TECHNICAL MANUAL FOR

1U GENESYS™ 2.4kW

PROGRAMMABLE DC POWER SUPPLIES

Document: 83-517-000 Rev. A

TDK-Lambda Americas Inc.

405 ESSEX ROAD, NEPTUNE, NJ 07753

TEL: +1.732.922.9300

FAX: +1.732.922.9334

WEB: www.us.tdk-lambda.com/hp

THIS PAGE INTENTIONALLY LEFT BLANK

TDK-Lambda Americas Inc
405 Essex Road
Neptune NJ 07753 USA
Tel: +1 732 922 9300
Fax: +1 732 922 9334
www.us.tdk-lambda.com/hp

DECLARATION OF CONFORMITY

GEN 2400W Series

We, TDK-Lambda Americas Inc., of 405 Essex Road, Neptune, NJ 07753, USA declare under our sole responsibility that the GEN 2400W series as detailed on the attached products covered sheet comply with the provisions of the following European Directives and are eligible to bear the CE mark:

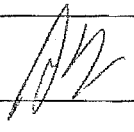
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC

Assurance of conformance of the described product with the provisions of the stated EC Directive is given through compliance to the following standards:

Electrical Safety	IEC/EN60950-1:2001, First Edition UL60950-1:2003, First Edition
Electromagnetic Emissions:	EN 55022: 1998 + A1::2000 + A2:2003 EN 55024: 1998 + A1::2001 + A2:2003 EN 61000-3-3: 1995+ A2:2005

These products are high-power equipment, with input power >1 kW, for professional use and installation, and carry the CE mark accordingly. These products are for use in Class A, ITE environment only, as defined by EN 55022: 1998 + A1::2000 + A2:2003 and EN 61000-3-3: 1995+ A2:2005.

Our European Representative in the EU is TDK-Lambda UK Limited, located at Kingsley Avenue, Ilfracombe, Devon, EX34 8ES UK. Further, all products covered by this declaration are manufactured in accordance with ISO9001:2000 which ensure continued compliance of the products with the requirements of the Low Voltage Directive.

Name of Authorized Signatory	Adam Rawicz-Szczerbo
Signature of Authorized Signatory	
Position of Authorized Signatory	Managing Director, TDK-Lambda EMEA
Date	1st Oct 08
Place where signed	Ilfracombe, Devon, England

PRODUCTS COVERED SHEET FOR THE GEN 2400W SERIES

Product Name: GEN 2400W Series Switch Mode DC Power Supply

Models: GEN www-xxx-yyyy-zzzzz-u

www= Volts (8V to 600V)
xxx= Current (4A to 300A depending on power not to exceed 2400W)
yyy = LAN, MD, IEEE, IEMD, IS420, IS510
zzzzz= 1P230 for 230Vac 1 phase input or 3P208 for 208Vac 3 phase input.
u = optional power cord.

GENESYS™ Manual Supplement

**FOR UNITS EQUIPPED WITH "LAN" OPTION,
REFER TO USER'S MANUAL P/N 83-034-100.**

**FOR UNITS EQUIPPED WITH "IEMD" OPTION,
REFER TO USER'S MANUAL P/N 83-030-200.**

**FOR UNITS EQUIPPED WITH "USB" OPTION,
REFER TO USER'S MANUAL P/N 83-033-800.**

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

WARRANTY

This TDK-Lambda Americas Inc. product is warranted against defects in materials and workmanship for a period of five years from date of shipment. During the warranty period, TDK-Lambda Americas Inc. will, at it's option, either repair or replace products which prove to be defective.

LIMITATION OF WARRANTY

The warranty shall not apply to defects resulting from improper or inadequate usage or maintenance by the buyer, buyer supplied products or interfacing. The warranty shall not apply to defects resulting from unauthorized modifications, or from operation exceeding the environmental specifications of the product, or if the QA seal has been removed or altered by anyone other than TDK-Lambda Americas Inc. authorized personnel. TDK-Lambda Americas Inc. does not warrant the buyer's circuitry or malfunctions of TDK-Lambda Americas Inc. products resulting from the buyer's circuitry. Furthermore, TDK-Lambda Americas Inc. does not warrant any damage occurring as a result of the buyer's circuitry or the buyer's - supplied products. THIS LIMITED WARRANTY IS IN LIEU OF, AND TDK-LAMBDA AMERICAS INC DISCLAIMS AND EXCLUDES, ALL OTHER WARRANTIES, STATUTORY, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR OF CONFORMITY TO MODELS OR SAMPLES.

WARRANTY SERVICE

This product must be returned to an authorized TDK-Lambda Americas Inc. service facility for repairs or other warranty service. For products returned to TDK-Lambda Americas Inc. for warranty service, the buyer shall prepay shipping charges to TDK-Lambda Americas Inc. If the unit is covered under the foregoing warranty then TDK-Lambda Americas Inc. shall pay the shipping charges to return the product to the buyer. Refer to Section 3.11 for repackaging for shipment.

DISCLAIMER

The information contained in this document is subject to change without notice. TDK-Lambda Americas Inc. shall not be liable for errors contained in this document or for incidental or consequential damages in connection with the furnishing, performance or use of this material. No part of this document may be photocopied, reproduced or translated into another language without the prior written consent of TDK-Lambda Americas Inc.

TRADEMARK INFORMATION

Genesys™ power supply is a trademark of TDK-Lambda Americas Inc.
Microsoft™ and Windows™ are trademarks of Microsoft Corporation.

THE FCC WANTS YOU TO KNOW

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

FCC WARNING

Modifications not expressly approved by manufacturer could void the user authority to operate the equipment under FCC Rules.

SAFETY INSTRUCTIONS

CAUTION

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

INSTALLATION CATEGORY

The Genesys™ power supply series has been evaluated to INSTALLATION CATEGORY II. Installation category (over voltage category) II: local level, appliances, portable equipment etc. With smaller transient over voltage than Installation Category (over voltage category) III.

GROUNDING

This product is a Safety Class 1 instrument. To minimize shock hazard, the instrument chassis must be connected to an electrical ground. The instrument must be connected to the AC power supply mains through a three conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet.
For instruments designed to be hard-wired to the supply mains, the protective earth terminal must be connected to the safety electrical ground before another connection is made. Any interruption of the protective ground conductor or disconnection of the protective earth terminal will cause a potential shock hazard that might cause personal injury.

WARNING

OUTPUT TERMINAL GROUNDING

There is a potential shock hazard at the RS-232/RS-485, LAN, IEEE, and USB ports when using power supplies with rated or combined voltage greater than 400V and the Positive Output of the Power Supply is grounded.

DO NOT connect the Positive Output to ground when using the RS-232/RS-485, LAN, IEEE, or USB port under this operating condition.

FUSES

Fuses must be changed by authorized TDK-Lambda Americas Inc. service personnel only. For continued protection against risk of fire, replace only with the same type and rating of fuse. Refer to maintenance instructions in Chapter 9 for fuse ratings.

CAUTION MULTI-POLE FUSING

The Genesys™ power supply units have fuses in all supply conductors. To prevent potential lrisk of hazard during servicing, the unit shall be fully disconnected from the supply

INPUT RATINGS

Do not use AC supply, which exceeds the input voltage and frequency rating of this instrument. The input voltage and frequency rating of the Genesys™ power supply series has one input range. Range is 190-240VAC, 50-60Hz for single-phase and three-phase 200V models. For safety reasons, the mains supply voltage fluctuations should not exceed +/-10% of the nominal AC Input voltage.

LIVE CIRCUITS

Operating personnel must not remove the instrument cover. No internal adjustment or component replacement is allowed by non-TDK-Lambda Americas Inc. qualified personnel. Never replace components with power cable connected. To avoid injuries, always disconnect power, discharge circuits and remove external voltage source before touching components.

PARTS SUBSTITUTIONS & MODIFICATIONS

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

SAFETY INSTRUCTIONS

ENVIRONMENTAL CONDITIONS

The Genesys™ Power Supply series safety approval applies to the following operating conditions:

*Indoor use
*Ambient temperature: 0°C to 50°C
*Maximum relative humidity: 80% (no condensation)
*Altitude: up to 3000m
*Pollution degree 2

CAUTION Do not use this product in environments with strong Electromagnetic field, corrosive gas and conductive materials.

	**ATTENTION** Observe Precautions for handling Electrostatic Sensitive Devices.
	**CAUTION** Risk of Electrical Shock
	Instruction manual symbol. The instrument will be marked with this symbol when it is necessary for the user to refer to the instruction manual.
	Indicates hazardous voltage.
	Indicates ground terminal.
	Protective Ground Conductor Terminal must be connected to Earth Ground.
	Off (Supply)
	On (Supply)
WARNING	The **WARNING** sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in personal injury. A WARNING sign should not be skipped and all indicated conditions must be fully understood and met.
CAUTION	The **CAUTION** sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in damage to the equipment. Do not proceed beyond a CAUTION sign until all indicated conditions are fully understood and met.
	FCC COMPLIANCE NOTICE: Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FRENCH

CONSIGNES DE SECURITE

ATTENTION

Les consignes de sécurité suivantes doivent être observées pendant toutes les phases de l'utilisation, entretien et réparations de cet équipement. Le non-respect des consignes de sécurité et des avertissements dans ce document viole les normes sécurité de conception, fabrication et utilisation prévue de cet équipement et peut compromettre les protections incorporées en lui.
TDK-Lambda Americas Inc. ne sera pas responsable des conséquences si l'utilisateur ne respecte pas ces consignes.

CATEGORIE D'INSTALLATION

Les alimentations Genesys™ ont été classées dans CATEGORIE INSTALLATION II. Catégorie installation (catégorie surtension) II : utilisation locale, appareils, équipement portable, etc. Avec des surtensions transitoires plus faibles que celles de la catégorie installation (catégorie surtension) III.

MISE A LA TERRE

Ce produit est un instrument Classe 1 Sécurité. Pour minimiser le risque de choc électrique, son châssis doit être raccordé à une terre électrique. L'instrument doit être raccordé à l'alimentation principale AC par un câble à trois conducteurs, le conducteur de terre étant raccordé à une terre électrique (terre sécurité) sur la prise électrique.
Pour les instruments conçus pour être raccordés à l'alimentation électrique principale, la borne de terre doit être raccordée à la terre électrique de sécurité avant d'établir une autre connexion. Si le conducteur de terre est coupé ou si la borne de terre est débranchée, il y a un risque de choc électrique pouvant provoquer des blessures.

ATTENTION-DANGER
MISE A LA TERRE DES BORNES DE SORTIE

Il y a un danger de choc électrique sur les ports RS-232/RS-485, LAN, IS420/IS520 et IEMD lorsqu'on utilise des alimentations électriques ayant à elles seules ou au total une tension supérieure à 400V et si la sortie positive ou negative de l'alimentation est raccordée à la terre.
Ne pas connecter la sortie positive ou negative à la terre lorsque vous utilisez le RS-232/RS-485, LAN, IEMD ou USB sous cette condition de fonctionnement.

FUSIBLES

Les fusibles ne doivent être remplacés que par des techniciens d'entretien agréés TDK-Lambda Americas Inc. Pour assurer une protection continue contre le risque d'incendie, remplacez les fusibles par des fusibles de même type et de même capacité.

ALIMENTATION PRINCIPALE

N'utilisez pas une alimentation AC dont la tension et la fréquence dépassent les valeurs nominales de cet instrument. La tension et la fréquence nominales des alimentation Genesys™ correspondent à un intervalle selon le modèle commandé. Les intervalle est 190-240VAC, 50-60Hz. Pour des raisons de sécurité, la tension d'alimentation principale ne doit pas fluctuer en dehors des intervalles ci-dessus.

CIRCUITS SOUS TENSION

Le personnel d'exploitation ne doit pas enlever le couvercle de l'instrument. Le réglage ou le remplacement des composants internes ne peut être effectué que par un personnel qualifié TDK-Lambda Americas Inc. Ne remplacez jamais les composants lorsque le câble d'alimentation est connecté. Pour éviter les blessures, débranchez toujours l'alimentation, déchargez les circuits et retirez la source de tension extérieure avant de toucher les composants.

CONSIGNES DE SECURITE

SUBSTITUTIONS ET MODIFICATIONS DE PIECES

Les substitutions et modifications de pièces ne peuvent être effectuées que par les techniciens d'entretien agréés TDK-Lambda Americas Inc. Pour les réparations ou les modifications, l'instrument doit être renvoyé à un centre d'entretien agréé TDK-Lambda Americas Inc.

CONDITIONS ENVIRONNEMENTALES

L'approbation sécurité des alimentations Genesys™ s'applique aux conditions opératoires suivantes :

*Utilisation en intérieur
*Température ambiante : 0°C à 50°C
*Humidité relative maximum : 80% (sans condensation)
*Altitude : 3000m maximum
*Pollution degré 2

	**PRECAUTION**. Observez les précautions pour manipuler les composants sensibles à l'électricité statique.
	**ATTENTION**. Risque de choc électrique
	Symbole dans le manuel d'instructions. Ce symbole sera marqué sur l'instrument lorsque l'utilisateur doit consulter le manuel d'instructions.
	Signale une tension dangereuse.
	Signale une borne de terre.
	La borne du conducteur de terre de protection doit être connectée à la terre électrique.
	Coupée (alimentation)
	Branchée (alimentation)
WARNING	Le symbole **WARNING** signale un danger. Il attire l'attention sur une procédure. Si la procédure n'est pas suivie correctement, il peut en résulter des blessures. Le symbole WARNING (Attention-danger) ne doit pas être ignoré et toutes les conditions indiquées doivent être bien comprises et respectées.
CAUTION	Le symbole **CAUTION** (Attention) signale un danger. Il attire l'attention sur une procédure. Si la procédure n'est pas suivie correctement, l'équipement peut être endommagé. Ne continuez pas après avoir rencontré le symbole CAUTION tant que vous n'avez pas parfaitement compris et respecté les conditions indiquées.
	NOTE CONCERNANT LA CONFORMITE FCC : Nota : Cet équipement a été testé et s'est avéré conforme aux limites pour un appareil numérique Classe A selon la part 15 des règles FCC. Ces limites sont conçues pour assurer une protection raisonnable contre les interférences dangereuses lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut rayonner des fréquences radio et, s'il n'est pas installé et utilisé conformément au manuel d'instructions, il peut provoquer des interférences dangereuses pour les communications radio. L'utilisation de cet équipement dans une zone résidentielle provoquera probablement des interférences nocives, et dans ce cas l'utilisateur doit prendre des mesures pour les supprimer à ses propres frais.

GERMAN

SICHERHEITSVORSCHRIFTEN

VORSICHT

Die folgenden Sicherheitsvorschriften müssen in allen Phasen des Betriebs, der Wartung und der Reparatur der Anlage eingehalten werden. Eine Missachtung der Sicherheitsvorschriften und Warnhinweise aus diesem Handbuch führt zur Verletzung der bestehenden Sicherheitsstandards für Design, Produktion und der zweckbestimmten Verwendung der Anlage und kann die integrierten Schutzvorrichtungen beschädigen.
TDK-Lambda Americas Inc. ist nicht haftbar für Schäden, die durch Missachtung dieser Sicherheitsvorschriften entstehen können.

INSTALLATIONSKATEGORIE

Die Genesys™ Reihe der Netzgeräte wurde in die INSTALLATIONSKATEGORIE II eingeteilt.
Installationskategorie (Überspannungskategorie) II: die lokale Ebene, Geräte, tragbare Anlagen, etc. mit kleineren vorübergehenden Überspannungen als die Installationskategorie (Überspannungskategorie) III.

ERDUNGSKONZEPT

Dieses Produkt ist ein Gerät der Schutzklasse 1. Zur Vermeidung von gefährlichen Energieinhalten und Spannungen, ist das Gehäuse des Gerätes an eine Schutzerde anzuschließen. Das Gerät muss über ein Dreileiterstromkabel an die AC-Hauptstromversorgung angeschlossen werden, wobei das Erdungskabel fest mit einer elektrischen Erdung (Schutzerde PE) am Stromanschluss verbunden sein muss.
Bei Festverdrahtung der Geräte ist sicherzustellen, dass der PE-Anschluss an die elektrische Schutzerde angeklemmt wird, bevor das Gerät an die Stromversorgung angeschlossen wird. Jede Unterbrechung des PE-Leiters oder die Trennung der PE-Verbindung kann einen möglichen elektrischen Schlag hervorrufen, der Personenschäden zur Folge haben kann.

WARNUNG

ERDUNG DER AUSGANGSANSCHLÜSSE

Es besteht die Gefahr von möglichen Schlägen an der RS-232/RS-485, LAN, IS420/IS520 und den IEMD-Anschlüssen, wenn Netzgeräte mit höheren Nenn- oder kombinierten Spannungen als 400V verwendet werden und die positive oder negative Ausgangsspannung der Netzgeräte geerdet wurde.
Schließen Sie den positiven oder negative Ausgang an Masse, wenn die RS-232/RS-485, LAN, IEMD der USB unter diesem Betriebszustand mit.

SICHERUNGEN

Sicherungen dürfen nur durch von TDK-Lambda Americas Inc. zugelassenes Personal ausgewechselt werden. Für anhaltenden Brandschutz dürfen die Sicherungen nur mit baugleichen Sicherungen mit der gleichen Leistung ersetzt werden.

EINGANGSLEISTUNG

Verwenden Sie keine AC-Spannung, die die Eingangsleistung und Frequenzrate dieses Gerätes übersteigt. Die Eingangsspannung und Frequenzrate der Genesys™ Reihe der Netzgeräte verfügt über eins Eingangsbereiche, je nach bestelltem Bautyp. Die Bereich ist 190-240VAC, 50-60Hz. Aus Sicherheitsgründen sollten die Spannungsschwankungen der Hauptstromversorgung den oberen Spannungsbereich nicht übersteigen.

SPANNUNGSFÜHRENDE TEILE

Die Geräteabdeckung darf nicht durch Betriebspersonal entfernt werden. Interne Modifikationen sowie Bauteileaustausch sind nur durch von TDK-Lambda Americas Inc. qualifiziertes Personal erlaubt. Vor dem Austausch von Komponenten muss immer die Versorgungsspannung getrennt werden. Um Personenschäden zu vermeiden, muss vor dem Kontakt mit dem Gerät immer die Stromversorgung unterbrochen, die Stromkreise entladen und externe Spannungsquellen entfernt werden.

SICHERHEITSVORSCHRIFTEN

ERSATZTEILE & MODIFIKATIONEN

Ersatzteile und Modifikationen dürfen nur durch von TDK-Lambda Americas Inc. zugelassenes Personal durchgeführt werden. Für Reparaturen oder Modifikationen muss das Gerät an einen autorisierten TDK-Lambda Americas Inc. Vertriebspartner geschickt werden.

UMGEBUNGSBEDINGUNGEN

Die Sicherheitsbestätigung der Genesys™ Netzteilserie gilt für die folgenden Betriebszustände:
* Gebrauch im Innenbereich *Umgebungstemperatur: 0°C bis 50°C

*Maximale relative Luftfeuchtigkeit: 80% (keine Kondensation) *Höhe: bis zu 3.000m
* Verschmutzungsgrad 2

	**ACHTUNG** Beachten Sie die Vorsichtsmaßnahmen im Umgang mit elektrostatisch gefährdeten Bauteilen.
	**VORSICHT** Gefahr von elektrischen Schlägen.
	Symbol der Bedienungsanleitung. Dieses Symbol wird am Gerät angezeigt, wenn der Benutzer die Bedienungsanleitung lesen soll.
	Weist auf eine gefährliche Spannung hin.
	Weist auf eine Erdungsklemme hin.
	PE-Leiterklemme must an Erde angeschlossen werden.
	Aus (Versorgung)
	Ein (Versorgung)
WARNING	Das **WARNSYMBOL** deutet auf eine Gefahr hin. Die Aufmerksamkeit wird auf ein Verfahren gelenkt. Eine Missachtung der Einhaltung des Verfahrens kann zu Personenschaden führen. Eine WARNUNG darf nicht übergangen werden und alle angezeigten Umstände müssen vollkommen verstanden und eingehalten werden.
CAUTION	Das **VORSICHTSYMBOL** deutet auf eine Gefahr hin. Die Aufmerksamkeit wird auf ein Verfahren gelenkt. Eine Missachtung der korrekten Einhaltung des Verfahrens kann zu Materialschaden führen. Ein VORSICHTSYMBOL darf nicht übergangen werden bis alle angezeigten Umstände vollkommen verstanden und eingehalten werden.
	FCC EINHALTUNGSVERMERK: Hinweis: Das Gerät wurde geprüft und erfüllt die Grenzwerte für ein digitales Gerät der Klasse A gemäß Teil 15 der FCC-Regeln. Diese Grenzwerte wurden definiert, um angemessenen Schutz vor gefährlichen Störungen zu bieten, wenn das Gerät im kommerziellen Umfeld betrieben wird. Dieses Gerät kann Funkfrequenzenergie erzeugen, verwenden und ausstrahlen und kann, sofern es nicht gemäß dem Benutzungshandbuch installiert wurde, gefährliche Störungen im Funkverkehr verursachen. Es ist wahrscheinlich, dass dieses Gerät in Wohngebieten zu schädlichen Störungen führt, die in solchen Fällen auf Kosten des Benutzers behoben werden müssen.

ITALIAN

NORME DI SICUREZZA

ATTENZIONE

La seguente precauzione di sicurezza deve essere osservata a tutti gli stadi del funzionamento, della manutenzione e della riparazione di questa apparecchiatura. L'inosservanza delle precauzioni o delle avvertenze di sicurezza contenute in questo documento viola gli standard di sicurezza della progettazione, della produzione e dell'uso previsto di questa apparecchiatura, e può compromettere i dispositivi di protezione in essa incorporati.
TDK-Lambda Americas Inc. non si assume alcuna responsabilità per il mancato rispetto di questi requisiti da parte dell'utente.

CATEGORIA DI INSTALLAZIONE

La serie di alimentatori Genesys™ è stata valutata e risulta conforme alla CATEGORIA DI INSTALLAZIONE II. Categoria di installazione (categoria di sovratensione) II: livello locale, elettrodomestici, apparecchiature portatili ecc. Con sovratensioni transitorie inferiori alla Categoria di installazione (categoria di sovratensione) III.

MESSA A TERRA

Questo prodotto è uno strumento di Classe di sicurezza 1. Per minimizzare il pericolo di scosse elettriche, il telaio dello strumento deve essere collegato a una terra elettrica. Lo strumento deve essere collegato alla rete di alimentazione a CA mediante un cavo a tre conduttori, con il filo di terra ben collegato a una terra elettrica (terra di sicurezza) in corrispondenza della presa di corrente.
Per strumenti progettati per il cablaggio alla rete di alimentazione, il terminale protettivo di terra va collegato alla terra elettrica di sicurezza prima di procedere ad altri collegamenti. Eventuali interruzioni del conduttore protettivo di terra, o scollegamenti del terminale protettivo di terra, porteranno al rischio di scossa elettrica e di conseguente potenziale infortunio.

AVVERTENZA

MESSA A TERRA DEI TERMINALI DI USCITA

Vi è rischio di scossa elettrica in corrispondenza delle porte R-S232/RS-485, LAN, IS420/IS520 e IEMD se si utilizzano alimentatori con tensione nominale o combinata oltre 400V e con l'Uscita positiva o negativa dell'alimentatore messa a terra.
Non collegare l'uscita positiva o negativa a terra quando si utilizza la RS-232 / RS-485, LAN, IEMD o USB in questa condizione di funzionamento.

FUSIBILI

I fusibili devono essere sostituiti unicamente da addetti autorizzati di TDK-Lambda Americas Inc. Per una protezione continua dal rischio di incendi, sostituire sono con fusibili di tipo e di potenza nominale identici.

POTENZE NOMINALI IN INGRESSO

Non usare un'alimentazione a CA che superi la tensione in ingresso e la potenza nominale di frequenza di questo strumento. La tensione in ingresso e la potenza nominale di frequenza della serie di alimentatori Genesys™ presentano uno bande di ingressi, a seconda del tipo di modello ordinato. Le band è: 190-240VAC, 50-60Hz. Per ragioni di sicurezza, eventuali fluttuazioni nella tensione di rete non devono superare il campo di potenze nominali suddetto.

CIRCUITI SOTTO TENSIONE

Nessun addetto deve mai rimuovere il coperchio dello strumento. Le regolazioni interne e la sostituzione dei componenti sono consentite unicamente al personale qualificato di TDK-Lambda Americas Inc. Non sostituire mai un componente con il cavo elettrico ancora collegato. A prevenzione degli infortuni, staccare sempre la corrente, scaricare i circuiti e scollegare le fonti di tensione esterne prima di toccare i componenti.

NORME DI SICUREZZA

SOSTITUZIONI E MODIFICHE DEI COMPONENTI

I componenti devono essere sostituiti o modificati unicamente da addetti autorizzati di TDK-Lambda Americas Inc. Per riparazioni o modifiche, restituire lo strumento al centro assistenza di TDK-Lambda Americas Inc.

CONDIZIONI AMBIENTALI

L'approvazione della sicurezza della serie di alimentatori Genesys™ è valida in presenza delle condizioni d'uso seguenti:

*Uso in interni
*Umidità relativa massima: 80% (zero condensa)
*Inquinamento grado 2
*Temperatura ambiente: 0ºC - 50ºC
*Altitudine: fino a 3000m

	**ATTENZIONE** Osservare le precauzioni su come maneggiare i dispositivi sensibili alle scariche elettrostatiche.
	**ATTENZIONE** Rischio di scossa elettrica
	Simbolo del manuale delle istruzioni. Lo strumento sarà contrassegnato da questo simbolo ovunque l'utente deve fare riferimento al manuale delle istruzioni.
	Indica tensioni pericolose.
	Indica il terminale di terra.
	Il terminale del conduttore protettivo di terra deve essere collegato alla messa a terra.
	Spento (Alimentazione)
	Acceso (Alimentazione)
WARNING	Il simbolo di **AVVERTIMENTO** denota un periodo. È necessario prestare attenzione alla procedura. Il mancato rispetto della procedura può sfociare in un infortunio. Non ignorare alcun simbolo di AVVERTIMENTO. Tutte le condizioni indicate devono essere pienamente comprese e rispettate.
CAUTION	Il simbolo di **ATTENZIONE** denota un pericolo. È necessario prestare attenzione alla procedura. Il mancato rispetto della procedura può sfociare in danni per l'apparecchiatura. Non procedere oltre un simbolo di ATTENZIONE senza prima avere pienamente compreso e rispettato tutte le condizioni indicate.
	AVVISO DI CONFORMITÀ FCC: NB: Questa apparecchiatura è stata testata ed è risultata conforme ai limiti per i dispositivi digitali di Classe A, ai sensi della parte 15 dei Regolamenti FCC. Tali limiti sono formulati per offrire ragionevole protezione dalle interferenze pericolose quando l'apparecchiatura viene azionata in ambienti commerciali. Questa apparecchiatura genera, usa e può irradiare energia a radiofrequenza; se non viene installata ed utilizzata attenendosi al manuale delle istruzioni, può causare interferenze pericolose per le radiocomunicazioni. È probabile che l'uso di questa apparecchiatura in zone residenziali provochi interferenze pericolose. In tal caso, l'utente dovrà rettificare a proprie spese tali interferenze.

PORTUGUESE

INSTRUÇÕES DE SEGURANÇA

CUIDADO

As seguintes precauções de segurança devem ser respeitadas em todas as fases de funcionamento, assistência e reparação deste equipamento. A não observância dos avisos e precauções de segurança constantes neste documento viola os padrões de segurança da concepção, fabrico e utilização pretendida deste equipamento, podendo danificar as protecções integradas no seu interior.
A TDK-Lambda Americas Inc. não poderá ser responsabilizada pelo não cumprimento destes requisitos por parte do utilizador.

CATEGORIA DA INSTALAÇÃO

A série Genesys™ de fontes de alimentação foi avaliada como sendo uma INSTALAÇÃO DA CATEGORIA II. Categoria da instalação (categoria de sobretensão) II: nível local, instrumentos, equipamento portátil, etc. Com uma sobretensão transitória provisória inferior à das instalações da categoria (categoria de sobretensão) III.

LIGAÇÃO À TERRA

Este produto é um instrumento de Classe de Segurança 1. Para reduzir o risco de choque, o chassis do instrumento deve ter ligação de terra. O instrumento deve ser ligado à fonte de alimentação de corrente alternada através de um cabo de alimentação de três condutores, com o fio de terra firmemente ligado a uma ligação de terra (sistemas de segurança por ligação à terra) na tomada de alimentação.
Em instrumentos concebidos para serem ligados à fonte de alimentação através de cabos, o terminal de terra de protecção deve ser ligado ao sistema eléctrico de segurança por ligação à terra antes de se realizar qualquer outra ligação. Qualquer interrupção do condutor de terra de protecção ou corte do terminal de terra de protecção poderá originar um risco de choque passível de provocar ferimentos.

