

General Safety Instructions:

READ SAFETY INSTRUCTIONS

Servicing:

These products are not customer serviceable TDK-Lambda UK LTD and their authorised agents only are permitted to carry out repairs.

Critical Components:

These products are not authorised for use as critical components 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 EMEA.

Product Usage:

These products are designed for use within a host equipment which restricts access to authorised competent personnel.

This product is a component power supply and is only to be installed by qualified persons within other equipment and must be not operated as a stand alone product.

This product is for sale to business to business customers and can be obtained via distribution channels. It is not intended for sale to end users.

This product is a component power supply and does not fall within the scope of the EMC directive. Compliance with the EMC directive must be considered in the final installation. Please contact your local TDK-Lambda office.

Environmental:

These products are IPX0, and therefore chemicals/solvents, cleaning agents and other liquids must not be used.

Environment:

This power supply is a switch mode power supply for use in applications within a Pollution Degree 2, overvoltage category II environment. Material Group IIIb PCB's are used within it.

Output Loading:

The output power taken from the power supply must not exceed the rating stated on the power supply label, except as stated in the product limitations in this handbook.

Input Parameters:

This product must be operated within the input parameters stated in the product limitations in this handbook.

End of Life Disposal:

The unit contains components that require special disposal. Make sure that the unit is properly disposed of at the end of its service life and in accordance with local regulations.



RISK OF ELECTRIC SHOCK

High Voltage Warning:

Dangerous voltages are present within the power supply. The professional installer must protect service personnel from inadvertent contact with these dangerous voltages in the end equipment.

WARNING: When installed in a Class 1 end equipment, this product must be reliably earthed and professionally installed.

The (+) or (-) output(s) can be earthed or left floating.

The unit cover(s)/chassis (where applicable) must not be made user accessible.

The mains input connector is not acceptable for use as field wiring terminals.

For encased products, do not use mounting screws, which penetrate the unit more than; See drawings.

Internal fuses protect the unit and must not be replaced by the user. In case of internal defect, the unit must be returned to TDK-Lambda UK LTD or one of their authorised agents.

A suitable mechanical, electrical and fire enclosure must be provided by the end use equipment for mechanical, electric shock and fire hazard protection.

Energy Hazards:

The main output of this product is capable of providing hazardous energy (240VA). Final equipment manufacturers must provide protection to service personnel against inadvertent contact with the output terminals.

The unit cover/chassis, where applicable, is designed to protect skilled personnel from hazards. They must not be used as part of the external covers of any equipment where they may be accessible to operators, since under full load conditions, part or parts of the unit chassis may reach temperatures in excess of those considered safe for operator access.

Allgemeine Sicherheitsvorschriften:

LESEN SIE DIE SICHERHEITSVORSCHRIFTEN

Wartung:

Diese Produkte können nicht durch den Kunden gewartet werden. Nur TDK-Lambda UK LTD. und deren zugelassene Vertriebshändler sind zur Durchführung von Reparaturen berechtigt.

Kritische Komponenten:

Diese Produkte sind nicht für die Verwendung als kritische Komponenten in nuklearen Kontrollsystemen, Lebenserhaltungssystemen oder Geräten in gefährlichen Umgebungen geeignet, sofern dies nicht ausdrücklich und in Schriftform durch den Geschäftsführer von TDK-Lambda EMEA genehmigt wurde.

Produktverwendung:

Diese Produkte sind zur Verwendung innerhalb von Host-Anlagen gedacht, die einen auf das Fachpersonal beschränkten Zugang haben.

Dieses Produkt ist eine Stromversorgungs-Komponente und sie darf nur von qualifiziertem Personal in andere Geräte eingebaut werden und sie darf NICHT als eigenständiges ("Stand-Alone") Gerät betrieben werden. Dieses Produkt ist für den Verkauf an Geschäftskunden entwickelt worden und es kann über Distributionskanäle bezogen werden.

Es ist NICHT für den Verkauf an Endkunden gedacht und konzipiert.

Dieses Produkt ist eine Stromversorgungsbaugruppe und sie fällt NICHT in den Bereich der EMV Direktive. Die Konformität mit der EMV Richtlinie muss in der finalen Gesamtinstallation betrachtet werden. Bitte kontaktieren Sie Ihr regionales TDK-Lambda Vertriebsbüro im Falle von Rückfragen.

Umwelt:

Diese Produkte sind IPX0, aus diesem Grund dürfen keine Chemikalien/Lösungsmittel, Reinigungsmittel und andere Flüssigkeiten verwendet werden.

Umgebung:

Dieses Netzteil ist ein Schaltnetzteil zur Verwendung in einer Umgebung mit einem Verschmutzungsgrad 2, Überspannungskategorie II. Materialgruppe IIIb mit darin verwendeten PCBs.

Ausgangsstrom:

Der Ausgangsstrom des Netzteiles darf die Leistung, die auf dem Label des Netzteiles vermerkt ist, nur dann überschreiten, wenn dies in den Produktgrenzen dieses Handbuches ausgezeichnet ist.

Eingangsparameter:

Dieses Produkt muss innerhalb der Eingangsparameter, die in den Produktgrenzen dieses Handbuches angegeben sind, betrieben werden.

Entsorgung am Ende der Betriebszeit:

Das Gerät enthält Komponenten die unter Sondermüll fallen. Das Gerät muss am Ende der Betriebszeit ordnungsgemäß und in Übereinstimmung mit den regionalen Bestimmungen entsorgt werden.

**GEFAHR DURCH ELEKTRISCHEN SCHLAG****Hochspannungswarnung:**

Innerhalb des Netzteiles gibt es gefährliche Spannungen. Der Elektroinstallateur muss das Wartungspersonal vor versehentlichem Kontakt mit den gefährlichen Spannungen im Endgerät schützen.

WARNUNG! Falls Sie unser Netzgerät in eine Anwendung mit Schutzklasse 1 eingebaut haben, stellen Sie sicher, dass es fachgerecht installiert und zuverlässig geerdet ist.

Die (+) oder (-) Ausgänge können geerdet werden oder unangeschlossen bleiben.

Die Abdeckung des Gerätes/das Gehäuse darf für den Benutzer nicht zugänglich sein.

Der Haupteingangsanschluss ist nicht für die Verwendung als Feldverdrahtungsanschluss geeignet.

Für ummantelt Produkte, verwenden Sie keine Schrauben, die das Gerät mehr als durchdringen; siehe Zeichnung. Eine interne Sicherung schützt das Gerät und darf durch den Benutzer nicht ausgetauscht werden. Im Fall von internen Defekten muss das Gerät an TDK-Lambda UK LTD oder einen der autorisierten Vertriebshändler zurückgeschickt werden.

Ein geeignetes mechanisches, elektrisches und brandgeschütztes Gehäuse muss als Schutz vor der Gefahr von mechanischen Risiken, Stromschlägen und Brandschutz in dem Endgerät vorgesehen werden.

Gefahren durch elektrische Energie:

Von bestimmten Modulen kann je nach Einstellung der Ausgangsspannung gefährliche elektrische Energie ausgehen (240 VA). Die Endgerätehersteller müssen einen Schutz für Servicepersonal vor unbeabsichtigtem Kontakt mit den Ausgangsanschlüssen dieser Module vorsehen. Kann aufgrund der Einstellung gefährliche elektrische Energie auftreten, dürfen die Modulanschlüsse für den Benutzer nicht zugänglich sein.

Die Geräteabdeckung/das Gehäuse ist so entworfen, dass das Fachpersonal vor Gefahren geschützt wird. Sie dürfen nicht als Teil der externen Abdeckung für Geräte verwendet werden, die für den Betreiber zugänglich sein müssen, da Teile oder das gesamte Gerätegehäuse unter voller Auslastung übermäßige Temperaturen erreichen kann, die für den Zugang des Betreibers nicht mehr als sicher betrachtet werden.

Consignes générales de sécurité:

LIRE LES CONSIGNES DE SECURITE

Entretien:

Ces produits ne peuvent pas être réparés par l'utilisateur. Seuls, TDK-Lambda UK LTD et ses agents agréés sont autorisés à effectuer des réparations.

Composants critiques:

Ces produits ne doivent pas être utilisés en tant que composants critiques dans des systèmes de commande nucléaire, dans des systèmes de sauvetage ou dans des équipements utilisés dans des environnements dangereux, sans l'autorisation écrite expresse du directeur général de TDK-Lambda EMEA.

Utilisation du produit:

Ces produits sont conçus pour être utilisés dans un équipement hôte dont l'accès n'est autorisé qu'aux personnes compétentes.

Ce produit est une alimentation considérée comme un composant devant être installé par des personnes qualifiées, dans un autre équipement. Il ne doit pas être utilisé en tant que produit fini.

Ce produit est destiné à la vente entre entreprises et peut être obtenu via des canaux de distribution.

Il n'est pas prévu à la vente pour les particuliers.

Ce produit est une alimentation considérée comme un composant, il ne relève pas du champ d'application de la directive CEM. Le respect de la directive CEM doit être pris en compte dans l'installation finale. Veuillez contacter votre bureau TDK-Lambda le plus proche.

Environnement:

Ces produits sont IPX0, et donc on ne doit pas utiliser des produits chimiques/solvants, des produits de nettoyage et d'autres liquides.

Environnement fonctionnel :

Cette alimentation fonctionne en mode commutation pour utilisation dans des applications fonctionnant dans un environnement avec Degré de Pollution 2 et catégorie de surtension II. Elle utilise des cartes des circuits imprimés (PCB) de Groupe IIIb.

Intensité soutirée:

L'intensité soutirée de l'alimentation ne doit pas dépasser l'intensité nominale marquée sur la plaque signalétique, sauf indications contraires dans les limitations du produit décrit dans ce manuel.

Paramètres d'entrée:

Ce produit doit être utilisé à l'intérieur des paramètres d'entrée indiqués dans les limitations du produit dans ce manuel.

Elimination en fin de vie:

L'alimentation contient des composants nécessitant des dispositions spéciales pour leur élimination. Vérifiez que cette alimentation est mise au rebut correctement en fin de vie utile et conformément aux réglementations locales en vigueur.



RISQUE DE CHOC ELECTRIQUE

Attention-Danger haute tension:

Des tensions dangereuses sont présentes dans l'alimentation. L'installateur doit protéger le personnel d'entretien contre un contact involontaire avec ces tensions dangereuses dans l'équipement final.

AVERTISSEMENT: Si ce produit est installé dans un équipement final de classe I, il doit être mis à la terre de manière fiable et installé par un professionnel averti.

Les sorties (+) ou (-) peuvent être raccordées à la terre ou laissées flottantes.

Le couvercle/châssis de l'alimentation ne doit pas être accessible à l'utilisateur. Le connecteur d'entrée d'alimentation principale ne doit pas être utilisé comme borne de raccordement.

N'utilisez pas de vis pénétrant dans le module sur une profondeur supérieure à : Voir dessins.

