A (12.5 A)**	**11 A (16 A)**
Low side voltage (Vdc)	**10 to 14.5 V** (optional from 0 V)				**40 to 88 V** (optional from 0 V)	**320 to 600 V** (optional from 0 V)
Low side current (max)	**92 A (130 A)**	**185 A (260 A)**	**92 A (130 A)**	**185 A (260 A)**	**100 A (108 A)**	**21 A (33 A)**
Size	**Size 1**	**Size 2**	**Size 1**	**Size 2**	**Size 2**	**Size 3**
Minimum high side load capacitance	**200 µF**	**200 µF**	**200 µF**	**200 µF**	**400 µF**	**400 µF**
Internal low side capacitance	**88 µF**	**286 µF**	**88 µF**	**286 µF**	**130 µF**	**75 µF**
Internal high side capacitance	**25 µF**	**50 µF**	**25 µF**	**50 µF**	**50 µF**	**20 µF**
Isolation (Withstand voltage)	**High to Low side: 2.5 kV | High side to earth: 4 kV; Low side to earth: 1.5 kV (2.5 kV for EPC-4k8-6125) Low side to user signals: 3 kV (5 kV for EPC-4k8-6125)**					
Max. efficiency	**98 %**					
Digital control self-powered from	**Low Side Voltage** (optional version from Low and High side: EPC 1k1 612iHL	**Low Side Voltage** (optional version from Low and High side: EPC 2k2 612iHL)	**Low Side Voltage** (optional version from Low and High side: EPC 1k1 312iHL)	**Low Side Voltage** (optional version from Low and High side: EPC 2k2 312iHL)	**Low Side Voltage** (optional version from Low and High side: EPC 7k 670iHL)	**High Side Voltage** (optional version from Low and High side: EPC 8k 8380iHL)
Stand-by	**<3 W**					
Weight	**6.10 kg**	**6.15 kg**	**6.10 kg**	**6.15 kg**	**7.95 kg**	**8.90 kg**
Dimensions (WxHxD)	**Size 1: 211x335x160 mm Size 2: 211x506x160 mm Size 3: 211x480x160 mm**					
Enclosure	**IP 20**					
Cooling	**Air cooled (Fans only ON when needed)**					
Max Input short circuit current	**5000 A (DC)**					

14.2. WIRING

Wiring Model	EPC-2k2-324i	EPC-2k2-348i	EPC-2k2-624i	EPC-3k5-648i	EPC-5k5-648i	EPC-4k8-6125i
Low side minimum wire size (mm^2)**	**25**	**25**	**25**	**25**	**50**	**16**
High side minimum wire size (mm^2)**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Wire insulation	**PVC***					
Observations	The conductors with regards to its ampacity, rated temperatures, operating conditions and its power loss must be made in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1. Conductor type must be copper wire Maximum permissible temperature: 90 °C (194 °F) The conductors must be made of solid wire, stranded wire or fine stranded wire. When using fine stranded wire, bootlace ferrules must be used.					

Model	EPC-1k1-612i	EPC-2k2-612i	EPC-1k1-312i	EPC-2k2-312i	EPC-7k-670i	EPC-8k-8380i
Low side minimum wire size (mm^2)**	**25**	**50**	**25**	**50**	**25**	**2.5**
High side minimum wire size (mm^2)**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Wire insulation	**PVC***					
Observations	The conductors with regards to its ampacity, rated temperatures, operating conditions and its power loss must be made in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code® CSA C22.1. Conductor type must be copper wire Maximum permissible temperature: 90 °C (194 °F) The conductors must be made of solid wire, stranded wire or fine stranded wire. When using fine stranded wire, bootlace ferrules must be used.					

