

HFE2500-D1U/PMBus RACK INSTRUCTION MANUAL

HFE2500-D1U SERIES RACK SPECIFICATIONS

1	Number of power supply modules (*1)(*7)	---	Dual output / Each output: Maximum 2 units HFE2500 of the same output voltage rating (*1)
2	Maximum output power (*8)	W	Refer to HFE2500 specifications or to pages 18-19 of this manual
3	Maximum output current	A	Refer to HFE2500 specifications or to pages 18-19 of this manual
4	Input voltage / frequency range (*2)	---	85~265Vac continuous, 47~63Hz, Single phase, separate input for each PS module.
5	Maximum input current (at 115/230Vac)	A	16/12 for each HFE2500 power supply module
6	Maximum line regulation (*4)	%	Less than 0.25 of rated output voltage
7	Maximum load regulation (*5)	%	Less than 0.8 of rated output voltage
8	AC input connector (*6)		Separate for each power supply. IEC inlet, C22
9	Output terminals	---	Dual output: Bus-bars outputs for each output terminal. Refer to outline drawing.
10	Remote sensing (*3)	V	Possible. Refer to Instruction Manual.
11	Parallel operation (*8)	---	Possible. Refer to Instruction Manual.
12	Series operation (*8)	---	Possible. Refer to Instruction Manual.
13	Remote On/Off control (INHIBIT)	---	Separate control for each PS unit, by electrical signal or dry contact. "OFF": 0~0.6V or short. "ON": 2~15V or open.
14	Remote On/Off control (ENABLE)	---	Common for each output, by electrical signal or dry contact. "ON": 0~0.6V or short. "OFF": 2~15V or open.
15	DC OK signal	---	Separate signal for each PS unit, open collector signal. Maximum sink current: 10mA, Max 15V. Tracking output setting, "LOW" when Vout>90+/-5% of output voltage setting
16	AC fail signal	---	Separate signal for each PS unit, open collector signal. Maximum sink current: 10mA, Max 15V. "LOW" when input voltage 85Vac<Vin<270Vac.
17	Over Temperature alarm signal	---	Separate signal for each PS unit, open collector signal. Maximum sink current: 10mA, Max 15V. Refer to Instruction Manual
18	Output voltage trimming	---	Possible. Separate for each output, by built-in potentiometer. Refer to Instruction Manual.
19	Output voltage programming	---	Possible, Separate for each output, by 0~5V signal. Refer to Instruction Manual.
20	OCV programming by external voltage	---	Possible, Separate for each output, by 0~5V signal. Refer to Instruction Manual.
21	Output voltage programming via I2C interface (*8)	---	Possible, Separate for each output. Refer to Instruction Manual.
22	OCV programming via I2C interface (*8)	---	Possible, Separate for each output. Refer to Instruction Manual.
23	Auxiliary power supply	---	Separate for each output. 11.2~12.5VDC. Maximum output current: 0.5A
24	Operating temperature	---	-10~50°C: 100% load. +50°C to +60°C: Derate 2%/°C of load +60°C to +70°C: Derate 2.5%/°C of load
25	Storage temperature	---	-30~85°C
26	Operating humidity	---	10~90% RH, no condensation.
27	Storage humidity	---	10~95% RH, no condensation.
28	Applicable safety standards	---	IEC/EN/UL/CSA 62368-1
29	Vibration	---	Build to meet IEC60068-2-64 (Basic Transportation)
30	Shock	---	Build to meet IEC60068-2-27 (Basic Transportation)
31	Withstand voltage	---	Input-Output: 3000Vrms, 1min.
			Input-Ground: 2000Vrms, 1min.
			Output-Ground: 12, 24V models - 500Vrms, 1min
			Output-Ground: 48V model - 2250VDC, 1min.
32	Insulation resistance	---	More than 100Mohm at 25°C and 70% RH. Output-Ground: 500Vdc
33	Weight (Typ) (with accessories)	kg	5.8
34	Size (W*H*D)	---	445x43.6x401mm. Refer to Outline Drawing.

Notes:

- *1 Mixing of PMBus option units ("HFE2500-xx/S") and standard units ("HFE2500-xx") is not allowed.
- *2 For cases where conformance to various safety standards (UL, EN etc.) is required, Input Voltage to be described as 100-240Vac (50/60Hz).
- *3 Maximum voltage drop on load wires: HFE2500-12: 0.25V/wire, HFE2500-24: 0.5V/wire, HFE2500-48: 1V/wire.
- *4 From 85~132Vac or 170~265Vac, constant load.
- *5 From No-load to Rated load, constant input voltage. Measured at the sensing point in Remote sense.
- *6 Use UL approved AC connector.
- *7 The output of each pair of HFE2500 modules are connected in parallel in the Rack
- *8 Refer to HFE2500 specification for more details.

SAFETY INSTRUCTIONS

CAUTION: HFE2500-D1U is intended for installation in Restricted Access Area.

ATTENTION: HFE2500-D1U sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT

CAUTION: The following safety precaution must be observed during all phases of operation, service and repair of this equipment. Failure to comply with the safety precautions or warnings in this document violates safety standards of design, manufacture and intended use of this equipment and may impair the built-in protections within. TDK Lambda shall not be liable for user's failure to comply with these requirements.

CAUTION: HFE2500-D1U rack is not authorized for use as critical component in nuclear control systems, life support systems or equipment for use in hazardous environments without the express written approval of the managing director of TDK-Lambda.

INSTALLATION (OVERVOLTAGE) CATEGORY & ENVIRONMENTAL CONDITIONS

The HFE2500-D1U has been evaluated to Overvoltage category II.

The HFE2500-D1U intended for use in the following operation conditions:

- * Indoor use
- * Pollution degree 2
- * Max. operational altitude: 3000m above sea level
- * Ambient temperature: -10°C-50°C at 100% load, up to 70°C with output de-rating applied (refer to Specification above).

GROUNDING

HFE2500-D1U rack is Class I product. This product is designed for use within other equipment which restricts access to Authorized competent personnel only. The unit covers/chassis must not be made user accessible. The mains input connector is not acceptable for use as field wiring terminals. The appliance must be securely mounted and the Ground Stud properly bonded to the main protective earth contact before any connection to AC mains supply is made.

To minimize shock hazard, the HFE2500-D1U rack must be connected to an electrical ground. The instruments must be connected to the AC power supply mains through a three conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. For instruments designed to be hard-wired to the supply mains, the protective earth terminal must be connected to the safety electrical ground before any other connection is made. Any interruption of the protective ground conductor or disconnection of the protective earth terminal will cause a potential shock hazard that might cause personal injury.

LIVE CIRCUITS

Operating personnel must not remove the HFE2500-D1U rack cover.

No internal adjustment or component replacement is allowed by non-TDK Lambda qualified service personnel. Never replace components with power cable connected. To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

Restricted Access Area: HFE2500-D1U rack should only be installed in a Restricted Access Area. Access should be available to service personnel only.

PARTS SUBSTITUTIONS & MODIFICATIONS

Parts substitutions and modifications are allowed by authorized TDK Lambda service personnel only. For repairs or modifications, the instrument must be returned to TDK Lambda service facility.

AC INPUT, AC INPUT RATING, AC POWER CABLES

CAUTION

Risk of electrical shock and energy hazard. Disconnecting one power supply line disconnects only one power supply module. To isolate the unit completely, disconnect all power supply lines. Terminal blocks should only be used by professional workers to connect AC cables.

ATTENTION

Risque de choc et de danger électriques. Le débranchement d'une seule alimentation stabilisée ne débranche uniquement qu'un module "Alimentation Stabilisée". Pour isoler complètement le module en cause, il faut débrancher toutes les alimentations stabilisées.

Do not connect HFE2500-D1U to mains supply exceeding the input voltage and frequency rating of HFE2500-D1U. The input voltage and frequency rating is: 100-240V~, 50/60Hz. For safety reasons, the mains supply voltage fluctuations should not exceed +/-10% of nominal voltage.

AC Cables are not provided with unit. Use a standard high temperature power cable with type C21 appliance plug rated: EU - 16A/250V; US/C - 20A/250V

HEAT HAZARD

WARNING: Top, bottom and side surfaces may become hot when operating the unit continuously. To reduce the risk of injury from a hot surface, allow the surface to cool before touching.

ENERGY HAZARD

The main output of HFE2500-D1U is capable of providing hazardous energy. Due to hazardous energy level the output bus bars and connections therefore must not be user accessible. Manufacturer's final equipment must provide protection to service personnel against inadvertent contact with output bus bars.

OVERCURRENT PROTECTION:

A readily accessible branch circuit over current protective device rated 30A max. per each input must be incorporated in the building wiring. The protective device must disconnect both supply line simultaneously.

FUSES

There are no fuses in the HFE2500-D1U rack.

Disconnect device - Permanently connected equipment

An appropriate, easily accessible disconnect device shall be incorporated in the building installation wiring

Safety Instructions - Rack Mounting

- A) Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.
- B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

Déconnexion - Équipement branché en permanence

Intégrez à l'installation électrique du bâtiment un appareil de coupure d'alimentation facile d'accès.