Un fusible interne protège le module et ne doit pas être remplacé par l'utilisateur. En cas de défaut interne, le module doit être renvoyé à TDK-Lambda UK LTD ou l'un de ses agents agréés.

Une enceinte appropriée doit être prévue par l'utilisateur final pour assurer la protection contre les chocs mécaniques, les chocs électriques et l'incendie.

Energies dangereuses :

Certains modules peuvent générer une énergie dangereuse (240 VA) selon le réglage de tension de sortie. Le fabricant de l'équipement final doit assurer la protection des techniciens d'entretien contre un contact involontaire avec les bornes de sortie de ces modules. Si une telle tension dangereuse risque de se produire, les bornes ou les connexions du module ne doivent pas être accessibles par l'utilisateur.

Le couvercle et le châssis du module sont conçus pour protéger des personnels expérimentés. Ils ne doivent pas être utilisés comme couvercles extérieurs d'un équipement, accessible aux opérateurs car en condition de puissance maximum, des parties du châssis peuvent atteindre des températures considérées comme dangereuses pour l'opérateur.

Norme generali di sicurezza:

SI PREGA DI LEGGERE LE NORME DI SICUREZZA

Manutenzione:

Il cliente non può eseguire alcuna manutenzione su questi prodotti. L'esecuzione delle eventuali riparazioni è consentita solo a TDK-Lambda UK LTD e ai suoi agenti autorizzati.

Componenti critici:

Non si autorizza l'uso di questi prodotti come componenti critici all'interno di sistemi di controllo nucleari, sistemi necessari alla sopravvivenza o apparecchiature destinate all'impiego in ambienti pericolosi, senza l'esplicita approvazione scritta dell'Amministratore Delegato di TDK-Lambda EMEA.

Uso dei prodotti:

Questi prodotti sono progettati per l'uso all'interno di un'apparecchiatura ospite che limiti l'accesso al solo personale competente e autorizzato.

Questo prodotto è da considerarsi come un alimentatore professionale componente e come tale deve essere installato da personale qualificato all'interno di altre apparecchiature e non può essere utilizzato come prodotto indipendente.

Questo prodotto non è inteso per la vendita al dettaglio o agli utilizzatori finali.

Questo alimentatore è da considerarsi come un componente e come tale non è assoggettato dagli scopi della direttiva EMC. Conformità alla direttiva EMC deve essere considerata nell'installazione finale di utilizzo. Gli uffici di TDK-Lambda Sas Succursale Italiana sono a vostra disposizione per ulteriori raggugli.

Condizioni ambientali:

Questi prodotti sono classificati come IPX0, dunque non devono essere utilizzati sostanze chimiche/solventi, prodotti per la pulizia o liquidi di altra natura.

Ambiente:

Questo prodotto è un alimentatore a commutazione, destinato all'uso in applicazioni rientranti in ambienti con le seguenti caratteristiche: Livello inquinamento 2, Categoria sovratensione II. Questo prodotto contiene schede di circuiti stampati in materiali di Gruppo IIIb.

Carico in uscita:

La potenza in uscita ottenuta dall'alimentatore non deve superare la potenza nominale indicata sulla targhetta dell'alimentatore, fatto salvo dove indicato nei limiti per il prodotto specificati in questo manuale.

Parametri di alimentazione:

Questo prodotto deve essere utilizzato entro i parametri di alimentazione indicati nei limiti per il prodotto, specificati in questo manuale.

Smaltimento:

L'unità contiene componenti che richiedono procedure speciali di smaltimento. Accertarsi che l'unità venga smaltita in modo corretto al termine della vita utile e nel rispetto delle normative locali.



RISCHIO DI SCOSSA ELETTRICA

Avvertimento di alta tensione:

All'interno dell'alimentatore sono presenti tensioni pericolose. Gli installatori professionali devono proteggere il personale di manutenzione dal rischio di contatto accidentale con queste tensioni pericolose all'interno dell'apparecchiatura finale.

ATTENZIONE: Se installato in un'attrezzatura di classe I, questo prodotto deve essere collegato a terra in modo affidabile ed installato in modo professionale.

Le uscite (+) o (-) possono essere messa a terra o lasciate isolate.

I coperchi/il telaio dell'unità non devono essere accessibili da parte dell'utente.

Il connettore dell'alimentazione principale non può essere utilizzato come terminale di collegamento di campo.

Non utilizzare viti che penetrano nell'unità per più di : Vedi disegni

Un fusibile interno protegge l'unità e non deve essere sostituito dall'utente. Nell'eventualità di un difetto interno, restituire l'unità a TDK-Lambda UK LTD o a uno dei suoi agenti autorizzati.

L'apparecchiatura finale deve includere una recinzione meccanica, elettrica e antincendio per proteggere dai pericoli di natura meccanica, dalle scosse elettriche e dai pericoli di incendio.

Pericoli energetici:

Alcuni moduli sono in grado di erogare energia pericolosa (240 VA) a seconda della tensione in uscita impostata. I produttori delle apparecchiature finali sono tenuti a proteggere il personale di manutenzione dal rischio di contatto accidentale con questi terminali dei moduli di uscita. Se impostati su livelli che non escludono l'erogazione di energia pericolosa, questi terminali o collegamenti non devono risultare accessibili da parte dell'utente.

Il coperchio/telaio dell'unità è realizzato per proteggere il personale esperto dai pericoli. Non deve essere usato come parte degli involucri esterni di qualsiasi apparecchiatura, se risulta accessibile da parte degli addetti, poiché è possibile che in condizioni di pieno carico una o più parti del telaio dell'unità giunga/ giungano a temperature superiori ai limiti considerati sicuri per l'accesso da parte degli addetti.

Instrucciones generales de seguridad:

LEA LAS INSTRUCCIONES DE SEGURIDAD

Servicio:

Estos productos no pueden ser reparados por los clientes. TDK-Lambda UK LTD. y sus agentes autorizados son los únicos que pueden llevar a cabo las reparaciones.

Componentes fundamentales:

Estos productos no pueden ser utilizados como componentes fundamentales en sistemas de control nuclear, sistemas de soporte vital o equipos a utilizar en entornos peligrosos sin el consentimiento expreso por escrito del Director General de TDK-Lambda EMEA.

Uso de los productos:

Estos productos han sido diseñados para ser utilizados en un equipo central que restrinja el acceso al personal cualificado autorizado.

Este producto es una fuente de alimentación y sólo puede ser instalado por personal cualificado dentro de otros equipos y no debe ser tratado como un producto independiente. Este producto debe ser vendido entre empresas profesionales y solo puede obtenerse a través de los canales de distribución. No está destinado para la venta a usuarios finales.

Este producto es una fuente de alimentación y no se ve afectada por la directiva EMC. El cumplimiento de la directiva EMC se debe considerar en la instalación final. Por favor, póngase en contacto con su oficina local de TDK – Lambda.

Medioambiental:

Estos productos son IPX0 y, por tanto, no pueden utilizarse sustancias químicas/disolventes, agentes de limpieza ni otros líquidos.

Medio ambiente:

Esta fuente de alimentación es una fuente de alimentación de modo conmutado a utilizar en aplicaciones dentro de un entorno con un Grado de contaminación 2 y una Categoría de sobretensión II. En él se utilizan policloruros de bifenilo del Grupo de materiales IIIb.

Carga de salida:

La potencia de salida tomada de la fuente de alimentación no puede sobrepasar el valor nominal indicado en la etiqueta de la fuente de alimentación, excepto en los casos indicados en las limitaciones del producto en este manual.

Parámetros de entrada:

Este producto debe ser utilizado dentro de los parámetros de entrada indicados en las limitaciones del producto en este manual.

Desecho de la unidad:

La unidad contiene componentes que deben ser desechados de una manera especial. Asegúrese de desechar correctamente la unidad al final de su vida útil y conforme a las normas locales vigentes.



PELIGRO DE DESCARGAS ELÉCTRICAS

Advertencia de alta tensión:

En esta fuente de alimentación hay tensiones peligrosas. El instalador profesional debe proteger al personal de servicio contra cualquier contacto accidental con estas tensiones peligrosas en el equipo final.

ADVERTENCIA: La instalación de este producto en un equipo de clase I la deben llevar a cabo profesionales y el producto debe estar conectado a tierra.

La salida o salidas (+) o (-) pueden conectarse a tierra o se las puede dejar flotando.

Debe impedirse el acceso de los usuarios a la cubierta o cubiertas y al chasis de la unidad.

El conector de entrada de la red no es apto para ser utilizado a modo de bornes de cableado de campo.

No utilice tornillos de montaje susceptibles de penetrar en la unidad más de: Ver dibujos.

Un fusible interno protege la unidad y este no debe ser nunca reemplazado por el usuario. En caso de existir algún defecto interno, la unidad debe ser enviada a TDK-Lambda UK LTD o a uno de sus agentes autorizados.

El equipo de uso final debe constituir un recinto de protección mecánica, eléctrica y contra incendios de protección mecánica, contra descargas eléctricas y contra el peligro de incendios.

Peligros de energía:

Algunos módulos pueden generar energía peligrosa (240VA) dependiendo de la configuración de la tensión de salida. Los fabricantes de equipos finales deben proteger al personal de servicio contra un contacto accidental con estos bornes de salida de los módulos. Si se configura de modo que pueda generarse energía peligrosa, hay que evitar que el usuario pueda acceder a los bornes o conexiones del módulo.

La cubierta/chasis de la unidad ha sido diseñada para que proteja a las personas cualificadas de los peligros. No deben ser utilizadas como parte de las cubiertas externas de cualquier equipo al que pueden acceder los operarios, ya que bajo unas condiciones de carga completa, la pieza o piezas del chasis de la unidad pueden alcanzar temperaturas superiores a las consideradas seguras para el acceso de los operarios.

Instruções gerais de segurança:

LEIA AS INSTRUÇÕES DE SEGURANÇA

Manutenção:

Estes produtos não são podem ser submetidos a manutenção por parte do cliente. Apenas a TDK-Lambda UK LTD e os seus agentes autorizados têm permissão para realizar reparações.

Componentes essenciais:

Não é autorizada a utilização destes produtos como componentes essenciais de sistemas de controlo nuclear, sistemas de suporte de vida ou equipamento para utilização em ambientes perigosos sem a expressa autorização por escrito do Director-Geral da TDK-Lambda EMEA.

Utilização do produto:

Estes produtos foram concebidos para utilização dentro de um equipamento de alojamento que apenas permita o acesso a pessoal qualificado autorizado.

Este produto é uma alimentação considerado com um componente para ser instalado por pessoas qualificadas, em outros equipamentos. Não deve ser usado como um produto acabado.

Este produto é destinado para venda entre as empresas e pode ser obtido através de canais de distribuição. Não se destina à venda aos particulares.

Este produto é uma alimentação considerado com um componente, não é dentro do application âmbito da directiva CEM.

Conformidade com a directiva CEM devem ser considerados na instalação final.

Entre em contacto com seu escritório TDK-Lambda mais próximo.

