USER MANUAL FOR

3U GENESYS™

10kW/15kW High Voltage

Programmable DC Power Supplies

Document: 83532400 Rev D

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EU DECLARATION OF CONFORMITY

Genesys™ 3U Power Supply Product Series

We TDK-Lambda Americas located in Neptune, NJ USA declare under our sole responsibility that the Genesys™ 3U Power Supply Product Series, as detailed on the attached products cover sheet, comply with the provisions of the following European Directives and are eligible to bear the CE mark:

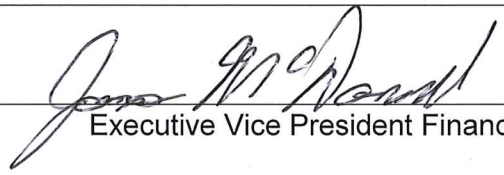
Low Voltage Directive	Directive 2014/35/EU
EMC Directive	Directive 2014/30/EU
RoHS	Directive 2015/863/EU

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

Electrical Safety:	EN60950-1:2006 + A2:2013
Electromagnetic Emissions:	EN 61326-1:2013 EN 61204-3:2000

These products are high-power equipment, with input power >1kW, 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 61326-1:2013 and EN 61204-3:2000.

Our European Representative in the EU is TDK-Lambda Germany GmbH, Karl-Bold-Strasse 40, 77855 Achern, Germany. Further all products covered by this declaration are manufactured in accordance with ISO9001:2008 which ensure continued compliance of the products with the requirements of the Low Voltage and the EMC directives.

Name of Authorized Signatory	James A. McDonnell
Signature of Authorized Signatory	
Position of Authorized Signatory	Executive Vice President Finance and Administration
Date	22nd July 2019
Date series first CE marked	1st May 2015
Place where signed	Neptune, NJ USA

PRODUCTS COVERED SHEET

Product Series: Genesys™ 3U Power Supply Product Series

Models: GEN AAA-BBBB-KKK-Z

Where:

"AAA": is the Output Voltage range (800V to 1500V).

"BBBB": is the Output Current range (0 to 18.8A, depending on Output Voltage).

"KKK": represents other options that do not affect Safety or EMC.

"Z": represents the Three-Phase AC Input Voltage as follows:

208VAC, 400VAC or 480VAC

Model number may also be followed by suffix representing additional options that do not affect safety or EMC.

Genesys™ Manual Supplement

For units equipped with the **"IEMD"** option,

If IEEE-488 with Multi-drop is installed,
also refer to IEMD User's Manual 83030200

For units equipped with the **"LAN"** option,

If Local Area Network with Multi-drop is installed,
also refer to LAN User's Manual 83034100

For units equipped with the **"USB"** option,

If USB with Multi-drop is installed,
also refer to USB User's Manual 83033800

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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.

ENGLISH

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 TERMINALS GROUNDING

There is a potential shock hazard at the RS-232/RS-485, LAN, IEEE, USB, Analog J1 and IS420 ports when using power supplies with rated or combined voltage greater than 1500V and the Positive or Negative Output of the Power Supply is grounded.
Do Not connect the Positive or Negative Output to ground when using the RS-232/RS-485, LAN, IEEE, USB, Analog J1 or IS420 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.

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 three input ranges depending on the model type ordered. Ranges are 180-253VAC, 342-440VAC & 432-528VAC, 50-60Hz. For safety reasons, the mains supply voltage fluctuations should not exceed above voltage ranges.

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

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, IEEE, USB, Analog J1, et IS420 lorsqu'on utilise des alimentations électriques ayant à elles seules ou au total une tension supérieure à 1500V 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, IEEE, USB, Analog J1, ou IS420 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 trois intervalles selon le modèle commandé. Les intervalles sont 180-253VAC, 342-440VAC & 432-528VAC, 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, IEEE, USB, Analog J1 und den IS420 -Anschlüssen, wenn Netzgeräte mit höheren Nenn- oder kombinierten Spannungen als 1500V 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, IEEE, USB, Analog J1 oder IS420 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.

SICHERHEITSVORSCHRIFTEN

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 drei Eingangsbereiche, je nach bestelltem Bautyp. Die Bereiche sind 180-253VAC, 342-440VAC & 432-528VAC, 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.

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.

SICHERHEITSVORSCHRIFTEN

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, IEEE, USB, Analog J1 e IS420 se si utilizzano alimentatori con tensione nominale o combinata oltre 1500V 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, IEEE, USB, Analog J1 o IS420 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 tre bande di ingressi, a seconda del tipo di modello ordinato. Le bande sono: 180-253VAC, 342-440VAC & 432-528VAC, 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.

NORME DI SICUREZZA

	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, IEEE, USB, Analog J1 e IS420 quando se utilizam fontes de alimentação com tensão nominal ou combinada superior a 1500V 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, IEEE, USB, Analog J1 ou IS420 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 três gamas de entrada, de acordo com o tipo de modelo encomendado. As gamas são: 180-253VAC, 342-440VAC & 432-528VAC, 50-60Hz. Por motivos de segurança, as flutuações da tensão da fonte de alimentação não devem exceder a gama da tensão superior.

INSTRUÇÕES DE SEGURANÇA

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.

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.

INSTRUÇÕES DE SEGURANÇA

	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 encargo do próprio utilizador.

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 1500V 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, IEEE, USB, Analog J1 e IS420.

No conecte la salida positiva o negativa a tierra cuando se utiliza el RS-232 / RS-485, LAN, IEEE, USB, Analog J1 o IS420 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 tres rangos de entrada dependiendo del tipo de modelo elegido. Los rangos son 180-253VAC, 342-440VAC & 432-528VAC, 50-60Hz. Por razones de seguridad, las fluctuaciones en la tensión de alimentación de la red no deberían superar los rangos de tensión antedichos.

INSTRUCCIONES DE SEGURIDAD

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.

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

	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.

INSTRUCCIONES DE SEGURIDAD

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.

1.*GENERAL INFORMATION*

1.1 User Manual Content

This User's Manual contains the operating instructions, installation instructions and specifications of the Genesys™ 10kW and 15kW High Voltage (HV) Power Supply Series. The instructions refer to the standard HV power supplies, including the built-in RS-232/RS-485 serial communication. For information related to operation with the optional LAN programming, refer to the User's Manual for Power Supply LAN Programming Interface. For information related to operation with the optional IEEE programming, refer to User's Manual for Power Supply IEEE/IEMD Programming Interface. For information related to operation with the optional USB programming, refer to User's Manual for Power Supply USB Programming Interface.

1.2 Introduction

1.2.1 General Description

Genesys™ HV power supplies are wide output range, high performance switching power supplies. The Genesys™ series is power factor corrected and operates from its specified AC voltage ranges continuously. Output voltage and Output 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 protections 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 isolated remote analog signals or by the built-in serial communication (RS-232/RS-485). LAN, GPIB, USB and Isolated Analog (4-20 mA) programming interfaces are optional.

1.2.2 Models covered by this manual

Models	Voltage Range (V)	Current Range (A)	Output Power
GEN 800–12.5	0 – 800	0 – 12.5	10kW
GEN 1000–10	0 – 1000	0 – 10	10kW
GEN 1250–8	0 – 1250	0 – 8	10kW
GEN 1500–6.7	0 – 1500	0 – 6.7	10kW
GEN 800–18.8	0 – 800	0 – 18.8	15kW
GEN 1000–15	0 – 1000	0 – 15	15kW
GEN 1250–12	0 – 1250	0 – 12	15kW
GEN 1500–10	0 – 1500	0 – 10	15kW

All models are available with nominal 3-Phase AC inputs of 208VAC, 400VAC and 480VAC.

1.2.3 Features and Options

- Constant Voltage / Constant Current with automatic crossover.
- Passive power factor correction (PFC)
- Embedded Microprocessor Controller.
- Built-in RS-232/RS-485 Interface.
- Voltage & Current high resolution adjustment by digital encoders.
- High accuracy programming/readback – 16bit.
- Last Setting Memory.

- Remote Enable/Disable and Shut-Off control signals (opto-isolated).
- Parallel operation (Master/Slave) with Active current sharing
- Remote sensing to compensate for voltage drop of power leads.
- External Isolated Analog Program and Monitor standard (0-5V or 0-10V, user selectable).
- Cooling fan speed control for low noise and extended fan life
- Zero stacking-no ventilation holes on the top and bottom surface of the power supply.
- Optional LXI certified LAN (Class C), IEEE 488.2 and USB (2.0) interfaces are SCPI compliant.
- Optional Isolated Analog programming/monitoring (4-20mA).

NOTE

Operating the Power Supply with a load which continuously pulses the voltage or current can significantly reduce lifetime. Consult your local TDK-Lambda Sales/Technical Support representative to discuss your pulsing application in detail.

1.2.4 Multiple Output Power System

The Genesys™ Power Supply series can be configured into a programmable power system of up to 31 units using the built in RS-232/RS-485 communication ports and the RS-485 linking cable provided with each power supply. In a GPIB or LAN system, each power supply can be controlled using the optional GPIB or LAN controller (factory installed)

1.2.5 Control via the Serial Communication Port

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

a) Output voltage setting.
b) Output current setting.
c) Output voltage measurement.
d) Output ON/OFF control.
e) Output current measurement.
f) Foldback protection setting
g) Over-voltage protection setting and readback.
h) Under-Voltage limit setting and readback.
i) Power-supply startup mode (Last-Setting or Safe-Start mode).

1.2.6 Analog Voltage Programming and Monitoring

Analog control of the power supply is provided at the rear panel using isolated (SELV) inputs and outputs. The Output voltage and the Output current limits 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™ HV power supplies of the same Output voltage and current rating can be paralleled in Master-Slave configuration with automatic current sharing to increase total power available.

1.2.8 Output Connections

Output connections are made to the rear panel via threaded studs. Either the positive or negative terminal may be grounded or the output may be floated. All models shall not float their output more than +/- 1500 VDC 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 power supply specifications of Chapter 2 for the remote sense maximum voltage drop value.

1.2.9 Cooling and Mechanical Construction

The Genesys™ series is cooled by internal fans (with fan-speed control). 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.

CAUTION

Observe all torque guidelines within this manual. Over-torqueing may damage the unit or accessories. Such damage is not covered under manufacturer's warranty.

1.3 Accessories

1.3.1 Included Accessories

The following accessories are delivered with the power supply:

A. Hardware:
- Output terminal cover and cable connect hardware
- AC Input terminal cover and cable connect hardware
- DB-25 Programming Plug kit (AMP 749809-9)

1.3.2 Communication Cables (optional):

- RS-232 Cables (to connect GEN to a computer's Serial Port)

GEN to PC (DB-9F)	GEN/232-9	P/N 15-507-203
GEN to PC (DB-25F)	GEN/232-25	P/N 15-507-204

- RS-485 Cable (to connect GEN to a computer's Serial Port)

GEN to PC (DB-9F)	GEN/485-9	P/N 15-507-202

1.3.3 Serial Link Cable:

- Cable description: 0.5m length, shielded, RJ45 type plugs, 8 contacts.

Serial Link (RJ-45 type)	GEN/RJ-45	P/N 15-507-201

1.3.4 AC Cables:

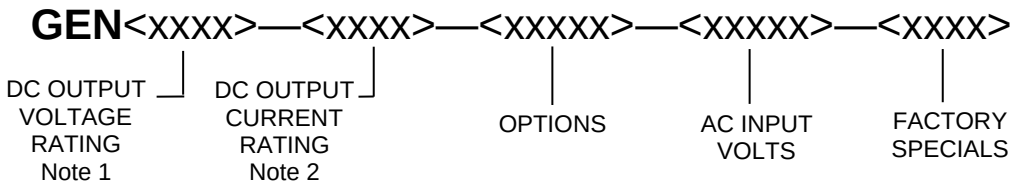
AC cables are *not* provided with the power supply.

Refer to the Table in Section 3.6.2 for recommended AC input cables (customer supplied).

1.4 Model Number Format

The model numbering system for Genesys™ power supply includes symbols for features and options. They are separated by dashes.

The following chart explains the model number for the GEN Power Supply Family.



Option	
Note 3	
LAN	LXI CERTIFIED ETHERNET W/MULTI-DROP
IEMD	IEEE W/MULTI-DROP
IS420	ISOL PROG (4-20mA)
USB	USB (2.0) W/MULTI-DROP

AC Input Volts	
Note 4,5	
3P400	400VAC,3Φ 47/63Hz
3P480	480VAC,3Φ 47/63Hz
3P208	208VAC,3Φ 47/63Hz

Factory Specials
Blank for standard supplies

Note 1: All Output voltages listed in Section 1.2.2

Note 2: All Output currents listed in Section 1.2.2

Note 3: LAN, IEMD, USB or IS420 may not be installed together. Factory Installed. Limit of one (1) per Power Supply.

Note 4: See power supply Specifications for AC Input voltage range.

Note 5: All 3ϕ are four wire input = 3ϕ + GND (No Neutral).

EXAMPLES: GEN 1250-12-3P400

GEN 800-18.8-IS420-3P400

GEN 1500-10-IEMD-3P480-1292

2. SPECIFICATIONS

All specifications are subject to change without notice. Contact factory for specific model availability.

2.1 MODEL (10kW)	GEN	800-12.5	1000-10	1250-8	1500-6.7	10kW	15kW
1. Rated Output voltage (*1)	V	800	1000	1250	1500	X	
2. Rated Output current (*2)	A	12.5	10	8	6.7	X	
3. Rated Output power	W	10000	10000	10000	10050	X	
4. Max Output settings		1% above rated Output Voltage and Output Current				X	
5. Efficiency (min) at low line, 100% rated load	%	93.5	93.5	93.5	93.5	X	
		Contact Factory for other models					

2.2 MODEL (15kW)	GEN	800-18.8	1000-15	1250-12	1500-10		X
6. Rated Output voltage	V	800	1000	1250	1500		X
7. Rated Output current	A	18.8	15	12	10		X
8. Rated Output power	W	15040	15000	15000	15000		X
9. Max output settings		1% above rated Output Voltage and Output Current					X
10. Efficiency (min) at low line, 100% rated load	%	93.5	93.5	93.5	93.5		X
		Contact Factory for other models					

2.3 CONSTANT VOLTAGE MODE

1. Max. Line regulation (0.05% of rated Vo)	mV	400	500	625	750	X	X
2. Max. Load regulation (0.1% of rated Vo)	mV	800	1000	1250	1500	X	X
3. Ripple, r.m.s., 5Hz-1MHz, CV (*3)	mV	80	100	120	140	X	X
4. Output noise, p-p, 20MHz (*3)	mV	700	800	1000	1400	X	X
5. Remote Sense compensation/wire	V	5	5	5	5	X	X
6. Temperature stability	–	± 0.05% of Vo(rated) over 8 hours, after 30 minutes warm-up. Constant line, load & temperature				X	X
7. Temperature coefficient	ppm/°C	200 (0.02% of Vo(rated)/°C)				X	X
8. Up-prog. response time 0-Vo(rated), full-load	mS	17				X	X
9. Up-prog. response time 0-Vo(rated), no-load	mS	17				X	X
10. Down-prog. response time, full-load (*4)	mS	20				X	X
11. Down-prog response time, no-load (*5)	S	5				X	X
12. Transient response time	mS	Less than 1.0mS for Vo to recover within 2% of Vo(rated) for a load change of 50 to 100% or 100 to 50% of Io(rated).				X	X
13. Time for Output Stable	S	Two (2) maximum, from Enable Output until Output stable (within 2% of steady-state).				X	X
14. Start-Up delay	S	Less than seven (7); without IEMD option installed.					
15. Bandwidth	Hz	3 With Remote Analog voltage programming. 3 With Remote Analog current programming				X	X

2.4 CONSTANT CURRENT MODE

1a. Max. Line regulation (0.15% of rated Io)	mA	19	15	12	10	X	
1b. Max. Line regulation (0.15% of rated Io)	mA	28	23	18	15		X
2a. Max. Load regulation (0.2% of rated Io) (*6)	mA	25	20	15	14	X	
2b. Max. Load regulation (0.2% of rated Io) (*6)	mA	38	30	24	20		X
3a. Ripple r.m.s., 5Hz-1MHz, CC (*3)	mA	15	10	6	4	X	
3b. Ripple r.m.s., 5Hz-1MHz, CC (*3)	mA	15	10	6	4		X
4. Temperature stability		± 0.05% of Io(rated) over 8 hours, after 30 minutes warm-up. Constant line, load & temperature				X	X
5. Temperature coefficient	ppm/°C	300 (0.03% of Io(rated)/°C)				X	X

2.5 PROTECTIVE FUNCTIONS

1. OCP		0 – 101%, constant current	X	X
2. Foldback Protection (FOLD)		Output shut-down when power supply changes from CV to CC mode, manual reset by FP OUT button, user selectable	X	X
3. Foldback response time	S	Min = 0.25 / Max = 25, Default = 0.25 Settable via "FBD" command using digital communication.	X	X

4. Over Voltage Protection (OVP)		Inverter shutdown. Manual reset by AC input recycle, by FP OUT button, remote analog or by digital communication command.	X	X
5. OVP programming accuracy		± 5% of Vo(rated)	X	X
6. OVP programming range	%	10% to 110% of Vo(rated) and shall always be greater than 105% of the Output Voltage setting. Default = 110% of Vo (rated)	X	X
7. OVP response time	mSec	Less than 2.0 mSec for Output Voltage to begin to drop	X	X
8. Max OVP Reset Time	S	7 (from AC On/Off switch turn On)		
9. Output Under Voltage Limit (UVL)		Prevents adjusting Output Voltage below limit. Preset by the front panel or digital communication command. 0 to 95% of Vo(rated) and shall always be less than 95% of the Output Voltage setting. Does not affect J1 Remote Analog programming. Default = 0V	X	X
10. Over Temperature protection (OTP)		Shut down if internal temperature exceeds safe operating levels or locked/stopped fan. User selectable: Latched in Safe-Mode/Auto-recovers in Auto-Mode	X	X
11. AC Input failure (AC Fail)		Shut down for phase loss or AC low line. User selectable: Latched in Safe-Mode/Auto-recovers in Auto-Mode	X	X

2.6 REMOTE ISOLATED ANALOG CONTROL & SIGNALS

1. Vout voltage programming	0-100%, 0-5V or 0-10V, User selectable Accuracy and linearity: ± 1 % of rated Vout	X	X
2. Iout voltage programming	0-100%, 0-5V or 0-10V, User selectable Accuracy and linearity: ± 1 % of rated Iout.	X	X
3. Vout resistor programming	0-100%, 0-5/10Kohm full scale, User selectable Accuracy and linearity: ± 1 % of rated Vout	X	X
4. Iout resistor programming	0-100%, 0-5/10Kohm full scale, User selectable Accuracy and linearity: ± 1 % of rated Iout	X	X
5. Shut-Off control (SO)	By Voltage: 0.6V = Disable, 2-15V = Enable (default) or Dry Contact: Open = Enable, Short = Disable. User selectable logic.	X	X
6. Output Current monitor	0-5V or 0-10V, User selectable. Accuracy: ± 1 %	X	X
7. Output Voltage monitor	0-5V or 0-10V, user selectable. Accuracy: ± 1 %	X	X
8. Power supply OK signal (PS_OK)	Yes. TTL High = OK, 0V = Fail / Output OFF (500ohm series resistance)	X	X
9. CV/CC signal	CV: TTL High (4 - 5V), Max source current = 10mA. CC: TTL Low (0.0 - 0.4V), Max sink current = 10mA.	X	X
10. Enable/Disable (ENA)	Dry Contact: Open = Off, Short = On Maximum voltage at Enable/Disable In = 6V	X	X
11. Local/Remote Analog Control	Selects Local or Remote operation by Voltage 0- 0.6V = Remote, 2-15 V = Local	X	X
12. Local/Remote Analog Indicator	Open collector: Local: Open (Maximum voltage:30V), Remote: On (Maximum sink current: 10mA)	X	X

2.7 FRONT PANEL

1. Control functions	Vout/Iout manual adjust by separate encoders (coarse and fine adjustment).	X	X
	OVP/UVL manual adjust by Voltage Adjust encoder	X	X
	Address selection by Voltage Adjust encoder. Range = 0 to 31	X	X
	AC On/Off, Output On/Off, Re-start modes (Auto-Restart, Safe-Restart), Foldback control (CV to CC), Go to local control.	X	X
	RS-232/RS-485, IEEE-488.2, LAN, USB selection by rear panel DIP switch	X	X
	Baud rate selection by Current Adjust encoder: 1200, 2400, 4800, 9600 and 19,200 (RS-232/RS-485 communication only)	X	X
	Parallel Master Slave (Basic/Advanced): HX, where X = Slaves 0 to 3	X	X
2. Volt Display	Voltage: 4 digits, Accuracy: 0.5% of rated Output voltage ± 1 count	X	X
	PREV setting for Vout, Actual Vout, OVP/UVL settings, SAF/AUT Restart mode OUT OFF or fault, LFP/UFP settings, RS-232/RS-485 Address setting, LAN, IEEE or USB Enabled and Address	X	X
3. Current setting	Current : 4 digits, Accuracy: 0.5% of rated Output current ± 1 count	X	X
	PREV setting for Iout, Actual Iout, RS-232/RS-485 Baud rate setting, H1 – H4 or S (for Parallel operation).	X	X
4. LED Indications	GREEN LED's: PREVIEW, FOLD, REM/LOCAL, OUT ON/OFF, CC/CV. FINE RED LED: ALRM (OVP, OTP, FOLD, AC FAIL, ENA, SO)	X	X

2.8 DIGITAL PROGRAMMING & READBACK

1. Vout Programming Accuracy	±0.5% of the rated Output voltage	X	X
2. Iout Programming Accuracy	±0.5% of the rated Output current	X	X
3. Vout Programming Resolution	0.02% of Vo(rated)	X	X
4. Iout Programming Resolution	0.04% of Io(rated)	X	X
5. Vout Readback Accuracy	±0.1% of Vo(actual) + 0.2% of Vo(rated)	X	X
6. Iout Readback Accuracy	±0.1% of actual + 0.4% of Io(rated)	X	X
7. Vout Readback Resolution	0.02% of Vo(rated)	X	X
8. Iout Readback Resolution	0.02% of Io(rated)	X	X
9. Other functions	Set OVP/UVL limits, Set local/remote, Identity, Calibration	X	X

2.9 INPUT CHARACTERISTICS

1. Input voltage/freq. (range)		208(180-253)VAC; 400(342 - 440)VAC; 480(432 - 528)VAC; all 47 - 63 Hz
2. No of phases		3-phase (Wye or Delta) 4 wires total (3 Phases and one Protective Earth Ground)
3. Dropout voltage	VAC	165/335 / 425
4. Input current at 342/432Vac	Arms	10 KW - 23/20; 15kW - 32/27 at rated Output power
5. Inrush current	A	Not to exceed rated Input current
6. Power Factor (typical)		10kW, 208VAC:0.90, 10kW, 400VAC: 0.89 , 10kW, 480VAC: 0.84 15kW, 208VAC: 0.93, 15kW, 400VAC: 0.92, 15kW, 480VAC: 0.88
7. Leakage current	mA	3.5 max. (EN60950-1)
8. Input protection		208VAC/400VAC/480VAC - line fuse
9. Input overvoltage protection		Unit shall not be damaged by line overvoltage of 120% with max duration of 100uSec.
10. Phase Imbalance	%	≤ 5% on three-phase input.

