

EZA2500

INSTRUCTION MANUAL

BEFORE USING THE POWER SUPPLY UNIT

Be sure to read the following precautions thoroughly before using this power supply unit.

Pay attention to all warnings and cautions before using the unit. Incorrect usage could lead to an electric shock, damage or a fire hazard.

⚠ DANGER

- Never use this product in locations where flammable gas or ignitable substances are present. There are risks of igniting these substances and explosion by arcing.

⚠ WARNING

- Do not touch this product or its internal components while turned on or shortly after shutdown. There may be high voltage or high temperature present which could cause electric shock or burn.
- While this product is operating keep your hands and face away from it as you may be injured by an unexpected event.
- Do not make unauthorized changes into this product or you will void your warranty and you risk electric shock.
- Do not drop or insert anything into this product. It might cause a failure, fire and/or electric shock.
- Do not use this product if it emits smoke or abnormal smell or sound. It might lead to fire and electric shock. In such cases please contact TDK-Lambda.
- Do not attempt repair by yourself: it is dangerous.
- Do not operate in the presence of condensation. It might lead fire and/or electric shock.
- The outputs from this product must be considered hazardous. The output may reach voltages in excess of 60V DC. As a result of this, the output must be guarded or a deflector fitted during installation to avoid a Service Engineers making inadvertent contact with the output terminals, or dropping a tool onto them. The output of this product must not be connected to a SELV circuit

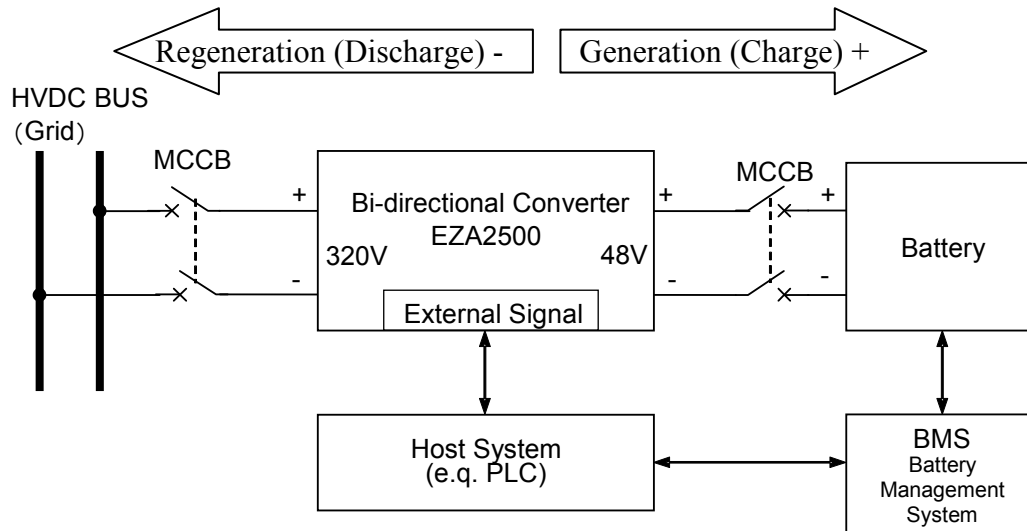
⚠ CAUTION

- This power supply is primarily designed and manufactured for use and enclosure in other equipment.
- This power supply unit has a built-in fan for cooling. Do not block air intake and exhaust as it might cause fire.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be within specifications otherwise the unit may be damaged.
- The unit might be broken by accident or an unexpected situation. For application equipment which requires very high reliability (For example: nuclear related equipment, traffic control equipment, medical equipment, etc.), please provide fail safe functionality in the equipment.
- Do not make improper wiring to input and output terminals. It may cause damage.
- Do not use in environment such as strong electromagnetic field, corrosive gas etc., or any environment where conductive foreign substance may enter.
- Do not operate and store this unit in condensation. In such case, waterproof treatment is necessary.
- Do not operate this unit after it falls.
- The output of this product is considered to be a hazardous energy level (The voltage is 2V or more and the power is 240VA or more). It must not be made accessible to users. Protection must be provided for Service Engineers against indirect contact with the output terminals and/or to prevent tools being dropped across them. While working on this product, the DC input power must be switched off and the input and output voltage should be zero.
- Please install suitable protection based on the instruction manual of any electric storage device which may be connected.
- No part of this document may be copied or reproduced in any form without prior written consent of TDK-Lambda.

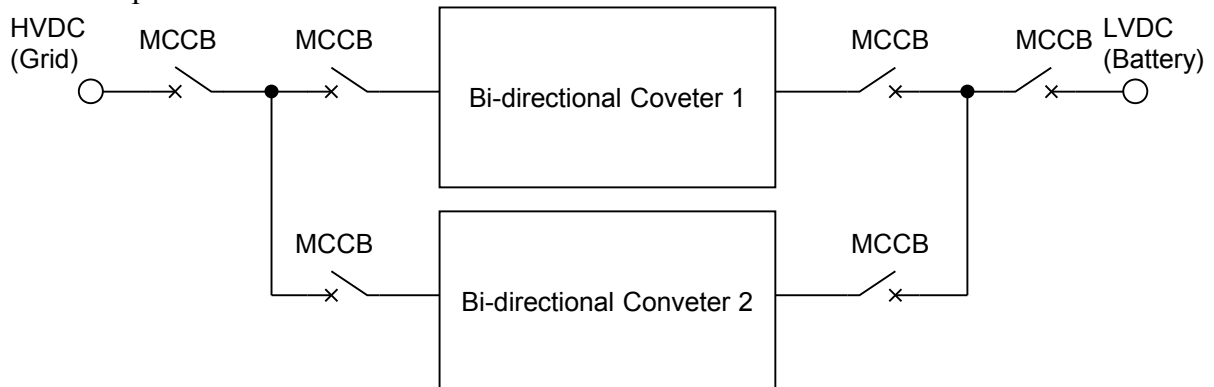
1. Over View

1-1. System construction example

Example of power conversion system is below. This example is constructed in Heteronomy mode meaning the power conversion direction is controlled by Host System.



Example of multiple connection



Operation

Generation (Charge) means that power conversion is from HVDC to LVDC.

Regeneration (Discharge) means that power conversion is from LVDC to HVDC.

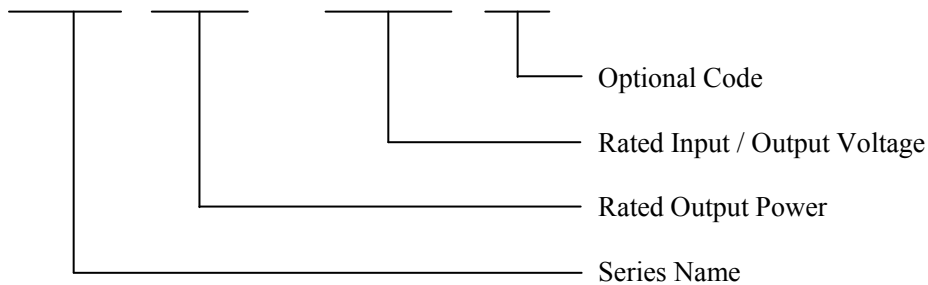
Current polarity is positive at generation and negative at regeneration.

Note: Bi-directional converter has a noise filter inside.

However if there is an operation issue due to noise on the DC-bus please add another noise filter in front of the converter.

2. Part Number Indication

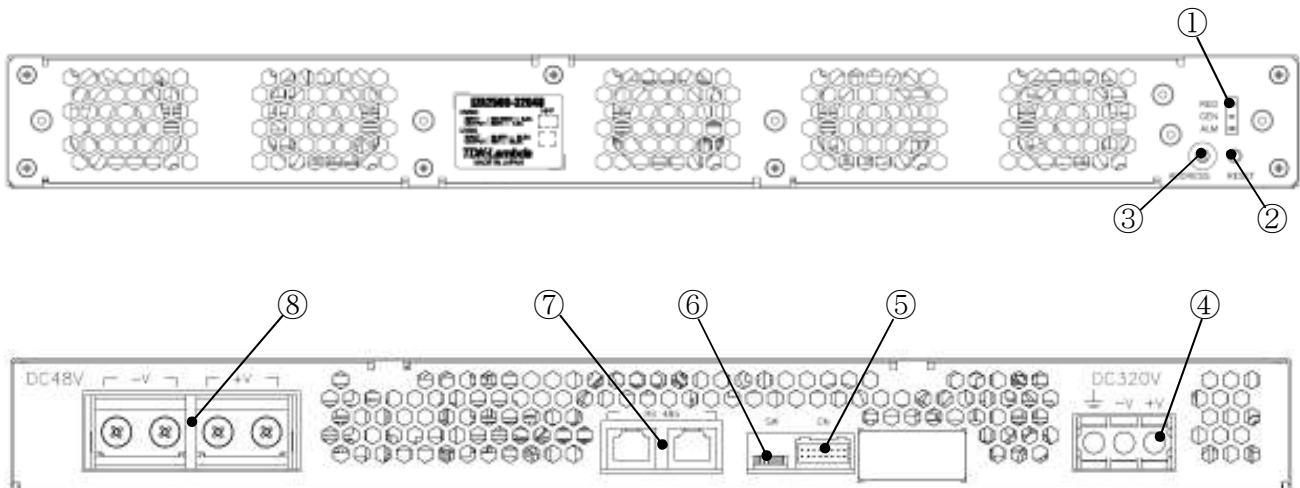
EZA 2500 - 32048



3. Example of Terminal Connection

Take care when wiring this power supply. Incorrect wiring will damage this product.

