ENGLISH

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.

DEUTSCH

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.

FRANÇAIS

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 flotttantes.

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.

ITALIANO

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 assogettato 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 ragguagli.

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 i 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.

ESPAÑOL

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.

PORTUGUÊS

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 alimentaçao 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 alimentaçao considerado com um componente, não é dentro do appliquation 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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PFE300SA ·500SA 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. There are risks of igniting these substances and exploding by an arcing.

⚠ WARNING

- Do not touch this product or its internal components while circuit is live, or shortly after shut down. There may be high voltage or high temperature present and you may receive an electric shock or burn.
- While this product is operating, keep your hands and face away from it as you may be injured by an unexpected situation.
- Do not make unauthorized changes to this product, otherwise you may receive an electric shock and void your warranty.
- Do not drop or insert anything into the product. It might lead to a failure, fire and electric shock.
- Do not use this product under unusual condition such as emission of smoke or abnormal smell and sound etc. It might lead fire and electric shock, In such cases, please contact us. Do not attempt repair by yourself, as it is dangerous for the user.
- Do not operate these products in the presence of condensation. It might lead to fire and electric shock.

⚠ CAUTION

- This power supply is designed and manufactured for use within an end product such that it is accessible to SERVICE ENGINEERS only.
- Confirm connections to input/output terminals and signal terminals are correct as indicated in the instruction manual before switching on.
- Input voltage, Output current, Output power, ambient temperature, base-plate temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged.
- Do not operate and store this product in an environment where condensation might occur. In such case, waterproof treatment is necessary.
- The equipment has been evaluated for use in a Pollution Degree 2 environment.
- Do not use this product in environment with a strong electromagnetic field, corrosive gas or conductive substances.
- For application which requires very high reliability (Nuclear related equipment, medical equipment, traffic control equipment, etc.), It is necessary to provide a fail-safe mechanism in the end equipment.
- Do not inject abnormal voltages into the output terminal or signal terminal of this product. The injection of reverse voltage or over voltage exceeding nominal output voltage into the output terminal or signal terminal might cause damage to internal components.
- Never operate the product under overcurrent or short circuit conditions. Insulation failure, or other damages may occur.
- 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). It must not be made accessible to users. Protection must be provided for Service Engineers against indirect contact with the output terminals and/or to prevent tools being dropped across them. While working on this product, the AC input power must be switched off and the input, output, +BC, -BC and R terminal voltage should be safe level.
- The application circuits and their parameters are for reference only. Be sure to verify effectiveness of these circuits and their parameters before finalizing the circuit design.
- Use a Fast-Blow external fuse to each module to ensure safe operation and compliance with the safety standards to which it is approved. The recommended input fuse rating within the instructions is as follows: 15A, 250V fast acting fuse. The breaking capacity and voltage rating of this fuse may be subject to the end use application.

⚠CAUTION

- The outputs less than 28V model has possibility that hazardous voltage may occur in output terminal depending on failure mode. The output of these products must be protected in the end use equipment to maintain SELV.
- 48V output model are considered non-SELV. End equipment manufacturers must provide protection against inadvertent contact by a service engineer.
- This information in this document is subject to change without prior notice. Please refer to the latest version of the data sheet, etc., for the most up-to date specifications of the product.
- No part of this document may be copied or reproduced in any form without prior written consent TDK-Lambda.

Note : CE MARKING

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

1. Model name identification method

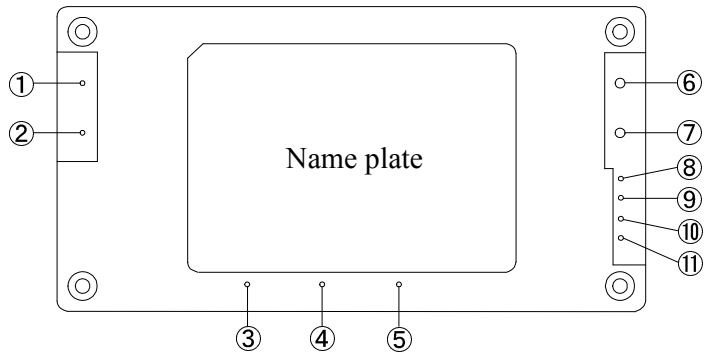
PFE 500 SA – 12 /□

- Option(*1)
- Rated Output Voltage
- Simple function
- Output Power type
- Series Name

(*1) /Blank : Standard

/T : Mounting stand ϕ 3.3
(Non-threaded through hole)