Instructions de sécurité - Montage en baie

- A) Température de service élevée - En cas d'installation en baie, multiple ou fermée, la température ambiante en fonctionnement dans la baie peut être plus élevée que la température de la pièce.
Par conséquent, il convient d'installer l'équipement dans un environnement compatible avec la température ambiante maximale (T_{ma}) recommandée par le fabricant.
- B) Débit d'air réduit - L'installation de l'équipement en baie doit permettre une ventilation suffisante pour garantir un fonctionnement en toute sécurité de l'équipement.
- C) Résistance mécanique - Le montage de l'appareil en baie doit être tel qu'il élimine tout risque provoqué par un charge mécanique inadaptée.
- D) Surcharge électrique - Une attention particulière doit être donnée au raccordement de l'équipement au circuit d'alimentation électrique et de l'effet qu'une surcharge possible des circuits pourrait avoir sur une protection contre les surcharges et sur les câbles électriques.
Il convient pour cela de considérer les valeurs nominales sur la plaque d'identification de l'équipement.
- E) Mise à la terre - La fiabilité de la mise à la terre doit être entretenue pour l'installation de l'équipement en baie. Une attention particulière doit être donnée aux connexions d'alimentation électrique autres que les connexions directes au circuit de dérivation (exemple : utilisation de prises électriques multiples).

SYMBOLS


CAUTION Risk of Electrical Shock.



Instruction manual symbol. The instrument will be marked with this symbol when it is necessary for the user to refer to the instruction manual.



Indicates hazardous voltage.



This symbol indicates the presence of a hot surface or component. Touching this surface could result in bodily injury.



Indicates ground terminal.



Protective Ground Conductor Terminal

L1

Indicates first Line supply terminal

L2/N

Indicates second Line or Neutral supply terminal

WARNING

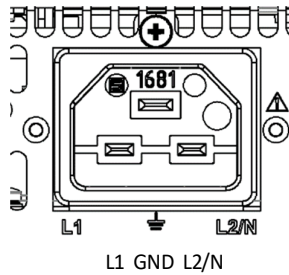
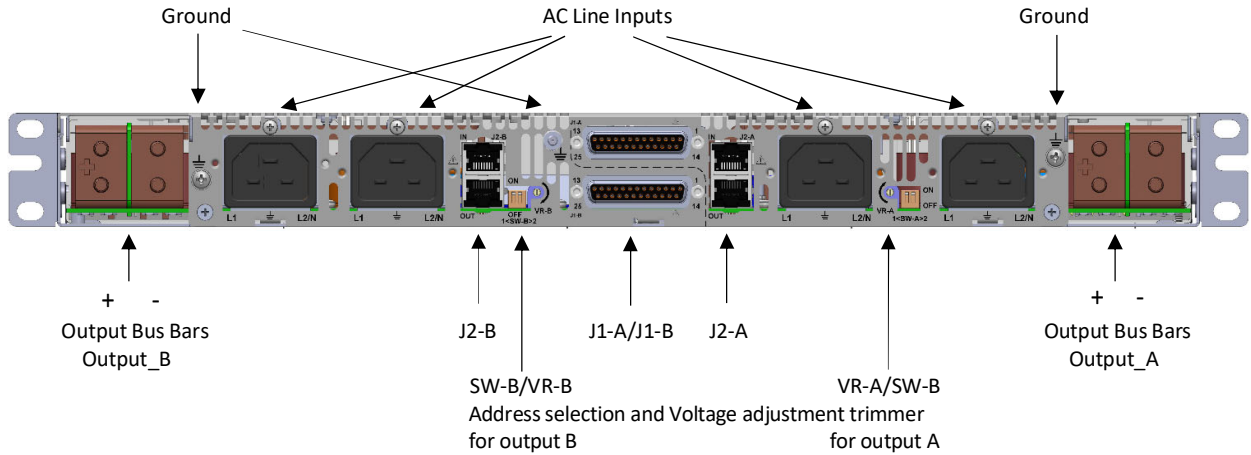
Denotes hazard. An attention to a procedure is called. Not following the procedure correctly could result in personal injury. A WARNING sign should not be skipped and all indicated conditions must be fully understood and met.

CAUTION

Denotes hazard. An attention to a procedure is called. Not following the procedure correctly could result in damage to the equipment.

1. REAR PANEL CONNECTIONS AND CONTROLS

Fig 1.1 Rear view of HFE2500-D1U series



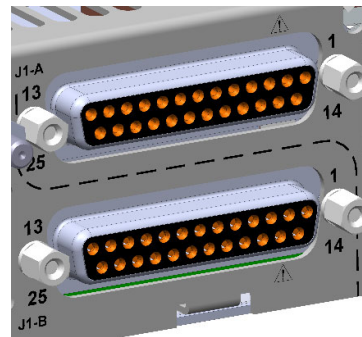
Use the supplied M6 nut, M6 flat washer, and M6 spring washer for load wires fixing. Recommended tightening torque: 42-56Kgf.cm

1.1. J1-A & J1-B Connector for Control and Monitoring

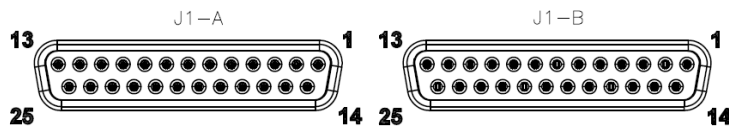
Mating for J1-A & J1-B Control Plug (provided) or custom made plug/ cable should be inserted to J1-A&J1-B for proper operation of HFE2500 rack. Refer to Chapter 3 for connection diagrams.

PLEASE VERIFY J1-A &/OR J1-B ARE PROPERLY PLUGGED IN.

ENSURE THAT THERE IS NO MECHANICAL STRESS ON J1-A & J1-B CONNECTOR.



J1-A & J1-B Pin Allocation Chart see Table 1.1a and Table 1.1b



J1-A & J1-B
 Connector description: P/N: 2-1734285-3 (AMP)
 Mating Plug description: P/N: DB-25 (Male)

Table 1.1a J1-A Connector Pin Allocation Chart

Pin #	Name	Description	Pos. #	Control plug J1-A	Referenced to
1	-LS_A	Connected to Negative Output bus bar through 3 Ohm resistor.	Out_A	Short	
5,14	-SENSE_A	Negative sense Connected to –LS for local sensing, or –V on Load side.	Out_A		
2	+LS_A	Connected to Positive Output bus bar through 3 Ohm resistor.	Out_A	Short	
15	+SENSE_A	Positive sense Connected to +LS for local sensing, or +V on Load side.	Out_A		
3	TRIM_A	Output of Rear Panel potentiometer, for manual adjustment of Output Voltage	Out_A	Short	-SENSE_A
16	V_PROG_A	Input (0~5V) referenced to –S. Provides Vout programming by Voltage. Refer to Fig 3.6 and Fig 3.8	Out_A		-SENSE_A
4	+5V_A	5V fix output for standard option unit.	Out_A	Short	-SENSE_A
17	I_PROG_A	Input (0-5V) referenced to -S. Provided current limit programming by external voltage. Refer to Fig 3.7 and Fig 3.9	Out_A		-SENSE_A
6	TEMP_ALM_A1	Output signal of PS in position A1. "LOW" when the internal temperature is within safe limit, "HIGH" approximately 10°C below Thermal shut down. Open Collector (15V Max, sink Current 10mA max)	A1		SIGNAL RETURN_A
7	AC_FAIL_A1	Output signal of PS in position A1. "LOW" when the input voltage is 85Vac<Vin<270Vac, "HIGH" when the input voltage is 85Vac>Vin or Vin>270Vac. Open Collector (15V Max, sink Current 10mA max)	A1		SIGNAL RETURN_A
8	DC_OK_A1	Output signal of PS in position A1. "LOW" when the output voltage is higher than 85~95% of Vout setting. Open Collector (15V Max, sink Current 10mA max)	A1		SIGNAL RETURN_A
9,13,24	SIGNAL RETURN_A	Reference for: ENABLE, INHIBIT, TEMP ALARM, AC FAIL, DC OK, +12V AUX. The SIGNAL RETURN is isolated from the output.	Out_A		---
10	INHIBIT_A1	Input for PS in position A1. Turns OFF the Main Output by electrical signal or dry contact. "SHORT" or 0~0.6V – Output OFF. "OPEN" or 2~15V – Output ON	A1		SIGNAL RETURN_A
11	PS_EXIST_A1	Output signal of PS in position A1. SHORT to Signal Return when PS is inserted into the Rack. "Active Low".	A1		SIGNAL RETURN_A
12	+12V_AUX_A	Output. Auxiliary supply 11.2~12.5VDC. Not affected by any signal or fail state			SIGNAL RETURN_A
18	V_REF_A	Variable output for Voltage/Current programming with PMBus option	Out_A		-SENSE_A
19	TEMP_ALM_A2	Output signal of PS in position A2. Same as 6.	A2		SIGNAL RETURN_A
20	AC_FAIL_A2	Output signal of PS in position A2. Same as 7.	A2		SIGNAL RETURN_A
21	DC_OK_A2	Output signal of PS in position A2. Same as 8.	A2		SIGNAL RETURN_A
22	INHIBIT_A2	Input signal for PS in position A2. Same as 10.	A2		SIGNAL RETURN_A
23	PS_EXIST_A2	Output signal of PS in position A2. Same as 11.	A2		SIGNAL RETURN_A
25	ENABLE_A	Input for Output_A. Turns ON the Main Output by electrical signal or dry contact. "SHORT" or 0~0.6V – Output ON. "OPEN" or 2~15V – Output OFF	Out_A	Short	SIGNAL RETURN_A

