1000W Switching Power Supply for Harsh Environment HEP-1000 series

User's Manual

(Terminal Type)

(Wiring Type)

TAIWAN EXCELLENCE 2020 | PMBus Power Management. Defined. | IS 13252 (Note 9)

IP67 (Wiring type) | UL62368-1 | BS EN/EN62368-1 | TPTC004 | IEC62368-1

Automate | Industrial | Security | Network | Telecom

Features

- Power or charger mode switchable by SBP-001(Terminal type)
- High efficiency up to 96%
- Aluminum case fanless design and filling with heat-conducted glue and able to withstand 10G vibration test
- Wide operating temperature range -40 ~ +70℃
- Charger for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese)
- Built-in default 2/3 stage charging curves and programmable curve
- Built-in PMBus protocol / CANBus protocol (optional)
- Output voltage and constant current level programmable
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in remote ON-OFF control (Terminal type)
- DC OK active signal and 12V Auxiliary power available
- LED indicator for power on (Terminal type)
- IP67 design for indoor or outdoor installation (Wiring type)
- 6 years warranty

Applications

- Industrial automation machinery
- Industrial control system at harsh environment
- Mechanical and electrical equipment
- Electronic instruments, equipments
- 5G telecom equipments
- Robotic lawn mower/AMR/AGV
- Equipments or instruments with back-up battery

GTIN CODE

MW Search: https://www.meanwell.com/serviceGTIN.aspx

Description

HEP-1000 is a 1000W industrial AC/DC power supply featuring the outstanding capability to operate under highly humid, dusty, oily, and high-vibration harsh environment. The entire series is housed with the aluminum case and fully potted with heat-conducted glue. Adopting the full range 90~305VAC input, the entire series provides an output voltage line of 24V, 48V and 100V. In addition to the high efficiency up to 96%, that the whole series operates from -40℃ ~ 70℃ under air convection without fan. HEP-1000 has the complete protection functions and 10G anti-vibration capability ; It is complied with the international safety regulations such as TUV BS EN/EN62368-1 UL62368-1, and the design refers to BS EN/EN61558-1 and BS EN/EN60335-1HEP-1000 series serves as a high performance power supply solution for various industrial and charger applications.

Model Encoding

HEP -1000 - 24 W □

- Function option: Blank/PM/CAN/CPM/CCAN
- Blank : Terminal type
- W : Wiring type with IP67
- Output voltage(24/48/100V)
- Rated wattage
- Series name

I/O Type	Function type	Communication Protocol	Note
Terminal	Blank	PMBus and PV/PC programmable	In Stock
	CAN	CANBus and PV/PC programmable	By request
Wiring	Blank	PV/PC programmable	By request
	PM	PMBus	By request
	CAN	CANBus	By request
	CPM	Charger with PMBus	By request
	CCAN	Charger with CANBus	By request

Note: Terminal type with charger function by programmer or PMBus/CANBus setting

SPECIFICATION FOR POWER SUPPLY (Default Setting)