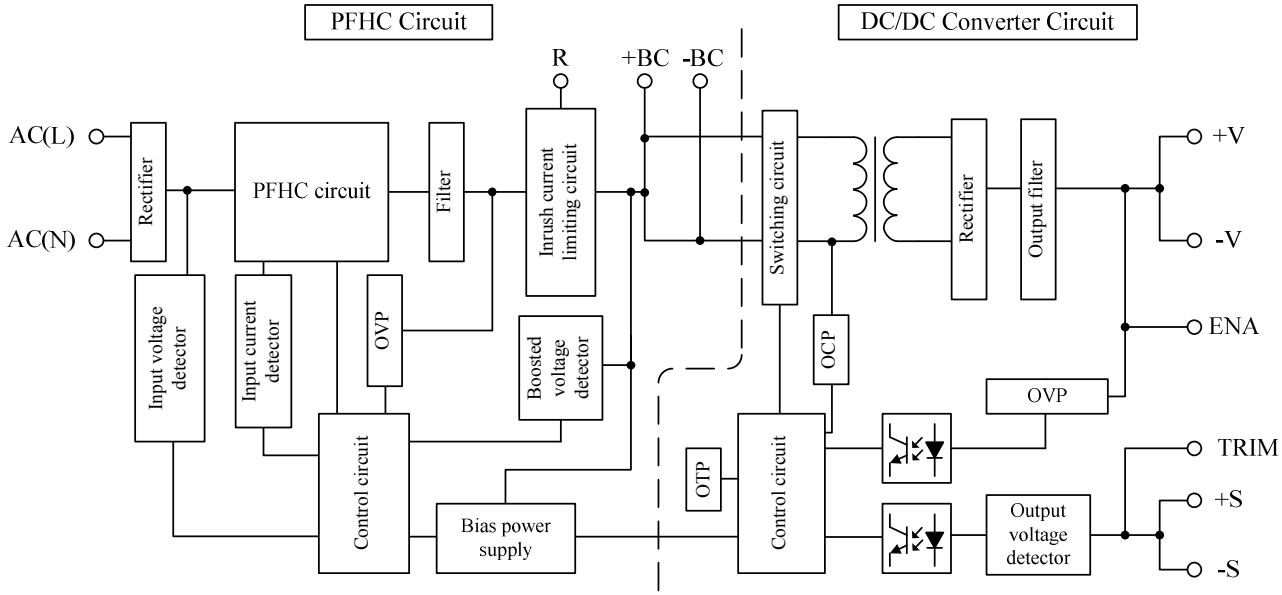
2. Terminal Explanation



①	AC(N)	: Input terminal neutral line
②	AC(L)	: Input terminal live line
③	R	: External inrush current limiting resister terminal
④	＋BC	: ＋Boosted voltage terminal
⑤	－BC	: －Boosted voltage terminal
⑥	－V	: －Output voltage
⑦	＋V	: ＋Output voltage
⑧	－S	: －Remote sensing terminal
⑨	＋S	: ＋Remote sensing terminal
⑩	TRIM	: Output voltage trimming terminal
⑪	ENA	: Power on signal terminal

- Base-plate 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 terminal are primary voltage with high voltage (390VDC).
  Do not connect load from these terminals.

3. Block Diagram



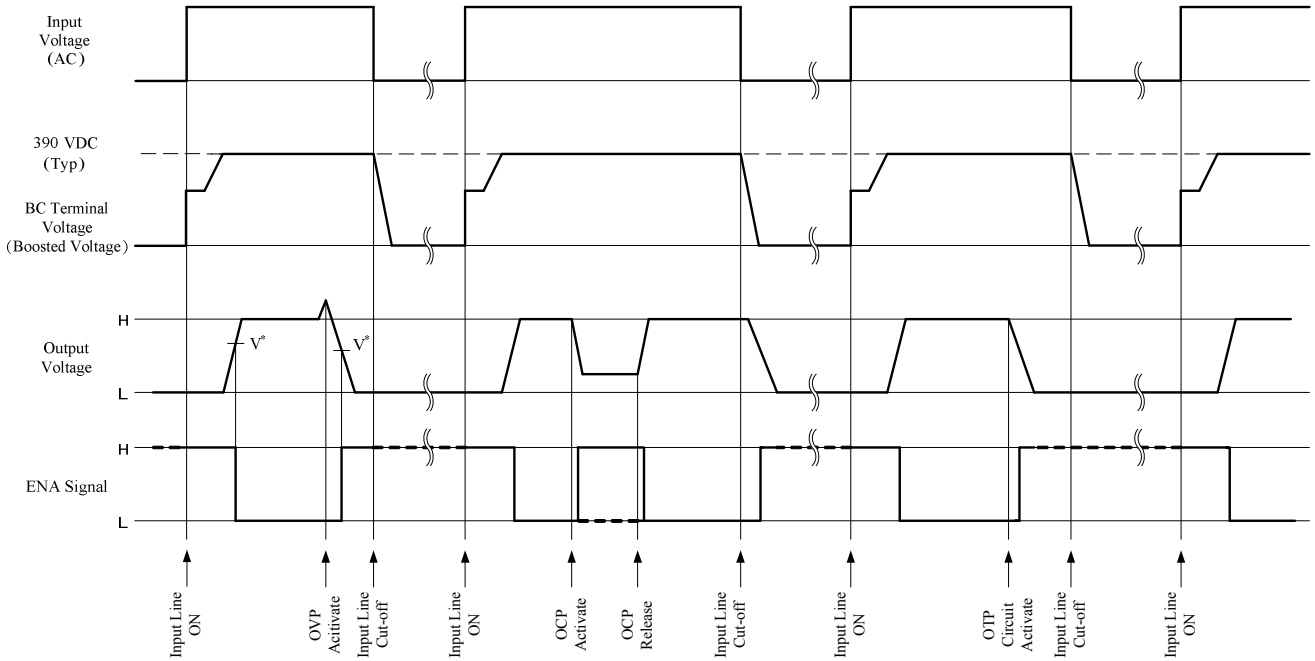
Switching Frequency

PFHC Circuit (fixed) : 100kHz

DC/DC Converter Circuit (fixed) **12, 28V : 230kHz (primary), 460kHz (secondary)**

48V : 180kHz (primary), 360kHz (secondary)

4. Sequence Time Chart



Note : This product has no remote ON/OFF function.

V* voltage level: Refer to Application Notes “6-8.Power ON Signal (ENA Terminal)” section.

5. Terminal connecting method

In order to use the PFE300SA,500SA Series, this module must be connected with external components according to Fig.5-1.
Pay attention to the each wiring. If it is connected to wrong terminal, the power supply will be damaged.
PFE300SA,500SA Series employs conduction cooling method. Use heat sink and fan to dissipate heat.
For selection of heat sink and heat sink dissipation method, refer to the Power Module Application Note.