AVISO

LIGAÇÃO À TERRA DE TERMINAIS DE SAÍDA

Há a possibilidade de existir risco de choque nas portas RS-232/RS-485, LAN, IS420/IS520 e IEMD quando se utilizam fontes de alimentação com tensão nominal ou combinada superior a 400V e a saída positiva ou negativa da fonte de alimentação está ligada à terra. Não ligue a saída positiva ou negativa para a terra quando se utiliza o RS-232/RS-485, LAN, IEMD ou USB sob esta condição de operação

FUSÍVEIS

Os fusíveis apenas devem ser substituídos por pessoal de assistência autorizado da TDK-Lambda Americas Inc. Para obter uma protecção contínua contra o risco de incêndios, substitua sempre os fusíveis por outros do mesmo tipo e classificação.

CLASSIFICAÇÃO DAS ENTRADAS

Não utilize fontes de alimentação de corrente alternada que excedam a tensão de entrada e a classificação de frequência deste instrumento. A tensão de entrada e a classificação de frequência das fontes de alimentação da série Genesys™ têm um gamas de entrada, de acordo com o tipo de modelo encomendado. As gama é: 190-240VAC, 50-60Hz. Por motivos de segurança, as flutuações da tensão da fonte de alimentação não devem exceder a gama da tensão superior.

CIRCUITOS SOB TENSÃO

Os operadores não devem retirar a cobertura do instrumento. A realização de ajustes internos ou substituições de componentes só é permitida se realizada por pessoal especializado da TDK-Lambda Americas Inc. Nunca substitua componentes com o cabo de alimentação ligado. Para evitar ferimentos, desligue sempre a energia, descarregue os circuitos e desligue a fonte de tensão externa antes de tocar nos componentes.

INSTRUÇÕES DE SEGURANÇA

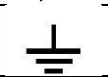
MODIFICAÇÕES E SUBSTITUIÇÕES DE PEÇAS

As modificações e substituições de peças apenas são permitidas quando realizadas pelo pessoal de assistência da TDK-Lambda Americas Inc. Para a realização de reparações ou modificações, é necessário devolver o instrumento a uma unidade de serviço autorizada da TDK-Lambda Americas Inc.

CONDIÇÕES AMBIENTAIS

A aprovação de segurança das fontes de alimentação da série Genesys™ aplica-se às seguintes condições de funcionamento:

*Utilização no interior
*Temperatura ambiente: De 0°C a 50°C
*Humidade relativa máxima: 80% (sem condensação)
*Altitude: até 3000m
*Nível de poluição 2

	**ATENÇÃO**: Respeitar as precauções relativas ao manuseamento de dispositivos sensíveis a electricidade estática.
	**CUIDADO**: Risco de choque eléctrico
	Símbolo do manual de instruções. O instrumento será assinalado com este símbolo sempre que for necessário que o utilizador consulte o manual de instruções.
	Indica tensão perigosa.
	Assinala um terminal de ligação à terra.
	O terminal do condutor de terra de protecção deve estar ligado à terra.
	Desactivado (alimentação)
	Activado (alimentação)
WARNING	O sinal de **AVISO** assinala um perigo. Solicita-se atenção para um procedimento. Não seguir correctamente o procedimento pode resultar em ferimentos. Não se deve ignorar um sinal de AVISO, e todas as condições indicadas devem ser compreendidas e respeitadas.
CAUTION	O sinal de **CUIDADO** assinala um perigo. Solicita-se atenção para um procedimento. Não seguir correctamente o procedimento pode resultar em danos no equipamento. Quando encontrar um sinal de CUIDADO não avance até que todas as condições indicadas tenham sido completamente entendidas e respeitadas.
	DECLARAÇÃO DE CONFORMIDADE FCC: Nota: Este equipamento foi testado e considerado estar dentro dos limites necessários para um dispositivo digital da Classe A, em conformidade com a parte 15 das normas da FCC. Estes limites estão concebidos de forma a fornecer uma protecção razoável contra interferências nocivas quando o equipamento é utilizado num ambiente comercial. Este equipamento gera, utiliza, e pode emitir energia por radiofrequência e, caso não seja instalado e utilizado de acordo com o manual de instruções, pode provocar interferências nocivas nas comunicações por rádio. A utilização deste equipamento numa área residencial poderá provocar interferências nocivas, situação na qual a correcção da interferência ficará ao

SPANISH

INSTRUCCIONES DE SEGURIDAD

PRECAUCIÓN

La siguiente precaución de seguridad debe ser respetada durante todas las fases de funcionamiento, mantenimiento y reparación de este equipo. El incumplimiento de las precauciones o advertencias de seguridad recogidas en este documento infringe las normativas de seguridad de diseño, fabricación y uso previsto de este equipo y puede afectar a las protecciones incorporadas en el mismo.
TDK-Lambda Americas Inc. no asumirá responsabilidad alguna si el usuario no cumple estos requisitos.

CATEGORÍA DE INSTALACIÓN

La serie de fuentes de alimentación Genesys™ ha sido evaluada conforme a la CATEGORÍA DE INSTALACIÓN II. Categoría de instalación (categoría de sobretensión) II: equipos de nivel local, eléctricos, portátiles, etc. Con una sobretensión transitoria menor que la Categoría de Instalación (categoría de sobretensión) III.

CONEXIÓN A TIERRA

Este producto es un aparato de Seguridad de Clase 1. Para minimizar el riesgo de descargas, el chasis del aparato se debe conectar a una toma de tierra eléctrica. El aparato se debe conectar a la toma de energía eléctrica de corriente alterna de la red de distribución a través de un cable de alimentación de tres conductores, con el conductor de tierra firmemente conectado a una toma de tierra eléctrica (toma de tierra de seguridad) de la toma de corriente.
En el caso de aquellos aparatos diseñados para quedar cableados a la red de alimentación, el borne de tierra de protección se debe conectar a la toma de tierra eléctrica de seguridad antes de establecer cualquier otra conexión. Cualquier interrupción del conductor de tierra de protección o desconexión del borne de tierra de protección supondrá un riesgo potencial de descarga eléctrica que puede llegar a causar daños personales.

WARNINGADVERTENCIA

CONEXIÓN A TIERRA DE LOS BORNES DE SALIDA

El uso de fuentes de alimentación con una tensión nominal o combinada superior a 400V y la Salida Positiva o Negativa de la Fuente de Alimentación conectada a tierra, representa un riesgo potencial de descarga en los puertos RS-232/RS-485, LAN, IS420/IS520 e IEMD.
No conecte la salida positiva o Negativa a tierra cuando se utiliza el RS-232 / RS-485, LAN, IEMD o USB bajo esta condición de funcionamiento.

FUSIBLES

Los fusibles sólo pueden ser cambiados por el personal de servicio autorizado de TDK-Lambda Americas Inc. Para una protección permanente contra el peligro de incendios, utilice únicamente fusibles del mismo tipo y de la misma potencia nominal.

POTENCIAS NOMINALES DE ENTRADA

No utilice fuentes de alimentación de CA cuyos valores nominales superen los de la tensión y frecuencia de entrada de este aparato. Los valores nominales de la tensión y frecuencia de entrada de la serie de fuentes de alimentación Genesys™ tienen uno rangos de entrada dependiendo del tipo de modelo elegido. Los rangos es 190-240VAC, 50-60Hz. Por razones de seguridad, las fluctuaciones en la tensión de alimentación de la red no deberían superar los rangos de tensión antedichos.

CIRCUITOS ACTIVOS

El personal operativo no debe retirar la cubierta del aparato. Los ajustes internos o el reemplazo de componentes sólo pueden ser realizados por el personal cualificado de TDK-Lambda Americas Inc. Desenchufe siempre el cable de alimentación antes de reemplazar los componentes. Para evitar lesiones, desenchufe siempre el cable de alimentación, descargue los circuitos y desconecte la fuente de tensión externa antes de tocar los componentes.

INSTRUCCIONES DE SEGURIDAD

SUSTITUCIÓN Y MODIFICACIÓN DE LAS PIEZAS

Las piezas sólo pueden ser sustituidas o modificadas por el personal de servicio autorizado de TDK-Lambda Americas Inc. Para cualquier reparación o modificación del aparato, éste debe ser enviado a un centro de servicio autorizado de TDK-Lambda Americas Inc.

CONDICIONES MEDIOAMBIENTALES

La aprobación de seguridad de la serie de fuentes de alimentación Genesys™ es aplicable a las siguientes condiciones de funcionamiento:

*Uso en interiores
*Temperatura ambiente: 0°C a 50°C
*Humedad relativa máxima: 80% (sin condensación)
*Altitud: hasta 3000m
*Grado de contaminación 2

	**ATENCIÓN** Observe las precauciones de manejo de dispositivos sensibles electrostáticos
	**PRECAUCIÓN** Riesgo de descargas eléctricas
	Símbolo de manual de instrucciones. Este símbolo se pondrá en el aparato siempre que el usuario tenga que consultar el manual de instrucciones.
	Indica una tensión peligrosa.
	Indica un borne de tierra.
	El borne del conductor de tierra de protección debe estar conectado para poder establecer una conexión a tierra.
	Apagado (fuente de alimentación)
	Encendido (fuente de alimentación)
WARNING	El símbolo de **ADVERTENCIA** indica un peligro. Llama la atención ante un procedimiento. Si el procedimiento no se realiza correctamente, podrían producirse lesiones personales. Los símbolos de ADVERTENCIA no se pueden pasar por alto y deben comprenderse y cumplirse todas las condiciones indicadas.
CAUTION	El símbolo de **PRECAUCIÓN** indica un peligro. Llama la atención ante un procedimiento. Si el procedimiento no se realiza correctamente, el equipo podría sufrir daños. Cuando encuentre un símbolo de PRECAUCIÓN, no siga hasta que no haya comprendido y esté seguro de que se cumplen las condiciones indicadas.
	DECLARACIÓN DE CONFORMIDAD CON LA FCC: Nota: Este equipo ha sido ensayado y cumple con los límites establecidos para los dispositivos digitales de Clase A, de conformidad con lo dispuesto en el Apartado 15 de la normativa de la FCC. Estos límites han sido diseñados para proporcionar una protección razonable contra interferencias perjudiciales cuando el equipo se utilice en entornos comerciales. Este equipo genera, usa y puede emitir energía de radiofrecuencia y, si no se instala y utiliza de acuerdo con el manual de instrucciones, puede ocasionar interferencias perjudiciales con las comunicaciones por radio. La utilización de este equipo en un área residencial puede llegar a provocar interferencias perjudiciales, en cuyo se le pedirá al usuario que las corrija y que se haga cargo del gasto generado.

CHAPTER 1 GENERAL INFORMATION

1.1 USER MANUAL CONTENT

This User's Manual contains the operating instructions, installation instructions and specifications of the Genesys™ 2400W power supply series. The instructions refer to the standard power supplies, including the built-in RS-232/RS-485 serial communication. For information related to operation with the optional LAN, IEEE or USB programming, refer to specific Programming Interface User Manual (TDK-Lambda P/N 83-034-100 (LAN), P/N 83-030-200 (IEEE) and P/N 83-033-800 (USB)).

1.2 INTRODUCTION

1.2.1 General Description

Genesys™ power supplies are wide output range, high performance switching power supplies. The Genesys™ series is power factor corrected and operates from worldwide AC voltage range. Output voltage and current are continuously displayed and LED indicators show the complete operating status of the power supply. The front panel controls allow the user to set the output parameters, the protection levels (Over-Voltage protection, Under-Voltage limit and Foldback) and Preview the settings. The rear panel includes the necessary connectors to control and monitor the power supply operation by remote analog signals or by the built-in serial communication (RS-232/RS-485). LAN,IEEE and USB programming and Isolated-Analog programming/monitoring are optional.

1.2.2 Models Covered by this Manual

Model	Voltage range (V)	Current range (A)
GEN 8 - 300	0 - 8	0 - 300
GEN 10 - 240	0 - 10	0 - 240
GEN 16 - 150	0 - 16	0 - 150
GEN 20 - 120	0 - 20	0 - 120
GEN 30 - 80	0 - 30	0 - 80
GEN 40 - 60	0 - 40	0 - 60
GEN 60 - 40	0 - 60	0 - 40
GEN 80 - 30	0 - 80	0 - 30
GEN 100 - 24	0 - 100	0 - 24
GEN 150 - 16	0 - 150	0 - 16
GEN 300 - 8	0 - 300	0 - 8
GEN 600 - 4	0 - 600	0 - 4

Table 1-1: Models Covered by this Manual

1.2.3 Features and Options

- Constant-Voltage / Constant-Current with automatic crossover.
- Active Power Factor correction.
- Single Phase or Three Phase options.
- Embedded Microprocessor Controller.
- Built-in RS-232/RS-485 Interface.
- Voltage & Current high resolution adjustment by digital encoders.
- High accuracy programming/readback-16 bit.
- Software Calibration (no internal trimmers / potentiometers).
- Last Setting Memory.
- Independent Remote **ON/OFF** (opto-isolated) and remote Enable/Disable.
- Parallel operation (Master/Slave) with Active current sharing.
- Remote sensing to compensate for voltage drop of power leads.

- External Analog Programming and Monitoring standard (0-5V or 0-10V, user selectable).
- Cooling fan speed control for low noise and extended fan life.
- Zero stacking-no ventilation holes at the top and bottom surface of the power supply.
- Optional LAN Interface (LXI compliant), GPIB Interface (SCPI compatible) or USB Interface (USB 2.0 compliant).
- Optional Isolated Analog programming/monitoring (0-5V or 0-10V, user selectable and 4-20mA).

1.2.4 Multiple Output Power System

The Genesys™ power supplies series can be configured into a programmable power system of up to 31 units using the built-in /RS-485 communication port in the power supply and the RS-485 linking cable provided with each power supply.
In a LAN, GPIB or USB system, each power supply can be controlled using the optional LAN, GPIB or USB controller (factory installed).

1.2.5 Control Via the Serial Communication Port

The following parameters can be programmed / monitored via the serial communication port:

1. Output voltage setting.
2. Output current setting.
3. Output voltage measurement.
4. Output **ON/OFF** control.
5. Output current measurement.
6. **FOLD**back protection setting.
7. Over-Voltage Protection (OVP) setting and readback.
8. Under-Voltage Limit (UVL) setting and readback.
9. Power-supply start-up mode (Safe-Start or Auto-Restart mode).

1.2.6 Analog Voltage Programming and Monitoring

Analog inputs and outputs are provided at the rear panel
for analog control of the power supply. The output voltage and the current limit can be programmed by analog voltage or by resistor and can be monitored by analog voltage. The power supply output can be remotely set to On or Off and analog signals monitor the proper operation of the power supply and the mode of operation (CV/CC).

1.2.7 Parallel operation

Genesys™ power supplies of the same output voltage and current rating can be paralleled in a master-slave configuration with automatic current sharing to increase power available.

1.2.8 Output Connections

Output connections are made to rear panel bus-bars for models up to 100V and to a 4-terminal wire clamp connector for models above 100V rated output voltage. Either the positive or negative terminal may be grounded or the output may be floated. Models up to 60VDC Rated Output shall not float outputs more than +/- 60VDC above/below chassis ground. Models > 60VDC Rated Output shall not float outputs more than +/-600VDC above/below chassis ground.Contact the factory for assistance with higher float voltage applications.
Local or remote sense may be used. In remote sense, the voltage drop on the load wires should be minimized. Refer to the specifications for the maximum voltage drop value.

1.2.9 Cooling and Mechanical Construction

The Genesys™ series is cooled by internal fans. At the installation, care must be taken to allow free airflow into the power supply via the front panel and out of the power supply via the rear panel. The Genesys™ power supplies have a compact and lightweight package, which allows easy installation and space saving in the application equipment.

CAUTION

Observe all torque guidelines within this manual. Over-torquing may damage unit or accessories. Such damage is not covered under manufacturers warranty.

1.3 ACCESSORIES

1.3.1 Included Accessories

The following accessories are delivered with the power supply:

1.3.1.1 Serial Link Cable

Serial link cable for linking power supplies by RS-485 communication (GEN/RJ45).
Cable description: 0.5m length, shielded, RJ-45 type plugs, eight (8) contacts (P/N: 15-507-201)

1.3.1.2 Hardware (delivered with power supply)

- Strain Relief for AC Cord
- Output terminal shield
- DB25 Programming Plug kit (AMP P/N: 749809-9)
- Connector plug kit, (Phoenix Contact: Plug: IMC 1, 5/7-ST-3,81, Header: IMC 1,5/7-G-3,81)

1.3.2 Optional Communication Cables (See Section 7.5)

- **RS-232 Cables to connect GEN to Serial Port on PC**

  GEN-to-PC (DB9) GEN 232/9 P/N: 15-507-203

  GEN-to-PC (DB25) GEN 232/25 P/N: 15-507-204

- **RS-485 Cable to connect GEN to Serial Port on PC**

  GEN-to-PC (DB9) GEN/485-9 P/N: 15-507-202

1.3.3 AC Cables

AC cables are not provided with the power supply. Refer to Table 1-2 for recommended AC input cables (customer supplied). Add a non-locking plug approved by the national safety standards of the country of usage.

AC Input Range	AC Input Cable
190-240VAC, Single-Phase	Min. 3x12AWG (2 wire plus safety ground), stranded copper, 300V, 60°C minimum, rated for 25A. 3m max. length, outer diameter: 9~11mm.
190-240VAC, Three-Phase	Min. 4x14AWG (3 wire plus safety ground), stranded copper, 600V, 60°C minimum, rated for 15A. 3m max. length, outer diameter: 9~11mm.

Table 1-2: Recommended AC Input Cable

CHAPTER 2 SPECIFICATIONS

2.1 OUTPUT RATING

MODEL	GEN	8-300	10-240	16-150	20-120	30-80	40-60	60-40	80-30	100-24	150-16	300-8	600-4
1.Rated Output voltage, (*1)	V	8	10	16	20	30	40	60	80	100	150	300	600
2.Rated Output current, (*2)	A	300	240	150	120	80	60	40	30	24	16	8	4
3.Rated Output power	W	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400

2.2 AUXILIARY OUTPUTS

1. +15V Output, (*14)	---	+15V ± 5% 0.2A max load, Ripple & Noise: 100mVp-p. Referenced internally to the negative output (-Vout) potential
2. +5V Output, (*14)	---	+5V ± 5%, 0.2A max load, Ripple & Noise: 100mVp-p. Referenced internally to IF_COM potential

2.3 INPUT CHARACTERISTICS

		V	8	10	16	20	30	40	60	80	100	150	300	600
1.Input voltage/frequency, (*3)		---	Single-Phase, 2 wire + Ground, 200VAC models: 170VAC~265 VAC, 47~63Hz											
			Three-Phase, 3 wire + Ground, 200VAC models: 170VAC~265 VAC, 47~63 Hz											
2.Maximum input current at 100% load	1-Phase 230VAC models	---	17.3	17.3	16.8	16.7	16.7	16.6	16.6	16.6	16.6	16.3	16.3	16.3
	3-Phase 208VAC models		10.5	10.5	10.2	10.1	10.0	10.0	9.9	9.9	9.9	9.8	9.8	9.8
3. Power Factor (typical)		---	Single-Phase models: 0.99 @ 230VAC, rated Output power; Three-Phase models:0.94 @ 200VAC, rated Output power.											
4. Efficiency (typical), (*4)		%	84	84	86	87	87	88	88	88	88	88	88	88
5. Inrush current, (*5)		---	Less than 50A											

2.4 CONSTANT-VOLTAGE MODE

		V	8	10	16	20	30	40	60	80	100	150	300	600
1. Max. Line regulation, (*6)		---	0.01% of rated Output voltage + 2mV											
2. Max. Load regulation, (*7)		---	0.015% of rated Output voltage + 5mV											
3. Ripple and Noise (p-p, 20MHz), (*8)		mV	50	50	50	50	55	55	60	60	70	90	150	240
4. Ripple (rms, 5Hz~1MHz)		mV	6	6	6	6	6	6	6	7	10	20	45	60
5. Temperature coefficient		ppm/°C	+/- 50ppm/°C from rated Output voltage, following 30 minute warm-up											
6. Temperature stability		%	+/- 0.01% of rated Output voltage over 8 hr interval following 30 minute warm-up. Constant line, load & temperature											
7. Warm-up drift		---	Less than +/- 0.05% of rated Output voltage + 2mV over 30 minutes, following Output power on											
8. Remote sense compensation/wire		V	2	2	2	2	5	5	5	5	5	5	5	5
9. Up-Prog. response time, 0~Vomax, (*9)		ms	15	15	15	15	15	20	30	40	40	60	80	100
10. Down-Prog response time	Full load, (*9)	ms	10	10	20	20	20	20	30	50	50	80	100	100
	No load, (*10)		500	500	500	500	600	700	1100	1200	1500	2500	3000	3000
11. Transient response time		ms	Time for Output voltage to recover within 0.5% of its rated Output for a load change 10~90% of rated output current. Output voltage set-point: 10~100%, local sense Less than 1ms for models up to and including 100V. Less than 2ms for models above 100V											
12. Hold-up time (typical)		ms	10ms, rated Output power											

2.5 CONSTANT-CURRENT MODE

	V	8	10	16	20	30	40	60	80	100	150	300	600
1. Max. Line regulation, (*6)	---	0.01% of rated Output current +2mA											
2. Max Load regulation, (*11)	---	0.02% of rated Output current +5mA											
3. Load regulation thermal drift	%	Less than 0.05% of rated Output current over 30 minutes following load change											
4. Ripple (rms,, 5Hz~1MHz), (*12)	mA	700	500	400	250	150	90	60	40	30	12	10	5
5. Temperature coefficient	ppm/°C	+/- 70PPM/°C from rated output current, following 30 minutes warm-up											
6. Temperature stability	%	+/- 0.01% of rated Iout over 8 hrs. interval following 30 minutes warm-up. Constant line, load & temperature											
7. Warm-up drift	---	8~16V models: Less than +/- 0.2% of rated Output current over 30 minutes, following power on											
		20V~600V models: Less than +/- 0.1% of rated Output current over 30 minutes, following power on											

2.6 ANALOG PROGRAMMING AND MONITORING

1. Vout voltage programming	---	0~100%, 0~5V or 0~10V, user-selectable. Accuracy and linearity: +/-0.5% of rated Vout
2. Iout voltage programming, (*13)	---	0~100%, 0~5V or 0~10V, user-selectable. Accuracy and linearity: +/-1% of rated Iout
3. Vout resistor programming	---	0~100%, 0~5/10Kohm full scale, user-selectable. Accuracy and linearity: +/-1% of rated Vout
4. Iout resistor programming, (*13)	---	0~100%, 0~5/10Kohm full scale, user-selectable. Accuracy and linearity: +/-1.5% of rated Iout
5. On/off control (SO)	---	By electrical Voltage: 0~0.6V/2~15V or dry contact, user selectable logic
6. Output current monitor, (*13)	---	0~5 or 0~10V, user-selectable. Accuracy: +/-1%
7. Output voltage monitor	---	0~5 or 0~10V, user-selectable. Accuracy: +/-1%
8. Power supply OK signal (PS_OK)	---	4~5V = OK, 0V = Fail. 500 ohm series resistance
9. Parallel operation	---	Possible, up to 4 units in Master/Slave mode with two wire current balance connection
10. Series operation	---	Possible (with external diodes), up to 2 units. 600VDC maximum from Chassis ground
11. CV/CC indicator	---	Open collector. CC mode = On, CV mode = Off. Maximum voltage: 30V, Maximum sink current: 10mA
12. Enable/Disable	---	Dry contact. Open = Off, Short = On. Maximum voltage at Enable /Disable IN: 6V
13. Local/Remote analog control	---	By electrical signal or Open/Short: 0.0/0.6V or short = Remote, 2~15V or open = Local
14. Local/Remote analog indicator	---	Open collector, Local = Open, Remote = On. Maximum voltage:30V, Maximum sink current: 10mA

2.7 PROGRAMMING AND READBACK (RS-232/485, Optional LAN, IEEE, USB Interface)

	V	8	10	16	20	30	40	60	80	100	150	300	600
1.Vout programming accuracy,	---	0.05% of rated Output voltage											
2.Iout programming accuracy,	---	0.1% of actual Output current + 0.2% of rated Output current											
3.Vout programming resolution	---	0.002% of rated Output voltage											
4.Iout programming resolution	---	0.002% of rated Output current											
5.Vout readback accuracy	---	0.05% of rated Output voltage											
6.Iout readback accuracy, (*13)	---	0.3% of rated Output current											
7.Vout readback resolution	% of rated Output voltage	0.002%	0.011%	0.007%	0.006%	0.004%	0.003%	0.002%	0.002%	0.011%	0.007%	0.004%	0.002%
8.Iout readback resolution	% of rated Output current	0.004%	0.005%	0.007%	0.009%	0.002%	0.002%	0.003%	0.004%	0.005%	0.007%	0.002%	0.003%

2.8 PROTECTIVE FUNCTIONS

	V	8	10	16	20	30	40	60	80	100	150	300	600
1.Foldback protection	---	Output shut-down when power supply changes from CV to CC mode. User-presetable											
2. Over-Voltage protection (OVP)	---	Inverter shut-down, manual reset by AC input recycle, by OUT button or by communication port command											
3. Over-Voltage trip point	V	0.5~10	0.5~12	1~19	1~24	2~36	2~44	5~66	5~88	5~110	5~165	5~330	5~660
4. Output Under-Voltage limit (UVL)	---	Preset by front panel or communication port. Prevents from adjusting Vout below limit. Does not affect Analog programming.											
5. Over-Temperature protection (OTP)	---	User-selectable, latched or non-latched.											

