

RFE 1000 SERIES INSTRUCTION MANUAL

RFE1000 SERIES SPECIFICATIONS			RFE1000-24	RFE1000-32	RFE1000-48
1	Rated output voltage	V	24	32	48
2	Output voltage set point	V	24+/-1%	32+/-1%	48+/-1%
3	Output voltage range	V	21.5-29	28.8-38.4	43-58
4	Maximum Output Current (Refer to Fig.1)	A	40	31	21
5	Maximum output power (*9)	W	960	992	1008
6	Input voltage / frequency range (*1)	-	85~265Vac continuous, 47~63Hz, Single phase		
7	Maximum input current (at 100/200Vac)	A	12.0/6.0		
8	Power Factor (Typ)	-	>0.98 at 115/230V and maximum output power		
9	Efficiency (Typ) (*2)	%	86/88%	86/88%	87/89%
10	Inrush current (*3)	A	Less than 40A		
11	Hold-up time	mS	20mS typical at 100Vac input, rated output voltage and less than 80% of rated load		
12	Maximum line regulation (*5)	-	0.40%		
13	Max load regulation (*6)	-	0.80%		
14	Output Ripple and noise (*4)	mV	200	250	300
15	Temperature stability	-	0.1 % of rated Vout for 8hrs after 30min warm-up. Constant line. load and temperature.		
16	Temperature coefficient	PPM/°C	200		
17	Remote sensing (*7)	V	Possible. Refer to Instruction Manual.		
18	Parallel operation	-	Possible. Refer to Instruction Manual.		
19	Series operation	-	Possible. Refer to Instruction Manual.		
20	Over current protection	-	105--125% of maximum oulool current. Refer to Fia. 1		
21	Over voltage protection (*8)	V	31-34	41.5-45.5	62-66
22	Over temperature protection	-	Inverter shut down method, automatic reset.		
23	Remote On/Off control	-	By electrical signal or dry contact. ON: 0~0.6V or short. OFF: 2~15V or open.		
24	DC OK signal	-	Open collector signal. On when Vout>80+/-5% rated output. Max.sink current: 10mA		
25	Over-Temp. warning	-	Open collector signal. Refer to Instruction Manual		
26	AC fail signal	-	Open collector signal. Refer to Instruction Manual		
27	Auxiliary power supply	-	11.2~12.5VDC. 0.25A Maximum output current.		
28	Vout voltage trimming	-	User accessible Internal Potentiometer. Full range.		
29	Output indicator	-	Green LED DC OK		
30	Operating temperature	-	0...50°C: 100% load. Derate 2%/°C. 50°C to 60°C. Derate 2.5%/°C. 60°C to 70°C.		
31	Storage temperature	-	-30...85°C		
32	Operating humidity	-	10-90% RH, no condensation.		
33	Storage humidity	-	10-95% RH, no condensation.		
34	Cooling	-	By internal Fans. Variable speed control.		
35	Vibration	-	Built to meet ETS 300 019		
36	Shock	-	Built to meet ETS 300 019		
37	Conducted emission	-	EN55022B FCC part 15J-B VCCI-B		
38	Radiated emission	-	EN55022B, FCC part 15J-B, VCCI-B		
39	Applicable safety standards	-	Input-Output: 3000Vrms,1min. Input-Ground: 2000Vrms. 1min. Output-Ground: 500Vrms, 1min.		
40	Withstand voltage	-	UL60950-1, EN60950-1		
41	Insulation resistance	-	More than 100Mohm at 25°C and 70% RH. Output-Ground: 500Vdc		
42	Leakage current	mA	Less Than 1.1 mA at 230Vac		
43	Weight (Typ)	Kg	2.0		
44	Size (W*H*D)	-	127x41 x305 mm. Refer to Outline Drawing.		