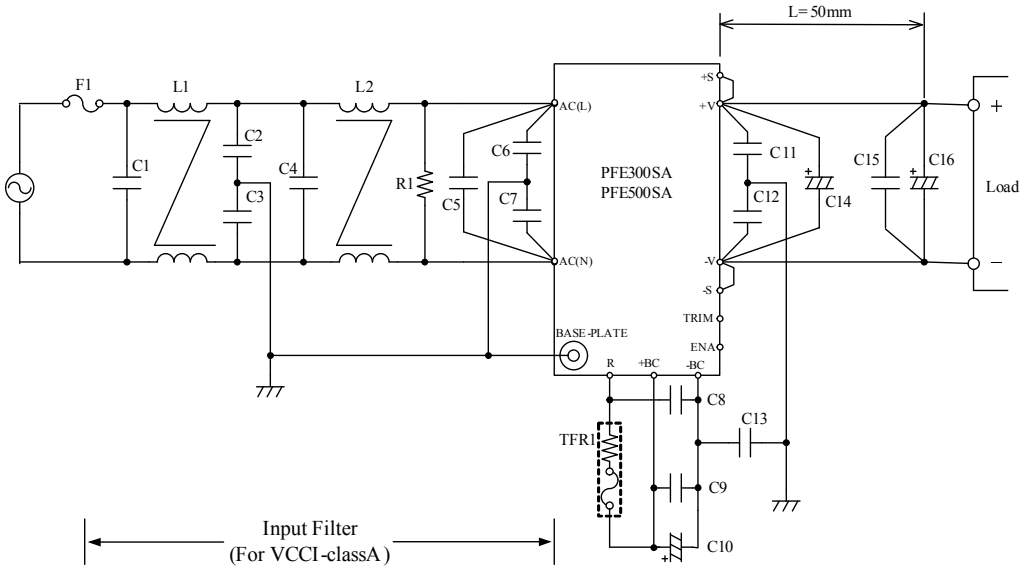


Fig.5-1 Basic connection

F1 : External Input Fuse

PFE300SA,500SA Series has no internal fuse. Use external fuse to acquire each Safety Standard and to further improve safety. PFE300SA,500SA Series acquired safety standard certification using 15A, 250V,Fast-Blow external fuse. 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 I^2t rating of external switch and external fuse.

Recommended External Fuse : 15A , 250V

Note) Select fuse based on rated voltage, rated current and surge current capability.

(1) Voltage Ratings
100VAC line : AC125V
200VAC line : AC250V

(2) Current Ratings
Rated current is determined by the maximum input current based on operating conditions and can be calculated by the following formula.

$$Iin\,(max) = \frac{Pout}{Vin \times \eta \times PF}\ (Arms) \quad \text{(Formula 5-1)}$$

Iin (max)	:	Maximum Input Current
Pout	:	Maximum Output Power
Vin	:	Minimum Input Voltage
η	:	Efficiency
PF	:	Power Factor

For Efficiency and Power Factor values, refer to separate document "PFE300SA Series Evaluation Data" or "PFE500SA Series Evaluation Data".

C1, C4, C5 : 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.
Connect C5 as close as possible towards the input terminals AC(N) and AC(L) of this power module.

Recommended Voltage Rating : 250VAC

L1, L2 : 6mH

Add common mode choke coil as EMI/EMS countermeasure. 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 : 4700pF(Ceramic Capacitor)

Add ceramic capacitor as EMI/EMS countermeasure. Be sure to consider leakage current of your equipment when adding this capacitor.
High withstand voltage are applied across this capacitor depending on the application. Select capacitor with high withstand voltage rating.

R1 : 470kΩ
Connect bleeder resistor across AC(L) and AC(N) terminals.

C6, C7 : 1000pF(Ceramic Capacitor)
Add ceramic capacitor as EMI/EMS countermeasure. Be sure to consider leakage current of your equipment when adding this capacitor.
High withstand voltage are applied across these capacitor during withstand voltage test depending on the application. Select capacitors with high withstand voltage rating.
Connect C6 as close as possible to AC(N) terminal, C7 as close as possible to AC(L) terminal.

C8, C9 : 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.
Connect C8 as close as possible to R terminal and -BC terminal, C9 as close as possible to +BC terminal and -BC terminal.

Recommended Voltage Rating : 450VDC

Note) Select Capacitor with more than 3A (rms) rating.

C10 : Electrolytic Capacitor
PFE300SA : 470uF x 1
PFE500SA : 390uF x 2 parallel
Refer to "Selection Method of External Bulk Capacitor for Boost Voltage" below. Allowable external capacitance at nominal capacitance value is shown below.

Recommended Voltage Rating : 450VDC
Recommended Total Capacitance : 390uF - 1200uF

Note) 1. Do not connect capacitors with more than the above capacitance value as this would result into power module damage.
2. When using module below -20℃ ambient temperature, AC ripple of boost voltage, output ripple voltage might be affected by ESR characteristics of the bulk capacitors. Therefore, be sure to verify characteristics by actual evaluation.

C11, C12 : 0.033uF
Connect ceramic or film capacitor as EMI/EMS countermeasure and to reduce spike noise.
High withstand voltage is applied across this capacitor during withstand voltage test depending on the application.
Connect C11 as close as possible to +V terminal, C12 as close as possible to -V terminal.

C13 : 1000pF(Ceramic Capacitor)
Add ceramic capacitor as EMI/EMS countermeasure.
High withstand voltage are applied across this capacitor during withstand voltage test depending on the application. Select capacitors with high withstand voltage rating.
Connect C13 as close as possible to -BC terminal.

C14: Refer to Table 5-1

To reduce output ripple noise voltage, connect electrolytic capacitors across +V and –V.
Connect C14 as close as possible to the +V and -V output terminals of this power module.