2.9 FRONT PANEL

1. Control functions	---	Vout/Iout manual adjust by separate encoders (Coarse and Fine adjustment)
	---	OVP/UVL manual adjust by Voltage Adjust encoder
	---	Address selection by Voltage Adjust encoder. No of addresses = 31
	---	Go-to-Local control
	---	Output On/Off
	---	AC On/Off
	---	Front panel lock/unlock
	---	Foldback control
	---	Baud rate selection: 1200, 2400, 4800, 9600, 19200
	---	Restart modes (Automatic-Restart, Safe-Start)
2. Display	---	4 digits, Accuracy: +/- 0.05% of rated Output voltage +/- 1 count
	---	4 digits, Accuracy: +/- 0.2% of rated Output current +/- 1 count
3. Indications	---	VOLTAGE, CURRENT, ALARM, FINE, PREVIEW, FOLDBACK, REMOTE (RS-232, RS-485, LAN, IEEE, USB), OUTPUT ON, FRONT PANEL LOCK

2.10 ENVIRONMENTAL CONDITIONS

1. Operating temperature	---	0 to +50°C, 100% load
2. Storage temperature	---	-20°C to +85°C
3. Operating humidity	%	20% to 90% RH (no condensation)
4. Storage humidity	%	10% to 95% RH (no condensation)
5.Vibration	---	MIL_STD_810F, Method 514.5, EUT is fixed to the vibrating surface
6. Shock	---	Less than 20G, half-sine, 11ms. Unit is unpacked
7. Altitude	---	Maximum 3000m (9843 ft). Derate Output current by 2%/100m (2%/328ft) above 2000m (6562ft) Alternatively, maximum ambient temperature derated by 1°C/100m (1°C/328ft) above 2000m (6562ft)
8.RoHS Compliance	---	Complies with requirements of RoHS directive

2.11 MECHANICAL CONSTRUCTION

1. Cooling	---	Forced air flow from front to rear of unit. No ventilation holes at the top or bottom of the chassis. Variable speed fan
2. Dimensions (WxHxD)	mm	W:422.8, H:43.6, D:441.0 (excluding connectors, encoders, handles, etc.)
3. Weight	kg	Less than 10kg (22 lbs)
4. AC Input connector (with protective cover)	---	Single-Phase 230VAC models: Power Combicon PC 6-16/3-GF-10, 16 Series wit h strain relief
		Three-Phase 208VAC/400VAC models: Power Combicon PC 6-16/4-GF-10, 16 Series with strain relief
5. Output connector	---	**8V to 100V models**: busbars (hole Ø 10.5mm); **150V to 600V models**: Wire clamp connector, Phoenix P/N FRONT-4-H-7.62

2.12 EMC

1. Applicable standards:	---	
2. ESD	---	IEC1000-4-2: Air-discharge – 8kV, Contact discharge – 4kV
3. Fast Transients	---	IEC1000-4-4: 2kV
4. Surge Immunity	---	IEC1000-4-5: 1kV line-to-line, 2kV line-to-ground
5. Conducted Immunity	---	IEC1000-4-6: 3V
6. Radiated Immunity	---	IEC1000-4-3: 3V/m
7. Magnetic Field Immunity	---	IEC1000-4-8: 1A/m
8. Voltage Dips	---	EN61000-4-11
9. Conducted Emissions	---	EN55022A, FCC Part 15-A, VCCI-A
10. Radiated Emissions	---	EN55022A, FCC Part 15-A, VCCI-A

2.13 SAFETY

1.Applicable standards	UL 60950-1, CSA 22.2 No.60950-1, IEC 60950-1, EN 60950-1
2.Interface classification	**Models with Vout ≤ 40V**: Output is SELV; LAN, IEEE, USB, RS-232/RS-485, Isolated Analog, J1 Remote Analog (all pins) and Remote sense pins are SELV; +5VDC and +15VDC Auxiliary Outputs are SELV
	Models with 60V < Vout ≤ 400V: Output is Hazardous; LAN, IEEE, USB, RS-232/RS-485, Isolated Analog and J1 Remote Analog (pins 1-3, 14-16) and +5VDC Auxiliary Output are SELV; Remote sense (all pins), J1 Remote Analog (pins 8-13, 21-25) and +15VDC Auxiliary Output are Hazardous.
	Models with 400V < Vout ≤ 600V: Output is Hazardous, LAN, IEEE, USB, RS-232/RS-485, Isolated Analog, J1 Remote Analog (all pins), Remote sense (all pins), +5VDC Auxiliary Output and +15VDC Auxiliary Output are Hazardous.
3. Withstand voltage	**Models with Vout ≤ 40V**: Input-Outputs (SELV): 4242VDC - 1minute, Input-Ground: 2828VDC - 1minute **Models with 40V < Vout ≤ 100V**: Input (Haz)-Output (Haz): 2600VDC - 1minute; Input (Haz)-SELV: 4242VDC – 1 minute; Output (Haz)-SELV: 1900VDC - 1minute; Output (Haz)-Ground: 1200VDC – 1 minute; Input (Haz)-Ground: 2828VDC – 1 minute. **Models with 100V ≤ Vout ≤ 600V**: Input (Haz)-Output (Haz): 4000VDC-1 minute; Input (Haz)-SELV: 4242VDC-1 minute; Output (Haz)-SELV: 3550VDC-1 minute; Output (Haz)-Ground: 2670VDC - 1 minute; Input (Haz)-Ground: 2828VDC- 1 minute.
4.Insulation resistance	More than 100Mohm at 25°C, 70%RH

NOTES:

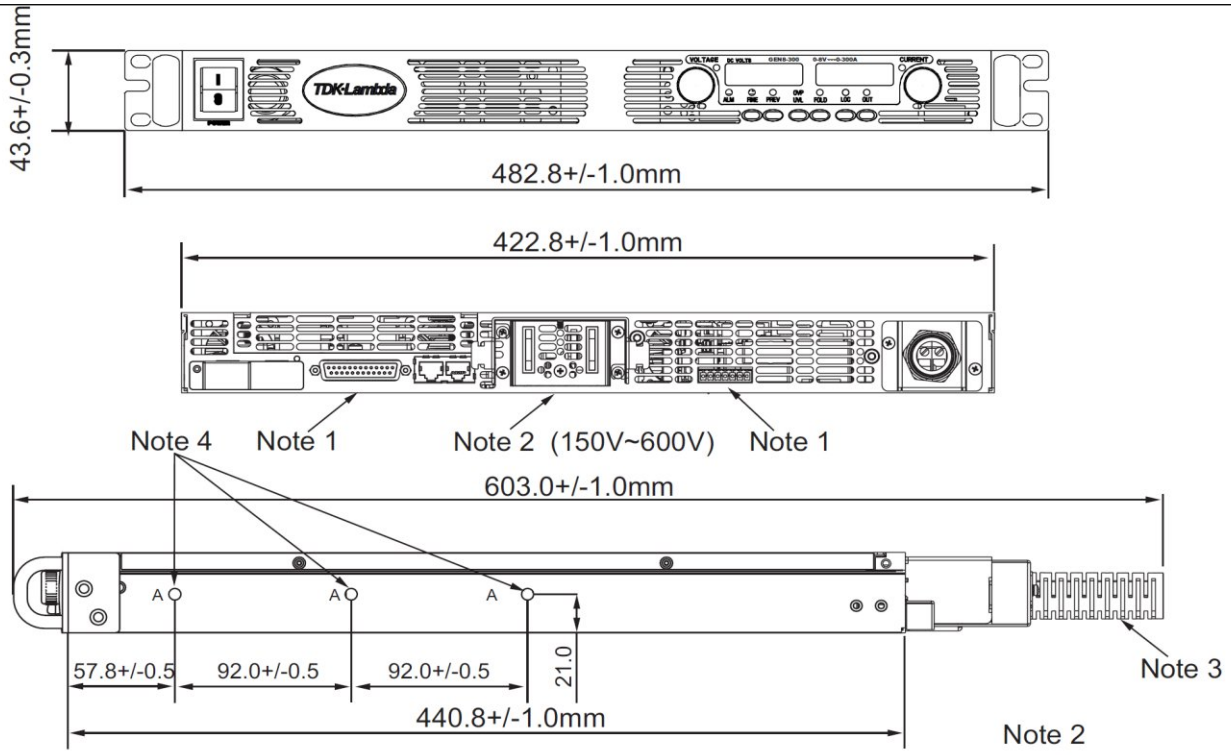
*1: Minimum voltage is guaranteed to maximum 0.2% of the rated Output voltage.
*2: Minimum current is guaranteed to maximum 0.4% of the rated Output current.
*3: For cases where conformance to various safety standards (UL, IEC etc.) is required, to be described as 190~240VAC (50/60Hz).
*4: A 200VAC input voltage, Ta=25C with rated Output power.
*5: Not including EMI filter inrush current, less than 0.2ms.
*6: At 170~265VAC, constant load.
*7: From no-load to full-load, constant input voltage. Measured at the sensing point in Remote Sense.
*8: For 8V~300V models: measured with JEITA RC-9131A (1:1) probe.
For 600V model: measured with 10:1 probe.
*9: From 10%-to-90% or 90%-to-10% of rated Output voltage, with rated, resistive load.
*10: From 90%-to-10% of rated Output voltage.
*11: For load voltage change, equal to the unit Output voltage rating, constant input voltage.
*12: For 8V~16V models the ripple is measured at 2V to rated Output voltage and rated Output current. For other models, the ripple is measured at 10~100% of rated Output voltage and rated Output current.
*13: The constant current programming readback and monitoring accuracy does not include the warm-up and load regulation thermal drift.
*14: Measured with JEITA RC-9131A(1:1) probe.
*15: Measured at the sensing point.

2.14 SUPPLEMENTAL CHARACTERISTICS

The supplemental characteristics give typical but non-warranted performance characteristics. The supplemental characteristics are useful in assessing applications for the power supply. Several kinds of supplemental characteristics are listed below.

1. Evaluation Data: Typical performance of the power supply.
2. Reliability Data: Reliability Performance of the power supply.
3. EN61000 Data: Performance of the power supply under EN61000 test conditions.
4. EMI Data: Typical EMI (conducted and radiated) performance of the power supply.

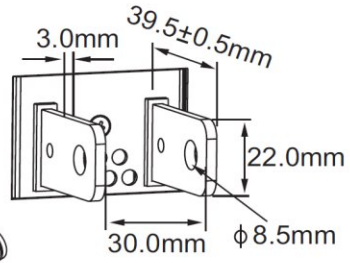
2.15 GENESYS™ 2400W POWER SUPPLY OUTLINE DRAWING

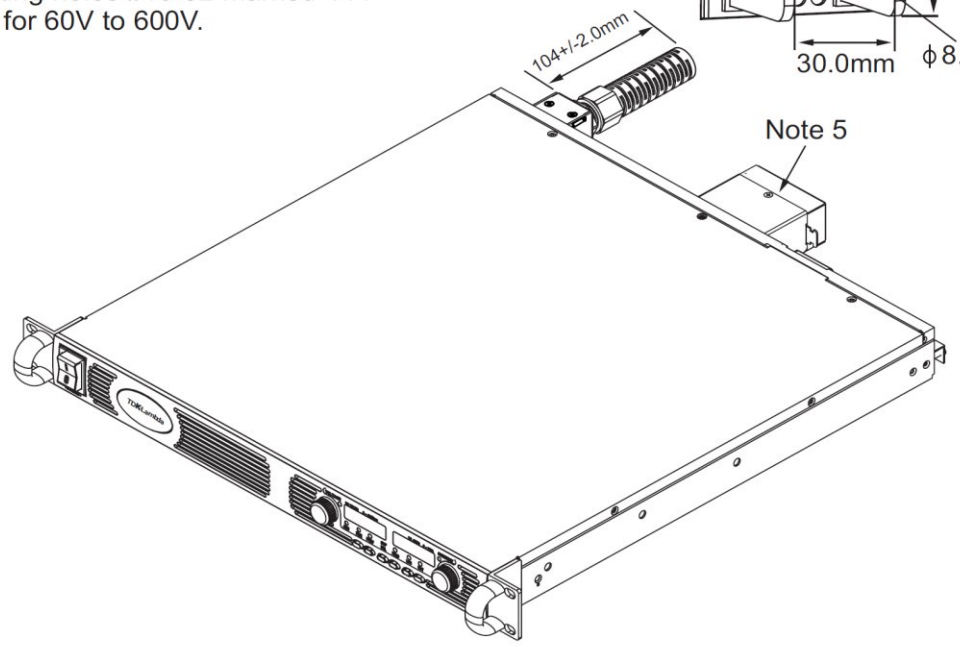


NOTES:

1. Mating plug supplied with power supply.
2. Bus-bars for 8V to 100V models. See detail.
   Wire clamp connector for 150V to 600V models (shown).
3. AC cable strain relief (supplied with power supply).
4. Chassis slides: GENERAL DEVICES P/N: CC3001-00-S160
   or equivalent, mounting holes #10-32 marked "A".
5. Bus Bars enclosure for 60V to 600V.

Note 2
Bus-Bar Detail
8V to 100V Models





CHAPTER 3 INSTALLATION

3.1 GENERAL

This Chapter contains instructions for initial inspection, preparation for use and repackaging for shipment. Connection to PC, setting the communication port and linking Genesys™ power supplies are described in Chapter 7.

WARNING
The Genesys™ series is intended only for installation in Restricted Access Location (RAL). Access to Hazardous parts (rear side of the power supply) shall be prevented after installation.

NOTE
Genesys™ power supplies generate magnetic fields, which might affect the operation of other instruments. If your equipment is susceptible to magnetic fields, do not position it adjacent to the power supply.

WARNING
To avoid electric shock hazard, do not insert conductive parts through the front panel slits.

3.2 PREPARATION FOR USE

In order to be operational the power supply must be connected to an appropriate AC source. The AC source voltage should be within the power supply specification. Do not apply power before reading Section 3.6 and 3.7.

Table 3-1 below, describes the basic setup procedure. Follow the instructions in Table 3-1 in the sequence given to prepare the power supply for use.

Step #	Item	Description	Reference
1	Inspection	Initial physical inspection of the power supply	Section 3.3
2	Installation	Installing the power supply, Ensuring adequate ventilation.	Section 3.4 Section 3.5
3	AC source	AC source requirements Connecting the power supply to the AC source	Section 3.6 Section 3.7
4	Test	Turn-on checkout procedure.	Section 3.8
5	Load connection	Wire size selection. Local/Remote sensing. Single or multiple loads.	Section 3.9
6	Default setting	The power supply setting at shipment.	Section 7.2.1

Table 3-1: Basic Setup Procedure

3.3 INITIAL INSPECTION

Prior to shipment this power supply was inspected and found free of mechanical or electrical defects. Upon unpacking of the power supply, inspect for any damage, which may have occurred in transit.

The inspection should confirm that there is no exterior damage to the power supply such as broken knobs or connectors and that the front panel and meter's faces are not scratched or cracked. Keep all packing material until the inspection has been completed. If damage is detected, file a claim with carrier immediately and notify the TDK Lambda Americas, Inc. Sales or Authorized Service Facility near you.

3.4 RACK MOUNTING

The Genesys™ power supply series is designed to fit in a standard 19" equipment rack.

3.4.1 To Install the Power Supply in a Rack:

1. Use the front panel rack-mount brackets to install the power supply in the rack.
2. Use a support bar to provide adequate support for the rear of the power supply. Do not obstruct the air exhaust at the rear panel of the unit.

3.4.2 Rack-Mount Slides (optional):

CAUTION

Ensure that the screws used to attach the slides to the unit do not penetrate more than 6mm into the sides of the unit.

Use rack mount slides: General Devices Catalog Number: C-300-S-116 (ordering P/N: C-300-S-116-RH-LH) or equivalent to install the unit in a standard 19" equipment rack. Refer to Figure 3-1 for slides assembly instructions. Use three #10-32x0.38" (max.) screws at each side. To prevent internal damage, use the specified screw length only.

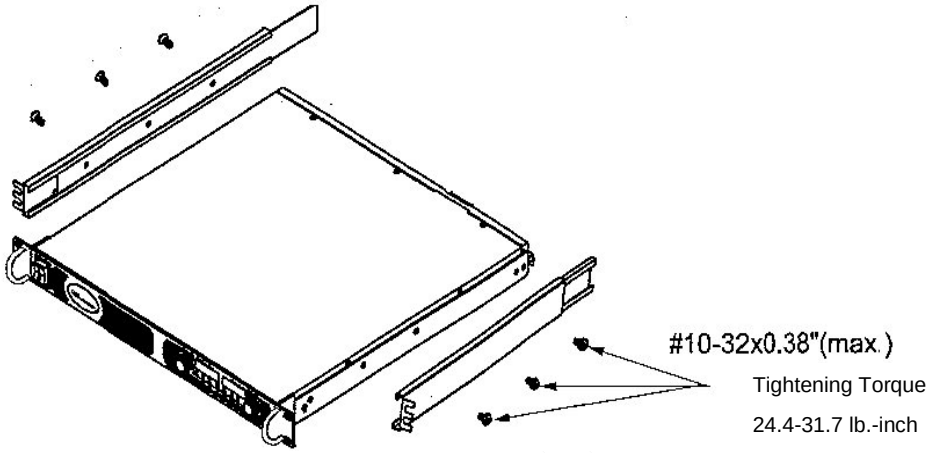


Figure 3-1: Rack-Mount Slides Assembly

3.5 LOCATION, MOUNTING AND COOLING

This power supply is fan cooled. The air intake is at the front panel and the exhaust is at the rear panel. Upon installation, allow cooling air to reach the front panel ventilation inlets. Allow a minimum of 10cm (4 inches) of unrestricted air space at the front and the rear of the unit.
The power supply should be used in an area that the ambient temperature does not exceed +50°C.

3.6 AC SOURCE REQUIREMENTS

The Genesys™ series is designed for use in TN, TT and IT power distribution system. Depending on its input option, the Genesys™ 2400W series can be operated from a nominal 190VAC to 240VAC, single and three-phase, 47~63Hz. The input voltage range and current required for each model is specified in Chapter 2. Ensure that under heavy load, the AC voltage supplied to the power supply does not fall below the specifications described in Chapter 2.

3.7 AC INPUT POWER CONNECTION

CAUTION

Connection of this power supply to an AC power source should be made by an electrician or other qualified personnel

The power supply shall be connected to the AC source via protective device (circuit breaker, fuses, etc.) rated 30A maximum.

WARNING

There is a potential shock hazard if the power supply chassis (with cover in place) is not connected to an electrical safety ground via the safety ground in the AC input connector.

WARNING

Some components inside the power supply are at AC voltage even when the On/Off switch is in the “Off” position. To avoid electric shock hazard, disconnect the line cord and load and wait two minutes before removing cover.

CAUTION

AC Input Wires No Conductor Pretreatment: Phoenix Contact clamping parts are designed so that all kinds of copper conductors can be clamped without pretreatment.

It is forbidden to solder the conductors. The solder tin yields and fractures under high pressure. The result is increased contact resistance and an excessive temperature rise. In addition, corrosion caused by pickling or fluxes has been observed on soldered conductor ends. Notch fractures at the transition point from the rigid to the flexible conductor area are also possible.

The power supply **ON/OFF** switch is not the main disconnect device and does not completely disconnect all the circuits from the AC source.
An appropriately rated disconnect device such as circuit breaker, type B plug on power cord, etc., shall be provided in the final installation. The disconnect device shall comply with UL/IEC 60950-1 requirements and shall be easily accessible.

3.7.1 AC Input Connector

The AC input connector is 4-terminal wire clamp (Phoenix-Contact P/N: FRONT4-H-7.62/4) located on the rear panel.

Use suitable wires and tightening torque as follows:

1. Wire diameter: 12AWG or 10AWG.
2. Tightening torque: 4.4-5.3Lb-inch. (0.5-0.6Nm).

3.7.2 AC Input Cord

WARNING

The AC input cord is not provided with power supply.

Refer to Section 1.3.4 for details of the recommended AC input cords and to Section 3.7 for disconnected device requirement.

3.7.3 AC Input Wire Connection

1. Strip the outside insulation of the AC cable approx. 10cm (3.94 inches). Trim the wires so that the ground wire is 10mm (0.4 inches) longer than the other wires. Strip 10mm (0.4 inches) at the end of each of the wires.

2. Unscrew the base of the strain relief from the helix-shaped body. Insert the base through the outside opening in the AC input cover and screw the locknut securely (11-14 lb-inch/1.24-1.58Nm) into the base, from the inside.

3. Slide the helix-shaped body onto the AC cable. Insert the stripped wires through the strain relief base until the outer cable jacket is flush with the edge of the base. Tighten (16-18 lb-inch/1.81 – 2.03Nm) the body to the base while holding the cable in place. Now the cable is securely fastened inside the strain relief. Refer to Figure 3-2.

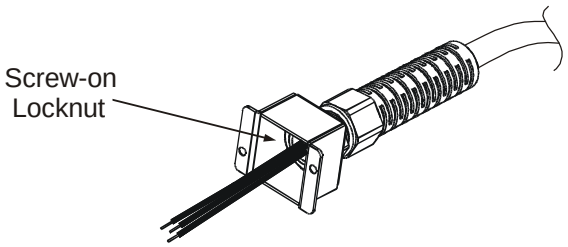


Figure 3-2: Stripped Wires installed in Strain Relief

4. Route the AC wires to the input connector terminals as required. To connect the wires, loosen the terminal screw, insert the stripped wire into the terminal and tighten the screw securely (4.4~5.3 lb-inch/0.50 – 0.60 Nm).
5. Route the wires inside the cover to prevent pinching. Fasten the cover to the unit using the M3x8 flat head screws which are provided. Strain relief cover could be opened for inspection. Refer to Figure 3-3 for details.

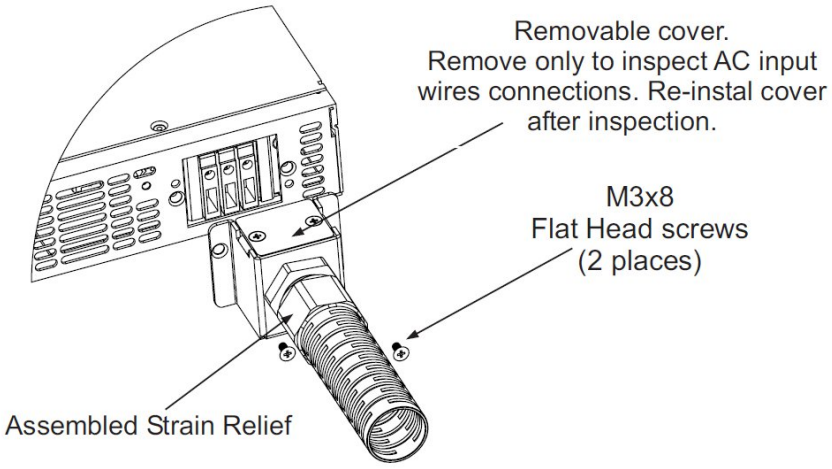


Figure 3-3: AC Input Cover and Strain Relief, 2400W models

3.8 TURN-ON CHECKOUT PROCEDURE

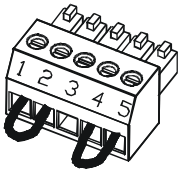
3.8.1 General

The following procedure ensures that the power supply is operational and may be used as a basic incoming inspection check. Refer to Figure 4-1 and Figure 4-2 for the location of the controls indicated in the procedure.

3.8.2 Prior to Operation

1. Ensure that the power supply is configured to the default setting:
   - Front panel AC On/Off switch at the **OFF** position.
   - SW1 DIP-switch: All positions at the **DOWN** ("Off") position.
   - J2 Sense connector: Configured to Local Sense as shown in Figure 3-4:

1. Remote (+) sense
2. Local (+) sense
3. Not Connected
4. Local (-) sense
5. Remote (-) sense



Plug P/N: MC1.5/5-ST-3.81
(Phoenix)

Figure 3-4: Sense Connector, Default Connection

   - For units equipped with the LAN (or IEEE option), ensure that the LAN_En (or IEEE_En) switch is in the **UP** position (refer to Figure 4-2, Item 8 for location). For units with the USB option, ensure that the USB_En switch is in the **DOWN** position.

2. Connect the unit to an AC source as described in Section 3.7.
3. Connect a DVM with appropriate cables for the rated voltage to the output terminals.
4. Press the front panel AC power switch to the **ON** position.

3.8.3 Constant-Voltage Check

1. Turn on the output by pressing the **OUT** pushbutton so the **OUT** LED illuminates.
2. Observe the power supply **VOLTAGE** meter and rotate the **VOLTAGE** encoder. Ensure that the Output voltage varies while the **VOLTAGE** encoder is rotated. The minimum control range is from zero to the maximum rated Output (voltage/current) for the power supply model.

NOTE
The Output current **PREV**iew setting must be greater than zero for the power supply to generate an Output voltage.

3. Compare the DVM reading with the front panel **VOLTAGE** meter reading to verify the accuracy of the **VOLTAGE meter**. Ensure that the front panel **VOLT** LED is illuminated.
4. Press the front panel AC power switch to the OFF position.

3.8.4 Constant-Current Check

1. Ensure that the front panel AC power switch is at the **OFF** position and the DVM connected across the output terminals measures zero Output voltage.
2. Connect a DC shunt across the power supply output terminals. Ensure that the shunt and the wire current ratings are higher than the power supply Output current rating. Connect a DVM across the shunt.
3. Press the front panel AC power switch to the **ON** position,
4. Turn on the output by pressing the **OUT** button so the **OUT** LED illuminates.
5. Observe the power supply **CURRENT** meter and rotate the **CURRENT** encoder. Ensure that the Output current varies while the **CURRENT** encoder is rotated. The minimum control range is from zero to the maximum rated Output current for the power supply model.

NOTE
The Output voltage **PREV**iew setting must be greater than zero for the power supply to generate an Output current.

6. Compare the DVM reading with the front panel **CURRENT** meter reading to verify the accuracy of the **CURRENT** meter. Ensure that the front panel **CURRENT** LED is illuminated.
7. Press the front panel AC power switch to the **OFF** position.
8. Remove the shunt from across the power supply output terminals.

3.8.5 OVP Check

Refer to Section 5.3 for explanation of the **OVP** function prior to performing the procedure below.

1. Turn the front panel AC power switch to the **ON** position and turn on the output by pressing the **OUT** button.
2. Using the **VOLTAGE** encoder, adjust the Output voltage to approximately 10% of the unit Output voltage rating.
3. Momentarily press the **OVP/UVL** button so that the **CURRENT** meter displays "**OUP**". The **VOLTAGE** meter will display the last **OVP** setting.
4. Rotate the **VOLTAGE** encoder CCW to adjust the OVP setting to 50% of the unit Output voltage rating.
5. Wait a few seconds until the **VOLTAGE** meter returns to display the Output voltage.
6. Adjust the Output voltage toward its maximum and check that the Output voltage cannot be increased more than the **OVP** setting.
7. Adjust the **OVP** limit to its maximum value by repeating Step 3 and rotating the **VOLTAGE** encoder CW.

3.8.6 UVL Check

Refer to Section 5.4 for explanation of the **UVL** function prior to performing the procedure below.

1. Press the **OVP/UVL** button TWICE so that the **CURRENT** meter displays "**UUL**". The **VOLTAGE** meter will display the last setting of the UVL level.
2. Rotate the **VOLTAGE** encoder to adjust the **UVL** level to approximately 10% of the unit Output voltage rating.

3. Wait a few seconds until the **VOLTAGE** meter returns to display the Output voltage.
4. Adjust the Output voltage toward its minimum value and check that the Output voltage cannot be decreased below the **UVL** setting.
5. Adjust the **UVL** limit to the minimum by repeating Step 1 and rotating the **VOLTAGE** encoder CCW.

3.8.7 Foldback Check

WARNING
Shorting the output may expose the user to hazardous voltages.
Observe proper safety procedures.

Refer to Section 5.5 for explanation of the **FOLD** function prior to performing the procedure below.

1. Ensure that the Output Voltage is set to approxiamtely 10% of the unit Output voltage rating.
2. Adjust the **CURRENT** encoder to set the current limit to approximately 10% of the unit Output current rating.
3. Momentarily press the **FOLD** button. Ensure that the **FOLD** LED illuminates. The Output voltage remains unchanged.

4. Momentarily place a short-circuit across the the Output terminals (approximately 0.5 seconds). Ensure that the Output Voltage falls to zero, the **VOLTAGE** meter displays "**Fb**" and the **ALARM** LED blinks.
5. Press the **FOLD** button again to cancel the **FOLD**back protection. The Output voltage should still remain at zero.
6. Press the **OUT** button. Ensure that the Output voltage returns to its last setting.
7. Turn the output off by pressing the **OUT** button. Ensure that the **VOLTAGE** meter displays "**OFF**".

3.8.8 Address Setting

1. Press and hold the **REM/LOC** button for approximately 3 seconds. The **VOLTAGE** meter will display the communication port address.
2. Using the **VOLTAGE** adjust encoder; check that the unit address can be set within the range of 0 to 30.

3.8.9 Baud Rate Setting (RS-232 and RS-485 only)

1. Press and hold the **REM/LOC** button for approximately 3 seconds. The **CURRENT** display will show the communication port Baud rate.
2. Using the **CURRENT** adjust encoder, check that the Baud rate can be set to 1200, 2400, 4800, 9600 and 19200.

3.9 CONNECTING THE LOAD

WARNING
Turn Off the AC input power before making or changing any rear panel connection. Ensure that all connections are securely tightened before applying power. There is a potential shock hazard when using a power supply with a rated Output voltage greater than 40V.

3.9.1 Load Wiring

The following considerations should be made to select wiring for connecting the load to the power supply:

Current carrying capacity of the wire (refer to Section 3.9.2)
Insulation rating of the wire should be at least equivalent to the maximum Output voltage of the power supply.
Maximum wire length and voltage drop (refer to Section 3.9.2)
Noise and impedance effects of the load wiring (refer to Section 3.9.4).

3.9.2 Current Carrying Capacity

Two factors must be considered when selecting the wire size:

1. Wires should be **at least** heavy enough not to overheat while carrying the power supply load current at the rated load, or the current that would flow in the event the load wires were shorted, whichever is greater.

2. Wire size should be selected to enable voltage drop per lead to be less than 1.0V at the rated Output current. Although units will compensate for up to 5V in each load wire, it is recommended to minimize the voltage drop (1V typical maximum) to prevent excessive output power consumption from the power supply and poor dynamic response to load changes. Please refer to Tables 3-2 and 3-3 for maximum wire length (to limit voltage drop) in American and European dimensions respectively.

Wire size (AWG)	Resistivity (Ohms/1000ft)	Maximum Length in feet to Limit Voltage Drop to 1V or less					
		10A	20A	50A	100A	200A	400A
14	2.526	40	20	8	4	2	---
12	1.589	60	30	12	6	3	---
10	0.9994	100	50	20	10	5	2
8	0.6285	160	80	32	15	8	4
6	0.3953	250	125	50	25	12	6
4	0.2486	400	200	80	40	20	10
2	0.1564	600	300	125	60	30	15
0	0.0983	1000	500	200	100	50	25

Table 3-2: Maximum Wire Length for 1V Drop Across Lead (in feet)

Cross Sect. area (mm^2)	Resistivity Ohms/km	Maximum length in meters to limit voltage drop to 1V or less					
		10A	20A	50A	100A	200A	400A
2.5	8.21	12.0	6.0	2.4	1.2	0.6	0.3
4	5.09	18.6	9.8	4.0	2	1.0	0.5
6	3.39	29.4	14.8	5.8	2.9	1.45	0.7
10	1.95	51.2	25.6	10.2	5.1	2.5	1.25
16	1.24	80.0	40.0	16.0	8	4	2
25	0.795	125.0	62.0	25.2	12.6	6.3	3.1
35	0.565	177.0	88.0	35.4	17.7	8.8	4.4

Table 3-3: Maximum Wire Length for 1V Drop Across Lead (in meters)

For currents not shown in Table 3-2 and 3-3, use the formula:
Maximum length = 1000/(current x resistivity)
where current is expressed in Amperes and resistivity in ohms/km or ohms/1000ft.

