

Genesys™

Programmable DC Power Supplies

750W /1500W in 1U

Built in RS-232 & RS-485 Interface

Parallel Current Summing

Optional Interfaces: USB

LXI Compliant LAN

IEEE488.2 SCPI Multi-Drop

Isolated Analog Interface



Genesys™ Family

GEN H 750W Half Rack

GEN 1U 750/1500W Full Rack

GEN 2U 3.3/5kW

GEN 3U 10/15kW

TDK-Lambda

www.us.tdk-lambda.com/hp

The Genesys™ family of programmable power supplies sets a new standard for flexible, reliable, AC/DC power systems in Test & Measurement, Industrial and Laboratory applications.

Features include:

- **High Power Density 750/1500W in 1U**
- **Wide Range Input (85 - 265Vac Continuous, single phase, 47/63Hz)**
- **Active Power Factor Correction (0.99 typical)**
- **Output Voltage up to 600V, Current up to 200A**
- **Built-in RS-232/RS-485 Interface**
- **Last Setting Memory; Front Panel Lockout**
- **Advanced Parallel reports total current up to four identical units**
- **Global Commands for Serial RS-232/RS-485 Interface**
- Reliable Encoders for Voltage and Current Adjustment
- Constant Voltage/Constant Current auto-crossover
- Parallel Operation with Active Current Sharing
- Independent Remote ON/OFF and Remote Enable/Disable
- External Analog Programming and Monitoring
- Reliable Modular and SMT Design
- 19" Rack Mounted ATE and OEM applications
- Optional Interfaces
 - Isolated Analog Programming and Monitoring
 - IEEE Multi-Drop - SCPI
 - LXI** Compliant LAN Interface
 - USB Interface
- Five Year Warranty
- Optional Isolated Analog Programming and Monitoring
- Optional IEEE 488.2 SCPI (GPIB) Interface

Worldwide Safety Agency Approvals; CE Mark for LVD and EMC Regulation



Applications

Genesys™ power supplies are designed for demanding applications. Common controls are shared across all platforms.

Test and Measurement

Last-Setting memory simplifies test design and requires no battery backup.

Built-in RS-232/RS-485 gives maximum system flexibility along with 0-5V and 0-10V, selectable analog programming.

Wide range of available outputs allows testing of many different devices.

Semiconductor Processing

Equipment designers appreciate the wide range Input (85-265Vac) and numerous Outputs from which to select depending on application. Selectable Safe and Auto Re-start protects loads and process integrity.

Typical applications include Magnets, Filaments and Heaters.

Aerospace and Satellite Testing

Complex systems use the complete Genesys™ Family: 1U 750W Half Rack, 1U 750W or 1500W Full-Rack, 2U 3.3kW and 3U 10/15kW. All are identical in Front Panel, Rear Panel Analog and Digital Interface Commands. A wide variety of outputs allows testing of many different devices.

Laser Diode

OVP is directly set on Voltage Display, assuring accurate protection settings.

Current Limit Fold Back assures load is protected from current surges.

Heater Supplies

Smooth, reliable encoders with selectable Fine and Coarse adjustment enhance Front Panel Control.

Remote Analog Programming is user selectable 0-5V or 0-10V and optional Isolated Programming/Monitoring Interfaces are also available.

RF Amplifiers and Magnets

Robust design assures stable operation under a wide variety of loads.

High linearity in voltage and current mode.

Front Panel Description



1. AC ON/OFF Switch
2. Air Intake allows zero stacking for maximum system flexibility and power density.
3. Reliable encoder controls Output Voltage and sets Address.
4. Volt Display shows Output Voltage and directly displays OVP, UVL and Address settings.
5. Reliable encoder controls Output Current, sets baudrate, and Advanced Parallel Mode
6. Current Display shows Output Current and displays baudrate.
7. Function/Status LEDs:
 - Alarm
 - Foldback Mode
 - Fine Control
 - Remote Mode
 - Preview Settings
 - Output On
8. Pushbuttons allow flexible user configuration
 - Coarse and fine Adjustment of Output Voltage/Current and Advanced Parallel Master or Slave select.
 - Preview settings and set Voltage/Current with Output OFF
 - Set OVP and UVL Limits
 - Set Current Foldback
 - Local/Remote Mode and select Address and Baudrate
 - Output ON/OFF and Auto-Start/Safe-Start Mode