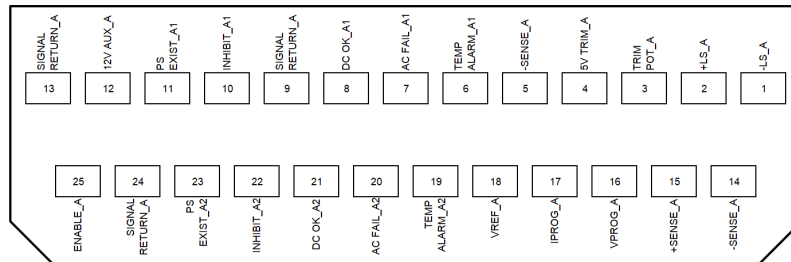
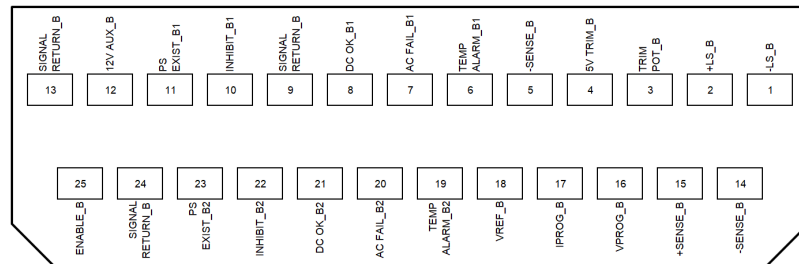


Table 1.1b J1-B Connector Pin Allocation Chart

Pin #	Name	Description	Pos. #	Control plug J1-B	Referenced to
1	-LS_B	Connected to Negative Output bus bar through 3 Ohm resistor.	Out_B	Short	
5,14	-SENSE_B	Negative sense Connected to –LS for local sensing, or –V on Load side.	Out_B		
2	+LS_B	Connected to Positive Output bus bar through 3 Ohm resistor.	Out_B	Short	
15	+SENSE_B	Positive sense Connected to +LS for local sensing, or +V on Load side.	Out_B		
3	TRIM_B	Output of Rear Panel potentiometer, for manual adjustment of Output Voltage	Out_B	Short	-SENSE_B
16	V_PROG_B	Input (0~5V) referenced to –S. Provides Vout programming by Voltage. Refer to Fig 3.6 and Fig 3.8	Out_B		-SENSE_B
4	+5V_B	5V fix output for standard option unit.	Out_B	Short	-SENSE_B
17	I_PROG_B	Input (0-5V) referenced to -S. Provided current limit programming by external voltage. Refer to Fig 3.7 and Fig 3.9	Out_B		-SENSE_B
6	TEMP_ALM_B1	Output signal of PS in position B1. "LOW" when the internal temperature is within safe limit, "HIGH" approximately 10°C below Thermal shut down. Open Collector (15V Max, sink Current 10mA max)	B1		SIGNAL RETURN_B
7	AC_FAIL_B1	Output signal of PS in position B1. "LOW" when the input voltage is 85Vac<Vin<270Vac, "HIGH" when the input voltage is 85Vac>Vin or Vin>270Vac. Open Collector (15V Max, sink Current 10mA max)	B1		SIGNAL RETURN_B
8	DC_OK_B1	Output signal of PS in position B1. "LOW" when the output voltage is higher than 85~95% of Vout setting. Open Collector (15V Max, sink Current 10mA max)	B1		SIGNAL RETURN_B
9,13,24	SIGNAL RETURN_B	Reference for: ENABLE, INHIBIT, TEMP ALARM, AC FAIL, DC OK, +12V AUX. The SIGNAL RETURN is isolated from the output.	Out_B		---
10	INHIBIT_B1	Input for PS in position B1. Turns OFF the Main Output by electrical signal or dry contact. "SHORT" or 0~0.6V – Output OFF. "OPEN" or 2~15V – Output ON	B1		SIGNAL RETURN_B
11	PS_EXIST_B1	Output signal of PS in position B1. SHORT to Signal Return when PS is inserted into the Rack. "Active Low".	B1		SIGNAL RETURN_B
12	+12V_AUX_B	Output. Auxiliary supply 11.2~12.5VDC. Not affected by any signal or fail state			SIGNAL RETURN_B
18	V_REF_B	Variable output for Voltage/Current programming with PMBus option	Out_B		-SENSE_B
19	TEMP_ALM_B2	Output signal of PS in position B2. Same as 6.	B2		SIGNAL RETURN_B
20	AC_FAIL_B2	Output signal of PS in position B2. Same as 7.	B2		SIGNAL RETURN_B
21	DC_OK_B2	Output signal of PS in position B2. Same as 8.	B2		SIGNAL RETURN_B
22	INHIBIT_B2	Input signal for PS in position B2. Same as 10.	B2		SIGNAL RETURN_B
23	PS_EXIST_B2	Output signal of PS in position B2. Same as 11.	B2		SIGNAL RETURN_B
25	ENABLE_B	Input for Output_B. Turns ON the Main Output by electrical signal or dry contact. "SHORT" or 0~0.6V – Output ON. "OPEN" or 2~15V – Output OFF	Out_B	Short	SIGNAL RETURN_B

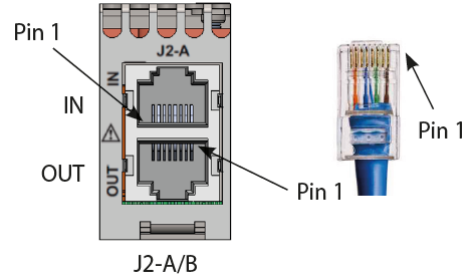


1.2. J2 Pin Allocation Chart

J2 connector (RJ45 type) is used to parallel connection.

Table 1.2a J2-A / J2-B

IN		OUT	
Pin#	Name	Pin#	Name
1	CURRENT SHARE	1	CURRENT SHARE
2	I_PROG	2	I_PROG
3	V_PROG	3	V_PROG
4	-SENSE	4	-SENSE
5	SCL (PMBus)	5	SCL (PMBus)
6	SIGNAL RETURN	6	SIGNAL RETURN
7	SDA (PMBus)	7	SDA (PMBus)
8	SMB ALERT	8	SMB ALERT



1.3 Output Bus Bar Connections

The HFE2500-D1U has two identical Output Bus Bar connections on both sides of Rear Panel. Each busbar have different output.

ATTENTION: Maximum allowable current per output – 320A. See pages 15-16.

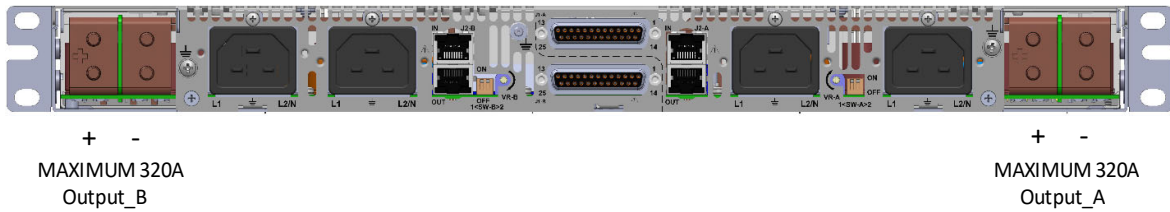


Fig 1.3a Output Bus-Bars.

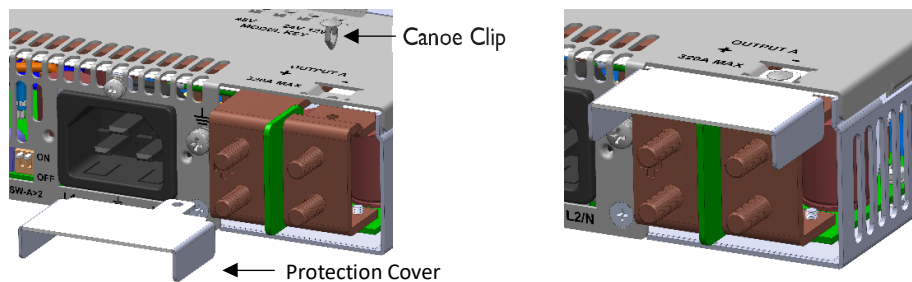


Fig 1.3b Installation of Output Bus-Bars Protection Cover.

1.4. Output Voltage adjustment Trimmer

Output Voltage may be adjusted by the Rear Panel Trimmer.

Model	HFE2500-12	HFE2500-24	HFE2500-48
Output voltage range (V)	9.6~13.2	19.2~29.0	38.4~58

*NOTE: manual trim setup not to be used with /S PMBUS versions.



1.5 PMBus address

Each slot in the Rack has its own address for PMBus communication. Valid only if /S option power supply is being used. In case of parallel connection of two racks is used, SW-A and SW-B located on the rear panel are used to differentiate between addresses for the same slots.