3.9.3 Wire Termination

The wires should be properly terminated with terminals securely attached. **DO NOT** use unterminated wires for load connection at the power supply.

CAUTION

When local sensing, a short from **"+LS** or **+S"** to " **–V** or **–S** or **–LS**" (or "**–LS** or **–S**" to "**+V** or **+S** or **+LS**"), will cause damage to the power supply. Reversing the sense wires might cause damage to the power supply in local and remote sensing. (Do not connect **"–S" to +V" or "+S to –V"**).

3.9.4 Noise and Impedance Effects

To minimize the noise pickup or radiation, the load wires and remote sense wires should be twisted pairs to the shortest possible length. Shielding of sense leads may be necessary in high noise environments. Where shielding is used, connect the shield to the chassis via a rear panel Ground screw. Even if noise is not a concern, the load and remote sense wires should be twisted-pairs to reduce coupling, which might impact the stability of the power supply. The sense leads should be separated from the power leads.

Twisting the load wires reduces the parasitic inductance of the cable, which could produce high frequency voltage spikes at the load and the output of the power supply, because of current variation in the load itself.
The impedance introduced between the power supply output and the load could make the ripple and noise at the load worse than the noise at the power supply rear panel output. Additional filtering with bypass capacitors at the load terminals may be required to bypass the high frequency load current.

3.9.5 Inductive Loads

Inductive loads can produce voltage spikes that may be harmful to the power supply. A diode should be connected across the output. The diode voltage and current rating should be greater than the power supply maximum Output voltage and Output current rating. Connect the cathode to the positive output and the anode to the negative output of the power supply.
Where positive load transients such as back EMF from a motor may occur, connect a surge suppressor across the output to protect the power supply. The breakdown voltage rating of the suppressor must be approximately 10% higher than the maximum Output voltage of the power supply.

3.9.6 Making the Load Connections

WARNING

Hazardous voltages may exist at the outputs and the load connections when using a power supply with a rated Output voltage greater than 40V. To protect personnel against accidental contact with hazardous voltages, ensure that the load and its connections have no accessible live parts. Ensure that the load wiring insulation rating is greater than or equal to the maximum Output voltage of the power supply.

CAUTION

Ensure that the load wiring mounting hardware does not short the output terminals. Heavy connecting cables must have some form of strain relief to prevent loosening the connections or bending the bus-bars.

8V to 100V Models

Refer to Figure 3-5 for connection of the load wires to the power supply busbars and to Figure 3-6 for mounting the busbars shield to the chassis.

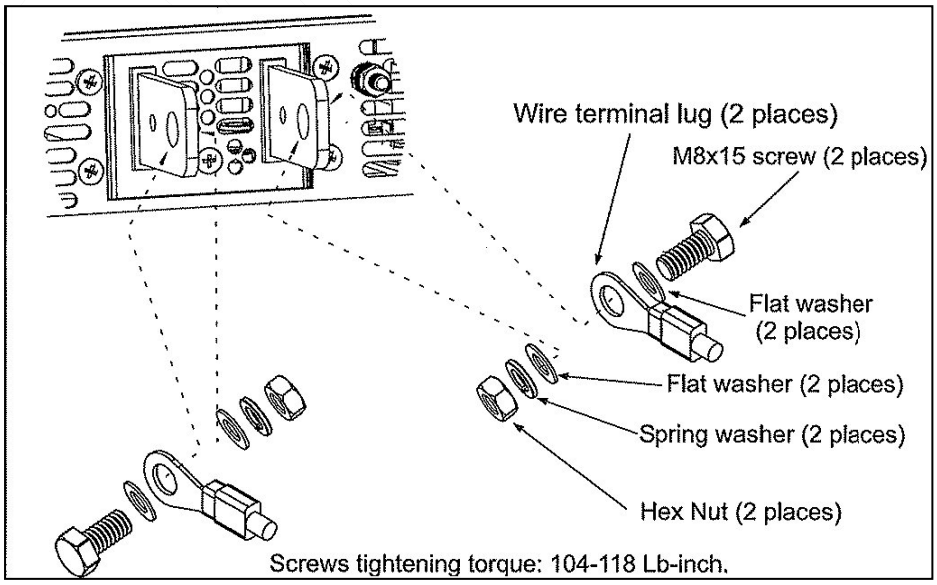


Figure 3-5: Load Wires Connection, 8V to 100V Models

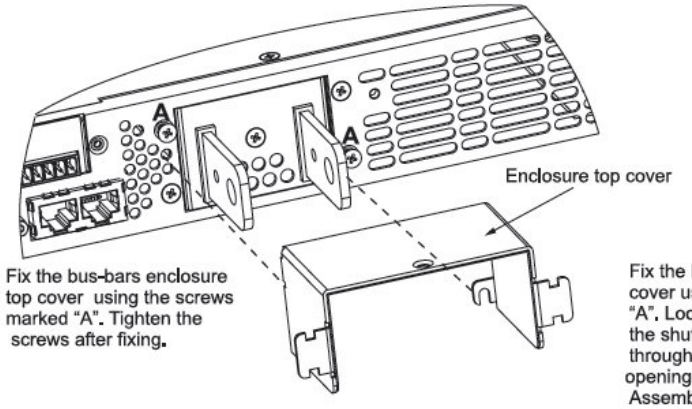


Fig. 3-6 Bus-bars cover 6V to 50V

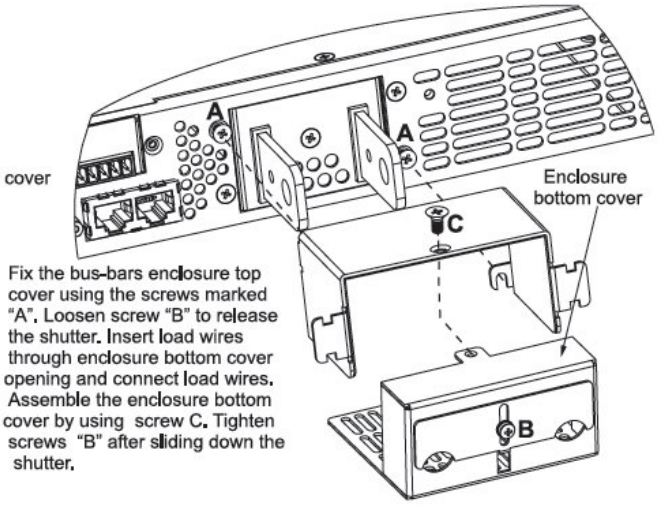


Fig. 3-7 Bus-bars enclosure 60V
(Refer to Fig.3-8, 3-9 for installation instructions.)

150V to 600V Models

WARNING

Hazardous voltages may exist at the outputs and the load connections when using a power supply with a rated Output voltage greater than 40V. To protect personnel against accidental contact with hazardous voltages, ensure that the load and its connections have no accessible live parts. Ensure that the load wiring insulation rating is greater than or equal to the maximum Output voltage of the power supply.

CAUTION

Output Load Wires No Conductors Pretreament: Phoenix contact clamping parts are designed so that all kinds of copper conductors can be clamped without pretreatment.
It is forbidden to solder to conductors. The solder tin yields and fractures under high pressure. The result is increased contact resistance and excessive temperature rise. In addition corrosion caused by pickling or fluxes has been observed on soldered conductor ends. Notch fractures at the transition point from the rigid to the flexible conductor area are also possible.

The 150V to 600V models have a four terminal wire clamp output connector. The two left terminals are the positive outputs and the two right terminals are the negative outputs (maximum 30A per terminal). The connector requirements are as follows:

1. Wires: AWG18 to AWG10.
2. Tightening torque: 4.4 - 5.3 Lb-inch. (0.5 - 0.6Nm).

Follow the instructions below for connection of the load wires to the power supply:

1. Strip approximately 10mm (4 inches) at the end of each of the load wires.
2. Loosen the connector terminal screws.
3. Loosen screw marked "**B**" from the enclosure bottom cover to release the shutter.
4. Insert stripped wires into the enclosure bottom cover opening and then to the terminals. Then tighten the terminals screws securely (see Figure 3-8).

5. Loosen the two chassis screws marked "**A**" halfway.
6. Assemble the enclosure top cover to the chassis and tighten the screws marked "**A**" (Tightening torque: 4.8 - 5.3 Lb-inch (0.5 - 0.6Nm)).

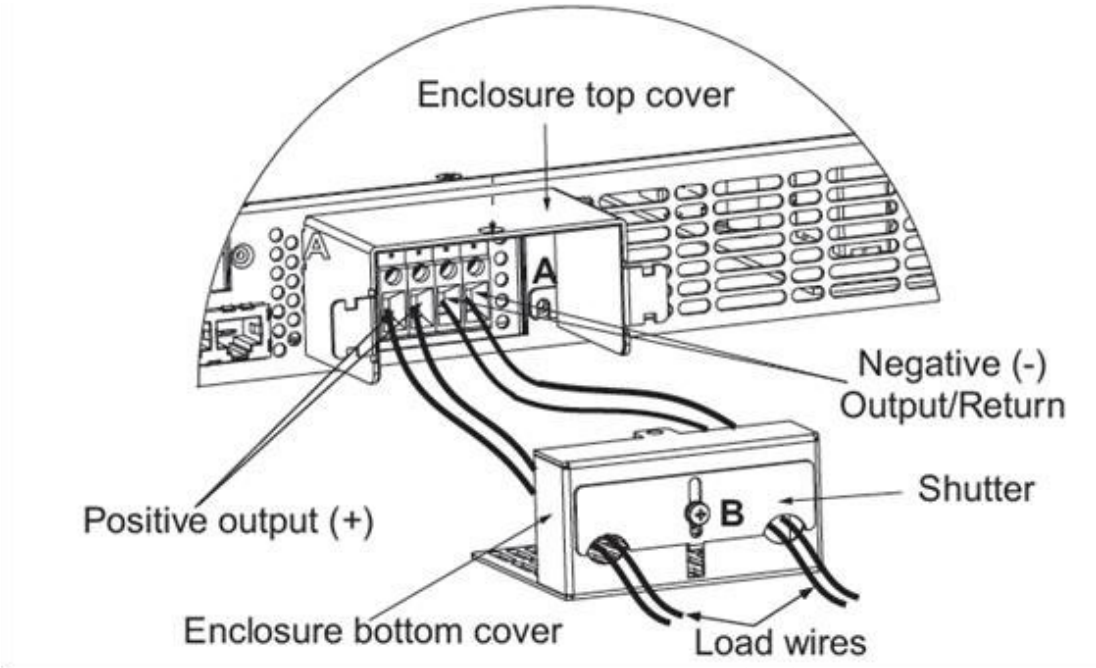


Figure 3-8 Load Wires Connection to the Output Connector

7. Assemble the enclosure bottom cover to it's place, as shown in Figure 3-9,using the screw marked "**C**", (Tightening torque 4.8-5.3 Lb-inch (0.5 – 0.6Nm)).
8. Slide down the shutter to secure load wires in place, and tighten the screw marked "**B**".

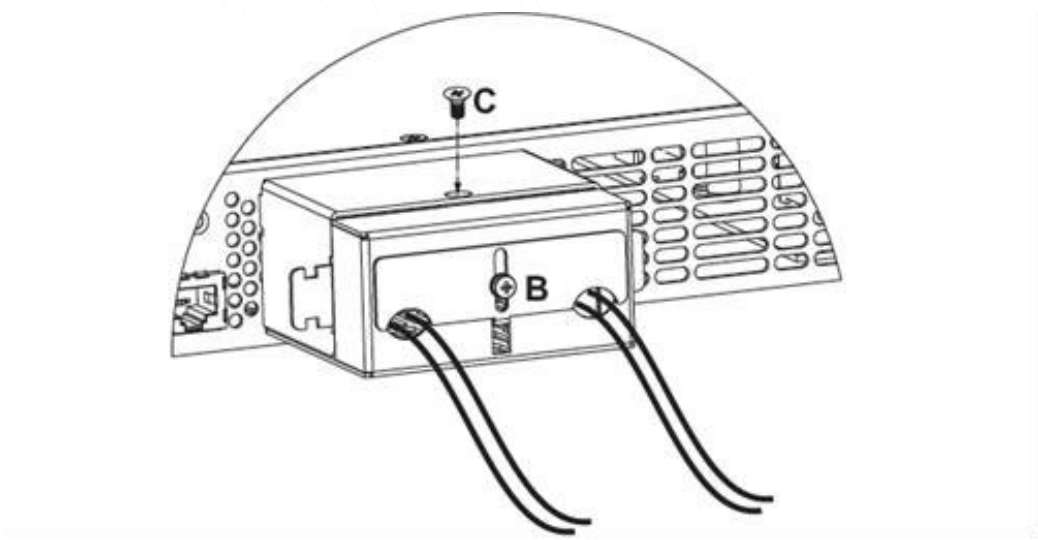


Figure 3-9: Shield Assembly

3.9.7 Connecting Single Loads, Local Sensing (default configuration).

Figure 3-10 shows recommended load and sensing connections for a single load. The local sense lines shown are default connections at the rear panel J2 sense connector. Local sensing is suitable for applications where load regulation is less critical.

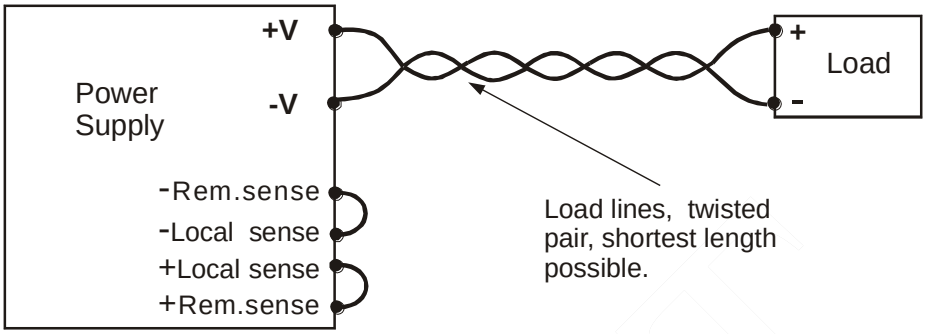


Figure 3-10: Single Load Connection, Local Sensing

3.9.8 Connecting Single Loads, Remote Sensing

Figure 3-11 shows recommended remote sensing connection for single loads. Remote sensing is used when, in Constant-Voltage mode, the load regulation is important at the load terminals. Use twisted or shielded wires to minimize noise pick-up. If shielded wires are used, the shield should be connected to the ground at one point, either at the power supply chassis or the load ground. The optimal point for the shield ground should be determined by experimentation.

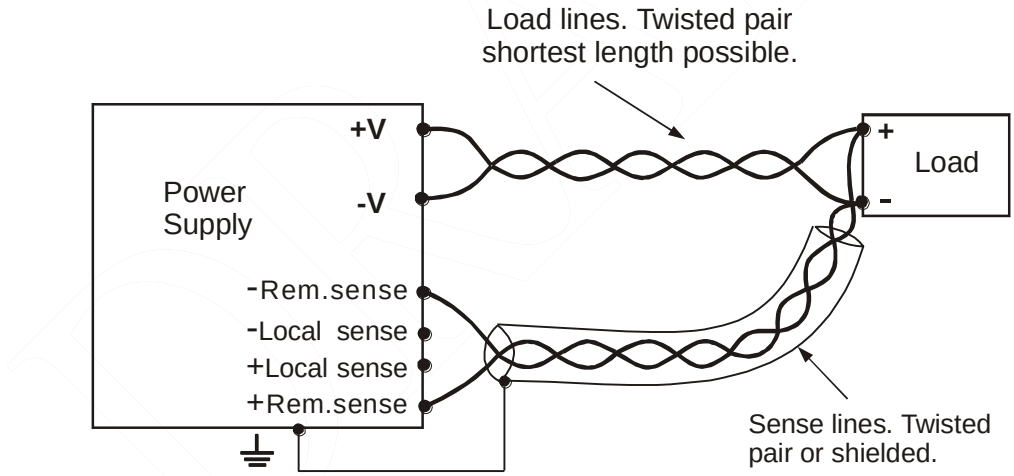


Figure 3-11: Remote Sensing, Single Load

3.9.9 Connecting Multiple Loads, Radial Distribution Method

Figure.3-12 shows multiple loads connected to one supply. Each load should be connected to the power supply's output terminals using separate pairs of wires. It is recommended that each pair of wires will be as short as possible and twisted or shielded to minimize noise pick-up and radiation. The sense wires should be connected to the power supply output terminals or to the load with the most critical load regulation requirement.

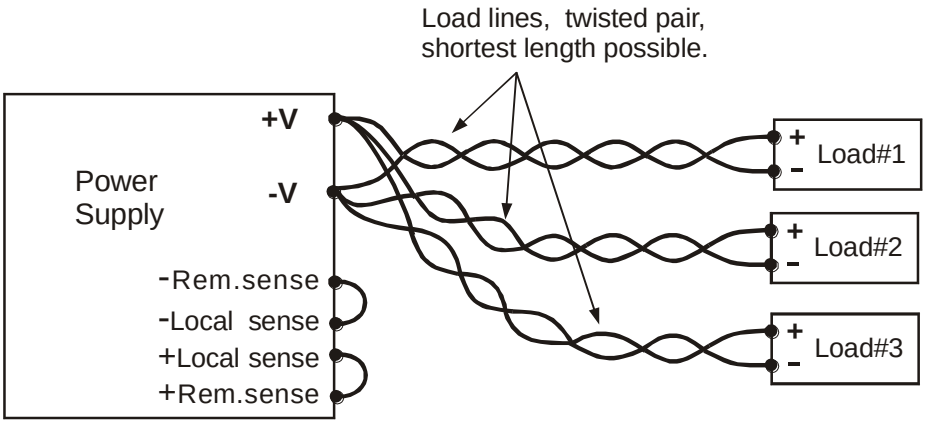


Figure 3-12: Multiple Loads Connection, Radial Distribution, Local Sense

3.9.10 Multiple Load Connection with Distribution Terminals

If remotely located output distribution terminals are used, the power supply output terminals should be connected to the distribution terminals by a pair of twisted and/or shielded wires. Each load should be separately connected to the remote distribution terminals (see Figure 3-13).
If remote sensing is required, the sensing wires should be connected to the distribution terminals or at the most critical load.

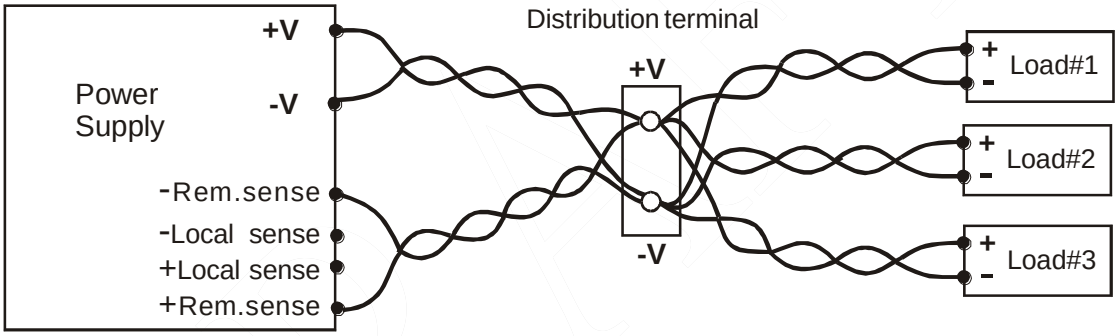


Figure 3-13: Multiple Load Connection with Distribution Terminal

3.9.11 Grounding Outputs

Either the positive or negative output terminals can be grounded. To avoid noise problems caused by common-mode current flowing from the load to ground, it is recommended to ground the output terminal as close as possible to the power supply chassis ground.
Always use two wires to connect the load to the power supply regardless of how the system is grounded.

WARNING
Models up to 60VDC Rated Output voltage shall not float outputs more than +/-60VDC above/below chassis ground. Models with > 60VDC Rated Output voltage shall not float outputs more than +/-600VDC above/below chassis ground.

WARNING

OUTPUT TERMINAL GROUNDING

There is a potential shock hazard at the RS-232/RS-485 and the LAN/IEEE/USB ports when using power supplies with rated or combined voltage greater than 400V with the Positive Output of the power supplies grounded. **Do not** connect the Positive output to ground when using the RS-232/RS-485 or LAN/IEEE/USB port under the above conditions.

3.10 LOCAL AND REMOTE SENSING

The rear panel J2 sense connector is used to configure the power supply for local or remote sensing of the Output voltage. Refer to Figure 3-14 for sense connector location.

3.10.1 Sense Wiring

WARNING

There is a potential shock hazard at the sense connector when using a power supply with a rated Output voltage greater than 40V. Local sense and remote sense wires should have a minimum insulation rating equivalent or greater than the maximum Output voltage of the power supply. Ensure that the connections at the load end are shielded to prevent accidental contact with hazardous voltages.

3.10.2 Local Sensing

The power supply is shipped with the rear panel J2 sense connector wired for local sensing of the Output voltage. See Table 3-4 for the J2 terminals assignments. With local sensing, the Output voltage regulation is made at the output terminals. This method does not compensate for voltage drop across the load wires, therefore it is recommended only for low load current applications or where the load regulation is less critical.

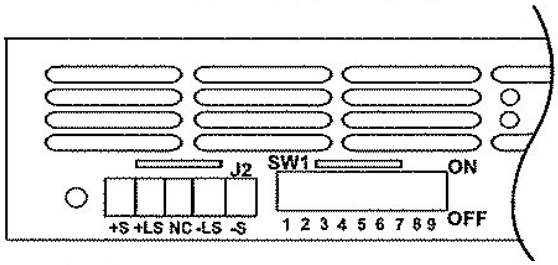


Figure 3-14: Sense Connector Location

Terminal	Function
J2-1	Remote positive sense (**+S**).
J2-2	Local positive sense. Connected internally to the positive output terminal (**+LS**).
J2-3	Not connected (NC).
J2-4	Local negative sense. Connected internally to the negative output terminal (**–LS**).
J2-5	Remote negative sense (**–S**).

Table 3-4: J2 Terminals

3.10.3 Remote Sensing

WARNING

There is a potential shock hazard at the J2 sense point when using a power supply with a rated Output voltage greater than 40V. Ensure that the connections at the load end are shielded to prevent accidental contact with hazardous voltages.

CAUTION

When using shielded sense wires, ground the shield in one place only. The location can be the power supply chassis or one of the output terminals.

Use remote sense where the load regulation at the load end is critical. In remote sense, the power supply will compensate for voltage drop across the load wires. Refer to the power supply specifications for the maximum voltage drop across the load wires. The voltage drop is subtracted from the total voltage available at the output.

Follow the instructions below to configure the power supply for remote sensing:

1. Ensure that the Power Supply AC ON/OFF switch is in the OFF position.
2. Remove the local sense jumpers from the J2 mating connector.
3. Connect the negative sense lead to terminal J2-5 (-S) and the positive sense lead to terminal J2-1 (+S) of the J2 mating connector. Ensure that the J2 mating connector is plugged securely into the rear panel J2 sense connector.
4. Press the Power Supply AC ON/OFF switch to the ON position.

Notes:

1. If the power supply is operating using remote sense and either the positive or negative load wire is not connected, an internal protection circuit will activate and shut down the power supply. To resume operation, press the AC ON/OFF switch to the OFF position, connect the open load wire, and then turn On the power supply.
2. If the power supply is operated without the remote sense lines or local sense jumpers, it will continue to work, but the output voltage regulation will be degraded. Also, the **OVP** circuit may activate and shut down the power supply.

3.10.4 J2 Sense Connector Technical Information

- J2 connector type: MC 1.5/5-G-3.81, Phoenix.
- Plug type: MC 1.5/5-ST-3.81, Phoenix.
- Wire AWG; 28 up to 16.
- Stripping length: 7mm.
- Tightening torque: 1.95 - 2.21Lb-Inch. (0.22 - 0.25Nm)

3.11 REPACKAGING FOR SHIPMENT

To ensure safe transportation of the instrument, contact the TDK Lambda Americas Inc Sales or Service facility near you for Return Authorization and shipping information. Please attach a tag to the power supply describing the problem and specifying the owner, model number and serial number of the power supply. Refer to Warranty Information for further instructions.

CHAPTER 4 FRONT AND REAR PANEL CONTROLS AND CONNECTORS

4.1 INTRODUCTION

The Genesys™ Power Supply series has a full set of controls, indicators and connectors that allow the user to easily setup and operate the unit. Before starting to operate the unit, please read the following Sections for explanation of the function of the controls and connector terminals.

-Section 4.2: Front Panel Controls and Indicators.

-Section 4.3: Rear Panel Controls and Connectors.

4.2 FRONT PANEL CONTROLS AND INDICATORS

See Figure4-1 to review the controls, indicators and meters located on the power supply front panel.

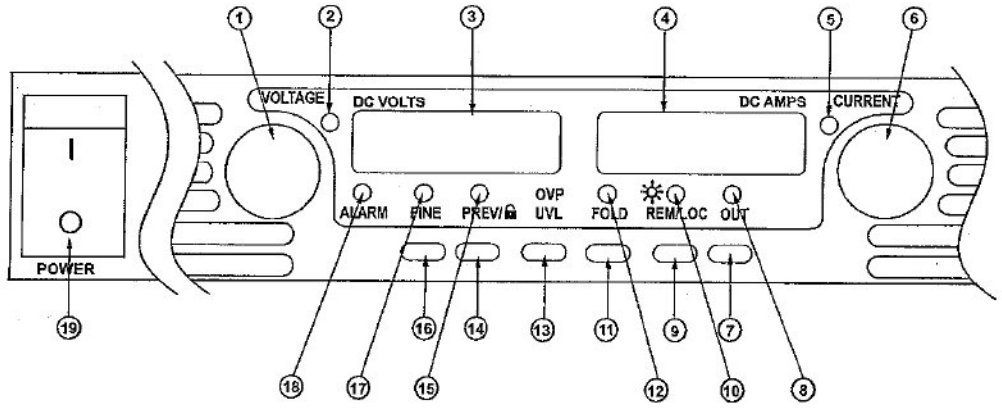


Figure 4-1: Front Panel Controls and Indicators

Table 4-1: Front Panel Controls and Indicators

Number	Control/Indicator	Description	Section
1	**VOLTAGE** control	High resolution rotary encoder for adjusting the Output voltage. Also adjusts the **OVP/UVL** levels and selects the unit Address (for digital communication).	**5.2.1** **5.3.1** **5.4.1** **7.2.2**
2	**VOLTAGE** indicator	Green **LED**, lights for Constant-Voltage mode operation.	
3	**VOLTAGE** display	4 digit, 7-segment **LED** display. Normally displays the Output voltage. When the **PREV** button is pressed, the **VOLTAGE** display indicates the programmed setting of the Output voltage. When the **OVP/UVL** button is pressed, the **VOLTAGE** display indicates the **OVP/UVL** setting.	
4	**CURRENT** display	4 digit, 7 segment LED display. Normally displays the output Current. When the PREV button is pressed, the display indicates the programmed setting of Output Current.	
5	**CURRENT** indicator	Green **LED**, lights for Constant-Current mode operation	
6	**CURRENT** control	High resolution rotary encoder for adjusting the Output current. Also selects the Baud-Rate of the serial (RS-232/RS-485) communication port.	**5.2.2** **7.2.4**

Table 4-1: **Front Panel Controls and Indicators (continued)**

Number	Control/Indicator	Description	Section
7	**OUT** button	**Main function:** Output **ON/OFF** control. Press **OUT** to set the output ON or OFF. Press **OUT** to turn On the output after **OVP** or **FOLD** alarm events have occurred. **Auxiliary function:** Selects between "**Safe-Start**" and "**Auto-Restart**" modes. Press and hold **OUT** button to toggle between "**Safe-Start**" and "**Auto-Restart**". The **VOLTAGE** display will cycle between "**SAF**" and "**AU7**". Releasing the **OUT** button while one of the modes is displayed, selects that mode.	**5.6** **5.11**
8	**OUT** indicator	Green **LED**, illuminates when the DC output is enabled.	
9	**REM/LOC** button	**Main function**: Go to Local mode. Press **REM/LOC** to put the unit into Local mode (**REM/LOC** button is disabled at Local Lockout mode). **Auxiliary function:** Address and Baud Rate setting. Press and hold **REM/LOC** for 3 seconds to set the unit Address with the **VOLTAGE** encoder and the Baud Rate with the **CURRENT** encoder.	**7.2.5** **7.2.2** **7.2.4**
10	**REM/LOC** indicator	Green **LED**, lights when the unit is in Remote mode.	
11	**FOLD** button	**FOLD**back protection control. - Press **FOLD** to set Foldback protection to **ON**. - To release **FOLD**back alarm event, press **OUT** to enable the output and re-arm the **FOLD**back protection. - Press **FOLD** again to cancel the **FOLD**back protection.	**5.5**
12	**FOLD** indicator	Green **LED**, lights when **FOLD**back protection is **ON**.	
13	**OVP/UVL** button	Over Voltage Protection and Under Voltage Limit setting. - Press once to set **OVP** using **VOLTAGE** encoder (the current display shows "**OUP**") - Press again to set the **UVL** using **VOLTAGE** encoder (the current display shows "**UUL**").	**5.3** **5.4**
14	**PREV**/ 🔒 button	**Main function:** Press **PREV** to display the Output voltage and Output current limit setting. For 5 seconds the display will show the **PREV**iew settings and then it will return to show the actual Output voltage and Output current. **Auxiliary function:** Front Panel Lock. Press and hold **PREV** button to toggle between "Locked Front Panel" and "Unlocked Front Panel". The display will cycle between "**LFP**" and "**UFP**". Releasing the **PREV**iew button while one of the modes is displayed selects that mode.	**5.17**
15	**PREV** indicator	Green **LED**, lights when the **PREV**iew button is pressed	
16	**FINE** button	Voltage and Current Fine/Coarse adjustment control. Operates as a toggle switch. In **FINE** mode, the **VOLTAGE** and **CURRENT** encoders operate with high resolution and in **COARSE** mode with lower resolution (approximately 6 turns). **Auxiliary function:** Advanced Parallel Operation Mode Setting.	**5.15.2**
17	**FINE** indicator	Green **LED**, lights when the unit is in **FINE** mode.	
18	**ALARM** indicator	Red **LED**, blinks in case of fault detection. **OVP**, **OTP**. **FOLD**back, Enable and AC fail detection will cause the **ALARM LED** to blink.	
19	AC Power switch	AC **ON/OFF** control.	