Table 5-1 C14 : Recommended output external capacitance

Output voltage	C14
12V	25V 1000uF
28V	50V 470uF
48V	100V 220uF

C15: 2.2uF(Ceramic Capacitor)

Connect chip ceramic capacitor at 50mm from the output terminals +V and -V of the power module to reduce output spike noise.
Also, note that output spike voltage may vary depending on the wiring pattern of the printed circuit board.

C16 : Refer to Table 5-2

Connect C16 at 50mm from the output terminals +V and -V of the power module to stabilize operation.
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 may vary depending on the wiring pattern of the printed circuit board.
Sudden change in output voltage due to sudden load change or sudden input voltage change can be reduced by increasing external output capacitance value.

Table 5-2 C16 : Recommended output external capacitance

Output voltage	C16
12V	25V 1000uF
28V	50V 470uF
48V	100V 220uF

Note) 1. Use low-impedance electrolytic capacitors with excellent temperature characteristics.
(Nihon Chemi-con LXY Series or equivalent)
(Nichicon PM Series or equivalent)

2. For module operation at ambient temperature -20℃ or less, output ripple voltage might be affected by ESR characteristics of the electrolytic capacitors. Increase the capacitance values shown in Table 5-1 and 5-2 according to the table below.

Table 5-3 C14,C16 : Recommended output external capacitance(Ambient Temperature ≦ -20℃)

Output voltage	C14 , C16
12V	25V 1000uF × 2 parallel
28V	50V 470uF × 2 parallel
48V	100V 220uF × 2 parallel

3. Take note of the maximum allowable 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 be exceeded.

For connection other than recommended capacitance, be sure to verify characteristics by actual evaluation.

●Selection Method of External Bulk Capacitor for Boost Voltage

Boost voltage bulk capacitor is determined by boost voltage ripple voltage, ripple current and hold-up time. Select capacitor value such that boost voltage ripple voltage does not exceed 15Vp-p.

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

For output hold-up time, refer to separate document “PFE300SA Series Evaluation Data” or “PFE500SA Series Evaluation Data" and use appropriate capacitor up to 1200uF maximum. It is recommended that verification should be done through actual evaluation.

For allowable ripple current value, refer to Fig. 5-2 and select a capacitor with higher ripple current rating.

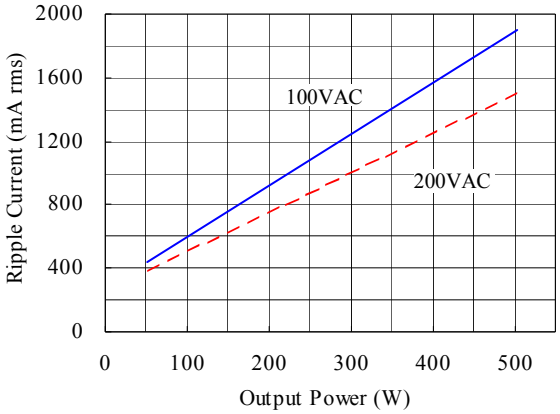


Fig. 5-2 Allowable ripple current value

The recommended boost voltage bulk capacitance value range is 390uF-1200uF.

When using with reduced the bulk capacitance value, it is necessary to reduce output power as shown in Fig. 5-3.

Fig. 5-3 shows recommended value at 25℃ Base-plate Temperature. Temperature variance might have some effect on the characteristics. Therefore, verify characteristics by performing actual evaluation. Refer to “Fig. 7-1 Base-plate Measuring Point”.

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.

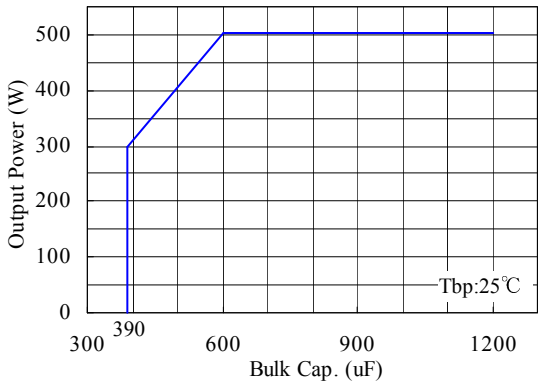


Fig. 5-3 Output Power v.s. Boost Voltage Bulk Capacitance

TFR1 : 10Ω - 100Ω

By connecting thermal fuse resistor across R and +BC terminals as shown in Fig. 5-1, 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) can occur. Therefore, be sure to connect this external thermal fuse resistor of 10Ω or more.
The allowable resistance value is limited by the external bulk capacitance value of shown in fig.5-4.
Note that power supply will not operate if this external resistor is. not connected.

●Selection Method of External Resistor

(1) Calculating Resistance Value for TFR1
Resistance can be calculated by the formula below.

$$R = \frac{Vin}{Irush} (\Omega) \qquad \text{(Formula 5-2)}$$

R	: Resistance Value for External TFR1
Vin	: Input Voltage converted to DC value = Input Voltage (rms) x $\sqrt{2}$
Irush	: Input surge current value

(2) Required Surge Current Rating
Sufficient surge current withstand capability is required for external TFR1.
Required Surge Current Rating can be selected by I^2t. (Current squared multiplied by time)

$$I^2t = \frac{Co \times Vin^2}{2 \times R} (A^2s) \qquad \text{(Formula 5-3)}$$

I^2t	: Current-squared multiplied by time
Co	: Boost Voltage Bulk Capacitance
Vin	: Input Voltage converted to DC value = Input Voltage (rms) x $\sqrt{2}$
R	: Resistance Value for External TFR1

(3)TFR1 limitation
TFR1 is limited as shown in drawing below.
Graph below shows resistor value at 25℃ Base-plate Temperature. Input Surge current might vary due to temperature. Therefore, verify characteristics by performing actual evaluation.