14.3. CONNECTORS SPECIFICATIONS

#	Solid wire size	Stranded wire size	Torque	Wire stripe	Max. Ratings
1	0.129-1.31 mm^2 26-16 AWG	0.129-1.31 mm^2 26-16 AWG	3.0 Lb.In 0.34 Nm	6-7 mm.	Voltage: 24 Vdc / 250 VAC Current: 3 Amp**
2	0.129-1.31 mm^2 26-16 AWG	0.129-1.31 mm^2 26-16 AWG	3.0 Lb.In 0.34 Nm	6-7 mm.	Dry contacts. Do not apply voltage to terminals.
3	0.129-1.31 mm^2 26-16 AWG	0.129-1.31 mm^2 26-16 AWG	3.0 Lb.In 0.34 Nm	6-7 mm.	Dry contacts. Do not apply voltage to terminals.
4	0.205-3.31 mm^2 24-12 AWG	0.205-3.31 mm^2 24-12 AWG	5.0 Lb.In 0.56 Nm	7-8 mm.	Voltage: same as EPC low side voltage Current: 20 Amp**
5	0.5-10.0 mm^2 20-8 AWG	0.5-6.0 mm^2 20-10 AWG	10.6-13,2 Lb.In 1.2-1.5 Nm	12 mm.	Voltage and current: same as EPC high side voltage**.
6	0.129-1.31 mm^2 26-16 AWG	0.129-1.31 mm^2 26-16 AWG	3.0 Lb.In 0.34 Nm	6-7 mm.	Voltage: 5 Vdc Current: 1 Amp.
7 / 8	M5 screw type with nut to be used with standard spade or ring tongue terminals. Max torque: 30.9 Lb.In / 3.5 Nm				
9*	1.5 – 70 mm^2 16-2/0 AWG	1.5 – 70 mm^2 16-2/0 AWG	48.6 Lb.In 5.5 Nm	20 mm.	Voltage and current: same as EPC low side voltage**

(*) Note: Only for size 2 and 3 converters.

(**) Note 2: Required external fuses (with fuseholders) for rated amperage. Disconnecting means must be provided as part of the installation and shall provide the required electrical ratings described above for the corresponding device. All electrical installations must be carried out in accordance with the local standards and the National Electrical Code® ANSI/NFPA 70 or the Canadian Electrical Code© CSA C22.1.

IMPORTANT NOTICE:

To reduce the risk of fire, connect only to a circuit provided with RATED AMPERAGE of the device maximum branch-circuit overcurrent protection in accordance with the National Electrical Code® ANSI/NFPA 70.

This unit is not provided with a GFDI device. This converter must be used with an external GFDI device as required by the Article 690 of the National Electrical Code® ANSI/NFPA 70 for the installation location if required.

If units are being parallelized, external fuses for each unit must be installed

14.4. USING THE UNIT AS A CHARGE CONTROLLER

This unit can be operated as a charge controller by configuring the setpoints through the CAN network interface as it has not implemented any kind of charging algorithm.

The following battery configurations are accepted:
Battery voltage:

- Battery voltage must be in the range of the device used. Please refer to *"14.1. TECHNICAL DATA"* for the right values.

Battery type:

- There is no limitation for using any kind of battery type. However, current and voltage values in *"14.1. TECHNICAL DATA"* must be respected

Grounding:

- Ungrounded
- Grounded with negative terminal
- Grounded with positive terminal

 **WARNING**	When adjusting setpoints for battery charging, they should only be done in accordance with the battery manufacturer's recommendations for the specific type of installed battery. If ignored, lead to dangerous conditions , personal injuries or even death due to incorrect handling.

14.5. ENVIRONMENTAL REQUIREMENTS

Operating temperature	**-10 to 40 °C**
Storage temperature	**-10 to 70 °C**
Relative humidity	**<95%, with no condensation(*)**
Altitude	**Not to be operated above 2000 m.****
Atmosphere	**The converter must not be exposed to dust, direct sunlight, corrosive gases, flammable gases, oil mist, vapor or water drops. Pollution degree 2***.**
Mechanical	**Class 3M1 (Vibration: 1 m/s^2)**
Electrical	**Overvoltage category OVC II / Protective class I equipment** **Note: If temporary overvoltages are expected on the power network (high and low voltage side), external protective devices must be installed.**