Ambiental:

Estes produtos são IPX0 e, como tal, não se devem utilizar químicos/solventes, agentes de limpeza e outros líquidos.

Ambiente:

Esta fonte de alimentação é uma fonte de alimentação do modo de comutação para utilização em aplicações com um Nível de Poluição 2 e ambientes da categoria de sobretensão II. São utilizadas placas de circuitos impressos do grupo de materiais IIIb.

Carga de saída:

A potência de saída extraída da fonte de alimentação não deve exceder a classificação assinalada na etiqueta da fonte de alimentação, excepto quando indicado nas limitações do produto neste guia.

Parâmetros de entrada:

Este produto deve ser utilizado dentro dos parâmetros de entrada indicados nas limitações do produto neste guia.

Eliminação no fim de vida:

A unidade contém componentes que necessitam de procedimentos especiais de eliminação. Certifique-se de que a unidade é devidamente eliminada no fim da sua vida útil e que tal é feito em conformidade com os regulamentos locais.



RISCO DE CHOQUE ELÉCTRICO

Aviso de alta tensão:

Estão presentes tensões perigosas dentro da fonte de alimentação. O profissional que realizar a instalação deve proteger o pessoal de assistência contra contactos inadvertidos com estas tensões perigosas do equipamento final.

AVISO: Quando instalado num equipamento de Classe I, este produto deve ser ligado à terra de forma fiável e instalado por um profissional.

As saídas (+) e (-) podem ser ligadas à terra ou deixadas soltas.

O chassis/cobertura(s) da unidade não deve estar acessível ao utilizador.

O conector de entrada de alimentação não deve ser utilizado como terminal de cablagens no local.

Não utilize parafusos de montagem, uma vez que estes penetrarão na unidade em mais do que: Veja os desenhos

Existe um fusível interno que protege a unidade e que não deve ser substituído pelo utilizador. Em caso de defeito interno, a unidade deve ser devolvida à TDK-Lambda UK LTD ou a um dos seus agentes autorizados.

O equipamento de utilização final deve fornecer um bastidor com protecção mecânica, eléctrica e contra incêndios adequada.

Perigos de energia:

Alguns módulos tem a capacidade de fornecer energia perigosa (240 VA), de acordo com a configuração da tensão de saída. O equipamento final do fabricante deve garantir que o pessoal de assistência está protegido contra contactos inadvertidos com estes terminais de saída do módulo. Se essa energia perigosa for produzida, as ligações e os terminais do módulo não devem ser acessíveis pelos utilizadores.

O chassis/cobertura da unidade está concebido de forma a proteger o pessoal especializado de perigos. Não devem ser utilizados como parte das coberturas externas de qualquer equipamento em que possam estar acessíveis aos operadores, uma vez que em condições de carga máxima, algumas peças do chassis da unidade podem atingir temperaturas superiores às consideradas seguras para o acesso do operador.

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PFE500F - 1000F SERIES

Instruction Manual

BEFORE USING THE POWER SUPPLY UNIT

Be sure to read this instruction manual thoroughly before using this product. Pay attention to all cautions and warnings before using this product. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

DANGER

- Never use this product in locations where flammable gas or ignitable substances are present.

WARNING

- Do not make unauthorized changes to power supply unit, otherwise you might have electric shock and void your warranty.
- Do not touch this unit and the internal components in operation or shortly after shut down. They might have high voltage or high temperature and as the unit dissipates its heat so the surface of the unit is hot. You might receive electric shock or burn.
- When the unit is operating, keep your hands and face away from it; you might be injured by an accident.
- Do not use unit under unusual condition such as emission of smoke or abnormal smell and sound etc. It might cause fire and electric shock. In such case, please contact us; do not repair by yourself, as it is dangerous for the user.
- Do not drop or insert anything into unit. It might cause failure and fire.
- Do not operate these units under condensation condition. It might cause fire and electric shock.

CAUTION

- As a component part, compliance with the standard will be based upon installation in the final application. This product must be installed in a restricted access location, accessible to authorized competent personnel only. These AC to DC converters have reinforced insulation between the input and the output. The outputs of these products are energy hazards. All models with an output greater than 28V model are considered to be non-SELV. As such, the instructions for use must refer to these energy hazardous outputs and Non-SELV outputs in that the outputs must not be accessible to the operator. The installer must also provide protection against inadvertent contact by a service engineer.
- The equipment has been evaluated for use in a Pollution Degree 2 environment.
- This power supply is primarily designed and manufactured to be used and enclosed in other equipment.
- Confirm connections to input/output terminals and signal terminals are correct as indicated in the instruction manual.
- Attach a fast acting external fuse to each module to ensure safety operation and compliance to each safety standard approval. The recommended input fuse rating within the instructions manual. The breaking capacity and voltage rating of this fuse might be subject to the end use application.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be used within specifications, otherwise the unit will be damaged.
- For application equipment, which requires very high reliability (Nuclear related equipment, traffic control equipment, medical equipment, etc.), please provide fail safety function in the equipment.
- Do not use the product in environment with strong electromagnetic field, corrosive gas and conductive substance.
- Do not operate and store this unit at an environment where condensation occurs. In such case, waterproof treatment is necessary
- Never operate the unit under over current or shorted conditions for 30 seconds or more and out of Input Voltage Range as specification. Insulation failure, smoking, burning or other damage might occur to the unit.
- The output voltage of this power supply unit is considered to be a hazardous energy level (The voltage is 2V or more and the electric power is 240VA or more). Prevention from direct contact with output terminal is highly necessary. While installing or servicing this power supply unit, avoid dropping tools by mistake or direct contact with output terminal. This might cause an electrical shock. While repairing this power supply unit, the AC input power must be switched off and the input and output voltage should be level.
- To maintain the SELV output for outputs less than 28VDC, under fault conditions, the output must be connected to earth in the final application.
- The application circuits and their parameter are for reference only. Be sure to verify effectiveness of application circuits and their parameters before finalizing circuit design.
- Do not inject abnormal voltage to output terminal and signal terminal from the outside. The injection of reverse voltage or over voltage exceeding nominal output voltage to output terminals might cause damage to internal components.
- This information in this document is subject to change without prior notice. For actual design-in, please refer to the latest publications of data sheet, etc., for the most up-to date specifications of the unit.
- Design the board of an application circuit implementing this product in consideration of components layout, pattern layout and pattern width.
- No part of this document might be copied or reproduced in any form without prior written consent of Densel-Lambda.

Note : CE MARKING

CE Marking, when applied to a product covered by this handbook, indicates compliance with the low voltage directive.

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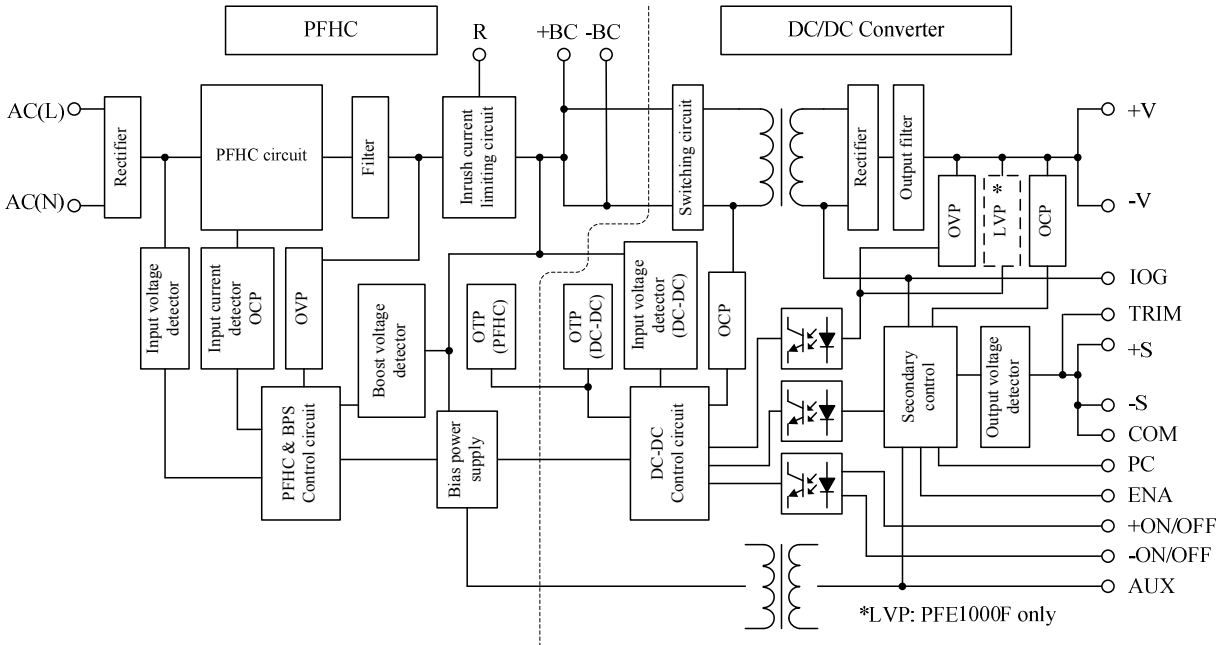
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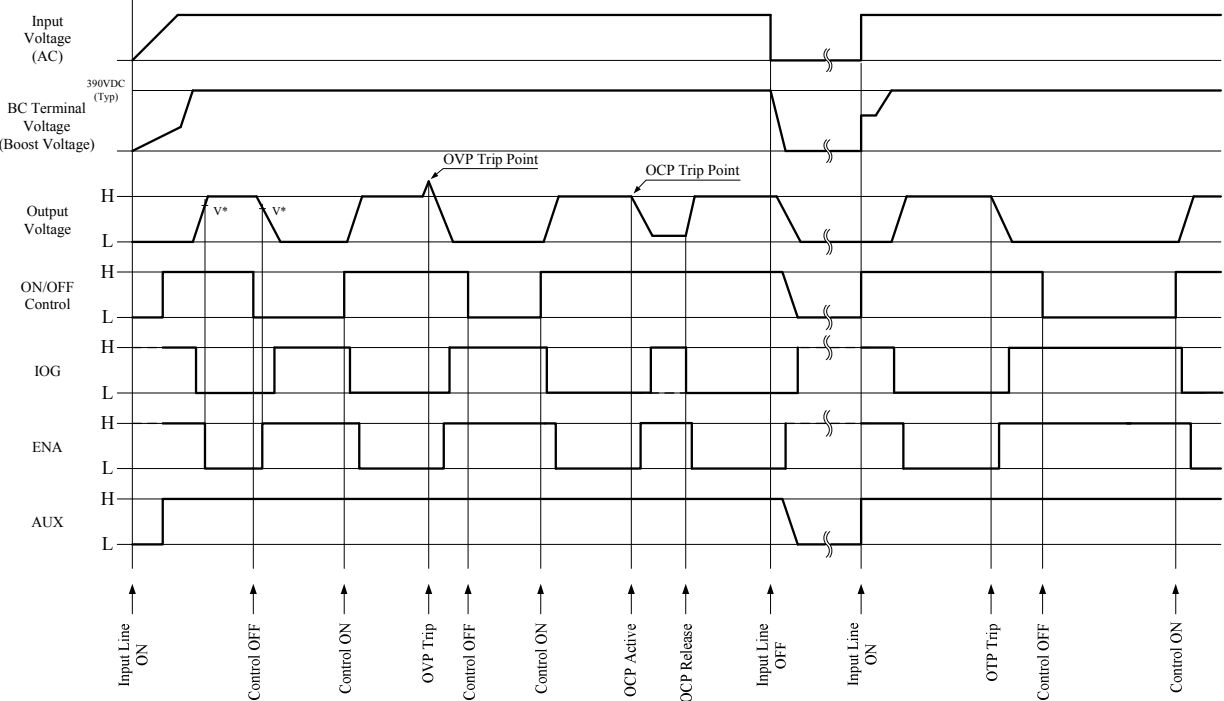
■ Block Diagram