4.3 REAR PANEL

See Figure 4-2 to review the connections and controls located on the power supply rear panel. Refer to Table 4-2 for explanations about the rear panel connections and controls.

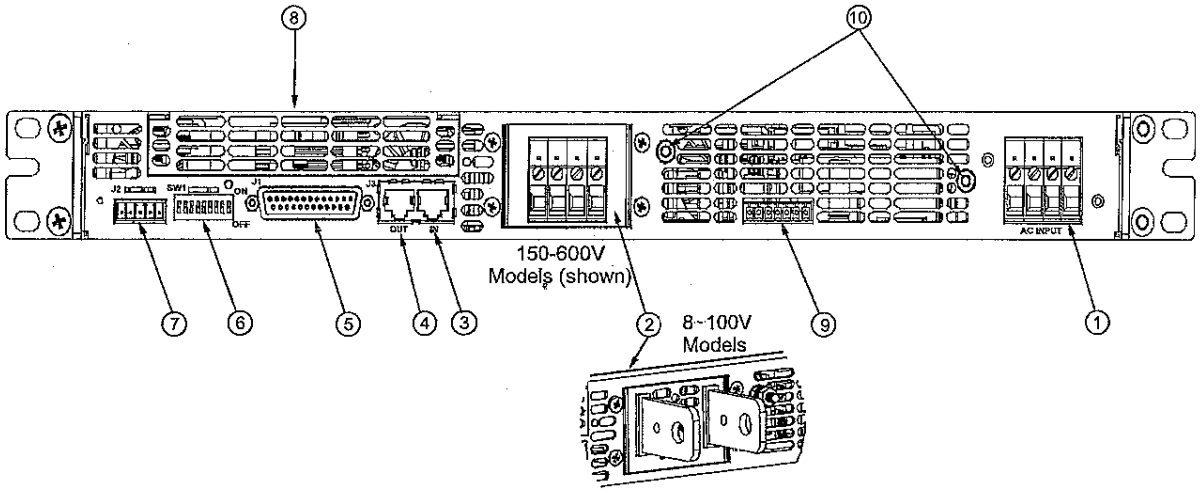


Figure 4-2: Rear Panel Connections and Controls

Table 4-2: Rear Panel Connections and Controls

Number	Item	Description	Section
1	AC input connector	Header with a screw plug connector (Phoenix Contact P/N PC6-16/4-GF-10,16)	**3.7**
2	DC output	Bus-bars for 8V to 100V models. Wire clamp connector for 150V to 600V models (shown in Figure 4-2).	**3.9.6**
3	Remote-In connector	RJ-45 type connector, used for connecting power supplies to RS-232 or RS-485 port of computer for remote control purposes. When using several power supplies in a power system, the first unit Remote-In is connected to the computer and the remaining units are daisy-chained, Remote-In to Remote-Out.	**7.3** **7.4**
4	Remote Out connector	RJ-45 type connector, used for daisy-chaining power supplies to form a serial communication bus.	**7.3** **7.4**
5	Programming and Monitoring connector	Connector for Remote Analog interface. Includes Output voltage and Output current limit programming and monitoring signals, Shut-off (**SO**) control (electrical signal), Enable/Disable control (dry-contact), Power Supply OK (**PS_OK**) signal and operation mode (**CV/CC**) signal.	**4.5**
6	SW1 Setup switch	Nine position DIP-switch for selecting Remote Programming and Monitoring modes for Output voltage, Output current and other control functions.	**4.4** **4.4.1** **4.4.2**
7	Remote Sense connector	Connector for making remote sensing connections to the load for regulation of the load voltage and compensation of load wire voltage drop.	**3.8.2** **3.10.2** **3.10.3**
8	Blank Sub-plate	Blank sub-plate for standard units (shown). **LAN** connector for LAN Interface option, **IEEE** connector for IEEE option, **USB** for USB Interface option and **Isolated Analog** connector for Isolated Analog Interface option.	
9	Auxiliary Power	Auxiliary power supply	**4.3.1**
10	Ground Stud	M4 stud and hardware for chassis ground connection.	

4.3.1 Auxiliary Power Supply

There are two Auxiliary Outputs provided:

- **+5VDC Output**: maximum Output current is 0.2ADC
- **+15VDC Output**: maximum Output current is 0.2ADC

Both Auxiliary outputs are considered a limited power source.

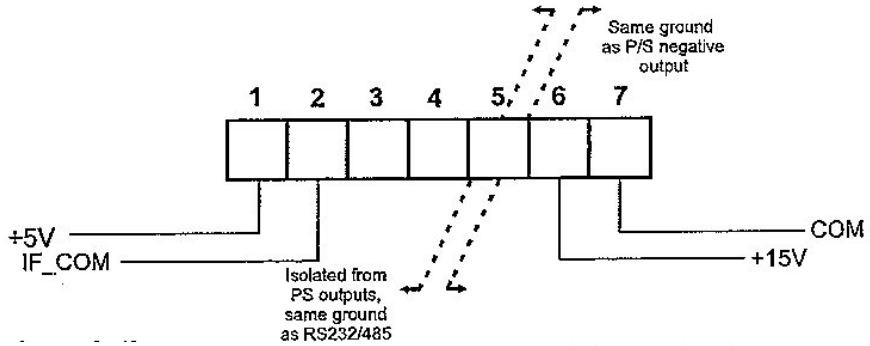


Figure 4-3 Connector Detail (Auxiliary Output)

Terminal	Signal name	Function	Reference
1	+5V	**+5.0V** +/- 5%, max current = **0.2A**	
2	IF_COM	Isolated Interface Common. Return for the Aux +5VDC, **SO**, ENA control, **PS_OK** signal and for the RS-232/RS-485, LAN, IEEE and USB interfaces	5.7 5.10
3	NC		
4	NC		
5	NC		
6	+15	**+15V** +/- 5%, max current = **0.2A**	
7	COM	Control Common. Return for the Aux +15VDC, VMON, IMON, CV/CC, LOC/REM. Referenced internally to the negative output (-V) potential.	6.2 5.9 6.6

Table 4-3: Auxiliary Power Connector Function Description

CAUTION

The **COM** terminal (Pin 7) is referenced internally to the –V potential (and J1 Pin 12) of the power supply. Do not attempt to bias any of these terminals relative to the –V or any other potential. Use the Isolated Programming interface option to allow control from a programming source at a different potential.

4.4 REAR PANEL SW1 SETUP SWITCH

The SW1 Setup switch (see Figure 4-3) is a 9-position DIP-switch that allows the user to choose the following:

- Internal or Remote programming for Output voltage and Output current limit.
- Remote voltage or resistive programming of Output voltage and Output current Limit.
- Select range of Remote voltage and resistive programming.
- Select range of Output voltage and Output current monitoring.
- Select the Remote Shut-Off (SO) control logic.
- Select between RS-232 and RS-485 serial communication interface.
- Enable or disable the rear panel Enable/Disable control (dry contact).

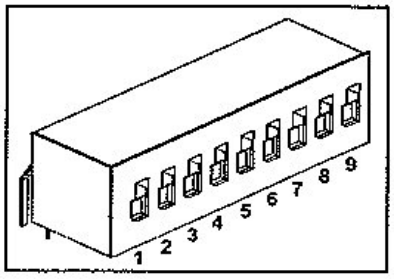


Figure 4-4: SW1 Setup DIP-switch

4.4.1 SW1 DIP-Switch Position Function

Refer to Table 4-3 for descriptions of SW1 position functions. The factory default setting is DOWN for all DIP-switch positions.

Table 4-4: SW1 DIP-switch Position Functions

Position	Function	DOWN (Factory default)	UP
SW1-1	Output Voltage Remote Analog Programming	Output Voltage Programmed by Front Panel	Output Voltage Programmed by Remote Analog External Voltage or External Resistor
SW1-2	Output Current Limit Remote Analog programming	Output Current Limit Programmed by Front Panel	Output Current Limit programmed by Remote Analog External Voltage or External Resistor
SW1-3	Programming Range Select (Remote Voltage/Resistive)	0-5V/(0-5Kohm)	0-10V/(0-10kohms)
SW1-4	Output Voltage and Current Monitoring Range	0-5V	0-10V
SW1-5	Shut-Off (SO) Logic select	**ON**: High (2-15V) or Open **OFF**: Low (0-0.6V) or Short	**ON**: Low (0-0.6V) or Short **OFF**: High (2-15V) or Open
SW1-6	RS-232/RS-485 select	RS-232 interface	RS-485 interface
SW1-7	Output Voltage Resistive Programming	Output Voltage programmed by External Voltage	Output Voltage programmed by External Resistor
SW1-8	Output Current Limit Resistive Programming	Output Current Limit programmed by External Voltage	Output Current Limit programmed by External Resistor
SW1-9	Enable/Disable control	Rear panel Enable/Disable control is **not** Active	Rear panel Enable/Disable control is Active

4.4.2 Resetting the SW1 DIP-switch

Before making any changes to the SW1 DIP-switch settings, disable the power supply output by pressing the front panel **OUT** button. Ensure that the Output Voltage falls to zero and the OUT **LED** is off. Then use any small flat-blade screwdriver to change the SW1 DIP-switch settings.

4.5 REAR PANEL J1 PROGRAMMING AND MONITORING CONNECTOR

The J1 Programming and Monitoring connector is a DB25 subminiature connector located on the power supply rear panel. Refer to Table 4-5 for description of the connector functions. The power supply default configuration is Local operation, which does not require connections to J1. For remote operation using J1 signals, use the plug provided with power supply (or equivalent type). It is essential to use a plastic body plug to conform to Safety Agency requirements. If a shield is required for the J1 wires, connect the shield to a power supply chassis ground screw.

4.5.1 Making J1 connections

- J1 Connector type: AMP, P/N: 5747461-3
- J1 plug description: AMP, P/N: 745211-7
- Wire dimension range: AWG26 - AWG22
- Extraction tool: AMP, P/N: 91232-1 or equivalent.
- Manual Pistol grip tool:

  Handle: AMP, P/N:58074-1

  Head: AMP, P/N:58063-2

Before making any connections, press the AC ON/OFF power switch to the OFF position and wait until the front panel display has turned OFF.

CAUTION

The programming return terminals (J1-12, -22 and -23) are referenced internally to the **-V** potential of the power supply. Do not attempt to bias any of these terminals relative to the **–V** or any other potential. Use the Isolated Programming Interface option to allow control from a programming source at a different potential relative to the power supply negative output.

CAUTION

To prevent ground loops and to maintain power supply isolation when programming from J1, use an ungrounded programming source.

WARNING

There is a potential shock hazard at the output when using a power supply with rated output greater than 40V. Use wires with minimum insulation rating equivalent to the maximum output voltage of the power supply.

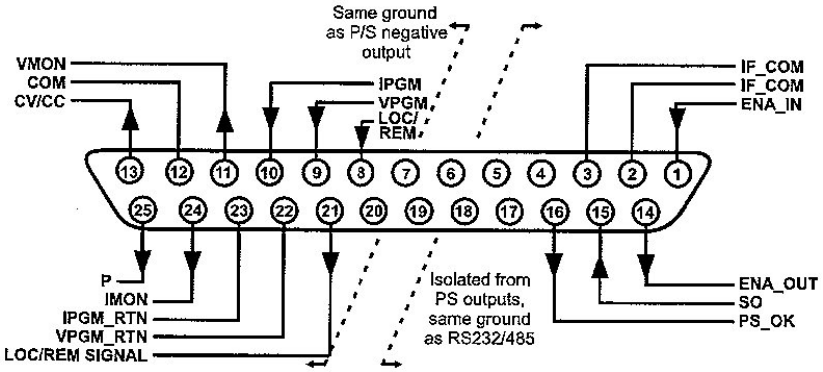


Figure 4-5: J1 Connector Terminals and Functions

Table 4-5: J1 Connector Terminals and Functions

J1 Pin	Signal Name	Function	Reference Section
J1-1	**ENA_IN**	Enable/Disable the power supply output by dry-contact (short/open) with **ENA_OUT**.	5.8
J1-2 **J1-3**	**IF_COM**	Isolated Interface Common. Return for the **SO** control, **PS_OK** signal and for the optional LAN, IEEE or USB interfaces.	5.7, 5.10
J1-4~J1-7	**N/C**	No Connection	
J1-8	**LOCAL/ REMOTE**	Input for selecting between Local or Remote Analog programming of Output voltage and Output current.	6.2
J1-9	**VPGM**	Input for Remote Analog Voltage/Resistance programming of the Output voltage.	6.1~6.4
J1-10	**IPGM**	Input for Remote Analog Voltage/Resistance programming of the Output current.	6.1~6.4
J1-11	**VMON**	Output for monitoring the power supply Output voltage.	6.6
J1-12	**COM**	Control Common. Return for **VMON**, **IMON**, **CV/CC**, and **LOC/REM**. Referenced internally to the negative sense (-S) potential.	
J1-13	**CV/CC**	Output for Constant-Voltage/Constant-Current mode indication.	5.9
J1-14	**ENA_OUT**	Enable/Disable the power supply output by dry-contact (short/open) with **ENA_IN**.	5.8
J1-15	**SO**	Input for Shut-Off (**SO**) control of the power supply output.	5.7
J1-16	**PS_OK**	Output for indication of the power supply status.	5.10
J1-17~20	**N/C**	No Connection	
J1-21	**LOC/REM SIGNAL**	Output for indicating if the unit is in **Local** or **Remote** analog programming mode.	6.3
J1-22	**VPGM_RTN**	Return for **VPGM** input. Connected internally to J1-12 (**COM**).	6.1, 6.4, 6.5
J1-23	**IPGM_RTN**	Return for **IPGM** input. Referenced internally to the negative output **(-V**) potential.	6.1, 6.4, 6.5
J1-24	**IMON**	Output for monitoring the power supply Output current.	6.6
J1-25	**P**	Output for current balance in parallel operation. Connected internally to J1-24 (**IMON**).	5.15

CHAPTER 5 LOCAL OPERATION

5.1 INTRODUCTION

This Chapter describes the operating modes that are not involved in programming and monitoring the power supply via its serial communication port (RS-232/R-S485) or by remote analog signals. Ensure that the REM/LOC **LED** on the front panel is **OFF**, indicating Local mode. If the REM/LOC **LED** is **ON**, press the front panel REM/LOC button to change the operating mode to **LOCAL**.

- For information regarding remote analog programming, refer to Chapter 6.
- For information regarding usage of the serial communication port, refer to Chapter 7.

5.2 STANDARD OPERATION

The power supply has two basic operating modes: Constant-Voltage Mode and Constant-Current Mode. The mode in which the power supply operates at any given time depends on the Output voltage setting, Output current limit setting and the load resistance.

5.2.1 Constant-Voltage Mode

1. In Constant-Voltage mode, the power supply regulates the Output voltage at the selected value, while the load current varies as required by the load.
2. While the power supply operates in Constant-Voltage mode, the **VOLTAGE LED** on the front panel stays illuminated.
3. Adjustment of the Output voltage can be made when the power supply output is Enabled (Output ON) or Disabled (Output OFF). When the output is enabled, simply rotate the **VOLTAGE** encoder knob to program the Output voltage. When the output is disabled, press the **PREV**iew button and then rotate the **VOLTAGE** encoder knob. The **VOLTAGE** meter will show the programmed Output voltage for 5 seconds after the adjustment has been completed. Then the **VOLTAGE** meter will display "**OFF**".
4. Adjustment resolution can be set to **COARSE** or **FINE** resolution. Press the **FINE** button to select between the lower and higher resolution. The **FINE LED** illuminates when the adjustment resolution is set to **FINE**.

NOTE
If after completing the adjustment, the display shows a different value than the setting, the power supply may be at the Output current limit setting. Check the load condition and the power supply Output current limit setting.

NOTE
The maximum and minimum setting values of the Output voltage are limited by the Over-Voltage-Protection and Under-Voltage-Limit settings. Refer to Sections 5.3 and 5.4 for more details.

5.2.2 Constant-Current Mode

1. In Constant-Current mode, the power supply regulates the Output current at the selected value, while the load voltage varies with the load requirement.
2. While the power supply is operating in Constant-Current mode, the **CURRENT LED** on the front panel stays illuminated.
3. Adjustment of the Output current limit can be made when the power supply output is Enabled (Output ON) or Disabled (Output OFF).

   - **Disabled output (OFF):** Press the **PREV**iew button and then rotate the **CURRENT** encoder knob. The **CURRENT** meter will show the programmed current limit for 5 seconds after the adjustment has been completed. Then the **VOLTAGE** meter will display "**OFF**".
   - **Enabled output, power supply in Constant-Voltage mode (ON):** Press the **PREV**iew button and then rotate the **CURRENT** encoder knob. The **CURRENT** meter will display the programmed current limit for 5 seconds after the adjustment has been completed, and then will return to display the actual load current.
   - **Enabled output, power supply in Constant-Current mode (ON):** Rotate the **CURRENT** encoder knob to adjust the Output current limit.

4. Adjustment resolution can be set to **COARSE** or **FINE** adjustment. Press the **FINE** button to select between the **COARSE** and **FINE** resolution. The **FINE LED** illuminates when the adjustment resolution is set to **FINE**.

5.2.3 Automatic Crossover

If the power supply operates in Constant-Voltage mode, while the load current is increased to greater than the Output current limit setting, the power supply will automatically switch to Constant-Current mode. If the load is decreased to less than the Output current limit setting, the power supply will automatically switch back to Constant-Voltage mode.

5.3 OVER-VOLTAGE PROTECTION (OVP)

The OVP circuit protects the load in the event of a remote or local programming error or a power supply failure. The protection circuit monitors the voltage at the power supply sense points and thus provides the protection level at the load. Upon detection of an Over-Voltage condition, the power supply output will shut down.

5.3.1 Setting the OVP level

The OVP can be set when the power supply output is Enabled (**ON**) or Disabled (**OFF**). To set the OVP level, press the **OVP/UVL** button, so that the **CURRENT** meter displays "**OUP**". The **VOLTAGE** meter will display the **OVP** setting level. Rotate the **VOLTAGE** encoder knob to adjust the **OVP** level. The **CURRENT** meter will show "**OUP**" and the **OVP** setting value for 5 seconds after the adjustment has been completed, and will then return to its previous operating state.

The minimum **OVP** setting level is approximately 105% of the set Output voltage, or the value in Table 7-6, whichever is higher. The maximum **OVP** setting level is shown in Table 5-1. To preview the **OVP** setting, press the **OVP/UVL** button so that the **CURRENT** meter displays "**OUP**". At this time, the **VOLTAGE** meter will display the **OVP** setting. After 5 seconds, the front panel display will return to its previous state.

Model	Max. OVP	Model	Max. OVP
8V	10.0V	60V	66.0V
10V	12.0V	80V	88.0V
16V	19.0V	100V	110.0V
20V	24.0V	150V	165.0V
30V	36.0V	300V	330.0V
40V	44.0V	600V	660.0V

Table 5-1: Maximum OVP setting levels

5.3.2 Activated OVP protection indications

When the Output **OVP** is activated the power supply output shuts down. The **VOLTAGE** meter displays "**OUP**" and the **ALARM LED** blinks.

5.3.3 Resetting the OVP circuit

To reset the OVP circuit after it activates:

1. Reduce the power supply Output voltage setting below the **OVP** set level.
2. Ensure that the load and the sense wiring are connected properly.
3. There are four methods to reset the **OVP** circuit.
   - 3.1 Press the **OUT** button.
   - 3.2 Turn the power supply **OFF** using the AC **ON/OFF** switch, wait until the front panel display turns **OFF**, then turn the power supply **ON** using the AC **ON/OFF** switch.
   - 3.4 Turn the power supply output **OFF** and then **ON** using the **SO** control (refer to Section 5.7). In this method the power supply should be set to **Auto-Restart** (**AUTO**) mode.
   - 3.4 Send an "**OUT1"** command via the RS-232/RS-485 serial communication port.

5.4 UNDER VOLTAGE LIMIT (UVL)

The Output **UVL** prevents adjustment of the Output Voltage below a user-set limit. The combination of Output **UVL** and OVP functions allow the user to create a protection window for sensitive load circuitry.

5.4.1 Setting the Output UVL level

Setting the Output **UVL** can be made when the power supply output is Enabled (**ON**) or Disabled (**OFF**). To set the Output **UVL** level, press the **OVP/UVL** button **TWICE** so that the **CURRENT** meter displays "**UUL**". The **VOLTAGE** meter will also display the **UVL** setting level. Rotate the **VOLTAGE** encoder knob to adjust the Output **UVL** level. The **CURRENT** meter will display '**UUL**" and the **UVL** setting value for 5 seconds after the adjustment has been completed and will then return to its previous operating state. Output **UVL** setting values are limited at the maximum level to approximately 95% of the Output voltage setting. Attempting to adjust the Output **UVL** above this limit will result in no response to the adjustment attempt. The minimum Output **UVL** setting is zero.

5.5 FOLDBACK PROTECTION

FOLDback protection will shut down the power supply output if the load current exceeds the Output current limit setting level. This protection is useful when the load circuitry is sensitive to an overcurrent condition.

5.5.1 Setting the FOLDback Protection

To arm the **FOLD**back protection, the **FOLD** button should be pressed so that the **FOLD LED** illuminates. In this condition, a transition from Constant-Voltage to Constant-Current mode will activate the **FOLD**back protection. Activation of the **FOLD**back protection disables the power supply output, displays "**Fb**" on the **VOLTAGE** meter and causes the **ALARM LED** to blink.

5.5.2 Resetting Activated Foldback Protection

There are four methods to reset an activated Foldback protection.

1. Press the **OUT** button. The power supply output is then enabled and the Output voltage and current will return to their last setting. In this method, the **FOLD**back protection remains armed, therefore if the load current is higher than the Output current limit setting, the **FOLD**back protection will be activated again.
2. Press the **FOLD** button to cancel the **FOLD**back protection. The power supply output will be disabled and the **VOLTAGE** meter will display "**OFF**". Press the **OUT** button to enable the power supply output.
3. Turn the power supply output **OFF** and then **ON** using the **SO** control (refer to Section 5.7). In this method the **FOLD**back protection remains armed, therefore if the load current is higher than the Output current limit setting, the **FOLD**back protection will be activated.
4. Turn the power supply **OFF** using the AC **ON/OFF** power switch, wait until the front panel display turns **OFF**, then turn the unit back **ON** using the AC **ON/OFF power switch**. The power supply output is then enabled and the Output voltage and Output current will return to their last settings. In this method, the **FOLD**back protection remains armed, therefore if the load current is higher than the Output current limit setting, the **FOLD**back protection will be activated again.

5.6 OUTPUT ON/OFF CONTROL

The Output **ON/OFF** Enables or Disables the power supply output. Use this function to make adjustments to either the power supply or the load without shutting off the AC input power. The Output **ON/OFF** can be activated from the front panel using the **OUT** button or from the rear panel J1 connector **SO** or Enable/Disable pins. The front panel **OUT** button can be pressed at any time to Enable or Disable the power supply output. When the output is disabled, the Output voltage and Output current fall to zero and the **VOLTAGE** meter displays "**OFF**".

5.7 OUTPUT SHUT-OFF (SO) CONTROL VIA REAR PANEL J1 CONNECTOR

Contacts J1-2, -3 and -15 (Figure 4-3, Item 5) serve as Output Shut-Off (**SO**) terminals. The **SO** terminals accept a 2.5V to 15V signal or Open-Short contact to Enable or Disable the power supply output

The **SO** function is activated **ONLY** when a transition from **ON** to **OFF** is detected (after applying AC power to the unit). Thus, in Auto-Restart mode the output will be enabled after applying AC input power; even if the **SO** is **OFF** (as no transition from ON to OFF occurred). After an **ON** to **OFF** transition it is detected, the **SO** will enable or disable the power supply output according to the signal level or the short/open applied to J1.

This function is useful for connecting power supplies in a "Daisy-chain" (refer to Section 5.16). The SO control can also be used to reset the OVP and **FOLD**back Protection (refer to Section 5.3 and 5.5 for details). When the unit is shut-off by a J1 signal, the VOLTAGE display will show "SO" to indicate the unit state. J1 contact 15 is the SO signal input and contacts 2 and 3, IF_COM, are the signal return (connected internally).

Contacts J1-2, -3 and -15 are optically isolated from the power supply output.

The SO control logic can be selected by the rear panel SW1 Setup switch. Refer to Table 5-2 for SW1 setting and SO control logic.

SW1-5 Setting	SO signal level J1-2 (3), J1-15	Power Supply Output	Display
DOWN (default)	2 - 15V or Open 0 - 0.6V or Short	**ON** **OFF**	Voltage/Current "**SO**"
UP	2 - 15V or Open 0 - 0.6V or Short	**OFF** **ON**	"**SO**" Voltage/Current

Table 5-2: Shut-Off (SO) Logic Selection

5.8 ENABLE/DISABLE CONTROL VIA REAR PANEL J1 CONNECTOR

Contacts J1-1 and -14 (Figure 4-2, Item 5) serve as Output Enable/Disable terminals (by switch or relay). This function is Enabled or Disabled by Dip-switch SW1-9. Refer to Table 5-3 for the Enable/Disable function and the SW1 setting.

SW1-9 setting	Enable/Disable Inputs	Power supply output	Display	ALARM LED
DOWN (Default)	Open or Short	**ON**	Voltage/Current	**OFF**
UP	Open	**OFF**	"**ENA**"	Blinking
	Short	**ON**	Voltage/Current	**OFF**

Table 5-3: Enable/Disable Function and SW1 Setting

CAUTION

To prevent possible damage to the unit, do not connect any of the Enable/Disable inputs to the positive (+V) or negative (-V) output potential.

NOTE

Safe-Start mode: If the Enable/Disable fault condition clears when the unit is in Safe-Start mode, recovery is made by pressing the **OUT** button or by sending an '**OUT 1**' serial command.

Auto-Restart mode: The output will turn back **ON** automatically when the Enable/Disable fault condition clears.

5.9 CV/CC SIGNAL

The **CV/CC** signal indicates the operating mode of the power supply, Constant-Voltage or Constant-Current. The **CV/CC** signal is an open collector output with a 30V parallel zener diode, at J1-13, referenced to the **COM** potential at J1-12 (connected internally to the negative sense **(-S)** potential). When the power supply operates in Constant-Voltage mode, the **CV/CC** output is open-circuit. When the power supply operates in Constant-Current mode, the **CV/CC** signal output is low (0.0 - 0.6V) with a maximum sink current of 10mA.

CAUTION

Do not connect the **CV/CC** signal to a voltage source higher than 30VDC. Always connect the CV/CC signal to voltage source with a series resistor to limit the sink current to less than 10mA.

5.10 PS_OK SIGNAL

The **PS_OK** signal indicates a fault condition in the power supply. **PS_OK** is a TTL signal output at J1-16 and is referenced to **IF_COM** at J1-2, -3 (Isolated Interface Common). When a fault condition occurs, the **PS_OK** level is low, with a maximum sink current of 1mA. When no fault condition occurs, the **PS_OK** level is high with a maximum source current of 2mA. The following faults will set the **PS_OK** to a fault state:

- **OTP**
- **OVP**
- **FOLD**back
- **AC** fail
- Enable/Disable open (Power supply is disabled)
- **SO** (Rear panel Shut-Off, Power Supply is shut off)
- IEEE failure (With optional IEEE interface)
- Output **OFF**

5.11 SAFE-START AND AUTO-RESTART MODES

When turning On the power supply AC On/Off, it can start to its last setting of Output voltage and Output current limit with the output Enabled (Auto-Restart mode) or start with the output disabled (Safe-Start mode). Press and hold the **OUT** button to select between **Safe-Start** and **Auto-Restart** modes. The **VOLTAGE** meter will continuously cycle between "**SAF**" and "**AU7**" every 3 seconds. Releasing the **OUT** button while one of the modes is displayed, selects that mode. The default setting at shipment is Safe-Start mode.