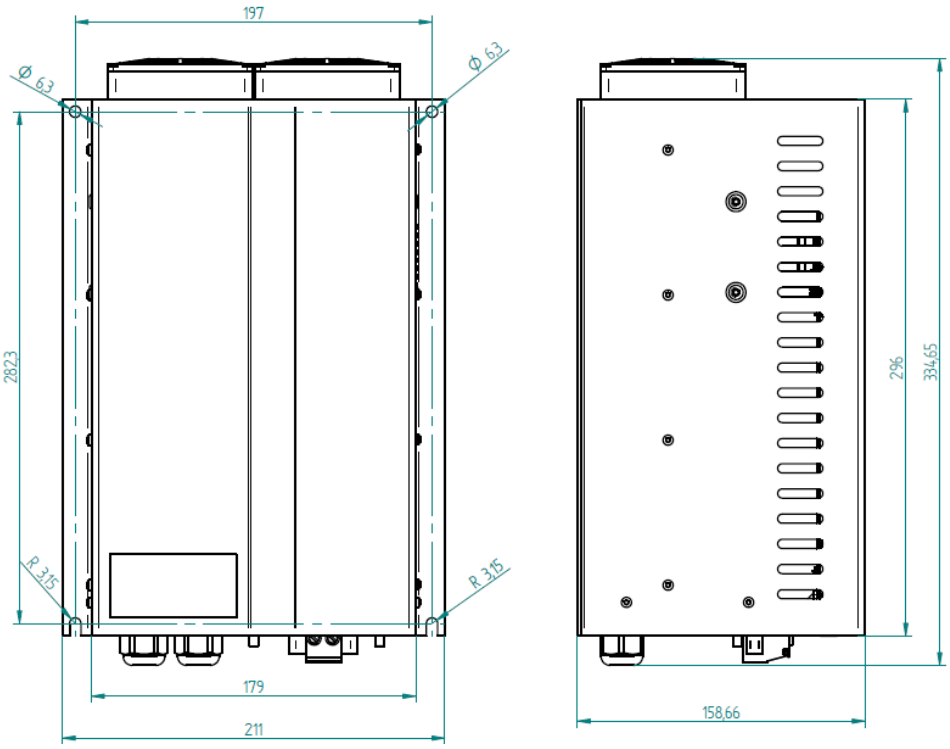
(*) Note: The system should not be summited to sudden temperature variations given that it could cause liquid condensation inside the device.

(**) Note: contact with epic power if you are intended to operate above the rated altitude.

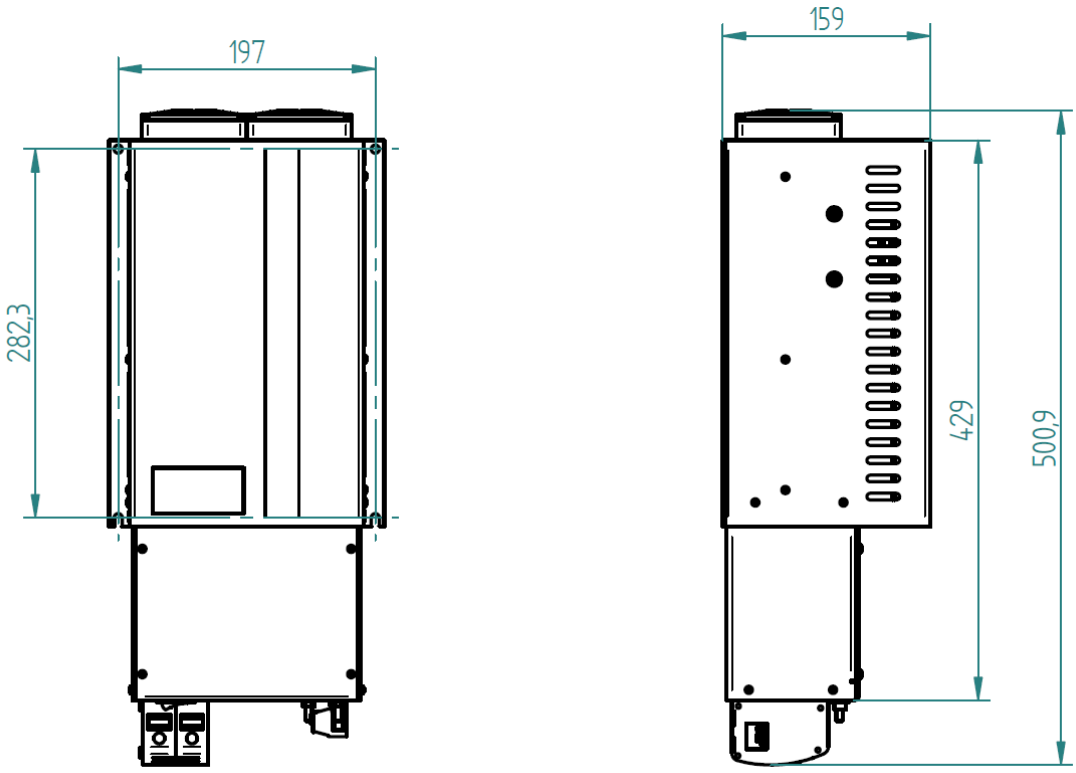
(***) Note: contact with epic power if your applications needs other requirements.