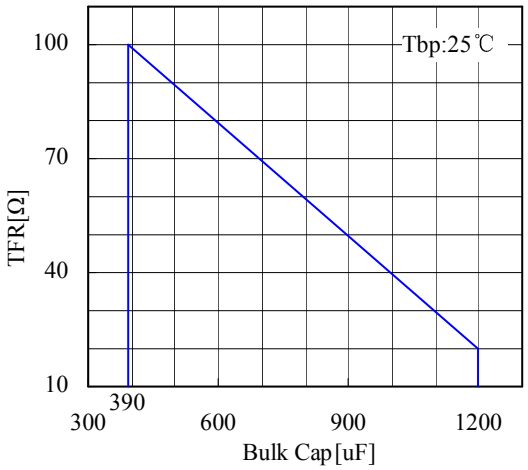


Fig.5-4 TFR1 v.s. Boost Voltage Bulk Capacitance

6. Explanation of Functions and Precautions

6-1. Input Voltage

Input voltage range is single phase 85-265VAC(47-63Hz). Take care not to apply input voltage which is out specified range nor should a DC input voltage be applied as this would result into power supply damage.
For cases where conformance to various safeties required, described as 100-240VAC (50-60Hz)

6-2. Output Voltage Range

Output voltage can be adjusted within the range below by connecting fixed and variable resistors. However, take care not to exceed the output voltage range shown below because OVP function will activate.

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

When increasing output voltage, reduce output current so as not to exceed maximum output power.
Even if the output voltage is adjusted using external circuit shown in Fig. 6-1, remote sensing can be done. For details on Remote Sensing function, refer to “6-7. Remote Sensing”.

●Output Voltage Adjustment using Fixed and Variable Resistors
External resistor (R2) 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.

Table 6-1 External Resistor and Variable Resistor Value (For +/-20% Output Adjustment)

	12V	28V	48V
R2	10kΩ	47kΩ	100kΩ
VR	10kΩ	20kΩ	30kΩ

External Resistor (R2) : Tolerance +/-5% or less
Variable Resistor (VR) : Total Tolerance +/-20% or less End Resistance 1% or less

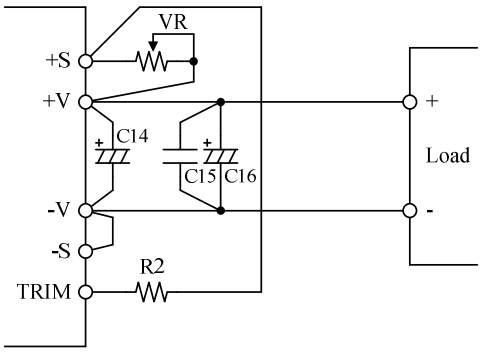


Fig.6-1 External Resistor Connection Example

6-3. Inrush Current

Input surge current changes with the thermal fuse resistor (TFR1) value and external boost voltage bulk capacitance value (C10).
It is recommended that verification should be done through actual evaluation.
The inrush current value indicated in the specification is measured under 25℃ using basic connection.
Inrush current increases after recovery from short interruptions.
Please be careful in the selection of an input switch, an external fuse, etc.

6-4. Over Voltage Protection (OVP)

This module is equipped with OVP function. OVP function operates within 125%-145% of nominal output voltage. When OVP triggers, the output will be shut down.
When the OVP function activates, first cut off input line and verify that boost voltage has dropped down to 7V or less. Then, recover output by recycling input line.
OVP value is fixed and cannot be set externally. Pay attention not to apply higher voltage externally to the output terminal to avoid power supply damage.

6-5. Over Current Protection (OCP)

This module is equipped with OCP function. OCP function operates when the output current exceeds 105% of maximum DC output current of specification.
Output will automatically recover when short circuit or overload condition is removed. OCP value is fixed and cannot be adjusted externally.
Note that continuous short circuit or overload condition might result in power supply damage.

6-6. Over Temperature Protection (OTP)

This module is equipped with OTP function. This function will activate and shutdown the output when ambient temperature or internal temperature abnormally rises. OTP activates at following base-plate temperature.

PFE300SA-12,28,48 : 105℃ - 130℃
PFE500SA-12 : 90℃ - 115℃
PFE500SA-28,48 : 105℃ - 130℃

When OTP function operates, output can be recovered by cooling down the baseplate sufficiently and letting the boost voltage drop down to 7V or less before recycling the input line.

6-7. 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 2V.
Consider power loss due to line drop and use power supply within the maximum allowable output power.
Before using, do adequate prior evaluation such that module does not receive any effect of noise by using a parallel pattern, etc. for remote sensing line

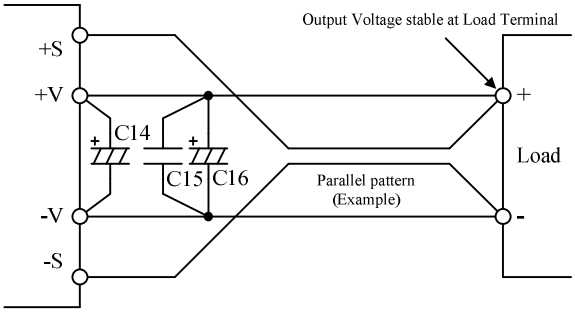


Fig.6-2 Remote Sensing is used

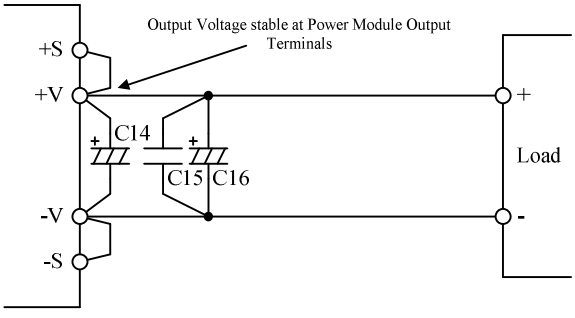


Fig.6-3 Remote Sensing is not used
(Local Sensing)

6-8. Power ON Signal (ENA Terminal)

This signal is located at the secondary side (output side) and is an open drain output.