3-1. Explanation of Terminal Connection



- ① Operating Mode Indicator LED (Refer to User Interface section)
- ② RESET : Tact Switch (Refer to User Interface section)
- ③ ADDRESS : Rotary Switch (Refer to User Interface section)
- ④ Grid Connection Terminal (DC320V Input Terminal (+V, -V, \perp) : M4 Screw) :
DC Power Supply Input Terminal +V, -V (Connect Fuse on +V Line)
 \perp Connect to Chassis
- ⑤ CN : External Signal Connector (Refer to System Interface section)
- ⑥ SW : DIP Switch (Refer to System Interface section)
- ⑦ RS-485 : Serial Interface Connector (Refer to System Interface section)
- ⑧ Battery Connection Terminal (DC48V Output Terminal (+V, -V) : M5 Screw)
(Connect Fuse on +V Line)

3-2. Appropriate Connectors, Housing and Terminal Pins for use in this power supply

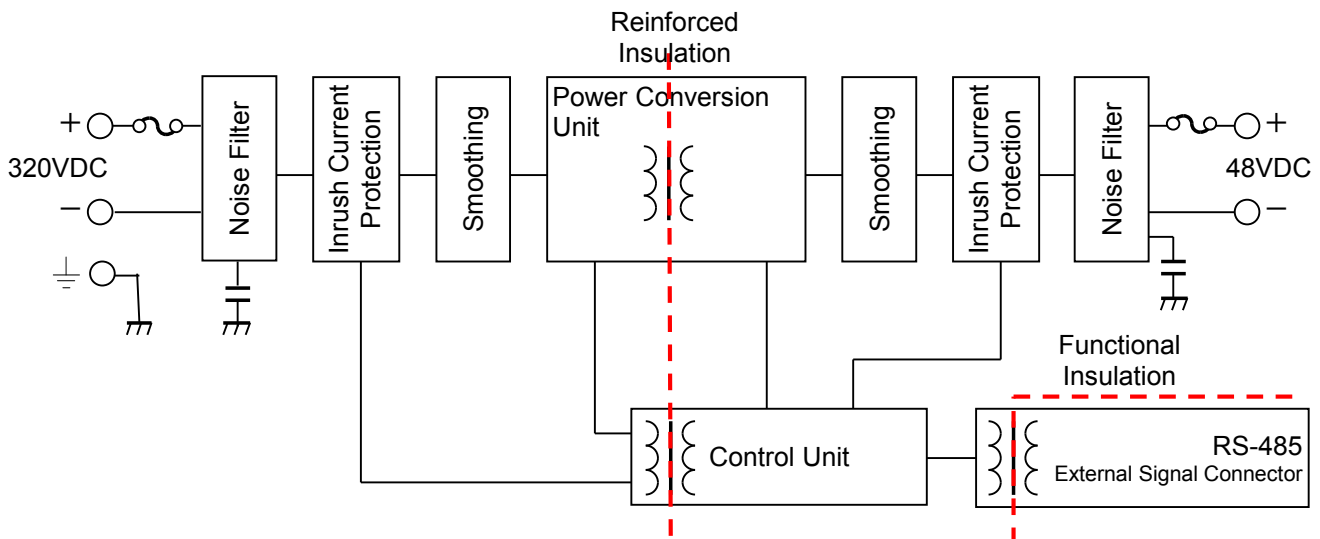
Part Name		Model Name	Maker
CN	Connector (Pin Header)	S16B-PADSS-1	JST
	Housing (Socket Housing)	PADP-16V-1-S	JST
	Terminal Pin (Contact)	SPH-002T-P0.5 (AWG28-24) SPH-001T-P0.5 (AWG26-22)	JST
	Crimping Tool	AP-K2N	JST

4. Connection Method

Take care when wiring this power supply. Incorrect wiring will damage this product.

- Be sure that all power lines are disconnected when wiring connections for input, output and connector terminals.
- Route input line and output line separately to avoid noise interference.
- Connect protective earth grounding to the \perp terminal of this power supply.
- Use the recommended connectors described in section “3-2. Appropriate Connectors, Housing and Terminal Pins for use in this power supply”.
- Connector accessories are not included in the delivery package.

5. Block Diagram



6. Operation Mode

By apply external voltage, HVDC side is more than 250VDC or LVDC side is more than 28VDC the control circuit will be initialized and setting information loaded in the non-volatile memory. At this point each LED will temporarily light up and turn off after completing the initialization process. If the internal interface detects Abnormality for some reason the LED will remain lit up.

After the initialize process the output will be in waiting mode. Power conversion operation will initiate when the operation command is sent.

The internal FANs are rotated during any power conversion operation.

FANs will stop after approximately 5minutes when operation is stopped by operation command.

With this Converter selection of Operation Mode such as Battery Autonomy CV Mode, Grid Autonomy CV Mode or Heteronomy CV Mode is possible.

Note that power conversion direction from HVDC (Grid) to LVDC (Battery) will be described as Generation Operation (Charge) and power conversion direction from LVDC (Battery) to HVDC (Grid) will be described as Regeneration Operation (Discharge).

Before operating the unit please double check applied voltage at HVDC side is more than 300VDC and voltage at LVDC side is more than 36VDC.

6-1. Battery Autonomy CV mode

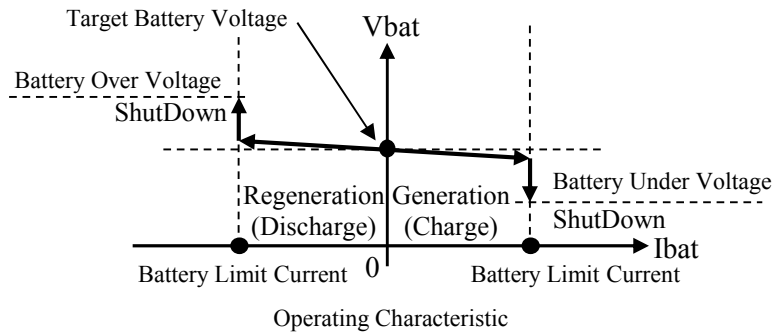
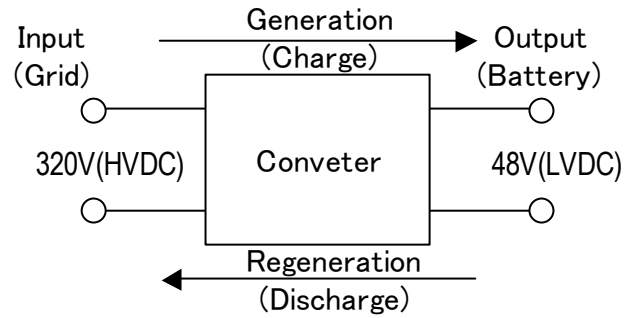
Battery Voltage is maintained at set target voltage.

If Battery Voltage is lower than the Target Voltage : Generation Operation (Charge)

If Battery Voltage is higher than the Target Voltage : Regeneration Operation (Discharge)

Constant current control is for Battery side current both Generation operation and Regeneration operation.

Battery bus rump up mode can be selected for charged up capacitor of Battery side from 0V and/or for operation as Bus converter.



6-2. Grid Autonomy CV mode

Grid Voltage is maintained at set target voltage.