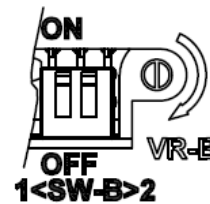
Table 1.5a

Position in Rack	SW-A-1	SW-A-2	ADDRESS (Bin)
A1	OFF	OFF	1000
A2			1001
A1	OFF	ON	1010
A2			1011
A1	ON	OFF	1100
A2			1101
A1	ON	ON	1110
A2			1111



Table 1.5b

Position in Rack	SW-B-1	SW-B-2	ADDRESS (Bin)
B1	OFF	OFF	0000
B2			0001
B1	OFF	ON	0010
B2			0011
B1	ON	OFF	0100
B2			0101
B1	ON	ON	0110
B2			0111



• RACK MECHANICAL FEATURES

2.1 Insertion and extraction of the PS

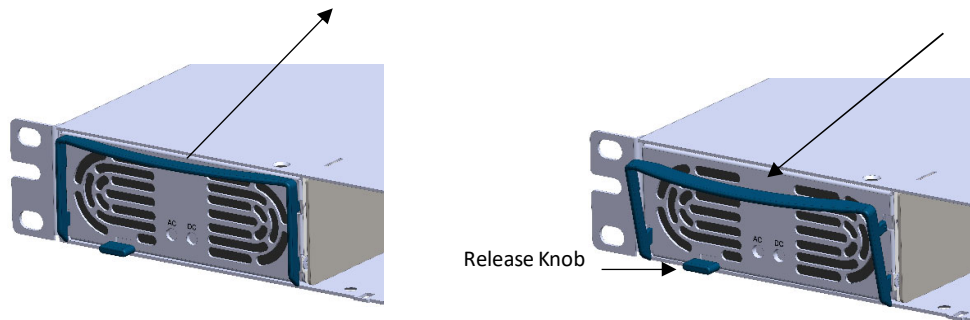


Fig 2.1

To insert the power supply, push unit into the rack with extraction handle closed.
 To extract power supply, elevate the release knob and pull the extraction handle simultaneously.

CAUTION

When inserting a power supply into the rack, do not use unnecessary force; slamming the power supply into the rack can damage the connectors on the rear of the supply and inside the rack.

2.2 Definition of Power Supplies Position

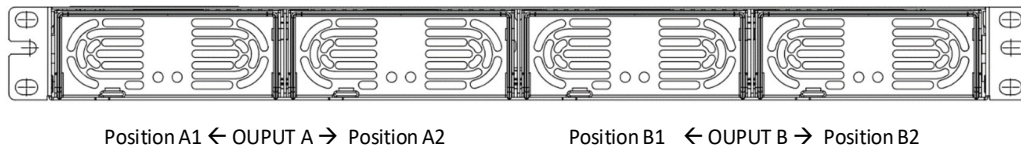


Fig 2.2 Power supply positions

2.3 Keying Option to define the Rack's Voltage

Keying Option can be installed to ensure that only the correct Power Supply can be inserted into the Rack. The Key Option consists of two parts: Power Supply Key (one per unit Fig 2.3a) and Rack Keys (4 per Rack Fig 2.3b). Power Supply Key and Rack Keys should be fixed (by Flat head screws M3x6) in position corresponding to Output Voltage.

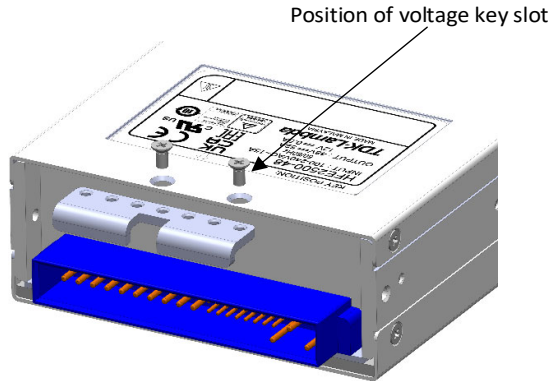


Fig 2.3a Assembly of PS Key
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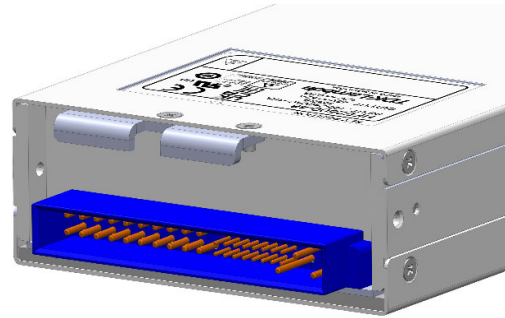


Fig 2.3c Example 24V Model with assembled Key.

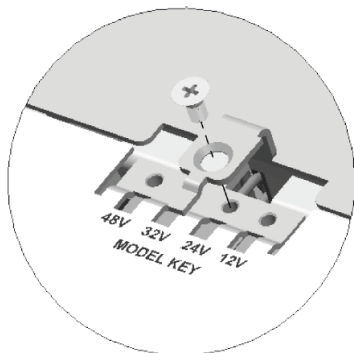


Fig 2.3b Assembly of Rack Key (RackTop View)
 IA705-32-14_

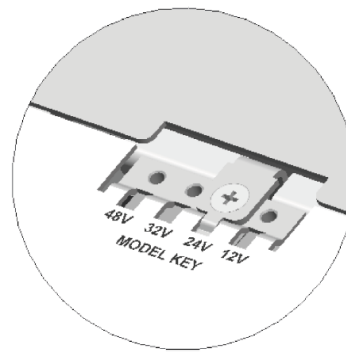


Fig 2.3d Example Rack Key assembled for 24V power supplies

2.4 Blank Panel

In case a position of the Rack is not filled with HFE2500, Blank Panel IA706-32-05_ should be used to ensure proper Air Flow. It is recommended to interleave supplies and Blank Panels wherever possible

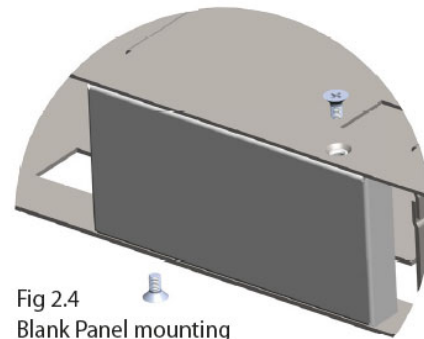


Fig 2.4
 Blank Panel mounting

2.5 Rack mounting options

Rack can be mounted into 19" Rack Cabinet which suits both USA and European Standards:

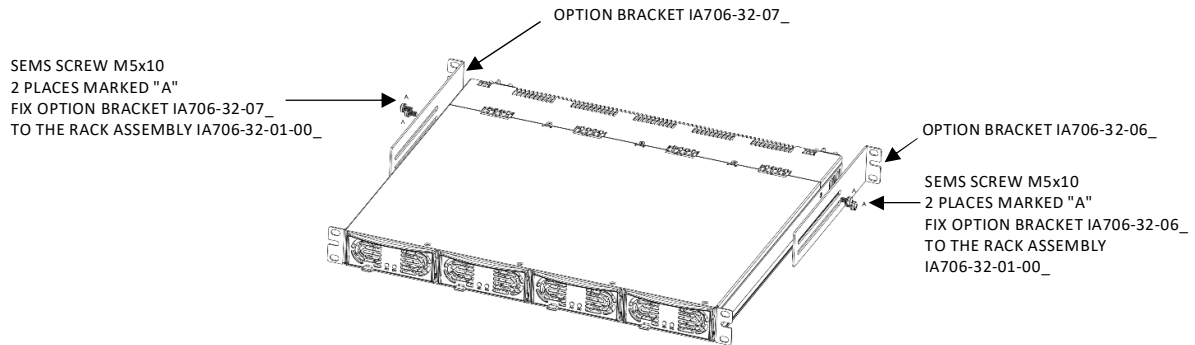
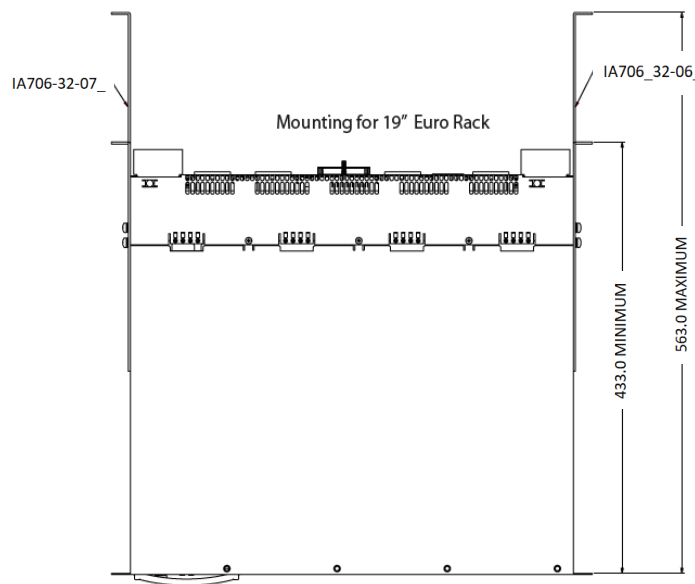
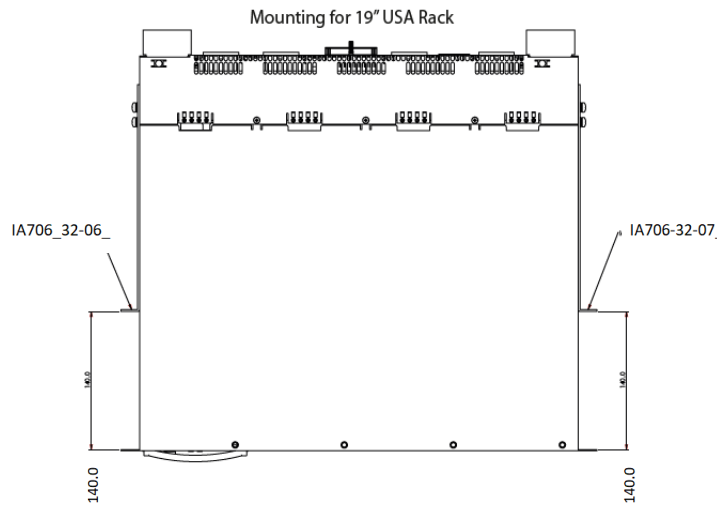


Fig 2.5 Mounting options, brackets and screws are included.