Notes:

- *1: For cases where conformance to various safety standards (UL, EN etc.) is required. to be described as 100-240Vac (50/60Hz).
- *2: At 100/200Vac, rated load and 25°C ambient temperature.
- *3: Not applicable for the noise filter inrush current less than 0.2mS.
- *4: Measured with JEITA RC-9131A 1:1 probe, 20MHz B.W.
- *5: From 85-132Vac or 170-265Vac, constant load.
- *6: From No-load to Rated load, constant input voltage. Measured at the sensing point in Remote sense.
- *7: Remote sensing can compensate up to 1V drop on each load wire.
- *8: Inverter shut down method. Reset by AC voltage recycle or by On/Off control.
- *9: Derate Maximum output power by 10% for input voltage less than 95VRMS

Model	RFE1000 -24	RFE1000 -32	RFE1000 -48
V1 (V)	24	32	48
V2 (V)	29	38.4	58
I1 (A)	33	26	17.25
I2 (A)	40	31	21

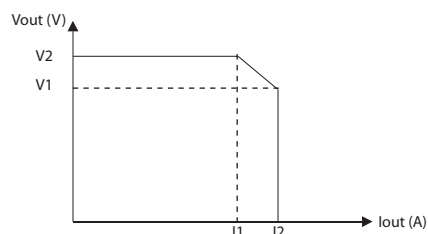


Fig. 1: Rated output current vs output voltage

REAR IN/OUT CONNECTOR PINS FUNCTION DESCRIPTION

Pin No	Function	Description
J1- 3	+V	Positive output voltage
J1- 10	-V	Negative output voltage
J1- 6	On/Off control	Turns the output to On and Off by electrical signal or dry contact between pin 6 and pin 11 (Signal Return). 0-0.6V or Short: On, 2-15V or Open: Off. The maximum sink current is 2.6mA
J1- 1	+Sense	Positive sensing. The +Sense signal should be connected to the positive terminal of the load. The +Sense and -Sense leads should be twisted pair to minimize noise pick-up effect. The maximum load wires drop compensation is 1V/wire
J1- 5	DC_OK	Open collector signal, referenced to pin 11 (Signal Return). On when $V_{out} \geq 80\% \pm 5\%$. The maximum sink current is 10mA and the maximum external voltage is 15V.
J1- 11	SignalReturn	Return for the following control and supervisory signals: On/Off, DC_OK, Over_temperature Alarm, AC_Fail, Auxiliary 12V supply. The Signal return is isolated from the output terminals.
J1-12	AC_Fail	Open collector signal, referenced to pin 11 (Signal Return). On when the input voltage is $\geq 85V_{rms}$. The maximum sink current is 10mA and the maximum external voltage is 15Vdc.
J1- 8	Over Temperature Alarm	Open collector signal, referenced to pin 11 (Signal Return). On when the internal temperature is within safe limit, Off approx. 10°C below Thermal shut down. The maximum sink current is 10mA and the maximum external voltage is 15V.
J1- 2	-Sense	Negative sensing. The -S signal should be connected to the negative terminal of the load. The -S and +S leads should be twisted pair to minimize noise pick-up effect. The maximum load wires drop compensation is 1V/wire.
J1-7,9	CS	Current sharing signal. When units are connected in parallel, the CS pins of the units should be connected to allow current balance between units.
J1- 4	+12V Auxiliary	Auxiliary voltage output, 11.2-12.5V. referenced to pin 11 (Signal Return). The maximum load current is 0.25A. This output has built in Oring diode and is not controlled by the On/Off control.