Rear Panel Description



1. Remote/Local Output Voltage Sense Connections.
2. DIP Switches select 0-5V or 0-10V Programming and other functions.
3. DB25 (Female) connector allows (Non-isolated) Analog Program and Monitor and other functions.
4. RS-485 OUT to other Genesys™ Power Supplies.
5. RS-232/RS-485 IN Remote Serial Programming.
6. Output Connections: Rugged busbars for up to 60V Output; Terminal block for Outputs >60V.
7. Exit air assures reliable operation when zero stacked.
8. Wide-Range Input 85-265VAC continuous, 47/63Hz with Active Power Factor Correction (0.99 typical)
AC Input Connector: 750W (IEC320), 1500W (screw terminal-shown).
9. Optional Interface Position for IEEE488.2 SCPI (shown), Isolated Analog Interface, LAN Interface or USB Interface.

LAN Interface complies with **LXI** Class C Specification

Genesys™ 750W/1500W Specifications

1.0 MODEL	GEN	6-200	8-180	12.5-120	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	600-2.6	750W	1500W
1. Rated output voltage(*1)	V	6	8	12.5	20	30	40	50	60	80	100	150	300	600		X
2. Rated Output Current(*2)	A	200	180	120	76	50	38	30	25	19	15	10	5	2.6		X
3. Rated Output Power	W	1200	1440	1500	1520	1500	1520	1500	1500	1520	1500	1500	1500	1560		X
4. Efficiency at 100/200Vac (*3)	%	77/80	78/81	81/84	83/86	83/86	84/88	84/88	84/88	84/88	84/88	84/88	83/87	83/87	X	X

1.0 MODEL	GEN	6-100	8-90	12.5-60	20-38	30-25	40-19	---	60-12.5	80-9.5	100-7.5	150-5	300-2.5	600-1.3	X	
1. Rated output voltage (*1)	V	6	8	12.5	20	30	40	---	60	80	100	150	300	600	X	
2. Rated Output Current (*2)	A	100	90	60	38	25	19	---	12.5	9.5	7.5	5	2.5	1.3	X	
3. Rated Output Power	W	600	720	750	760	750	760	---	750	760	750	750	750	780	X	

1.1 CONSTANT VOLTAGE MODE

1. Max. line regulation (0.01% of Vo+ 2mV)(*4)	mV	2.6	2.8	3.3	4	5	6	7	8	10	12	17	32	62	X	X
2. Max. load regulation (0.01% of Vo+2mV)(*5)	mV	2.6	2.8	3.3	4	5	6	7	8	10	12	17	32	62	X	X
3. Ripple and noise p-p 20MHz	mV	60	60	60	60	60	60	60	60	80	80	100	120	300	X	X
4. Ripple r.m.s 5Hz~1MHz	mV	8	8	8	8	8	8	8	8	8	8	10	20	60	X	X
5. Remote sense compensation/line	V	1	1	1	1	1.5	2	2	3	4	5	5	5	5	X	X
6. Temp. coefficient	PPM/°C	100PPM/°C of rated output voltage, following 30 minutes warm up													X	X
7. Up-prog. response time, 0~Vo Rated	mS	80mS , N.L/F.L , resistive load				150mS , N.L/F.L , resistive load				250					X	X
8. Down-prog response time full-load	mS	10				80				150				250	X	X
9. Down-prog response time no-load	mS	500	600	700	800	900	1000	1100	100	1200	1500	2000	2500	4000	X	X
10. Transient response time (*8)		Less than 1mSec for models up to and including 100V. 2msec for models above 100V													X	X