MODEL		HEP-1000-24□□	HEP-1000-48□□	HEP-1000-100□□
OUTPUT	DC VOLTAGE	24V	48V	100V
	RATED CURRENT	42A	21A	10A
	RATED POWER	1008W	1008W	1000W
	RIPPLE & NOISE (max.) Note.2	200mVp-p	250mVp-p	500mVp-p
	VOLTAGE ADJ. RANGE	By built-in potentiometer, SVR		
		24 ~ 30V	48 ~ 60V	100 ~ 125V
	VOLTAGE TOLERANCE Note.3	±1.0%	±1.0%	±1.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±0.5%	±0.5%	±0.5%
	SETUP, RISE TIME	1800ms, 80ms at full load 230VAC /115VAC		
	HOLD UP TIME (Typ.)	16ms / 230VAC at 75% load 12ms / 230VAC at full load		
INPUT	VOLTAGE RANGE Note.4	90 ~ 305VAC 250 ~ 431VDC		
	FREQUENCY RANGE	47 ~ 63Hz		
	POWER FACTOR (Typ.)	PF>0.99/115VAC, PF>0.95/230VAC, PF>0.93/277VAC at full load		
	EFFICIENCY (Typ.)	95%	96%	96%
	AC CURRENT (Typ.)	10.1A / 115VAC 5.3A / 230VAC 4.5A / 277VAC		
	INRUSH CURRENT(Typ.)	Cold start 40A at 230VAC		
	LEAKAGE CURRENT	<0.75mA / 240VAC		
PROTECTION	OVERLOAD	105~125% rated current		
		Protection type : Constant current limiting, shut down O/P voltage after 5 sec. After O/P voltage falls, re-power on to recover		
	SHORT CIRCUIT	Constant current limiting, unit will shutdown after 5 sec, re-power on to recover		
	OVER VOLTAGE	30 ~ 35V	60 ~ 70V	125 ~ 145V
		Protection type :Shut down O/P voltage,re-power on to recover		
	OVER TEMPERATURE	Protection type :Shut down O/P voltage, recovers automatically after temperature goes down		
FUNCTION	OUTPUT VOLTAGE PROGRAMMABLE(PV) Note 5	Adjustment of output voltage is allowable to 50 ~ 125% of nominal output voltage Please refer to the Function Manual.		
	OUTPUT CURRENT PROGRAMMABLE(PC) Note 5	Adjustment of constant current level is allowable to 20 ~ 100% of rated current. Please refer to the Function Manual.		
	REMOTE ON/OFF CONTROL	Power ON : Short circuit Power OFF : Open circuit		
	AUXILIARY POWER	12V @ 0.5A tolerance ±10%, ripple=150mVp-p		
	DC-OK SIGNAL	The TTL signal out, PSU turn on = 4.4 ~ 5.5V ; PSU turn off = -0.5 ~ 0.5V. Please refer to the Function Manual.		
ENVIRONMENT	WORKING TEMP.	-40 ~ +70℃ (Refer to "Derating Curve")		
	WORKING HUMIDITY	20 ~ 95% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH non-condensing		
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)		
	VIBRATION	20 ~ 500Hz, 10G 12min./1cycle, period for 72min. each along X, Y, Z axes		
SAFETY & EMC (Note.7)	SAFETY STANDARDS	UL62368-1, TUV BS EN/EN62368-1, BIS IS13252(Part1): 2010/IEC 60950-1:2005(NOTE 9), EAC TP TC 004 approved; design refer to BS EN/EN61558-1, BS EN/EN60335-1(by request)		
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:1.25KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG,O/P-FG:100M Ohms/500VDC/25℃/ 70%RH		
	EMC EMISSION	**Parameter**	**Standard**	**Test Level / Note**
		Conducted	BS EN/EN55032 (CISPR32)	Class B
		Radiated	BS EN/EN55032 (CISPR32)	Class B
		Harmonic Current	BS EN/EN61000-3-2	Class A
		Voltage Flicker	BS EN/EN61000-3-3	-----
	EMC IMMUNITY	BS EN/EN55024 , BS EN/EN61000-6-2		
		Parameter	**Standard**	**Test Level / Note**
		ESD	BS EN/EN61000-4-2	Level 3, 8KV air ; Level 2, 4KV contact
		Radiated	BS EN/EN61000-4-3	Level 3
		EFT / Burst	BS EN/EN61000-4-4	Level 3
		Surge	BS EN/EN61000-6-2	2KV/Line-Line 4KV/Line-Earth
		Conducted	BS EN/EN61000-4-6	Level 3
		Magnetic Field	BS EN/EN61000-4-8	Level 4
		Voltage Dips and Interruptions	BS EN/EN61000-4-11	>95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods
OTHERS	MTBF	583.7K hrs min. Telcordia SR-332 (Bellcore) ; 52.3K hrs min. MIL-HDBK-217F (25℃)		
	DIMENSION	310*144*48.5mm (L*W*H)		
	PACKING	4Kg;4pcs/17Kg/1.04CUFT		

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.
3. Tolerance :includes set up tolerance, line regulation and load regulation.
4. Derating may be needed under low input voltages. Please check the derating curve for more details.
5. PV/PC functions when users do not use SVR.
6. In power mode: When O/P voltage is below < 80% of Vset for 5 sec. the unit will shut down afterwards.
7. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 720mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to “EMI testing of component power supplies.”
   (as available on https://www.meanwell.com//Upload/PDF/EMI_statement_en.pdf)
8. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/1000m with fan models for operating altitude higher than 2000m(6500ft).
9. Some model may not have the BIS logo, please contact your MEAN WELL sales for more information.

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SPECIFICATION FOR CHARGER (Option function)