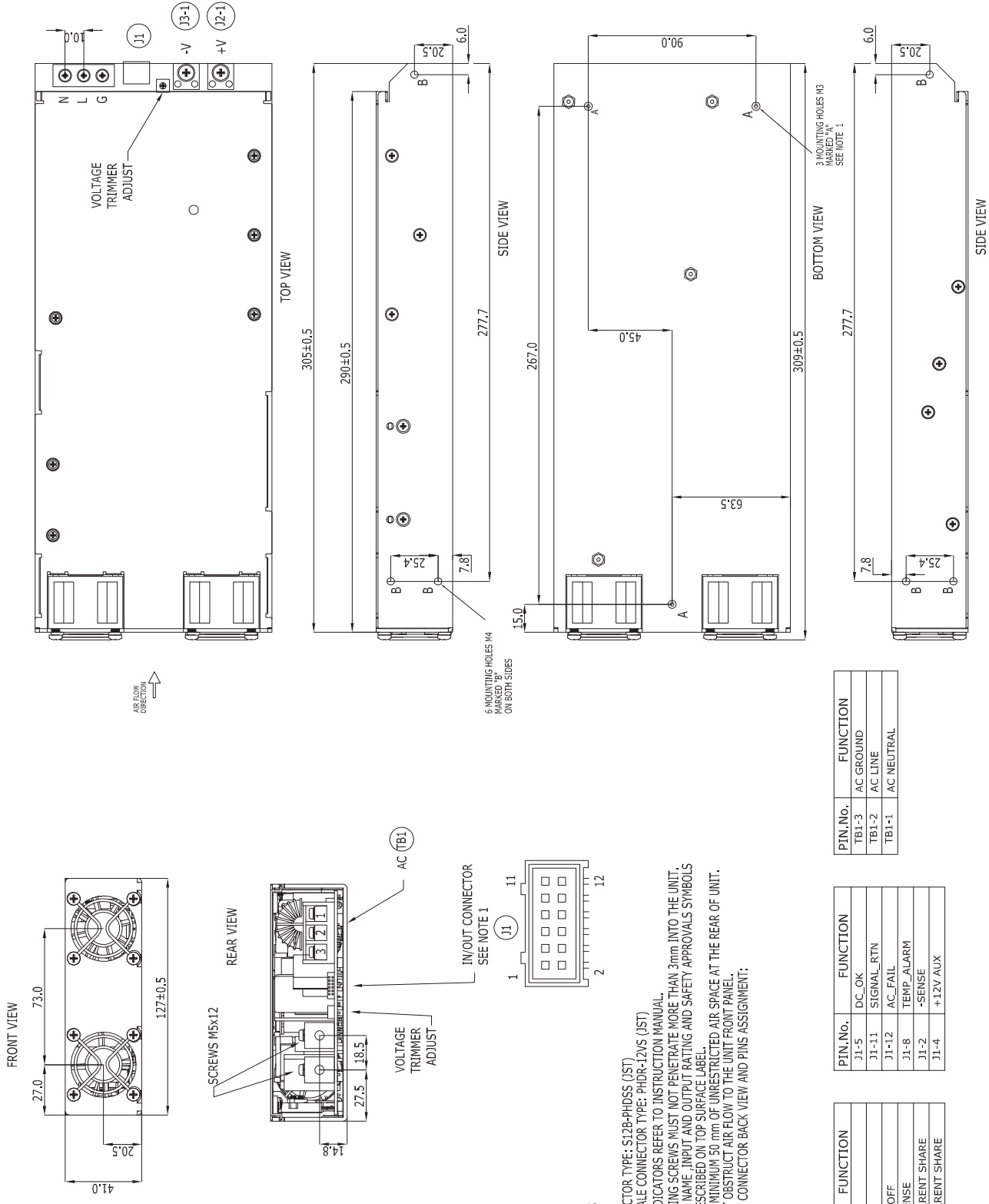
Pin No	Function	Description
TB-1	AC Neutral	AC Neutral connection. refer to the safety instructions for safety standards requirements.
TB-2	AC Line	AC Line connection. refer to the safety instructions for safety standards requirements.
TB-3	AC Ground	AC Ground connection. refer to the safety instructions for safety standards requirements.

Table 1: Rear In/Out connector pins function description

Refer to Table 1 for description of the control and supervisory signals provided at the rear In/Out connector. Refer to Fig. 1.1- 5.1 for typical connections for operation.

Options	
Suffix	Description
RFE1000 -Y	O Ring output diode

RFE1000 - SERIES OUTLINE DRAWING



NOTES

- CONNECTOR TYPE: S12B-PHDS5 (JST)
FEMALE CONNECTOR TYPE: PHDR-12VS (JST)
- LED INDICATORS REFER TO INSTRUCTION MANUAL.
- MOUNTING SCREWS MUST NOT PENETRATE MORE THAN 3mm INTO THE UNIT.
- MODEL NAME, INPUT AND OUTPUT RATING AND SAFETY APPROVALS SYMBOLS ARE DESCRIBED ON TOP SURFACE LABEL.
- ALLOW MINIMUM 50 mm OF UNRESTRICTED AIR SPACE AT THE REAR OF UNIT. DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT PANEL.
- IN OUT CONNECTOR BACK VIEW AND PINS ASSIGNMENT:

PIN.No.	FUNCTION
J1-3	+V
J1-10	-V
J1-6	ON/OFF
J1-1	+SENSE
J1-7	CURRENT SHARE
J1-9	CURRENT SHARE

PIN.No.	FUNCTION
J1-5	DC_OK
J1-11	SIGNAL_RTN
J1-12	AC_FAIL
J1-8	TEMP_ALARM
J1-2	-SENSE
J1-4	+12V_AUX

PIN.No.	FUNCTION
TB1-3	AC GROUND
TB1-2	AC LINE
TB1-1	AC NEUTRAL

RFE1000 SAFETY INSTRUCTIONS

SAFETY APPROVALS

UL 60950-1 and CSA22.2 No.60950-1 - UL Recognized. C-UL for Canada.
IEC 60950-1 - CB Report and Certificate.
EN 60950-1 - CE mark.

Marking by the CE Symbol indicates compliance to the Low Voltage Directive of the European Union.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at our EU representative TDK LAMBDA UK, located at Kingsley Avenue, Ilfracombe, Devon EX34 8ES, UK.

A "Declaration of Conformity" may be accessed via company website www.uk.tdk-lambda.com/technical-data

SAFETY INSTRUCTIONS

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.

Vorsicht: Die folgenden Sicherheitsvorschriften müssen vor Inbetriebnahme und in jedem Betriebszustand bei Service oder Reparatur beachtet werden. Missachtung der Sicherheitsvorschriften und Warnhinweise aus diesem Handbuch führen zur Verletzung der bestehenden Sicherheitsstandards. Bei Betrieb des Gerätes ausserhalb dem bestimmungsgemässen Einsatz können die im Gerät integrierten Schutzfunktionen beeinträchtigt werden. TDK-Lambda ist nicht haftbar für Schäden, die durch Missachtung dieser Sicherheitsvorschriften entstehen können.

CAUTION: RFE1000 units are 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.

Vorsicht: Dieses Produkt ist nicht für die Verwendung als kritische Komponente in nuklearen Steuerungssystemen, lebenserhaltenden Systemen oder Geräte für den Einsatz in gefährlichen Umgebungen, ohne die ausdrückliche schriftliche Genehmigung durch TDK-Lambda zugelassen.

INSTALLATION (OVERVOLTAGE) CATEGORY & ENVIRONMENTAL CONDITIONS

The RFE1000 units have been evaluated to Overvoltage category II.

The RFE1000 units 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 (See Specification)

GROUNDING

RFE1000 units are Class I product. To minimize electrical shock hazard, the RFE1000 units 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.

Erdungskonzept: Dieses Produkt ist ein Gerät der Schutzklasse 1. Zur Vermeidung von gefährlichen Energieinhalten und Spannungen, ist das Gehäuse an eine Schutz Erde anzuschliessen. Der PE-Anschluss ist an einen festen Erder anzuschliessen. Bei Festverdrahtung des Gerätes ist sicherzustellen, dass der PE Anschluss als erstes angeklemt wird. Jede mögliche Unterbrechung des PE-Leiters oder Trennung der PE Verbindung kann einen möglichen elektrischen Schlag hervorrufen, der Personenschäden zur Folge hätte.

LIVE CIRCUITS

Operating personnel must not remove the RFE1000 units 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: RFE1000 units should only be installed in a Restricted Access Area. Access should be available to service personnel only

Spannungsführende Teile

Die Geräteabdeckung darf nicht durch Endanwender geöffnet werden. Interne Modifikationen, sowie Bauteilaustausch ist nur durch TDK-Lambda qualifiziertes Personal erlaubt. Vor Austausch von Bauteilen ist das Netzkabel bzw. die Versorgungsspannung zu trennen. Energieversorgungsanschlüsse sind immer zu trennen, um Personenschäden durch gefährliche Energieinhalte und Spannungen auszuschliessen. Die Stromkreise sind zu entladen, externe Spannungsquellen sind zu entfernen, bevor auf Bauteile bzw. Komponenten Ebene gearbeitet wird.