Maximum sink current : 10mA
Maximum applied voltage : 75V.

Return line for ENA terminal is the -V terminal.
When output voltage goes over a specified voltage level at start up, Power ON signal is “Low level”. Output voltage threshold level is as follows.

Table 6-2 Output voltage in case an ENA signal changes

ENA signal	12V	28V	48V
High→Low	9V(TYP)	20V(TYP)	35V(TYP)

6-9. Maximum Ripple and Noise

This value is measured according to the description below in accordance with JEITA RC-9131B.
In the basic connection shown in Fig. 5-1, additional connection shown in Fig. 6-4 is done for measurement.
Capacitor (Ceramic Capacitor : 2.2µF and Electrolytic Capacitor : Refer to Table 5-2) 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 may vary depending on the wiring pattern of the printed circuit board.
In general, output ripple voltage and output spike noise can be reduced by increasing external capacitor value.

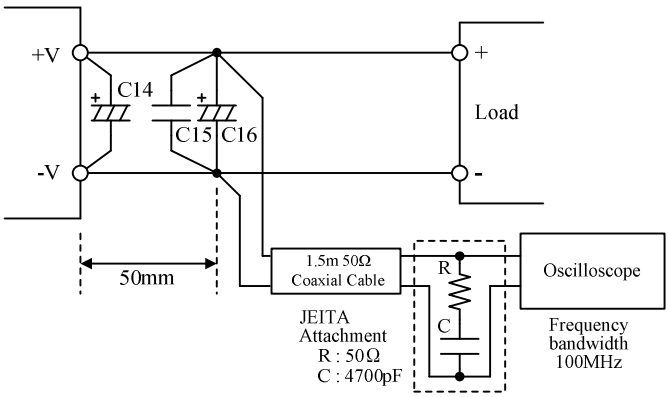


Fig.6-4 Output Ripple Voltage (including Spike Noise) Measurement Method

6-10. Series Operation

Series operation is possible for PFE300SA,500SA Series. Connections shown in Fig. 6-5 and Fig. 6-6 are possible. Also, Maximum allowable modules in series is 3 pieces.

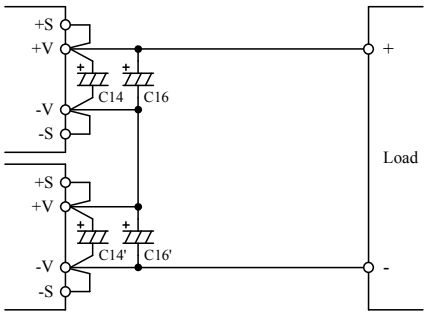


Fig.6-5 Series Operation
(High Output Voltage Applications)

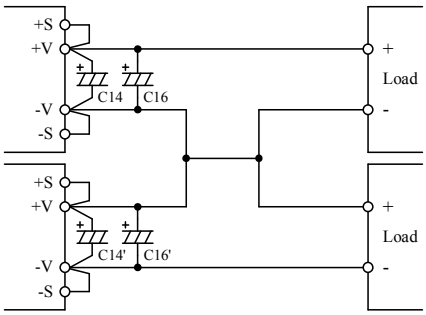


Fig.6-6 +/-Output Series Applications

6-11. Isolation Resistance

Isolation resistance between Output – Base-plate is more than 100MΩ at 500VDC. For safety operation, voltage setting of DC isolation tester must be done before the test. Ensure that the unit is fully discharged after the test.

Output – Base-plate : 100MΩ or more at 500VDC

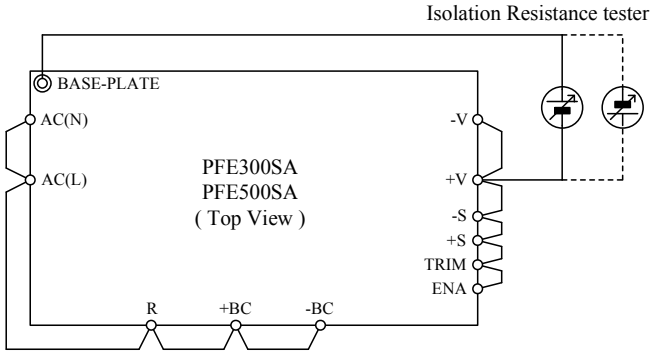


Fig.6-7 Isolation Resistance Test Method

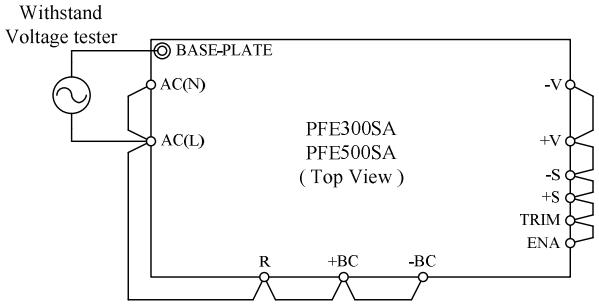
6-12. Withstand Voltage Test

This series is designed to withstand 2.5kVAC between input and base-plate, 3.0kVAC between input and output and 1.5kVDC between output and base-plate each for 1 minute. When testing withstand voltage, set current limit of withstand voltage test equipment at 20mA.

Be sure to apply DC voltage between output - base-plate. Avoid applying AC voltage during this test because this will damage the power supply.