2.10 POWER SUPPLY CONFIGURATION

1. Parallel Operation	Up to four (4) identical units may be connected in Basic or Advanced Master/Slave Mode using two-wire connection. In Advanced Parallel mode, the Master displays the calculated (not actual) Output current for the combined parallel combination on the front panel and is made available via the digital interface. Remote analog current of the Master unit is scaled to its actual Output current (only).
2. Series Operation	Possible (with external diodes), up to two identical units with the total output not to exceed +/- 1500V from Chassis to ground

2.11 ENVIRONMENTAL CONDITIONS

1. Operating Temperature	0 to 50ºC, 100% load
2. Storage Temp	-20 to 70ºC
3. Operating Humidity	20 to 80% RH (non-condensing)
4. Storage Humidity	10 to 90% RH (non-condensing)
5. Shock and Vibration	ASTM D4169, Standard Practice for performance Testing of Shipping Containers and Systems Distribution Cycle: 12 - Air (intercity) and motor freight (local, single package up to 100 lbs.) Shipping Unit: Single Package Assurance Level: Level II Acceptance Criteria: Criterion 1 – No product damage; Criterion 2 – Package is intact
6. Altitude	Operating: Full load @50ºC up to 7500ft/2500m; Full load @45ºC from 7501 to 10,000ft/2501 to 3000m. Non-operating 40,000ft (12000m)
7. Audible Noise	65dBA at Full Load, measured 1m from Front Panel (fan-speed controlled by Output current)

2.12 EMC

1. **208/400/480Vac Input Models**	CE Mark
2. ESD	EN61000-4-2 (IEC 1000-4-2) Air-discharge +/- 8kV, Contact discharge +/- 4kV
3. Fast transients	EN61000-4-4 (IEC 1000-4-4): 2kV
4. Surge immunity	EN61000-4-5 (IEC 1000-4-5): 1kV line-to-line, 2kV line-to-ground
5. Conducted immunity	EN61000-4-6 (IEC 1000-4-6): 10Vrms
6. Radiated immunity	EN61000-4-3 (IEC 1000-4-3): 10V/m
7. Power Frequency Magnetic Field	EN61000-4-8: 30A/m
8. Conducted emission	EN55011A, FCC part 15J-A
9. Radiated emission	EN55011A, FCC part 15J-A

2.13 SAFETY

1. Applicable standards	UL/cUL 60950-1, EN60950-1 recognized. 800= < Vout =< 1500V : Output is hazardous (J1 Analog output, and units with IEMD, LAN, USB and IS420 are SELV to 1500V output). CE Mark: 208VAC, 400VAC and 480VAC inputs
2. Withstand Voltage	400VAC/480VAC Input: Vout = 800VDC to 1500VDC models: Input-Ground: 2900VDC for 60s, Input-Output: 5040VDC for 60s, Output-Ground: 2500VDC for 60s, Input-SELV: 2900VDC for 60s, Output-SELV: 2500VDC for 60s. 208VAC Input: Vout = 800VDC to 1500VDC models: Input-Ground: 2200VDC for 60s, Input-Output 4500VDC for 60s, Output-Ground: 2500VDC for 60s, Input-SELV: 2900VDC for 60s, Output-SELV: 2500VDC for 60s.
3. Insulation resistance	> 100Megohm at 500VDC, 25^{o}C, 70%RH

2.14 MECHANICAL CONSTRUCTION

1. Cooling	Fan driven (variable speed), Airflow from front to the rear. Supplemental vents on side shall not be blocked. EIA Rack mounting Stackable. "Zero Stackable" top and bottom. Slides or suitable rear support required
2. Dimensions (W x H x D)	Width: 429mm/16.9", H: 3U - 133mm/5.22", D: 564mm/22.2" (excluding connectors, encoders, handles etc.)
3. Weight	32kg / 70lbs
4. AC input connector (with Protective Cover)	3 x M6 x 1" threaded studs (L1, L2, L3 and Chassis GND) and terminal cover
5. Output connector	M6 x 0.5" threaded studs
6. Control connectors	Analog programming: ISOLATED 25 pin DB connector, plastic connector, AMP747461-5 Female on supply, Male on mating connector 747321. Std 25 pin D connector
7. Mounting methods	Std. 19" Rack Mount, provision for standard Chassis slides, Side and rear support required
8. Output ground connection	M5 x 0.9" threaded stud

2.15 Reliability

3. Warranty	Yrs	5 years
4. Shelf Life	Yrs	5 years, electrolytic capacitors shall be reformed after 2 years

NOTES:

*1 Minimum voltage is guaranteed to be maximum of 0.5% of Vo(rated).
*2 Minimum current is guaranteed to be maximum of 0.5% of Io(rated).
*3 Ripple and noise at rated Output voltage and load at 25C, nominal AC Input voltage, per EIJ R9002A
*4 From 90% to 10% of Rated Output Voltage with rated, resistive load.
*5 From 90% to 10% of Rated Output Voltage.
*6 At 100% Io, for load change from 10% - 90% of Vo(rated).

2.16 Outline Drawing

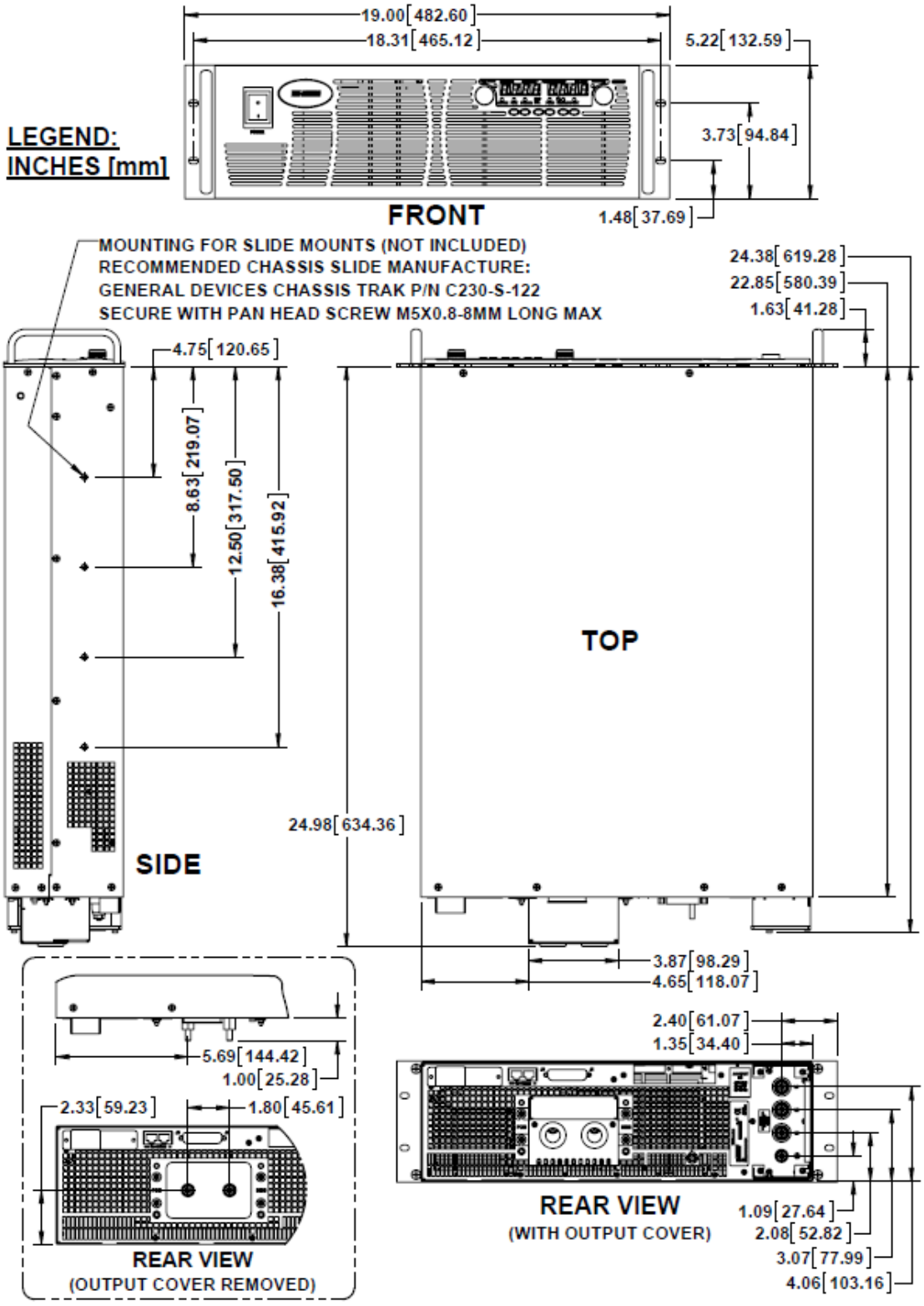


Figure 2-1. Outline Drawing

3. *INSTALLATION*

3.1 General

This Chapter contains instructions for initial inspection, preparation for use and repackaging for shipment.

Connection to the PC, setting the communication port and linking Genesys™ HV power supplies are described in Chapter 8.

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.

3.2 Preparation for Use

In order to be operational the power supply must be connected to an appropriate AC power source. The AC power source voltage should be within the power supply specification. Do not apply AC Input power before reading Section 3.6 of this User's Manual.

Table 3-1 below, lists the Basic Setup Procedure. Follow the instructions listed 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
4	Test	Turn-on checkout procedure.	Section 3.7
5	Load connection	Wire size selection. Local/Remote sensing. Single or multiple loads.	Section 3.8 Section 3.9
6	Default setting	The power supply setting at shipment.	Section 0 Section 4.4.1 Section 8.2.1

Table 3-1. Basic Setup Procedure

3.3 Initial Inspections

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 meters face 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 nearest you.

3.4 Rack Mounting

3.4.1 The Genesys™ HV Power Supply Series is designed to fit in a standard 19" equipment rack.

To Install the Power Supply in a Rack:

- Use the front panel mounting tabs to install the power supply in the rack.
- 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, customer provided)

CAUTION

Ensure that the screws used to attach the slides to the unit are not longer than 8mm in length.

Use rack-mount slides (General Devices P/N C230-S-122 or equivalent) to install the unit in a standard 19" equipment rack. Use four M5 X 0.8- 8mm long (max) pan head screws to attach a slide to each side of the unit. To prevent damage, use the specified screw length only.

3.5 Location, Mounting and Cooling

This power supply is fan-cooled (with fan-speed control). The air intake is at the front panel and the exhaust is at the rear panel. Upon installation allow a minimum 10 cm (4 inches) of unrestricted air space at the front and the rear of the power supply to allow proper cooling air for the power supply.

The power supply should be used in an area that the ambient temperature does not exceed $+50^{0}$C.

3.6 AC Source Requirements

The Genesys™ series 10kW/15kW power supply can be operated from a nominal 208VAC, 400VAC or 480VAC three-phase, four (4) wire, 47-63 Hz AC input. The AC Input voltage range and current required for each model is specified in Chapter 2, Section 2.9 (Input Characteristics). Ensure that under heavy load, the AC Input voltage supplied to the Power Supply does not fall below the specifications described in Chapter 2, Section 2.9 (Input Characteristics).

3.6.1 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.

Do not exceed the torque (32 inch-lb/3.5NM) specified next to the input stud terminals. Location of the input torque label is shown in Figure 3-1

WARNING

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

WARNING

Some components inside the power supply are at AC/DC voltage even when the front panel ON/OFF Switch is in the “Off” position. To avoid electric shock hazard, disconnect the AC input and load and wait 15 minutes before removing any AC input cover, DC output cover or the power supply cover.

The power supply AC input ON/OFF switch is not the main disconnect device and does not completely disconnect all internal circuits from the AC power source.

The customer AC Input connects to the power supply through four M6 threaded-stud type terminals. Only use a power cable with the correct voltage and current ratings. The recommended wire gauge is listed in the Table in Section 3.6.2. The ground wire must be equal to or larger than the recommended gauge for each AC phase.

The power supply must be permanently connected to an approved AC distribution box with suitably rated over-current protection (40A UL listed fuse for 400VAC/480VAC input: 70A UL LISTED fuse for 208VAC input).

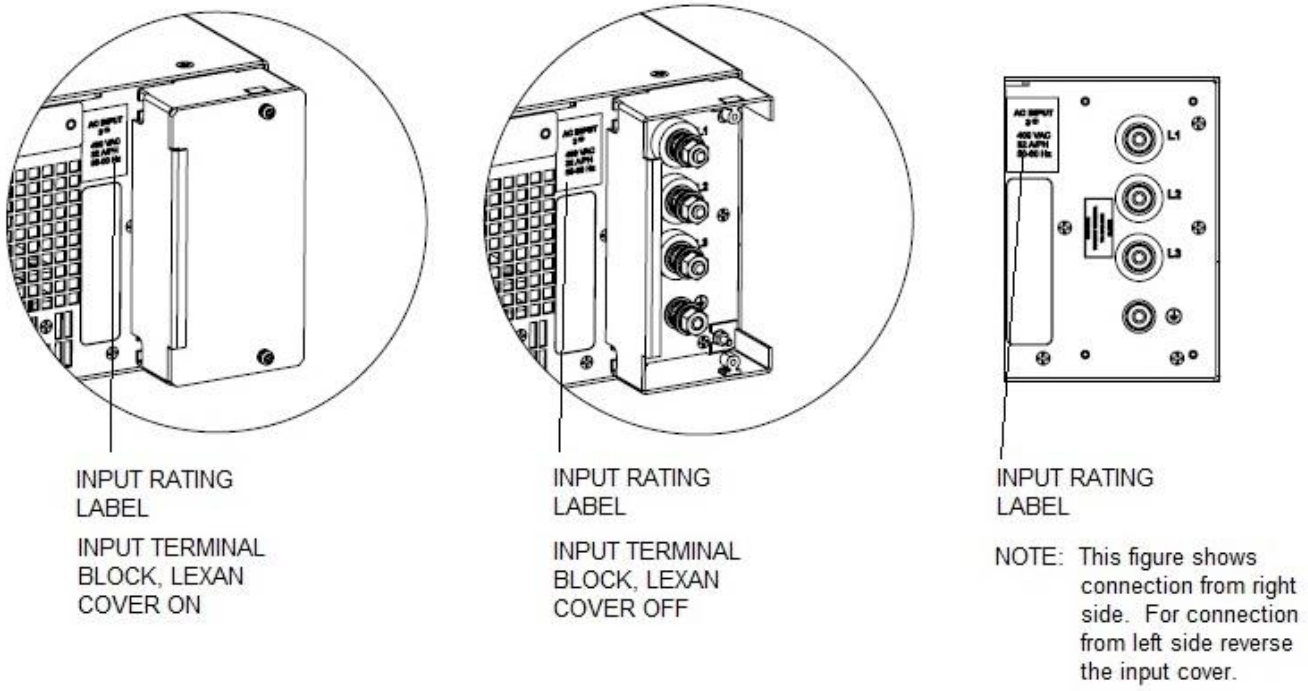


Figure 3-1. AC Input Connections

3.6.2 Recommended CABLE SIZE for Input Connection

Input Voltage (VAC)	Current Per Phase (Arms)	Recommended COPPER WIRE SIZE
208	55	6AWG
400	32	6 AWG
480	27	7 AWG

The AC Input current and voltage rating is marked on the rear terminal of the power supply.

The Protective Earth Ground ⏚ must be connected before applying AC Input Power to the power supply.

3.7 Turn-On Checkout Procedure

3.7.1 Purpose

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

3.7.2 Prior to Operation

a) Ensure that the power supply is configured to the default setting:
   - Front Panel “AC ON/OFF switch” at the OFF position.
   - DIP-switch (SW1): All positions at the DOWN position.
   - Sense connector (J2): configured to Local Sense (as shown in Figure 3-8).
   - For units equipped with LAN, IEEE or USB options, there is an ‘Enable’ DIP-switch next to the option connector. Set that “Enable” DIP-switch to the UP (Disabled) position for the LAN or IEEE options or DOWN (Disabled) position for the USB option.

b) Connect the unit to an AC power source as described in Section 3.6.

c) Connect a DVM across the output terminals using cables rated for the Output voltage. This checkout procedure starts with no load connections to the power supply Output terminals.

d) Press the front panel AC ON/OFF switch to the ON position.

e) After several seconds, the front panel should display “OFF” (per power supply default settings of Chapter 8) or some volts and amps measurement readings.

f) If the “REM/LOC” LED is illuminated, press the REM/LOC to turn the “REM/LOC” LED Off. This will put the Power Supply into Local mode (for front panel control).

3.7.3 Constant Voltage Check

a) Turn On the output by pressing the OUT pushbutton (the front panel OUT LED should illuminate).

b) Observe the power supply VOLT display and rotate the Voltage encoder. Ensure that the Output voltage varies while the VOLT encoder is rotated. The minimum control range is from zero to the maximum rated Output voltage for the power supply model.

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

c) Compare the DVM reading with the front panel VOLT display to verify the accuracy of the VOLT display. Ensure that the front panel VOLT LED is on.

d) Press the front panel AC ON/OFF Switch to the OFF position.

3.7.4 Constant Current Check

a) Ensure that the front panel AC ON/OFF switch is at the OFF position and the DVM connected to the output terminals shows zero Output voltage.

b) Connect a DC shunt across the output terminals. Ensure that the shunt and the wire voltage and current ratings are higher than the power supply Output voltage and Output current ratings. Connect a DVM across the shunt.

c) Press the front panel AC ON/OFF switch to the ON position.

d) Turn On the output by pressing the OUT pushbutton, (the front panel OUT LED should illuminate).

e) Observe the power supply CURRENT display 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 PREView setting must be greater than zero for the power supply to generate an Output current.

f) Compare the DVM reading with the front panel CURRENT display to verify the accuracy of the CURRENT display. Ensure that the front panel CURRENT LED is on.

g) Press the front panel AC ON/OFF switch to the OFF position.

h) Remove the DVM and shunt from the power supply output terminals.

3.7.5 OVP Check

Refer to Section 5.3 for an explanation of the Over-Voltage Protection (OVP) function prior to performing the procedure below.

a) Press the front panel AC ON/OFF Switch to the ON position. Turn the output On by pressing the front panel OUT pushbutton (the front panel OUT LED should illuminate).

b) Using the VOLT encoder, adjust the Output voltage to approximately 10% of the unit Output voltage rating.

c) Momentarily press the OVP/UVL button so that the CURRENT display shows "**OUP**". The VOLTAGE display will show the last setting of the OVP level.

d) Rotate the VOLT encoder CCW to adjust the OVP setting to 50% of the unit Output voltage rating.

e) Wait a few seconds until the VOLT display returns to show the actual Output voltage.

f) Adjust the Output voltage toward its maximum value and check that the Output voltage cannot be increased more than the OVP setting of Step d).

g) Adjust the OVP limit to its maximum value by repeating Step c) and rotating the VOLT encoder clockwise (CW).

3.7.6 UVL Check

Refer to Section 5.4 for an explanation of the Under-Voltage Limit (UVL) function prior to performing the procedure below.

a) Press the OVP/UVL button TWICE so that the CURRENT display shows "**UUL**". The VOLTAGE display will show the last setting of the UVL level.

b) Rotate the VOLT encoder to adjust the UVL level to approximately 10% of the unit Output voltage rating.

c) Wait a few seconds until the VOLT display returns to show the actual Output voltage.

d) Adjust the Output voltage toward its minimum value and check that the Output voltage cannot be decreased below the UVL setting of Step b).

e) Adjust the UVL limit to its minimum by repeating Step a) and rotating the VOLT encoder counterclockwise (CCW).

3.7.7 Foldback Check

WARNING

Shorting the Positive and Negative Output connections together may expose the user to hazardous voltages.

Observe proper safety procedures.

Refer to Section 5.5 for explanation of the Foldback Protection (FOLD) function prior to performing the procedure below.

a) Ensure that the front panel ON/OFF Switch is at the OFF position and the DVM connected to the output terminals shows zero Output voltage.

b) Connected a rated load across the output of the Power Supply.

c) Ensure that the Output voltage PREView is set to approximately 20% of the unit Output voltage rating.

d) Adjust the CURRENT encoder to set the Output current PREView to approximately 30% of the unit Output current rating.

e) Press the front panel AC ON/OFF switch to the ON position. Turn the output On by pressing the OUT pushbutton. Ensure that the VOLTAGE LED is lit.

f) Momentarily press the FOLD button. Ensure that the FOLD LED illuminates. The Output voltage should remain unchanged.

g) Decrease the Output Current limit by rotating the CURRENT encoder counterclockwise (CCW). Note that the Output voltage does not change. Continue rotating the CURRENT encoder CCW until the Output voltage falls to zero, the VOLT display shows "**Fb**" and the ALARM LED blinks.

h) Press the FOLD button again to cancel the foldback protection. The Output voltage should still remain at zero.

i) Adjust the CURRENT encoder clockwise (CW) to set the Output current limit to approximately 30% of the unit Output current rating.

j) Press the front panel OUT button. Ensure that the output turns on and the Output voltage returns to its last setting.

k) Turn the output off by pressing the OUT button. The VOLT display should show "**OFF**".

3.7.8 Address Setting (RS-232 and RS-485 only)

a) Press and hold the REM/LOC button for approximately 3 seconds. The VOLT display will show the communication port Address.

b) Using the VOLT adjust encoder, set the unit Address within the range of 0 to 30.

c) Set the unit Address back to the factory default setting (factory default setting is 6; see Section 8.2.1).

3.7.9 Baud rate Setting (RS-232 and RS-485 only)

a) Press and hold the REM/LOC button for approximately 3 seconds. The CURRENT display will show the communication port Baud rate.

b) Using The CURRENT adjust encoder, set the Baud rate to 1200, 2400, 4800, 9600 (default) or 19200.

c) Set the unit Baud rate back to the factory default setting (factory default setting is 9600; see Section 8.2.1).

3.8 Connecting the Load

WARNING

Turn Off the AC input power before making or changing any rear panel connection.

Ensure all live circuits are discharged and that all connections are securely tightened before applying power.

There is a potential shock hazard at the Output of the power supply.

The following considerations should be made when selecting the cables to connect the load to the power supply output:

- Current carrying capacity of the cable (refer to Section 3.8.1 below)
- Insulation rating of the cable must be more than the maximum Output voltage of the power supply.
- Maximum wire length and voltage drop (refer to Section 3.8.1).
- Noise and impedance effects of the load cable (refer to Section 3.8.4).
- The output of the GEN-3U HV power supply uses M6 studs. Proper hardware and correct torque should be used to connect the output cables to the power supply (see Figure 3-2).
- The output terminals are protected by a metal cover. Make sure to replace the cover after completing any cable connections.

3.8.1 Current Carrying Capacity

The following factors need to be considered when selecting the output cable size.

a) The cable should be heavy enough to not overheat while carrying the rated Output current or the current that would flow in the event the load wires were shorted, whichever is greater.

b) The cable should be selected so that the voltage drop per cable is less than 1V at the rated Output current to prevent excessive power losses in the leads and poor dynamic response to load changes. Refer to Tables 3.2 and 3.3 for maximum lead wire lengths to limit the cable voltage drop to less than 1V.

Wire size AWG	Resistivity OHM/1000ft	Maximum length in feet to limit voltage drop to 1V or less	
		10A	20A
14	2.526	40	20
12	1.589	60	30
10	0.9994	100	50
8	0.6285	160	80

Table 3.2. Maximum Wire Length for 1V drop on Lead (in feet)

Cross Sect. Area (mm^2)	Resistivity OHM/Km	Maximum length in meters to limit voltage drop to 1V or less	
		10A	20A
2.5	8.21	12.0	6.0
4	5.09	18.6	9.8
6	3.39	29.4	14.8
10	1.95	51.2	25.6

Table 3.3. Maximum Wire Length for 1V drop on Lead (in meters)

3.8.2 Load Cable Terminations

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

CAUTION

Be careful when connecting the remote sense lines to the far end of the load cables. Reversing the sense line polarity to the load, or leaving the +S or –S sense lines opened, could damage the power supply.
See Section 3.8.6.2 for more information.

3.8.3 Grounding Outputs

Either the Positive or Negative Output terminals can be grounded.

To avoid noise probems 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

The Outputs of the power supply shall not be floated more than ±1500VDC relative to chassis ground.

3.8.4 Noise and Impedance Effects

To minimize any noise pickup or radiated noise, 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 power supply and 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 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.

3.8.5 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.

3.8.6 Making the Load Connections

WARNING

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

CAUTION

DO NOT touch (loosen or tighten) the brass nut on the M6 threaded studs for output load connections

CAUTION

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

800V to 1500V Models

Figure 3-2 shows an exploded view of output wire connection.

Apply the tightening torque values to connect the output cable hardware and the screws for the cover installation as shown in Figure 3-2.