If Grid Voltage is lower than the Target Voltage : Regeneration Operation (Discharge)

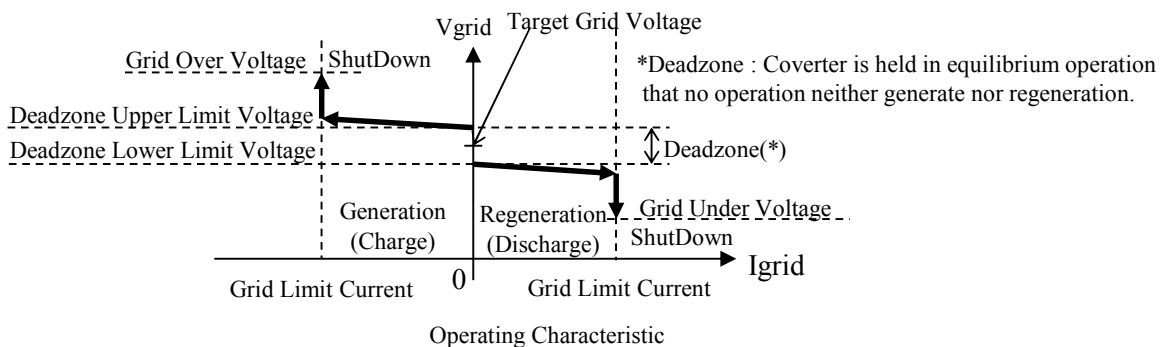
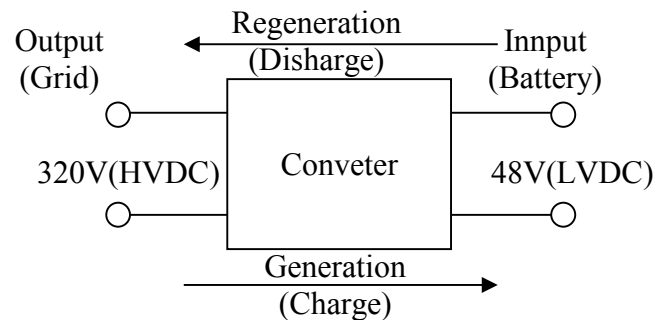
If Grid Voltage is higher than the Target Voltage: Generation Operation (Charge)

There is a dead zone (Power Conversion Non-Operational Band) which can be set between Regeneration Voltage Level and Generation Voltage Level.

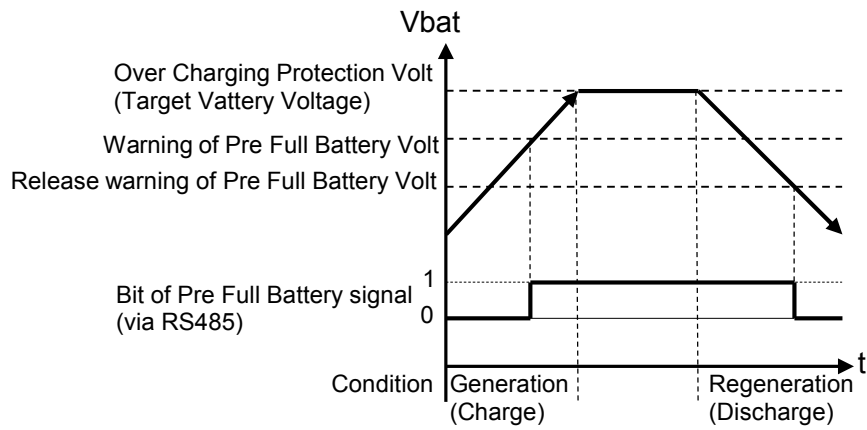
Constant current control is for Grid side for both Generation operation and Regeneration operation.

Also, it is possible to set Battery Over-Charge and Over-Discharge Protection that stops charging and discharging process when Battery Voltage Level reaches the Target Voltage Level.

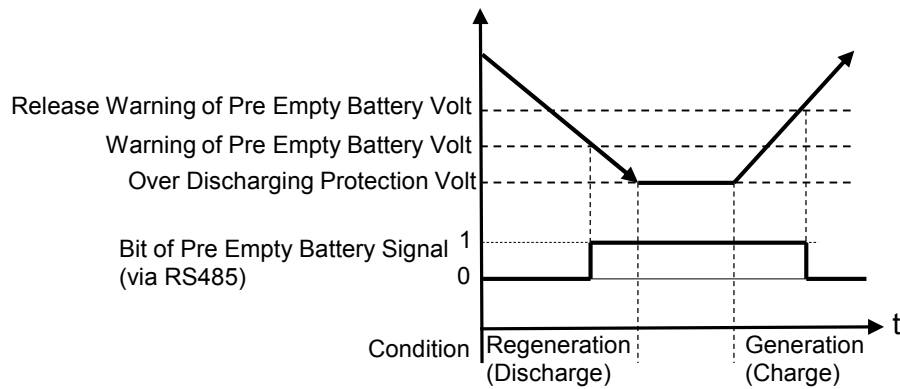
Forced Charging Mode (Heteronomy CV Generation Mode) can be selected for charging up capacitor of battery side. Also, for the Output Side (Grid Port), 300V or more pre-charge is required. When external voltage is not applied, this converter will not operate.



By activating the Battery Over-Charge Protection and Over-Discharge Protection function, Battery Charge and Discharge Current is limited, preventing Over-Charge and Over-Discharge (See Illustration Below).



Battery Over Charging Protection Timing Chart

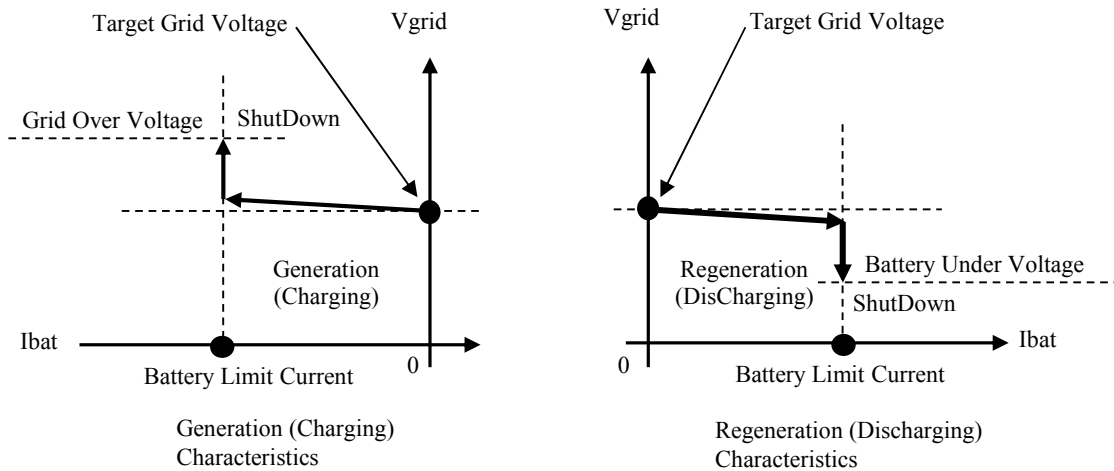


Battery Over Discharging Protection Timing Chart

If the battery internal impedance is large please set the larger release voltage deviation to not affect by the battery internal impedance.

6-2-1. Grid Autonomy CV with Battery CC Mode

This operation mode keeps the Battery Current constant in Grid Autonomy CV mode. It controls the Grid Current to be constant at both Generation operation (Charging) and Regeneration operation (Discharging)



6-2-2. Heteronomy CV and Regeneration with Battery CC

This mode will forced the charge battery by changing operation mode to Heteronomy Charging Mode under Grid Autonomy CV Mode. This operation mode change is by using CHRГ of External Signal Connector,

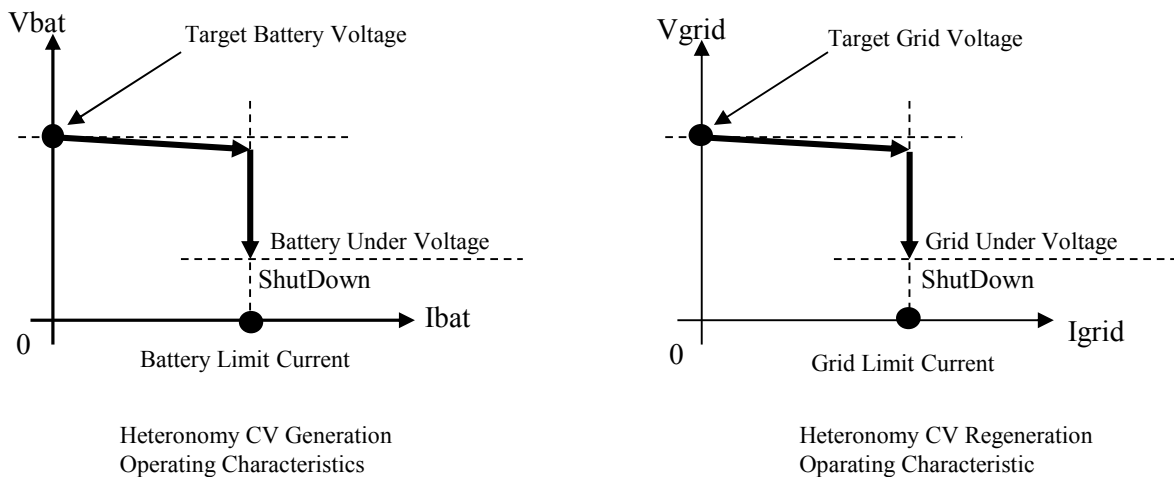
6-3. Heteronomy CV mode

Battery Port is controlled by Constant Voltage at Generation Operating Mode, and Grid Port is controlled by Constant Voltage Mode at Regeneration Operating Mode.