Recommended Tightening torque: 27-31 Kgf.cm



TYPICAL APPLICATIONS

3.1 Basic connection

For basic connection, the supplied Control Plug should be inserted to J1-A & J1-B.

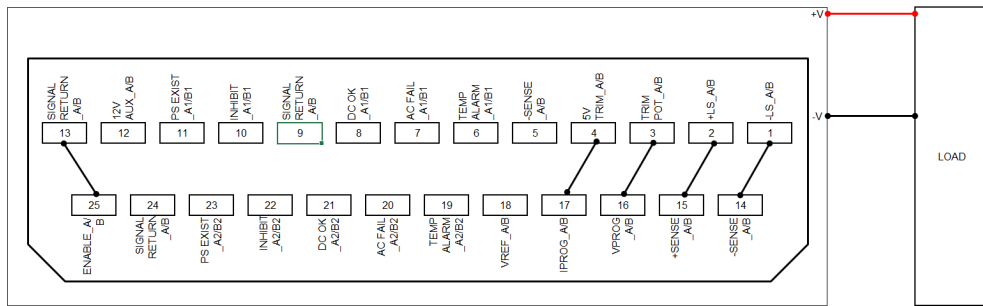


Fig 3.1 Basic connection diagram.

3.2 Remote sensing

ATTENTION:

1. Maximum voltage drop on load wires: HFE2500-12: 0.25V/wire, HFE2500-24: 0.5V/wire, 48: 1V/wire.
2. Twisted wires should be used for Remote Sense connection.
3. If Remote Sensing is used, do not break Main Output connection.

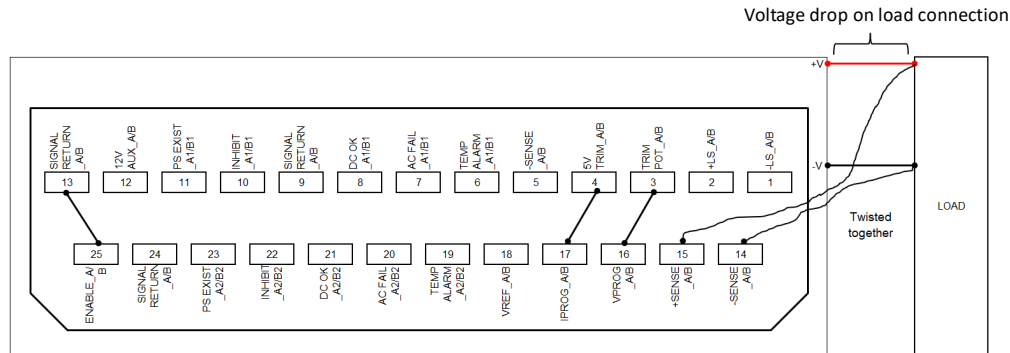


Fig 3.2 Remote Sensing connection diagram

3.3 On/Off control for Output-A and Output-B

Switch closed: Output ON
 Switch open: Output OFF

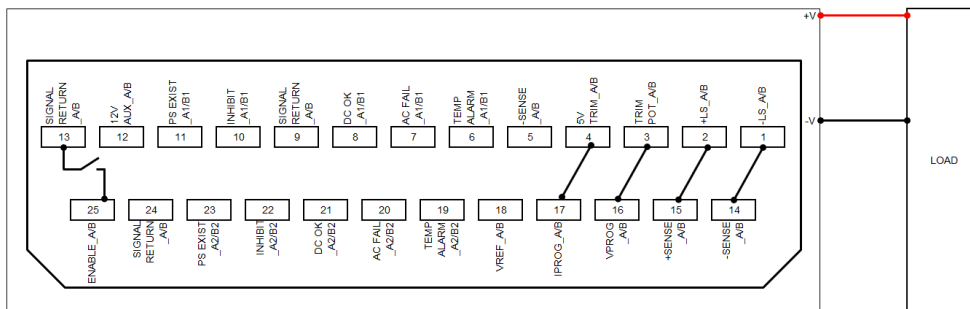


Fig 3.3 On/Off control diagram.

3.4 Individual On/Off control for each PS

Switch closed: Output OFF
 Switch open: Output ON

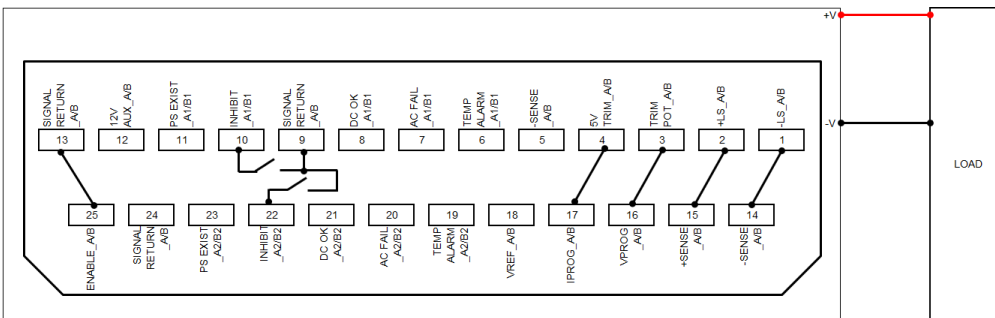


Fig 3.4 individual units On/Off diagram.

3.5 Supervisory signals.

Following signals are accessible from each power supply at J1-A & J1-B:
 DC OK / AC FAIL / PS EXIST / TEMP ALARM

These signals are Open Collector type (Max 15V, 10mA), isolated from Output and referenced to SIGNAL RETURN.

Fig 3.5 presents example of the typical connection for DC OK signal of power supply in position A1 or B1.

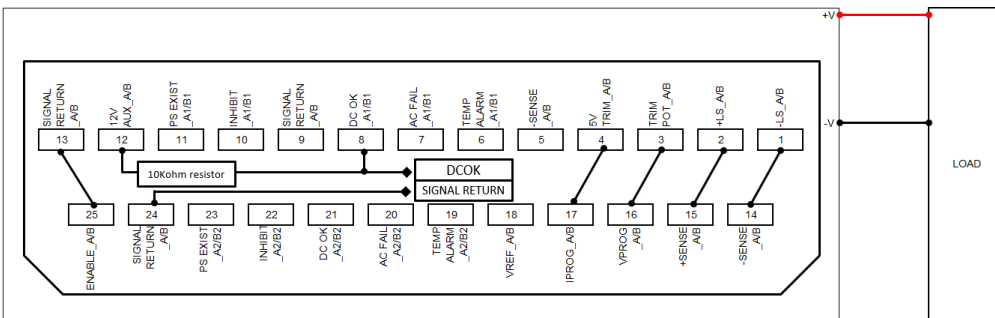


Fig 3.5 "DC OK" signal connection diagram for Power Supply in Position A or B.

3.6 Output Voltage programming by External Voltage.

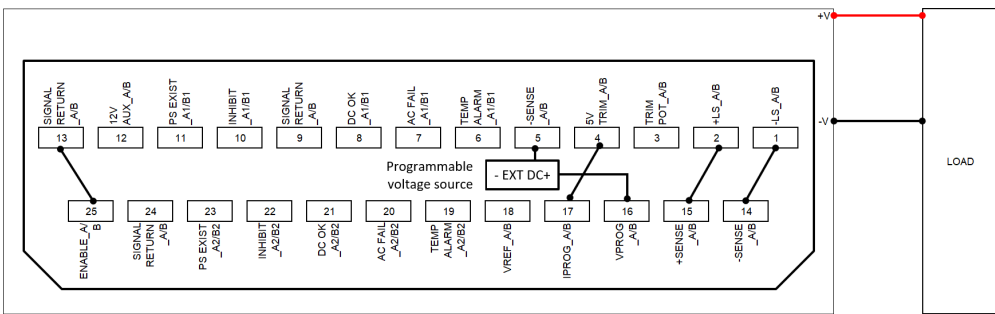
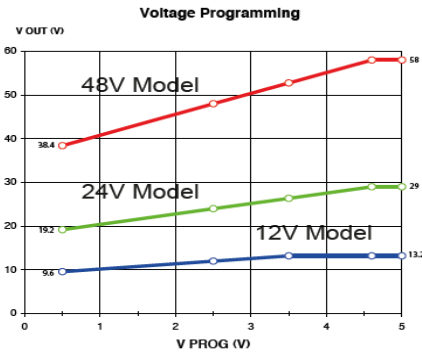


Fig 3.6 Output voltage programming by External Voltage.