1.2 CONSTANT CURRENT MODE

1. Max. line regulation (0.01% of Io+ 2mA)(*4)	mA	12	11	8.0	5.8	4.5	3.9	---	3.25	2.95	2.75	2.5	2.25	2.13	X	
2. Max. load regulation (0.02% of Io+5mA)(*6)	mA	25	23	17	12.6	10	8.8	---	7.5	6.9	6.5	6.0	5.5	5.26	X	
3. Ripple r.m.s 5Hz~1MHz . (*7)	mA	200	180	120	76	63	48	---	38	29	23	18	13	8	X	
4. Max. line regulation (0.01% of Io+ 2mA)(*4)	mA	22	20	14	9.6	7.0	5.8	5	4.5	3.9	3.5	3.0	2.5	2.26		X
5. Max. load regulation (0.02% of Io+5mA)(*6)	mA	45	41	29	20.2	15	12.6	11	10	8.8	8.0	7.0	6.0	5.52		X
6. Ripple r.m.s 5Hz~1MHz .(*7)	mA	400	360	240	152	125	95	85	75	57	45	35	25	12		X
7. Temp. coefficient	PPM/°C	100PPM/°C from rated output voltage, following 30 minutes warm up													X	X

1.3 PROTECTIVE FUNCTIONS

1. OCP	0~105% Constant Current														X	X
2. OCP Foldback	Output shut down when power supply change from CV to CC. User selectable.														X	X
3. OVP type	Inverter shut-down, manual reset by AC input recycle or by OUT button														X	X
4. OVP trip point	0.5~7.5V 0.5~10V 1~15V 1~24V 2~36V 2~44V 5~57V 5~66V 5~88V 5~110V 5~165V 5~330V 5~660V														X	X
5. Over Temp. Protection	User selectable , latched or non latched														X	X

1.4 ANALOG PROGRAMMING AND MONITORING

1. Vout Voltage Programming	0~100%, 0~5V or 0~10V, user select. Accuracy and linearity: +/-0.5% of rated Vout.														X	X
2. Iout Voltage Programming	0~100%, 0~5V or 0~10V, user select. Accuracy and linearity: +/-1% of rated Iout.														X	X
3. Vout Resistor Programming	0~100%, 0~5/10Kohm full scale, user select. Accuracy and linearity: +/-1% of rated Vout.														X	X
4. Iout Resistor Programming	0~100%, 0~5/10Kohm full scale, user select. Accuracy and linearity: +/-1.5% of rated Iout.														X	X
5. On/Off control (rear panel)	By electrical. Voltage: 0~0.6V/2~15V, or dry contact , user selectable logic														X	X
6. Output Current monitor	0~5V or 0~10V , accuracy: 1% , user selectable														X	X
7. Output Voltage monitor	0~5V or 0~10V , accuracy: 1% , user selectable														X	X
8. Power Supply OK signal	TTL High=OK, 0V-Fail 500ohm impedance														X	X
9. CV/CC indicator	CV: TTL high (4~5V) source: 10mA, CC: TTL low (0~0.4V):10mA														X	X
10. Enable/Disable	Dry contact. Open: off , Short: on. Max. voltage at Enable/Disable in: 6V														X	X

1.5 FRONT PANEL

1. Control functions	Vout/ Iout manual adjust by separate encoders (coarse and fine adjustment selectable) OVP/UVL manual adjust by Volt. Adjust encoder AC on/off, Output on/off, Re-start modes (auto, safe), Foldback control (CV to CC), Go to local control Address selection by Voltage (or current) adjust encoder. Number of addresses: 31 RS232/485 and IEEE488.2 selection by IEEE enable switch and DIP switch Baudrate selection: 1200, 2400, 4800, 9600 and 19,200														X	X
2. Display	Voltage 4 digits , accuracy: 0.5% +/-1 count Current 4 digits, accuracy: 0.5% +/-1 count														X	X
3. Indications	Voltage, Current, Alarm, Fine, Preview, Foldback, Local, Output On														X	X

1.6 Interface RS232&RS485 or Optional GPIB Interface

Model	V	6	8	12.5	20	30	40	50	60	80	100	150	300	600	750W	1500W
1. Remote Voltage Programming (16 bit)															X	X
Resolution (0.012% of Vo Rated)	mV	0.72	0.96	1.50	2.40	3.60	4.80	6	7.2	9.6	12	18	36	72	X	X
Accuracy (0.05%Vo Rated+0.05% of Vo Actual Output)	mV	6.0	8.0	12.5	20	30	40	50	60	80	100	150	300	600	X	X