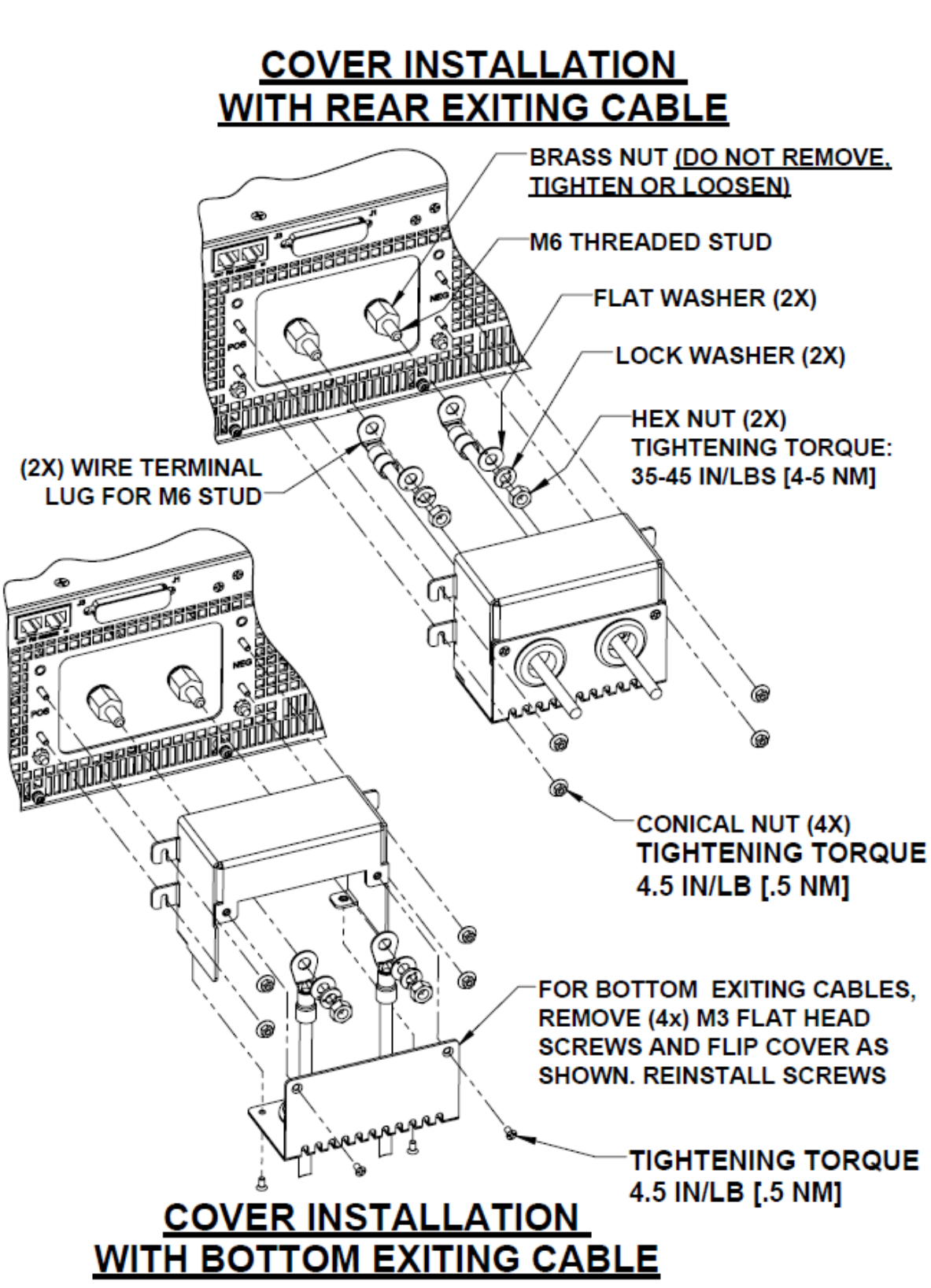


Figure 3-2. Load Wires Connection (800V – 1500V models) for Rear-Exit and Bottom-Exit

WARNING

Hazardous voltages exist at the outputs and the load connections.

To protect personnel against accidental contact with hazardous voltages, ensure that the load and its connections have no accessible live parts. Also, ensure that the load wiring insulation rating is greater than or equal to the maximum Output voltage of the power supply.

3.8.6.1 Connecting Single Loads, Local Sensing (Default)

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

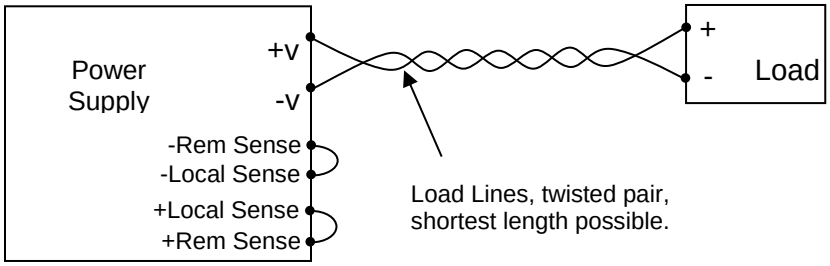


Figure 3-3. Load Connections with Local Sensing

3.8.6.2 Connecting Single Loads, Remote Sensing

Figure 3-4 shows the recommended remote sensing connection for single loads. Remote sensing is used when, in Constant Voltage mode, the voltage regulation at the load is important. 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.

WARNING

There is a potential shock hazard at the sense connector. Local or remote sense wires should have an insulation rating 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.

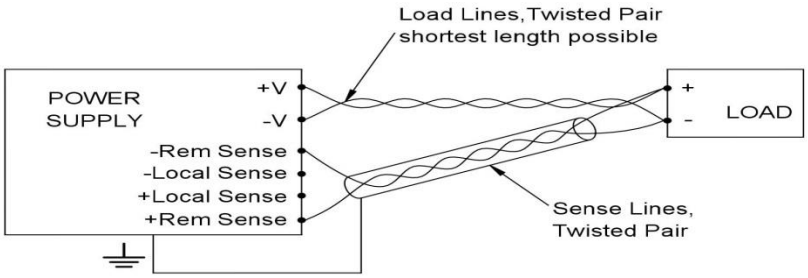


Figure 3-4. Remote Sensing with Single Load

3.8.6.3 Connecting Multiple Loads, Radial Distribution Method

Figure 3-5 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 be as short as possible and twisted or shielded to minimize noise pickup. The sense wires should be connected to the power supply output threaded studs or to the load with the most critical load regulation requirement.

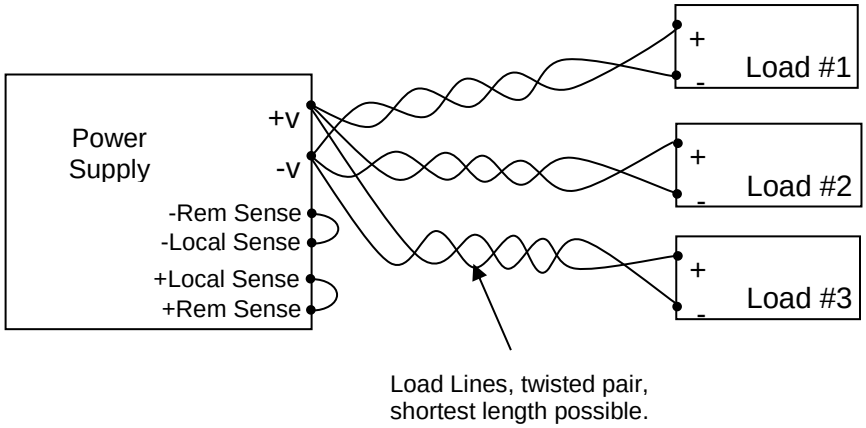


Figure 3-5. Multiple Loads Connection, Radial Distribution, Local Sense

3.8.6.4 Multiple Load Connection with Distribution Terminals

If remotely located output distribution terminals are used, the power supply Output should be connected by a pair of twisted and/or shielded wires. Each load should be separately connected to the distribution terminals.

If remote sensing is required, the sensing wires should be connected to the distribution terminals or at the most critical load.

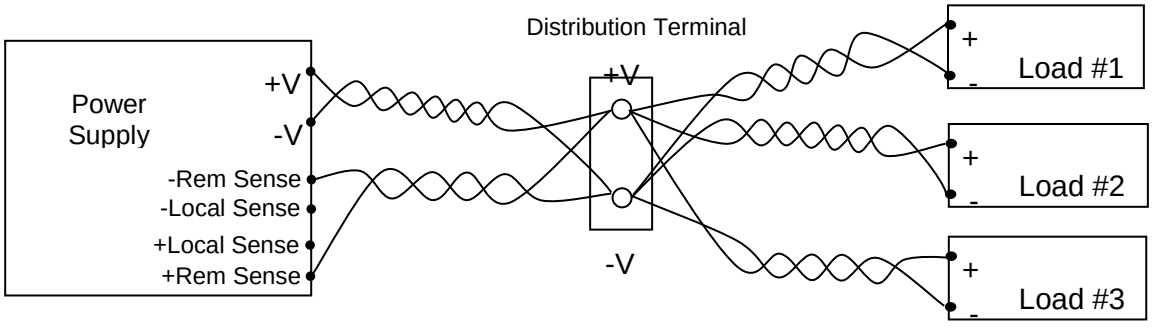


Figure 3-6. Multiple Loads Connected with Distribution Terminal, Remote Sensing

3.9 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. See Figure 3-7 for the J2 sense connector location.

3.9.1 Sense Plug

WARNING

There is a potential shock hazard at the sense connector. Local or remote sense wires should have an insulation rating 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.

WARNING

There is a potential shock hazard at the sense connector.
The protective cover of the remote sense connector ***must*** be installed before applying the AC input power.

The J2 sense plug is a 7-terminal removable plug on the rear panel:

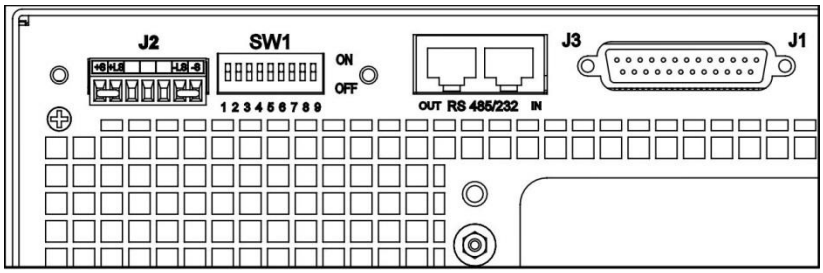


Figure 3-7. J2 Sense Connector Location

As described in the following sections, the plug may be connected for Local or Remote sensing:

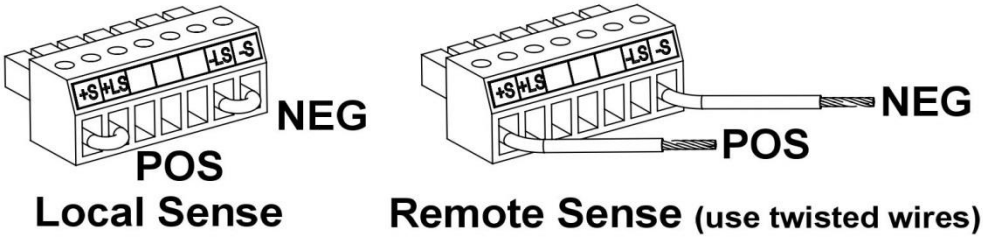


Figure 3-8. J2 Sense Connector Pin Assignments

Terminal	Name	Function
J2-1	+S	Remote positive sense
J2-2	+LS	Local positive sense. Connected internally to the positive output terminal
J2-3		Not connected (NC)
J2-4		Not connected (NC)
J2-5		Not connected (NC)
J2-6	–LS	Local negative sense. Connected internally to the negative output terminal
J2-7	–S	Remote negative sense

Table 3.4. J2 Sense Plug Terminals

3.9.2 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 J2 terminals assignment. With local sensing, the Output voltage regulation is made at the output terminals. This method ***does not*** compensate for voltage drop on the load wires. Therefore, local sensing is recommended only for low load current applications or where the load regulation is less critical.

3.9.3 Remote Sensing

WARNING

There is a potential shock hazard at the remote sense point. Ensure that the connections at the load end are shielded to prevent accidental contact with hazardous voltages.

CAUTION

When using shielded sense wires, connect the shield at one end only. The connection can be to the power supply chassis or one of the output terminals.

Use remote sense when the load regulation at the load is critical. With remote sensing, the power supply will compensate for the voltage drop across the load cables. Refer to Section 3.8.1 for estimating the voltage drop across the load cables. The voltage drop is subtracted from the total voltage available at the output. See Figure 3-8 and follow these instructions below to configure the power supply for remote sensing:

a) Ensure that the AC ON/OFF switch is in OFF position.
b) Remove the local sense jumper wires from the J2 sense connector.
c) Connect the negative sense lead to terminal J2-7 (-S) and the positive sense lead to terminal J2-1(+S) of the J2 mating connector. Reconnect the J2 sense connector to the power supply J2 mating connector.
d) Press the AC ON/OFF power switch to the ON position.

NOTES:

1. *If the power supply is operating in remote sense and either the positive or negative load cable disconnects, an internal protection circuit will activate and shut down the power supply. To resume operation, turn the power supply Off using the AC ON/OFF switch. Then re-connect the open load wire, turn the power supply On using the front panel AC ON/OFF switch and press the front panel OUT button.*
2. *If the power supply is operated without any sense connections, it will continue to work, but the Output voltage regulation will be degraded. Also the Over-voltage protection (OVP) circuit may active and shut down the power supply.*

3.9.4 J2 Remote Sense Plug Technical Information

With the sense plug shipped with the power supply:

– J2 Plug type: MC 1.5/7-ST-3.81, Phoenix Contact or equivalent.
– Wire size: 16 to 28AWG.
– Use wire with insulation rating greater than the supply's rated Output voltage.
– Stripping length: 7mm (0.28 inches).
– Tightening torque: 0.22-0.25 Nm (1.95–2.21 Lb-Inch).

3.10 Repackaging for Shipment

To ensure safe transportation of the power supply, contact the TDK-Lambda 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 the serial number of the power supply. Refer to the Warranty for further instructions.

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 functions of the controls and connectors terminals.

- Section 4.2: Front Panel Controls and Indicators.
- Section 4.3: Rear Panel Connections and Controls.

4.2 Front Panel Controls and Indicators

See Figure 4-1 to review controls, indicators and meters located on the Power Supply front panel.

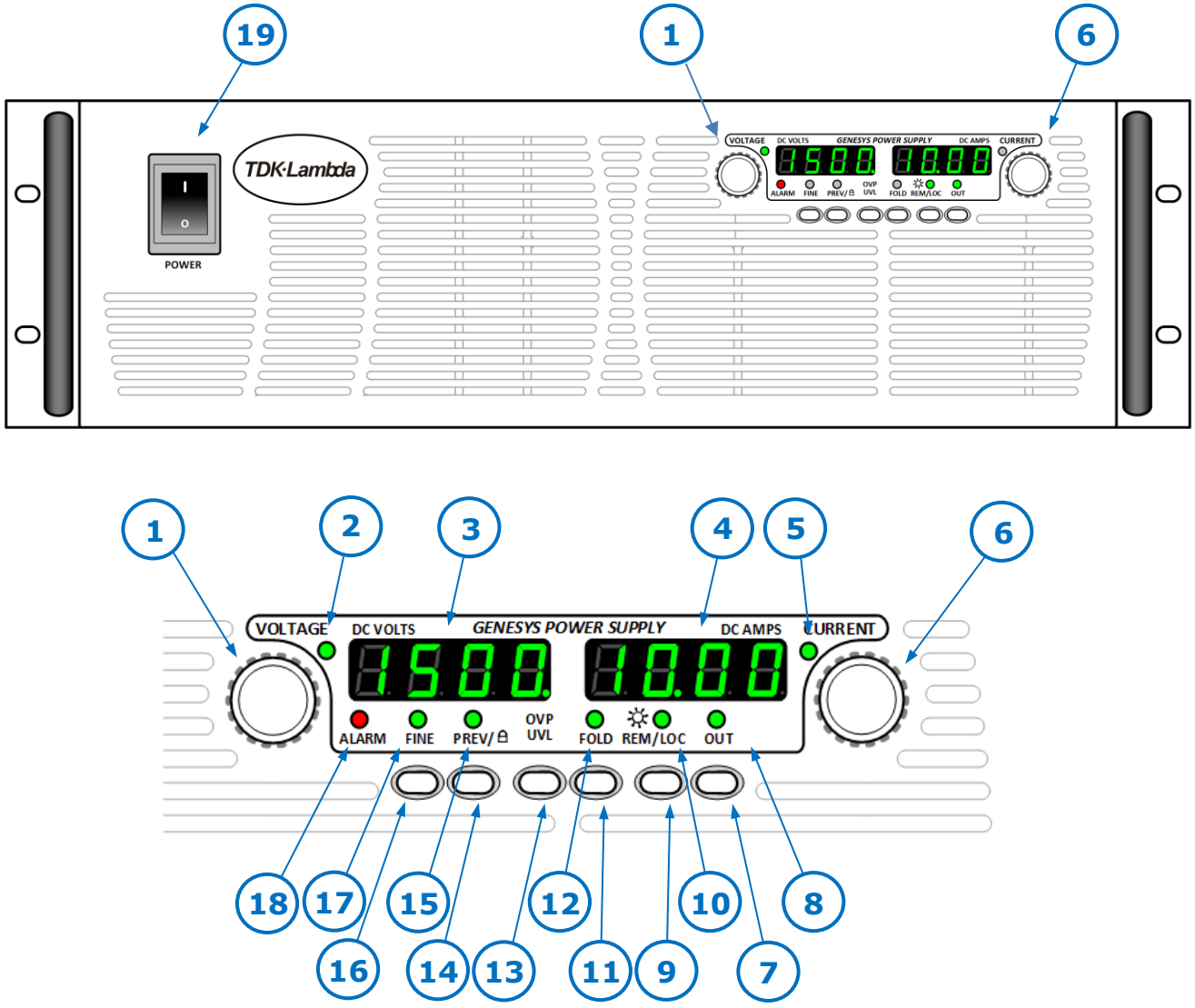


Figure 4-1. Front Panel Controls and Indicators

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	5.2.1 5.3.1 5.4.1 8.2.2
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 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 communication port.	5.2.2 8.2.4
7	**OUT** button	**Main function:** Output ON/OFF control. Press OUT to set the output On or Off. Press to reset and 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 VOLT display will cycle between “**SAF**” and “**AUT**”. Releasing the OUT button while one of the modes is displayed, selects that mode.	5.6 5.11
8	**OUT** indicator	Green LED, lights when the DC output is enabled.	
9	**REM/LOC** button	**Main function**: Go to local. Press REM/LOC to put the unit into Local (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 Address with the VOLTAGE encoder and the Baud rate with the CURRENT encoder.	8.2.5 8.2.2 8.2.4
10	**REM/LOC** indicator	Green LED, lights when the unit is in Remote mode.	
11	**FOLD** button	Foldback protection control. - Press FOLD to set Foldback protection to On. - To release Foldback alarm event, press OUT to enable the output and re-arm the protection. - Press FOLD again to cancel the Foldback protection.	5.5
12	**FOLD** indicator	Green LED, lights when Foldback 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. The display will show the setting for five (5) seconds and then it will return to show the actual Output voltage and 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 button while one of the modes is displayed selects that mode.	5.12
15	**PREV** indicator	Green LED, lights when PREV button is pressed	
16	**FINE** button	**Main function:** 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 (approx. 6 turns). **Auxiliary function:** Advanced Parallel Operation Mode Setting.	6.4.2
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 Foldback, Enable and AC fail detection will cause the ALARM LED to blink.	
19	**AC** Power Switch	AC ON/OFF Control	

Table 4.1. Front Panel Controls and Indicators (continued)

4.3 Rear Panel Connections and Controls

See Figure 4-2 to review connections and controls located on the Power Supply rear panel.

Refer to Table 4.2 for explanations about rear panel connections and controls.

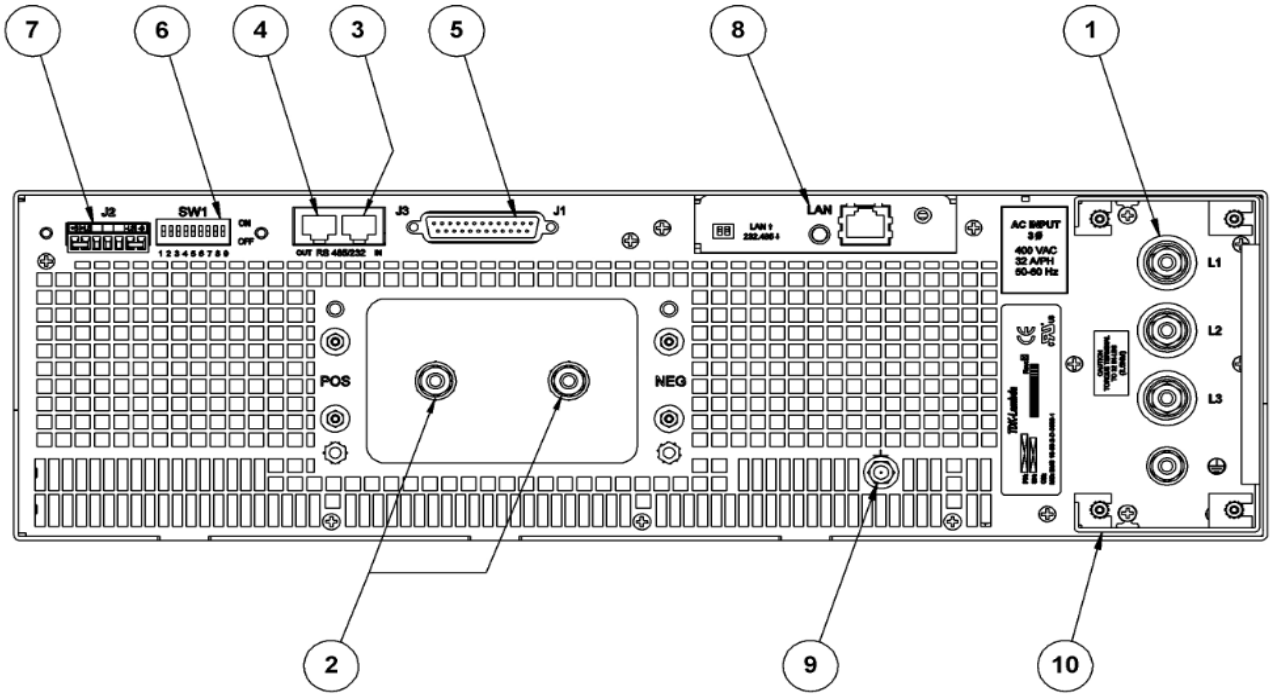


Figure 4-2. Rear Panel Connections and Switches

Number	Control / Indicator	Description	Section
1	AC input	M6 threaded stud (length ~ 0.7”) for ring lugs. Connect three phases of AC power plus safety ground.	3.6.1
2	DC output	M6 threaded stud (length ~ 0.7”) suitable for ring lugs.	3.8.6
3	J3-Remote In connector	RJ-45 type connector, use for connecting power supplies to a RS-232 or RS-485 port of computer for Remote Digital remote control. Several power supplies may be daisy-chained to one port by connecting the J3-OUT to the next supply’s J3-IN.	8.3.2
4	J3- Remote Out connector	RJ-45 type connector, used for daisy-chaining power supplies in a serial communication bus.	8.3.2
5	J1 Analog Remote connector	Connector for Remote Analog interface. Includes Output voltage and Output current programming and monitoring signals, Shut-off control (electrical signal), Enable/Disable control (dry-contact), Power Supply OK (PS_OK) signal and operation mode (CV/CC) signal. 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.	7.2
6	SW1 Setup DIP-switch	Nine position DIP-switch for selecting Remote programming and monitoring modes for Output voltage, Output current and other control functions.	4.4
7	J2 Remote sense connector	Connector for making remote sensing connections to the load for regulation of the load voltage and compensation of load wire drop.	3.9.3
8	Blank or Option Plate	Blank sub-plate for standard units. Other plates and connectors for options such as LAN, IEMD, USB or Isolated Analog (4-20 mA) option. Figure 4-2 shows LAN option card.	Fig 4-2
9	Ground screw	M5 x 20 mm threaded stud for Chassis Ground connection.	Fig 4-2
10	DC Output Cover	Figure 3-2 shows exploded view of how to mount the DC Output cover	Fig 3-2
10	AC Input Terminals Cover	Figure 3-1shows AC Input protective cover.	Fig 3-1

Table 4.2. Rear Panel Connections and Controls

4.4 Rear Panel SW1 Setup DIP-switch

The SW1 Setup DIP-switch is a rear-panel 9-position DIP-switch that allows the user to choose a variety of control and monitor modes. The modes are listed in Table 4.3 below.

WARNING

There is a potential shock hazard at the SW1 Setup DIP-switch. All changes to the switch positions should be made with the power supply output OFF. Ensure that the SW1 DIP-switch protective cover is installed before turning ON the Output voltage of the power supply.

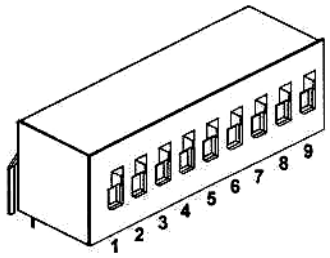


Figure 4-3. SW1 Setup DIP-switch

4.4.1 SW1 Position Function

Refer to Table 4.3 for a description of the SW1 DIP-switch position functions. The factory default setting is DOWN for all positions.

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 Remote Analog Programming	Output Current programmed by Front Panel	Output Current programmed by Remote Analog External voltage or External resistor
SW1-3	Programming Range select (Remote voltage/resistive)	0-5V (0-5kohms)	0-10V (0-10kohms)
SW1-4	Output Voltage and Current Monitoring Range	0-5V	0-10V
SW1-5	Shut-Off Logic select	Off: Low (0-0.6V) or Short On: High (2-15V) or Open	Off: High (2-15V) or Open On: Low (0-0.6V) 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 Front Panel	Output Voltage programmed by External resistor
SW1-8	Output Current Resistive Programming	Output Current programmed by Front Panel	Output Current programmed by External resistor
SW1-9	Enable/Disable control	Rear panel Enable/Disable control is not Active	Rear panel Enable/Disable control is Active

Table 4.3. SW1 DIP-switch Position Functions

4.4.2 Resetting the SW1 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 volts and that the front panel OUT LED is OFF. Then use a small flat-blade screwdriver to change the SW1 DIP-switch settings.