3.7. Over Current programming by External Voltage.

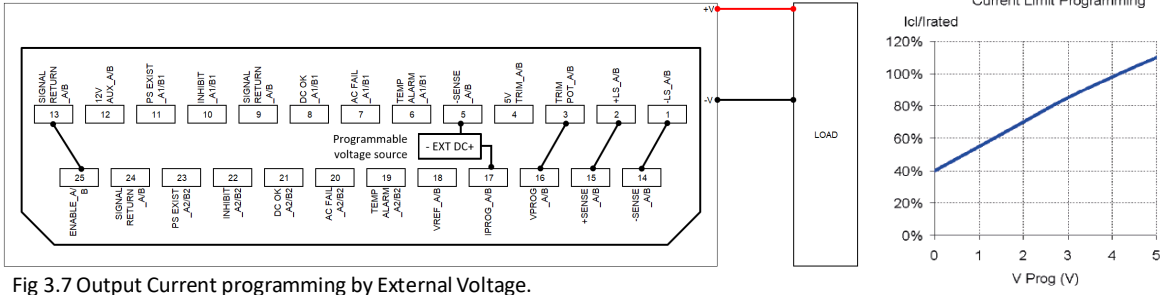


Fig 3.7 Output Current programming by External Voltage.

3.8. Output Voltage programming by PMBUS.

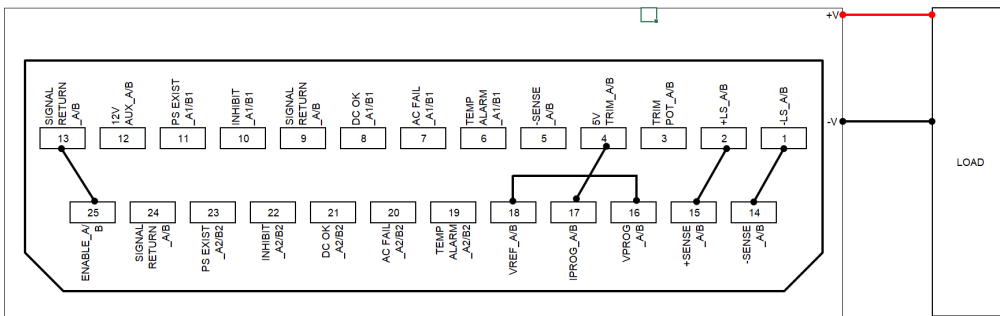


Fig 3.8 Output voltage programming by PMBUS.

3.9. Output Current programming by PMBUS.

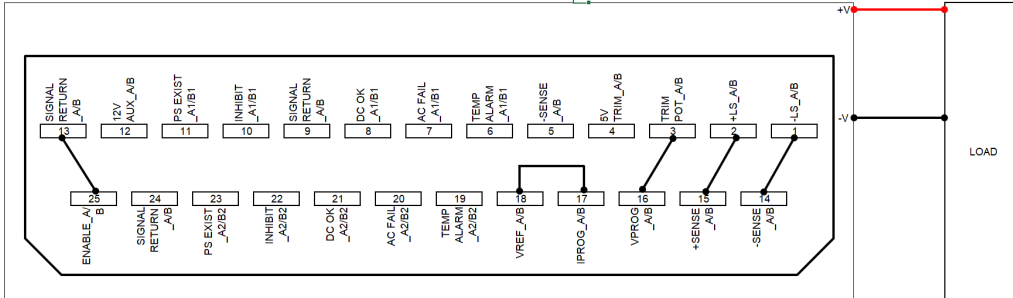


Fig 3.9 Output current programming by PMBUS.

3.10. PMBUS Host connection.

To connect the rack to the Host computer, connect the communication cable. Refer to table 3.10 for cable connection between J2 and computer.

Table 3.10 PMBUS cable:

Signal Name	From pin (J2)	Wire AWG	To Host	Note
SCL	5	22-24	--	Twisted pair
SIGNAL RETURN	6	22-24	--	
SDA	7	22-24	--	Twisted pair
SMB_ALERT	8	22-24	--	

RJ45 shielded male connector should be used.

Cable must be shielded.

3.11 Parallel connection of Output-A and Output-B

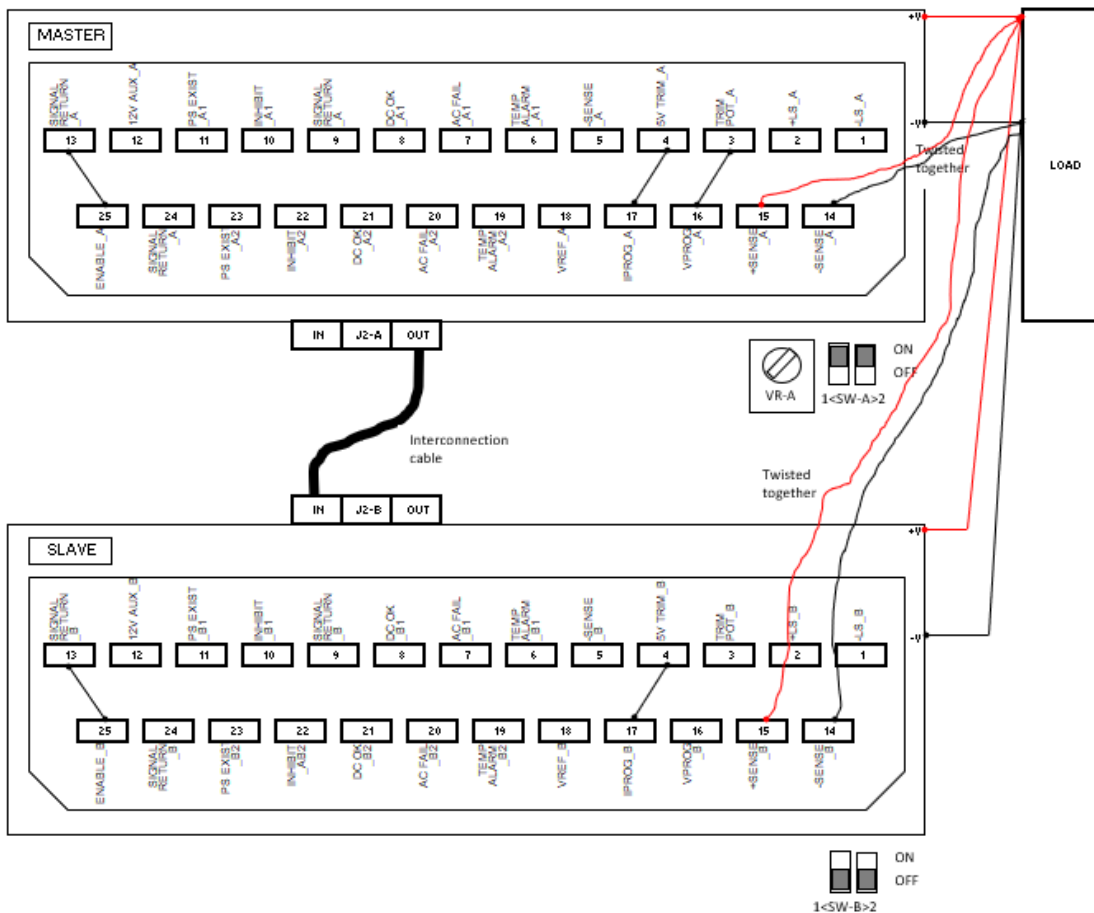
To connect two outputs in parallel for higher Output Current:

- Connect Main Output (Bus-Bars) in parallel. Make the connections as short as possible and with equal length.
- Connect Sense (twisted pairs) to Load point.
- Connect both output by Cable (for cable construction see Table 3.11).
- Connect J2 MASTER output to J2 SLAVE input by RJ45 cable.
- Slave – Disconnect connection between VPROG and TRIM (J1-A p16 and p3).
- Slave – Switch SW-B to OFF position, applicable to /S PMBus option. For addressing, see Table 1.5a/b
- Output Voltage can be adjusted by the trimmer on Master Rack (Output_1A VR-A)

Table 3.11 Rack Interconnection Cable.

Signal Name	From pin : MASTER	Wire AWG	To pin : SLAVE	Note
CURRENT SHARE	1	22-24	1	
I_PROG	2	22-24	2	
V_PROG	3	22-24	3	Twisted pair
-SENSE	4	22-24	4	
SCL	5	22-24	5	Twisted pair
SIGNAL RETURN	6	22-24	6	
SDA	7	22-24	7	Twisted pair
SMB ALERT	8	22-24	8	

Fig 3.11
Racks parallel Connection diagram.



Note for PMBUS option In the master rack:

1. Disconnect PIN3 and 16
2. Connect PIN16 and 18

3.12 Series connection

Only 2 HFE2500-xx power supplies are allowed for series connections in HFE2500-D1U. Up to 2 HFE2500-D1U can be connected in series. 2 outputs with the same number of power supplies and rating (voltage and current) can be used to increase the output voltage. To connect Output-A and Output-B in series, see Fig 3.12. Output Voltage can be adjusted by potentiometers on both.

To connect 2 HFE2500-D1U in series:

- Connect Mains Output busbar in series.
- Connect SENSES (twisted) to load points as shown in Fig 3.12
- In case when PMBus are used, connect J2 connectors of both output by interconnect cable, see Table 3.12.

CAUTION

Do not use Cable as of Table 3.11.

- On one Rack Switch SW1 up to OFF position (only for HFE2500-xx /S PMBus option), Addressing see Table 1.5;
- Output Voltage can be adjusted by potentiometers on both Racks.

Table 3.12 Rack Interconnection cable for series connection.