Switching Frequency
PFHC circuit (fixed) :100kHz
DC/DC converter (fixed) :230kHz (primary),460kHz (secondary)

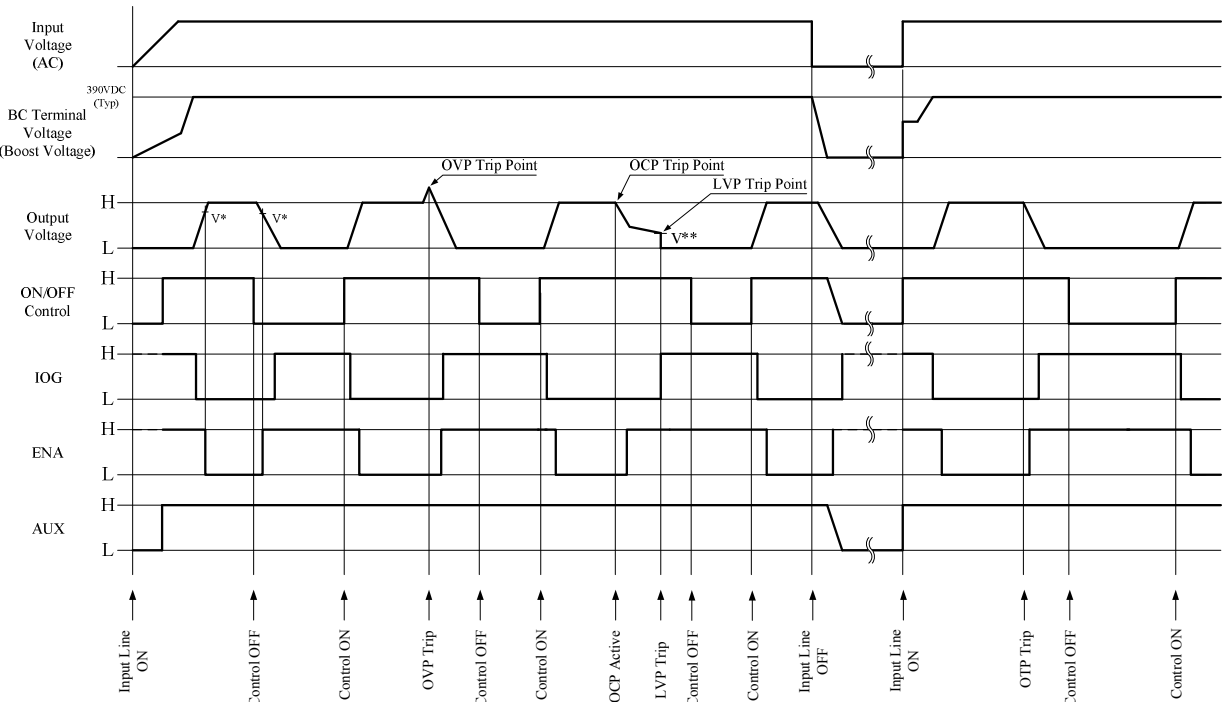
Sequence Time Chart

PFE500F Series



V^* voltage level: Refer to Application Notes “13.Power ON Signal” section.

PFE1000F Series

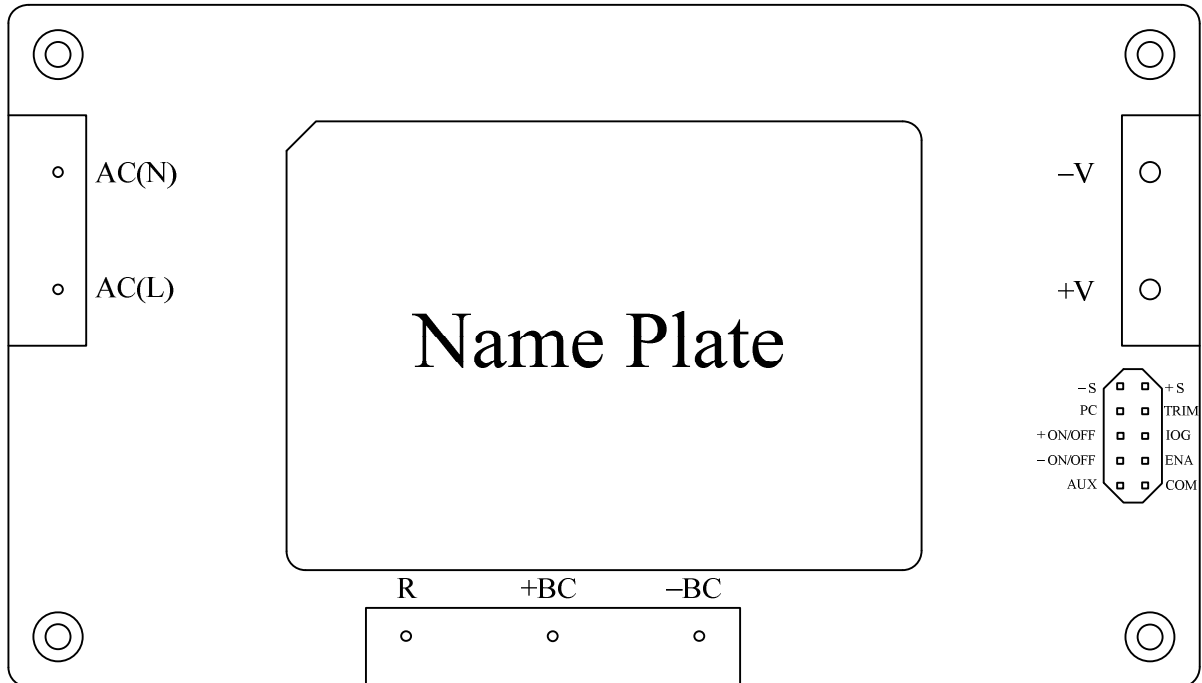


V^* voltage level: Refer to Application Notes “13.Power ON Signal” section.

V^{**} voltage level: Refer to Application Notes “6.Over Current Protection” section.

Terminal Explanation

PFE500F Series



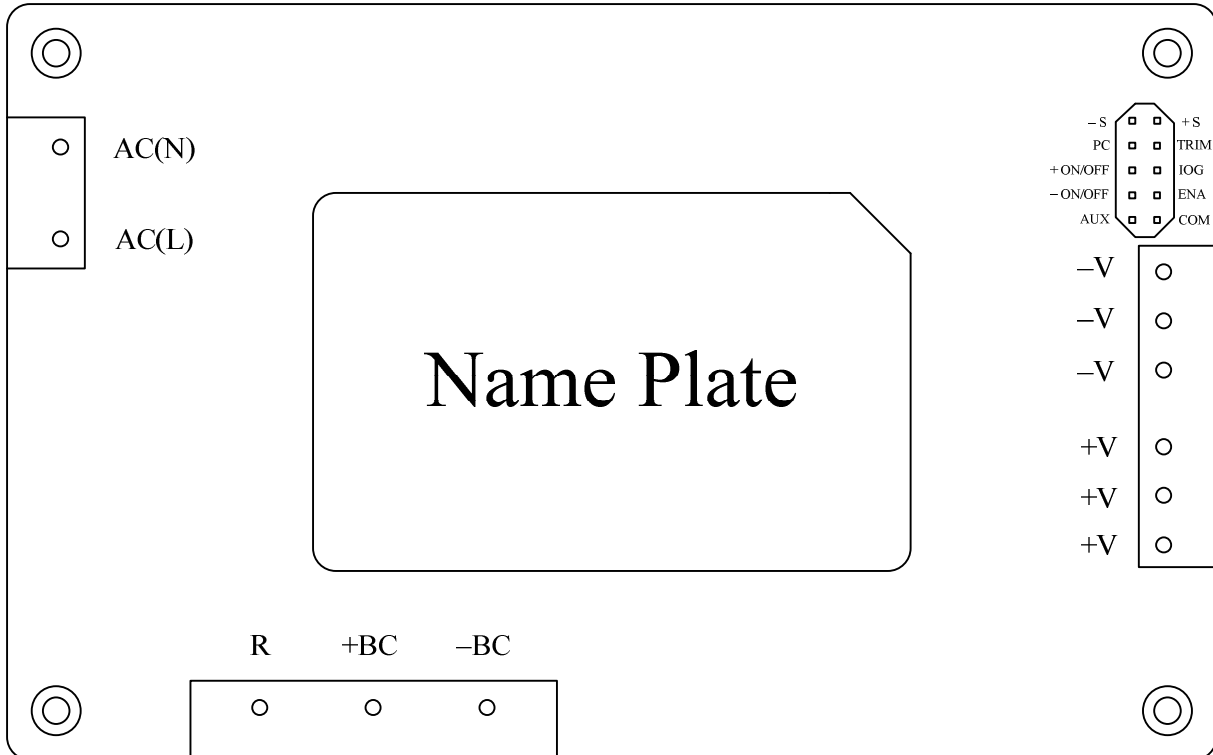
[Input side terminals]	
AC (L)	: Input terminal live line
AC (N)	: Input terminal neutral line
+BC	: +Boost voltage terminal
-BC	: -Boost voltage terminal
R	: External inrush current limiting resistor terminal

[Output side terminals]	
+V	: +Output terminal
-V	: -Output terminal
+S	: +Remote sensing terminal
-S	: -Remote sensing terminal
PC	: Output current balance terminal
TRIM	: Output voltage trimming terminal
IOG	: Inverter operation good terminal
ENA	: Power on signal terminal
+ON/OFF	: +ON/OFF control terminal
-ON/OFF	: -ON/OFF control terminal
AUX	: Auxiliary power supply terminal for external circuits
COM	: Common ground terminal

- Baseplate can be connected to FG through M3 mounting tapped holes.
- Consider contact resistance when connecting AC (L), AC (N), R, +BC, -BC, +V, -V.
- Note that +BC and -BC terminals is a primary voltage with high voltage (390VDC). Do not connect load to these terminals. It might result in power module damage.