4.5 J1 Remote Analog Program and Monitor

The J1 Remote Analog Programming and Monitoring connector is a DB25 subminiature connector located on the power supply rear panel. Refer to Table 4.4 for a description of the connector functions. The Power Supply default configuration is Local operation (front panel control) which does not require connections to J1. For Remote Analog operation using J1 signals, use the plastic-body plug provided (or an equivalent type). A shielded cable is required to maintain the EMC specifications for the J1 wires.

All pins of the J1 connector are isolated from the Output voltage. They are UL approved as Safety Extra Low Voltage (SELV) for Output voltages up to 1500VDC.

4.5.1 Making J1 Connections

- J1 connector: TE Connectivity (AMP), P/N: 5747461-5 (On P/S Rear Panel)
- J1 plug: TE Connectivity (AMP), P/N: 745211-2
- Wire dimension range: 26-22AWG
- Manual Pistol grip tool:
  - Handle: TE Connectivity (AMP), P/N: 58074-1
  - Head: TE Connectivity (AMP), P/N: 58063-1
- Extraction tool: TE Connectivity (AMP), 91232-1

Before making any connection, press the Front Panel AC ON/OFF switch to the OFF position, wait until the front panel display has turned OFF and wait until the Output voltage has dropped to zero.

CAUTION

All pins of the J1 connector are isolated form the ±V potential of the power supply output (and the local sense ± LS).

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

WARNING

There is a potential shock hazard at the Power Supply Output. Use wires with a minimum insulation rating equivalent to the maximum Output voltage of the Power Supply.

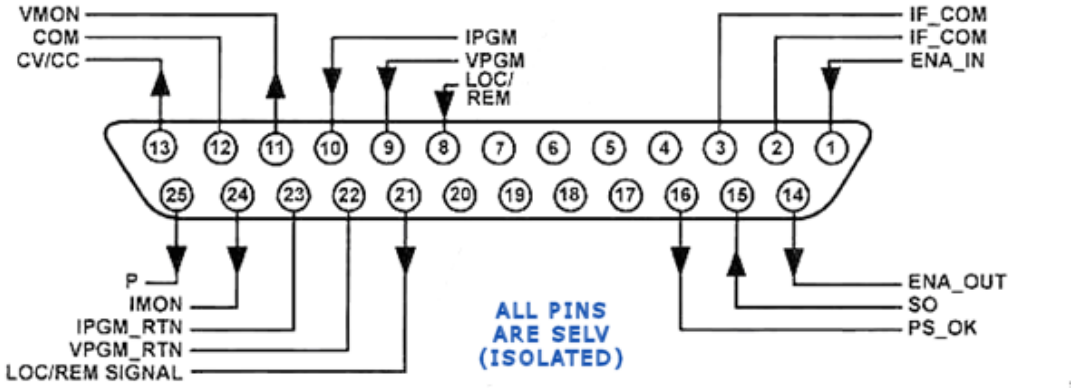


Figure 4-4. J1 Connector Pin Signals

J1 contact	Signal name	Function	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 interface (**Note 1**)	5.7, 5.10
J1-4 J1-7	N/C	No Connection	
J1-8	LOCAL/ REMOTE	Input for selecting between Local (Front Panel) or Remote Analog programming (J1) of Output voltage and Output current.	7.2
J1-9	VPGM	Input for Remote Analog voltage or Resistance programming of the Output voltage.	7.1, 7.4
J1-10	IPGM	Input for Remote Analog voltage/resistance programming of the Output current.	7.1, 7.4
J1-11	VMON	Output for monitoring the power supply Output voltage.	7.6
J1-12	COM	Isolated Common. Return for VMON, IMON, CV/CC, LOC/REM and P. (**Note 1)**	
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 control of the power supply Output.	5.7
J1-16	PS_OK	Output for indication of the power supply status.	5.10
J1-17 J1-20	N/C	No Connection	
J1-21	LOC/REM SIGNAL	Output for indicating if the unit is in Local or Remote Analog Programming mode.	7.3
J1-22	VPGM_RTN	Isolated Common. Return for VPGM input (J1-9) (**Note 1**)	7.1, 7.4, 7.5
J1-23	IPGM_RTN	Isolated Common. Return for IPGM input (J1-10). (**Note 1**)	7.1, 7.4, 7.5
J1-24	IMON	Output for monitoring the power supply Output Current.	7.6
J1-25	P	Output for current balance in Parallel operation.	6.2

Table 4.4. J1 Connector Terminals and Functions

Note 1. IF_COM, COM, VPGM_RTN and IPGM_RTN are electrically connected.

5. *LOCAL OPERATION*

5.1 Introduction

This Chapter describes how to operate the Power Supply using the front panel controls. Ensure that the REM/LOC LED on the front panel is Off indicating local front panel) control. If the REM/LOC LED is ON, press the front panel REM/LOC button to change the operation to Local control.

- For information regarding Remote Analog programming refer to Chapter 7.
- For information regarding usage of the Serial Communication Interface refer to Chapter 8.

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 setting and the load resistance.

5.2.1 Constant-Voltage (CV) Mode

a) 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.

b) While the Power Supply operates in Constant-Voltage mode, the VOLTAGE LED on the front panel is illuminated.

c) 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 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”.

d) 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 turns On when the resolution is set to FINE.

NOTE

If, after completing the adjustment, the front panel display shows a different value than the setting, the power supply may be at Output current limit. 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 (OVP) and Under-Voltage Limit (UVL) settings. Refer to Sections 5.3 and 5.4 for more details.

5.2.2 Constant-Current (CC) Mode

a) In Constant-Current mode, the Power Supply regulates the Output current at the selected value, while the Output voltage varies with the load requirement.

b) While the power supply is operating in Constant-Current mode, the CURRENT LED on the front panel illuminates.

c) Adjustment of the Output current can be made when the Power Supply output is Enabled (Output On) or Disabled (Output Off).
   - **Disabled Output (Off)**: Press the PREV button and then rotate the CURRENT encoder knob. The CURRENT meter will show the programmed current for 5 seconds after the adjustment has been completed. Then the VOLTAGE meter will display "**OFF**".
   - **Enabled Output (in Constant-Voltage mode)**: Press the PREV button and then rotate the CURRENT encoder knob. The CURRENT meter will show the programmed current for 5 seconds after the adjustment has been completed, and will then return to show the actual Output current.
   - **Enabled Output (in Constant-Current mode)**: Rotate the CURRENT encoder knob to adjust the current limit.

d) Adjustment resolution can be set to Coarse or Fine adjustment. Press the FINE button to select between Coarse and Fine resolution. The FINE LED will turn ON when the resolution is set to FINE.

5.2.3 Automatic Crossover

If the Power Supply operates in Constant-Voltage mode, and if the load current is increased to greater than the programmed current setting, the power supply will automatically switch to Constant-Current mode. If the load is then decreased to less than the programmed current setting, the Power Supply will automatically switch back to Constant-Voltage mode.

5.3 Over-Voltage Protection (OVP)

The OVP circuit prevents an Output voltage setting equal or greater than the OVP setting from the front panel or from Digital Remote programming.

The OVP circuit protects the load in the event of a Remote or Local programming error or a power supply failure. The OVP circuit monitors the voltage at the Power Supply local sense points. Upon detection of an Output Over-Voltage condition, the Power Supply output will shut down.

5.3.1 Setting the OVP Level

To set the OVP level, press the OVP/UVL button, so that the CURRENT meter shows "**OUP**" while the VOLTAGE meter shows the OVP setting level. Rotate the VOLTAGE encoder knob to adjust the OVP level. The display will return to its previous state after 5 seconds of inactivity. The OVP can be set when the Power Supply output is On or Off.

The OVP setting may range from 10% to 110% of rated Output voltage, and has to be more than 105% of the Output voltage setting. The OVP setting cannot be set so low that an OVP fault will be tripped.

OVP Programming Range (10kW/15kW)		
Model Rated Output Voltage (VDC)	**Minimum (VDC)**	**Maximum (VDC)**
800	0	880
1000	0	1100
1250	0	1375
1500	0	1650

Table 5.1. OVP Programming Range (10kW/15kW Models)

To preview the OVP setting, press the OVP/UVL pushbutton so that the CURRENT display shows "**OUP**". At this time, the VOLTAGE display will show the OVP setting. After 5 seconds, the display will return to its previous state.

5.3.2 Activated OVP Protection Indications

When the OVP is activated the power supply output shuts down. The VOLTAGE display will show "**OUP**" and the ALARM LED will blink.

5.3.3 Resetting the OVP Circuit

To reset the OVP circuit after it activates:

a) Reduce the power supply Output voltage setting below the OVP set point.

b) Ensure that the load and the sense wiring are connected properly.

c) There are four methods to reset the OVP circuit.
   - Press the OUT button to turn the Output back On.
   - Turn the power supply Off using the AC ON/OFF switch, wait until the front panel display turns Off and then turn the power supply On using the AC ON/OFF switch.
   - Turn the power supply output Off and then On using the **SO** control (refer to Section 5.7). In this method the power supply must be set to Auto-Restart mode.
   - Send the "**OUT 1**" command via the RS-232/RS-485 communication port. See the command in Section 8.6.5.

5.4 Under-Voltage Limit (UVL)

The UVL prevents adjustment of the Output voltage below a specific limit. The combination of UVL and OVP functions allow the user to create a protection window for sensitive load circuitry. The UVL setting will *not* cause a fault if the Output voltage drops below this setting.

5.4.1 Setting the UVL Level

To set the UVL level, press the OVP/UVL button TWICE, so that the CURRENT meter shows "**UUL**". While the VOLTAGE meter will shows the UVL setting level rotate the VOLTAGE encoder knob to adjust the UVL level. The display will return to its previous state after 5 seconds of inactivity. The UVL can be set when the power supply output is On or Off.

UVL programming Range (10kW/15kW)		
Model Rated Output Voltage (VDC)	**Minimum (VDC)**	**Maximum (VDC)**
800	0	760
1000	0	950
1250	0	1187.5
1500	0	1425

Table 5.2. UVL Programming Range (10kW/15kW Models)

The UVL setting may range from zero to 95% of rated Output voltage, and has to be less than 95% of the Output voltage setting.

5.5 Foldback Protection (FB)

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 Foldback 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 Foldback protection. Activation of the Foldback protection disables the power supply output, causes the ALARM LED to blink and displays "**Fb**" on the front panel VOLTAGE meter.

5.5.2 Resetting Activated Foldback Protection

There are four methods to reset an activated Foldback protection.

a) Press the OUT button. The power supply output is Enabled and the Output voltage and Output current will return to their last settings. In this method, the Foldback protection remains armed. Therefore, if the load current is higher than the Output current limit setting, the Foldback protection will be activated again

b) Press the FOLD button to cancel the Foldback protection. The power supply output will remain disabled and the VOLTAGE display will show "**OFF**". Press the OUT button again to Enable the power supply output.

c) Turn the power supply output Off and then On using the J1 connector Shut-off (SO) control as described in Section 5.7. In this method, the Foldback protection remains armed. Therefore, if the load current is higher than the Output current limit setting, the Foldback protection will be activated again.

d) Turn the power supply Off using the front panel AC ON/OFF switch, wait until the front panel display turns Off, then turn the unit back ON again using the front panel AC ON/OFF switch. The power supply output is Enabled and the Output voltage and Output current will return to their last settings. In this method, the Foldback protection remains armed. Therefore, if the load current is higher than the Output current limit setting, the Foldback protection will be activated again.

5.6 Output ON/OFF Control

The Output ON/OFF Enables or Disables the power supply output. The Output ON/OFF can be activated from the front panel using the OUT button. The 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 display shows "**OFF**".

5.7 Output SHUT-OFF (SO) Control via Rear Panel J1 Connector

CAUTION

The SO function is activated ONLY when a transition from On to Off is detected after applying AC power to unit. (In Auto-Restart mode, the output will be enabled after applying AC power; even if SO is set to an Off level). After an On to Off transition is detected, the SO will Enable or Disable the power supply output according to the signal level or the short/open applied to J1.

J1-2, -3 and -15 (Figure 4-2, Item 5) serve as the 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 will be activated only when a transition from On-to-Off is detected after applying AC power to the unit. (In Auto-Restart mode, the output will be enabled after applying AC power; even if SO is set to an Off level). After an On-to-Off transition 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" connection as described in Section 6.4. The SO control can also be used to reset the Overvoltage (OVP) and Foldback (FB) faults (refer to Sections 5.3 and Section 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. J1-15 is the SO signal input and J1-2, -3 are the signal return connections (connected internally). Contacts J1-2, -3 and -15 are isolated from the power supply output.

The SO control logic can be selected by the rear panel SW1 Setup DIP-switch. Refer to Table 5.3 for SW1 settings and SO control logic.

SW1-5 setting	SO signal level J1-2 (-3), J1-15	Power supply output	Display Voltage/Current
DOWN (default)	2-15V or Open	On	Voltage/Current
	0-0.6V or Short	Off	"**SO**"/Zero current
UP	2-15V or Open	Off	"**SO**"/Zero Current
	0-0.6V or Short	On	Voltage/Current

Table 5.3. SO Logic Selection

5.8 Output ENABLE (ENA) Control via Rear Panel J1 Connector

J1-1 and J1-14 (Figure 4-2, Item 5) serve as Output Enable/Disable terminals by switch or relay. This function is Enabled or Disabled by SW1-9. Refer to Table 5.4 for the Enable/Disable function and SW1 settings.

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 5.4. Enable/Disable Function and SW1 DIP-switch Settings

CAUTION

To prevent possible damage to the unit, **DO NOT** connect any of the Enable/Disable inputs to the positive or negative output potential.

NOTE

SAFE-START MODE: If the Enable/Disable input is opened when the unit is in Safe-Start mode, it is required to short the Enable/Disable inputs and then press the OUT button (or send the "OUT 1" command) to resume operation.

AUTO-RESTART MODE: If the Enable/Disable inputs are opened when the unit is in Auto-Restart mode, it is required to short the Enable/Disable inputs and then the output will turn back ON automatically.

5.9 CV/CC Signal

J1-13 serves as the CV/CC signal. This signal indicates the operating mode of the power supply (Constant-Voltage or Constant-Current).

It is an open-collector output (with a 30V parallel Zener diode), and is referenced to IF_COM at J1-2, -3 and -12.

- When the power supply operates in Constant-Voltage mode, the CV/CC open collector output is open.
- When the power supply operates in Constant-Current mode, the CV/CC open collector output is closed/low (0-0.6V) with a maximum sink current of 10mA.

CAUTION

Do not connect the CV/CC signal to a voltage source greater than 30VDC. Always connect the CV/CC signal to a 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 if the power supply output is On or Off. The PS_OK signal is activated if the output is turned Off by an output OFF command or by a fault condition in the power supply (see the list below).

The PS_OK is a TTL signal output at J1-16, referenced to IF_COM at J1-2, -3 and -12 (Isolated interface Common). When the output is Off, PS_OK level switches to a low level with a maximum sink current of 1mA. When the output is turned On, the PS_OK level switches to a high level with a maximum source current of 2mA.

The power supply faults which can shut Off the output are:

- OTP
- OVP
- Foldback
- AC Fail
- Enable/Disable open (power supply disabled)
- SO (Rear panel Shut-Off, power supply is shut off)
- Output Off (by front panel OUT button or Remote command)

5.11 Safe-Start and Auto-Restart Modes

When turning On the power supply with the front panel AC ON/OFF Power switch, the supply may start up with its output OFF (Safe-Start) or start with its output ON and return its last setting of the Output voltage and current (Auto-Restart). The start setting may also affect how some faults recover after the fault clears.

5.11.1 Changing the Start Mode

To change the start mode, press and hold the OUT button. The VOLTAGE display will continuously cycle between "**SAF**" and "**AUT**" every 3 seconds. Release the OUT button when the desired mode is displayed. The factory default setting is Safe-Start mode.

5.11.2 Safe-Start Mode

In the Safe-Start mode, when the front panel AC ON/OFF switch is turned On, the power supply output will always be Off. The output is turned on by pressing the OUT button or sending an "**OUT ON**" command. All other settings are the same as they were at the last power-down.

In Safe-Start, if any power supply fault turns Off the output, then the output will not turn on again until the OUT button is pressed or an "**OUT ON**" command is sent to the unit.

5.11.3 Auto-Restart Mode

In the Auto-Restart mode, when the front panel AC switch is turned On, the power supply output will turn On automatically, *if the output was On* when the power supply was last powered-down. All other settings are the same as they were at the last power-down.

In Auto-Restart, if certain non-latching faults occur and then clear, the output will turn On again automatically to the last settings. Non-latching faults include: Over-Temperature (OTP), AC brown-out or phase-loss (AC), Enable opened (ENA) and Shut-off (SO).

In Auto-Restart, if certain latching faults occur (OVP or Foldback (FB)), the output can be turned On again by toggling the J1 connector Shut-off (SO) signal (refer to Section 5.7 for details).

5.12 Front Panel Locking

The front panel controls can be locked to protect against an operator accidentally changing the power supply settings.

5.12.1 Changing the Locking

Press and hold the front panel PREView button. See the VOLTAGE display toggle between locked front panel ("**LFP**") and unlocked front panel ("**UFP**"). Select a mode by releasing the PREView button when the desired mode is displayed.

5.12.2 Unlocked Front Panel

This is the normal operating mode. The front panel controls are able to program and monitor the power supply parameters.

5.12.3 Locked Front Panel

When the front panel is locked, the following controls are *DISABLED*:

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

The power supply will not respond to attempts to use these controls. The VOLT display will show "**LFP**" to indicate that the front panel is locked.

Other buttons, such as PREView and OVP/UVL may still be used to view power supply settings.

5.13 Over-Temperature Protection (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 display will show "**O7P**" and the ALARM LED will blink.

Resetting the OTP circuit can be automatic (non-latched) or manual (latched), depending on if the Safe-Start or Auto-Restart mode is enabled.

a) Safe-Start mode: In the Safe-Start mode, the power supply stays Off after the Over-Temperature condition has been removed. The VOLTAGE display continues to show "**O7P**" and the ALARM LED continues to blink. To reset the OTP circuit, press the OUT button (or send the "OUT ON" command).

b) Auto-Restart mode: In the Auto-restart mode, the power supply recovers to its last setting automatically when the Over-Temperature condition is removed.

5.14 Last Setting Memory

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

Stored Parameters:

- Output is ON or OFF
- Output voltage setting (PV setting)
- Output current setting (PC setting)
- OVP level
- UVL level
- FOLD setting
- Start-up mode (Safe-Start or Auto-Restart)
- Remote/Local (see note below)
- Address setting (RS-232/RS-485, LAN, IEEE or USB)
- Baud rate (RS-232/RS-485 only)
- Locked/Unlocked Front Panel (LFP/UFP)
- Parallel Master/Slave setting

Remote/Local, Address setting and Baud rate are related to Remote Digital Control and are explained in Chapter 8.

Note: If the last setting was Local Lockout, the power supply will return to Remote mode.

6. *SERIES AND PARALLEL OPERATION*

Users may connect the outputs of Genesys™ power supplies together to produce:

- Voltages greater than any one power supply rating (series connection).
- Plus and minus polarity (series connection).
- More current than any one power supply rating (parallel connection).

In addition to connecting the outputs together, analog control connections are used to ensure the power supplies are properly sharing the total voltage or current. Digital Remote programming through the LAN, IEEE, USB or RS-232/RS-485 is allowed for all power supplies.

NOTE

Consult your local TDK-Lambda Sales/Technical Support representative to discuss your Series or Parallel application in detail.

NOTE

When a power supply is set to Remote Analog control the corresponding VOLTAGE or CURRENT encoder (and their respective PREView settings) will not operate.

Although the front panel seems like it can be used to adjust the output settings, it is the Remote Analog control lines that actually set the programming Limits.

6.1 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 positive and negative Output voltage.

CAUTION

Do not connect power supplies from different manufacturers in series or in parallel. Use only the same models for series or parallel connection.

6.1.1 Series Connection for Increased Output Voltage

In this mode, two (2) units are connected so that their Output voltages 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 the start up sequence or in case one unit shuts down. Each diode should be rated for at least the power supply rated Output voltage and Output current. Refer to Figures 6-1, 6-2 and 6-3 for Series Operation with Local and Remote setting.

WARNING

When power supplies are connected in series, and the load or one of the output terminals is connected to Chassis ground:

- For models with $V_{OUT} \geq$ 800 VDC rated output, no point may be at a greater potential than +/-1500 VDC from Chassis ground.
- When using RS-232/RS-485, LAN, IEMD or USB, no point may be at a greater potential than +/-1500 VDC from Chassis ground. Refer to Section 3.8.3 (Grounding Outputs) for more details.

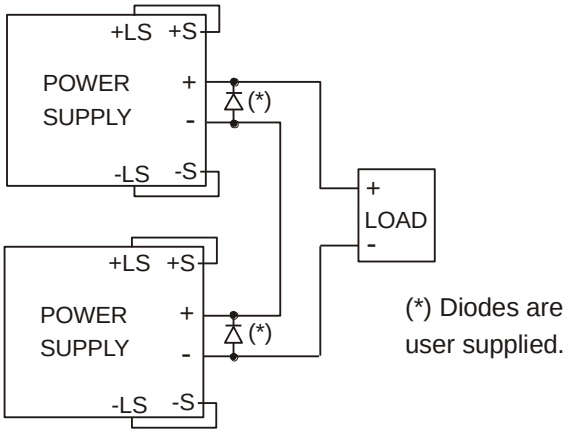


Figure 6-1. Series connection, Local sensing

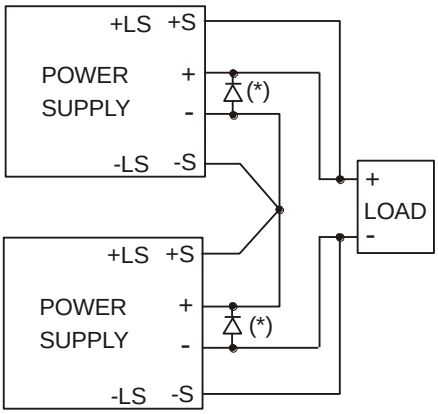


Figure 6-2. Series connection, Remote sensing

6.1.2 Remote programming in Series Operation for Increased Output Voltage:

For all GEN-3U HV models with rated Output voltage ≥ 800V, all remote control circuits (Analog control (J1), RS-232/RS-485, LAN, IEMD and USB controls) are isolated from the power supply Outputs. They are UL approved as SELV circuits with respect to the Output for up to 1500VDC.

Therefore:

1. Programming by External voltage: The Remote Analog programming circuits (J1) for GEN-3U HV model and the common of the Analog control circuits used to control each series connected unit can be connected together or kept separate from each other.
2. Using the SO and PS_OK signals: The Shut-Off and PS_OK circuits (J1) for GEN-3U HV model and the common of the Analog control circuits used to control each series connected unit can be connected together 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 7.5 for details.

4. Programming via the Digital Communication port (RS-232/RS-485, LAN, IEEE, USB): The communication port is referenced to the IF_COM which is isolated from the power supply Output potential. Therefore power supplies connected in series can be daisy-chained using the J3-IN and J3-OUT connectors. Refer to Chapter 8 for details.

6.1.3 Series Connection for Positive and Negative Output Voltage

In this mode, two (2) 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 the start-up sequence 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 Figure 6-3 for this operating mode.

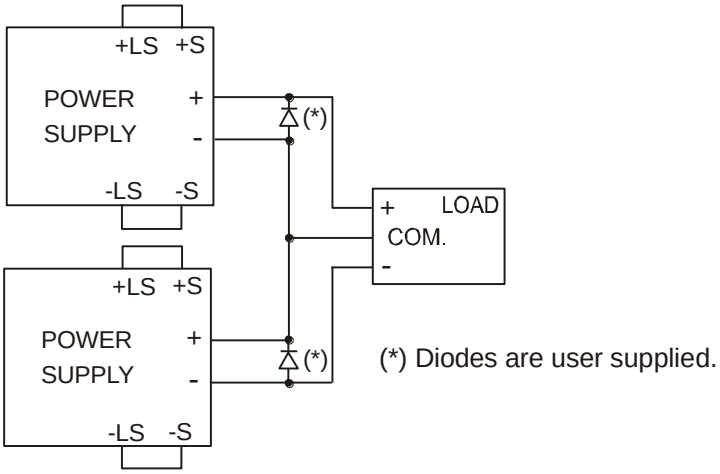


Figure 6-3. Series Connection for Positive/Negative Output Voltages

Remote Programming in Series for Positive and Negative Output voltage:

1. Programming by External voltage: The Remote Analog programming circuits (J1) for GEN-3U HV model and the common of the Analog control circuits used to control each series connected unit can be connected together or kept separate from each other.
2. Using the SO and PS_OK signals: The Shut-Off and PS_OK circuits (J1) for GEN-3U HV models and the common of the Analog control circuits used to control each series connected unit can be connected together 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 7.5 for details.

4. Programming via the Digital Communication port (RS-232/RS-485, LAN, IEEE, USB):	The communication port is referenced to IF_COM which is isolated from the power supply Output potential. Therefore power supplies connected in series can be daisy-chained using the J3-IN and J3-OUT connectors. Refer to Chapter 8 for details.