2. Remote Current Programming (16 bit)																
Resolution (0.012% of Io Rated)	mA	12	10.8	7.2	4.56	3.0	2.28	---	1.50	1.14	0.90	0.60	0.30	0.16	X	
Accuracy (0.1% of Io Rated+0.1% of Io Actual Output)	mA	200	180	120	76	50	38	---	25	19	15	10	5.0	2.6	X	
Resolution (0.012% of Io Rated)	mA	24	21.6	14.4	9.12	6.0	4.56	3.60	3.0	2.28	1.80	1.20	0.60	0.32		X
Accuracy (0.1% of Io Rated+0.1% of Io Actual Output)	mA	400	360	240	152	100	76	60	50	38	30	20	10	5.2		X

3. Readback Voltage																
Resolution (0.012% of Vo Rated)	mV	0.72	0.96	1.50	2.40	3.60	4.80	6.0	7.2	9.6	12	18	36	72	X	X
Accuracy (0.1%Vo Rated+0.1% of Vo Actual Output)	mV	12	16	25	40	60	80	100	120	160	200	300	600	1200	X	X

4. Readback Current																
Resolution (0.012% of Io Rated)	mA	12	10.8	7.2	4.56	3.0	2.28	---	1.50	1.14	0.90	0.60	0.30	0.16	X	
Accuracy (0.3% of Io Rated+0.1% of Io Actual Output)	mA	400	360	240	152	100	76	---	50	38	30	20	10	5.2	X	
Resolution (0.012% of Io Rated)	mA	24	21.6	14.4	9.12	6	4.56	3.60	3.0	2.28	1.80	1.20	0.60	0.32		X
Accuracy (0.3% of Io Rated+0.1% of Io Actual Output)	mA	800	720	480	304	200	152	120	100	76	60	40	20	10.4		X

5. OVP/UVL Programming																
Resolution (0.1% of Vo Rated)	mV	6	8	12	20	30	40	50	60	80	100	150	300	600	X	X
Accuracy (1% of Vo Rated)	mV	60	80	125	200	300	400	500	600	800	1000	1500	3000	6000	X	X

*1: Minimum voltage is guaranteed to maximum 0.2% of Vo Rated.

*3: At maximum output power.

*5: From No-load to Full-load, constant input voltage.

*2: Minimum current is guaranteed to maximum 0.4% of Io Rated

*4: 85~132Vac or 170~265Vac, constant load.

*6: For load voltage change, equal to the unit voltage rating, constant input voltage.

*7: For 6V models the ripple is measured at 2~6V output voltage and full output current. For other models, the ripple is measured at 10~100% output voltage and full output current.

*8: Time for the output voltage to recover within 0.5% of its rated for a load change 10~90% of rated output , Output set-point: 10~100%.

Accuracy -Values have been calculated at Vo Rated & Io Rated

General Specifications Genesys™ 750W/1500W

2.1 INPUT CHARACTERISTICS

1. Input voltage/freq. (*1)	85~265Vac continuous, 47~63Hz, single phase
2. Power Factor	0.99 @100/200Vac, rated output power.
3. EN61000-3-2,3 compliance	Complies with EN61000-3-2 class A and EN61000-3-3 at 20~100% output power.
4. Input current 100/200Vac	750W :10.5A / 5A, 1500W :21A / 11A
5. Inrush current 100/200Vac	750W :Less than 25A, 1500W :Less than 50A
6. Hold-up time	More than 20mS , 100Vac , at 100% load.

2.2 POWER SUPPLY CONFIGURATION

1. Parallel Operation	Up to 4 identical units in master/slave mode with parallel current summing (Advanced Parallel)
2. Series Operation	Up to 2 units. with external diodes. 600V Max to Chassis ground

2.3 ENVIRONMENTAL CONDITIONS

1. Operating temp	0~50 °C, 100% load.
2. Storage temp	-20~70 °C
3. Operating humidity	30~90% RH (non-condensing).
4. Storage humidity	10~95% RH (non-condensing).
5. Vibration	MIL-810E, method 514.4 , test cond. I-3.3.1. The EUT is fixed to the vibrating surface.
6. Shock	Less than 20G , half sine , 11mSec. Unit is unpacked.
7. Altitude	Operating: 10000ft (3000m) , Non operating: 40000ft (12000m).

