

TDC-9030

Industrial Battery Charger

Operating manual



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1. Introduction

The all-digital battery charger (BCU) developed by HANMI TECHWIN is a device that charges 3-phase AC power to DC by making high-speed switching method using IGBT, etc., and controlling it in the optimal state.

The BCU (Battery Charging Unit) monitors and protects the battery status in real time to provide the optimum operating environment.

2. Characteristics

■ Simplicity

Charge automatically with battery capacity(AH) and battery rating setting only.

■ Monitoring charging voltage and current through LCD

Charge voltage, current and charge capacity are displayed, so you can check it immediately without any additional measuring equipment.

■ Small, lightweight

It is compact and lightweight because it does not adopt transformer and large capacitor, and it is easy to handle.

■ Battery diagnostic function

Continuously check the battery's overvoltage, discharge end voltage and other conditions to ensure that it is always in top condition.

■ Equalization function

Equalization charging is performed when the voltage between the terminals of the battery and the specific gravity of the electrolyte is not uniform and the performance can not be fully demonstrated. This function charges the battery at a constant voltage (117% of the battery rating) during equalizing time.

When the set time has elapsed and the equal charge is completed, the auto run parameter is automatically switched to floating charge if the parameter is set to ON. If it is OFF, the output is stopped.

■ Recovery charge function

When the battery voltage is below the discharge end voltage (75% of the rated voltage), it automatically operates in the recovery charge (RC) mode and is also possible by key operation. When the battery voltage exceeds the rated voltage, it charges to 115% of the battery rating. When the voltage and current are proper (the voltage is 115% and the current is the battery capacity / 50 or less), It switches to the floating charge or standby state according to the setting of Auto Run.

■ Enhanced fault diagnosis

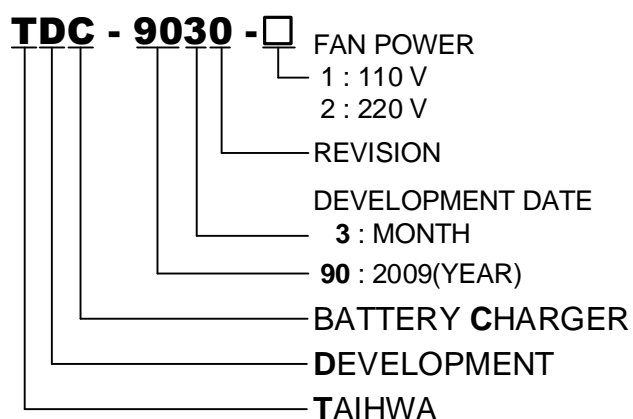
Hardware and software control the voltage and current, check the battery itself and wiring to improve safety.