6.2 Parallel Operation

Up to four (4) units of the same VOLTAGE and CURRENT rating can be connected in parallel to provide up to four times the current capability of one power supply. One of the units operates as a Master and the remaining units are Slaves. The Slave units are Analog programmed by the Master unit through their J1 Remote Analog connectors.

The Master unit operates in Constant-Voltage (CV) mode and regulates the Output voltage of the paralleled power supplies. The Output voltage of the Master supply can be set using its front panel encoders, by Remote Analog control (J1 or IS420) using VPGM or by Remote Digital control through the RS-232/RS-485, LAN, IEEE or USB Interface.

The Slave units operate in Constant-Current (CC) mode and their Output current follows the Output current of the Master unit. This is accomplished by connecting the P signal (J1-25) of the Master unit to the IPGM signal (J1-10) of each Slave unit (see Figure 6-5 for more details).

In Remote Digital operation, only the Master unit can be programmed by the computer, while the Slave units may be connected to the computer to read back measurement (voltage and current) and status only.

A shutoff daisy-chain can be added so that when a fault condition in one power supply shuts down its output, all the other power supplies will also shut down.

There are two methods (Basic and Advanced) to configure multiple power supplies for parallel operation Refer to Sections 6.3 and 6.4 for more details.

6.3 Basic Parallel Operation

In this method, setting the units as Master and Slave(s) is made by the rear panel J1 Remote Analog connections and the SW1 Setup DIP-switch. 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 power supplies for Basic Parallel operation.

6.3.1 Setting Up the Master Unit

Set the Master unit Output voltage to the desired voltage. Program the Master unit Output current to the desired Output current divided by the number of parallel power supplies. During operation, the Master power supply operates in CV mode, regulating the load voltage at the programmed Output voltage.

Connect the Output voltage sensing circuit to local or remote as shown in Section 3.9 and Figure 6-5.

6.3.2 Setting up the Slave Units

a. The Output voltage of the Slave units must be programmed at least 2-5% higher than the voltage of the Master unit to prevent interference with the Master unit’s control.

CAUTION

Failure to set the Slave unit(s) Output voltage setting high enough will cause the Slave unit(s) to go into Constant-Voltage (CV) mode. When this happens, Output current will no longer be shared equally between the paralleled power supplies.

b. Set the rear panel Setup DIP-switch SW1-2 to the UP position.

c. Set SW1-3 of the Slave unit(s) to the same setting as SW1-4 of the master unit. All power supplies must be set for 5V or 10V IPROG and IMON ranges.

d. Connect a wire jumper between J1-8 (LOC/REM) and J1-12 (COM) (refer to Table 4.4).

e. Connect the Slave unit J1-10 (IPGM) to the Master unit J1-25 (P).

f. Connect the Slave unit J1-23 (IPGM_RTN) to the Master unit J1-12 (IF_COM).

During operation, the Slave units operate as a controlled current source, following the Master unit Output current. It is recommended that the power system be designed so that each unit provides up to 95% of its Output current rating. This allows headroom for any imbalance caused by cabling and connection voltage drops.

6.3.3 Daisy Chain Connection for Shut-Off

This setup and connections are optional but are STRONGLY recommended. It will shut down all power supplies when a fault condition occurs in any single power supply. This is optional but strongly recommended (see Figure 6-4).

a. For all power supplies, DIP-switch SW1-5 should be in the DOWN position.

b. Connect J1-16 (PS_OK) of the Master unit to J1-15 (SO) of the first Slave unit (if any).

c. If there is a second Slave unit, connect the first Slave unit J1-16 (PS_OK) to the second Slave unit J1-15 (SO).

d. If there is a third Slave unit, connect the second Slave unit J1-16 (PS_OK) to third Slave unit J1-15 (SO).

e. Connect the last Slave unit J1-16 (PS_OK) to the Master unit J1-15 (SO).

f. Connect J1-2 or J1-3 (IF_COM) of all power supplies together.

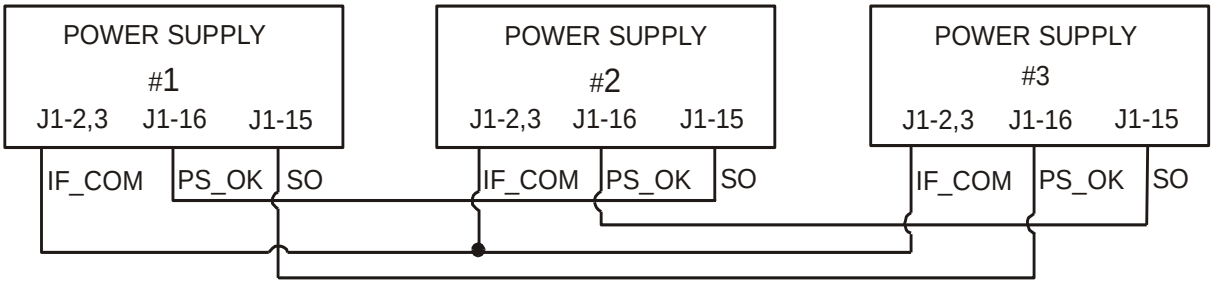


Figure 6-4. Shut-Off Daisy-Chain Connection

6.3.4 Setting Over-Voltage Protection (OVP)

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 the Master unit OVP setting, which should prevent the Slave unit from shutting down before the Master unit does. Thus, when the Master unit shuts down due to an Output OVP condition, it programs the parallel system Output voltage to zero.

If a Slave unit shuts down (when its OVP is set lower than the Master Output voltage and, if all power supplies are not daisy-chained), only that Slave unit would shut down and the remaining Slave units would supply all the load current.

When there is a risk from Output Over-Voltages, it is recommended to use the Shut-Off Daisy-Chain method (see Section 6.3.3) so all power supplies will turn off together.

6.3.5 Setting Foldback protection (FB)

Foldback protection, If desired, may only be used with the Master unit. Thus, when the Master unit shuts down, it programs the parallel system Output voltage to zero.

6.3.6 Connecting the Load

In parallel operation, power supplies can be connected for Local or Remote sensing. Refer to Figure 6-5. The figure shows the connection of two (2) units, however, the same connection method applies for up to four (4) units.

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

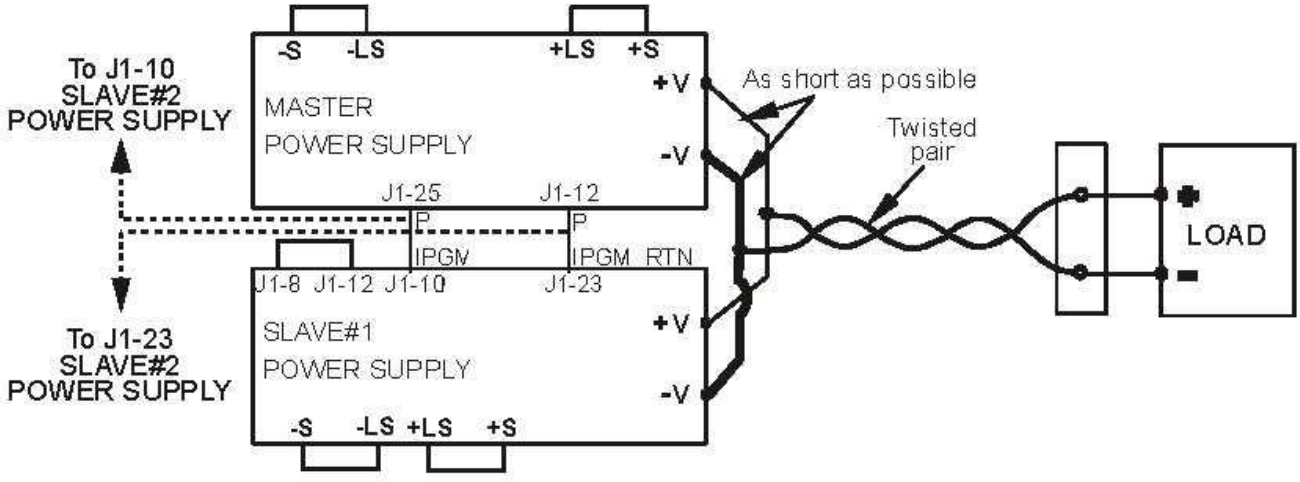


Figure 6-5. Parallel Supply Connections without Remote Sense

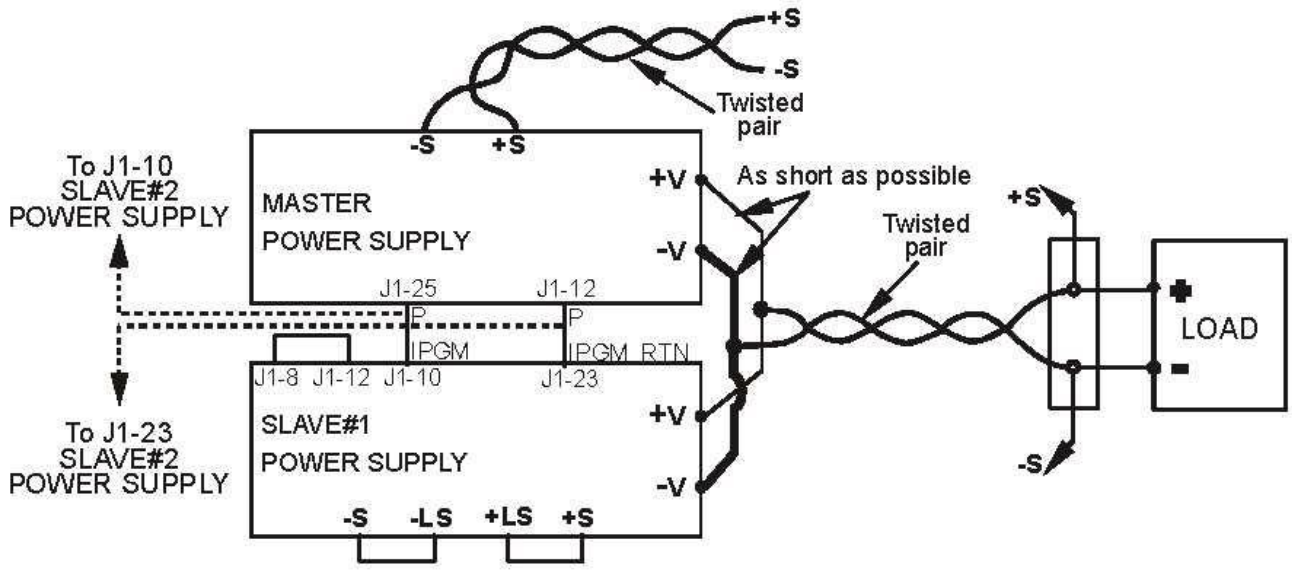


Figure 6-6. Parallel Supply Connections with Remote Sense

6.4 Advanced Parallel Operation

In this method, multiple parallel power supplies can be configured to operate as a single power supply. The total 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 a system of power supplies for Advanced Parallel operation.

NOTE

In an **"Advanced Parallel"** system, the Output current measured by the Master unit is only the Master unit's Output current multiplied by two, three or four (depending on the number of Slave units in the system).

The total parallel system Output current may be different, subject to the combined output errors of the Slave units.

It is required to use the Shutoff Daisy-Chain with the **"Advanced Parallel"** configuration.

6.4.1 Advanced Parallel Configuration

a) MASTER SUPPLY: the Master unit may be configured and controlled the same as a Basic Parallel operation as described in Section 6.3.1.

b) SLAVE SUPPLIES: one or more Slave units are connected the same as a Basic Parallel operation as described in Section 6.3.2.

c) SHUT-OFF DAISY-CHAIN: it is STRONGLY recommended to use the connections described in Section 6.3.3.

6.4.2 Setting the Units as Master or Slave

a) Press and hold the FINE button for 3 seconds. The Master/Slave configuration will be displayed on the CURRENT display.

b) Rotate the CURRENT encoder to obtain the desired mode as shown in the Table 6.1. The Master power supply is set to '**H2**', '**H3**' or '**H4**' ('**H1**' means there are no Slave units connected) and all Slave power supplies are set to '**S**'.

CURRENT Display	Operating Mode
H1	Single supply (default)
H2	Master supply with 1 Slave supply
H3	Master supply with 2 Slave supplies
H4	Master supply with 3 Slave supplies
S	Slave supply

Table 6.1. Setting the "Advanced Parallel" Operating Mode

c) When the desired configuration is showing on the display, press and release the FINE button again or wait 5 seconds for the CURRENT display to clear.

6.4.3 Master and Slave Units Default Operation

a) When a supply is set to be a Slave ('S' setting), it always runs in Local Lockout mode with front panel controls disabled to prevent settings changes (see Section 8.2.7).

b) The Slave units will automatically be set the following:

- Output voltage to approximate. 101% of rated Output voltage.
- Programmed Current to zero (actual current is set by J1 IPGM signal).
- UVL to zero volts
- OVP to its maximum value
- AST On
- OUT On
- Foldback protection Off

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

6.4.4 Current Display Accuracy

In the "Advanced Parallel" operating mode, the Master unit calculates the total current by multiplying the Master unit's current by the number of Slave units. In this method, the CURRENT display accuracy is 2% +/- 1 count. In cases where higher accuracy is required, it is recommended to use the "Basic Parallel" operating mode.

6.4.5 To Release Units from Slave Mode

Slave units can be released from their operating mode by performing the following procedure:

1. Press the FINE button for 3 seconds. The Master/Slave configuration will be shown on the CURRENT display (**H2**, **H3** or **H4**).
2. Select the "**H1**" mode using the CURRENT encoder (**H1** means no Slave units are connected).
3. Press the FINE button again or wait 5 seconds.

   After exiting from the Slave setting the unit will be set to:

   - Programmed Voltage to zero
   - Programmed Current to zero
   - UVL to zero volts
   - OVP to its maximum value
   - AST OFF
   - OUT OFF
   - Foldback protection OFF
   - Locked Front Panel

4 Finally, unlock the front panel by pressing the Preview (PREV) button until the VOLTAGE display shows "UFP".

7. *REMOTE ANALOG PROGRAMMING*

7.1 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 to read the Output voltage and Output current. The program and monitor signals range can be selected between 0-5V or 0-10V using the SW1 Setup DIP-switch. When the power supply is in Remote Analog programming mode, Digital communication (RS-232/RS-485, LAN, IEEE or USB) is active and can be used to read the power supply operating parameters.

CAUTION

All J1 pins are isolated from the Output return of the power supply.
All Analog control circuits are UL approved as SELV.

IF_COM (J1-2, -3 and -12), VPGM_RTN (J1-22) AND IPGM_RTN (J1-23) pins of Isolated Analog control circuit (J1) are internally connected.

.

CAUTION

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

7.2 Local/Remote Analog Programming Selection

J1-8 (see Figure 4-4) accepts a TTL signal or Open/Shorted 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 can be programmed via the front panel VOLTAGE and CURRENT encoders or via the RS-232/RS-485 port. In Remote Analog mode, the Output voltage and Output current can be programmed by Analog voltage or by programming resistors via J1-9 and J1-10 (refer to Sections 7.4 and 7.5). Refer to Table 7.1 for the Local/Remote Analog control (J1-8) function and Setup DIP-switch SW1-1 and -2 settings.

SW1-1, -2 setting	J1-8 function	Output Voltage/ Current setting
DOWN (default)	No effect	Local
UP	“0” or Short	Remote
	“1” or Open	Local

Table 7.1. Local/Remote Analog Selection

7.3 Local/Remote Analog Indication

J1-21 is an open collector output that indicates if the power supply is in Local mode or in Remote Analog mode. To use this output, 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 5mA when the output is in the LOW state. Refer to Table 7.2 for J1-21 functionality.

J1-8	SW1-1	SW1-2	J1-21 signal	Analog Mode
TTL “0” or Short	**DOWN**	**DOWN**	OPEN	Local: Voltage/Current Programming
	DOWN	**UP**	LOW = 0 to 0.6V	Local: Voltage Programming Remote: Current Programming
	UP	**DOWN**	LOW = 0 to 0.6V	Remote: Voltage Programming Local: Current Programming
	UP	**UP**	LOW = 0 to 0.6V	Remote: Voltage/Current Programming
TTL “1” or Open	**DOWN or UP**	**DOWN or UP**	OPEN	Local: Voltage/Current Programming

Table 7.2. Local/Remote Analog Indication

7.4 Analog Remote Voltage Programming of Voltage and Current

Perform the following procedure to set the power supply to Analog Remote Voltage and Current programming.

1. Press the front panel AC ON/OFF power switch to the OFF position.
2. Set SW1-1 and SW1-2 to their UP position for Analog Remote voltage programming of Output voltage and Output current respectively.
3. Set SW1-3 to select programming Voltage Range according to Table 7.3.
4. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4.4).
5. Ensure that SW1-7 and SW1-8 are in their DOWN (default) position.
6. Connect the programming voltage sources to the mating plug of J1 as shown in Figure 7-1. Observe correct polarity for the voltage source.
7. Set the programming sources to the desired levels and press the power supply front panel AC ON/OFF power switch to the ON position. Then adjust the programming sources to change the power supply Output voltage/current.

NOTES:

A. SW1-4, -5, -6 and -9 are not required for Remote Analog programming. Their setting can be determined by the application requirements.

B. The control circuits allow the user to set the Output voltage and Output current up to 1% over the model-rated maximum value. However, it is not recommended to operate the power supply over its Output voltage or Output current rating and performance is not guaranteed.

C. When Remote Analog voltage programming is used, front panel and computer control (via RS-232/485, LAN, IEEE, or USB) of output voltage and current are disabled.

SW1-3 setting	Output Voltage program VPGM (J1-9)	Current Limit program IPGM (J1-10)
UP	0-10V	0-10V
DOWN	0-5V	0-5V

Table 7.3. SW1-3 Setting and Programming Range

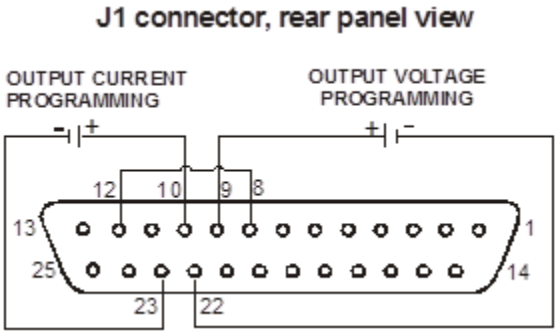


Figure 7-1. Remote Voltage Programming of Output Voltage and Current

Note
Use a shielded cable (Refer to Section 4.5 for more details)

7.5 Remote Resistive Programming of Output Voltage and Current

For Remote Resistive voltage or current programming, internal current sources supply 1mA of current through external programming resistors connected between J1-9 & J1-22 and J1-10 & J1-23. The voltage across the programming resistors is used as a programming voltage for the power supply. Resistance of 0 to 5kohms or 0 to 10kohms can be selected to program the Output voltage and the Output current 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 restricted portion of its range.

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

1. Press the front panel AC ON/OFF switch to the OFF position.
2. Set DIP-switch SW1-1 and SW1-2 to their UP position for Remote Resistive programming of Output voltage and Output current respectively.
3. Set SW1-3 to select the programming resistor range according to Table 7.4.
4. Set SW1-7 and SW1-8 to their UP position to enable Remote Resistive programming mode.
5. Connect a wire jumper between J1-8 and J1-12 (refer to Table 4.4).
6. Connect the programming resistors to the mating plug of J1 as shown in Figure 7-2.
7. Set the programming resistors to the desired resistance and turn the power supply front panel AC ON/OFF switch to the ON position. Then adjust the resistors to change the power supply output level(s).

NOTES:

A. SW1-4, -5, -6 and -9 are not required for Remote Resistive programming. Their settings can be determined by the application requirements.

B. The control circuits allow the user to set the Output voltage and Output current up to 1% 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 outside of its Output voltage and Output current ratings and Power Supply performance is not guaranteed.

C. The resistors used for programming should be stable and low noise resistors, with temperature coefficient of less than 50ppm.

D. When Remote Resistive programming is used, front panel and computer control (via RS-232/RS-485, LAN, IEEE or USB) of Output voltage and Output current is disabled.

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

Table 7.4. SW1-3 Setting and Programming Range

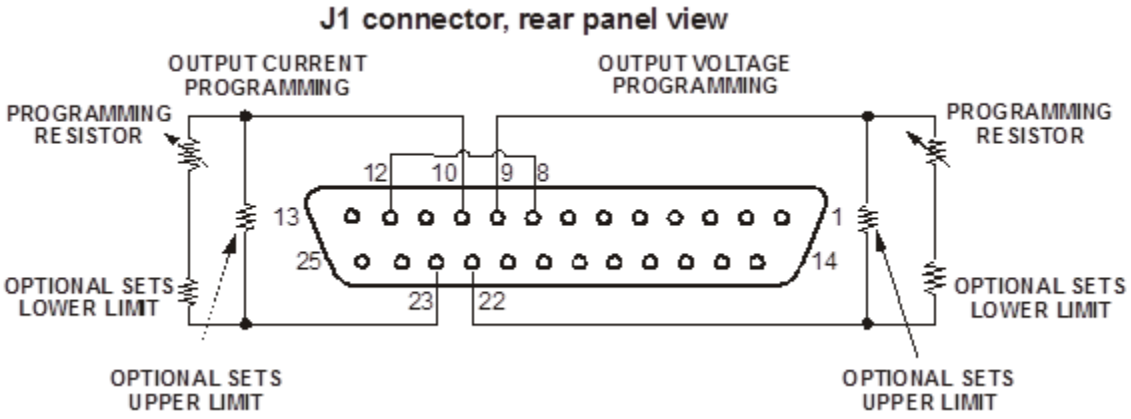


Figure 7-2. Remote Resistance Programming of Output Voltage and Current

7.6 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 voltage range between 0-5V or 0-10V is made by DIP-switch SW1-4. The monitor signals represent 0 to 100% of the power supply Output voltage and Output current. The monitor outputs have 500 ohm series output resistance.

Ensure that the sensing circuit has an input resistance of greater than 500 kohm or accuracy will be reduced.

Refer to Table 7.5 for required J1 connection, SW1-4 setting and monitoring voltage range.

Signal name	Signal function	J1 connection		Range	SW1-4
		Signal (+)	Return (-)		
VMON	V_{out} monitor	J1-11	J1-12	0-5V	**DOWN**
IMON	I_{out} monitor	J1-24			
VMON	V_{out} monitor	J1-11	J1-12	0-10V	**UP**
IMON	I_{out} monitor	J1-24			

Table 7.5 Monitoring Signals Setting

NOTES:

1. Radiated Emissions, FCC requirements: FCC requirements for radiated emissions use shielded cable for the Analog control signals and connect the shield to chassis ground (A chassis ground stud is provided on the power supply rear panel).
2. Front Panel Encoder operation: In Remote Analog Programming mode, the Output voltage and Output current CAN NOT be set by the VOLTAGE and CURRENT encoders.

3. Front panel (PREView button): Use the PREV button to display the Output voltage and Output current setting defined by the encoders or by Remote Digital communication.

4. Communication: Remote Analog mode power supply parameters can be programmed or read back via the Remote Digital communication port (RS-232/RS-485, etc.) except for the Output voltage and Output current setting.

8. *RS-232 & RS-485 REMOTE CONTROL*

8.1 Introduction

This Chapter describes the operation of the Genesys™ 10kW and 15kW 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.

8.2 Configuration

8.2.1 Default setting

The power supply is shipped with the following settings:

- Address 6
- Baud-rate 9600
- RS-232/485 RS-232
- V_{out} setting 0
- I_{out} setting 0
- Master/Slave H1 (Master)
- Output Off
- Startup mode Safe-Start
- OVP Maximum
- UVL 0
- Foldback Off
- Front panel Unlocked (UFP)

8.2.2 Address Setting

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

a) 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.

b) Press and hold the REM/LOC button for approximately three (3) seconds. The VOLTAGE meter display will indicate the communication port Address.

c) Rotate the VOLTAGE encoder to select a new unit Address (0 to 30).

d) After three (3) seconds with no adjustment, the display will revert and save the last unit Address setting.

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

8.2.3 RS-232 or RS-485 Selection

To select between RS-232 or RS-485, set the rear panel Setup DIP-switch SW1-6 position to:

- Down: RS-232
- UP: RS-485

8.2.4 Baud Rate Setting

Five RS-232 or RS-485 communication port Baud rates are possible: 1200, 2400, 4800, 9600 and 19200.
To select the desired communication port Baud rate, the following steps should be taken:

a) If the unit is in Remote mode (front panel REM/LOC LED illuminates), press REM/LOC button to put the unit into Local mode.

b) Press and hold REM/LOC button for approximately three (3) seconds. The CURRENT meter will display the communication port Baud Rate.

c) Using the CURRENT adjust encoder, select the desired Baud Rate.

d) After 3 seconds with no adjustment, the display will revert and save the last communication port Baud rate setting.

8.2.5 Setting the Unit into Remote or Local Mode

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

RST	PV n	RMT
OUT n	PC n	

For command descriptions, see Section 8.6.5.
For values of “n”, see Tables 8.4, 8.6 and 8.7.