2.4 EMC

1.Applicable Standards:	
2.ESD	IEC1000-4-2. Air-disch.-8KV, contact disch.-4KV
3.Fast transients	IEC1000-4-4. 2KV
4.Surge immunity	IEC1000-4-5. 1KV line to line, 2KV line to ground
5.Conducted immunity	IEC1000-4-6, 3V
6.Radiated immunity	IEC1000-4-3, 3V/m
7.Conducted emission	EN55022B,FCC part 15-B,VCCI-2
8.Radiated emission	EN55022A,FCC part 15-A,VCCI-1
9.Voltage dips	EN61000-4-11
10. Conducted emission	EN55022B, FCC part 15-B, VCCI-2.
11. Radiated emission	EN55022A, FCC part 15-A, VCCI-1.

2.5 SAFETY

1.Applicable standards:	CE Mark, UL60950,EN60950 listed. Vout<60V:Output is SELV , IEEE/Isolated analog are SELV. 60<Vout<400V: Output is hazardous, IEEE/Isolated analog are SELV. 400<Vout<600V:Output is hazardous, IEEE/Isolated analog are not SELV.
2.Withstand voltage	Vout<60V models :Input-Outputs (SELV): 3.0KVrms 1min, Input-Ground: 2.0KVrms 1min. 60<Vout<600V models: Input-Haz. Output: 2.5KVrms 1min, Input-SELV: 3KVrms 1min. Hazardous Output.-SELV: 1.9KVrms 1min, Hazardous Output-Ground:1.9KVrms 1min. Input-Ground: 2KVrms 1min.
3.Insulation resistance	More than 100Mohm at 25 °C , 70% RH, 500Vdc

2.6 MECHANICAL CONSTRUCTION

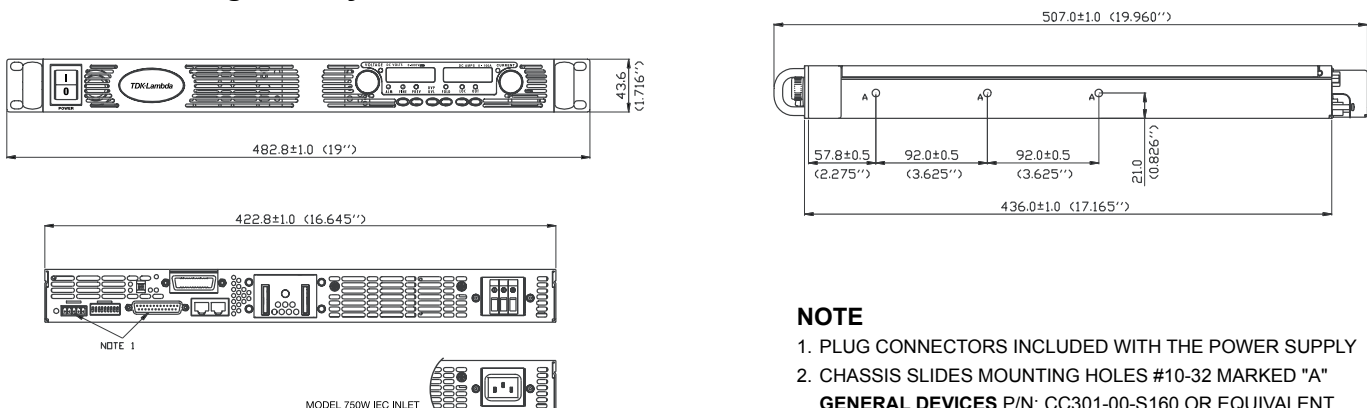
1. Cooling	Forced air flow: from front to rear. No ventilation holes at the top or bottom of the chassis; Variable fan speed.
2. Dimensions (WxHxD)	W: 16.64in, H: 1.72in, D: 17.04in (excluding connectors, encoders, handles, etc.)
3. Weight	750W : 7Kg (15 Lbs) 1500W : 8.5Kg (18 Lbs)
4. AC Input connector	750W: IEC320 AC Inlet. 1500W: Screw terminal block, Phoenix P/N: FRONT-4-H-7.62 , with strain relief
5.Output connectors	6V to 60V models: Bus-bars (hole Ø 8.5mm). 80V to 600V models: Terminal block, Phoenix P/N: FRONT-4-H-7.62