5.11.1 Auto-Restart Mode

In this mode, the power supply restores its last operation setting. Upon start-up (AC Input power recycle), the output is enabled or disabled according to its last settings.

5.11.2 Safe-Start Mode

In this mode, the power supply restores its last operational settings and sets the Output to an **OFF** state. At start-up (AC Input power recycle), the output is disabled and the Output voltage and Output current are zero. To Enable the output and restore the last Output voltage and Output current limit values, momentarily press the **OUT** button.

5.12 OVER-TEMPERATURE PROTECTON (OTP)

The **OTP** circuit shuts down the power supply before the internal components can exceed their safe internal operating temperature. When an **OTP** shutdown occurs, the **VOLTAGE** meter displays "**O7P**" and the **ALARM LED** blinks.

Resetting the **OTP** circuit can be automatic (non-latched) or manual (latched) depending on the Safe-Start or AutoRestart mode.

1. **Safe-Start mode:** In Safe-Start mode, the power supply stays **OFF** after the over temperature condition has been removed. The display continues to show "**O7P**" and the **ALARM LED** continues to blink. To reset the **OTP** circuit, press the **OUT** button (or send an **OUT ON** (**OUT 1**) command via the RS-232/RS-485 serial communication port).
2. **Auto-Restart mode:** In Auto-Restart mode, the power supply recovers to its last setting operational automatically when the over temperature condition is removed.

5.13 LAST SETTING MEMORY

The power supply is equipped with Last Setting Memory, which stores several power supply parameters at each AC turn-off sequence.

STORED PARAMETERS:

1. **OUT**put On or Off
2. Output voltage setting (PV setting)
3. Output current setting (PC setting)
4. Output OVP level
5. Output UVL level
6. **FOLD**back setting
7. Start-up mode (Safe-Start or Auto-Restart)
8. Remote/Local mode: If the last setting was Local Lockout, (latched mode), the supply will return to Remote mode (non-latched).
9. Address setting
10. Baud rate setting
11. Locked/Unlocked Front Panel (**LFP/UFP**)

    (Items 8, 9, 10 are related to Remote Digital Control operation and are explained in Chapter 7)

12. Master/Slave setting (for parallel operation)

5.14 SERIES OPERATION

Power supplies of the **SAME MODEL** can be connected in series to obtain increased output voltage. Split connection of the power supplies gives both positive and negative output voltage.

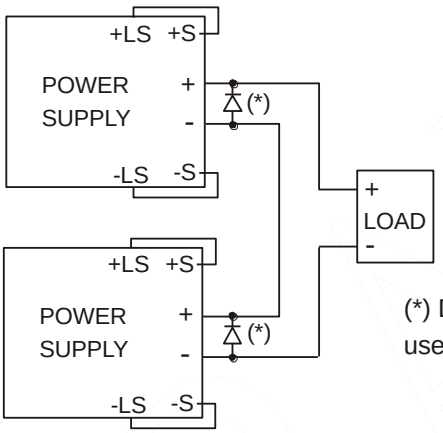
CAUTION
Do not connect power supplies from different manufacturers in series or in parallel.

5.14.1 Series Connection for Increased Output Voltage

In this mode, two units are connected in series so that their outputs are summed. Set the Output current limit of each power supply to the maximum that the load can handle without damage. It is recommended that diodes be connected in parallel with each unit output to prevent reverse voltage during start up or in case one of the units shuts down. Each diode should be rated to at least the power supply rated Output voltage and Output current. Refer to Figures 5-1 and 5-2 for series operation with local and remote sensing.

WARNING

When power supplies are connected in series, and the load or one of the output terminals is grounded, no point may be at a greater potential of +/-60VDC from Chassis ground for models up to 60VDC Rated Output voltage and +/-600VDC from ground for models > 60VDC Rated Output voltage. When using the RS-232/RS-485 LAN, IEEE or USB interfaces, refer to the **OUTPUT TERMINALS GROUNDING** warning in Section 3.9.11.



(*) Diodes are user supplied.

Fig.5-1: Series connection, local sensing

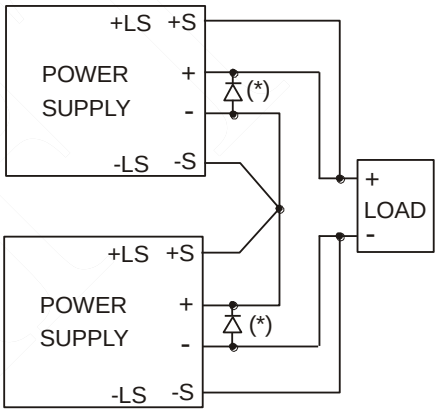


Fig.5-2: Series connection, remote sensing

Remote Programming in Series Operation for Increased Output Voltage:

1. **Programming by External Voltage**: The analog programming circuits of this power supply are referenced to the negative output (-V) potential. Therefore, the circuits used to control each series connected unit must be separated and floated from each other.

2. **Using the SO Function and PS_OK Signal**: The Shut-Off (**SO**) and **PS_OK** circuits are referenced to the isolated interface common, **IF_COM** (J1-2,3). The **IF_COM** terminals of different units can be connected to obtain a single control circuit for the power supplies connected in series.

3. **Programming by External Resistor**: Programming by external resistor is possible. Refer to Section 6-5 for details.

4. **Programming Via the Serial Communication Port (RS-232/RS-485)**: The communication port is referenced to the isolated interface common (**IF_COM**), which is isolated from the power supply output potential **(+V** or **–V**). Therefore, power supplies connected in series can be daisy-chained using the J3 **Remote-In** and **Remote-Out** connector. Refer to Chapter 7 for details.

5.14.2 Series Connection for Positive and Negative Output Voltage

In this mode, two units are configured as a positive and negative output. Set the Output current limit of each power supply to the maximum that the load can handle without damage. It is recommended that diodes be connected in parallel with each unit output to prevent reverse voltage during start-up or in case one of the units shuts down. Each diode should be rated to at least the power supply rated Output voltage and Output current. Refer to Figure5-3 for this operating mode.

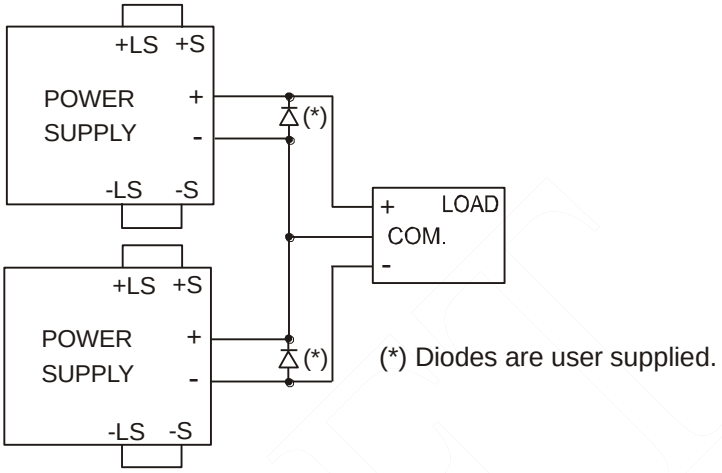


Figure 5-3: Series Connection for Positive/Negative Output Voltages

Remote Programming in Series Operation for Positive and Negative Output Voltage

1. **Programming by External Voltage**: The analog programming circuits of this power supply are referenced to the negative output (-V) potential. Therefore, the circuits used to control each series connected unit must be separated and floated from each other.

2. **Using the SO Function and PS_OK Signal**: The Shut-Off (**SO**) and **PS_OK** circuits are referenced to the isolated interface common, **IF_COM** (J1-2, -3). The **IF_COM** terminals of different units can be connected to obtain a single control circuit for the power supplies connected in series.

3. **Programming by External Resistor**: Programming by external resistor is possible. Refer to section 6.5 for details.

4. **Programming via the Serial Communication Port (RS-232/RS-485)**: The communication port is referenced to the isolated interface common (**IF_COM**) which is isolated from the power supply output potential (**+V** or **–V**). Therefore, power supplies connected in series can be daisy-chained using the J3 **Remote-In** and **Remote-Out** connectors. Refer to chapter 7 for details.

5.15 PARALLEL OPERATION

Up to four units of the same **VOLTAGE** and **CURRENT** rating can be connected in parallel to provide up to four times the output current capability. One of the units operates as a Master and the remaining units operate as Slaves. The Slave units are analog programmed by the Master unit. In remote digital operation (RS-232/RS-485, etc.), only the Master unit can be programmed by the controller while the Slave units may be connected to the controller for voltage, current and status readback only.

There are two parallel operating methods, **Basic** and **Advanced**, to configure multiple power supplies for parallel operation. With both parallel operating methods, power supplies should be connected in a Daisy-Chain configuration. Refer to Sections 5.15.1, to Section 5.15.2, and to Section 5.16 for additional details.

5.15.1 Basic Parallel Operation

In this method, setting the units as **Master** and **Slaves** is made by the rear panel J1 connections and the setup DIP-switch SW1. Each unit displays its own Output current and Output voltage. To program the load current, the **Master** unit should be programmed to the total load current divided by the number of units in the system. Refer to the following procedure to configure multiple supplies for **Basic** parallel operation.

5.15.1.1 Setting up the Master Unit

Set the **Master** unit Output voltage to the desired voltage. Program the Output current limit to the desired load current limit divided by the number of parallel units. During operation, the **Master** unit operates in CV mode, regulating the load voltage to the programmed Output voltage. Connect the sensing circuit to local or remote sensing as shown in Figure 5-4 or Figure 5-5.

5.15.1.2 Setting up the Slave Units

1. The Output voltage of all the **Slave** units should be programmed 2% - 5% higher than the Output voltage of the **Master** unit to prevent interference with the **Master** unit's control. The Output current limit of each unit should be programmed to the desired load current limit divided by the number of paralleled units.
2. Set the rear panel setup DIP-switch SW1-2 to the **UP** position.
3. Set the rear panel setup DIP-switch SW1-3 to the same position as SW1-4 of the **Master** unit.
4. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4-4).
5. Connect J1-10 (IPGM) of the **Slave** unit to J1-25 (P) of the **Master** unit.
6. Connect J1-23 (IPGM_RTN) of the **Slave** unit to J1-12 (COM) of the **Master** unit.

During operation, the **Slave** units operate as a controlled current source that follows the **Master** unit Output current. It is recommended that the power system be designed so that each unit supplies up to 95% of its Output current rating because of the imbalance which may be caused by cabling and connection voltage drop.

5.15.1.3 Setting Over-Voltage Protection

The **Master** unit **OVP** setting should be programmed to the desired **OVP** level. The **OVP** setting of the **Slave** units should be programmed to a higher value than that of the **Master** unit OVP setting. When the **Master** unit shuts down, it programs the **Slave** unit to zero Output voltage. If a **Slave** unit shuts down (when its **OVP** is set lower than the **Master** unit Output voltage), only that **Slave** unit would shut down, and the remaining **Master/Slave** units would supply all the load current.

5.15.1.4 Setting Foldback Protection

FOLDback protection, if desired, may only be used with the **Master** unit. When the **Master** unit shuts down, it programs the **Slave** units to zero output voltage.

5.15.1.5 Connection to the Load

In parallel operation, power supplies can be connected with local or remote sensing. Refer to Figure 5-4 and 5-5 for typical connections of parallel power supplies. The figures show the connection of two (2) units, however the same connection method applies for up to four (4) units.

5.15.2 Advanced Parallel Operation

In this method, multiple power supplies can be configured to parallel operation as a single power supply. The total calculated load current and Output voltage are displayed by the **Master** unit and can be read back from the **Master** unit. The **Slave** units display only their operating status (ON, OFF or Fault condition). Refer to the following procedure to configure multiple power supplies for **Advanced** parallel operation.

5.15.2.1 Basic Configuration

Repeat Steps 1 to 5 in Section 5.15.1 (**Basic** parallel operation).

5.15.2.2 Setting the Units as Master or Slave

1. Depress and hold the **FINE** button for 3 seconds. The **Master/Slave** configuration will be displayed on the **CURRENT** meter. Rotate the **CURRENT** encoder to obtain the desired operating mode. Refer to Table 5-4 for the **CURRENT** meter display and operating modes.
2. When the desired configuration is obtained, depress and release the **FINE** button or wait approximately 5 seconds.

CURRENT Display	Parallel Operating Mode
H1	Single power supply (default)
H2	**Master** supply with One (1) **Slave** supply
H3	**Master** supply with Two (2) Slave supplies
H4	**Master** supply with Three (3) Slave supplies
S	**Slave** supply

Table 5-4: Setting Mode of Operation

5.15.2.3 Master and Slave Units Default Operation

7. When a unit is programmed to **Slave** mode it enters the Remote mode with Local Lockout. In this mode, the front panel controls are disabled to prevent any accidental setting change (refer to Section 7.2.7 for details).
8. The Slave units parameters will automatically set the following:

NOTE

With local sensing it is important to minimize the wire length and resistance. Also the positive and negative wire resistance should be as close as possible to each other to achieve current balance between power supplies

- Output voltage **PREV**iew set to approximately 102% of rated Output voltage.
- Output current **PREV**iew set to zero amperes.
- **UVL** set to zero volts
- **OVP** to its maximum value
- **AST** ON
- **OUT** ON
- **FOLD**back protection OFF

The **Master** and **Slave** modes are stored in the individual power supply EEPROM memory when the AC Input power is turned **OFF**. The system will return to the **Master/Slave** operating mode upon re-application of AC Input power.

5.15.2.4 CURRENT Display Accuracy

In the **Advanced** parallel mode, the total current is programmed and reported by the **Master** unit. In this mode, the **Master** unit **CURRENT** meter accuracy is 2% +/- 1 count. In cases where higher accuracy is required, it is recommended to use the **Basic** parallel operating mode.

5.15.2.5 To Release Units from Slave Mode

Slave units can be released from **Slave** mode operation using the following procedure:

1. Depress the **FINE** button for 3 seconds. The **Master/Slave** configuration will be displayed on the **CURRENT** meter.
2. Select **H1** mode using the **CURRENT** encoder.
3. Depress the **FINE** button again or wait 5 seconds.
4. Turn the AC Input power **OFF** to store the new parallel operating mode setting.
5. After exiting from **Slave** mode operation the power supply operating parameters will be set to:
   - Programmed voltage to zero
   - Programmed current to zero
   - **UVL** set to zero volts
   - **OVP** set to its maximum value
   - **AST** OFF
   - **OUT** OFF
   - **FOLD**back protection OFF
   - Locked Front Panel

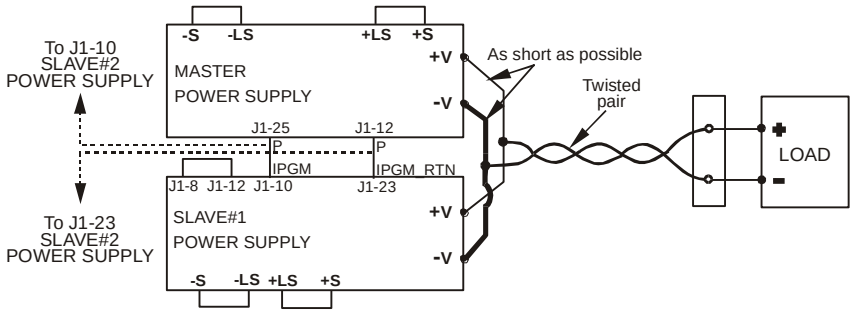
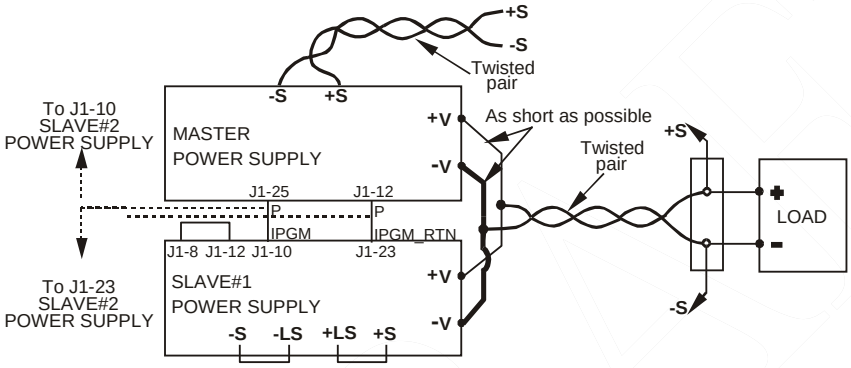


Figure 5-4: Parallel Connection with Local Sensing

CAUTION

Make sure that the connection between **–Vo** terminals is reliable to avoid disconnection during operation. Disconnection may cause damage to the power supply.



CAUTION

Make sure that the connection between **–Vo** terminals is reliable to avoid disconnection during operation. Disconnection may cause damage to the power supply.

Figure 5-5: Parallel Operation with Remote Sensing

5.16 DAISY-CHAIN CONNECTION

It is possible to configure a multiple power supply system to shut down all the units when a fault condition occurs in one of the units. When the fault is removed, the system recovers according to its setting to **Safe-Start** mode or **Auto-Restart**.

Setup DIP-switch SW1-5 should be set to the **DOWN** position to enable the Daisy-Chain Shut-Off operation. Other SW1 positions can be set according to the application requirements.

If a fault occurs in one of the daisy-chained units, its **PS_OK** signal will be set to a low level and the unit front panel display will indicate the fault. The other units in the daisy-chain will **Shut-Off** and their front panel display

NOTE

1. In parallel operation, the AC Supply should be applied to the **Master** unit first and then to the each of the **Slave** units.
2. The above sequence is not required if the units are connected for Daisy-Chain Shut-Off operation.

displays will indicate "**SO**". When the fault condition is removed, the units will recover to their last setting according to their **Safe-Start** or **Auto-Restart** setting. Figure 5-6 shows a connection of three units, however the same connection method applies to systems with a larger number of units.

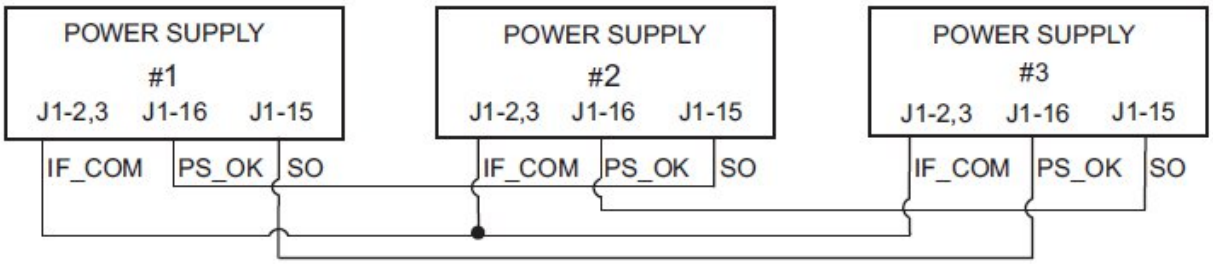


Figure 5-6: Daisy-Chain Connection

5.17 FRONT PANEL LOCKING

The front panel controls can be locked to protect from accidental power supply parameter change. Press and hold the **PREView** button to have the VOLTAGE meter cycle between "Locked Front panel" (**LFP**) and "Unlocked Front Panel" (**UFP**). Releasing the **PREV**iew button while one of the modes is displayed, selects that operating mode.

5.17.1 Unlocked Front Panel

In this mode, the front panel controls are Enabled so that the user is able to program and monitor the power supply parameters.

5.17.2 Locked Front Panel

In this mode the following front panel controls are **Disabled**:

- **VOLTAGE** and **CURRENT** encoders
- **FOLD** button
- **OUT** button

The power supply will not respond to attempts to use these controls and the **VOLTAGE** meter will display "**LFP**" to indicate that the front panel is locked.
The **OVP/ UVL** button is active to **PREV**iew the **OVP** and **UVL** settings.
Use the **PREV**iew button to display the Output voltage and Output current limit settings or to unlock the front panel.

CHAPTER 6 REMOTE ANALOG PROGRAMMING

6.1 INTRODUCTION

The rear panel connector J1 allows the user to program the power supply Output voltage and Output current limit with an analog device. J1 also provides monitoring signals for Output voltage and Output current. The programming range and monitoring signals range can be selected between 0 - 5V and 0 - 10V using the setup DIP-switch SW1. When the power supply is in the Remote Analog programming mode, the serial communication port (J3) is active and can be used to read the power supply operating parameters.

CAUTION

COM (J1-12), **VPGM_RTN** (J1-22) and **IPGM_RTN** (J1-23) terminals of J1 connect internally to the -Vout potential (**-V**). Do not connect these terminals to any potential other than -Vout (**-V**), as it may damage the power supply.

6.2 LOCAL/REMOTE ANALOG CONTROL

J1-9 (Figure 4-2, Item 5) accepts a TTL signal or Open-Short contact (referenced to J1-12) to select between **Local** or **Remote** Analog programming of the Output voltage and Output current limit.

In **Local** mode, the Output voltage and Output current limit can be programmed via the front panel **VOLTAGE** and **CURRENT** encoders or via the J3 RS-232/RS-485 port. In **Remote** Analog mode, the Output voltage and Output current limit can be programmed by analog voltage or by programming resistors via J1-9 and J1-10 (refer to Sections 6.4 and 6.5 for additional details). Refer to Table 6-1 for **Local/Remote** Analog control (J1-8) function and Setup DIP-switch SW1-1, -2 settings.

SW1-1, -2 setting	J1-8 Function	Output V/I Setting
DOWN (default)	No effect	Local
UP	“0” or Short	Remote Analog
	“1” or Open	Local

Table 6-1: Local/Remote Analog Control Function

6.3 LOCAL/REMOTE ANALOG INDICATION

J1-21 (Figure 4-2, Item 5) is an open-collector output that indicates if the power supply is in **Local** mode (front panel) or in **Remote** Analog mode. To use this function, connect a pull-up resistor to a voltage source of 30VDC maximum. Choose the pull-up resistor so that the sink current will be less than 5mADC when the output is in a low state. Refer to table 6-2 for J1-21 function.

J1-8	SW1-1	SW1-2	J1-21 Signal
TTL “0” Or Short	**DOWN**	**DOWN**	OPEN
	DOWN	**UP**	0.0 ~ 0.6V
	UP	**DOWN**	0.0 ~ 0.6V
	UP	**UP**	0.0 ~ 0.6V
TTL “1” or Open	**DOWN or UP**	**DOWN or UP**	Open-collector

Table 6-2: Local/Remote Analog Indication

6.4 REMOTE VOLTAGE PROGRAMMING OF OUTPUT VOLTAGE AND OUTPUT CURRENT

CAUTION
To maintain the isolation of the power supply and to prevent ground loops, use an Isolated programming source when operating the power supply via Remote Analog programming at the J1 connector.

Perform the following procedure to set the power supply to **Remote** Voltage programming:

1. Press the power supply AC Input ON/OFF power switch to the **OFF** position.
2. Set DIP-switch SW1-1 to the **UP** position for Output voltage external programming and SW1-2 to the **UP** position for output current limit external programming.
3. Set SW1-3 to select the programming voltage range according to Table 6-3.
4. Ensure that SW1-7 and -8 are set to the **DOWN** (default) position.
5. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4-4).
6. Connect the programming source to the mating plug of J1 as shown in Figure 6-1. Observe correct polarity for the voltage source.
7. Set the programming sources to the desired levels.
8. Press the power supply AC Input ON/OFF power switch to the **ON** position.
9. Press the **OUT** button to turn the power supply **ON**.
10. Adjust the programming sources to change the power supply Output voltage and Output current.

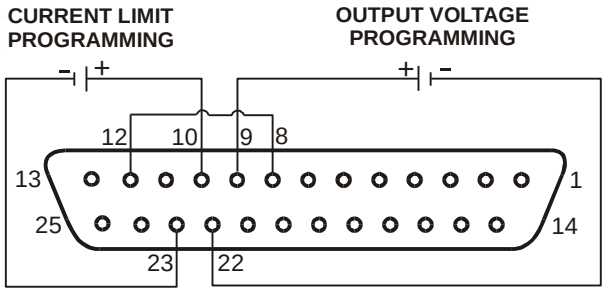
NOTES:

- SW1-4, -5, -6 and -9 are not required for Remote Analog V/I programming. Their settings can be determined according to the application.
- The control circuits allow the user to set the Output voltage and Output current limit up to 5% over the model-rated maximum value. The power supply will operate within the extended range, however it is not recommended to operate the power supply over its Output voltage and Output current rating, and performance is not guaranteed.

SW1-3 Setting	Output Voltage programming VPGM (J1-9)	Output Current programming IPGM (J1-10)
UP	0-10V	0-10V
DOWN	0-5V	0-5V

Table 6-3: SW1-3 Setting and Programming Range

J1 connector, rear panel view



iFigure 6-1: Remote Voltage Programming Connection

6.5 RESISITIVE PROGRAMMING OF OUTPUT VOLTAGE AND CURRENT LIMIT

For Remote **Resistive** programming, internal current sources, for Output voltage and/or Output current control, supply 1mADC through external programming resistors connected between J1-9 & J1-22 (for VPGM) and J1-10 & J1-23 (for IPGM). The voltage across the programming resistors is used as a programming voltage for the power supply. Resistance of 0~5kohms or 0~10kohms can be selected to program the Output voltage and Output current limit from zero to full-scale.
A variable resistor can control the output over its entire range, or a combination of variable resistor and series/parallel resistors can control the output over a restricted portion of its range.

Perform the following procedure to set the power supply to **Resistive** programming:

1. Press the AC Input ON/OFF power switch to the **OFF** position.
2. Set DIP-switch SW1-1 to the **UP** position for Output voltage external programming and SW1-2 to the **UP** position for Output current limit external programming.
3. Set SW1-3 to select the programming resistor range according to Table 6-4.
4. Set SW1-7 to the **UP** position for Output voltage **Resistive** programming and SW1-8 to the **UP** position for Output Current limit **Resistive** programming.
5. Connect a wire jumper between J1-8, J1-12 and J1-23 (refer to Table 4-4).
6. Connect the programming resistors to the mating plug of J1 as shown in Figure 6-2.
7. Set the programming resistors to the desired resistance.
8. Press the AC Input ON/OFF power switch to the **ON** position.
9. Press the **OUT** button to turn the power supply **ON**.
10. Adjust the resistors to change the power supply Output voltage and Output current.

NOTES:

1. SW1-4, -5, -6 and -9 are not required for Remote **Resistive** programming. Their settings can be determined according to the application requirements.
2. The control circuits allow the user to set the Output voltage and Output current limit up to 5% over the model-rated maximum value. The power supply will operate within the extended range, however it is not recommended to operate the power supply over its Output voltage and Output current rating, and performance is not guaranteed.
3. To maintain the temperature stability specification of the power supply, the resistors used for programming should be stable and low noise resistors, with a temperature coefficient of less than 50ppm.
4. When Remote Resistive programming is used, the front panel and computer control (via the J3 serial communication port) of Output voltage and Output current are disabled.

SW1-3 setting	Output Voltage programming VPGM (J1-9)	Output Current programming IPGM (J1-10)
UP	0-10kohms	0-10kohms
DOWN	0-5kohms	0-5kohms

Table 6-4: SW1-3 Setting and Programming Range

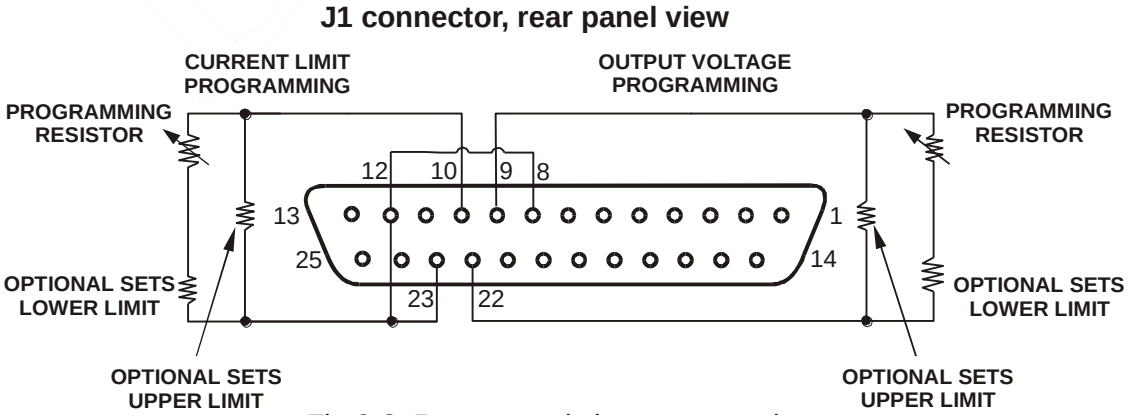


Figure 6-2: Remote Voltage Programming Connection

6.6 REMOTE MONITORING OF OUTPUT VOLTAGE AND CURRENT

The J1 connector, located on the rear panel provides analog signals for monitoring the Output voltage and Output current. Selection of the voltage range between 0-5V and 0-10V is made by setup DIP-switch SW1-4. The monitoring signals represent 0 to 100% of the power supply Output voltage and Output current. The monitor outputs have an output resistance of 500 ohms. Ensure that the sensing circuit has an input resistance of greater than 500kohms or accuracy will be reduced.