Terminal Explanation

PFE1000F Series



[Input side terminals]
AC (L) : Input terminal live line
AC (N) : Input terminal neutral line
+BC : +Boost voltage terminal
-BC : -Boost voltage terminal
R : External inrush current limiting resistor terminal

[Output side terminals]
+V : +Output terminal
-V : -Output terminal
+S : +Remote sensing terminal
-S : -Remote sensing terminal
PC : Output current balance terminal
TRIM : Output voltage trimming terminal
IOG : Inverter operation good terminal
ENA : Power on signal terminal
+ON/OFF : +ON/OFF control terminal
-ON/OFF : -ON/OFF control terminal
AUX : Auxiliary power supply terminal for external circuits
COM : Common ground terminal

- Baseplate can be connected to FG through M3 mounting tapped holes.
- Consider contact resistance when connecting AC (L), AC (N), R, +BC, -BC, +V, -V.
- Note that +BC and -BC terminals is a primary voltage with high voltage (390VDC). Do not connect load to these terminals. It might result in power module damage.

■ Explanations on Specifications

1. Input Voltage Range

Input voltage range is indicated below. Take care not to apply input voltage which is above this specified range or under this specified range for more than 30 seconds. Nor should a DC input voltage be applied as this would result into power module damage.

Input Voltage Range : Single Phase 85 to 265VAC Line Frequency Range : 47 to 63Hz

● Basic Connection

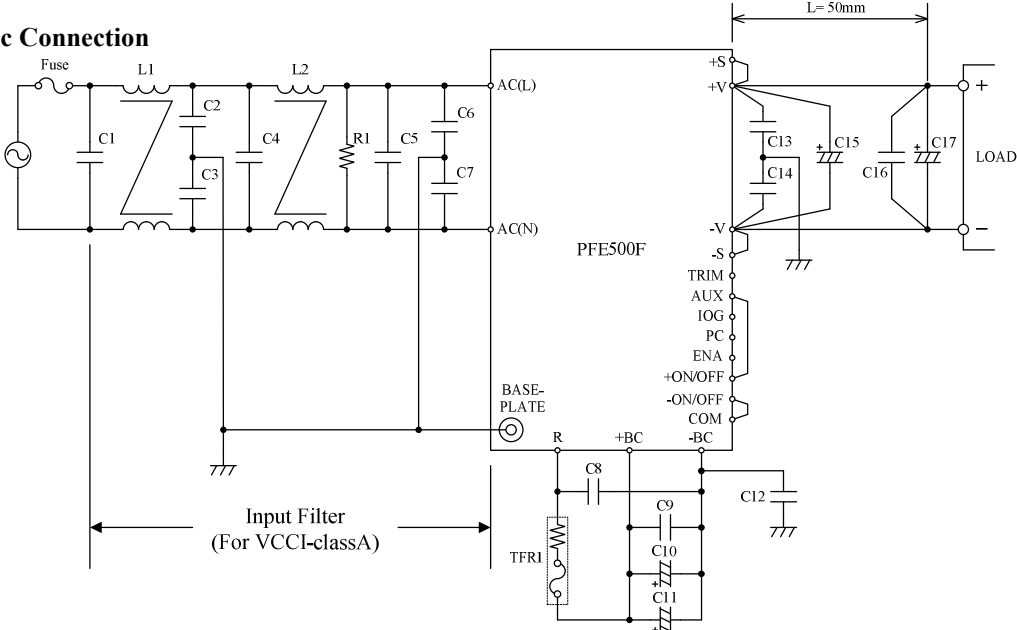


Fig. 1-1-(1) Basic Connection for PFE500F Series

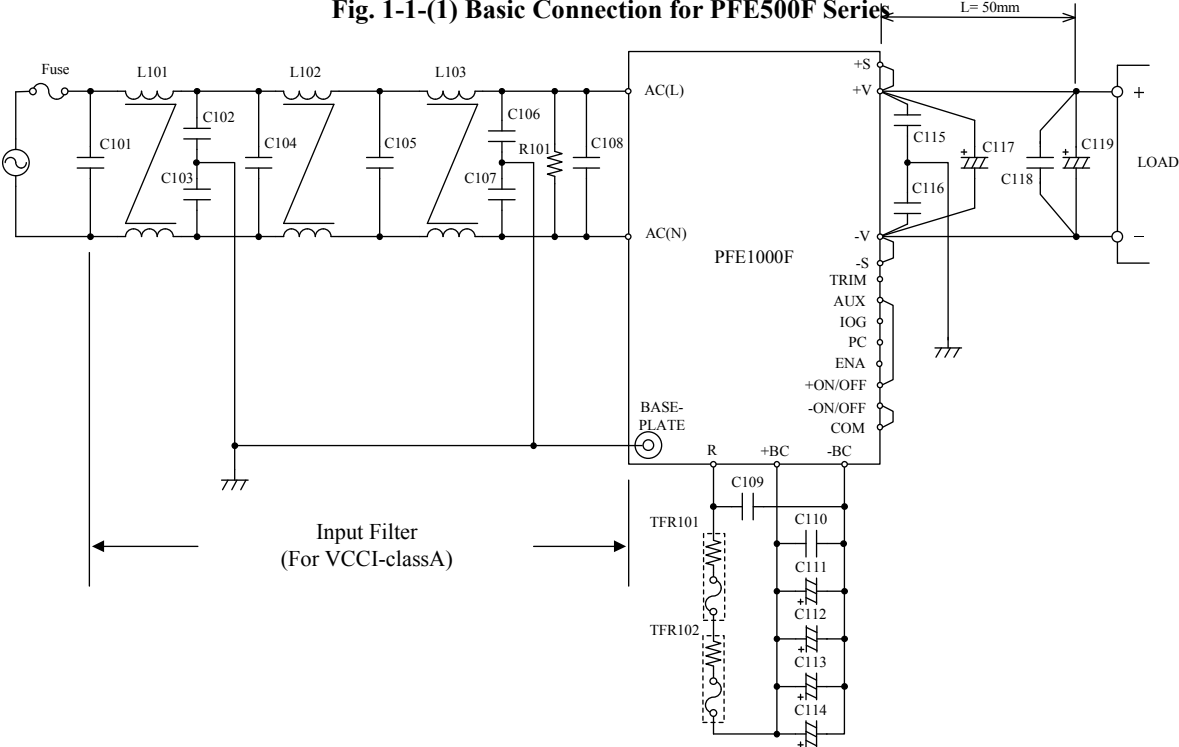


Fig. 1-1-(2) Basic Connection for PFE1000F Series

Note) To meet the surge immunity, evaluate the addition of the surge protection components. Refer to separate document "PFE500F Series IEC Data" and "PFE1000F Series IEC Data".

External Input Fuse

This power module has no internal fuse. Use external fuse to acquire each Safety Standard and to further improve safety. Further, Fast-Blow type fuse must be used per one module. Also, in-rush surge current flows during line throw-in. Be sure to check I²t capability of external switch and fuse.

Recommended External Fuse
PFE500F : F15AH, 250V
PFE1000F : F25AH, 250V

Note) Select fuse based on rated voltage, rated current and breaking capacity.

(1) Voltage Ratings

100VAC line : AC125V
 200VAC line : AC250V

(2) Current Ratings

Rated current is selected by the maximum input current based on operating conditions and can be calculated by the following formula.

$$I_{in(max)} = \frac{P_{out}}{V_{in} \times Eff \times PF} \text{ (Arms)} \quad \text{(Formula 1-1)}$$

I_{in} (max) : Maximum Input Current
 P_{out} : Maximum Output Power
 V_{in} : Minimum Input Voltage
 Eff : Efficiency
 PF : Power Factor

(3) Breaking Capacity

The breaking capacity may be subject to the end use application. Please select a suitably rated breaking capacity fuse for end use application.

For Efficiency and Power Factor values, refer to separate document “PFE500F Series Evaluation Data” and “PFE1000F Series Evaluation Data”.

C1, C4, C5 : 1uF (Film Capacitor)

C101, C104, C105, C108 : 1uF (Film Capacitor)

Ripple current flows through this capacitor. When selecting capacitor, be sure to check the allowable maximum ripple current rating of this capacitor. Verify the actual ripple current flowing through this capacitor by doing actual measurement.

Recommended Voltage Rating : 250VAC

Note) Connect C5, C108 as near as possible towards the input terminals of this power module.

Audible noise may occur depending on type of film capacitor.

L1, L2 : 6mH

L101, L102, L103 : 2mH

Add common mode choke coil to conform to EMI/EMS standard. When using multiple modules, connect coil to each module.

Note) Depending on the input filter used, noise might increase or power module might malfunction due to filter resonance.

C2, C3, C6, C7, C12 : 2,200pF (Ceramic Capacitor)

C102, C103 : 470pF (Ceramic Capacitor)

C106, C107 : 4,700pF (Ceramic Capacitor)

Connect ceramic capacitor to conform to EMI/EMS standard. Be sure to note the leakage current of your equipment when connecting this capacitor.

High withstand voltage are applied across this capacitor depending on the application. Select capacitors with high withstand voltage rating.

R1, R101 : 470kohm

Connect bleeder resistor across AC(L) and AC(N) terminals.

C8, C9 : 1uF (Film Capacitor)

C109, C110 : 1uF (Film Capacitor)

Ripple current flows through this capacitor. When selecting capacitor, be sure to check the allowable maximum ripple current rating of this capacitor. Verify the actual ripple current flowing through this capacitor by doing actual measurement.

Recommended Voltage Rating : 450VDC

Note) Select Capacitor with more than 3A (rms) rating. Connect C8, C9, C109, C110 as near as possible towards the terminals of this power module.

C10, C11 : 390uF (Electrolytic Capacitor)

C111, C112, C113, C114 : 390uF (Electrolytic Capacitor)

Refer to “Selection Method of External Bulk Capacitor for Boost Voltage”.

Allowable External Capacitance at nominal capacitor value is shown below.

Recommended Voltage Rating : 450VDC

Recommended Total Capacitor :

390uF to 1,200uF (PFE500F Series)

780uF to 2,300uF (PFE1000F Series)

Note) 1. Do not connect capacitors with more than the above capacitance value as this might result in power module damage.

2. When using module between 390uF – 600uF for PFE500F Series, 780uF – 1,200uF for PFE1000F Series total capacitor value, it is necessary to reduce output power as shown in Fig1-3.

3. When using module below -20 deg C ambient temperature, AC ripple of boost voltage, output ripple voltage and start up characteristics might be affected by ESR characteristics of the bulk capacitors.

Therefore, be sure to verify characteristics by actual evaluation.

C13, C14, C115, C116 : 0.033uF

Connect ceramic or film capacitor to conform to EMI/EMS standard and to reduce output spike noise voltage.

Note) High Voltage is applied across this capacitor during withstand voltage test depending on the application.

Connect C13, C14, C115, C116 as near as possible towards the terminals of this power module.

C15, C117 : Refer to Table 1-1

To reduce output ripple voltage and to stabilize operation, connect electrolytic capacitors across +V and -V terminals.