MODEL		HEP-1000-24□□	HEP-1000-48□□	HEP-1000-100□□
OUTPUT	BOOST CHARGE VOLTAGE Vboost	28.8V	57.6V	115.2V
	FLOAT CHARGE VOLTAGE Vfloat	27.6V	55.2V	110.4V
	RECOMMENDED BATTERY CAPACITY(AMP HOURS)(Note 2)	120 ~ 350AH	60 ~ 175AH	30 ~ 85AH
	BATTERY TYPE	Open & Sealed Lead Acid		
	OUTPUT CURRENT	35A	17.5A	8.7A
INPUT	VOLTAGE RANGE Note 3	90 ~ 305VAC 250 ~ 431VDC		
	FREQUENCY RANGE	47 ~ 63Hz		
	POWER FACTOR (Typ.)	PF>0.99/115VAC, PF>0.95/230VAC, PF>0.93/277VAC at full load		
	EFFICIENCY (Typ.)	95%	96%	96%
	AC CURRENT (Typ.)	10.1A / 115VAC 5.3A / 230VAC 4.5A / 277VAC		
	INRUSH CURRENT(Typ.)	Cold start 40A at 230VAC		
	LEAKAGE CURRENT	<0.75mA / 240VAC		
PROTECTION	SHORT CIRCUIT	Constant current limiting, unit will shutdown after 5 sec, re-power on to recover.		
	OVER VOLTAGE	30 ~ 35V	60 ~ 70V	125 ~ 145V
		Protection type :Shut down O/P voltage,re-power on to recover		
	OVER TEMPERATURE	Protection type :Shut down O/P voltage, recovers automatically after temperature goes down		
FUNCTION	REMOTE ON/OFF CONTROL	Power ON : Short circuit Power OFF : Open circuit		
	AUXILIARY POWER	12V @ 0.5A tolerance ±10%, ripple=150mVp-p		
	DC-OK SIGNAL	The TTL signal out, PSU turn on = 4.4 ~ 5.5V ; PSU turn off = -0.5 ~ 0.5V. Please refer to the Function Manual.		
ENVIRONMENT	WORKING TEMP.	-40 ~ +70℃ (Refer to "Derating Curve")		
	WORKING HUMIDITY	20 ~ 95% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH non-condensing		
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)		
	VIBRATION	20 ~ 500Hz, 10G 12min./1cycle, period for 72min. each along X, Y, Z axes		
SAFETY & EMC (Note.5)	SAFETY STANDARDS	UL62368-1, TUV BS EN/EN62368-1, BIS IS13252(Part1): 2010/IEC 60950-1:2005(NOTE 7), EAC TP TC 004 approved; design refer to BS EN/EN61558-1, BS EN/EN60335-1(by request)		
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:1.25KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG,O/P-FG:100M Ohms/500VDC/25℃/ 70%RH		
	EMC EMISSION	**Parameter**	**Standard**	**Test Level / Note**
		Conducted	BS EN/EN55032 (CISPR32)	Class B
		Radiated	BS EN/EN55032 (CISPR32)	Class A
		Harmonic Current	BS EN/EN61000-3-2	Class A
		Voltage Flicker	BS EN/EN61000-3-3	-----
	EMC IMMUNITY	BS EN/EN55024 , BS EN/EN61000-6-2		
		Parameter	**Standard**	**Test Level / Note**
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		Radiated	BS EN/EN61000-4-3	Level 3
		EFT / Burst	BS EN/EN61000-4-4	Level 3
		Surge	BS EN/EN61000-6-2	2KV/Line-Line 4KV/Line-Earth
		Conducted	BS EN/EN61000-4-6	Level 3
		Magnetic Field	BS EN/EN61000-4-8	Level 4
		Voltage Dips and Interruptions	BS EN/EN61000-4-11	>95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods
OTHERS	MTBF	583.7K hrs min. Telcordia SR-332 (Bellcore) ; 52.3K hrs min. MIL-HDBK-217F (25℃)		
	DIMENSION	310*144*48.5mm (L*W*H)		
	PACKING	4Kg;4pcs/17Kg/1.04CUFT		

NOTE

1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.
2. This is Mean Well's suggested range. Please consult your battery manufacturer for their suggestions about maximum charging current limitation.
3. Derating may be needed under low input voltages. Please check the derating curve for more details.
4. In charge mode: When O/P voltage < 67% of Vset for 5 sec. the unit will shut down afterwards.
5. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 720mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on https://www.meanwell.com//Upload/PDF/EMI_statement_en.pdf)
6. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/1000m with fan models for operating altitude higher than 2000m(6500ft).
7. Some model may not have the BIS logo, please contact your MEAN WELL sales for more information.