Refer to Table 6-5 for the required J1 connection, SW1-4 setting and monitoring voltage range.

Signal Name	Signal Function	J1 connection		Range	SW1-4
		Signal (+)	Return (-)		
VMON	Vout Monitor	J1-11	J1-12	0-5V	Down
IMON	Iout Monitor	J1-24			
VMON	Vout Monitor	J1-11	J1-12	0-10V	Up
IMON	Iout Monitor	J1-24			

Table 6-5 Monitoring Signals Settings (Vout/Iout)

Notes:

1.**Radiated Emissions, FCC requirements**: FCC requirements for radiated emissions: Use a shielded cable for the analog control signals If using an unshielded cable, attach an EMI ferrite suppressor to the cable, as close as possible to the power supply.

2.**Front Panel Encoders Operation**: In remote analog mode, the Output voltage and Output current can't be set by the **VOLTAGE** and **CURRENT** encoders.

3.**Front Panel PREView Button**: Use the **PREV**iew button to display the Output voltage and Output current setting defined by the encoders or digital communication.

4.**Communication**: In Remote **Analog** mode, all power supply parameters can be programmed and read back via the serial (RS-232/RS-485) communication port, except the Output voltage and Output current setting (which can only be read back).

CHAPTER 7 RS-232 & RS-485 REMOTE CONTROL

7.1 INTRODUCTION

This chapter describes the operation of the Genesys™ 2400W power supplies via the serial communication port. Details of the initial set-up, operation via RS-232 or RS-485, the command set and the communication protocol are described in this chapter.

7.2 CONFIGURATION

7.2.1 Default setting

The power supply is shipped with the following settings:

- **Address**:	6	- **Output**:	Off
- **Baud rate**:	9600	- **Start-Up mode**:	Safe-Start
- **RS-232/RS-485**:	RS-232	- **OVP**:	Maximum
- **Vout setting**:	0	- **UVL**:	0
- **Iout setting**:	Maximum	- **Foldback**:	Off
- **Master/Slave**	H1 (Master)	- **Front panel**:	Unlocked (UFP)

7.2.2 Address Setting

The power supply Address can be set to any integer value between 0 and 30. Follow the instructions described below to set the unit Address.

1. If the unit is in **Remote** mode (front panel **REM/LOC LED** illuminated), press the **REM/LOC** button to put the unit into **Local** mode.
2. Press and hold the **REM/LOC** button for approximately 3 seconds. The **VOLTAGE** meter will display the communication port Address.
3. Using the **VOLTAGE** adjust encoder, select the unit Address.

   To preview the power supply Address at any time, press and hold the **REM/LOC** button for approximately 3 seconds. The **VOLTAGE** meter will display the power supply Address.

7.2.3 RS-232 or RS-485 Selection

To select between RS-232 and RS-485 serial communication, set the rear panel setup DIP-switch SW1-6 position to:

- **DOWN:** RS-232
- **UP**: RS-485

7.2.4 Baud Rate Setting

Five optional Baud rates are possible: 1200, 2400, 4800, 9600 and 19200. To select the desired Baud rate, the following steps should be taken:

1. If the unit is in **Remote** mode (front panel **REM/LOC LED** illuminated), press the **REM/LOC** button to put the unit into **Local** mode.
2. Press and hold the **REM/LOC** button for approximately 3 seconds. The **CURRENT** meter will display the communication port Baud rate.
3. Using the **CURRENT** adjust encoder, select the desired Baud Rate.

   To preview the power supply Address at any time, press and hold the **REM/LOC** button for approximately 3 seconds. The **VOLTAGE** meter will display the power supply Address.

7.2.5 Setting the Unit into Remote or Local Mode

1. The unit will be put into **Remote** mode only via serial communication command.
   Commands that will put the unit into **Remote** mode are:

   - **RST**
   - **PV n**
   - **OUT n**
   - **PC n**
   - **RMT n**

   (for "**n"** values see Tables 7-3, 7-4, 7-5, and 7-6)

2. There are two Remote modes:

   1. **Remote**: In this mode, return to **Local** mode can be made by the front panel **REM/LOC** button or via serial port command **RMT 0**. Set the unit into **Remote** mode via serial port command **RMT 1**.

   2. **Local Lockout**: In this mode the unit can be returned to **Remote** mode via the serial port command **RMT 1** or by recycling the AC Input power. In **Local Lockout** mode, the front panel **REM/LOC** button is not active. Set the unit into **Local Lockout** mode via serial port command **RMT 2**.

7.2.6 RS-232/RS-485 Port in Local Mode

When the power supply is in **Local** mode, it can receive queries or commands. If a query is received, the power supply will reply and remain in **Local** mode. If a command that affects the output is received, the power supply will perform the command and switch to **Remote** mode.
Serial commands may be sent to set the status registers and read them while the unit is in **Local** mode. If the Enable registers are set (refer to Section 7.8) the power supply will transmit SRQ's while in **Local** mode.

7.2.7 Front Panel in Remote Mode

Front panel control in **Remote** mode is disabled except for:

- **PREView**: use to preview the Output voltage and Output current settings.
- **OVP/UVL**: use to preview the power supply OVP/UVL settings.
- LOC/REM: use to set the unit into **Local** mode.

In **Local Lockout** mode, only the **PREView** and *OVP/UVL* pushbuttons are active.

7.3 REAR PANEL RS-232/RS-485 CONNECTOR

The RS-232/RS-485 interface is accessible through the rear panel RS-2332/RS-485 **IN** and RS-485 **OUT** connectors. The connectors are 8 contact RJ-45. The **IN** and **OUT** connectors are used to connect power supplies in a RS-232 or RS-485 daisy-chain to a controller. Refer to Figure 7-1 for the **IN/OUT** connectors.

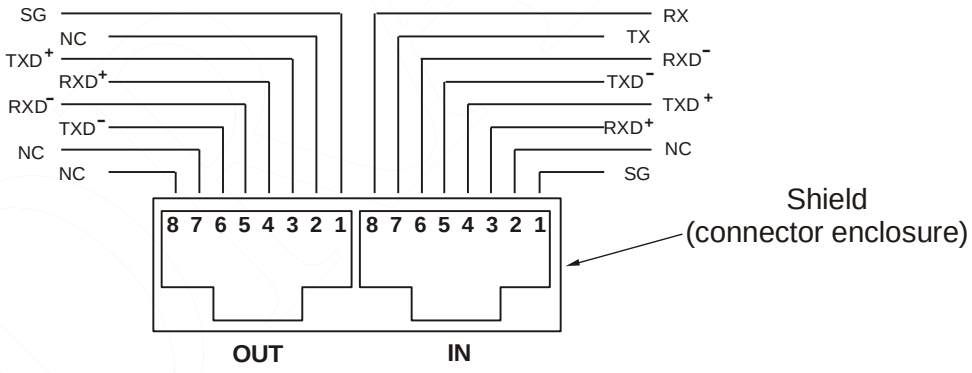


Figure 7-1: Rear Panel J3 IN/OUT Connectors Pinout

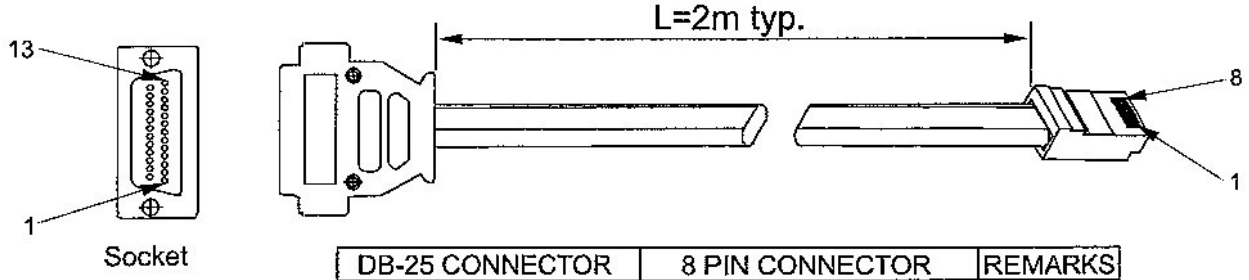
NOTE

Tx and Rx are used for R-S232 communication. Txd +/- and Rxd +/- are used for RS-485 communication. Refer to RS-232 and RS-485 cables description for connection details.

7.4 CONNECTING POWER SUPPLIES TO RS-232 OR RS-485 BUS

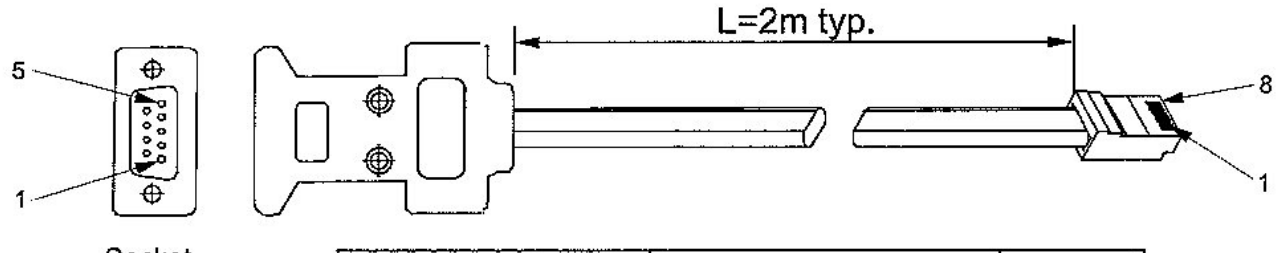
7.4.1 Single Power Supply

1. Select the desired serial communication interface (RS-232 or RS-485) using rear panel setup DIP-switch SW1-6 (Section 4-4).
   - RS-232: **DOWN** position
   - RS-485: **UP** position
2. Connect the rear panel J3-IN connector to the controller RS-232 or RS-485 port using a suitable shielded cable. Refer to Figures 7-2, 7-3 and 7-4 for available RS-232 and RS-485 cables.



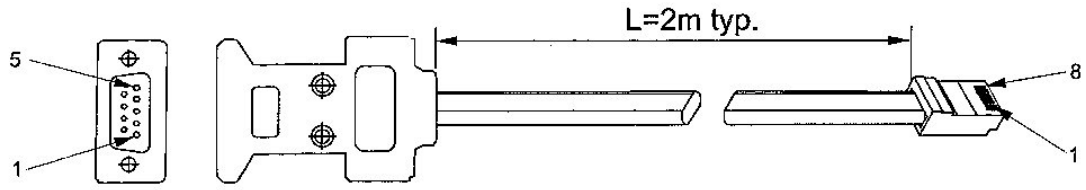
DB-25 CONNECTOR		8 PIN CONNECTOR		REMARKS
PIN NO.	NAME	PIN NO.	NAME	
1	SHIELD	HOUSING	SHIELD	
2	TX	8	RX	TWISTED PAIR
3	RX	7	TX	
7	SG	1	SG	

Figure 7-2: RS-232 Cable with DB25 Connector (P/N:GEN/232-25)



DB-9 CONNECTOR		8 PIN CONNECTOR		REMARKS
PIN NO.	NAME	PIN NO.	NAME	
HOUSING	SHIELD	HOUSING	SHIELD	
2	RX	7	TX	TWISTED PAIR
3	TX	8	RX	
5	SG	1	SG	

Figure 7-3: RS-232 Cable with DB9 Connector (P/N: GEN/232-9)



DB-9 CONNECTOR		8 PIN CONNECTOR		REMARKS
PIN NO.	NAME	PIN NO.	NAME	
HOUSING	SHIELD	HOUSING	SHIELD	
9	TXD-	6	RXD-	TWISTED PAIR
8	TXD+	3	RXD+	
1	SG	1	SG	
5	RXD-	5	TXD-	TWISTED PAIR
4	RXD+	4	TXD+	

Figure 7-4: RS-485 Cable with DB9 Connector (P/N: GEN/485-9)

7.4.2 Multi-Power Supply Connection to RS-232 or RS-485 Bus

Up to 31 units can be connected to a RS-232 or RS-485 bus (via a RS-485 daisy-chained serial communication bus). The first unit connects to the controller via the J3-IN (RS-232 or RS-485) connector and the other units are connected via the daisy-chained J3-IN/J3-OUT (RS-485) connectors. The user must set all Slave supplies to a unique unit Address and no two supplies may have the same unit Address.

1. **First unit connection**: Refer to Section 7.5.1 for connecting the first unit to the controller.
2. **Other unit(s) connection**: The other units on the daisy-chained serial communication bus are connected via their RS-485 interface. Refer to Figure 7-5 for a typical multi-power supply connection.
   - Set the rear panel setup **DIP-**switch SW1-6 to the **UP** position.
   - Using the "**Linking**" cable, supplied with each unit (refer to Figure 7-6), connect each unit J3-**OUT** connector to the next unit **J3-IN** connector.

   *It is recommended that when using several power supplies in a serial communication daisy-chain system to connect a 120ohm resistive termination at the last unit J3-OUT (RS-485) connector.
   - 120Ω (0.5W) between **TXD+** and **TXD-**
   - 120Ω (0.5W) between **RXD+** and **RXD-**

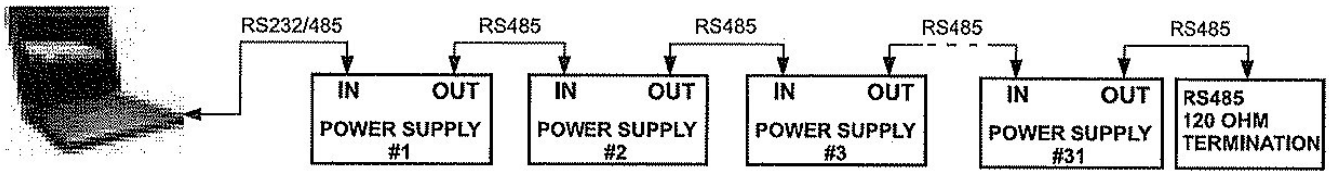
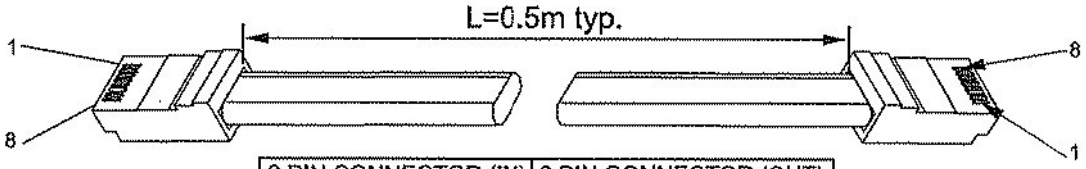


Figure 7-5: Multi-Power Supply RS-232/RS-485 Daisy-Chain Connection



8 PIN CONNECTOR (IN)		8 PIN CONNECTOR (OUT)	
PIN NO.	NAME	PIN NO.	NAME
HOUSING	SHIELD	HOUSING	SHIELD
1	SG	1	SG
6	TXD −	6	RXD −
3	TXD +	3	RXD +
5	RXD −	5	TXD −
4	RXD +	4	TXD +

Figure 7-6: Serial "Link" Cable with RJ-45 Shielded Connectors (P/N:GENR45)

7.5 COMMUNICATION INTERFACE PROTOCOL

> **NOTE**
>
> The address (**ADR n**) command must return an "**OK**" response before any other commands are accepted.

7.5.1 Data Format

Serial data format is 8 bit, one start bit and one stop bit. No parity bit.

7.5.2 Addressing

The unit Address is sent separately from the command. It is recommended to add a 100 millisecond software delay between a unit query or sent command to next unit addressing. Refer to Section 7.7.3 for details.

7.5.3 End of Message

The end of message is the Carriage Return character (ASCII 13). The power supply ignores the Line Feed (ASCII 10) character.

7.5.4 Command Repeat

The backslash character "\" will cause the last command to be repeated.

7.5.5 Checksum

The user may optionally add a checksum to the end of the command. The checksum is "**$**" followed by two hex characters. If a command or a query has a checksum, the response will also have one. There is no **CR** between the command string and the "**$**" sign.

Example: **STT?$3A**
STAT?$7B

7.5.6 Acknowledge

The power supply acknowledges received commands by returning an "**OK**" message. If an error is detected the power supply will return an error message. The rules of checksum also apply to the Acknowledge.

7.5.7 Error Message

If an error is detected in command or query, the power supply will respond with an error message. Refer to Section 7.6 for details.

7.5.8 Backspace

The backspace character (ASCII 8) clears the last character sent to the power supply.

7.6 ERROR MESSAGES

The power supply will return error messages for illegal commands and illegal programming parameters. Refer to Table 7-1 for programming error messages and Table 7-2 for command error messages.

Error Code	Description
E01	Returned when program voltage (**PV**) is programmed above acceptable range. Example: **PV** above '105% of supply rating' or **PV** above 95% of OVP setting'.
E02	Returned when programming output voltage below **UVL** setting.
E04	Returned when **OVP** is programmed below acceptable range. Example: **OVP** less than "5% of supply voltage rating' plus 'voltage setting'.
E06	Returned when **UVL** is programmed above the programmed Output voltage.
E07	Returned when programming the Output to **ON** during a fault shut down.

Table 7-1: Programming Error Messages

Error Code	Description
C01	Illegal command or query
C02	Missing parameter
C03	Illegal parameter
C04	Checksum error
C05	Setting out of range

Table 7-2: Command Error Messages

7.7 COMMAND SET DESCRIPTION

7.7.1 General Guide

1. Any command or argument may be in capital letters or small letters.
2. In commands with an argument, a space must be between the command and the argument.
3. For any command that sets a numeric value, the value may be up to 12 characters long.
4. Carriage Return: If the **CR** character (ASCII 13) is received by itself, the power supply will respond with "**OK**" and **CR**.

7.7.2 Command Set Categories

The Genesys™ 2400W Power Supply Series command set is divided into four categories as follows:

1. Initialization Control
2. ID Control
3. Output Control
4. Status Control

7.7.3 Initialization Control Commands

#	Command	Description
1	**ADR n**	**ADR** is followed by address, which can be 0 to 30, and is used to access the power supply.
2	**CLS**	Clear status. Sets **FEVE** and **SEVE** registers to zero (refer to Section 7-8).
3	**RST**	Reset command. Brings the power supply to a safe and known state: **Output voltage**: zero **Remote/Local Mode**: non-lockout remote **Output current**: zero, **Auto-ReStart mode**: OFF **Output ON/OFF**: OFF **OVP setting**: maximum **FOLDback ON/OFF**: OFF **UVL setting**: zero The conditional registers (**FLT** and **STAT**) are updated while other registers are not changed.
4	**RMT**	Sets the power supply to local or remote mode: 1. **RMT 0** or **RMT LOC**, sets the power supply into **Local** mode. 2. **RMT 1** or **RMT REM**, sets the unit into **Remote** mode. 3. **RMT 2** or **RMT LLO**, sets the unit into **Local Lockout** mode (**Latched Remote** mode).
5	**RMT?**	Returns to the **Remote** mode setting: 1. "**LOC**": The unit is in **Local** mode. 2. "**REM**": The unit is in **Remote** mode. 3. "**LLO**": The unit is in **Local Lockout** (**Latched Remote**) mode.
6	**MDAV?**	Returns **MD MODE OPTION** Status. "**1**" indicates installed, and "**0**" indicates not installed.
7	****	Repeat last command. If **\<CR>** is received, the power supply will repeat the last command.

7.7.4 ID Control Commands

#	Command	Description
1	**IDN?**	Returns the power supply model identification as an ASCII string: **LAMBDA, GENX-Y**
2	**REV?**	Returns the software version as an ASCII string.
3	**SN?**	Returns the unit serial number. Up to 12 characters.
4	**DATE?**	Returns date of last test. **Date format:** yyyy/mm/dd

7.7.5 Output Control Commands

#	Command	Description
1	**PV n**	Sets the Output voltage value in Volts. The range of Output voltage value is described in Table 7-3. The maximum number of characters is 12. See the following examples for **PV n** format: PV 12, PV 012, PV 12.0, PV 012.00, etc…
2	**PV?**	Reads the Output voltage setting. Returns the string "**n**" where "**n**" is the exact string sent in the **PV n** command. When in **Local** mode, returns the **PREView** (front panel) settings in a 5 digit string.
3	**MV?**	Reads the actual Output voltage. Returns a 5 digit string. **Example**: 60V supply sends 01.150, 15.012, 50.000, etc…
4	**PC n** (See Note 1)	Sets the Output current value in Amperes. The range of Output current value is described in Table 7-4. The maximum number of characters is 12. See the following examples for **PC n** format: PC 10, PC 10.0, PC 010.00, etc…
5	**PC?**	Reads the Output current setting. Returns the string "**n**" where "**n**" is the exact string sent in the **PC n** command. When in **Local** mode, returns the **PREV**iew (front panel) settings in a 5 digit string.
6	**MC?** (See Note 2)	Reads the actual Output current. Returns a 5 digit string. **Example**: 200A supply sends 000.50, 110.12, 200.00, etc…

7.7.5 Output Control Commands (continued)

#	Command	Description
7	**DVC?**	Display Voltage and Current data. Data will be returned as a string of ASCII characters. A comma will separate the different fields. The fields, in order, are: Measured Voltage, Programmed Voltage, Measured Current, Programmed Current, Over-Voltage Set Point and Under-Voltage Set Point. **Example**: 5.9999,6.0000,010.02,010.00,7.500,0.000
8	**OUT n**	Turns the output to **ON** or **OFF**. Recover from Safe-Start, OVP or FLD fault. **OUT 1** (or **OUT ON**): Turn Output **ON**; **OUT 0** (or **OUT OFF**): Turn Output **OFF**
9	**OUT?**	Returns the Output **ON/OFF** status string. **ON**: Output **ON**. **OFF**: Output **OFF**.
10	**FLD n**	Sets the **FOLD**back protection to **ON** or **OFF**. **FLD 1** (or **FOLD ON**) - Arms the **FOLD**back protection **FLD 0** (or **FOLD OFF**) - Cancels the **FOLD**back protection. When the Foldback protection has been activated, the **FLD 1** command will release the protection and re-arm it, while the **FLD 0** command will cancel the protection.
11	**FLD?**	Returns the **FOLD**back protection status string: **ON**: **FOLD**back is armed. **OFF**: **FOLD**back is cancelled.
12	**FBD nn**	Add (nn x 0.1) seconds to the **FOLD**back Delay. This delay is in addition to the standard delay. The range of nn is 0 to 255. The value is stored in EPROM memory at AC Input power down and recovered at AC Input power up.
13	**FBD ?**	Returns the value of the added **FOLD**back Delay.
14	**FBDRST**	Resets the added **FOLD**back Delay to zero.
15	**OVP n**	Sets the **OVP** level. The **OVP** setting range is given in Table 7-5. The number of characters after **OVP** is up to 12. The minimum setting level is approximately 105% of the Output voltage setting, or the value in Table 7-6, whichever is higher. The maximum setting level is shown in Table 5-1. Attempting to program the **OVP** below this level will result in an execution error response ("**E04**") and the **OVP** setting stays unchanged.
16	**OVP?**	Returns the setting "**n**" where "**n**" is the exact string from the "**OVP n**" command. When in **Local** mode, returns the last setting from the front panel in a 4 digit string.
17	**OVM**	Sets **OVP** level to the maximum level. Refer to Table 7-5.
18	**UVL n**	Sets the Under Voltage Limit level. Value of "**n**" may be equal to the **PV** setting, but returns "**E06**" if higher. Refer to Table 7-6 for **UVL** programming range.
19	**UVL?**	Returns the setting "**n**" where "**n**" is the exact string from the "**UVL n**" command. When in **Local** mode, returns the last setting from the front panel in a 4 digit string.
20	**AST n**	Sets the **Auto-Restart** mode to **ON** or **OFF**. **AST 1** (or **AST ON**): Auto-Restart **ON**. **AST 0** (or **AST OFF**): Auto restart **OFF**.
21	**AST?**	Returns the string Auto-Restart mode status.
22	**SAV**	Saves "Present Settings". The "Present Settings" are the same as power-down "Last Settings". These settings are erased when the power supply AC Input power is switched OFF and the new "Last Settings" are saved.
23	**RCL**	Recalls "Last Settings". Settings are from the last AC Input power-down or from the last "**SAV**" command.
24	**MODE?**	Returns the power supply operation mode. When the power supply Output is **ON** (**OUT 1**) it will return "**CV**" or "**CC**". When the power supply Output is **OFF** (**OUT 0**) it will return "**OFF**".
25	**MS?**	Returns the unit Master/Slave setting. Master: n = 1, 2, 3, or 4 Slave: n = 0

NOTES:
1. In "**Advanced Parallel**" mode (refer to Section 5.15.2), "**n**" is the total system Output current.
2. In "**Advanced Parallel**" mode, "**MC?**" returns the Master unit Output current multiplied by the "Number of Slave units + 1".

7.7.6 Global Output Commands

7.7.6.1 General

All power supplies, even if not the currently addressed power supply, receiving a Global command will execute that Global command. No response (to the controller/PC issuing the command) will be returned to the controller/PC. The controller/PC issuing the Global command will be responsible to delay any other communications until the command is executed. The suggested delay is 200 milliseconds minimum.
If the Global command contains an error, "out of range values" for example, no error report will be sent to the issuing controller/PC.

#	Command	Description
1	**GRST**	**Global Reset**. Brings the power supply to a safe and known state: **Output voltage**: 0V, **Output current**: 0A, **OUT**: Off**, Local/Remote**: Remote, **AST**: OFF, **OVP**: Maximum, **UVL**: 0V. The conditional register (**FLT** and **STAT**) are updated. Other registers are *not* changed. Non-latching faults (FB, OVP, SO) are cleared, **OUT** fault stays
2	**GPV n**	Sets the Output voltage value in Volts. The range of Output voltage values is shown in Table 7-3. '**n**' may be up to 12 characters plus decimal point
3	**GPC n**	Program the Output current value in Amperes. The range of Output current values is shown in Table 7-4. '**n**' may be up to 12 characters plus decimal point
4	**GOUT**	Turns the output to **ON** or **OFF**: "**OUT 1 (or OUT ON)**" **=** Turn Output **ON** "**OUT 0** (or **OUT OFF)**" **=** Turn Output **OFF**; clears **CV** and **CC** bits in the Status Condition (**STAT**) register. **OUT ON** will respond with "**E07**" if the output cannot be turned **ON** because of a latching fault (OTP, AC, ENA, SO) shutdown.
5	**GSAV**	Saves "Present Settings". Same settings as power-down last settings listed in Section 5.13 except the unit Address and Baud rate are not saved to EPROM memory. These settings are erased when the power supply AC Input power is switched OFF and the new 'Last Settings" are saved.
6	**GRCL**	Recalls "Last Settings". Settings are from last AC Input power-down or from last '**SAV**' or '**GSAV**' command. Unit Address and Baud rate are not recalled so serial communication is not interrupted.

Model VOrated	Minimum (V)	Maximum (V)
8	0.0000	8.000
10	00.000	10.000
16	00.000	16.000
20	00.000	20.000
30	00.000	30.000
40	00.000	40.000
60	00.000	60.000
80	00.000	80.000
100	000.00	100.00
150	000.00	150.00
300	000.00	300.00
600	000.00	600.00

Table 7-3: Voltage programming range

Model IOrated	Minimum (A)	Maximum (A)
300	000.00	300.00
240	000.00	240.00
150	000.00	150.00
120	000.00	120.00
80	00.000	80.000
60	00.000	60.000
40	00.000	40.000
30	00.000	30.000
24	00.000	24.000
16	00.000	16.000
8	0.0000	8.0000
4	0.0000	4.0000

Table 7-4: Current programming range

NOTE

The power supply can accept values 5% higher than the values Tables 7-3 and 7-4, however it is not recommended to program the power supply beyond its rated values.