3. Purpose

- ◆ Industrial Battery Charger

4. Basic Specification

4-1. Type name

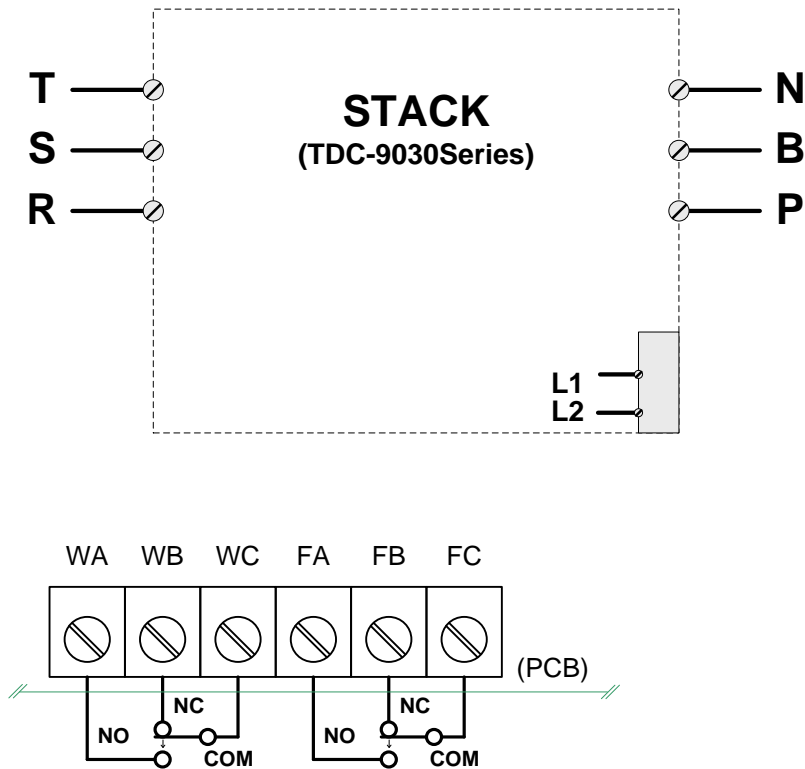


4-2. Specifications

Specifications	Contents
Power supply	3Ø AC 220V
Operating voltage	AC 80 ~ 265 [V]
FAN Power	AC 110 / 220 [V]
Operating temperature	-20 ~ 85 [℃]
Output signal	WARNING OUT (Mechanical contact : AC250V/DC30V, 5A) FAULT OUT (Mechanical contact : AC250V/DC30V, 5A)
Weight	11.5 Kg