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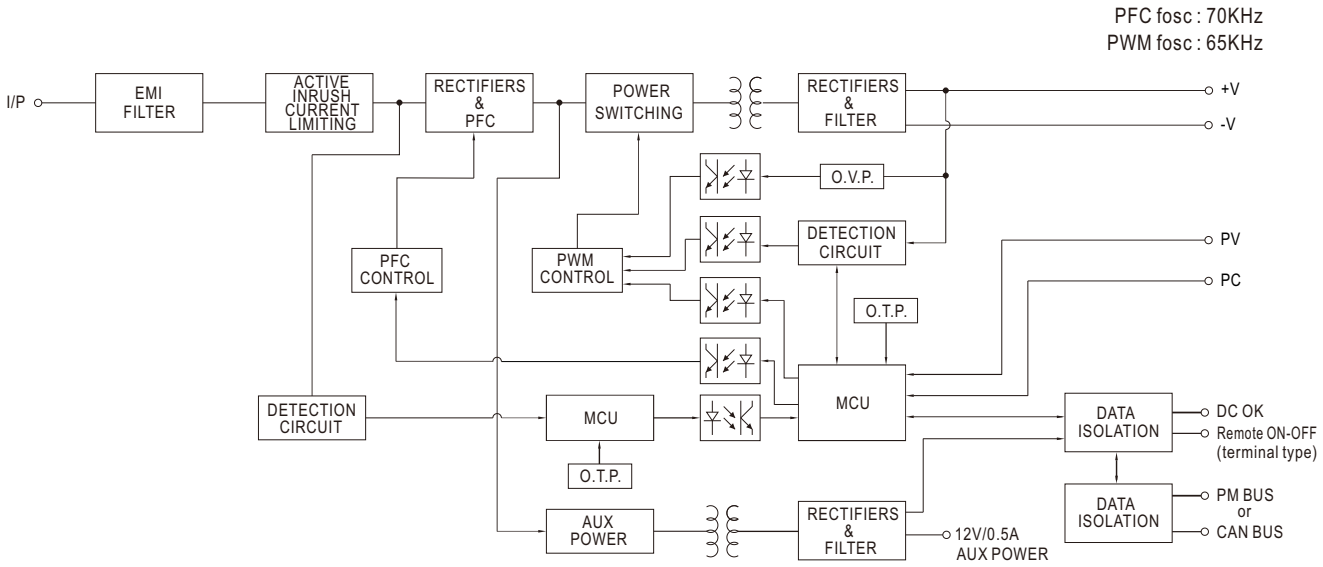
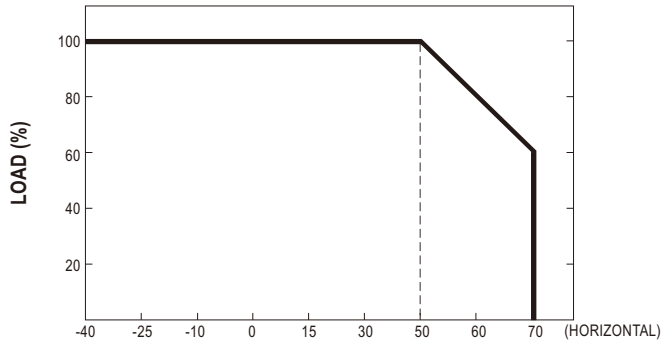
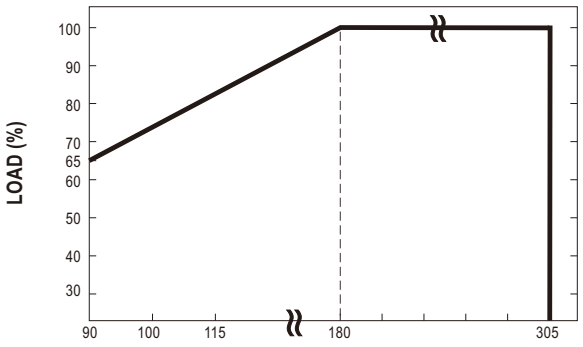
■ BLOCK DIAGRAM



■ DERATING CURVE



■ STATIC CHARACTERISTICS



※ For 100V model charging mode, output current is 20% rated min. when operating tempature at -40℃, and can reach 100% above -30℃.

■ TABLE OF FUNCTION

I/O TYPE	Function type	Power Supply Function	Charging Function	PV/PC Programmable	PMBus Protocol	CANBus Protocol	LED Indicator	Remote On/Off	DC-OK Signal	Temperature Compensation	12V/0.5A Aux. output
Terminal type	Blank	V(default)	V	V	V		V	V	V	V	V
	CAN	V(default)	V	V		V	V	V	V	V	V
Wiring type	Blank	V		V					V		V
	PM	V			V				V		V
	CAN	V				V			V		V
	CPM		V		V				V	V	V
	CCAN		V			V			V	V	V

■ FUNCTION MANUAL

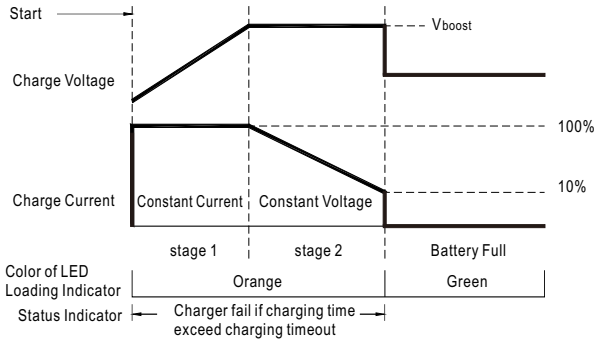
1.Charging Curve (For charger type or setting HEP-1000 to charger mode)

※ By default, the HEP-1000 operates in power supply mode, and it can be configured to charger mode by PMBus, CANBus, or SBP-001.

※ By factory default, this charger performs the default curve which can be programmed via PMBus and CANBus.

※ To accommodate the parameters of the charging curve, SBP-001, the smart battery charging programmer designed by MEAN WELL, and a personal computer are needed. Please contact MEAN WELL for details.

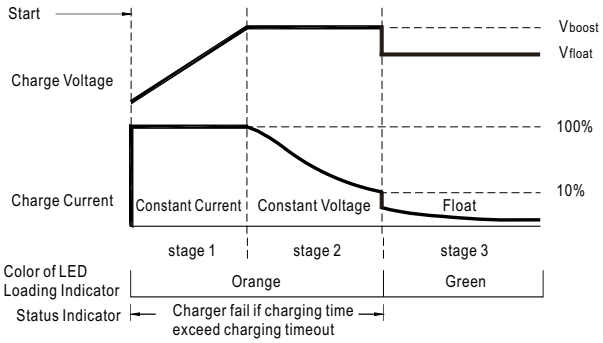
※ 2 stage charging curve



State	24	48	100
Constant Current	35A	17.5A	8.7A
Vboost	28.8V	57.6V	115.2V

◎ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).