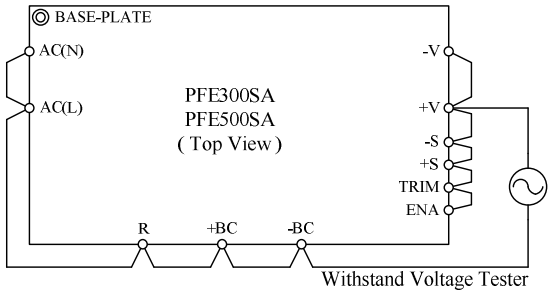
The applied voltage must be gradually increased from zero to testing value and then gradually decreased for shut down. When timer is used, the power supply may be damaged by high impulse voltage at timer switch on and off.

Connect each terminals according to the circuit diagram shown below.



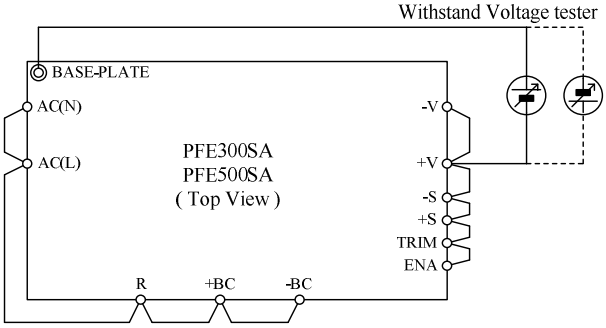
2.5kVAC 1 minute (20mA)

Fig.6-8
Input to Base-plate Withstand Voltage Test Method



3kVAC 1 minute (20mA)

Fig.6-9
Input to Output Withstand Voltage Test Method



1.5kVDC 1 minute

Fig.6-10
Output to Base-plate Withstand Voltage Test Method

Withstand Voltage Testing with External Application

The above Withstand Voltage Testing specification applies only to power module as stand-alone unit. Please take note of the following points when Withstand Voltage Testing is performed with attached external application.

For connections shown in Fig. 5-1, when injecting 3kVAC between Input – Output, Voltage Divider Ratio between Input – Base-plate and Output – Base-plate will be affected by capacitance value ratio connected between the Input – Base-plate and Output – Base-plate.

When selecting external capacitor at the Input – Base-plate and Output – Base-plate, take care of the capacitance value and voltage rating.

Capacitor of Input – Base-plate : (C2,C3,C6,C7,C13)
Capacitor of Output – Base-plate : (C11,C12)

7. Mounting Method

7-1. Mounting Method

These products can be used in any orientation but be sure to consider enough airflow to avoid heat accumulation around the power supply. Consider surrounding components layout and set the PCB mounting direction such that air can flow through the heat sink by forced or convection cooling.
Refer to the power module application note "Power module mounting method" for mounting method on PWB.
This product can operate at actual mounting condition when base-plate temperature and ambient temperature are maintained at or below the following temperature.

PFE300SA-12,28,48 : 100℃
PFE500SA-12 : 85℃
PFE500SA-28,48 : 100℃

Temperature at worst case operating condition at the measuring point shown in Fig. 7-1 and Fig. 7-2.
For Thermal Design details, refer to Application Notes “Thermal Design” section.

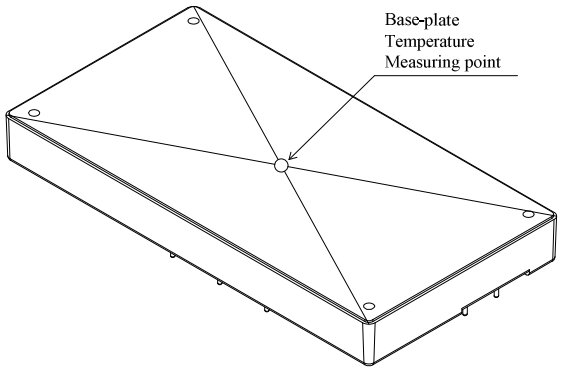


Fig.7-1 Base-plate Temperature Measuring Point

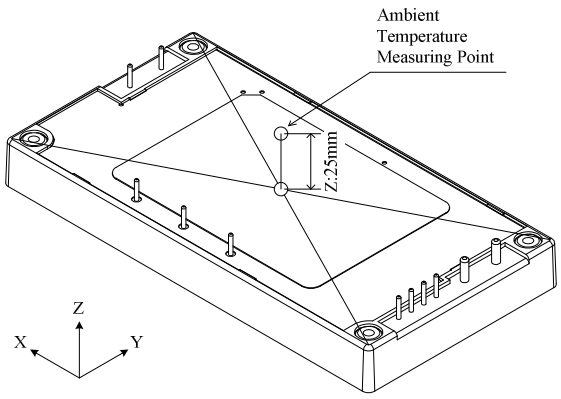


Fig.7-2 Ambient Temperature Measuring Point

7-2. Output Derating

Operating temperature range is limited according to Fig. 7-3.

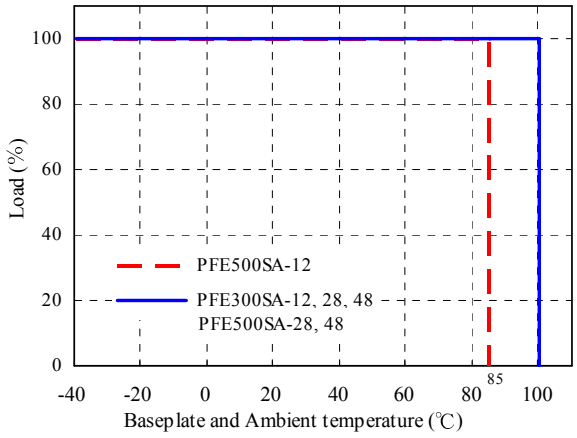


Fig.7-3 Derating Curve

To further improve the reliability, it is recommended to use this power supply with base-plate and ambient temperature derating.