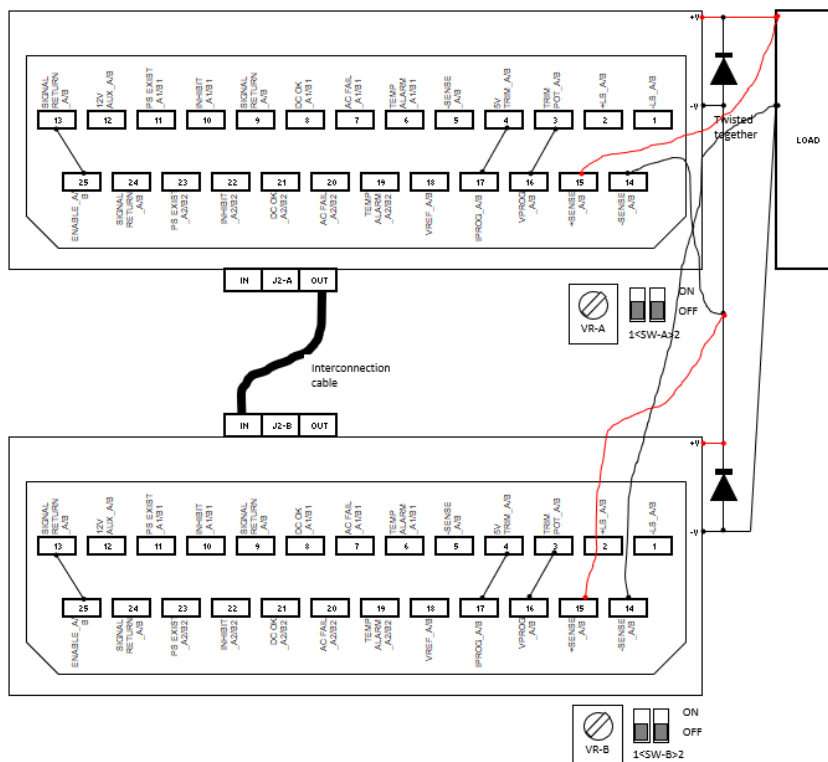
Signal Name	From pin : MASTER	Wire AWG	To pin : SLAVE	Note
CURRENT SHARE	1	Open	1	DO NOT CONNECT
I_PROG	2	Open	2	DO NOT CONNECT
V_PROG	3	Open	3	DO NOT CONNECT
-SENSE	4	Open	4	
SCL	5	22-24	5	Twisted pair
SIGNAL RETURN	6	22-24	6	
SDA	7	22-24	7	Twisted pair
SMB ALERT	8	22-24	8	

RJ45 shielded male connector should be used.

Diodes should be connected in parallel with each unit output to prevent reverse voltage. Each diode should be rated to at least the power supply rated output voltage and output current.

WARNING

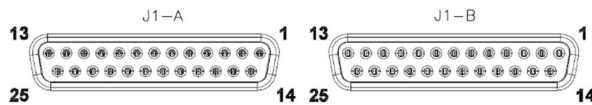
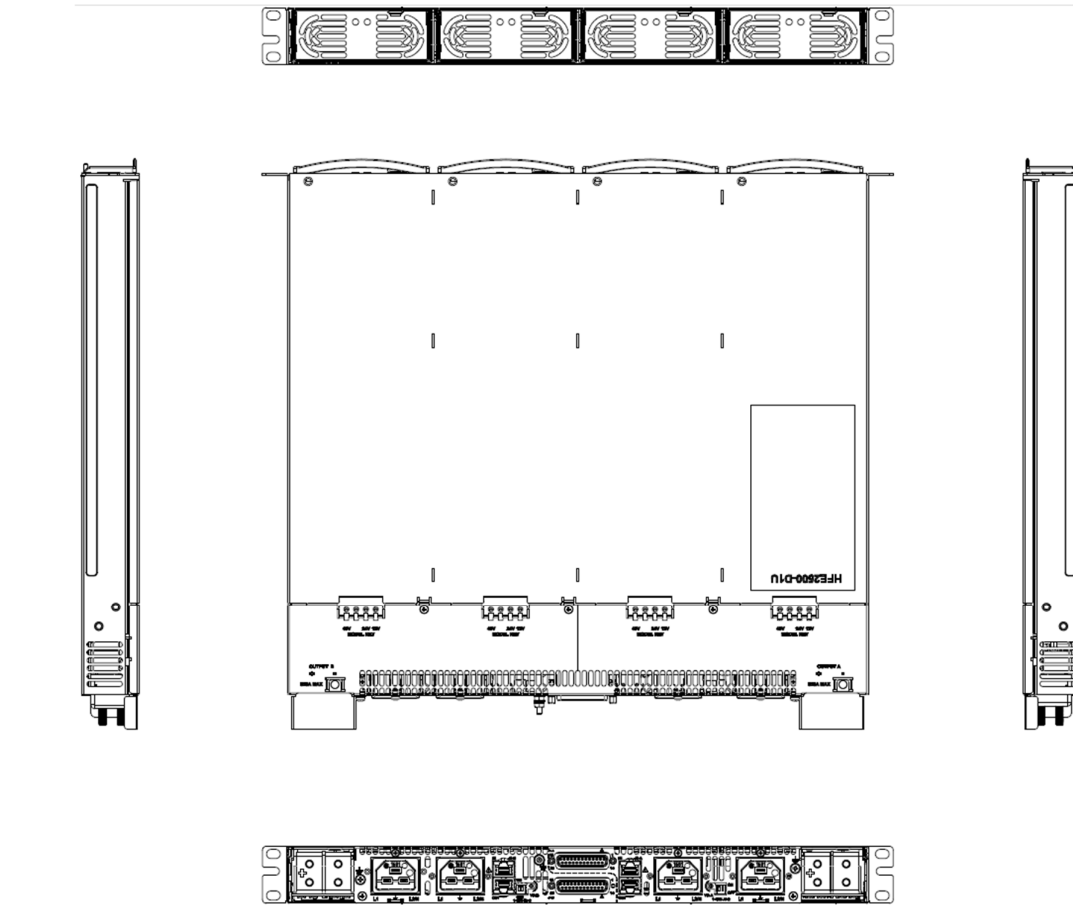
Do not connect -SENSE and any signals referenced to -SENSE between the two outputs. Only signals referenced to SIGNAL RETURN can be connected.



* User supplied diodes must be rated above Vout max & Iout max with typical 20% margin.

Fig 3.12 Serial connection diagram (remote sense).

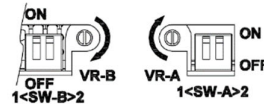
4. HFE2500-D1U Outline Drawing



SIGNALS & CONTROL CONNECTOR PINS ASSIGNMENT

J1-A		J1-B	
1 -LS_A	14 -SENSE_A	1 -LS_B	14 -SENSE_B
2 +LS_A	15 +SENSE_A	2 +LS_B	15 +SENSE_B
3 TRIMPOT_A	16 V_PROG_A	3 TRIMPOT_B	16 V_PROG_B
4 SVTRIM_A	17 L_PROG_A	4 SVTRIM_B	17 L_PROG_B
5 -SENSE_A	18 VREF_A	5 -SENSE_B	18 VREF_B
6 TEMP_ALARM_A1	19 TEMP_ALARM_A2	6 TEMP_ALARM_B1	19 TEMP_ALARM_B2
7 AC_FAIL_A1	20 AC_FAIL_A2	7 AC_FAIL_B1	20 AC_FAIL_B2
8 DC_OK_A1	21 DC_OK_A2	8 DC_OK_B1	21 DC_OK_B2
9 SIGNAL_RETURN_A	22 INHIBIT_A2	9 SIGNAL_RETURN_B	22 INHIBIT_B2
10 INHIBIT_A1	23 PS_EXIST_A2	10 INHIBIT_B1	23 PS_EXIST_B2
11 PS_EXIST_A1	24 SIGNAL_RETURN_A	11 PS_EXIST_B1	24 SIGNAL_RETURN_B
12 12VAUX_A	25 ENABLE_A	12 12VAUX_B	25 ENABLE_B
13 SIGNAL_RETURN_A		13 SIGNAL_RETURN_B	

ADDRESS SWITCH



J2 CONNECTOR PINS ASSIGNMENT

J2-B IN		J2-B		J2-A IN		J2-A	
PIN#	NAME	PIN#	NAME	PIN#	NAME	PIN#	NAME
1	CURRENT_SHARE-B	1	CURRENT_SHARE-B	1	CURRENT_SHARE-A	1	CURRENT_SHARE-A
2	L_PROG-B	2	L_PROG-B	2	L_PROG-A	2	L_PROG-A
3	V_PROG-B	3	V_PROG-B	3	V_PROG-A	3	V_PROG-A
4	-SENSE-B	4	-SENSE-B	4	-SENSE-A	4	-SENSE-A
5	SCL (PMBUS)-B	5	SCL (PMBUS)-B	5	SCL (PMBUS)-A	5	SCL (PMBUS)-A
6	SIGNAL_RETURN-B	6	SIGNAL_RETURN-B	6	SIGNAL_RETURN-A	6	SIGNAL_RETURN-A
7	SDA (PMBUS)-B	7	SDA (PMBUS)-B	7	SDA (PMBUS)-A	7	SDA (PMBUS)-A
8	SMB_ALERT-B	8	SMB_ALERTCP-B	8	SMB_ALERT-A	8	SMB_ALERTCP-A

Refer to Table 1.1a and 1.1b for pin assignments

5. HFE2500 rated Output Current and Voltage versus Line Voltage.

Single module.