There are two Remote modes:

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

2) **Local Lockout:** In this mode the unit can be returned to Remote mode via the serial port “RMT 1” command or by pressing the front Panel AC ON/OFF switch to the OFF position (until the front panel VOLTAGE meter displays **OFF**) and then recycling AC Input power. In Local Lockout mode, the front panel REM/LOC button is not active. Set the unit into Local Lockout mode via the serial port “RMT 2” command.

8.2.6 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 change to Remote mode.

8.2.7 Front Panel in Remote Mode

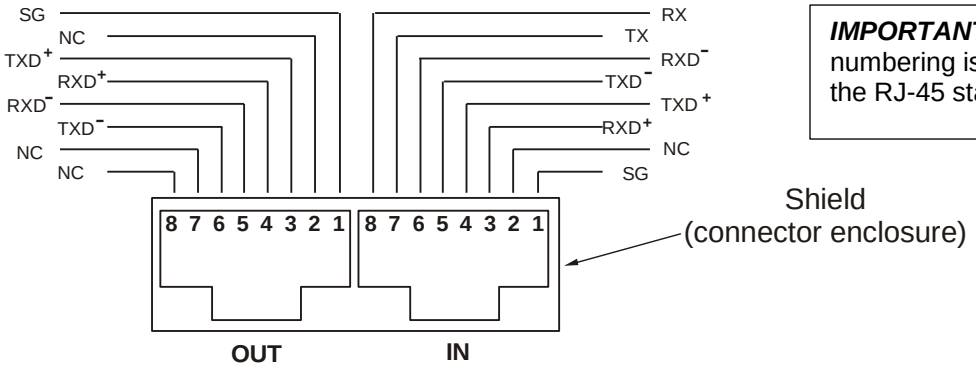
Front panel control in Remote mode is disabled except for:

1. PREV: use to preview the Output voltage and Output current limit setting.
2. OVP/UVL: use to preview the OVP/UVL settings.
3. LOC/REM: use to set the unit into Local mode.

In Local Lockout mode, only the PREV and OVP/UVL front panel functions are active.

8.2.8 Rear Panel RS-232/RS-485 Connector

The RS-232/RS-485 interface is accessible through the rear panel J3 RS-232/RS-485 **IN** and RS-485 **OUT** connectors. The connectors are RJ-45 with eight contacts. The **IN** and **OUT** connectors are used to connect power supplies in a RS-232 or RS-485 chain to a controller. Refer to Figure 8-1 for the **IN/OUT** connections.



IMPORTANT: J3-1 to J3-8 numbering is reversed from the RJ-45 standard numbering.

Figure 8-1. RS-232/RS-485 J3 IN/OUT Connector Pin Out

RS-232 communication uses the Tx and Rx pins.
RS-485 communication uses the Txd **+/-** and Rxd **+/-** pins.
Refer to the individual RS-232 and RS-485 cable descriptions for connection details.

8.3 Connecting Power Supplies to RS-232 or RS-485 Communication Bus

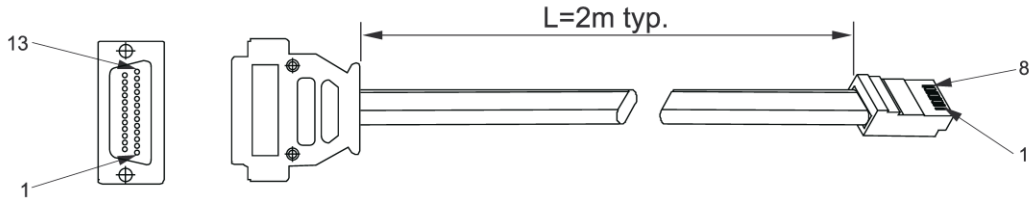
8.3.1 Single Power Supply

a) Select the desired interface on rear panel SW1 Setup DIP-switch (see Section 4.4).

- SW1-6 DOWN: RS-232
- SW1-6 UP: RS-485

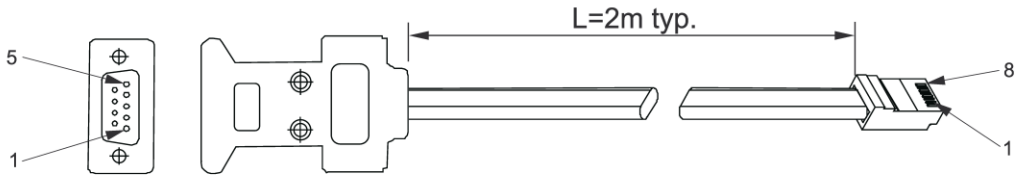
IMPORTANT: J3-1 to J3- 8 numbering is reversed from the RJ-45 standard numbering.

b) Connect rear panel J3-IN connector to the controller RS-232 or RS-485 port using a suitable shielded cable. Refer to Figure 8-2, 8-3 and 8-4 for available RS-232 and RS-485 cables.



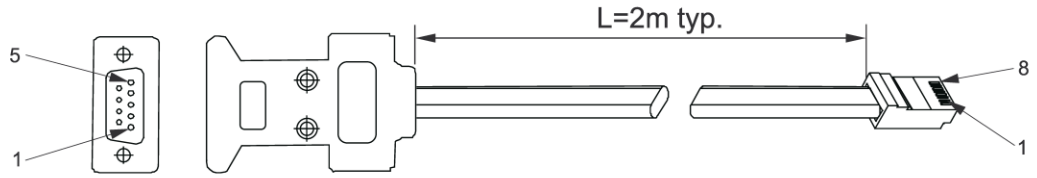
DB-25 CONNECTOR		8 PIN CONNECTOR		REMARKS
PIN NO.	NAME	PIN NO.	NAME	
1	SHIELD	HOUSING	SHIELD	
2	TX	8	RX	TWISTED
3	RX	7	TX	PAIR
7	SG	1	SG	

Figure 8-2. 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 8-3. 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 8-4. RS-485 Cable with DB9 Connector (P/N: GEN/485-9)

8.3.2 Multi Power Supply Connection to RS-232 or RS-485 Communication Bus

Up to 31 units (0 – 30) can be connected on one RS-232 or RS-485 bus. The first unit connects to the controller via RS-232 or RS-485 (J3-IN) and the other units are connected with RS-485 bus.

a) First unit connection: Refer to Section 8.3.1 for connecting the first unit to the controller.

b) Remaining units connection: via the RS-485 Daisy-Chain interface.

Refer to Figure 8-5 for the typical Daisy-Chain connection.

- For the second and later units on the Digital communication bus, set switch SW1-6 to its UP position.
- Using the Linking cable (Figure 8-6), connect each unit J3-OUT connector to the next unit J3-IN connector.

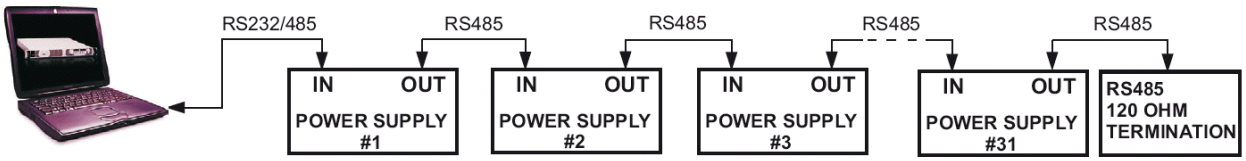
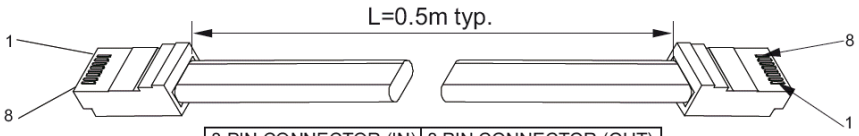


Figure 8-5. Multiple Power Supply RS-232/RS-485 Daisy Chain



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 +

IMPORTANT:
Unused pins 2, 7 and 8 must *not* be connected.

Figure 8-6. Serial Link Cable with Shielded Connectors (P/N: GEN/RJ-45)

8.4 Communication Interface Protocol

8.4.1 Data format

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

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

8.4.2 Addressing

The unit Address is sent separately from the command. Refer to Section 8.6.3 for details.

8.4.3 End of Message

The end of message is the Carriage Return character (ASCII 13). The power supply ignores the Line Feed (ASCII 10) character. It is recommended to add a 100 ms delay between a query or sent command to next unit addressing. Refer to Section 8.6.3 for details.

8.4.4 Command Repeat

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

8.4.5 Checksum

The user may add a checksum (optional) to the end of the command. This ensures no data bits are corrupted by bad wires or noise. The checksum is a "$" followed by two hex characters. If a command or a query has a checksum, the response will also have a checksum. There is no CR between the command string and the "$" sign. Examples:

Commands:	ADR 6$2D	PC 342.1$AB	MV?$E2	OUT$37
Responses:	OK$9A	OK$9A	18.840$33	ON$9D

8.4.6 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.

8.4.7 Error Message

If an error is detected in command or query, the power supply will respond with an error message. Refer to Section 8.5 for details.

8.4.8 Backspace

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

8.5 Error Messages

The power supply will return error messages for illegal commands and illegal programming parameters. Refer to Table 8.1 for programming error messages and Table 8.2 for commands error messages.

Error Code	Description
E01	Returned when program voltage (PV) is programmed above acceptable range. Example: PV above '101% of supply rating' or above 95% of OVP.
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 8.1. 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 8.2. Commands Error Messages

8.6 Command Set Description

8.6.1 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 numeric 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.

8.6.2 Command Set Categories

The following three tables show four categories of serial messages:

1. Initialization control
2. ID control
3. Output control
4. Status monitor

8.6.3 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 8.10).
3	**RST**	Reset command. Brings the power supply to a safe and known state: Output voltage: zero, Remote: non-lockout remote, Output current: zero, Auto-start: Off, Output: Off, OVP: maximum, FOLD: Off, UVL: zero The conditional registers (FLT and STAT) are updated, 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 if the Multi-drop option is installed. 1 indicates installed and 0 indicates not installed.
7	****	Repeat last command. If \<CR> is received, the power supply will repeat the last command.

8.6.4 ID Control Commands

#	Command	Description
1	IDN?	Returns the power supply model identification as an ASCII string. Format of response: "LAMBDA,GEN<VRATE>–<IRATE>–<OTION> Example response: LAMBDA,GEN10-500-IEMD
2	REV?	Returns the software version as an ASCII string.
3	SN?	Returns the unit serial number. Up to 12 characters. Example response: 15B1234G
4	DATE?	Returns date of last test. Date format: yyyy/mm/dd

8.6.5 Output Control and Status Monitor Commands

#	Command	Description
1	**PV nn.n**	Sets the Output voltage value in Volts. The range of voltage values is in Table 8.4. The maximum number of characters is 12. Examples: **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: A 60 Volt supply sends 01.150, 15.012, 50.000, etc…
4	**PC nn.n**	Set the Output current value in Amperes. The range of current values is described in Table 8.5. The maximum number of characters is 12. Examples: **PC** 10, **PC** 10.0, **PC** 010.00, etc… In "Advanced Parallel" mode (Section 6.4), "n" is the total system current.
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 PREVIEW (front panel) settings in a 5 digit string.
6	**MC?**	Reads the actual Output current. Returns a 5 digit string. Example: A 200 Amp supply sends 000.50, 110.12, 200.00, etc… In Advanced Parallel mode (Section 6.4), "**MC?**" returns the total system current.
7	**MODE?**	Returns the power supply operation mode. When the power supply is On (**OUT 1**) it will return "CV" or "CC". When the power supply is OFF (**OUT 0** or fault shutdown) it will return "OFF".
8	**OUT n**	Turns the Output to ON or OFF. Recover from Safe-Start, OVP or FLD fault. **OUT 1** (or **OUT ON**): Turn On. **OUT 0** (or **OUT OFF**): Turn Off
9	**OUT?**	Returns the Output ON/OFF status string. ON: output On. OFF: output Off.

10	**FLD n**	Sets the Foldback protection to ON or OFF. **FLD 1** (or **FOLD ON**): Arms the Foldback protection **FLD 0** (or **FOLD OFF**): Cancels the Foldback protection. When the Foldback protection has been activated, the **OUT 1** command will release the protection and re-arm it, while **FLD 0** will cancel the protection.
11	**FLD?**	Returns the Foldback protection status string: "ON" : Foldback is armed; "OFF" : Foldback is cancelled.
12	**FBD nn**	Add (nn x 0.1) seconds to the Foldback Delay. This delay is in addition to the standard 250millisecond delay. The range of nn is 0 to 255. Therefore, the total delay is 0.25 to 25.75 seconds. The value is stored in non-volatile memory. The delay sets how long the power supply must run in constant current (CC) mode before a Foldback fault gets triggered.
13	**FBD?**	Power supply returns the value of the added Foldback delay.
14	**FBDRST**	Reset the added single wire delay to zero.
15	**OVP n**	Sets the OVP level. The OVP setting range is given in Table 8.6. The number of characters after OVP is up to 12. The minimum setting level is approximately 105% of the Output voltage setting ("**PV nn.n**"), or the values in Table 8.6, whichever is higher. 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 in the user's "**OVP n**". 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 8.6).
18	**UVL n**	Sets Under Voltage Limit. Value of "n" may be equal to PV setting, but returns "E06" if higher. Refer to Table 8.7 for UVL programming range.
19	**UVL?**	Returns the setting "n" where "n" is the exact string in the user's "**UVL n**". 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 (see Section 5.11). **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. These are the same as power-down last setting. These settings are erased when the power supply power is switched Off (see Section 5.14).
23	**RCL**	Recalls last settings. Settings are from the last power-down or from the last "SAV" command (see Section 5.14).
#	**Command**	**Description**
24	**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
25	**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)
26	**FILTER nn**	Set the low pass filter frequency of the A-to-D converter for voltage and current measurement where nn = 18, 23 or 46Hz (default is 18Hz). Lower value is slowest update rate, but most stable and accurate.
27	**FILTER?**	Returns the A-to-D Converter filter frequency: 18,23 or 46Hz (default is 18Hz)
28	**MS?**	Returns the Advanced Parallel Master/Slave setting. Master: n= 1, 2, 3, or 4; Slave: n=0

8.7 Global Output Commands

8.7.1 Description

Global commands are a way to quickly set all power supplies on the RS-232/RS-485 digital communication bus to the same setting. For example, sending "**GOUT OFF**" is one way to turn a whole group of supplies OFF at nearly the same time.

CAUTION

After sending a global command, it is important that the controller wait 200milliseconds before sending any more RS-232/RS-485 messages.

If the command contains an error, such as incorrect syntax or range values, *NO* error response will be returned by any power supply.

1	**GRST**	Reset. Brings the power supply to a safe and known state: Output voltage: 0V, output current: 0A, OUT: Off, Remote: RMT 1, AST: Off OVP: Max, UVL: 0. 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 voltage values is shown in Table 8.4. 'n' may be up to 12 characters plus decimal point.
3	**GPC n**	Program the output current value in amperes. The range of current values is shown in Table 8.5. 'n' may be up to 12 characters plus decimal point
4	**GOUT**	Turns the output to ON or OFF: "**OUT 1/ON**" = turn on "**OUT 0/OFF**" = turnoff, clears CV and CC bits in the Status Condition (STAT). "**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**	Save present settings (to RAM memory). Same settings as power-down last settings listed in Section 5.14 except the unit(s) address and Baud rate are not saved. These settings are erased when the power supply power is switched Off and the new "Last Settings" are saved.
6	**GRCL**	Recall last settings. Settings are from last power-down or from last '**SAV**' or '**GSAV**' command. Unit(s) Address and Baud rate are not recalled so communication is not interrupted.

Table 8.3. Global Output Commands

NOTE:

The Power Supply can accept values greater than 5% of the maximum value called out in Table 8.4 and 8.5, however it is not recommended to program the power supply beyond the rated Output voltage/Output Current values and Power Supply performance is not guaranteed.

Voltage Programming Range (10kW/15kW)		
Model Rated Output Voltage (VDC)	**Minimum (VDC)**	**Maximum (VDC)**
800	0	808
1000	0	1010
1250	0	1262.5
1500	0	1515

Table 8.4. Voltage Programming Range (10kW/15kW Models)

Current Programming Range					
(10kW)			(15kW)		
Model Rated Output Current (ADC)	**Minimum (ADC)**	**Maximum (ADC)**	**Model Rated Output Current (ADC)**	**Minimum (ADC)**	**Maximum (ADC)**
12.5	0	12.625	18.8	0	18.988
10	0	10.100	15	0	15.15
8	0	8.080	12	0	12.12
6.7	0	6.767	10	0	10.10

Table 8.5. Current Programming Range (10kW/15kW Models)

OVP Programming Range (10kW/15kW)		
Model Rated Output Voltage (VDC)	**Minimum (VDC)**	**Maximum (VDC)**
800	0	880
1000	0	1100
1250	0	1375
1500	0	1650

Table 8.6. OVP Programming Range (10kW/15kW Models)

UVL Programming Range (10kW/15kW)		
Model Rated Output Voltage (VDC)	**Minimum (VDC)**	**Maximum (VDC)**
800	0	760
1000	0	950
1250	0	1187.5
1500	0	1425

Table 8.7. UVL Programming Range (10kW/15kW Models)

8.8 Fast Queries

These are commands that read a response very quickly from the power supply. They use unprintable character codes. They allow the power supply to avoid the normal command processing delays.

The processing time for these queries is typically 2milliseconds, so total query speed is 2milliseconds plus the RS-232/RS-485 transmission time.

Since these queries embed the power supply address (0 to 30), there is no need to first send the "**ADR n**" addressing command.

8.8.1 Fast Test for Connection

This is an addressed query that is good for scanning to see what supplies are “on line”. If no response is returned within 10 ms, your control program has determined that no power supply is connected at that address.

Query Format:

Send two bytes of unreadable characters. First:

Byte 1 = 1010 1010 = AA hex

Byte 2 = 000x xxxx (where xxxxx is the Address of the supply in binary)

Query Response:

The power supply returns 5 characters:

First a “1” = 31 hex if Multi-drop is enabled

or a “0” = 30 hex if Multi-drop is not enabled

Then four printable characters:

Dollar sign “$”

Checksum (two ASCII hex characters) = “30” or “31”

Carriage-return terminator

8.8.2 Fast Read Registers

This query allows fast polling of the status and error registers for many power supplies on a RS-232/RS-485 link. It is useful for checking many power supplies to verify they are all operating as expected.

Query Format:

Send two bytes of unreadable characters. First:

100x xxxx (where xxxxx is the address of the supply in binary)

And send it a second time:

100x xxxx send 2 characters sequentially

Query Response:

The power supply returns 16 characters including the contents of the status and fault registers (see Section 8.9 and Figure 8-7).

First twelve bytes contain binary data from six registers:

STAT? SENA? SEVE? FLT? FENA? FEVE?

Then four printable characters:

Dollar sign “$”

Checksum (two ASCII hex characters)

Carriage-return terminator

8.8.3 Read Power-On Time

This query allows you to read how many minutes the power supply has been running since it was built. The accuracy, in minutes, is not guaranteed for time critical applications.

Query Format:

Send two bytes of unreadable characters. First:

Byte 1 = 1010 0110 = A6 hex

Byte 2 = 000x xxxx (where xxxxx is the address of the supply in binary)

Query Response:

The power supply returns 12 characters:

First is the minutes as a 32 Bit integer as 8 ASCII Hex bytes

Then four printable characters:

Dollar sign "$"

Checksum (two ASCII hex characters) = "30" or "31"

Carriage-return terminator

8.8.4 Service Request Messages

A Genesys™ power supply can automatically send messages over the RS-232/RS-485 lines when there is a change in operating mode or if a fault occurs. These messages are called Service Requests or SRQ's. They are setup with the status and event registers (see Sections 8.10 and 8.11).

Since the SRQ messages may be sent from any power supply at any time, there is a chance they can collide with other messages from other power supplies. Your controller software has to be developed enough to read messages that may come at any time, and to recover if messages are corrupted by collisions.

If Service Request messaging is needed, please contact TDK-Lambda for assistance. Several special communication commands and settings can be provided that will help with this issue.

8.9 Status and Error Commands

The following commands operate on the power supply status and error registers. They are used to read operating conditions and fault conditions, they can be set to latch changes in these conditions, and masks can be set up to send service requests messages if the conditions change.

Refer to Chapter 8 and Figure 8-7 for more instructions on using these register commands.

#	Command	Description
2	**FLT?**	Reads Fault Conditional Register. Returns 2-digit hex.
3	**FENA**	Set Fault Enable Register using 2-digit hex.
4	**FENA?**	Reads Fault Enable Register. Returns 2-digit hex.
5	**FEVE?**	Reads Fault Event Register. Returns 2-digit hex. Clears bits of Fault Event
6	**STAT?**	Reads Status Conditional Register. Returns 2-digit hex.
7	**SENA**	Sets Status Enable Register using 2-digit hex.
8	**SENA?**	Reads Status Enable Register. Returns 2-digit hex.
9	**SEVE?**	Reads Status Event register. Returns 2-digit hex. Clears bits of Status Event

Table 8.8. Status and Error Register Commands

8.10 Status, Error, and SRQ Registers

8.10.1 General Description

This Section describes the structure and operation of the six status, error, and SRQ registers. The registers can be set or read via the RS-232/RS-485 commands.

The Status and Error Registers Diagram below is a summary of the register tree and the commands to read their contents or to enable latching any momentary events.

NOTE: These registers operate in a way that is similar to the IEEE-488 and SCPI registers (as used by the Genesys™ with the “-IEMD” option), but the structure and command set is different.

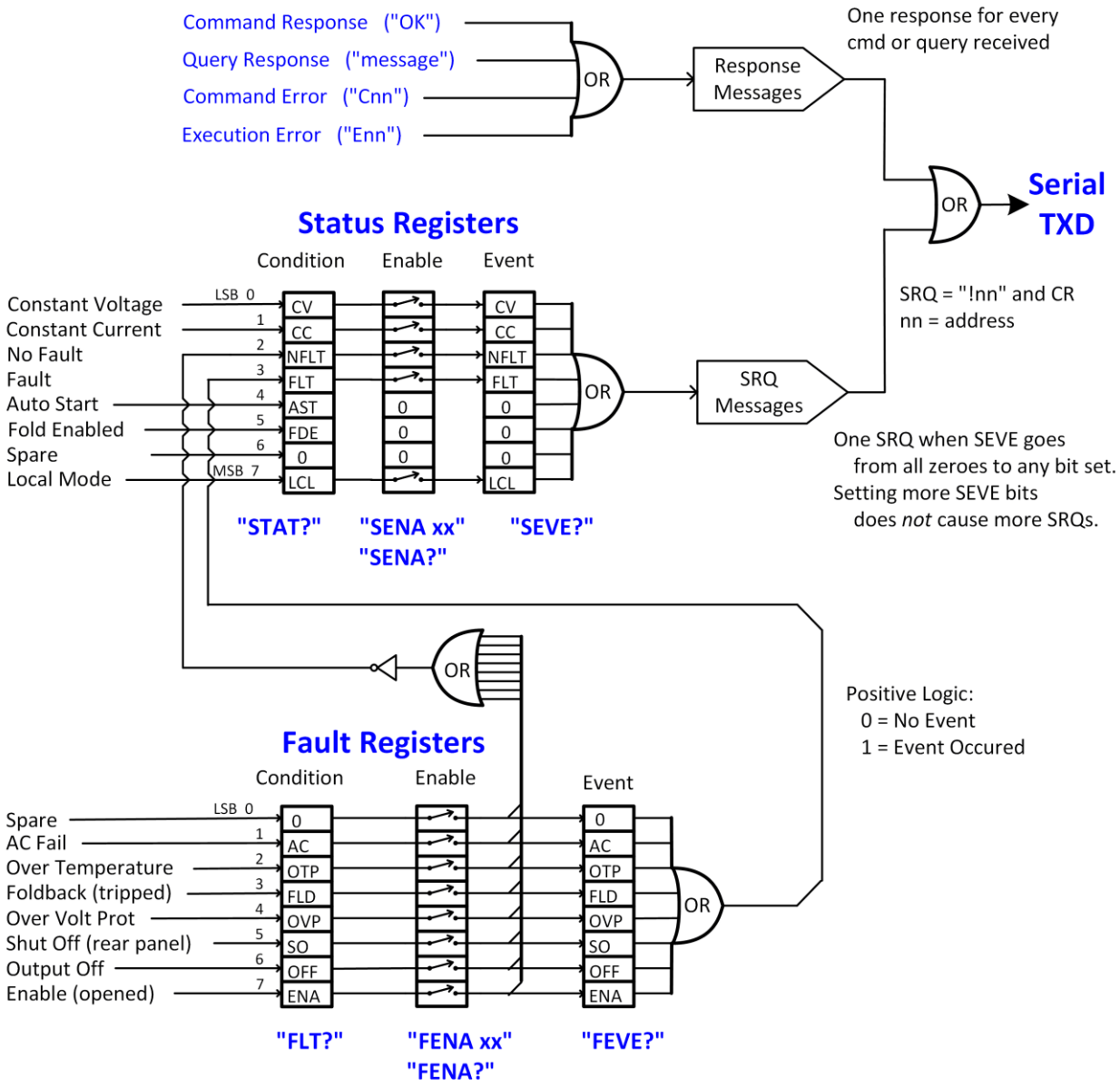


Figure 8-7. Status and Error Registers Diagram

8.10.2 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 supply. Refer to Table 8.9 for description of the Fault Condition Register bits and Table 8.10 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.
2	Over-Temperature	OTP	OTP shutdown has occurred.	The power supply cools down.
3	Foldback	FOLD	Foldback shutdown has occurred	The supply output is turned On by front panel button or **OUT 1** command.
4	Over-Voltage	OVP	OVP shutdown has occurred.	The supply output is turned ON by front panel button or **OUT 1** command.
5	Shut Off	SO	Rear panel J1 “Shut Off” condition has occurred.	Rear panel J1 “Shut Off” condition removed.
6	Output Off	OFF	Front panel OUT button pressed to Off.	The supply output is turned On by front panel button or **OUT 1** command.
7(MSB)	Enable	ENA	Rear panel J1 Enable terminal (J1-1 & J1-14) opened.	Rear panel J1 Enable terminals closed.