Note) Connect C15, C117 as near as possible to the +V and -V terminals of this power module.

Vout	C15, C117
12V	25V 1,000uF
28V	50V 470uF
48V	100V 220uF

Table 1-1 C15, C117:Recommended external capacitance

C16, C118 : 2.2uF (Ceramic Capacitor)

Connect ceramic capacitor within 50mm from the output terminals +V and -V of the power module to reduce output spike noise voltage.

Also, note that output spike noise voltage might vary depending on the wiring pattern of the printed circuit board.

C17, C119 : Refer to Table 1-2

Connect C17, C119 within 50mm from the output terminals +V and -V of the power module to stabilize operation and to reduce output ripple noise voltage.

Note that the output ripple and line turn off characteristics of the power module might be affected by the ESR and ESL of the electrolytic capacitor.

Also, note that output ripple voltage might vary depending on the wiring pattern of the printed circuit board.

Fluctuation in output voltage due to sudden load change or sudden input voltage change can be reduced by increasing external output capacitor value.

Vout	C17, C119
12V	25V 1,000uF
28V	50V 470uF
48V	100V 220uF

Table 1-2 C17, C119:Recommended external capacitance

Note) 1. Use low-impedance electrolytic capacitors with excellent temperature characteristics.

(Nippon Chemi-con LXY Series or equivalent)

(Nichicon PM Series or equivalent)

2. For module operation at ambient temperature -20 deg C or less, output ripple voltage might be affected by ESR characteristics of the electrolytic capacitors. Increase the capacitor values shown in Table 1-1 and 1-2 according to the table below.

Vout	C15, C17, C117, C119
12V	25V 1,000uF x 2 parallel
28V	50V 470uF x 2 parallel
48V	100V 220uF x 2 parallel

Table 1-3 C15, C17, C117, C119 : Recommended external capacitance (Ambient Temperature < -20 deg C)

3. Take note of the allowable maximum ripple current of the electrolytic capacitor used. Especially, for sudden load current changes, verify actual ripple current and make sure that allowable maximum ripple current is not exceeded.

● **Selection Method of External Bulk Capacitor for Boost Voltage**

Boost voltage bulk capacitor is selected by ripple voltage, ripple current and output hold-up time.

Select capacitor value such that boost voltage ripple voltage does not exceed 15Vp-p.

Note) When ambient temperature is -20 deg C or less, ripple voltage of the boost voltage might increase due to ESR characteristics. Therefore, verify above characteristics by actual evaluation.

For output hold-up time, refer to separate document "PFE500F Series Evaluation Data" or "PFE1000F Series Evaluation Data" and use appropriate capacitor up to 1,200uF maximum for PFE500F Series, 2,300uF maximum for PFE1000F Series. (It is recommended that verification should be done through actual evaluation).

For allowable ripple current value, refer to Fig. 1-2 and select a capacitor with higher ripple current rating.

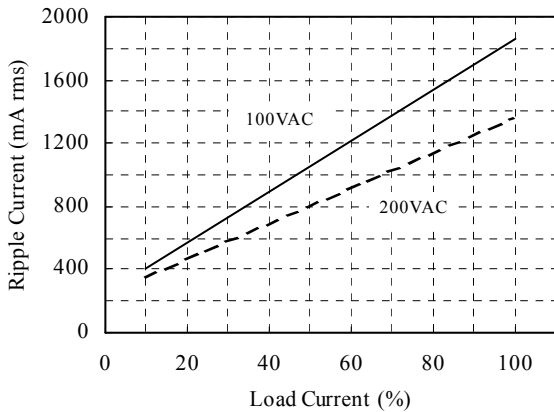


Fig. 1-2-(1) Ripple current value for PFE500F Series
 (A value per one of Fig. 1-1-(1) connection)

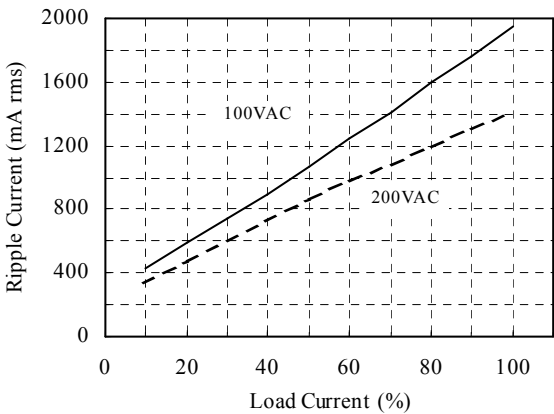


Fig. 1-2-(2) Ripple current value for PFE1000F Series
 (A value per one of Fig. 1-1-(2) connection)

The recommended boost voltage bulk capacitor value range is 390uF-1,200uF for PFE500F Series, 780uF-2,300uF for PFE1000F Series.

When using with reduced the bulk capacitor value, it is necessary to reduce output power as shown in Fig1-3.

Note that reducing the bulk capacitance affects output hold-up time, dynamic line response and dynamic load response characteristics.

It is recommended that verification should be done through actual evaluation.

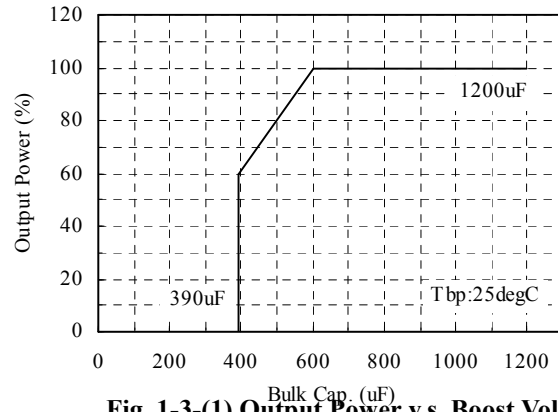


Fig. 1-3-(1) Output Power v.s. Boost Voltage Bulk Capacitance For PFE500F Series

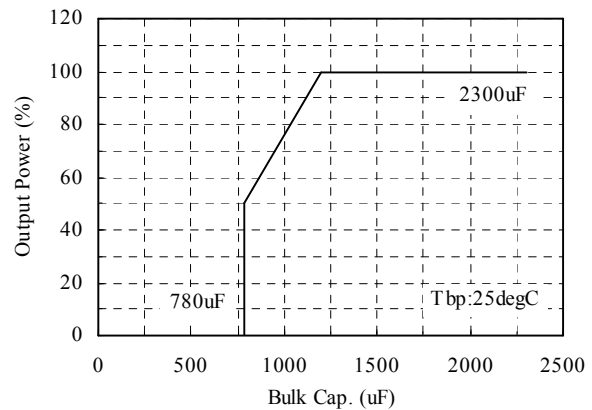


Fig. 1-3-(2) Output Power v.s. Boost Voltage Bulk Capacitance For PFE1000F Series

TFR1 : 10 to 100 ohm

TFR101, TFR102 : 10 to 50 ohm (Total value)

By connecting resistor across R and +BC terminals as shown in Fig. 1-1, in-rush current during line throw-in can be suppressed. Failures due to in-rush current such as melting of external fuse, welding of relay or switch connecting joints or shutdown of No-Fuse Breakers (NFB) might occur. Therefore, select TFR1, TFR101, TFR102 in consideration of the surge current capability of the external components. (TFR1, TFR101, TFR102 are recommended to use the Thermal Fuse Resistor.)

- Note) 1. Do not connect resistors that is out of range from the values shown above as this might result in power module damage.
 2. Note that this module will not operate without this external resistor.

● **Selection Method of External Resistor**

(1) Calculating Resistance Value for External Resistor
 Resistance can be calculated by the formula below.

$$R = \frac{V_{in}}{I_{rush}} (\Omega) \quad (\text{Formula 1-2})$$

R : Resistance Value for External resistor
 V_{in} : Input Voltage converted to DC value
 = Input Voltage (rms) × √2
 I_{rush} : Input surge current value

(2) Required Surge Current Rating

Sufficient surge current withstand capability is required for external resistor.

Required Surge Current Rating can be selected by I²t.
 (Current squared multiplied by time)

$$I^2t = \frac{C_o \times V_{in}^2}{2 \times R} (A^2s) \quad (\text{Formula 1-3})$$

I²t : Current-squared multiplied by time
 C_o : Boost Voltage Bulk Capacitance
 V_{in} : Input Voltage converted to DC value
 = Input Voltage (rms) × √2
 R : Resistance Value for External Resistor

2. Output Voltage Adjustment Range (TRIM terminal)

Output voltage can be adjusted within the range below by connecting fixed and variable resistors or applying external voltage.

However, take care not to exceed the output voltage range shown below because OVP function will activate.

In the PFE1000F Series, be careful not to drop from the following range, because a Low Voltage Protection (LVP) function will be activate.

Output Voltage Adjustment Range :
 +/-20% of the typical voltage rating

When increasing or decreasing output voltage, it must not exceed maximum output current and power.

Even if the output voltage is adjusted using external circuit shown in Fig. 2-1, remote sensing can be done. For details on Remote Sensing function, refer to “9. Remote Sensing”.

Output Voltage Adjustment using Fixed and Variable Resistors

External resistor (R1) and variable resistor (VR) values, as well as, circuit connection is shown below.

For this case, remote programming of the output voltage can be done through the remote programming resistor VR.

Be sure to connect the remote programming resistor between +S and +V terminals.

	12V	28V	48V
R1	18k	18k	18k
VR	10k	20k	50k

unit : [ohm]

External Resistor : Tolerance +/-5% or less
 Variable Resistor : Total Tolerance +/-20% or less
 Remain Resistance 1% or less

Table 2-1
External Resistor and Variable Resistor Value (For +/-20% Output Adjustment)

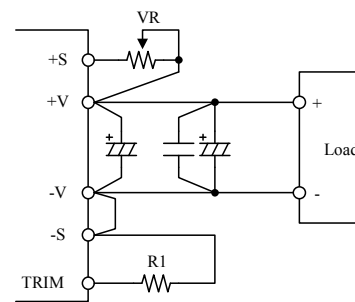


Fig. 2-1 External Resistor Connection Example

Output Voltage Adjustment by applying external voltage

By applying external voltage at the TRIM terminal, output voltage can be adjusted within the same output voltage adjustment range as the output voltage adjustment by external resistor or variable resistor. For this case, output voltage can be determined by the formula shown below.

Output Voltage = TRIM Terminal Voltage
x Nominal Output Voltage

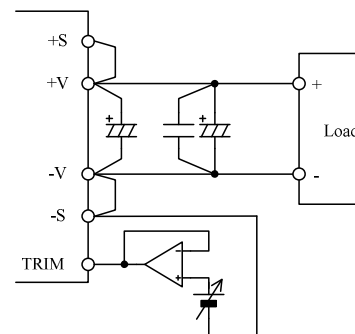


Fig. 2-2 Output Voltage Adjustment by applying external voltage

For applications other than the above, refer to the TRIM circuit as shown in fig.2-3 and determine external circuit and components values.