Rated Output Voltage (V)	OVP Minimum (V)	OVP Maximum (V)
8	0.5	10.0
10	0.5	12.0
16	1.0	19.0
20	1.0	24.0
30	2.0	36.0
40	2.0	44.0
60	5.0	66.0
80	5.0	88.0
100	5.0	110
150	5.0	165
300	5.0	330
600	5.0	660

Table 7-5: OVP Programming Range

Rated Output Voltage (V)	UVL Minimum (V)	UVL Maximum (V)
8	0	7.60
10	0	9.50
16	0	15.2
20	0	19.0
30	0	28.5
40	0	38.0
60	0	57.0
80	0	76.0
100	0	95.0
150	0	142
300	0	285
600	0	570

Table 7-6: UVL Programming Range

7.7.7 Status Control Commands

Refer to Section 7-8 for definition of registers.

#	Command	Description
1	**STT?**	Reads the complete power supply status. Returns ASCII characters representing the following data, separated by commas: **MV**<actual (measured) voltage> **PC**<programmed (set) current> **PV**<programmed (set) voltage> **SR**<status register, 2-digit hex> **MC**<actual (measured) current> **FR**<fault register, 2-digit hex> Example response: **MV**(45.201), **PV**(45), **MC**(4.3257), **PC**(10), SR(30), FR(00)
2	**FLT?**	Reads Fault Conditional Register. Returns 2-digit hexadecimal (hex)
3	**FENA**	Set Fault Enable Register using 2-digit hexadecimal (hex)
4	**FENA?**	Reads Fault Enable Register. Returns 2-digit hexadecimal (hex)
5	**FEVE?**	Reads Fault Event Register. Returns 2-digit hex. Clears bits of Fault Event Register.
6	**STAT?**	Reads Status Conditional Register. Returns 2-digit hexadecimal (hex)
7	**SENA**	Sets Status Enable Register using 2-digit hexadecimal (hex)
8	**SENA?**	Reads Status Enable Register. Returns 2-digit hexadecimal (hex)
9	**SEVE?**	Reads Status Event register. Returns 2-digit hex. Clears bits of Status Event register.

7.8 STATUS, ERROR AND SRQ REGISTERS

7.8.1 General

This Section describes the various status errors and **SRQ** registers structure. The registers can be read or set via the RS-232/RS-485 serial communication commands. When using the LAN, IEEE or USB Interface option, refer to the specific User's Manual. Refer to Figure 7-7 for the Status and Error Registers Diagram.

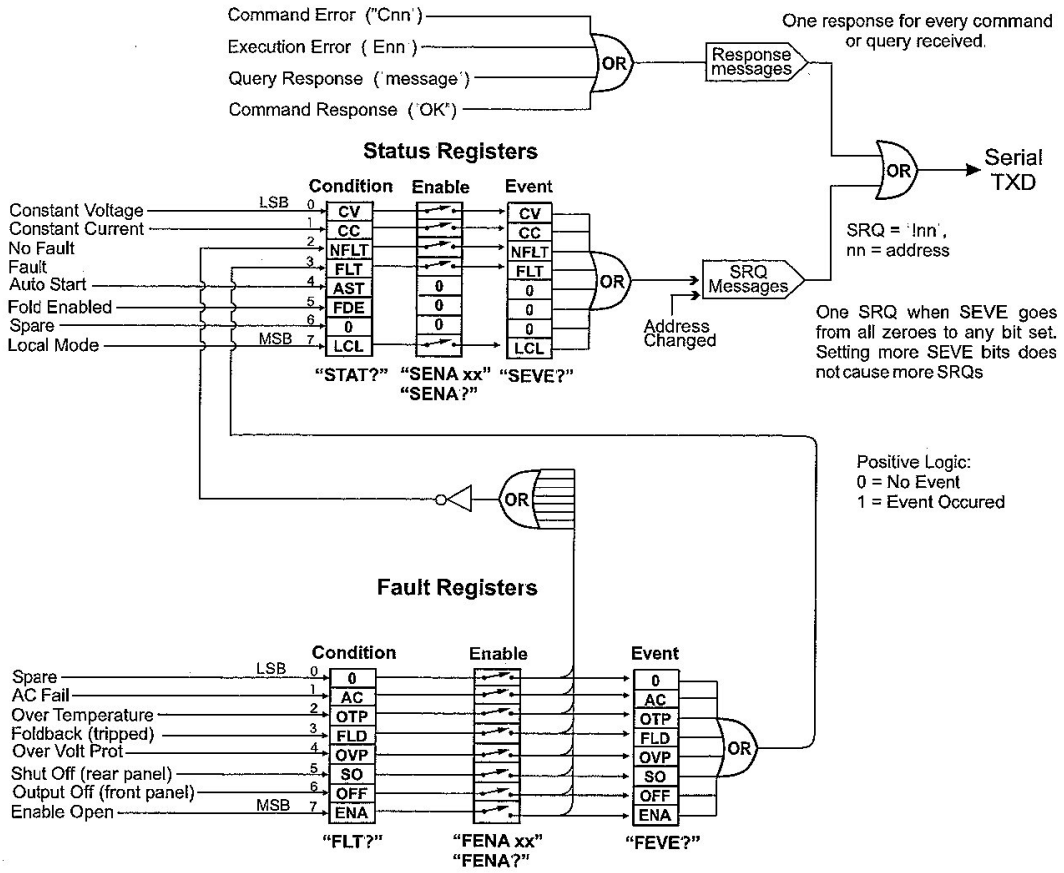


Figure 7-7 Status and Error Registers Diagram

7.8.2 Conditional Registers

The Fault Condition Register and the Status Condition Register are read only registers that the user may read to see the condition of the power supply. Refer to Table 7-7 for a description of the Fault Condition Register bits and Table 7-8 for the Status Condition Register bits.

BIT	Fault name	Fault symbol	Bit Set condition	Bit Reset condition
0 (LSB)	Spare bit	SPARE	Fixed to zero	Fixed to zero
1	AC Fail	AC	**AC** fail has occurred.	The AC input returns to normal operating range.
2	Over-Temperature	OTP	**OTP** shutdown has occurred.	**OTP** condition removed and power supply returns to normal operation.
3	**FOLD**back	FOLD	**FOLD**back shutdown has occurred	The power supply output is turned **ON** by front panel **OUT** button or **OUT 1** command.
4	Over-Voltage	OVP	**OVP** shutdown has occurred.	The power supply output is turned **ON** by front panel **OUT** button or **OUT 1** command.
5	Shut-Off	SO	Rear panel J1 "Shut- Off" condition has occurred.	Rear panel J1 "**Shut Off**" condition has been removed.
6	Output **OFF**	OFF	Front panel OUT button pressed to OFF.	The power supply output is turned **ON** by front panel **OUT** button or **OUT 1** command.
7(MSB)	Enable	ENA	Rear panel J1 Enable terminals (J1-1 & J1-14) opened.	Rear panel J1 Enable terminals closed.

Table 7-7: Fault Condition Register

BIT	Status name	Status symbol	Bit Set condition	Bit Reset condition
0 (LSB)	Constant-Voltage	CV	Output is **ON** and the power supply is in **CV** mode.	Output is **ON** and the power supply is **NOT** in **CV** mode.
1	Constant-Current	CC	Output is **ON** and the power supply is in **CC** mode.	Output is **ON** and the power supply is **NOT** in **CC** mode.
2	No Fault	NFLT	The power supply is operating normally or fault reporting is not Enabled. See the "**OUT n**" command in Section 7.8.5.	One or more faults are active and fault reporting is Enabled (using "**FENAxx**").
3	Fault active	FLT	One or more faults are enabled and occur.	Fault Event Register cleared (**FEVE?**).
4	Auto-Restart Enabled	AST	Supply is **in Auto-Restart** mode (from Front Panel or **AST 1** serial command).	Supply is in **Safe-Start** mode (from Front Panel or **AST 0** serial command).
5	Fold Enabled	FDE	FOLDback protection is Enabled (from front panel **FOLD** button or **FLD 1** serial command).	**FOLD**back protection is Disabled (from front panel **FOLD** button or **FLD 0** serial command).
6	Spare bit	SPARE	Fixed to zero.	Fixed to zero.
7(MSB)	Local Mode	LCL	Power supply in **Local** mode.	Power supply in **Remote** mode or **Local-Lockout** mode.

Table 7-8: Status Condition Register

7.8.3 Service Request: Enable and Event Registers

The Conditional Registers are continuously monitored. When a change is detected in a register bit which is enabled, the power supply will generate an **SRQ** message.

The **SRQ** message is: "**!nn**" terminated by **CR**, where the "**nn**" is the power supply Address. The **SRQ** will be generated either in Local or Remote mode. Refer to Tables 7-9 to 7-12 for details of the Enable and Event Registers.

7.8.3.1 Fault Enable Register

The Fault Enable Register is set to the enable fault **SRQ's**.

BIT	Enable bit name	Fault symbol	Bit Set condition	Bit reset condition
0 (LSB)	Spare bit	SPARE	User command: "**FENA nn**" where "**nn"** is hexadecimal	User command: "**FENA nn**" where "**nn**" is hexadecimal. If **nn=**"00", no fault **SRQ's** will be generated.
1	AC Fail	AC		
2	Over-Temperature	OTP		
3	**FOLD**back	FOLD		
4	OverVoltage	OVP		
5	Shut-Off	SO		
6	Output OFF	OFF		
7(MSB)	Enable	ENA		

Table 7-9: Fault Enable Register

7.8.3.2 Fault Event Register

The Fault Event will set a bit if a condition occurs and it is Enabled. The register is cleared when **FEVE?**, **CLS** or **RST** commands are received.

BIT	Enable bit name	Fault symbol	Bit Set condition	Bit reset condition
0 (LSB)	Spare bit	SPARE	Fault condition occurs and it is enabled. The fault can set a bit, but when the fault clears the bit remains set.	Entire Event Register is cleared when user sends "**FEVE?**" command to read the register. "**CLS**" and AC Input power-up also clear the Fault Event Register. (The Fault Event Register is not cleared by the **RST** command)
1	AC Fail	AC		
2	Over-Temperature	OTP		
3	**FOLD**back	FOLD		
4	Over-Voltage	OVP		
5	Shut-Off	SO		
6	Output OFF	OFF		
7(MSB)	Enable	ENA		

Table 7-10: Fault Event Register

7.8.3.3 Status Enable Register

The Status Enable Register is set by the user to Enable **SRQ's** for changes in power supply status.

BIT	Status name	Status symbol	Bit Set condition	Bit reset condition
0 (LSB)	Constant-Voltage	CV	User command: "**SENA nn**" is received, where "**nn**" is hexadecimal bits.	User command: "**SENA nn**" is received, where "**nn**" is hexadecimal bits. If "**nn**"=00, no **SRQ** is sent when there is a change in Status Condition Register.
1	Constant-Current	CC		
2	No Fault	NFLT		
3	Fault active	FLT		
4	Auto-Restart Enabled	AST	Always zero	Always zero
5	**FOLD**back enabled	FDE	Always zero	Always zero
6	Spare	Spare	Always zero	Always zero
7 (MSB)	Local Mode	LCL	"**SENA nn**" command	"**SENA nn**" command

Table 7-11: Status Enable Register

7.8.3.4 Status Event Register

The Status Event Register will set a bit if a change in the power supply status occurs and it is enabled. The register is cleared when the "SEVE?" or "CLS" commands are received. A change in this register will generate SRQ.

BIT	Status name	Status symbol	Bit Set condition	Bit reset condition
0 (LSB)	Constant-Voltage	CV	Changes in status occur and it is Enabled. The change can set a bit, but when the change clears the bit remains set.	Entire Event Register is cleared when user sends "SEVE?" command to read the register. "CLS" and power-up also clear the Status Event Register. (The Fault Event Register is not cleared by RST.).
1	Constant-Current	CC		
2	No Fault	NFLT		
3	Fault active	FLT		
4	Not used	0	Always zero	
5	Not used	0	Always zero	
6	Not used	0	Always zero	
7 (MSB)	Local Mode	LCL	Unit is set to **Local** by pressing front panel **REM/LOC** button.	

Table 7-12: Status Event Register

7.9 SERIAL COMMUNICATION TEST SET-UP

Use the following instructions as basic set-up to test the serial communication operation.

7.9.1 Equipment:

PC with Windows Hyper-Terminal, private edition, software installed, Genesys™ Power supply, RS-232 cable.

7.9.2 PC Set-Up:

1. **Open Hyper Terminal**……. New Connection.
2. **Enter a name**
3. **Connect to**…… Direct to Com1 or Com2
4. **Configure port properties**:

   Bits per second……9600
   Data bits……8
   Parity……None
   Stop bits……1
   Flow control…….None
5. **Open Properties in the program** File……Properties
6. **Setting**: ASCII Set Up
   Select Echo characters locally, select send line ends with line feed. On some PC systems, pressing the number keypad "**Enter**" will distort displayed messages. Use the alphabetic "**Enter**" instead.

7.9.3 Power Supply Set-Up:

1. Connect the power supply to the PC using the RS-232 cable.
2. Set via the front panel: Baud Rate: 9600, Address: 06.
3. Set via the rear panel: RS-232/RS-485 to RS-232 (refer to Section 4-4).

7.9.4 Communication Test:

1. **Model identification**:
   PC write: **ADR 06**
   Power supply response: "**OK**"
2. **Command test**:
   PC write: **OUT1**
   Power supply response: "**OK**"
   PC write: **PVn**
   Power supply response: "**OK**"
   PC write: **PCn** (for values of "**n**" see Tables 7-3, 7-4 and 7-5)
   Power supply response: "**OK**"

The power supply should turn on and the front panel display will indicate the actual Output voltage and the actual Output current.

CHAPTER 8 ISOLATED ANALOG PROGRAMMING OPTION

8.1 INTRODUCTION

The Isolated Analog Programming Interface is an internal option card for Remote Analog programming of the Genesys™ Power Supply Series. This option is factory installed and cannot be mixed with any other optional interface (LAN, IEEE or USB). Output voltage and Output current limit can be programmed and read back through optically isolated signals which are isolated from all other ground references in the power supply.

There are two types of Isolated Analog Programming Interfaces:

1. **0-5V/0-10V option** : Using 0-5V or 0-10V signals for programming and readback.
2. **4-20mA option** : Using current signals for programming and readback.

8.2 SPECIFICATIONS

8.2.1 0-5V/0-10V OPTION (PN: IS510)

Programming Inputs	Output Voltage programming accuracy	**%**	+/-1
	Output Current programming accuracy	**%**	+/-1
	Output Voltage programming temperature coefficient	**ppm/°C**	+/-100
	Output Current programming temperature coefficient	**ppm/°C**	+/-100
	Input impedance	**Ohms**	1Meg
	Absolute maximum voltage	**VDC**	0-15
	Max. voltage between program inputs and supply outputs	**VDC**	600
Monitoring Outputs	Output Voltage monitoring accuracy	**%**	+/-1.5
	Output Current monitoring accuracy	**%**	+/-1.5
	Output Impedance (see Note)	**Ohms**	100
	Max. voltage between monitoring outputs and supply outputs	**VDC**	600

NOTE:

Use 100kohms minimum input impedance for the monitoring circuits to minimize the readback error.

8.2.2 4-20mA option (PN: IS420)

Programming Inputs	Output Voltage programming accuracy	**%**	+/-1
	Output Current programming accuracy	**%**	+/-1
	Output Voltage programming temperature coefficient	**ppm/°C**	+/-200
	Output Current programming temperature coefficient	**ppm/°C**	+/-200
	Input impedance	**Ohms**	50
	Absolute maximum input current	**mA**	0-30
	Max. voltage between program inputs and supply outputs	**VDC**	600
Monitoring Outputs	Output Voltage monitoring accuracy	**%**	+/-1.5
	Output Current monitoring accuracy	**%**	+/-1.5
	Maximum load impedance	**Ohms**	500
	Max. voltage between monitoring outputs and supply outputs	**VDC**	600

8.3 ISOLATED PROGRAMMING & MONITORING CONNECTOR

Refer to Table 8-1 for a detailed description of the rear panel Isolated Programming & Monitoring connector. To provide the lowest noise performance, it is recommended to use shielded-twisted pair wiring.
Refer to Figure 8-1 for a description of the Isolated Analog Programming & Monitoring connector.

Isolated Analog Programming Plug P/N: MC1.5/8-ST-3.81, Phoenix.

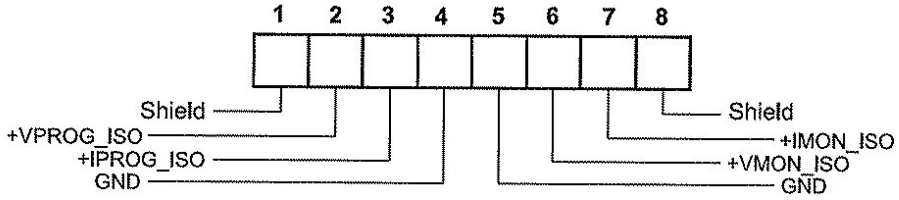


Figure 8-1: Isolated Programming and Monitoring Connector

Terminal	Signal name	Function	Range (IS510 option)	Range (IS420 option)
1	SHLD	Shield, connected internally to chassis of the supply.	Chassis ground	
2	+VPROG_ISO	Output Voltage programming input	0-5V/0-10V	4-20mA
3	+IPROG_ISO	Output Current programming input	0-5V/0-10V	4-20mA
4	GND	Ground for programming signals.	Ground	Ground
5	GND	Ground for programming signals.	Ground	Ground
6	+VMON_ISO	Output voltage monitoring output	0-5V/0-10V	4-20mA
7	+IMON_ISO	Output current monitoring output	0-5V/0-10V	4-20mA
8	SHLD	Shield, connected internally to chassis of the supply.	Chassis ground	

Table 8-1: Description of Isolated programming & Monitoring Connector

CAUTION

When the Isolated Analog Option is installed, **DO NOT** apply any signals to the non-isolated VPGM and IPGM (J1-9 and J1-10) pins. All other J1 features may be used normally. Refer to Section 4.5 for a description of J1 features.

Parallel Operation: The optional Isolated Analog (IS510/IS420) Interface must be installed in both the **Master** and **Slave** unit.

8.4 SETUP AND OPERATING INSTRUCTIONS

CAUTION
To prevent damage to the unit, do not program the Output voltage and Output current to higher than the power supply ratings.

8.4.1 Setting up the Power Supply for 0-5V/0-10V Isolated Programming and Monitoring

Perform the following procedure to configure the power supply:

1. Press the power supply AC Input power switch to the **OFF position**.
2. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4-4).
3. Set DIP-switch SW1-1 to the **UP** position for Output voltage external programming and SW1-2 to the **UP** position for Output current limit external programming.
4. Set SW1-3 to select the Programming Voltage Range: **DOWN** = 0-5V, **UP** = 0-10V.
5. Set SW1-4 to select the Monitoring Voltage Range: **DOWN** = 0-5V, **UP** = 0-10V.
6. Ensure that SW1-7 and SW1-8 are in the **DOWN** position.
7. Connect the programming sources to the mating plug of the Isolated Programming connector. Observe for correct polarity of the voltage source.

NOTE
J1-8 and J1-12 must be connected together with a jumper.

8. Set the programming sources to the desired levels. Turn **ON** the power supply by pressing the AC Input power switch to ON and then pressing the front panel display OUT button.

8.4.2 Setting up the Power Supply for 4-20mA Isolated Programming and Monitoring

Perform the following procedure to configure the power supply:

1. Press the power supply AC Input power switch to the OFF position.
2. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4-4).
3. Set DIP-switch SW1-1 to the **UP** position for Output voltage external programming and SW1-2 to the **UP** position for Output current limit external programming.
4. Set SW1-3 to the **UP** position.
5. Set SW1-4 to the **UP** position.
6. Ensure that SW1-7 and SW1-8 are in the **DOWN** position.
7. Connect the programming source to the mating plug of the Isolated Programming connector. Observe for correct polarity of the voltage source.

NOTE
J1-8 and J1-12 must be connected together with a jumper.

8. Set the programming sources to the desired levels. Turn **ON** the power supply by pressing the AC Input power switch to ON and then pressing the front panel display OUT button.programming sources to the desired levels and turn the power supply ON.

NOTE
SW1-3 and SW1-4 must be in the **UP** position for operation with the 4-20mA Isolated Programming and Monitoring Interface.

8.5 PARALLEL OPERATION WITH ISOLATED ANALOG OPTION

CAUTION
To prevent damage to the unit, do not program the Output voltage and Output current to higher then the power supply ratings.

8.5.1 Setting Up The Master Unit

Setting up the Power Supply for 0-5/0-10V Isolated Programming and Monitoring.

Perform the following procedure to configure the power supply:

1. Press the power supply AC Input power switch to the **OFF** position.
2. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4-4).
3. Set DIP-switch SW1-1 to the **UP** position for Output voltage external programming and SW1-2 to the **UP** position for Output current limit external programming.
4. Set SW1-3 to select the Programming Voltage Range: **DOWN** = 0-5V, **UP** = 0-10V.
5. Set SW1-4 to select the Monitoring Voltage Range: **DOWN** = 0-5V, **UP** = 0-10V.
6. Ensure that SW1-7 and SW1-8 are in the **DOWN** position.
7. Connect the programming sources to the mating plug of the **Master** Isolated Programming connector. Observe for correct polarity of the voltage source.

8.5.2 Setting Up The Slave Unit

Setting up the Power Supply for 0-5/0-10V Isolated Programming and Monitoring.

Perform the following procedure to configure the power supply:

1. Press the power supply AC Input power switch to the **OFF** position.
2. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4-4).
3. Set DIP-switch SW1-1 to the **DOWN** position for Output Voltage programming by front panel and SW1-2 to the **UP** position for Output Current limit external programming.
4. Set SW1-3 to select the Programming Voltage Range: **DOWN** = 0-5V, **UP** = 0-10V.
5. Set SW1-4 to select the Monitoring Voltage Range: **DOWN** = 0-5V, **UP** = 0-10V.
6. Ensure that SW1-7 and SW1-8 are in the **DOWN** position.
7. Connect pin 7 (**IMON_ISO**) of the **Master** unit Isolated Analog connector to pin 3 (**IPROG_ISO**) of the **Slave** unit Isolated Analog connector.
8. Connect pin 4 (GND) of the **Master** unit Isolated Analog connector to pin 4 (GND) of the **Slave** unit Isolated Analog connector.

Daisy-Chain Connection:

NOTE: All power supplies should be connected in a daisy-chain configuration

9. Connect J1-2, -3 of the **Master** unit to J1-2, -3 of the **Slave** unit.
10. Connect J1-15 of the **Master** unit to J1-16 of the **Slave** unit.
11. Connect J1-16 of the **Master** unit to J1-15 of the **Slave** unit.
12. Set the **Master** unit programming sources to the desired programming levels.
13. Turn **ON** the **Master** and **Slave** power supplies by pressing their respective AC Input power switch to the **ON** position and then pressing the **Master** unit front panel display **OUT** button.
14. Check and readjust the **Master** unit programming sources to the desired programming levels.

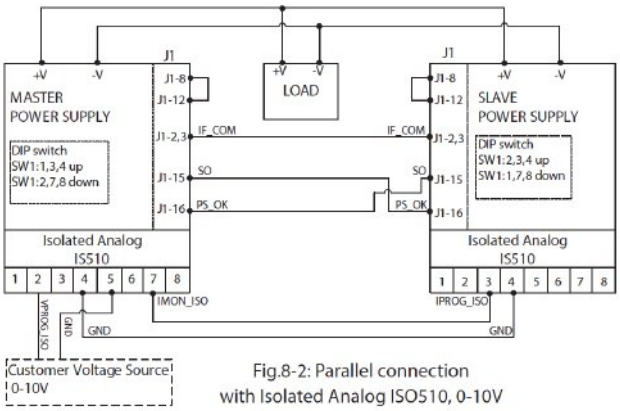


Fig.8-2: Parallel connection with Isolated Analog ISO510, 0-10V

CHAPTER 9 MAINTENANCE

9.1 INTRODUCTION

This Chapter provides information about maintenance, calibration and troubleshooting.

9.2 UNITS UNDER WARRANTY

Units requiring repair during the warranty period should be returned to a TDK Lambda Americas Inc Authorized Service Facility. Refer to the addresses listed on the back cover of this User's Manual. Unauthorized repairs performed by other than the Authorized Service Facilities may void the warranty.

9.3 PERIODIC MAINTENANCE

No routine maintenance of the power supply is required except for periodic cleaning. To clean, disconnect the unit from the AC supply and allow 30 seconds for discharging internal voltage. The front panel and the metal surfaces should be cleaned using a mild solution of detergent and water. The solution should be applied onto a soft cloth, and not directly to the surface of the unit. Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. Use low pressure compressed air to blow dust from the unit.

9.4 ADJUSTMENTS AND CALIBRATION

No internal adjustment or calibration is required. There is NO REASON to open the power supply cover.

9.5 PARTS REPLACEMENT AND REPAIRS

As repairs are made only by the manufacturer or by Authorized Service Facilities, no parts replacement information is provided in the User's Manual. In case of failure, unusual or erratic operation of the unit, contact a TDK-Lambda Americas Inc. Sales or Service Facility nearest you. Please refer to the TDK-Lambda Americas Inc. Sales offices addresses listing on the TDK- Lambda Americas Inc (Programmable & High Voltage) website: http://www.us.tdk-lambda.com/hp/

9.6 TROUBLESHOOTING

If the power supply appears to be operating improperly, use the Troubleshooting Guide (Table 9-1) to determine whether the power supply, load or external control circuit are the cause.

Configure the power supply for basic front panel operation and perform the tests of Section 3.8 to determine if the problem is with the supply.

Table 9-1 provides the basic checks that can be performed to diagnose problems, with references to sections of this User's Manual for further information.

Table 9-1: Troubleshooting Guide

SYMPTOM	CHECK	ACTION	REF
No output. All displays and indicators are blank.	Is the AC power cord defective ?	Check continuity, replace cord if necessary.	3.7
	Is the AC input voltage within range ?	Check AC input voltage. Connect to appropriate voltage source.	3.6 3.7
Output is present momentarily but shuts Off quickly. The display indicates "**AC**".	Does the AC source voltage sag when load is applied ?	Check AC input voltage. Connect to appropriate voltage source.	3.6
Output is present momentarily but shuts off quickly.The display indicates "**OUP**".	Is the power supply configured to Remote sense ?	Check if the positive or negative load wire is loose.	3.9.6 3.9.8
Output Voltage will not adjust. Front panel **CC LED** is illuminated.	Is the unit in Constant-Current (CC) mode ?	Check Output current limit setting and load current.	5.2.1 5.2.2

Table 9-1: Troubleshooting Guide (continued)

SYMPTOM	CHECK	ACTION	REF
Output Voltage will not adjust. Front panel **CV LED** is illuminated.	Check if output voltage is adjusted above **OVP** setting or below **UVL** setting.	Set **OVP** or **UVL** so their settings will not limit the Output voltage.	5.3 5.4
Output Current will not adjust. Front panel **CV LED** is illuminated.	Is the unit in Constant-Voltage (CV) mode ?	Check Output current limit and Output voltage setting	5.2
Large voltage ripple present across Output.	Is the power supply in remote sense ? Is the voltage drop on the load wire too high ?	Check load and sense wires connection for noise and impedance effects. Minimize the voltage drop on the load wires.	3.9.4 3.9.8
No output. Display indicates "**OUP**"	Over-Voltage Protection (**OVP**) circuit is tripped.	Turn **OFF** the AC Input power switch. Check load connections. If J1 Analog Programming is used, check if the **OVP** is set lower than the output.	5.3
No output. Front panel **ALARM LED** is blinking.	Display indicates "**EnA**"	Check rear panel J1 ENABLE connection.	5.8
		SW1 DIP-switch setting.	4.4
	Display indicates "**SO**"	Check rear panel J1 Output Shut-Off (SO) connection.	5.7
	Display indicates "**OTP**"	Check if air intake or exhaust are blocked. Check if the unit is installed adjacent to heat generating equipment.	5.12
	Display indicates "**Fb**"	Check Foldback setting and load current.	5.5
Poor Load regulation. Front panel **CV LED** is illuminated.	Are sensing wires connected properly ?	Connect the sense wires according to User's Manual instructions.	3.9.8
The front panel controls are non-functional.	Is the power supply in **Local-Lockout** mode ?	Turn Off the AC Input power and wait until the display turns **OFF**. Turn on the AC Input power and press the front panel **REM/LOC** button.	7.2.5

9.7 FUSE RATING

There are no user-replaceable fuses in the power supply. Internal fuses are sized for fault protection and if a fuse opened, it would indicate that service is required. Fuse replacement should be made by qualified technical personnel. Refer to Table 9-2 for a listing of the internal fuses.

Fuse designation	Single-Phase, 190-240VAC	Three-Phase, 190-240VAC
INPUT FUSE	F301, F302: 30A, 250VAC, Fast Acting	F321, F322, F323: 15A, 250VAC, Fast-Acting

Table 9-2 Internal Fuses

INDEX (User's Manual)