14.6. DC/DC CONVERTER DIMENSIONS AND MOUNTING DRAWING (mm)

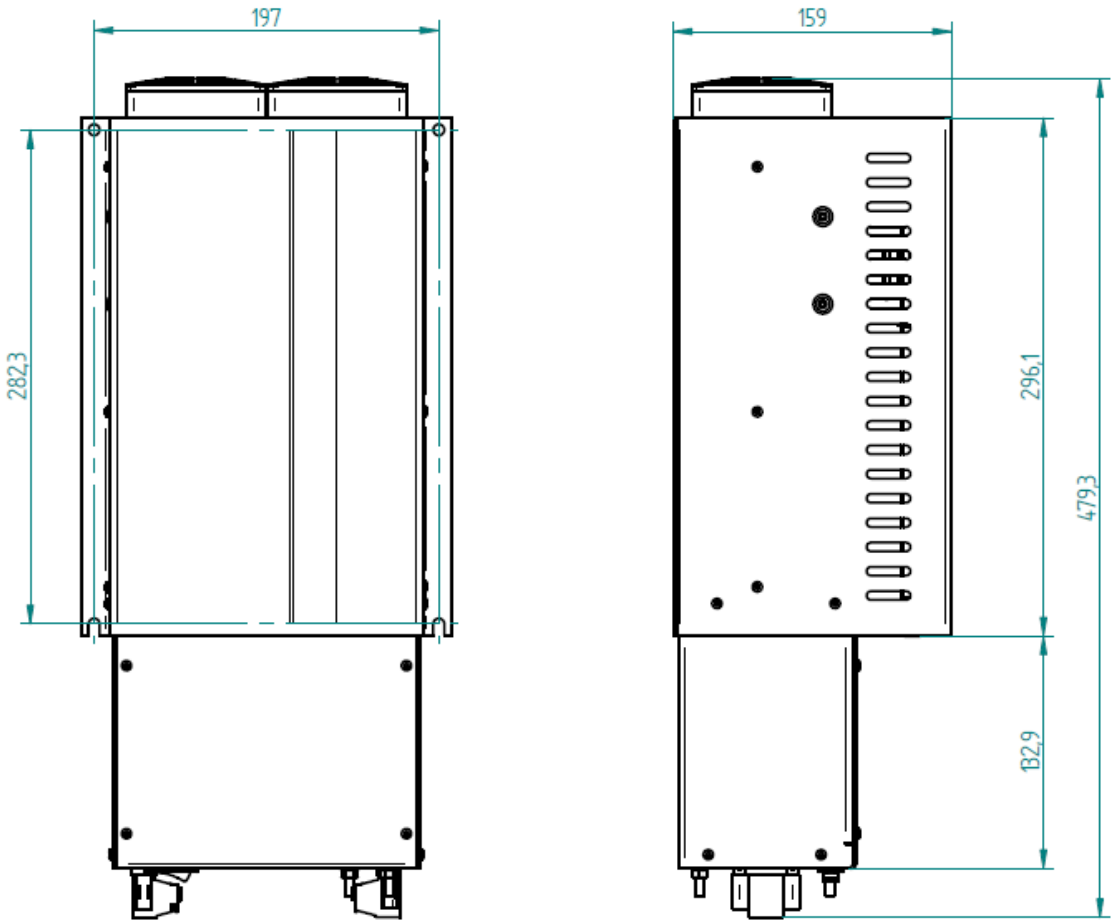
Size 1



Size 2:



Size 3:



15. REGULATIONS

EPC system has been designed and manufactured according to the following regulations:

UL 61800-5-1: Standard for safety – Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal and Energy

UL 1741: Standard for safety – Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources

CSA 22.2 No. 107.1: Power conversion equipment

- **Low Voltage Regulations (LVD)**: **European directive 2014/35/UE**, which establishes low voltage regulations for electronic systems.
  - EN 62109-1:2010
  - EN 62477-1:2012 + A11:2014, A1:2017, A12:2021
- **Electromagnetic Compatibility Regulations (EMC): European directive 2014/30/UE**, which regulates electromagnetic equipment compatibility and seeks the proper functioning of internal market, demanding suitable EMC levels.
  - -EN 12015:2021
  - -EN 12016:2014
  - -EN 61000-6-2:2019
  - -EN 61000-6-4:2019
  - -EN 61204-3:2018

- **Restriction of hazardous substances: European directive 2011/65/UE**, which regulates the use of certain hazardous substances in electrical and electronic equipment.
  - EN 50581:2012

16. EU DECLARATION OF CONFORMITY

Epic Power Converters, S.L.

info@epicpower.es - www.epicpower.es

DECLARACIÓN UE DE CONFORMIDAD
EU DECLARATION OF CONFORMITY

Modelo(s) /*Model(s)*: EPC isolated series – Size 2
(EPC(L) 5k5 648ixx / EPC 7k 670ixx / EPCL-e³ 5k5 648xx)

Fabricante / *Manufacturer*: Epic Power Converters S.L.
Dirección / *Address*: C\F Oeste Nave 93 (Grupo Gregorio Quejido), 50016, Zaragoza, Spain

La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del fabricante.
Objeto de la declaración: EPC isolated series es una gama de convertidores bidireccional multipropósito con amplio rango de tensiones de entrada y salida.
El objeto de la declaración descrita anteriormente es conforme con la legislación de armonización pertinente de la Unión:

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.
Object of the declaration: EPC isolated series are wide input/output voltage range multipurpose bidirectional DCDC converters.
The object of the declaration described above is in conformity with the following EU Directives listed below by using the relevant sections of the following EU harmonized standards.

Directiva de Baja Tensión / *Low Voltage Directive* : 2014/35/EU

- EN 62477-1:2012 + A12:2012 + A1:2017 + A11:2014

Directiva de Compatibilidad Electromagnética / *Electromagnetic Compatibility Directive* : 2014/30/EU

- EN 12015:2021 / EN 12016:2014
- EN IEC 61000-6-2:2019 / EN IEC 61000-6-4:2019
- EN IEC 61204-3:2018

Zaragoza, 30/06/2023

Rubén Gálvez, Administrador / Legal Administrator

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17. EMC GUIDELINES COMPLIANCE

EPC Converters have been tested according to European Standards EN 62477-1:2012 + A11:2014, A1:2017, A12:2021 and complies with the European Standards EN 12015:2021, EN 12016:2014, EN 61000-6-2:2019, EN 61000-6-4:2019, EN 61204-3:2018.

The following conditions must be met to ensure continued compliance with EN 12015 and EN61000-6-4:

- 3 turns of EMI Suppression Toroidal Ferrite (Würth 74270097) must be used for signal cables: connectors 1,2,3,7 and 8.

  This ferrite can be supplied by epic power with SKU M.1191.0093.

EMC-related performance of the devices that comply with EU Directives will vary depending on the configuration, wiring, and other conditions of the equipment on which EPC converters are installed.

The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.



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