※ 3 stage charging curve (default)



State	24	48	100
Constant Current	35A	17.5A	8.7A
Vboost	28.8V	57.6V	115.2V
Vfloat	27.6V	55.2V	110.4V

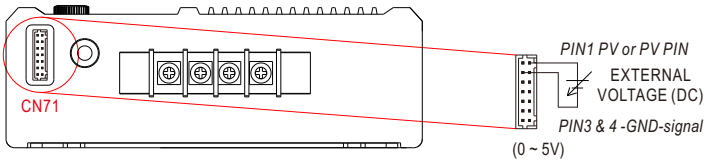
◎ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).

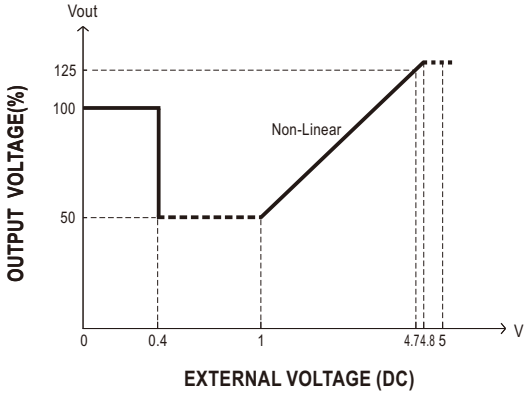
2. Front Panel LED Indicators & Corresponding Signal at Function Pins (Terminal type)

LED	Description
Green	Float (stage 3)
Orange	Charging (stage 1 or stage 2)
Red	Abnormal status (OTP, OLP, Charging timeout.)
Red (Flashing)	The LED will flash with the red light when the internal temperature reaches 95℃; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus interface.)

3.Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim)

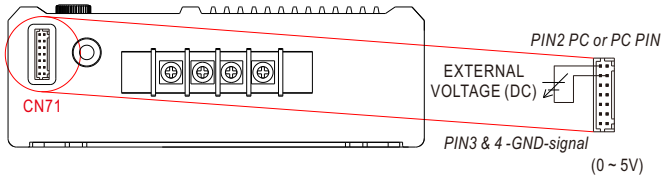
※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE.
(For Blank type of Terminal and wiring)

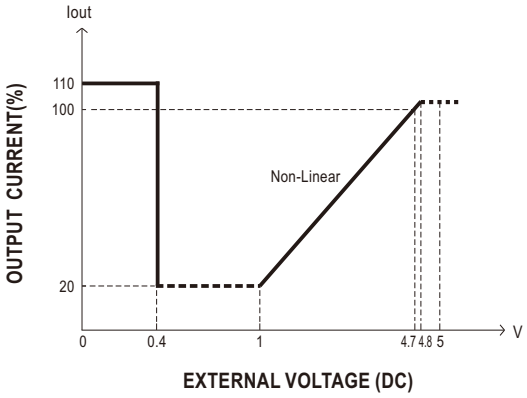




4.Output Current Programming (or, PC / remote current programming / dynamic current trim)

※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.
(For Blank type of Terminal and wiring)

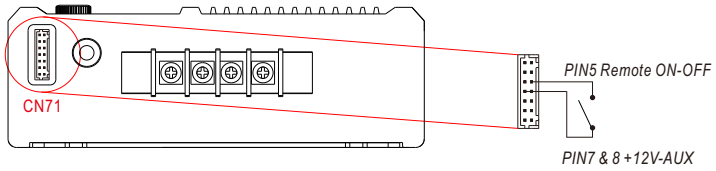




◎ When O/P voltage is below 80% of Vset for 5 sec, the unit will shut down afterwards, re-power on to recover.

5.Remote ON-OFF Control (Terminal type)

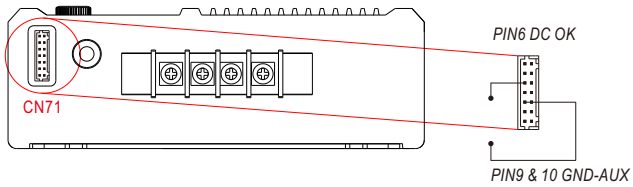
The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function.



Remote ON-OFF	Power Supply Status
Short circuit	ON
Open circuit	OFF

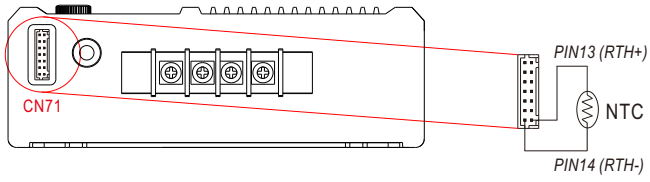
6.DC-OK Signal

DC-OK signal is a TTL level signal. The maximum source current is 10mA and the maximum external voltage is 5.5V.



DC-OK signal	Power Supply Status
“High” >4.4~5.5V	ON
“Low” <-0.5~0.5V	OFF

7.Temperature Compensation



◎ To exploit the temperature compensation function, please attach the temperature sensor, NTC, which is enclosed with the charger, to the battery or the battery's vicinity.
◎ The charger is able to work normally without the NTC.