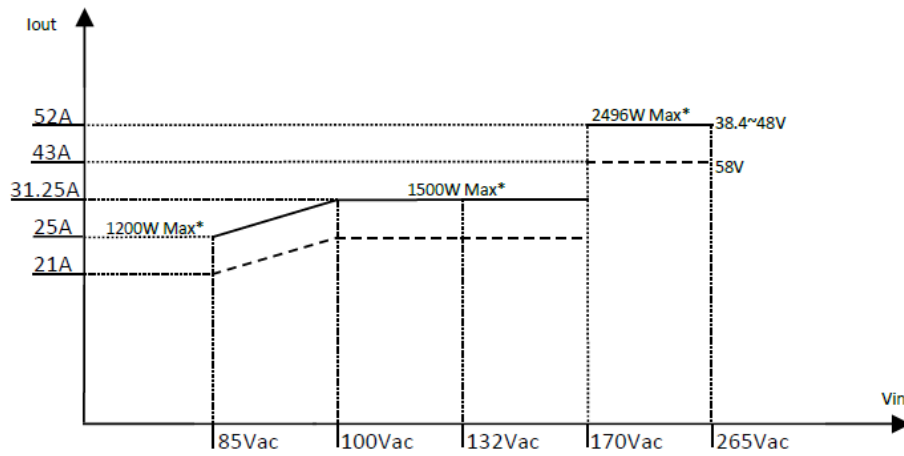


Fig 5.1. HFE2500-48; 48/S

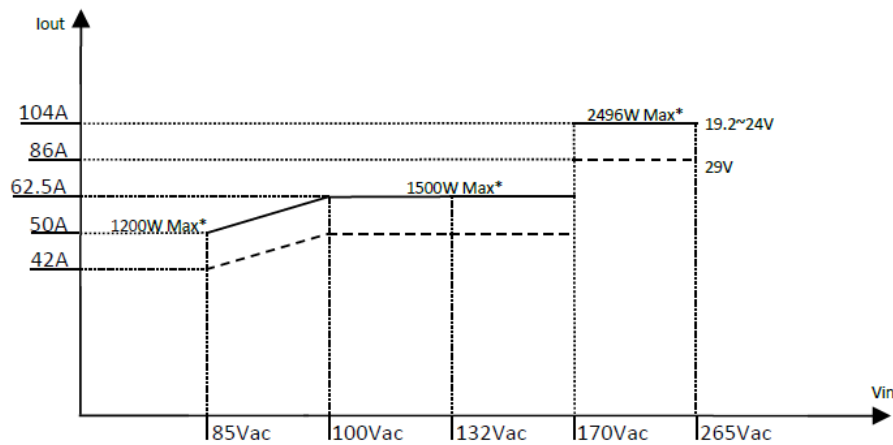


Fig 5.2. HFE2500-24; 24/S

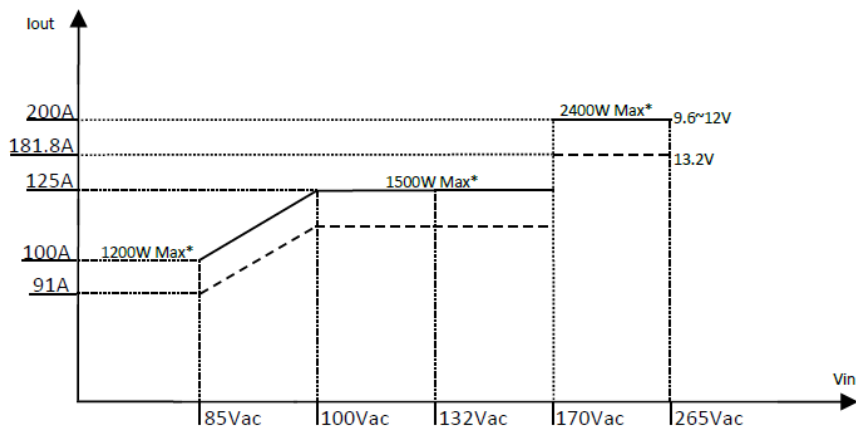


Fig 5.3. HFE2500-12; 12/S

Notes:

- Derate the total output current by 5% when using parallel operation to prevent unit overload condition.
- In HFE2500-D1U, when 2 units are connected in parallel on each pair, for 48V model, 52A x 2 then derate by 5%, max output power per output will be TYP 4750W.
- For 12V model, when 2 units are inserted, max output current is 320A per output.

6. HFE2500 Output Power vs. Temp derating.

Single module

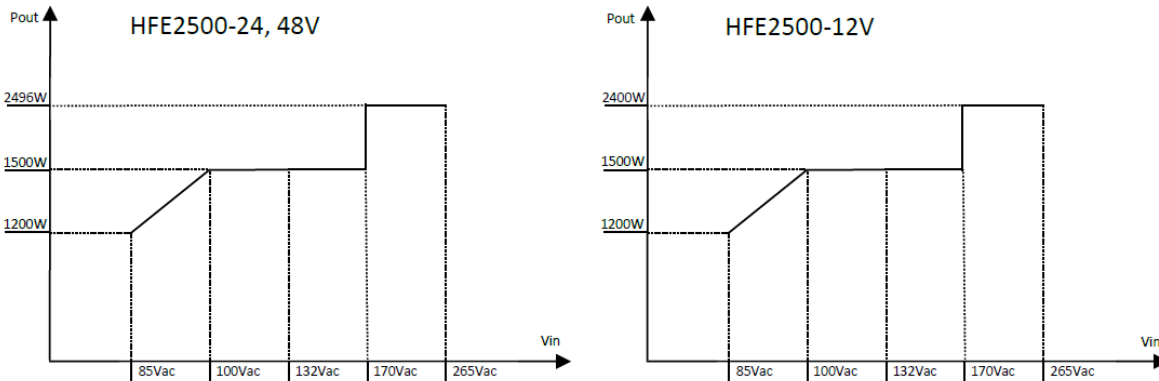


Fig 6.1. Output power derating at temperature -10°C to +50°C

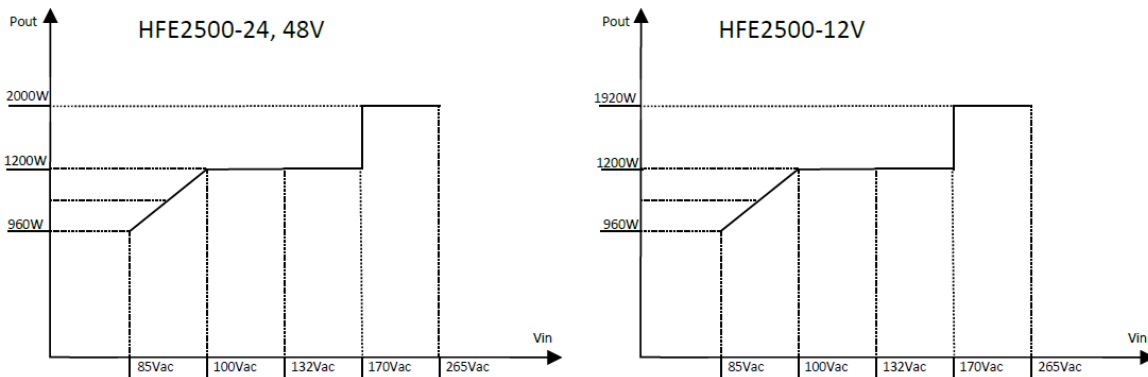


Fig 6.2. Output power derating at temperature +60°C

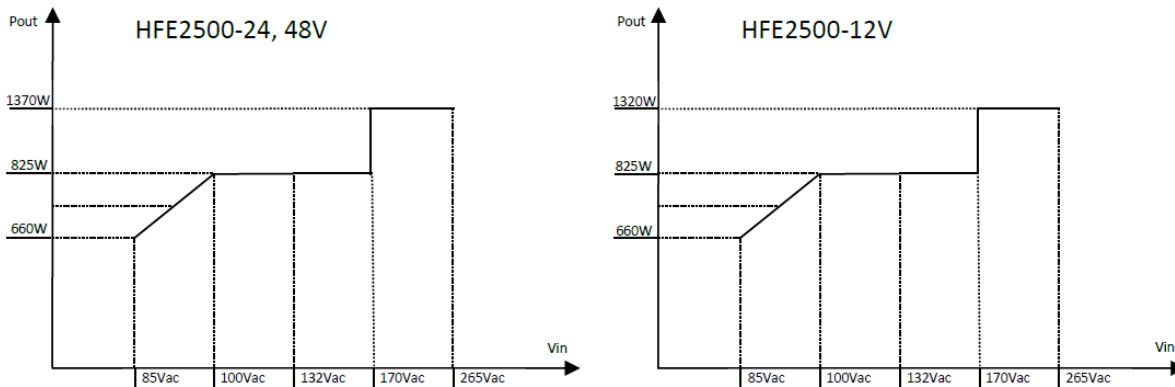


Fig 6.3. Output power derating at temperature +70°C

Notes:

- Derate the total output power by 5% when using parallel operation to prevent unit overload condition.
- In HFE2500-D1U, when 2 units are connected in parallel on each pair, for 48V model at 70degC, 1370W x 2 then derate by 5%, max output power per output will be TYP 2600W.
- For 12V model, when 2 units are inserted, max output current is 320A, 3040W.