Table 8.9. Fault Condition Register (FLT?)

BIT	Fault name	Fault symbol	Bit Set condition	Bit Reset condition
0 (LSB)	Constant Voltage	CV	Output is On and the supply in CV mode.	Output is ON and the supply is not in CV mode.
1	Constant Current	CC	Output is ON and the supply in CC mode.	Output is ON and the supply is not in CC mode.
2	No Fault	NFLT	The power supply is operating normally or fault reporting is not enabled. See “**OUT n**” command in Section 8.6.5.	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 serial command).	Supply is in Safe-Start mode (from Front Panel or serial command).
5	Fold Enabled	FDE	Fold protection enabled (from Front Panel or serial command).	Fold protection disabled (from Front Panel or serial command).
6	Spare bit	SPARE	Fixed to zero.	Fixed to zero.
7(MSB)	Local Mode	LCL	Supply in Local mode.	Supply in Remote mode or Local-Lockout mode.

Table 8.10. Status Condition Register (STAT?)

8.10.3 Service Request: Enable and Event Registers

The conditional registers are continuously monitored. When a change is detected in a register bit, and if the bit is enabled, the power supply will generate an SRQ message.

The SRQ message is: “Inn” 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 8.11 to 8.14 for details of the Enable and Event registers.

A. Fault Enable Register (FENA nn, FENA?)

The Fault Enable Register is set to the enable SRQs when a fault occurs.

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	Foldback	FOLD		
4	Over-Voltage	OVP		
5	Shut Off	SO		
6	Output Off	OFF		
7(MSB)	Enable	ENA		

Table 8.11. Fault Enable Register

B. Fault Event Register (FEVE?)

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 power-up also clear the Fault Event Register.
1	AC Fail	AC		
2	Over-Temperature	OTP		
3	Foldback	FOLD		
4	Over-Voltage	OVP		
5	Shut Off	SO		
6	Output Off	OFF		
7(MSB)	Enable	ENA		

Table 8.12. Fault Event Register

C. Status Enable Register (SENA nn, SENA?)

The Status Enable Register is set by the user to enable SRQ's when there are 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 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 8.13. Status Enable Register

D. Status Event Register (SEVE?)

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 a 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.
1	Constant-Current	CC		
2	No Fault	NFLT		
3	Fault active	FLT		
4	Auto-Restart enabled	0	Always zero	
5	Fold enabled	0	Always zero	
6	Spare	0	Always zero	
7 (MSB)	Local Mode	LCL	Unit is set to Local	

Table 8.14. Status Event Register (SEVE?)

8.11 Serial Communication Test Set-Up

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

Equipment: PC with Windows Hyper Terminal or other terminal program installed, Genesys™ Power supply, RS-232 cable.

PC set-up:

Open HyperTerminal..... New Connection

Enter a name

Connect to ..... Direct to COM1 or other COM2

Configure port properties ..... Bits per second.....9600

Data bits 8

Stop bits.....1

Flow control .....None

Open "Properties" window..... File.....Properties

Setting: ASCII Set Up ..... Echo characters locally,
Send line ends with line feed.

8.11.1 Power Supply Set-Up:

Connect the power supply to the PC using the RS-232 cable.

Set via the front panel: **Baud rate: 9600**, **Address: 06 (default setting)**

(factory default setting. See the OUT button in Section 4.2).

Set Setup DIP-switch SW1-6 (rear panel): RS-232 (factory default is DOWN for RS-232).

8.11.2 Communication Test:

Outlined below is a list of commands that may be sent from the computer (PC) using Hyperterminal or other terminal program.

Select a power supply at Address 6:	PC write:	**ADR 6**	Power supply response: “OK”
Command test:	PC write:	**OUT 1**	Power supply response: “OK”
	PC write:	**PV 50.0**	Power supply response: “OK”
	PC write:	**PC 10.0**	Power supply response: “OK”
Read back the “Output voltage” test:	PC write:	**MV?**	Power supply response: “0050.0” (or voltage as seen on the front panel display)

The power supply should turn On and show the actual Output voltage and the actual Output current. The Output voltage will be close to 50V if no load is connected across the power supply Output terminals.

9. *4-20 mA ISOLATED ANALOG PROGRAMMING OPTION*

9.1 Introduction

The 4-20mA Isolated Analog is an option for Remote Analog Programming and monitoring of the Genesys™ Power Supply series. The option is factory installed and cannot be installed with LAN or IEEE or USB Interfaces. Output voltage and current can be programmed and read back through optically isolated signals which are isolated from all other ground references in the power supply.

4-20mA option (P/N: IS420): Use current signals for programming and readback.

9.2 Specifications

9.2.1 4-20mA Option (Option -IS420)

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	50
	Absolute maximum input prog. current	mA DC	0-30
	Max. voltage between program inputs and supply outputs	VDC	1500
Monitoring Outputs	Output voltage monitoring accuracy	%	+/-1.5
	Output current monitoring accuracy	%	+/-1.5
	Maximum load impedance	Ohms	50
	Max. voltage between monitoring outputs and supply outputs	VDC	1500

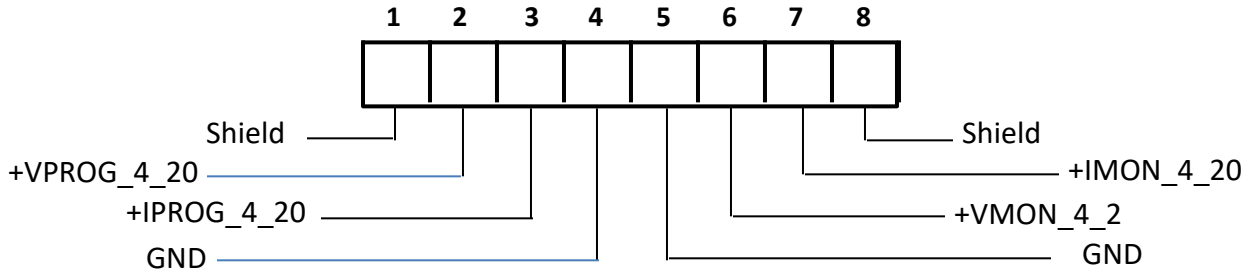
NOTE: Use 100kohms minimum input impedance for the monitoring circuits to minimize the readback error.

9.3 Isolated Programming & Monitoring Connector

Refer to Table 9.1 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.

Isolated programming plug P/N: Phoenix Contact, MC1.5/8-ST-3.81, or equivalent.

Isolated analog plug pin assignments:



Terminal	Signal name	Function	Range 4-20mA IS420 option
1	SHLD	Shield, connected internally to chassis of the supply.	Chassis GND
2	+VPROG_4_20	Programming input for Output Voltage	4-20mA
3	+IPROG_4_20	Programming input for Output Current	4-20mA
4	GND_ISO	Ground for programming signals.	Ground
5	GND_ISO	Ground for programming signals.	Ground
6	+VMON_4_20	Output Voltage monitoring output	4-20mA
7	+IMON_4_20	Output Current monitoring output	4-20mA
8	SHLD	Shield, connected internally to chassis of the power supply.	Chassis GND

Table 9.1. IS420 Programming & Monitoring Connector

CAUTION

When the 4-20mA Option is installed, do not apply any signals to the 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 the J1 features.

9.4 Isolated Setup and Operating Instructions

Many of the instructions for standard (non-isolated) analog control are applicable to the same operations using the isolated analog or 4-20mA option.

Refer to Chapter 7 for details on setting up the rear panel SW1 configuration DIP-switch and for using other analog signals on the J1 DB-25 connector.

CAUTION

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

9.4.1 Setting Up for 4-20mA Isolated Programming and Monitoring

Perform the following procedure to configure the power supply:

a) Press the power supply front panel AC ON/OFF switch to the OFF position.
b) Connect a wire jumper between J1-8 and J1-12 (required).
c) Set SW1-1 and/or SW1-2 to the UP position (setting depends on application).
d) Set SW1-3 to the UP position (required).
e) Set SW1-4 to the UP position (required).
f) Set SW1-7 and SW1-8 to the DOWN position (required).
g) Connect the programming source to the mating plug of the IS420 connector. Observe for correct polarity of the current source.

NOTE

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

h) Set the 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 4-20mA Isolated Programming and Monitoring.

10. *MAINTENANCE*

10.1 Introduction

This Chapter provides information about maintenance, calibration and troubleshooting.

10.2 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 address listing on the back cover of this User's Manual. Unauthorized repairs performed by other than the Authorized Service Facilities will void the product warranty.

10.3 Periodic Maintenance

No routine maintenance of the power supply is required except for periodic cleaning. To clean, disconnect the unit from the AC power source and allow 60 seconds for discharging of internal voltages. The front panel and the metal surfaces should be cleaned using a damp cloth containing 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 hydocarbons or chlorinated solvents for cleaning. Use low pressure compressed air to blow dust from the unit.

10.4 Adjustments and Calibration

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

10.5 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 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 Ltd (High Power) Website: http://www.us.tdk-lambda.com/hp/

10.6 Troubleshooting

If the power supply appears to be operating improperly, use the troubleshooting guide 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 of this User's Manual to determine if the problem is with the power supply.

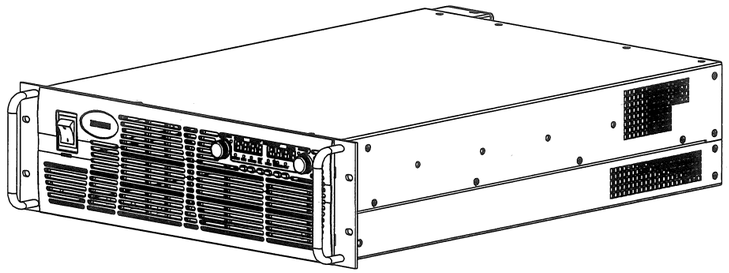
Table 10.1 provides the basic checks that can be performed to diagnose problems, and references to Sections of this User's Manual for further information.

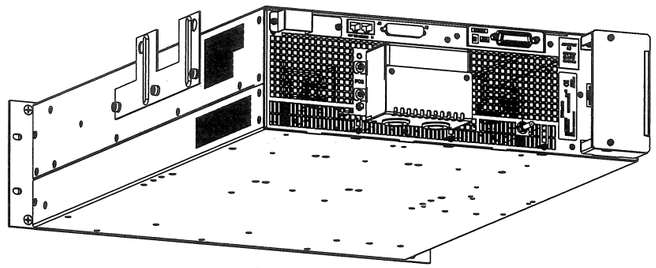
SYMPTOM	CHECK	ACTION	REF
No output. All displays and indicators are blank.	Is the AC power cord defective ?	Check continuity. Replace AC powerr cord if necessary.	3.6
	Is the AC input voltage within range ?	Check AC input voltage. Connect to appropriate AC voltage source.	3.6
Output is present momentarily 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 AC 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.	3.7
Output voltage will not adjust. Front panel CC LED is on.	Is the unit in Constant-Current mode ?	Check Output current limit setting and load current.	5.2.1 5.2.2
Output voltage will not adjust Front panel CV LED is on.	Check if Output voltage is adjusted above OVP setting or below UVL setting.	Set OVP or UVL so they will not limit the power supply output.	5.3 5.4
Output current will not adjust. Front panel CV LED is on.	Is the unit in Constant-Voltage mode ?	Check Output current limit and Output voltage setting	5.2
Large voltage ripple present across the output.	Is the power supply using remote sense? Is the voltage drop on the load wire high ?	Check load and sense wires connection for noise and impedance effects. Minimize the voltage drop on the load wires.	3.8
No output. Display indicates "**OUP**"	Over-Voltage Protection circuit is tripped.	Turn off the AC power switch. Check load connections. If analog programming is used, check if the OVP is set lower than the Output voltage.	5.3
No output. Front panel **ALARM** LED is blinking.	Front panel display indicates "**ENA**"	Check rear panel J1 ENABLE connection.	5.8
		SW1 Setup DIP-switch setting.	4.4
	Front panel display indicates "**SO**"	Check rear panel J1 Output Shut-Off connection.	5.7
	Front panel display indicates "**OTP**"	Check if air intake or exhaust are blocked. Check if the unit is installed adjacent to heat generating equipment.	
	Front panel display indicates "**Fb**"	Check Foldback setting and load current.	5.5
Poor Load regulation. Front panel CV LED is on.	Are sensing wires connected properly ?	Connect the sense wires according to User's Manual instructions.	3.7
The front panel controls are non-functional.	Is the power supply in Local-Lockout mode ?	Turn Off the AC power and wait until the front panel display turns off. Turn on the AC power and press front panel REM/LOC button to turn off the REM/LOC LED.	8.2.5

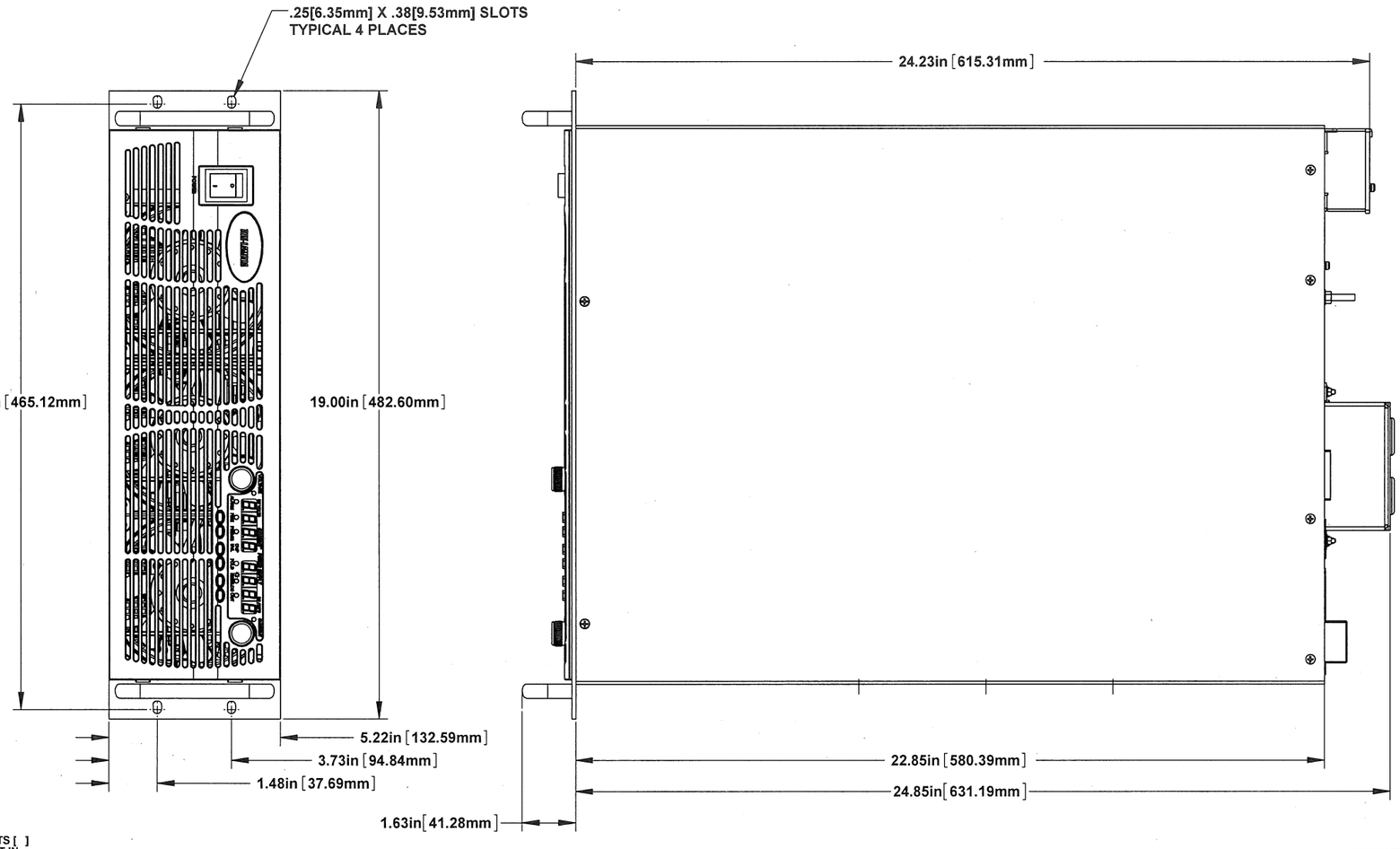
Table 10.1. Troubleshooting Guide

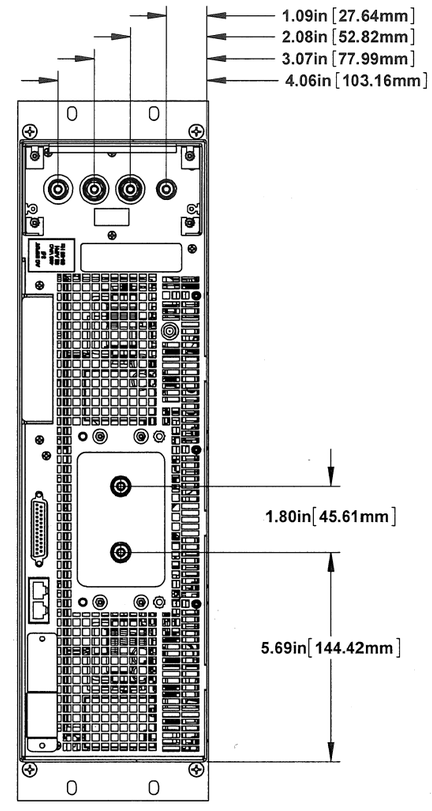
THIS IS A COMPUTER GENERATED DWG.
NO MANUAL REVISIONS ARE PERMITTED.

LTR	E.C.O. NO.		BY	APP.
1	INITIAL RELEASE	10/06/14	JL	
A	T/G REL TO PROD. REV 1= REV A	5/11/15	JL	
B	ECO 27270	3/11/16	JL	









DIMENSIONS IN BRACKETS [ ]
ARE METRIC EQUIVALENT IN
MILLIMETERS.

SOLIDWORKS DRAWING.
THIS IS A STANDARD FORMAT.
NOT ALL BOXES APPLY TO EVERY
DRAWING AND MAY NOT BE FILLED IN.

Drawing file name: 02OL_02532400

Model File name: 00TOP_005324xxx

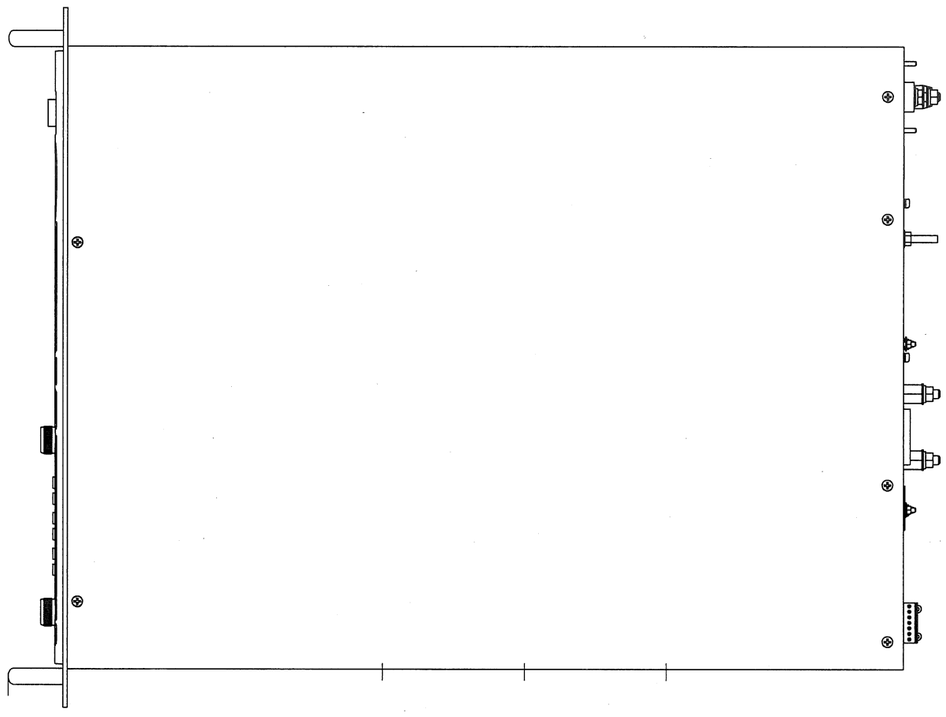
RoHS COMPLIANCE REQUIRED

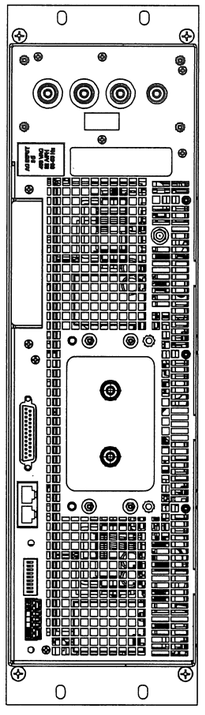
Sheet 1 of 3

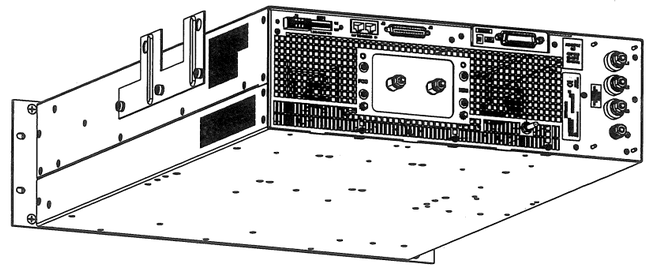
MTL: - -	TOL. .X = ± .02" [0.508] .XX = ± .01" [0.254] .XXX = ± .005" [0.127] FRAC. = ± 1/64" [0.381] ANGLES = ± 1/2°	REL. TO MFG. ENG: DATE: 3/11/16 MFG: DATE: 3/11/16	ENG. CTL. DWN: J. LADA DATE: 3-11-16 CHK: DATE: 3/11/16	TDK-Lambda
FIN: - -	PIL: 532	DOC. REL: DATE: 3/11/16	ENG: J. LADA DATE: 3-11-16	TITLE: DIM. OUTLINE DRAWING, GEN 3U 15KW HV
	SCALE: NONE	FLAT PLAN REL. DATE: N/A	APP: DATE: 3/11/16	DWG. NO. 02-532-400 REV. B

THIS IS A COMPUTER GENERATED DWG.
NO MANUAL REVISIONS ARE PERMITTED.