5. Wiring Diagram

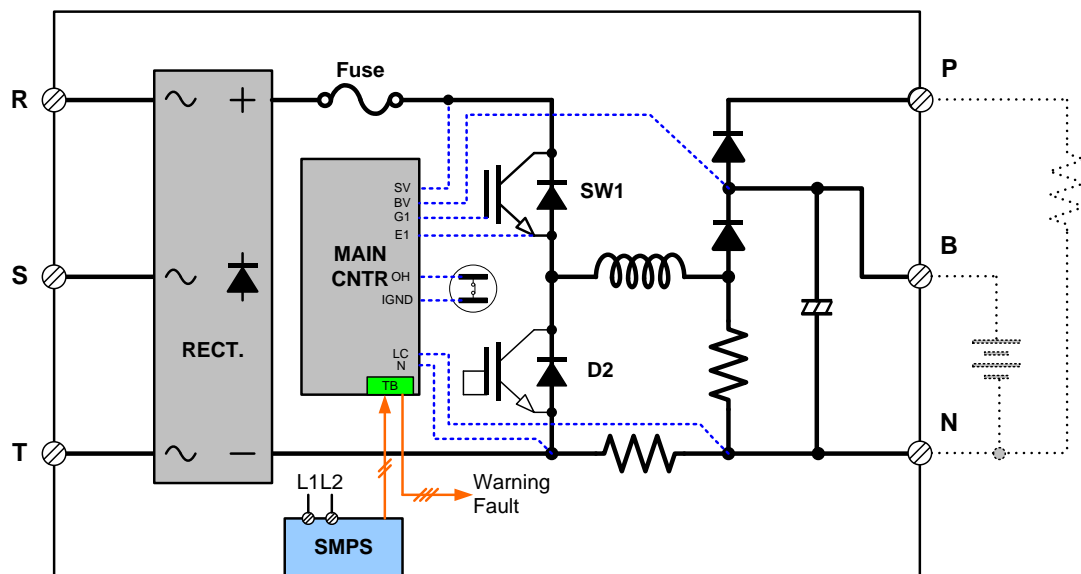
5-1. Outside view of terminal block



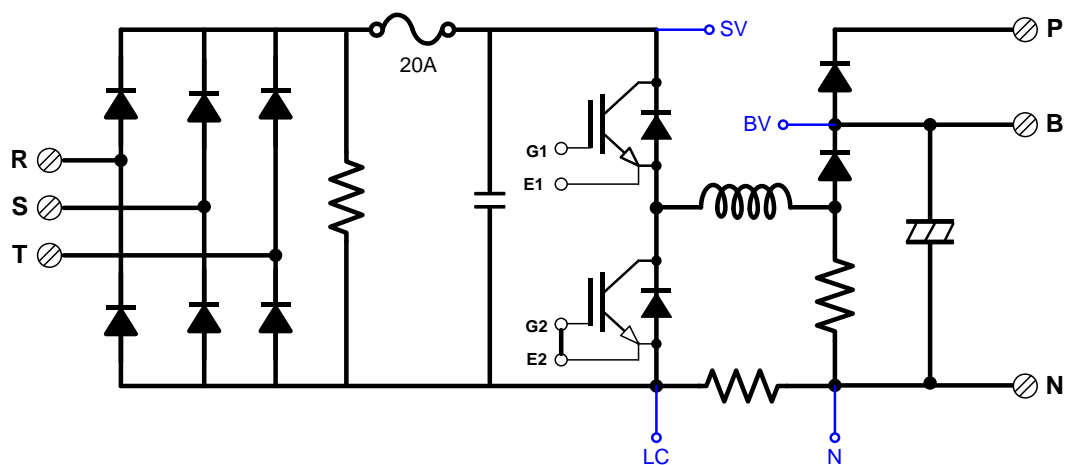
5-2. Explanation of terminal block

Terminal	Mark	Designation	Function	Rating
CN103	1	WA	NORMAL OPEN	AC250V / 5A DC 30V / 5A
	2	WB	NORMAL CLOSE	
	3	WC	COMMON	
	4	FA	NORMAL OPEN	
	5	FB	NORMAL CLOSE	
	6	FC	COMMON	
LINE1	L1	CONTROL POWER	PCB POWER	AC 85V ~ AC265V
LINE2	L2	CONTROL POWER	PCB POWER	
BUSBAR	R	Source Voltage	R PHASE INPUT	
	S	Source Voltage	S PHASE INPUT	
	T	Source Voltage	T PHASE INPUT	
	P	DC OUTPUT (+)	LOAD OUTPUT (+)	
	B	DC OUTPUT (+)	BATTERY OUTPUT(+)	
	N	DC COMMON (-)	COMMON (-)	

6. Configuration and Operation Principle

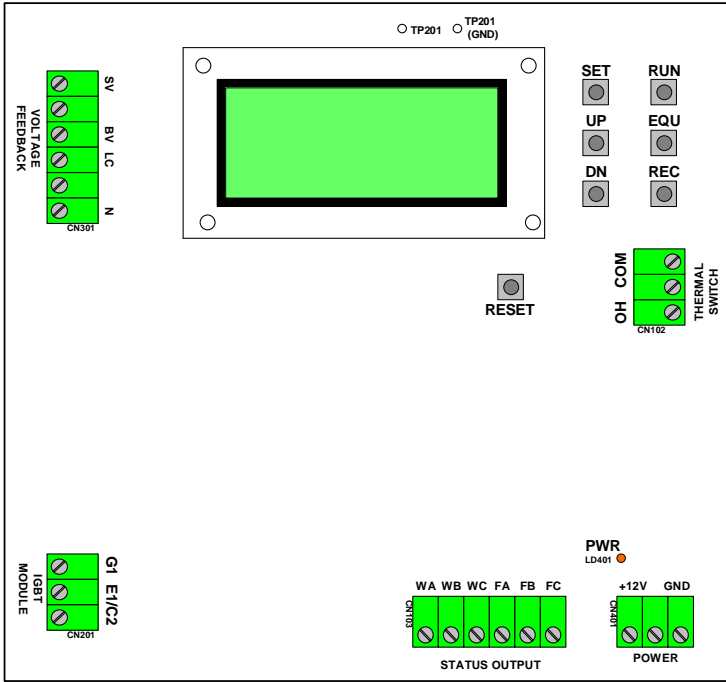


6-1. Power circuit configuration diagram



Mark	Designation	Function	Remarks
R	Source Voltage (R Phase)	Input Voltage	
S	Source Voltage (S Phase)		
T	Source Voltage (T Phase)		
P	Positive Voltage	Output Voltage(Load)	
B	Battery Voltage	Output Voltage(Battery)	
N	Neutral Node	Output Voltage(Common)	

6-2. Control board configuration diagram



Mark		Designation	Function	Remarks
CN301	SV	Source Voltage	Voltage / Current Feedback	
	BV	Battery Voltage		
	LC	Load Current		
	N	Neutral Node		
CN103	WA	Warning NO	Warning Output	
	WB	Warning NC		
	WC	Warning Common		
	FA	Fault NO	Fault/Run Output	
	FB	Fault NC		
	FC	Fault Common		
CN201	G1	Gate Signal 1	IGBT Gate Signal	
	E1	Emitter Signal 1		
CN401	+12V	PCB Power (+12V)	PCB Power	
	GND	Ground (0V)		
CN102	OH	Overheat	Temperature sensor (85℃ NO)	
	COM	Common		