Power Conversion Direction command can be sent via external signal interface or RS-485.

For the Grid Port, 300V or more pre-charge is required. When external voltage is not applied, this converter will not operate. Battery Bus Ramp Function can be selected for applications requiring connection to electric storage devices that can be charged up from 0V to their allowable rated capacity or for applications that require bus converter application.

Also, it is possible to set Battery Over-Charge and Over-Discharge Protection to stop the charging and discharging process when the Battery Voltage Level reaches the Target Voltage Level.



6-3-1. Battery CC under Heteronomy CV Mode

This operation mode is controlled the Battery Current constant at Regeneration Operation (Discharge). Generation Operation (Charging) controls the Battery Current constant as normal operation.

7. User Interface

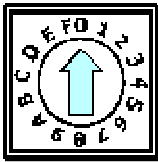
The front Panel of this converter has a Tact Switch, Rotary Switch and 3 LEDs.
Also the Rear Panel has an 8-bit DIP Switch.

7-1. Tact SW

The Tact Switch functions as Alarm clear Button when the Alarm is activated due to abnormal occurrence.
When this switch is pushed, a command to clear the alarm is sent to the converter while in alarm clear state (ALM LED ON).
This switch does not function when converter is in other modes.

7-2. Rotary SW

The Rotary Switch functions as the RS-485 address setting switch of this converter.



The interface Address is composed of 7 bits and can be set within the range "0x00"~"0x7E" range.
Rotary Switch is used to set the lowest digits (last 4 bits) and DIP SW is used to set the highest digits.
Note: The last digit address "F" is a reserved address for broadcast address and must not be used for setting address.

The value pointed by the arrow of the switch is recognized as the lowest digits of the interface address.

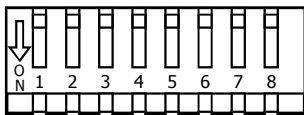
"0x00" is default value at factory shipment.

The value of the Rotary Switch is only recognized at the start of the charging process of this converter (interface MCU initialization) If the settings are changed during converter operation, the changed setting becomes valid at the start of the next charging process of this converter.

7-3. DIP SW

DIP Switch functions as a setting switch to designate operating mode of this converter.

DIP switch is turned ON in the state of pressing down on the lever.



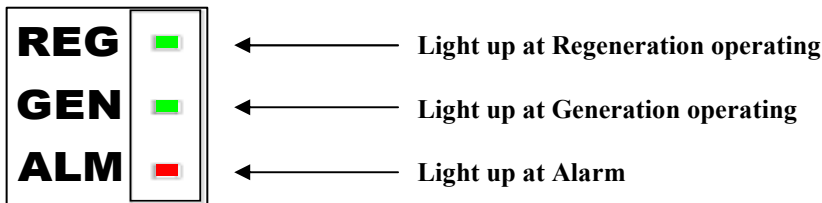
DIP SW			Operating Mode
1	2	3	
OFF	OFF	OFF	Operate by Communication
OFF	OFF	ON	Heteronomy CV
OFF	ON	OFF	Reserved
OFF	ON	ON	Battery Autonomy CV
ON	OFF	OFF	Grid Autonomy CV
ON	OFF	ON	Heteronomy CV and Regeneration with Battery CC
ON	ON	OFF	Grid Autonomy CVwith Battery CC
ON	ON	ON	Reserved
DIP SW			RS-485 baud rate
4	5		
OFF	OFF		19.2kbps
OFF	ON		38.4kbps
ON	OFF		57.6kbps
ON	ON		9600bps
DIP SW			RS-485 Address Area
6	7	8	
OFF	OFF	OFF	0 : 0x00 - 0x0E
OFF	OFF	ON	1 : 0x10 - 0x1E
OFF	ON	OFF	2 : 0x20 - 0x2E
OFF	ON	ON	3 : 0x30 - 0x3E
ON	OFF	OFF	4 : 0x40 - 0x4E
ON	OFF	ON	5 : 0x50 - 0x5E
ON	ON	OFF	6 : 0x60 - 0x6E
ON	ON	ON	7 : 0x70 - 0x7E

The value of the DIP Switch is only recognized at the start up control circuit in the converter during interface MCU initialization. If the settings are changed during converter operation then the changed settings become valid at the next start up control circuit.

7-4. Operating Status Indicator

The Front Panel of this converter has an Operating Status Indicator LED (3 pcs).

The LED arrangement is shown below together with the conditions when these LEDs light up or turn off.



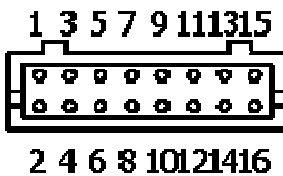
When there is failure inside the converter at all the LEDs light up.
At no load conditions, REG/GEN LED blinks.

8. System Interface

This converter is provided with one external signal connector and 2 serial interface connectors as an interface to the host devices.

8-1. External Signal Connector (CN)

The external signal connector layout as seen from the rear panel is shown below.



Pin #	Signal	I/O	Note
1	ALM	O	Alarm
2	SG	-	Signal Ground
3	PG	O	Converter Operation Good Signal
4	SG	-	Signal Ground
5	STOP	I	Converter Operation Stop Command
6	SG	-	Signal Ground
7	RUN	I	Converter Operation Start Command
8	SG	-	Signal Ground
9	CHRG	I	Charge, Discharge Conversion Command
10	SG	-	Signal Ground
11	ALMCLR	I	Alarm Clear
12	SG	-	Signal Ground
13	-	-	Reserved
14	SG	-	Signal Ground
15	AUX5V	O	Service Power Supply
16	SG	-	Signal Ground

Pin #13 is reserved, do not connect.

8-1-1. Alarm Signal, ALM

Alarm Signal ALM lights up (Pin 1 becomes open) when Alarm occurs. (Synchronized with Alarm Indicator LED)

8-1-2. Converter Good Operation Signal, PG

Converter Good Operation Signal PG lights up (Pin 3 becomes short to SG) during Converter Operation (Power Conversion).

8-1-3. Converter Operation Stop Command, STOP

By shorting Converter Operation Stop Command STOP (Pin 5) to SG the converter can be forcibly stopped.
(STOP prioritizes interface command)

This signal is categorized as a heavy alarm. When this command is detected the Alarm Signal "ALM" lights up.

8-1-4. Converter Operation Start Command, RUN

By shorting Converter Operation Start Command RUN (Pin 7) to SG the converter will commence power conversion according to the pre-set DIP Switch Operation Mode.

8-1-5. Charge/Discharge Conversion Command, CHRG

The function of the Charge/Discharge Conversion Command CHRG (Pin 9) changes depending on the operating mode. In heterogeneous operating mode, charge or discharge mode can be selected by opening this signal or by shorting this signal to SG.

Power Conversion operates in charging mode when this signal is shorted, and in discharging mode when this signal is open. In Grid Autonomous Mode, Heterogeneous Charging Mode and Autonomous Operating Mode should also be switched.

When this signal is shorted, power conversion is in Heterogeneous Charging Mode.

When this signal is open, power conversion is in Autonomous Operating Mode.

As an application example we connect a storage element such as capacitor to the battery port: in this condition regardless of the Grid Voltage Level the storage converter is forcibly charged.

At Battery Autonomous Operating Mode, this function does not operate.

Regardless of the signal status Battery Autonomous Operating Mode will always be sustained.

8-1-6. Alarm Clear Command, ALM CLR

During converter stoppage due to alarm, the latched alarm of this converter can be reset by momentarily shorting Alarm Clear Command ALMCLR (Pin 11) short to SG, then open again. After clearing the alarm, power conversion will commence again provided that the converter operating signal are valid.

8-1-7. Service Power Supply, AUX 5V

Service Power Supply (Pin 15) is referenced to SG with approximately 4.7V.

A maximum of 20mA DC load can be connected. Current Limit should be provided externally outside the converter.

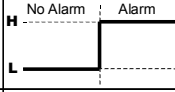
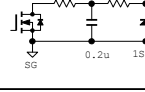
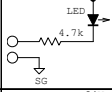
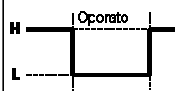
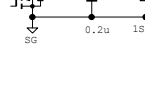
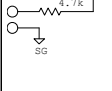
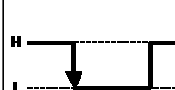
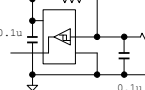
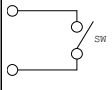
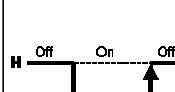
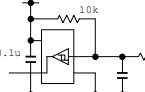
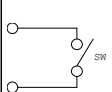
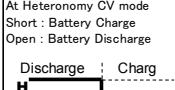
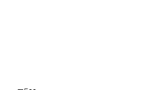

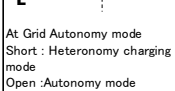
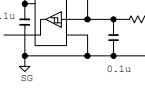
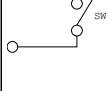
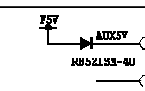
Pin 13 is reserved terminal. Do not connect anything at this terminal.