REVISIONS				
REV.	E.C.O. NO.	DATE	BY	APP
-	See Sheet1	-	-	-







VIEWS WITH COVERS REMOVED

DIMENSIONS IN BRACKETS [ ]
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Model File name: 00TOP_005324xxx

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FIN: - -	P/L: 532	DOC. REL. DATE:	ENG: DATE:	TITLE: DIM. OUTLINE DRAWING, GEN 3U 15KW HV
	SCALE: NONE	FLAT PLAN REL. DATE:	APP: DATE:	DWG. NO. 02-532-400 REV. B

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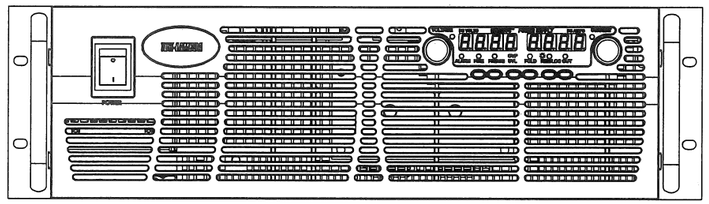
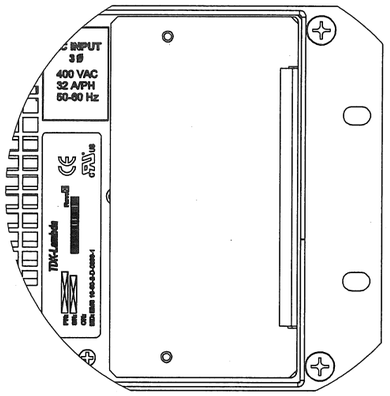
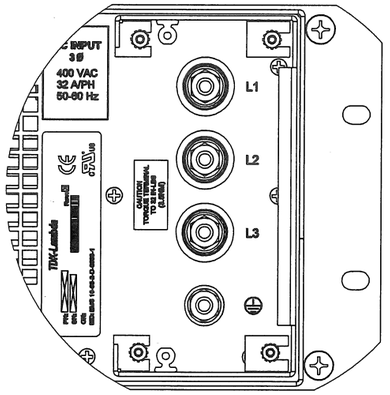
REVISIONS				
REV.	E.C.O. NO.	DATE	BY	APP
-	See Sheet1	-	-	-



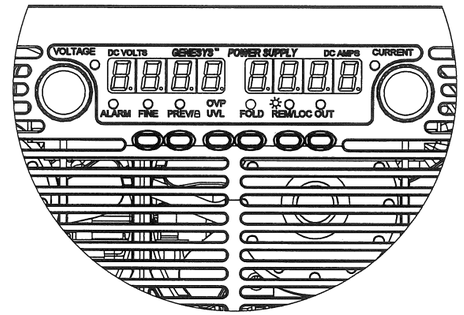
FRONT VIEW



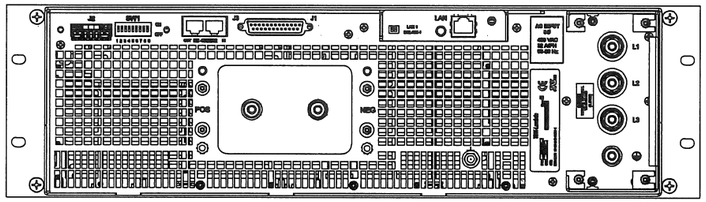
AC INPUT TERMINAL AREA



AC INPUT TERMINALS
WITH COVER REMOVED FOR CLARITY

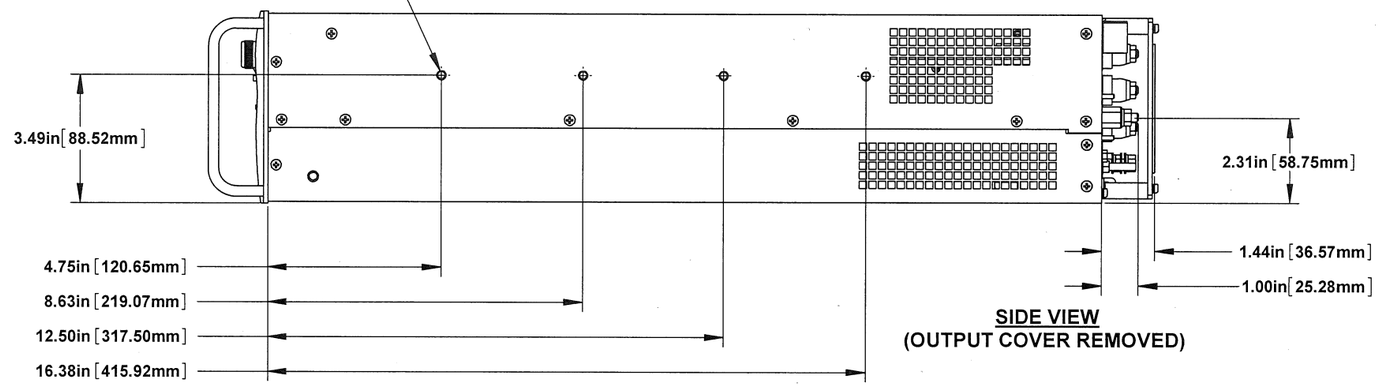


DISPLAY CONTROLS

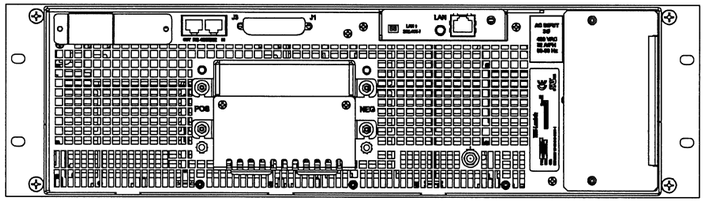


REAR VIEW
(COVERS REMOVED)

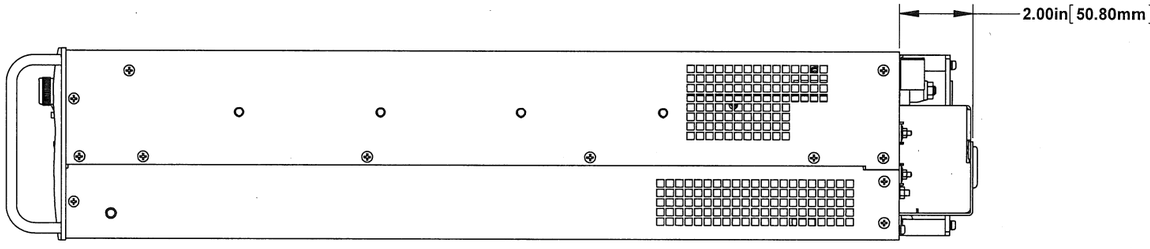
MOUNTING FOR SLIDE MOUNTS (NOT INCLUDED)
RECOMMENDED CHASSIS SLIDE MANUFACTURE:
GENERAL DEVICES CHASSIS TRAK P/N C230-S-122
SECURE WITH PAN HEAD SCREW M5X0.8-8MM LONG MAX



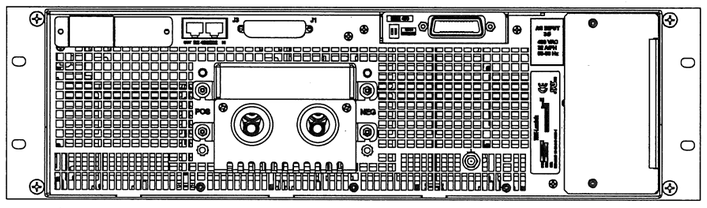
SIDE VIEW
(OUTPUT COVER REMOVED)



REAR VIEW
(BOTTOM OUTPUT CABLE ROUTING)



SIDE VIEW
(WITH OUTPUT COVER)



REAR VIEW
(REAR OUTPUT CABLE ROUTING)

RoHS COMPLIANCE REQUIRED

DIMENSIONS IN BRACKETS [ ]
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SOLIDWORKS DRAWING.
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Drawing file name: 02OL_02532400

Model File name: 00TOP_005324xxx

		REL. TO MFG.	ENG. CTL.	
MTL: - - (MUST BE RoHS COMPLIANT)		PRJ. ENG. DATE: SEE SHEET 1	DWN: DATE:	TDK-Lambda
		MFG: DATE:	CHK: DATE:	TITLE: DIM. OUTLINE DRAWING, GEN 3U 15KW HV
FIN: - - NONE	P/L: 532	DOC. REL. DATE:	ENG: DATE:	
	SCALE: NTS	FLAT PLAN REL. DATE:	APP: DATE:	DWG. NO. 02-532-400 REV. B

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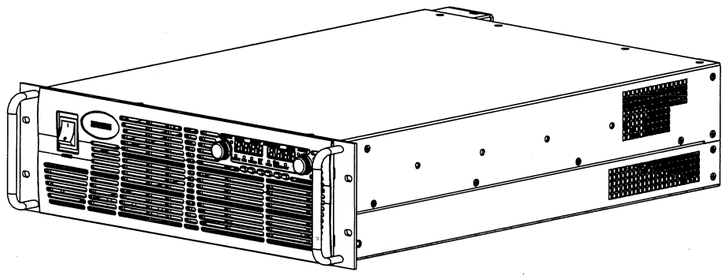
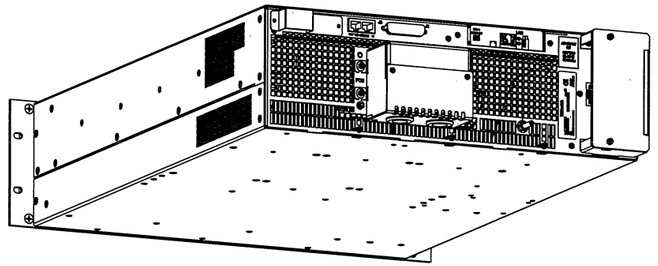
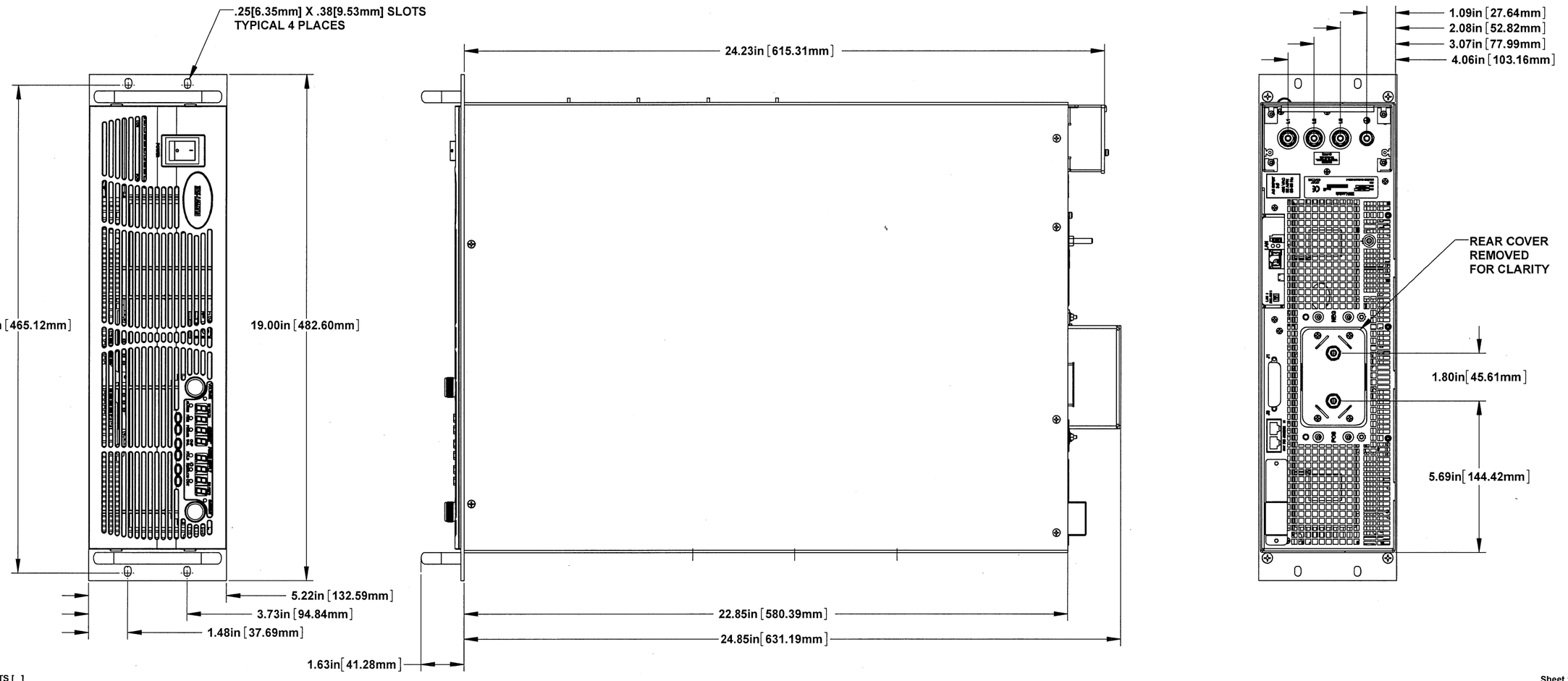
NO MANUAL REVISIONS ARE PERMITTED.

LTR	E.C.O. NO.		BY	APP.
A	INITIAL RELEASE	3/08/17	DJH	







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Drawing file name: 02OL_02532401

Model File name: 00TOP_005324xxx

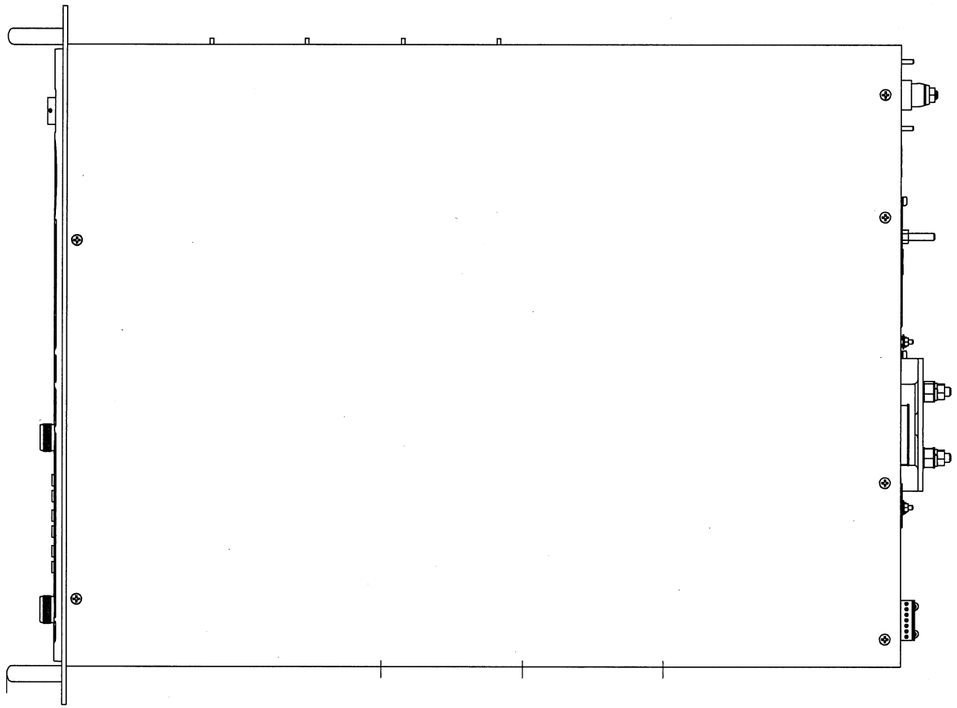
RoHS COMPLIANCE REQUIRED

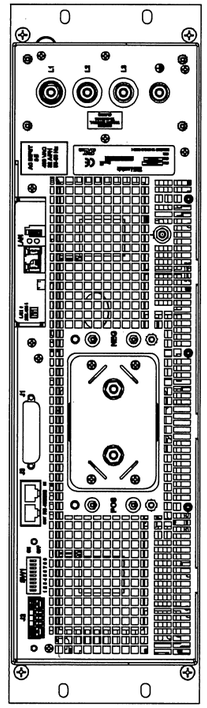
Sheet 1 of 3

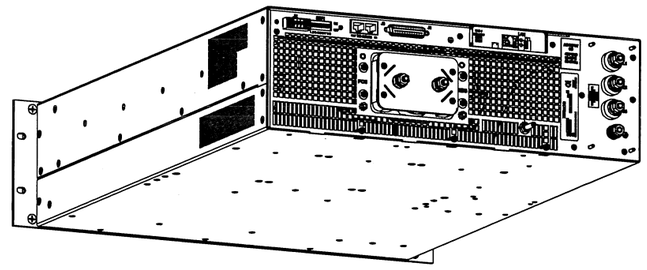
MTL: - -	TOL. .X = ± .02" [0.508] .XX = ± .01" [0.254] .XXX = ± .005" [0.127] FRAC. = ± 1/64" [0.381] ANGLES = ± 1/2°	REL. TO MFG. PRJ ENG. DATE: MFG DATE:	ENG. CTL. DWN: DJH 3-8-17 CHK: DATE: 3-9-17	TDK-Lambda
FIN: - -	P/L: 532	DOC REL DATE:	ENG: DJH 3-8-17	TITLE: DIM. OUTLINE DRAWING, GEN 3U 15KW HV, 208V
	SCALE: NONE	FLAT PLAN REL. DATE: N/A	APP: DATE:	DWG. NO. 02-532-401 REV. A

THIS IS A COMPUTER GENERATED DWG.
NO MANUAL REVISIONS ARE PERMITTED.

REVISIONS				
REV.	E.C.O. NO.	DATE	BY	APP
-	See Sheet1	-	-	-







VIEWS WITH COVERS REMOVED

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Model File name: 00TOP_005324xxx

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		MFG: DATE: SEE SHEET 1	CHK: DATE:	TITLE: DIM. OUTLINE DRAWING, GEN 3U 15KW HV, 208V
FIN: - -	P/L: 532	DOC. REL. DATE:	ENG: DATE:	
	SCALE: NONE	FLAT PLAN REL. DATE:	APP: DATE:	DWG. NO. 02-532-401 REV. A

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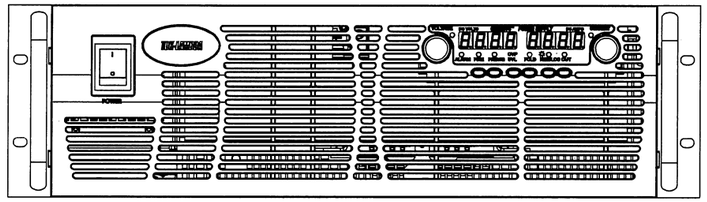
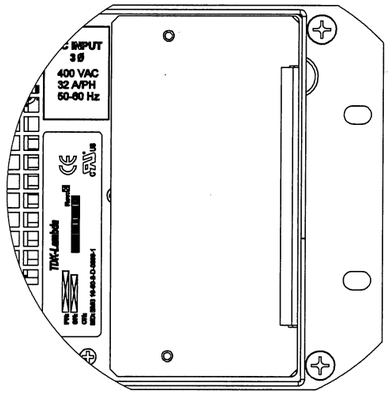
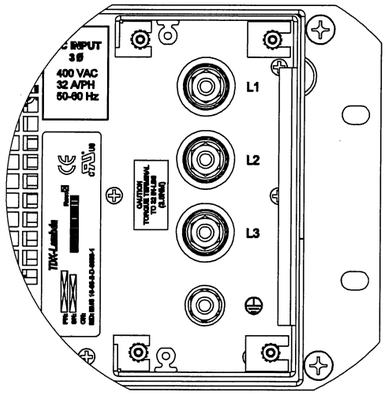
REVISIONS				
REV.	E.C.O. NO.	DATE	BY	APP
-	See Sheet1	-	-	-



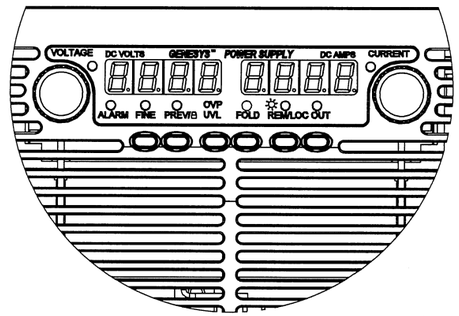
FRONT VIEW



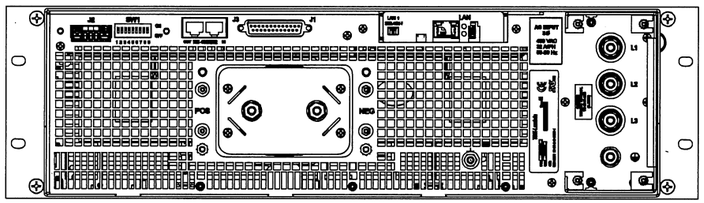
AC INPUT TERMINAL AREA



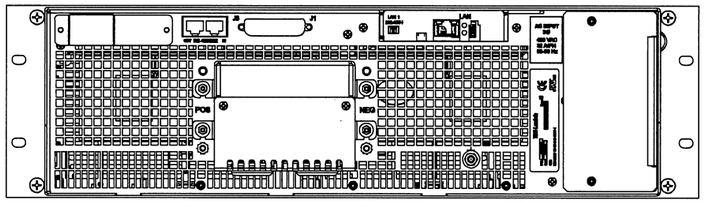
AC INPUT TERMINALS
WITH COVER REMOVED FOR CLARITY



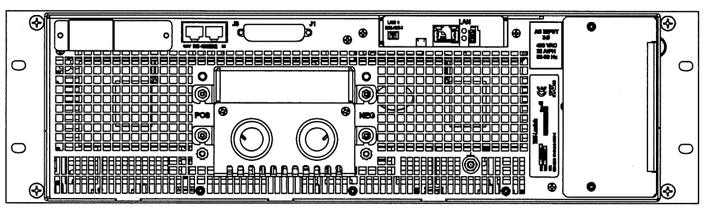
DISPLAY CONTROLS



REAR VIEW
(COVERS REMOVED)

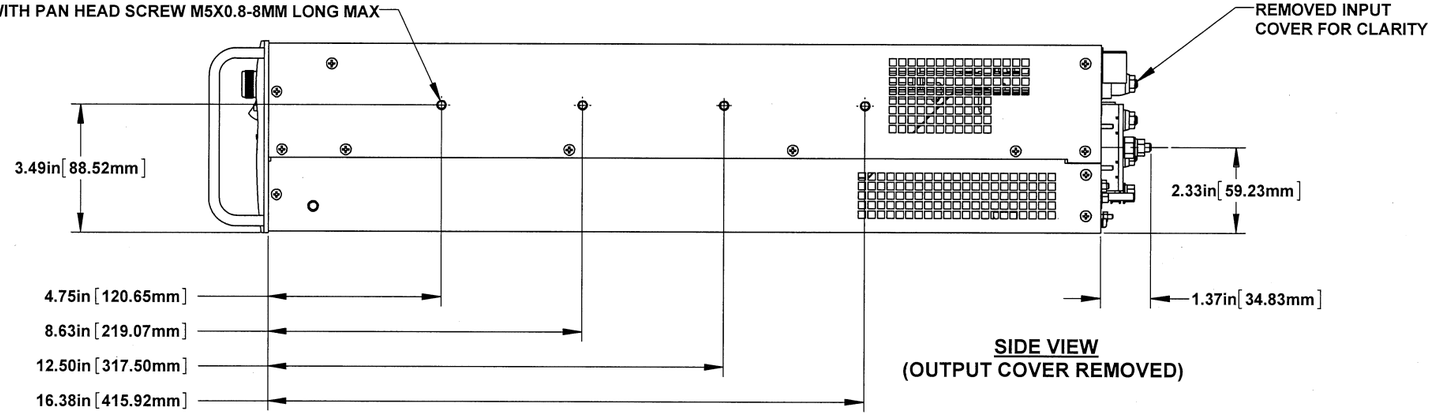


REAR VIEW
(BOTTOM OUTPUT CABLE ROUTING)

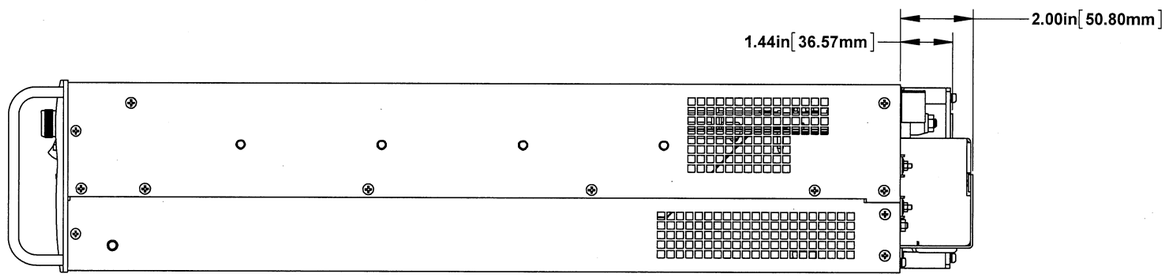


REAR VIEW
(REAR OUTPUT CABLE ROUTING)

MOUNTING FOR SLIDE MOUNTS (NOT INCLUDED)
RECOMMENDED CHASSIS SLIDE MANUFACTURE:
GENERAL DEVICES CHASSIS TRAK P/N C230-S-122
SECURE WITH PAN HEAD SCREW M5X0.8-8MM LONG MAX



SIDE VIEW
(OUTPUT COVER REMOVED)



SIDE VIEW
(WITH OUTPUT COVER)

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Drawing file name: 02OL_02532401

Model File name: 00TOP_005324xxx

SHEET 3 OF 3

		REL. TO MFG.	ENG. CTL.	
MTL: - - (MUST BE RoHS COMPLIANT)		PRJ. ENG. DATE: SEE SHEET 1	DWN: DATE:	TDK-Lambda
		MFG: DATE:	CHK: DATE:	TITLE: DIM. OUTLINE DRAWING, GEN 3U 15KW HV, 208V
FIN: - - NONE	P/L: 532	DOC. REL. DATE:	ENG: DATE:	
	SCALE: NTS	FLAT PLAN REL. DATE:	APP: DATE:	DWG. NO. 02-532-401 REV. A