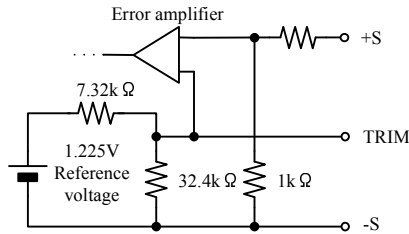


Fig.2-3 Internal TRIM Circuit (For the Reference)

3. Maximum Ripple and Noise

This value is measured according to the description below in accordance with JEITA-9131B(Section 7.16, 7.17 and 7.18).

In the basic connection shown in Fig. 1-1, additional connection shown in Fig. 3-1 is done for measurement. Capacitor (Ceramic Capacitor : 2.2μF and Electrolytic Capacitor : Refer to Table 1-2) must be connected within 50mm from the output terminals. Then, connect coaxial cable with JEITA attachment across the ceramic capacitor electrodes. Use 100MHz bandwidth oscilloscope or equivalent.

Also, note that output ripple voltage and output spike noise voltage might vary depending on the wiring pattern of the printed circuit board.

In general, output ripple voltage and output spike noise voltage can be reduced by increasing external capacitance.

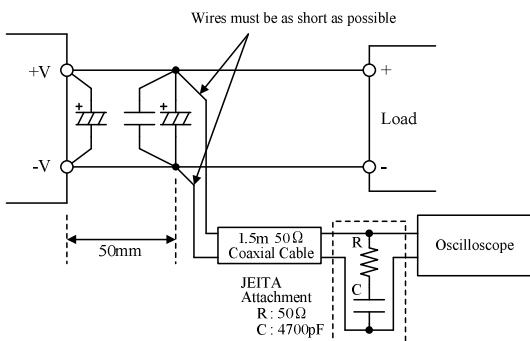


Fig. 3-1
Output Ripple Voltage (including Spike Noise)
Measurement Method

4. Maximum Line Regulation

Maximum line regulation is defined as the maximum output voltage change when input voltage is gradually changed (Steady-State) within specification range.

5. Maximum Load Regulation

Maximum load regulation is defined as the maximum output voltage change when output load current is gradually changed (Steady-State) within specification range.

When using power module in dynamic load mode, audible sound could be heard from the power module or large output voltage change might occur. Make prior evaluation thoroughly before using this power module.

6. Over Current Protection (OCP)

This module is equipped with OCP function.

Constant current limiting with automatic recovery for PFE500F Series. Output will automatically recover when short circuit or overload condition is released.

Constant current limiting with delay shutdown for PFE1000F Series. Output will be shutdown when output about under 70% by short circuit or overload condition that continue about 0.5s. When the shutdown function activates, first cut off input line and verify that boost voltage has dropped down to 20V or less. Then, recover output by recycling input line. In other method, reset to ON/OFF control. OCP value is fixed and cannot be adjusted externally.

Note that continuous short circuit or overload condition more than 30s, might result in power module damage.

7. Over Voltage Protection (OVP)

This module is equipped with OVP function. This value is set between 125% to 145% of nominal output voltage.

When the OVP function activates, first cut off input line and verify that boost voltage has dropped down to 20V or less. Then, recover output by recycling input line. In other method, reset to ON/OFF control. OVP value is fixed and cannot be set externally.

8. Over Temperature Protection (OTP)

This module is equipped with OTP function. This function activates and shuts down the output when ambient temperature or internal temperature abnormal rises. OTP activates at following baseplate temperature.

PFE500F-12	:	90 to 115 deg C
PFE500F-28, 48	:	105 to 130 deg C
PFE1000F-*	:	105 to 130 deg C

When OTP function operates, output can be recovered by cooling down the baseplate sufficiently and letting the boost voltage drop down to 20V or less before recycling the input line. In other method, reset to ON/OFF control.

9. Remote Sensing (+S, -S terminals)

This module has remote sensing terminals to compensate for voltage line drop from the output terminals to the output load. When remote sensing is not required, (local sensing) short +S to +V and -S to -V terminals respectively.

Note that line drop (voltage drop due to wiring) compensation voltage range must be such that the output voltage is within the output voltage adjustment range and that the voltage between -V and -S must be within 0.5V.

Consider power loss due to line drop and use power module within the maximum allowable output power. Reduce the effect of noise to the remote sensing line by using a shield line, a twist pair, or a parallel pattern, etc.

When remote sensing line is long, add the electrolytic capacitor as shown in Fig 9-1.

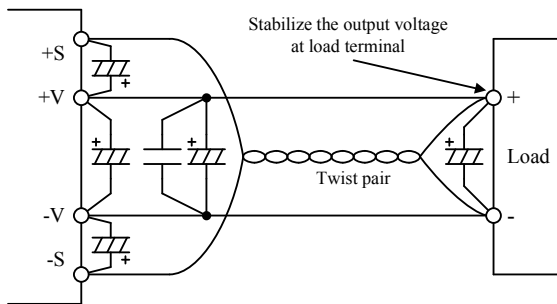


Fig. 9-1 Remote Sensing is used

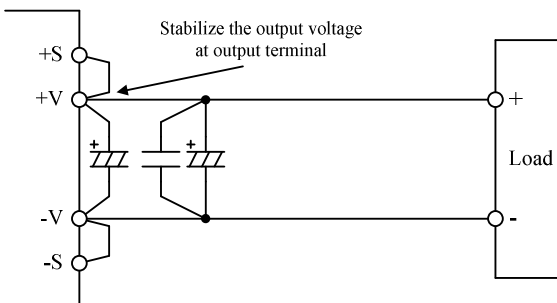


Fig. 9-2 Remote Sensing is not used (Local Sensing)

10. ON/OFF Control

(+ON/OFF, -ON/OFF terminal)

This module is equipped with ON/OFF control function. Without turning the input supply on and off, the output can be enabled and disabled using this function.

The ON/OFF control circuit is isolated from input circuit of the power supply by photo-coupler.

Fig. 10-1 and Fig. 10-2 is connection example of ON/OFF control. When the ON/OFF control is not used, short +ON/OFF to AUX and -ON/OFF to COM terminals respectively.

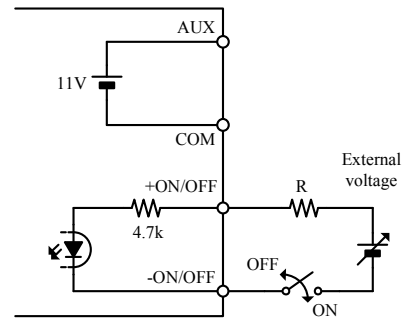


Fig. 10-1 ON/OFF Control
Connection Example 1
(ON/OFF Control by External Voltage)

Select the external voltage and external resistance, as the ON/OFF terminal current is shown below.

ON/OFF terminal current	Output Voltage
2.5mA (+/-0.5mA)	ON
Less than 0.15mA	OFF

Table 10-1
Recommended ON/OFF Terminal Current

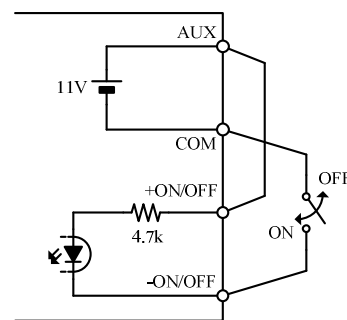


Fig. 10-2 ON/OFF Control
Connection Example 2
(ON/OFF Control by Built-in AUX)

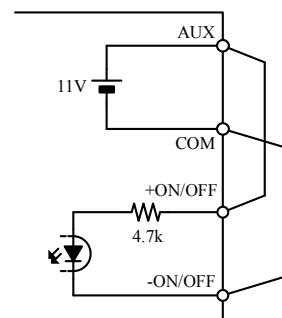


Fig. 10-3 ON/OFF Control
Connection Example 3
(ON/OFF Control is not used)

11. Series Operation

Series operation is possible for PFE500F Series and PFE1000F Series. Connections shown in Fig. 11-1 and Fig. 11-2 are possible.

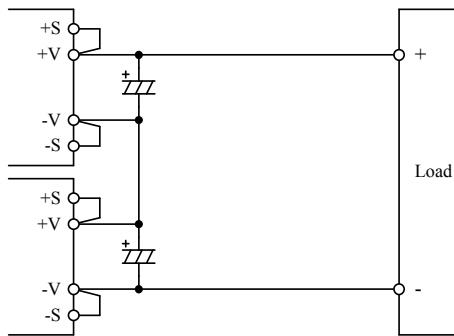


Fig. 11-1 Series Operation for High Output Voltage Applications

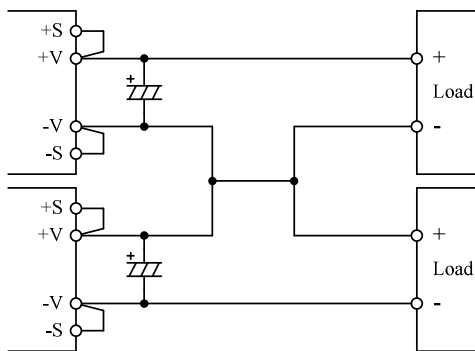


Fig. 11-2 +/--Output Series Applications

12. Parallel Operation (PC terminal)

By connecting the PC terminal of each power module, output current can be equally drawn from each module. A maximum of 6 units of the same model can be connected.

However, maximum output current is derated by parallel operation units as shown in Table 12-1.

Note that usage of power module at out-of-rated condition might result in power module temperature abnormal rise or damage.

Parallel units	Maximum output current
~3 units	90% of nominal output current
4~6 units	85% of nominal output current

Table 12-1 Condition for Parallel Operation

Set the accuracy of the output voltage within +/-1% when adjust the output voltage for parallel operation.

When adjust the output voltage by applying external voltage at the TRIM terminal, insert a about 10k ohm resistor between TRIM terminal and external source.

Moreover, external circuits are necessary for TRIM terminal at each individual module.

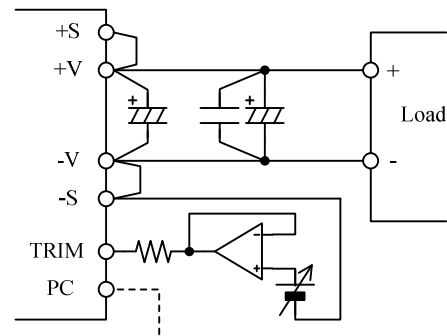


Fig. 12-1 Output Voltage Adjustment by applying external voltage (For parallel operation)

At parallel operation, +BC, -BC and R terminals must not be connected in parallel with other modules. It might result in power module damage.

Refer to “Parallel Operation” of the PH-Series Application Notes for details.

13. Power ON Signal (ENA terminal)

This signal is located at the secondary side (output side) and it is an open collector output. (Maximum sink current is 10mA and maximum applied voltage is 75V.)

Return line for ENA terminal is the COM terminal.

When output voltage goes over a specified voltage level at start up, Power ON signal is LOW.

Output voltage threshold level is as follows.