We recommend that use of twist pair for cable connection of Terminal N and N+1 (N=1, 3, 5).

TDK-Lambda

EZA2500

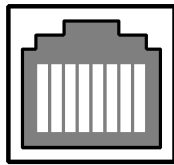
INSTRUCTION MANUAL

Pin #	I/O	Signal	Signal Operation	Response time	Internal Circuit	External Condition	Example Circuit	Note
1 2	O	ALM	Open at Heavy Alarm 	-		Extra Circuit Voltage : 5V~30V (max 20mA)		Open Drain Output. Current limitation should be limited by External Circuit. Pin #1 becomes open when heavy alarm occurs.
3 4	O	PG	Short at Operating 	-		Extra Circuit Voltage : 5V~30V (max 20mA)		Open Drain Output. Current limitation should be limited by External Circuit. Pin #3 becomes short to SG when converter operating.
5 6	I	STOP	Converter Shut Down at Falling Edge Input 	2ms(typ.) +Chattering removal time (16ms)		No Voltage Contact Input		When use semiconductor SW, ON voltage should be 0.3V maximum. Converter can be forcibly stopped by pin #5 short to SG. Converter shuts down is by falling edge of input signal and is hold if input signal released. When this command is detected, ALM lights up. Reset is by ALMCLR.
7 8	I	RUN	Operate at Short input 	10ms(typ.) 30ms(max) +Chattering removal time (60ms)		No Voltage Contact Input		When use semiconductor SW, ON voltage should be 0.3V maximum. Converter starts operate Battery Autonomy CV mode by pin #7 short to SG. Converter will be started operate by falling edge of signal and keep operate under low level signal. Converter will be stopped by rising edge of input signal released.
9 10	I	CHRG	At Heteronomy CV mode Short : Battery Charge Open : Battery Discharge  At Grid Autonomy mode Short : Heteronomy charging mode Open : Autonomy mode	10ms(typ.) 30ms(max) +Chattering removal time (60ms)		No Voltage Contact Input		When use semiconductor SW, ON voltage should be 0.3V maximum. At Heteronomy CV mode Power conversion is between Generation and Regeneration. Generate operation when pin #9 short to SG. Regeneration mode when pin #9 open. At Grid Autonomy CV mode. Power conversion is between heteronomy generation mode and Grid Autonomy mode. Heteronomy generation mode (Charging mode) when pin #9 short to SG. Grid Autonomy mode when pin #9 open. This command does not function at Battery Autonomy mode.
11 12	I	ALMCLR	Alarm Clear at Rising Edge of Input Release 	10ms(typ.) 30ms(max) +Chattering removal time (60ms)		No Voltage Contact Input		When use semiconductor SW, ON voltage should be 0.3V maximum. During converter stopped due to ALM, converter can be restart by ALMCLR. Become alarm clear by rising edge when pin #11 short to SG then open again. After clearing the alarm, power conversion will commence again provided that the converter operating signal are valid.
13 14	I	Reserved	-	-	-	No Voltage Contact Input	-	This reserved. Do not connect.
15 16	-	AUXSV	4.7V, max 20mA	-		-	-	Current limitation should be limited by External Circuit.

※ SG(Float Ground)is functional insulation from converter ground.

8-2. Serial Interface Connector

This converter uses RS-485 as serial interface to the host devices.
The connector type employs the same RJ-45 (shielded) as the general-purpose LAN cables.
Connector Pin configuration is compatible with Two-Wire MODBUS.
The interface connector layout as seen from the rear panel is shown below.



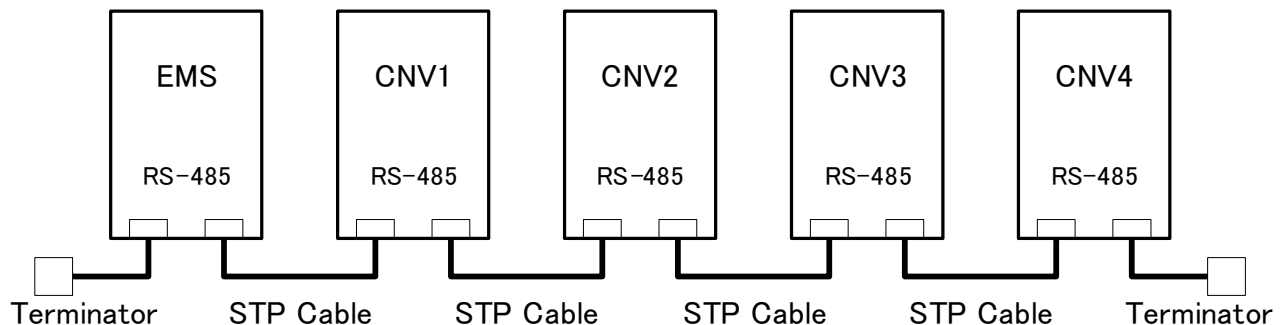
87654321

Pin #	Signal	Note
1	NC	No use
2	NC	No use
3	NC	No use
4	D1	B (Inverted differential pair)
5	D0	A (Non-inverted differential pair)
6	NC	No use
7	NC	No use
8	Common	Common return

It is also possible to use LAN STP cables as connecting cables.
Setting value is stored in the internal memory.
For detail of communication, please refer to "Communication manual".

8-3. Serial Connection of Multiple Converters

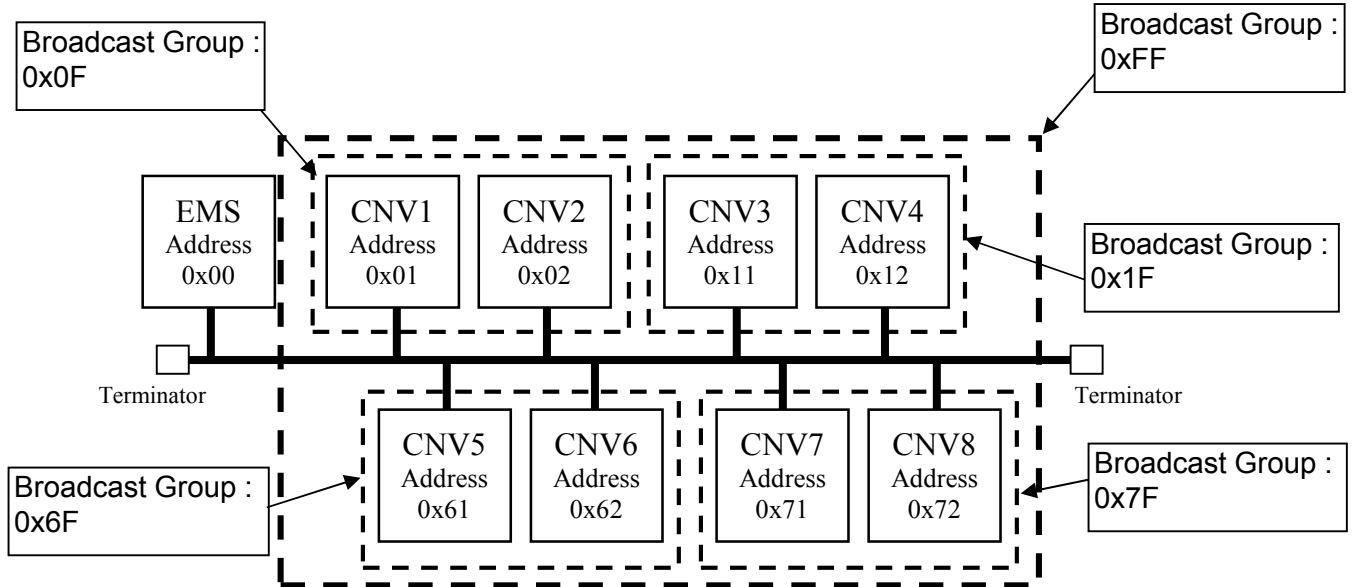
In order to facilitate RS-485 connection, this converter is provided with 2 serial interface connectors.
The interface circuit of this converter functions as intermediate RS-485 connectors.
Due to this feature RS-485 bus can be extended simply by connecting interface cables between converters when connecting multiple converter converters to the host devices. (Depending on surrounding environment, there might be a need to use a termination to connect to one converter or both the converter and the host devices.)
Shown below is an example of serial connection of 4 converter converters.