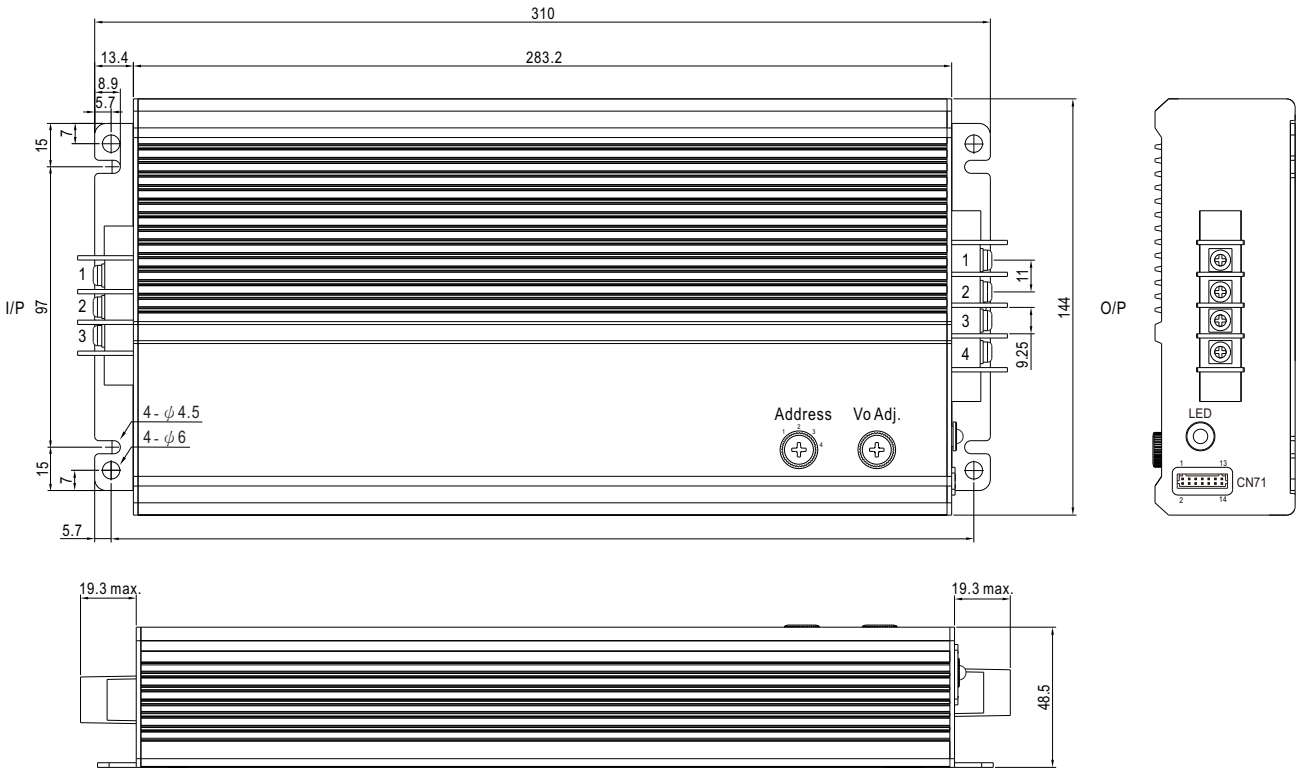
8.PMBus Communication Interface

HEP-1000 supports PMBus Rev. 1.1 with maximum 100KHz bus speed, allowing information reading, status monitoring, output trimming, etc. For details, please refer to the User’s Manual.

■ MECHANICAL SPECIFICATION

Case No.228F Unit:mm Tolerance:±1

※**Blank-Type (Terminal type)**



※ Output voltage current level can be adjusted through internal potentiometer.(Vo Adj.)
(Can access by removing the rubber stopper on the case.)
※ PMBus interface address selection.(Address)