7. Display

7-1. Parameter setting

7-1-1. Parameter type and description

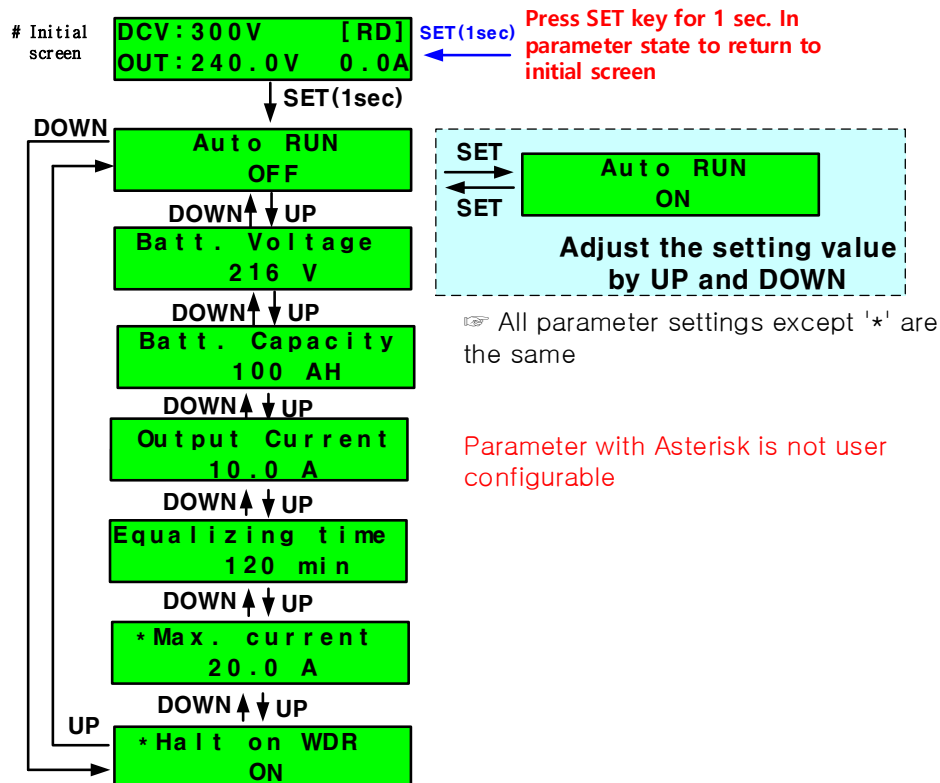
Parameter	Settion	Range	Default
Auto Run	OFF / ON		OFF
Batt. Voltage		24 ~ 240 [V]	216 V
Batt. Capacity		10 ~ 300 [AH]	100 AH
Output Current		1.0 ~ 30.0 [A]	Capacity / 20
Equalizing Time		30 ~ 180 [min]	120 min
*Max. Current		1.0 ~ 30.0 [A]	20.0 A
*Halt on WDR	OFF / ON		ON
Relay Out	FAULT/RUN		FAULT

Caution 1) When you actually use the product after commissioning, be sure to set Auto Run to ON to charge the battery automatically and prevent the battery from discharging.

Caution 2) The '*' mark can not be adjusted by the user.