PARTS SUBSTITUTIONS & MODIFICATIONS

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

AC INPUT

Do not connect RFE1000 units to mains supply exceeding the input voltage and frequency rating. 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.

ENERGY HAZARD

The main output of RFE1000 units is capable of providing hazardous energy. Due to hazardous energy level the output 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.

FUSE

Internal fuse is sized for fault protection and if a fuse was opened it would indicate that service is required. Fuse replacement should be made by qualified technical personnel. RFE1000 unit's fuse ratings are described below. F101: F20A H 250Vac; F102: 6.3A 400VDC.

SICHERUNGEN: Vor Anschluss an die Netzversorgung ist die Aufstelanleitung zu beachten!

1. Absicherung: F101: F20A H 250VAC; F102: 6.3A 400VDC

2. Die

Gehäuseabdeckung darf nur im stromlosen Zustand geöffnet werden.

ACHTUNG: Sicherungen dürfen nur durch geschulte Service Personen getauscht werden.

OVERCURRENT PROTECTION:

A readily accessible branch circuit over-current protective device rated 20A max. must be incorporated in the building wiring.

Überstromschutz

Eine leicht zugängliche Vorsicherung mit 20A max. pro Eingang muss in der Hausinstallation vorgesehen werden

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.



Indicates ground terminal.



Protective Ground Conductor 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.



RFE1000 - CONNECTIONS FOR OPERATION

1. SINGLE UNIT OPERATION

1.1. Remote sensing*

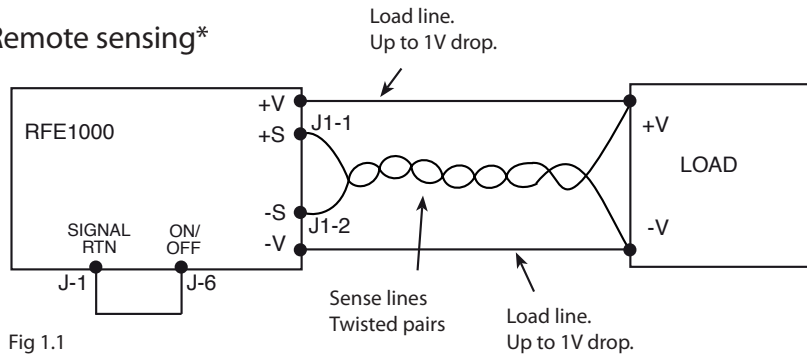


Fig 1.1

* In Local sense applications, the +/- sense have to be connected to the +/-V terminals of the RFE1000 units before the operating the RFE1000 units