The address of converters connected to RS-485 bus including host devices should be unique.
Each unique address can be set by Rotary Switch and DIP Switch.
Possible address setting ranges are "0x00"~"0x7E".

8-4. Broadcast Address

Interface Address "0xFF" and Interface "0xkF"(k : 0~7) are special addresses and functions as broadcast address.
When interface "0xFF" is set as receiving address, all the converter converters connected within the interface bus becomes interface receiver.
When the lowest digit of the interface address is set to "F", all the converter converters within the same group become interface receiver.
Please note that all commands addressed to the Broadcast Address cannot receive response.
Below is an example of converter address and their corresponding Broadcast Address.



*For details regarding Serial Interface, please refer to “Communication Manual”

9. Alarm

9-1 Types of Alarm

Alarm category	Alarm Rest	Operating Detail
Heavy Alarm	Can be Reset	Converter Stoppage, Alarm Signal triggered ON, PG Open; Can be reset to former status by Alarm Clear Command
Heavy Alarm (System Alert)	Cannot be Reset	Converter Stoppage, Alarm Signal triggered ON, PG Open; Cannot be reset to former status by Alarm Clear Command
Light Alarm	Automatic	Converter Stoppage, PG Open; Can be reset to former status by clearing the alarm

There are two types of alarms such as heavy and light. Alarm status can be verified by RS-485 interface.

9-1-1. Heavy Alarm (Output Shutdown Manual Recovery)

When Heavy Alarm is detected, External Signal Connector ALM signal is triggered (open).

When this happens during power conversion process power conversion stops and the External Signal Connector PG becomes open.

Heavy Alarm can be reset by Alarm Clear Command (Interface, External Signal Connector ALMCLR or pushing Tact Switch RESET).

After resetting the alarm, power conversion will commence again if the converter operation command is valid. However, a Heavy Alarm due to System Alert cannot be reset.

To reset System Alert, charging should be stopped and input line should be recycled.

Depending on the cause heavy alarm (system alert) might re-occur.

9-1-2. Light Alarm (Output Shutdown Automatic Recovery)

If a light alarm occurred during power conversion operation then power conversion operation will stop and the external signal connector PG will open.

Light alarm indicates that power conversion cannot be executed due to external abnormalities.

Power conversion will commence once the external abnormalities are removed and the converter operation mode command is valid.

9-2. Alarm Category and their Details

Alarm Item	Operation mode	Heteronomy mode		Autonomy mode		Battery Bus Ramp up
	Waiting	Generation (Charging)	Regeneration (Discharging)	Battery Autonomy CV	Grid Autonomy CV	
Battery Over Voltage	Lght Alarm	Heavy Alarm	Lght Alarm	Heavy Alarm	Lght Alarm	Heavy Alarm
Battery Under Voltage	Lght Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	-
Battery Over Current	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Grid Over Voltage	Lght Alarm	Lght Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Grid Under Voltage	Lght Alarm	Lght Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Grid Over Current	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Hardware Over Current	-	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Converter Stop Command (External Signal)	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
FAN Problem (FAN Rotation Speed Down)	-	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	-
Abnormal Temperature at Heatsink (Primary)	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Abnormal Temperature at Heatsink (Secondary)	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm
Abnormal Temperature of Converter	Lght Alarm	Lght Alarm	Lght Alarm	Heavy Alarm	Lght Alarm	Heavy Alarm
System Alert	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm	Heavy Alarm

Alarm Category

Threshold Values that are adjustable can be set by RS-485 interface.

9-2-1. Battery Over Voltage

When battery measured voltage value exceeds detect threshold level the battery over voltage alarm is triggered. Detect threshold level can be adjusted.

9-2-2. Battery Under Voltage

When battery measured voltage value goes below detect threshold level the battery under voltage alarm is triggered. Detect threshold level can be adjusted.

9-2-3. Battery Over Current

When battery measured current value exceeds detect threshold level the battery over current alarm is triggered. Detect threshold level is fixed.

9-2-4. Grid Over Voltage

When grid measured voltage value goes below detect threshold level the battery under voltage alarm is triggered. Detect threshold level can be adjusted.

9-2-5. Grid Under Voltage

When grid measured current value exceeds detect threshold level the battery over current alarm is triggered. Detect threshold level can be adjusted.

9-2-6. Hardware Over Current

When over current circuit comparator detects current over the threshold level the Hardware Over Current Alarm is triggered. Detect threshold level is fixed.

9-2-7. Converter Stop Command (External Signal)

When Converter Stop Command of the External Signal Connector is detected the Converter Stop Alarm is triggered.

9-2-8. FAN Problem (FAN rotation speed down)

If internal FAN rotation speed reduces too far: the FAN problem Alarm is triggered. Detect threshold level is fixed.

9-2-9. Abnormal Temperature at Heatsink (Primary)

Abnormal temperature at Heatsink (Primary) detection is done through thermistor its detection temperature is about 100 degree C.

Signal from the Abnormal detect circuit triggers Abnormal Temperature at Heatsink (Primary). Detect threshold level is fixed.

9-2-10. Abnormal Temperature at Heatsink (Secondary)

Abnormal temperature at Heatsink (Secondary) detection is done through thermistor its detection temperature is about 100 degree C.

Signal from the Abnormal detect circuit triggers Abnormal Temperature at Heatsink (Secondary).
Detect threshold level is fixed.

9-2-11. Abnormal Temperature of Converter

When converter internal measured temperature exceeds detect threshold level (about more than 53 degree C) Abnormal Temperature of Converter Alarm is triggered.

Detect threshold level is fixed.

9-2-12. System Alert

When Abnormality is detected in this converter, System Alarm will be triggered.
Alarm due to System Alert is not covered by Alarm Recovery procedures.

10. Explanation of Functions and Precautions

10-1. Input Voltage Range

Input voltage range is 300 – 380VDC for HVDC, and 36 – 60VDC for LVDC.
Input voltage which is out of specification might lead unit damage.

10-2. Output Voltage Range

Output voltage setting range is 36 – 60VDC for LVDC and 300 – 380VDC for HVDC.
Set output voltage is via RS-485 communication.

10-3. Constant Current Range

Constant current setting range is 2.4 – 56A for LVDC current and 0.5 – 8.5A for HVDC current.
Set constant current is via RS-485 communication.

Attention:

If you want to operate constant current at Regeneration (discharge) mode then set grid under voltage level is in the HVDC voltage vs LVDC voltage derating curve area.

During operation outside of derating curve the converter cannot operate constant current operation and output current increases.
In this case the converter will be shut down when the output current is more than 8.7A and the input power of battery side is more than 2750W.

Example:

Case of regeneration constant current mode operation at 380VDC of output voltage (Grid side) and 60VDC of input voltage (Battery side), set Grid under voltage level is more than 350VDC.

10-4. Output Ripple & Noise

The standard specification for maximum ripple value is measured according to specified measurement circuit, using Ripple Meter RM-103 made in Keisokugiken co.LTD.

10-5. Series Operation

Series operation is not possible.

10-6. Parallel Operation

Operation to increase the output current is possible.

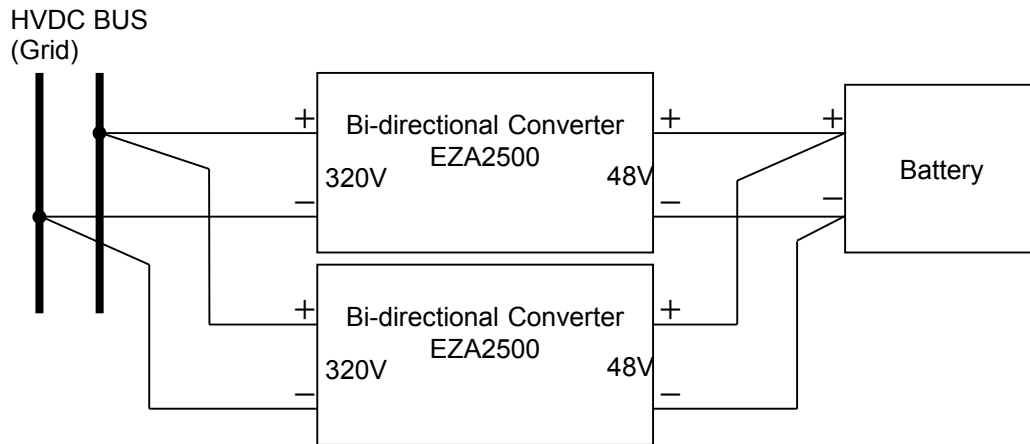
Converter has droop function for current share.

Droop ratio can be set via RS-485.

Voltage drop will increase with a large current droop ratio which makes it easier to balance.

Please follow below indications:

- 1) Please set same output voltage.
- 2) Please use same size and same length of output wires.
- 3) Please use same size and same length of input wire for each separate converter.