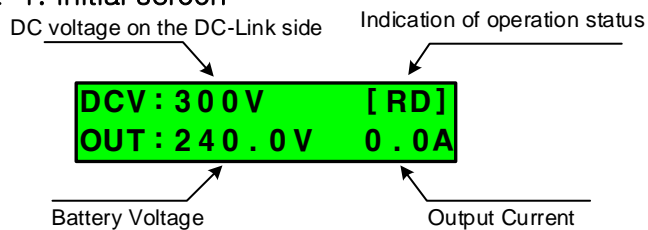
- ① Auto Run : Set which mode to start at initial startup
 - This parameter is used when the MCU starts to operate due to Power ON or Reset. If it is set to OFF, the RUN key can control the charging start and stop.
- ② Batt. Voltage : Set the battery voltage.
 - If 18 batteries of 12V are used in series, set to $12 \times 18 = 216$ [V]. The Floating Charge charges 111% of the battery voltage and the Equalized Charge charges the constant voltage / constant current to 117% of the battery voltage.
- ③ Batt. Capacity : Set the battery capacity.
 - If the battery capacity is 100AH, setting 100 will automatically set the 'Max. Out Current' parameter to 5A, the 20 hour charging reference.
- ④ Output Current : Set limit of output current.
 - The charger sets the maximum current that can be output, and can be used to safeguard the battery and circuit with this limiting setting, especially when large currents can flow, such as a recovery charge.
- ⑤ Equalizing Time : Sets the equalization charge time.
- ⑥ *Max. Current : Overcurrent fault occurs when the charger flows above set current.
- ⑦ *Halt on WDR : Enable or disable the MCU's self-test feature.
- ⑧ Relay Out : Set the relay output signal.
 - FAULT : FA contact short-circuited in case of trouble.
 - RUN : FA contact is short-circuited during operation, and FB contact is short-circuited when a fault occurs.