1.2. On/off control

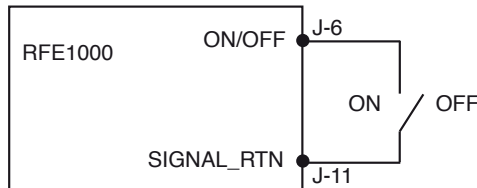


Fig 1.2

1.3. Supervisory signals

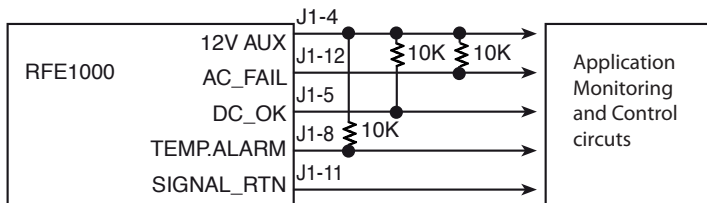


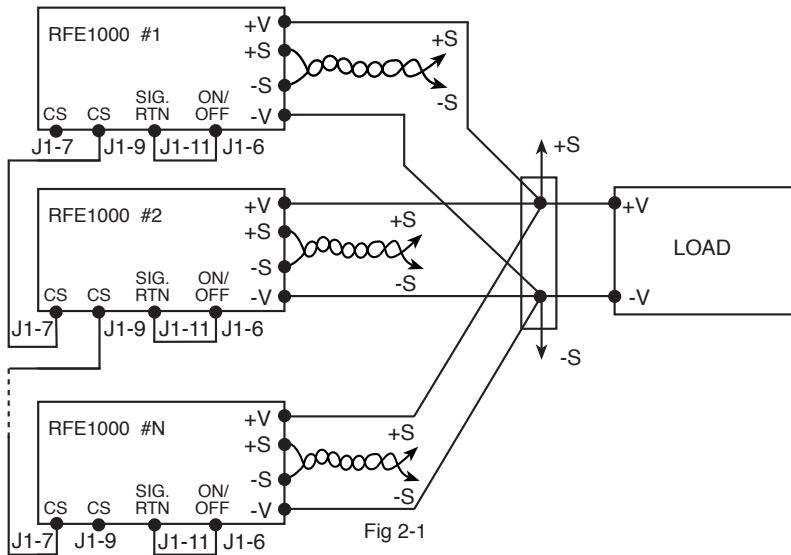
Fig 1.3

Note: AC_FAIL, DC_OK and TEMP.ALARM are open collector signals. See Table 1

RFE1000 - CONNECTIONS FOR OPERATION

2. PARALLEL OPERATION

2.1. Remote sensing and current balance



Up to 8 RFE1000 units of the same output voltage rating can be connected in parallel. By connecting the CS signal between the paralleled units, automatic current balance is achieved, with +/-10% accuracy.

Derate the total output current by 10% when using parallel operation to prevent overload condition. The built-in Oring diodes on the main output and the 12V Auxiliary output allow N+1 operation. For input voltages less than 100Vac, maximum output Power derated by 10% of the Power rating.

RFE1000 - CONNECTIONS FOR OPERATION

3. ON/OFF CONTROL

3.1. On/off control

On/off control can be made via separate control for individual units (refer to Fig 1-2), or via single control as shown in Fig 3-1.

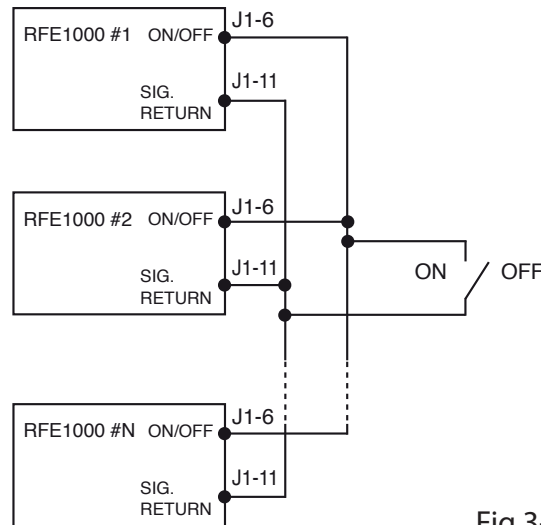
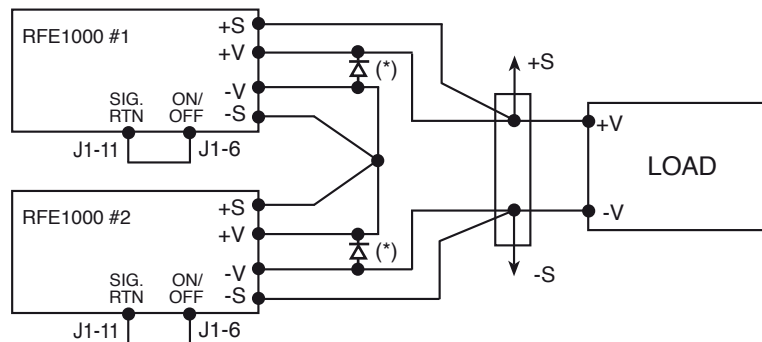


Fig 3-1.

4. SERIES OPERATION

Up to 3 units can be used for increased output voltage

It is recommended that diodes 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.