10-7. Dynamic Loads

At full load or no-load conditions and during transients and dynamic changes of output voltage it is possible that over-voltage protection and under-voltage protection might function. So, please pay attention.

10-8. Isolation Test

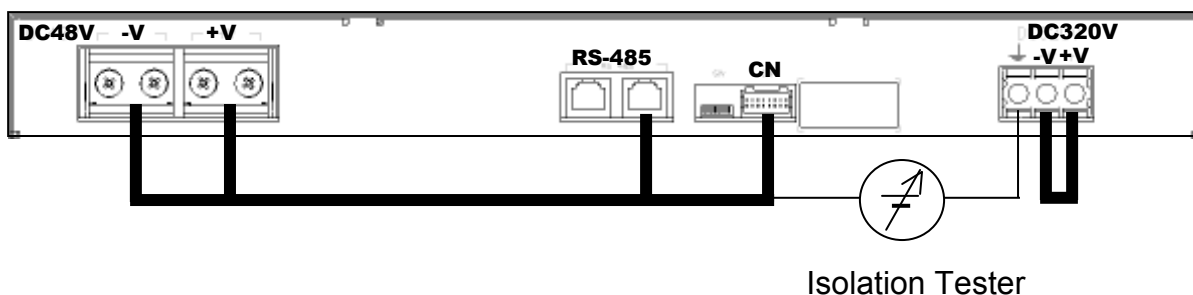
Isolation Resistance between secondary (DC48V) & signals and chassis (\perp) is more than 100M Ω at 500VDC.

The voltage setting of isolation tester to the test voltage should be made and verified before the test is performed higher voltages than recommended could damage the unit.

Ensure that the unit is fully discharged after the test.

- Secondary (DC48V) & signals and chassis (\perp) : more than 100M Ω at 500VDC

*All pins of RS-485 and CN connectors must be shorted.



10-9. Withstand Voltage Test

This converter is designed to withstand 3kVAC between primary (DC320V) and secondary (DC48V) & signals, 2kVAC between primary (DC320V) and chassis (\perp), 707VDC between secondary (DC48V) & signals and chassis (\perp) each for 1minute.

When testing withstand voltage set current trip limit of withstand voltage test equipment to 20mA.

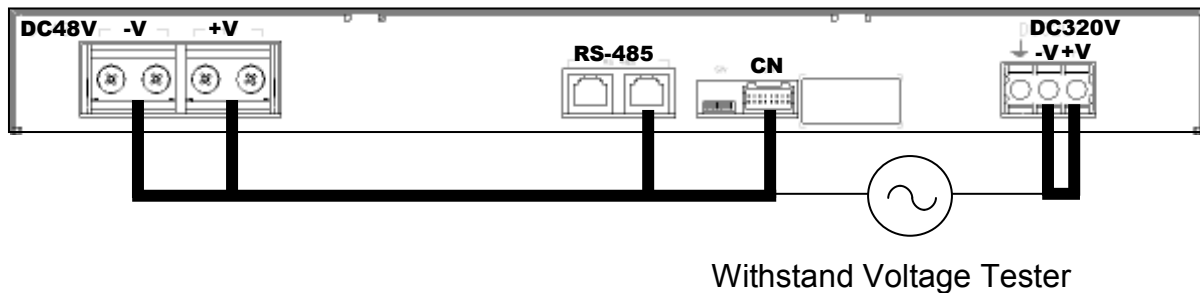
The applied voltage must be gradually increased from zero to testing value and then gradually decreased to zero.

When timer is used the unit may be damaged by high rate of change of voltage at turn on/off. Ramp the voltage even if using a timer.

Connect +V and -V as follows.

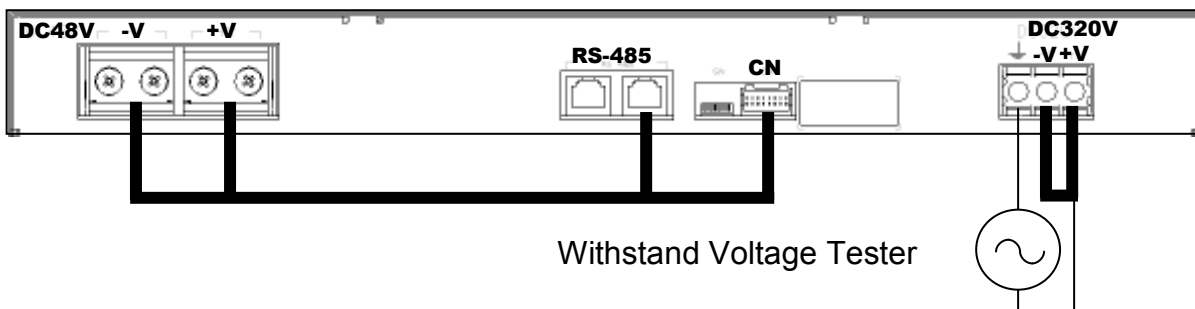
• Primary (DC320V) - Secondary (DC48V) & Signals 3kVAC, 1min. (20mA)

*Must connect short all pins of RS-485 and CN.

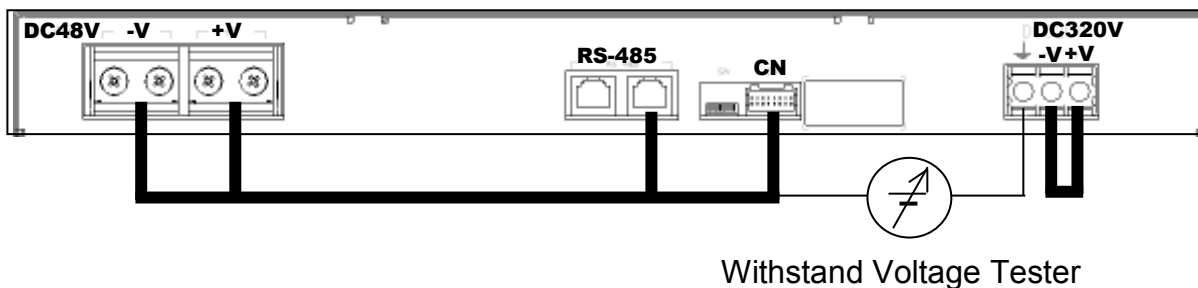


\perp

• primary (DC320V) - Chassis (\perp) : 2kVAC, 1min. (20mA)



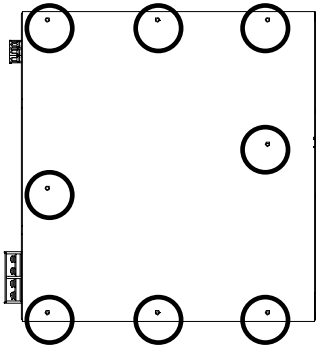
• Secondary (DC48V) & Signals - Chassis (\perp) : 707VDC 1min.



Notes: This product has ceramic capacitor between secondary circuit and chassis. Some withstand voltage tester can generate higher voltage than the capacitor can withstand – so be careful to set the test voltages as above and no higher – otherwise capacitors may be damaged.

11. Mounting

Please install reliably using M4 tap 8 places of the bottom of chassis (see below circle).

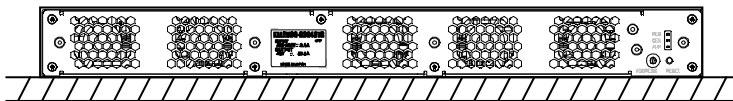


Converter Bottom View

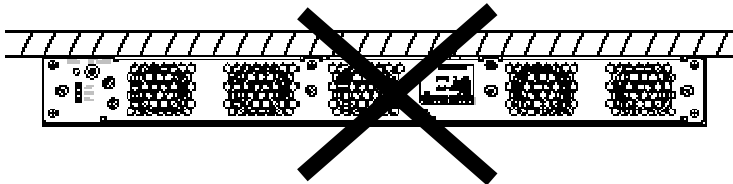
11-1. Mounting Direction

Recommended standard mounting method (A).