PFE500F•1000F-12	: 8V (TYP)
PFE500F•1000F-28	: 19V (TYP)
PFE500F•1000F-48	: 33V (TYP)

On the other hand, output voltage threshold level for Power ON signal to turn HIGH is as follows.

PFE500F•1000F-12	: 6V (TYP)
PFE500F•1000F-28	: 15V (TYP)
PFE500F•1000F-48	: 28V (TYP)

14. I.O.G signal (IOG terminal)

Normal or abnormal operation of the power module can be monitored by using the IOG terminal. Output of this signal monitor is located at secondary side (output side) and is an open collector output.

This signal is LOW when inverter is normally operating and HIGH when inverter stops or when inverter is operating abnormally. (maximum sink current is 5mA, maximum applied voltage is 35V)

Ground for the IOG terminal is the COM terminal.

Also note that IOG becomes unstable for following conditions:

- Operation of Over Current Protection (OCP)
- Light load conditions at parallel operation
- Dynamic load operation

15. Auxiliary power supply for external circuits (AUX terminal)

For AUX terminal, output voltage value is within 10~14VDC range, maximum output current is 20mA. Ground for the AUX terminal is COM terminal.

Avoid short circuit of AUX terminal with other terminals as this would lead to power module damage.

16. Operating Temperature Range

These products can be used in any mounting direction but be sure to consider enough airflow to avoid heat accumulation around the module.

Consider surrounding components layout and set the PCB mounting direction such that air can flow through the heatsink by forced or convection cooling .

This product can operate at actual mounting condition when baseplate temperature is maintained at or below the following baseplate temperature.

- PFE500F-12 : 85 deg C**
- PFE500F-28,48 : 100 deg C**
- PFE1000F-12 : 100 deg C**
- PFE1000F-28,48 : 85 deg C (85VAC ≤ Vin < 170VAC)**
- 100 deg C (170VAC ≤ Vin ≤ 265VAC)**

Verify baseplate temperature at worst case operating condition at the measuring point as shown in Fig. 16-1.

For Thermal Design details, refer to Power Module Application Notes “Thermal Design” section.

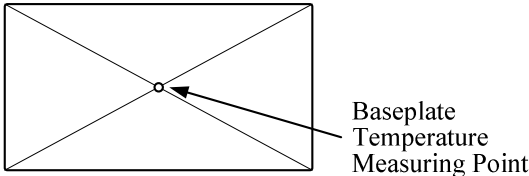


Fig. 16-1 Baseplate Measuring Point

Baseplate temperature range is limited according to Fig. 16-2.

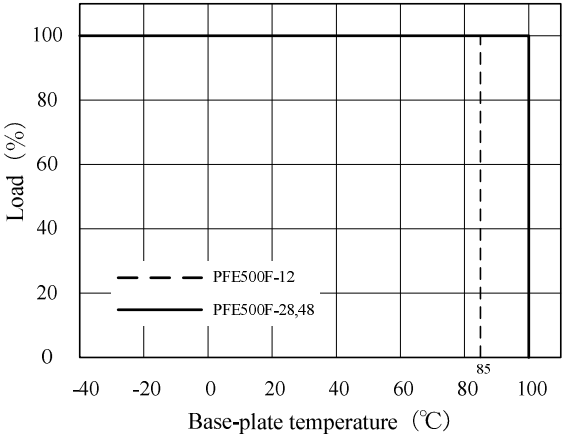


Fig. 16-2-(1) PFE500F Series Derating Curve

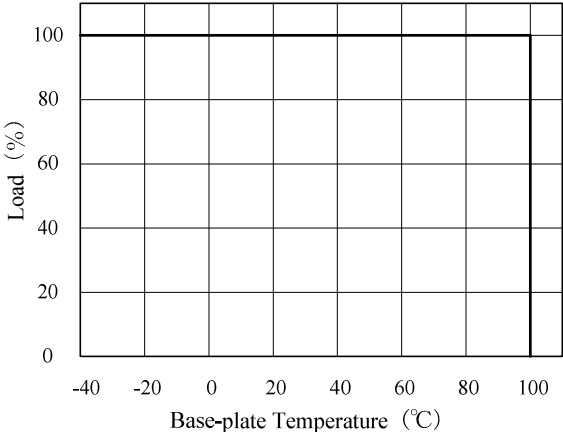


Fig. 16-2-(2) PFE1000F-12 Derating Curve

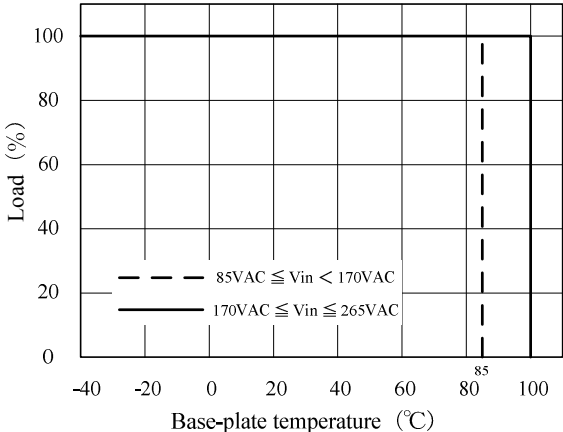


Fig. 16-2-(3) PFE1000F-28,48 Derating Curve

To further improve the reliability, it is recommended to use this module with baseplate temperature derating.

17. Operating Humidity

Note that dewdrop might cause power module abnormal operation or damage.

18. Storage Temperature

Note that rapid temperature change causes dewdrop causing harmful effect on soldering condition of the terminal pins.

19. Storage Humidity

Storage under high temperature and high humidity causes rust on terminal pins that causes deterioration of soldering conditions. Take enough caution when storing this module.

20. Cooling Method

For details of thermal design, refer to Power Module Application Notes “Thermal Design” section.

21. Withstand Voltage

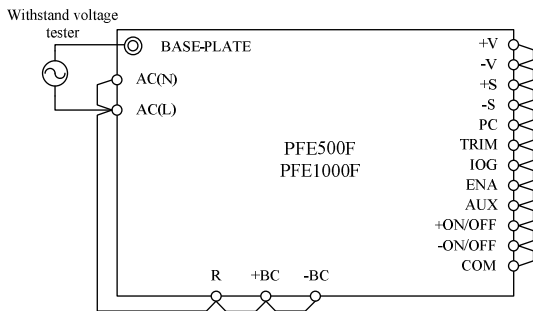
This module is designed to withstand applied voltage 2.5kVAC between input and baseplate, 3kVAC between input and output for a duration of 1 minute. When doing this test during incoming inspection, set the current limit of test equipment to 20mA.

This module is designed to withstand applied voltage 500VDC between output and baseplate for 1 minute. When doing this test during incoming inspection, be sure to apply DC voltage only. Avoid applying AC voltage during this test because this will damage the module.

Refrain from injecting high test voltage suddenly. Be sure to gradually increase the applied voltage during testing and gradually reduce the voltage after the test.

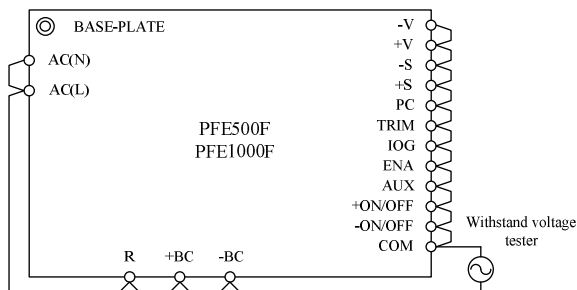
Especially, when using timer switch of the test equipment, impulse voltage which is higher than the applied set voltage, is generated when the timer switch is cut off. This causes damage to the power module. Connect each terminal according to the circuit diagram shown below.

For basic connection shown in Fig. 1-1, do the same terminal connections.



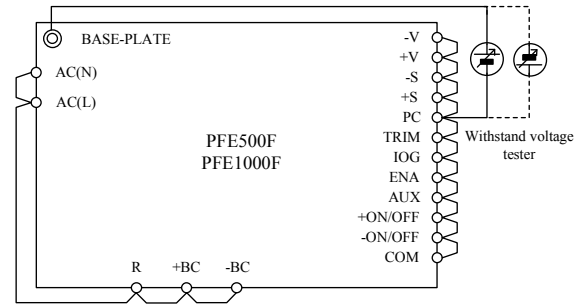
2.5kVAC 1 minute (20mA)

Fig. 21-1 Input to Baseplate Withstand Voltage Test Method



3kVAC 1 minute (20mA)

Fig.21-2 Input to Output Withstand Voltage Test Method



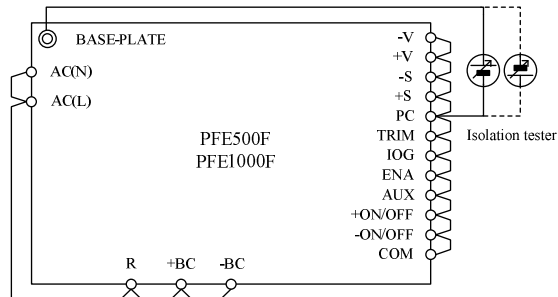
500VDC 1 minute

Fig.21-3 Output to Baseplate Withstand Voltage Test Method

22. Insulation Resistance

Use DC Insulation Resistance test equipment (MAX.500V) between output and baseplate.

Insulation Resistance must be 100Mohm or more at 500VDC. Take caution that some types of test equipment generate high pulse voltage when switching applied voltage. After test, discharge this module using resistor, etc.



100Mohm or more at 500VDC

Fig. 22-1 Insulation Resistance Test Method

23. Recommended Soldering Condition

Recommended soldering temperature is as follows.

(1) Soldering Dip :
260°C, within 10 seconds

Preheat :
130°C, within 60 seconds

(2) Soldering iron :
350°C, within 3 seconds

■ Before Concluding Power Module Damage

Verify following items before concluding power module damage.

1) No output voltage

- Is specified input voltage applied?
- During output voltage adjustment, is the fixed resistor or variable resistor setting correct?
- Is there no abnormality with the output load?
- Is the actual baseplate temperature within the specified operating temperature of this module?
- Are the ON/OFF control terminals (+ON/OFF, -ON/OFF) correctly connected?

2) Output voltage is high

- Are the remote sensing terminals (+S, -S) correctly connected?
- Is the measurement done at the sensing points?
- During output voltage adjustment, is the fixed resistor or variable resistor setting correct?

3) Output voltage is low

- Is specified input voltage applied?
- Are the remote sensing terminals (+S, -S) correctly connected?
- Is the measurement done at the sensing points?
- During output voltage adjustment, is the fixed resistor or variable resistor setting correct?
- Is there no abnormality with the output load?

4) Load regulation or line regulation is large

- Is specified input voltage applied?
- Are the input or output terminals firmly connected?
- Is the measurement done at the sensing points?
- Are the input and output wires too thin?

5) Large output ripple

- Is the measurement done according to methods described Application Notes or is it an equivalent method?