7-1-2. How to set parameters

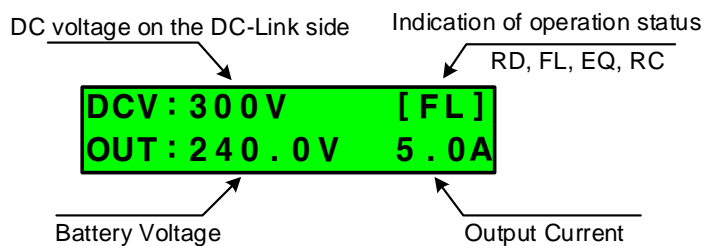


7-2. Monitoring

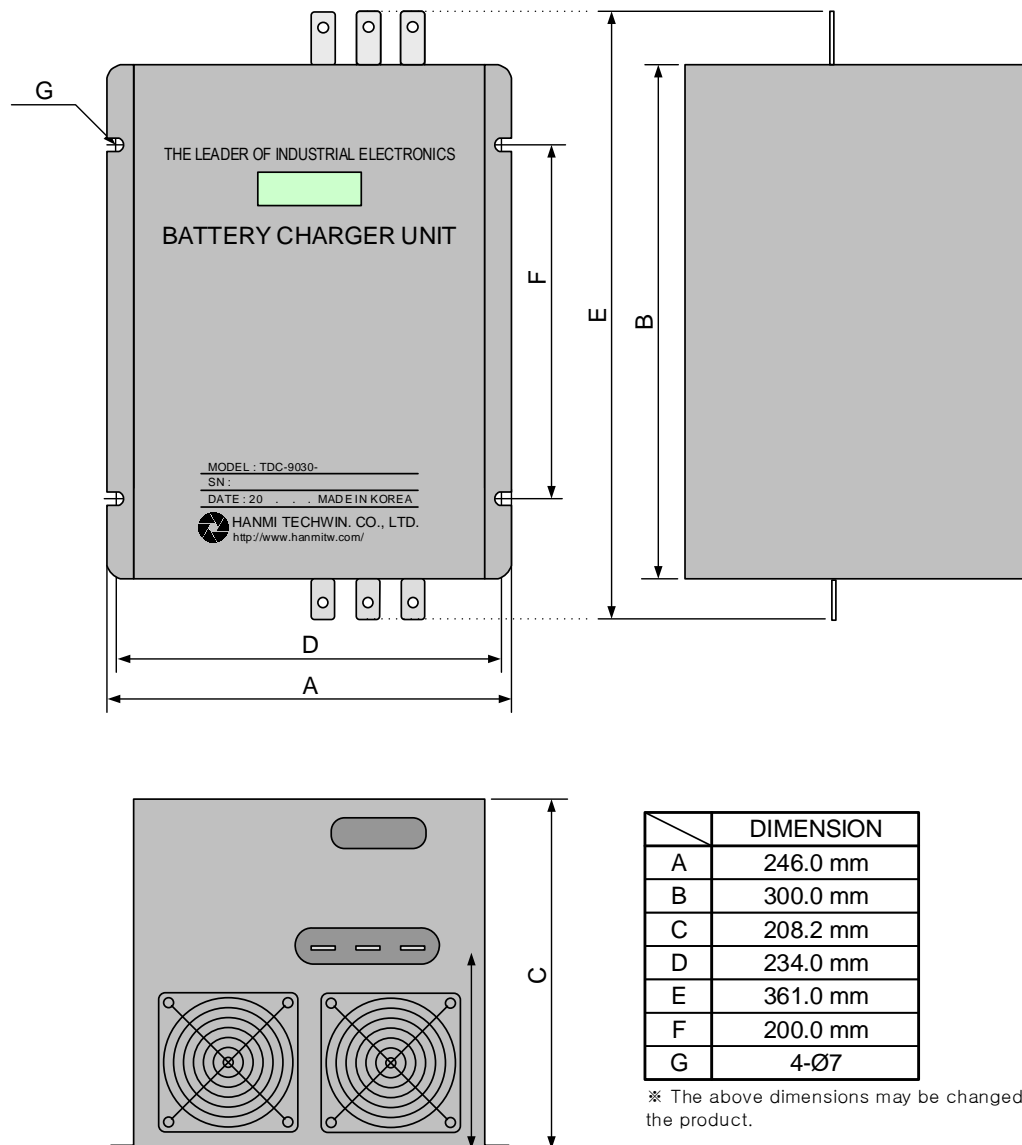
7-2-1. Initial screen



7-2-2. 운전 중 화면

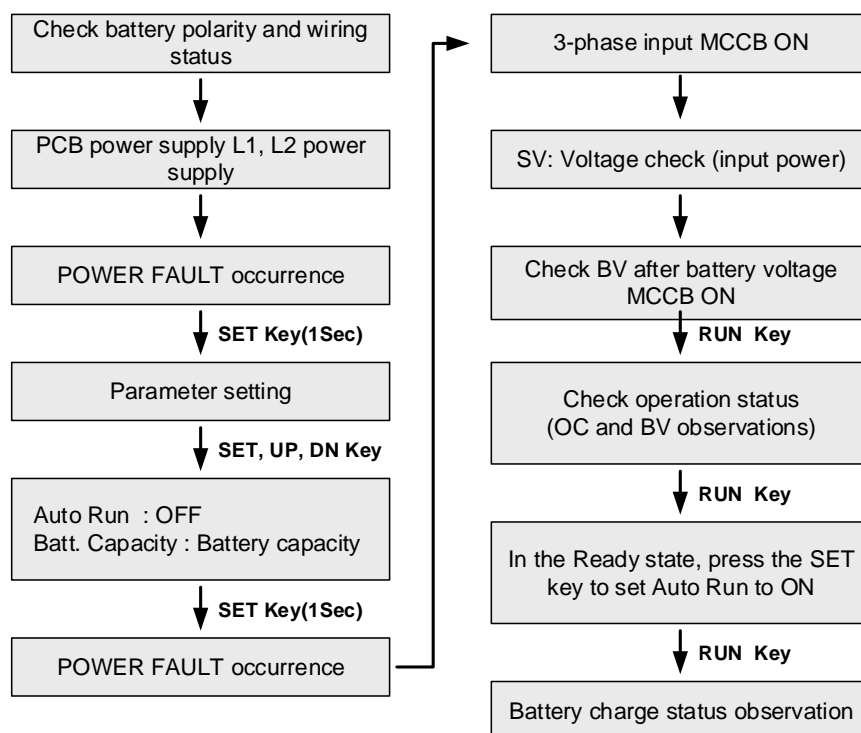


8. Outside dimension



9. Trial run recommendation sequence

- 1) Be sure to check the polarity of battery power before applying power.
[Caution] Be extremely careful not to connect the battery (+) and the output (B) of the controller to the controller's diode and reactor.
- 2) Apply single-phase AC [L1, L2] power for PCB power supply.
- 3) If the 'PF' fault message is displayed on the LCD, press and hold the SET key to enter the parameter setting mode.
- 4) Press UP, DOWN, SET Key to see [Parameter setting method] Set the rated AH and Auto Run of the battery to OFF and press SET key to exit the setting mode and 'PF' fault message will be displayed again.
- 5) Apply the 3-phase power of the controller to clear the fault and check the LCD window display.
- 6) Verify that the SV voltage matches the actual input source voltage and that the BV voltage is at 0V.
- 7) Apply battery voltage and verify BV voltage matches actual battery voltage.
- 8) Press the RUN key to charge the battery while observing the OC [Output Current] current.
- 9) If the current and voltage are not abnormal, press the RUN Key again to stop charging.
- 10) Press and hold SET key to set Auto Run to ON in parameter setting mode.**
- 11) Press the RUN key to charge the battery.