2.7 RELIABILITY SPECS

1. Warranty	5 years.
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*1: For cases where conformance to various safety standards (UL, IEC etc.) is required, to be described as 100-240Vac (50/60Hz).

Outline Drawing Genesys™ 750W/1500W Units

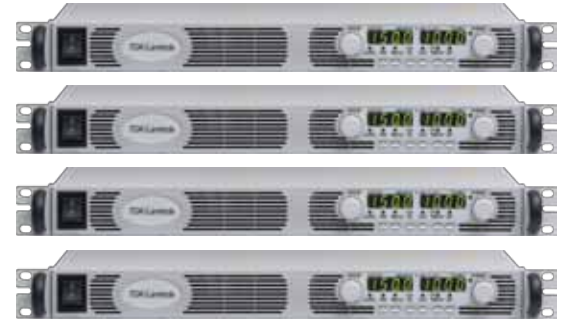


Genesys™ Power Parallel and Series Configurations

Parallel operation - Master/Slave:

Active current sharing allows up to four identical units to be connected in an auto-parallel configuration for four times the output power.

In Advanced Parallel Master/Slave Mode, total current is programmed and reported by the Master. Up to four supplies act as one.

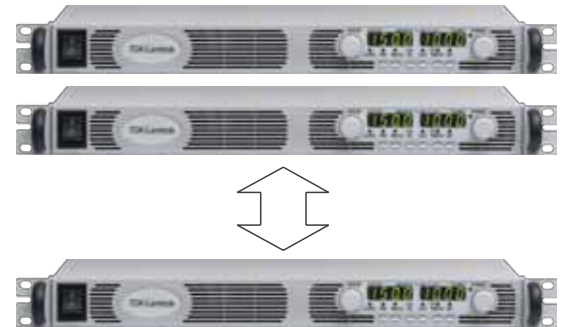
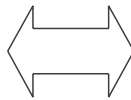


Series operation

Up to two units may be connected in series to increase the output voltage or to provide bipolar output. (Max 600V to Chassis Ground).

Remote Programming via RS-232 & RS-485 Interface

Standard Serial Interface allows daisy-chain control of up to 31 power supplies on the same communication bus with built-in RS-232 & RS-485 Interface with or without Multi-Drop option.



Programming Options (Factory installed)

New IEEE Multi-Drop Interface

P/N: IEMD

- Allows IEEE Master to control up to 30 (Multi-Drop equipped) slaves over RS-485 daisy-chain
- Only the Master needs be equipped with IEEE Interface
- IEEE 488.2 SCPI Compliant
- Program Voltage
- Measure Voltage
- Over Voltage setting and shutdown
- Error and Status Messages
- Program Current
- Measure Current
- Current Foldback shutdown

New Multi-Drop Slave Option

P/N: MD

- Slaves need to be equipped with the MD Slave (RS-485) option

Isolated Analog Programming

P/N: IS510

- Four Channels to Program and Monitor Voltage and Current.
- Isolation allows operation with floating references in harsh electrical environments.
- Choose between programming with Voltage or Current.
- Connection via removable terminal block: Phoenix MC1,5/8-ST-3.81.
- Voltage Programming, user-selectable 0-5V or 0-10V signal.
 - Power supply Voltage and Current Programming Accuracy $\pm 1\%$
 - Power supply Voltage and Current Monitoring Accuracy $\pm 1.5\%$
- Current Programming with 4-20mA signal.
 - Power supply Voltage and Current Programming Accuracy $\pm 1\%$
 - Power supply Voltage and Current Monitoring Accuracy $\pm 1.5\%$