(*) Diodes are user supplied

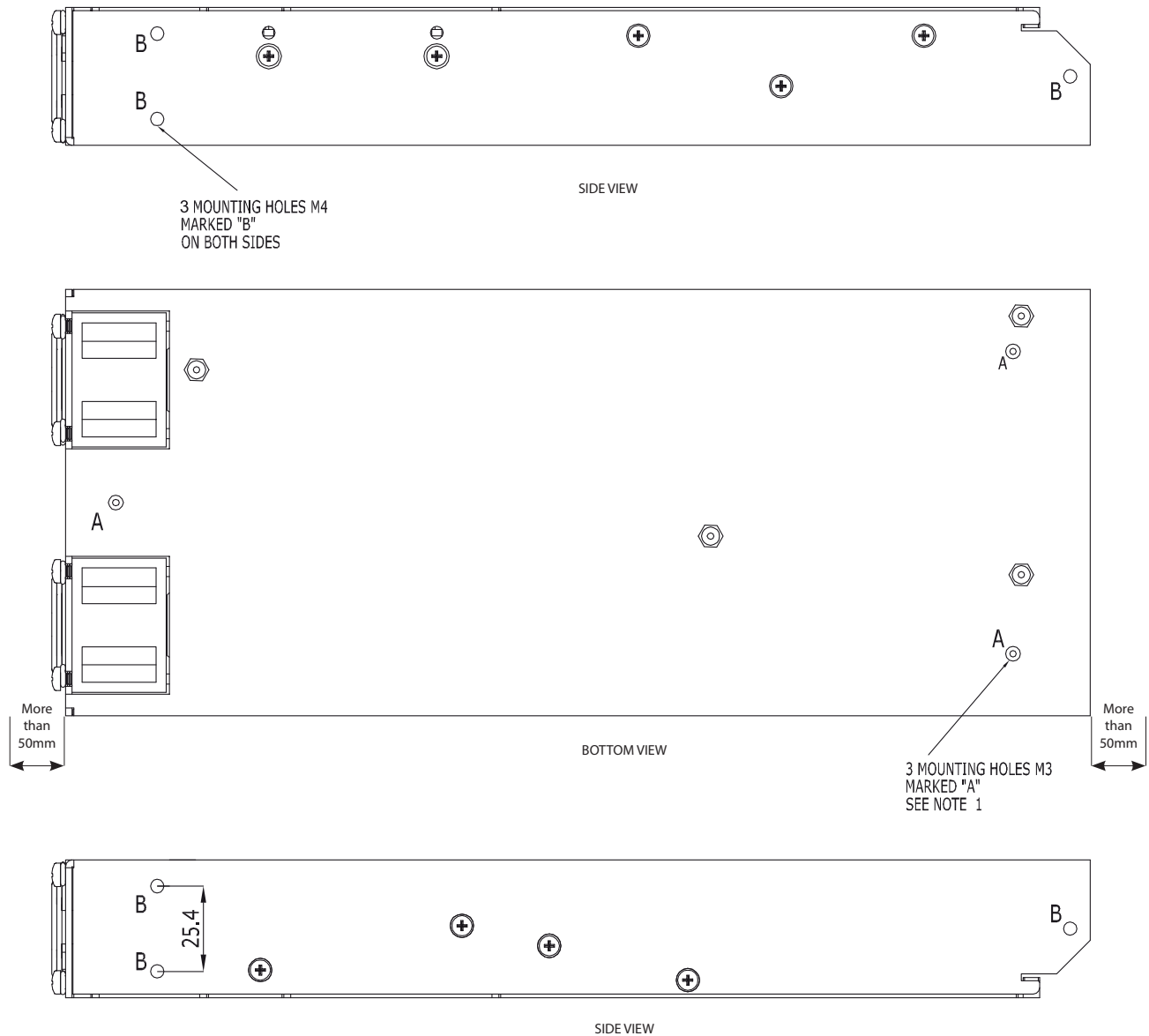
Fig 4-1

RFE1000 - CONNECTIONS FOR OPERATION

5. OUTPUT INDICATORS.

1. DC OK Green LED: On when output voltage $V_{out} \geq 80\% \pm 5\%$ of rated V_o
Off when output voltage $V_{out} < 80\% \pm 5\%$ of rated V_o

6. MOUNTING METHOD.



1. Forced air cooling allow minimum 50mm of unrestricted air space at the rear of the unit do not obstruct air flow to the unit front panel
2. Mounting screws must not penetrate more than 3mm into the unit.