10. Fault and Warning Description

10-1. Fault list

NO	Display	Cause
1	[FAULT] GATE-DRV	IGBT Gate Driver Damage
2	[FAULT] WATCHDOG	Abnormal operation of MCU
3	[FAULT] OVR-CURR	Overcurrent
4	[FAULT] BAD BATT	Battery failure

10-2. Fault Cause and Action

LIST	Cause and Action
[FAULT] WATCHDOG	<p>Watchdog / MCU function error</p> <p>If the MCU malfunctions momentarily due to noise or other external conditions</p> <p>☞ Reset the MCU.</p>
[FAULT] GATE-DRV	<p>Gate Driver Defect / Gate Driver Damage</p> <p>If the IGBT Gate Driver is physically damaged</p> <p>☞ Turn off all the power and then turn it on again.</p> <p>If the fault persists, replace the PCB because it is a physical damage.</p>
[FAULT] OVR- CURR	<p>Over Current</p> <p>Overcurrent flows above set current</p> <p>☞ Check the output wiring.</p>
[FAULT] BAD BATT	<p>Bad Battery</p> <p>If current is not flowing even when voltage is continuously applied to the battery</p> <p>☞ Check the battery condition.</p> <p>☞ Charge the battery in Equal Charge [EQU Key] mode.</p>

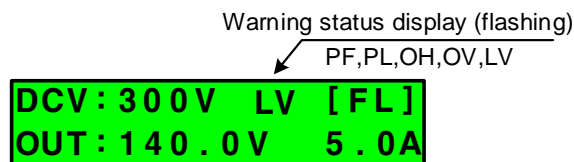
10-3 Warning list

NO	Display	Cause
1	PF	Power Fault
2	PL	Power Too Low
3	OH	Over Heat
4	OV	Over Voltage
5	LV	Low Voltage

10-4 Warning Cause and Action

LIST	Cause and Action
PF	Power Fault / Input power abnormality Input power (AC power) is not applied. ☞ Check the input power line. If there is no problem Check the fuse inside the unit for burnout
PL	Power Too Low / Input Power Undervoltage The input voltage is lower than the set battery voltage. ☞ Check the input power line.
OH	Over Heat Unit temperature is over 85 °C. ☞ Check the ambient temperature and the air circulation inside the unit ☞ Check whether the fan is abnormal, check the connection of the unit internal temperature sensor.
OV	Over Voltage / Overcharge The battery voltage is overcharged (25% or more of the rated voltage). ☞ Check if charging stops and charging starts when the battery voltage is discharged to the rated voltage. ☞ Make sure the battery voltage setting is correct
LV	Low Voltage / Overcharge Battery voltage is over-discharged (less than 25% of rated voltage). ☞ Make sure that it is charging. The warning is released when the battery continues to charge and the battery voltage is reached.

10-5 Warning Display



- * If it is displayed like this, it is charged to 5A with input voltage of 440VAC (DCV 600V). However, the battery voltage (OUT: 140V) does not reach the rated voltage (216V Setting) and LV Warning (low voltage) is displayed.
- * When the alarm is canceled, it operates normally. (Reset is not required)

11. Caution for operation

- 1) This product contains sensitive electronic components. Opening the lid of the product and touching any electronic components may be dangerous as well as cause fatal damage.
- 2) Be sure to turn off all power supply when replacing PCB and maintenance. High pressure inside the product can cause fatal injuries.
- 3) Although this product is designed to withstand noise and surge in power supply, excessive noise, surge, etc. may cause abnormal operation. Please use stable power as much as possible.
- 4) Always use the correct rated product for the device fuse.
- 5) If any information not explained in this manual is displayed on the display, please contact our laboratory. (+82-31-498-9270).