P/N: IS420

LAN Interface

LXI Compliant to Class C

P/N: LAN

- Meets all LXI-C Requirements
- Address Viewable on Front Panel
- Fixed and Dynamic Addressing
- Fast Startup
- VISA & SCPI Compatible
- LAN Fault Indicators
- Auto-detects LAN Cross-over Cable
- Compatible with most standard Networks

USB Interface

P/N: USB

- Allows Serial Connection to USB Port on computer
- Serial commands same as (standard) RS-232/RS-485 Interface

Power Supply Identification / Accessories

How to order

GEN	600	-	2.6	-		-	
Series Name	Output Voltage (0~600V)		Output Current (0~2.6A)		Factory Options		AC Cable option is 750W only
					Option: IEMD MD IS510 IS420 LAN USB		Region: E - Europe J - Japan I - Middle East U - North America

Models 750/1500W

Model	Output Voltage VDC	Output Current (A)	Output Power (W)
GEN6-100	0~6V	0~100	600
GEN6-200		0~200	1200
GEN8-90		0~90	720
GEN8-180	0~8V	0~180	1440
GEN12.5-60		0~60	750
GEN12.5-120	0~12.5V	0~120	1500
GEN20-38		0~38	760
GEN20-76	0~20V	0~76	1520
GEN30-25		0~25	750
GEN30-50	0~30V	0~50	1500
GEN40-19		0~19	760
GEN40-38	0~40V	0~38	1520

Model	Output Voltage VDC	Output Current (A)	Output Power (W)
GEN50-30	0~50V	0~30	1500
GEN60-12.5	0~60V	0~12.5	750
GEN60-25		0~25	1500
GEN80-9.5	0~80V	0~9.5	760
GEN80-19		0~19	1520
GEN100~7.5	0~100V	0~7.5	750
GEN100~15		0~15	1500
GEN150~5	0~150V	0~5	750
GEN150~10		0~10	1500
GEN300~2.5	0~300V	0~2.5	750
GEN300~5		0~5	1500
GEN600~1.3	0~600V	0~1.3	780
GEN600~2.6		0~2.6	1560





Factory option

RS-232/RS-485 Interface built-in Standard
 GPIB (Multi-Drop Master) Interface
 Multi-Drop Slave Interface
 Voltage Programming Isolated Analog Interface
 Current Programming Isolated Analog Interface
 LAN Interface (Complies with **LXI** Class C)
 USB Interface

P/N

-
 IEMD
 MD
 IS510
 IS420
 LAN
 USB

AC Cords sets (750W only)

Region	Europe	Japan	Middle East	North America
Output Power	750W	750W	750W	750W
AC Cords	10A/250 Vac L=2m	13A/125 Vac L=2m	10A/250 Vac L=2m	13A/125 Vac L=2m
Wall Plug	INT'L 7/VII	IEC320-C13	SI-32	NEMA 5-15P
Power Supply Connector	IEC320-C13		IEC320-C13	IEC320-C13
				
Part Number	P/N: GEN/E	P/N: GEN/J	P/N: GEN/I	P/N: GEN/U

Accessories

1. Communication cable

RS-232/RS-485 Cable is used to connect the power supply to the PC Controller.

Mode	RS485	RS232	RS232
PC Connector	DB-9F	DB-9F	DB-25F
Communication Cable	Shield Ground L=2m	Shield Ground L=2m	FShield Ground L=2m
Power Supply Connector	EIA/TIA-568A (RJ-45)	EIA/TIA-568A (RJ-45)	EIA/TIA-568A (RJ-45)
P/N	GEN/485-9	GEN/232-9	GEN/232-25

2. Serial link cable*

Daisy-chain up to 31 Genesys™ power supplies.

Mode	Power Supply Connector	Communication Cable	P/N
RS-485	EIA/TIA-568A (RJ-45)	Shield Ground L=50cm	GEN/RJ45

* Included with power supply

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[TDK-Lambda:](#)

[GEN30-50](#) [GEN40-38](#)