(A) Standard Mounting

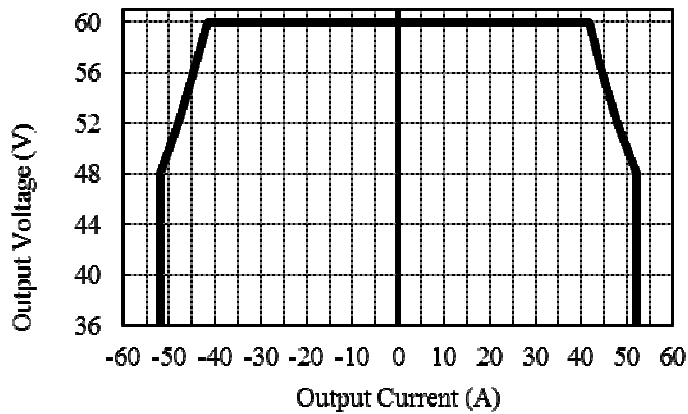


(B) Not possible

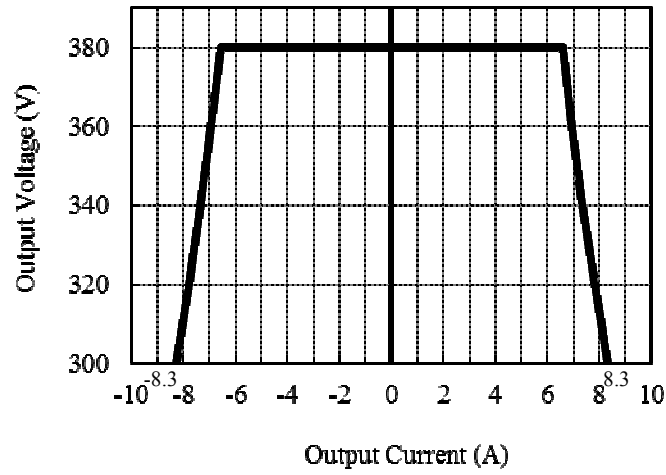


11-2. Output Derating

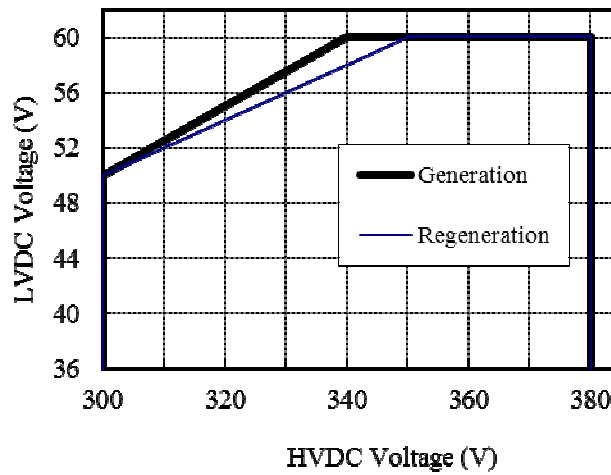
11-2-1. LVDC Voltage (DC48V) vs LVDC Current Derating



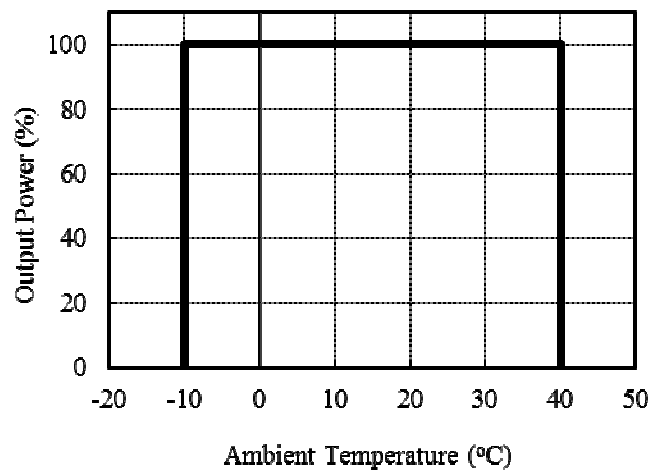
11-2-2. HVDC Voltage (DC320V) vs HVDC Current Derating



11-2-3. HVDC Voltage vs LVDC voltage Derating

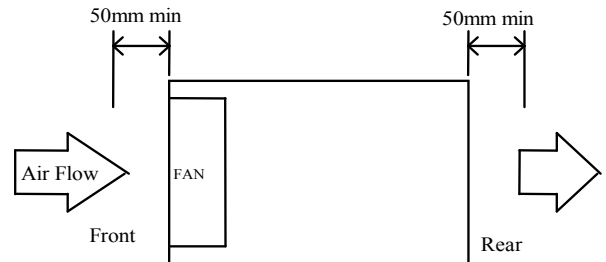


11-2-4. Ambient Temperature vs Output Derating



11-3. Mounting Method

- (1) Forced air cooling type converter
This converter has ventilating holes on the front and rear side panel.
Keep these two areas freely as much as possible.
- (2) The maximum allowable penetration of mounting screws is 6mm.
Incomplete thread of mounting screw should not be penetrated.
- (3) Recommended torque for mounting screw
M4 screw : 1.27 N·m (13.0kgf·cm)



12. Wiring Method

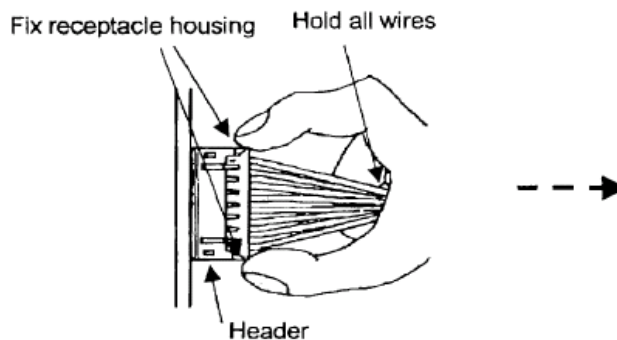
- (1) The output load line and input line should be separated. Use all lines as thick and short as possible to make lower impedance.
The lines shall be twisted or use shielded wire to improve noise sensitivity.
- (2) Noise can be reduced by attaching a capacitor to the load terminals..
- (3) For safety and EMI considerations connect \perp terminal to the mounting set ground terminal by thick wire
- (4) If lightning protection is required, please place it in front of the converter. There is no protection against lightning surge inside the converter.

12-1. Inserting contact into housing

- (1) Do not apply any pulling force to crimped part and insert contact parallel to housing.
- (2) Insert contact into housing, without stopping, to its furthest extent.
- (3) Check secure locking on each insertion by pulling wire softly in order to check that contact does not come off housing.
Besides, check whether there is the backlash in the direction of insertion axis.

12-2. Mating and Un-mating connector

Hold receptacle housing securely and insert into header straight against to headed post until click sounds.
Hold all wire securely and fix receptacle housing by figures so as to pry and then withdraw it on the mating axis.



12-3. Routing of Wire

Routing wire so as not to apply external force to connector except force such an extent that wire slightly buckles, considering an enough length to route and fixing of wire.

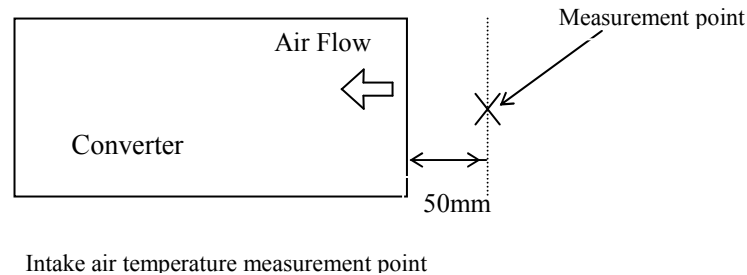
13. External Fuse Rating

Refer to following fuse rating when selecting external fuses that are to be used on input line.
Surge current flows when line turn on.
Do not select the fuse with input current values under the actual load condition.

HVDC (DC320V): 20A Fast Blow type
LVDC (DC48V): 125A Fast Blow type

14. Fan Life Expectancy

The Fan-life expectancy is about 6.5 years at 40 degree C intake-air temperature. Therefore, periodic maintenance by exchanging the life-expired fan is required for the converter. Fan replacement service will be a charge, please contact your local TDK-Lambda sales office.



15. Before concluding that the unit is fault

- (1) Check if the rated input voltage connected.
- (2) Check if the wiring of input and output is correct.
- (3) Check if the wire thickness is enough.
- (4) Check if the built-in FAN is not stopped. Is FAN stopped by something irregular?
If FAN stops, heavy alarm is triggered.
- (5) The converter has ventilating holes on the front and rear panels.
Check if there is any irregulars or dust, etc.
- (6) Is this chassis of converter abnormally hot?
The output might shut down by OTP operation. Please re-start after allowing time for the unit to cool down sufficiently.
- (7) Check if the output current and output wattage does not over specifications.
- (8) Audible noise can be heard during dynamic load operation.

16. Range of free warranty

This product warranted for a period of 5 years from the date of shipment. For a breakdown under a normal use during free warranty term repair is a free of charge. However replacement of the built-in fan is chargeable. Please contact your local TDK-Lambda sales office for FAN replacement.

The following cases are not covered by warranty:

- (1) Improper usage like dropping products, applying shock and defects from operation exceeding specification of the unit.
- (2) Defects resulting from natural disaster (fire, flood).
- (3) Unauthorized modifications or repair by the user, defects not cause by TDK-Lambda.