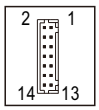
AC Input Terminal Pin No. Assignment

Pin No.	Assignment
1	FG ⏚
2	AC/L
3	AC/N

DC Output Terminal Pin No. Assignment

Pin No.	Assignment
1,2	-V
3,4	+V

※Control Pin No. Assignment(CN71) : JST S14B-PHDKS-B or equivalent

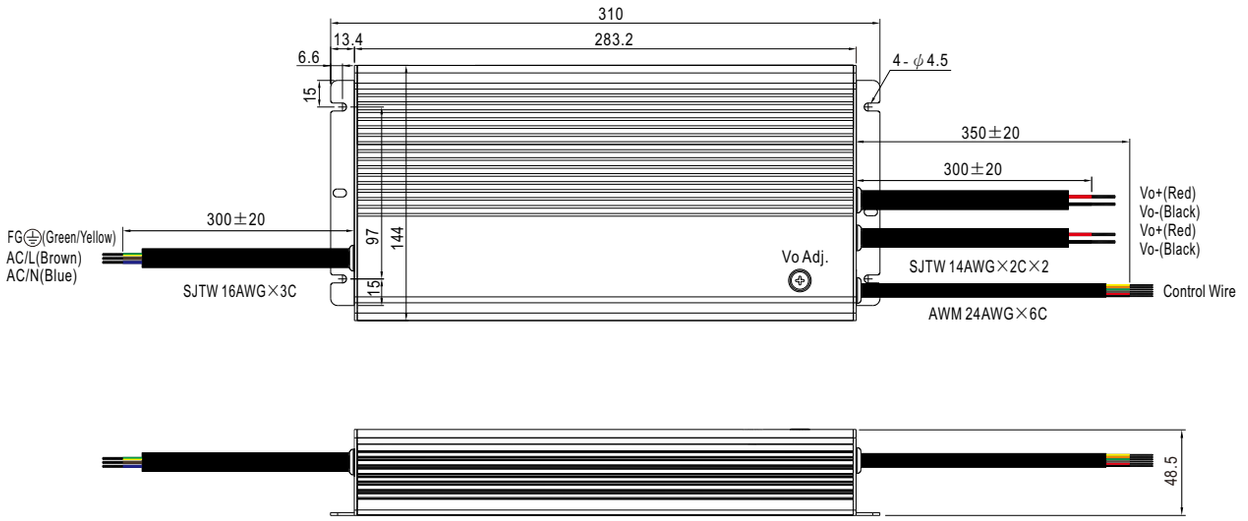


Mating Housing	JST PHDR-14VS or equivalent
Terminal	JST SPHD-001T-P0.5 or equivalent

Pin No.	Function	Description
1	PV	Connection for output voltage programming.(Note1)
2	PC	Connection for constant current level programming.(Note.1)
3,4	GND (Signal)	Negative output voltage signal.
5	Remote ON-OFF	The unit can turn the output ON/OFF by dry contact between Remote ON/OFF and +12-AUX.(Note.2) Short (10.8 ~ 13.2V) : Power ON ; Open(0 ~ 0.5V) : Power OFF ; The maximum input voltage is 13.2V
6	DC-OK	Low (-0.5 ~ 0.5V) : When Vout≦77%±6% at power mode. Vout≦66%±6% at charger mode. High (4.4 ~ 5.5V) : When Vout≧80%±6% at power mode. Vout≧67%±6% at charger mode. The maximum sourcing current is 10mA and only for output.(Note.2)
7,8	+12V-AUX	Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX (pin9 & 10). The maximum load current is 0.5A. This output is not controlled by "Remote ON-OFF".
9,10	GND-AUX	Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V).
11	SDA	For PMBus model: Serial Data used in the PMBus interface. (Note.2)
	CANH	For CANBus model: Data line used in CANBus interface. (Note.2)
12	SCL	For PMBus model: Serial Clock used in the PMBus interface. (Note.2)
	CANL	For CANBus model: Data line used in CANBus interface. (Note.2)
13	RTH+	Temperature sensor(NTC, 5KOhm) comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage.
14	RTH-	

Note1: Non-isolated signal, referenced to [GND(signal)].
Note2: Isolated signal, referenced to GND-AUX.

※**W-Type (Wiring type)**



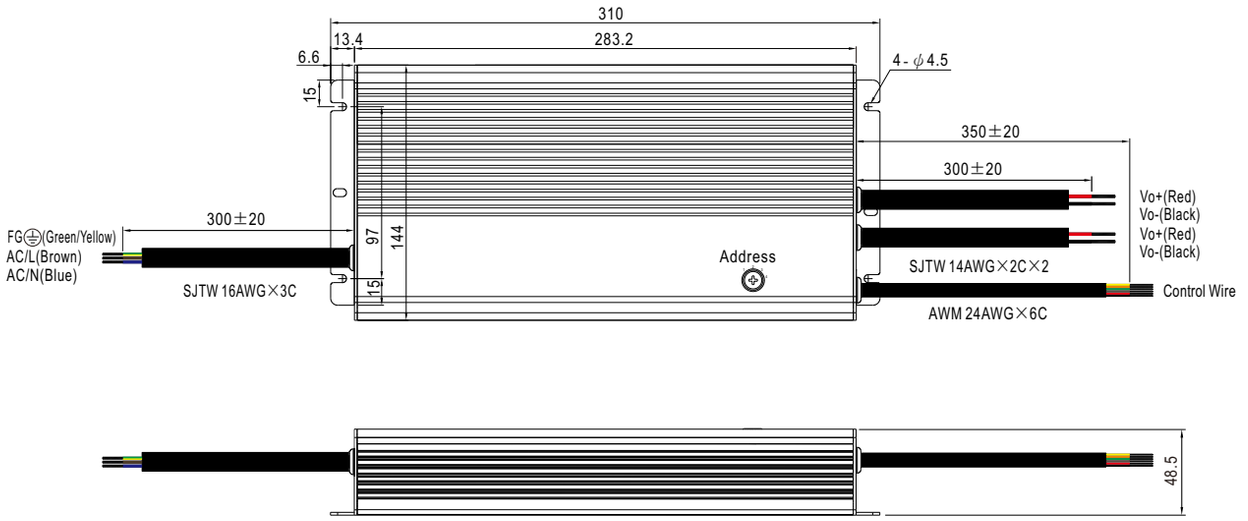
※ Output voltage current level can be adjusted through internal potentiometer.
(Can access by removing the rubber stopper on the case.)