7-3. Notes on Designing PWB for Power Module Mounting

In order to satisfy withstand voltage specification, it is recommended to keep following distances for each pattern wiring and mounting components distance of primary circuit (Input), secondary circuit (Output) and FG (Baseplate).

Between primary circuit and FG ・・・・・ 5.0mm or more
Between secondary circuit and FG ・・・・ 2.0mm or more

To ensure conformance to various safety standards, creepage distance and clearance between the primary and the secondary of the PWB for power module mounting shall be considered. From the power module cover outline and terminals, keep creepage distance and clearance between the primary and the secondary.
In order to acquire safety standards for this power module, creepage distance and clearance between the primary and the secondary is designed to be 7.5 mm. The pattern wiring prohibited area of the PWB is shown in Fig. 7-4, and power module cover outline is shown in Fig. 7-5.
Creepage distance and clearance between the primary and the secondary of the PWB for power module mounting varies depending on power module mounting condition, contact our customer support for details.

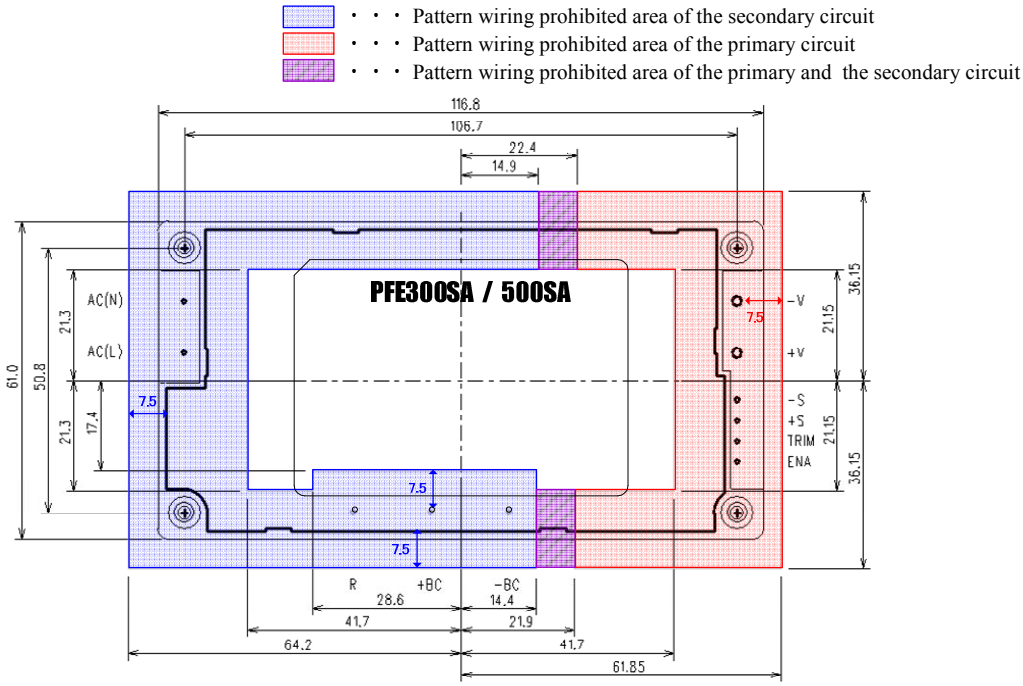


Fig.7-4 Pattern wiring prohibited area of PWB for power module mounting
(When the distance on the primary and the secondary is 7.5 mm)

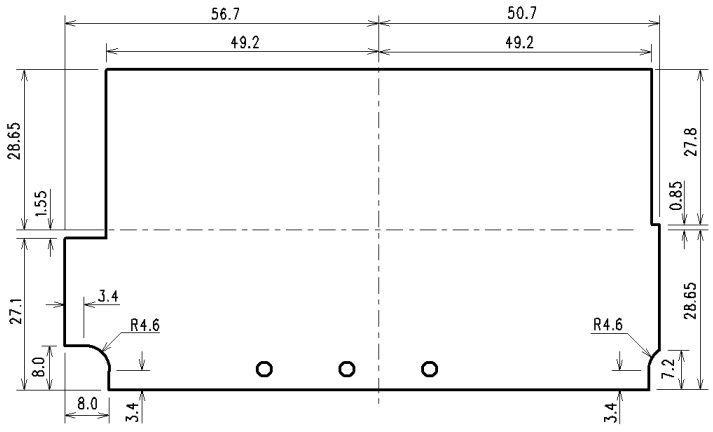


Fig.7-5 Dimensions of the power supply cover

7-4. Recommended Soldering Condition

Recommended soldering temperature is as follows.

Soldering Dip : 260℃, within 10 seconds
Preheat : 130℃, within 60 seconds

7-5. Recommended washing Condition.

After soldering, following washing condition is recommended.
For other washing conditions, consult our Customer Support Group.

(1) Recommended washing solution
・IPA（Isopropyl Alcohol）

(2) Washing method
In order to avoid penetration inside the power module, washing should be done with brush. Then, dry up thoroughly after washing.

8. 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?

(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 in the Instruction Manual or is it an equivalent method?

9. Warranty Period

Warranty period is 5 years.
For damages occurring at normal operation within this warranty period, repair is free of charge.

Following cases are not covered by warranty

(1) Improper usage like dropping products, applying shock and defects from operation exceeding specification of the unit.
(2) Defects resulting from natural disaster (fire, flood etc.)
(3) Unauthorized modifications or repair by the buyers' defects not cause by our company.