※ Control Wire Assigment : (AWM 24AWG×6C)

Color	Function	Description
Yellow	PV	Connection for output voltage programming.(Note1)
Orange	PC	Connection for constant current level programming.(Note.1)
Green	GND (Signal)	Negative output voltage signal.(PV/PC GND)
Brown	DC-OK	Low (0 ~ 0.5V) : When Vout≦77%±6% at power mode. Vout≦66%±6% at charger mode. High (4.4 ~ 5.5V) : When Vout≧80%±6% at power mode. Vout≧67%±6% at charger mode. The maximum sourcing current is 10mA and only for output.(Note.2)
Red	+12V-AUX	Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX. The maximum load current is 0.5A.
Black	GND-AUX	Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V).

Note1: Non-isolated signal, referenced to [GND(signal)].
Note2: Isolated signal, referenced to GND-AUX (GND for CANBus and PMBus protocal).

※**W-Type (Wiring type with charger)**



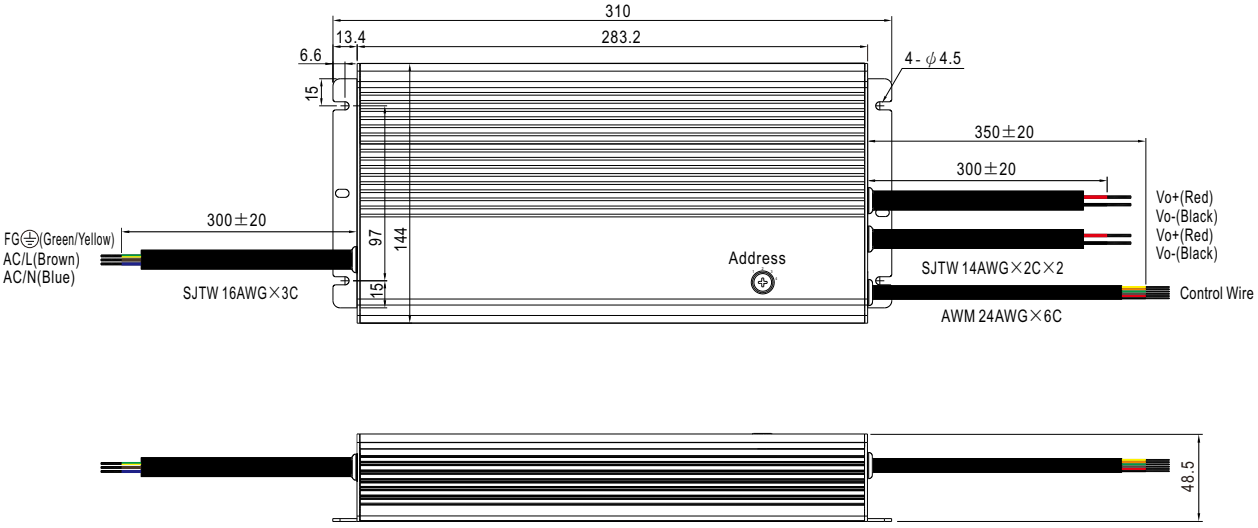
※ Output voltage current level can be adjusted through internal potentiometer.
(Can access by removing the rubber stopper on the case.)

※ Control Wire Assigment : (AWM 24AWG×6C)

Color	Function	Description
Yellow	SDA	For PMBus model: Serial Data used in the PMBus interface. (Note.1)
	CANH	For CANBus model: Data line used in CANBus interface. (Note.1)
Orange	SCL	For PMBus model: Serial Clock used in the PMBus interface. (Note.1)
	CANL	For CANBus model: Data line used in CANBus interface. (Note.1)
Green	RTH-	Temperature sensor(NTC, 5KOhm) comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage.
Brown	RTH+	
Red	+12V-AUX	Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX. The maximum load current is 0.5A.
Black	GND-AUX	Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V).

Note1: Isolated signal, referenced to GND-AUX.

※**W-Type (Wiring of WPM/WCAN)**



※ Output voltage current level can be adjusted through internal potentiometer.
(Can access by removing the rubber stopper on the case.)

※ Control Wire Assigment : (AWM 24AWG×6C)

Color	Function	Description
Yellow	SDA	For PMBus model: Serial Data used in the PMBus interface. (Note.1)
	CANH	For CANBus model: Data line used in CANBus interface. (Note.1)
Orange	SCL	For PMBus model: Serial Clock used in the PMBus interface. (Note.1)
	CANL	For CANBus model: Data line used in CANBus interface. (Note.1)
Green	GND (Signal)	Negative output voltage signal.(PV/PC GND)
Brown	DC-OK	Low (0 ~ 0.5V) : When Vout≦77%±6% at power mode. Vout≦66%±6% at charger mode. High (4.4 ~ 5.5V) : When Vout≧80%±6% at power mode. Vout≧67%±6% at charger mode. The maximum sourcing current is 10mA and only for output.(Note.1)
Red	+12V-AUX	Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX. The maximum load current is 0.5A.
Black	GND-AUX	Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V).

Note1: Isolated signal, referenced to GND-AUX.