

# TDK-Lambda



## **ZERO-UP** 200W/400W/800W Programmable DC Power Supplies

**Built-in RS-232 & RS-485 Interface  
with IEEE488 (GPIB) optional.**

- Constant Voltage/Constant Current
- Built-in RS-232 & RS-485 Interface
- An embedded Microprocessor controller
- Digital Encoder Knob
- Software Calibration
- Last Setting Memory
- Parallel Operation (Master/Slave) Active Current Sharing
- External Voltage or Resistance Programming
- Voltage up to 120V, Current up to 132A
- Active Power Factor Correction: 99%
- 85~265Vac Universal Input Voltage
- 19" Rack Mounted ATE and OEM
- Worldwide Safety Agency Approvals
- CE Mark for LVD and EMC Regulation

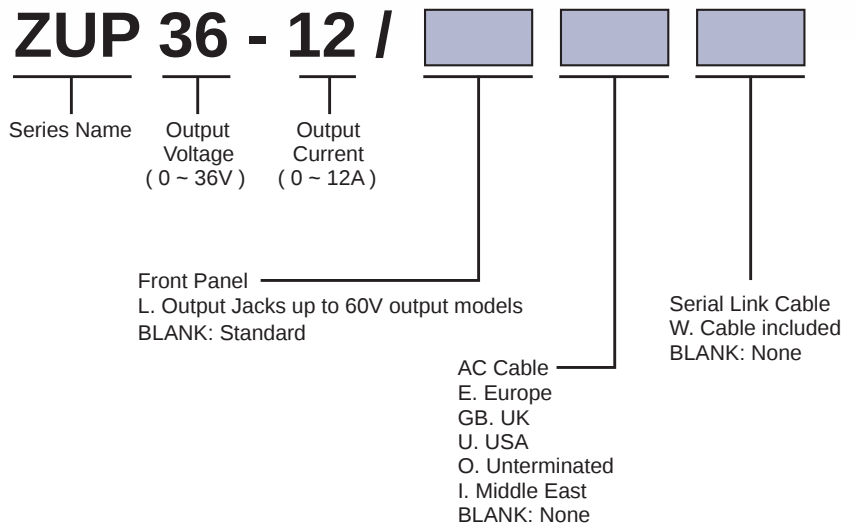


Control Flexibility for Worldwide Applications

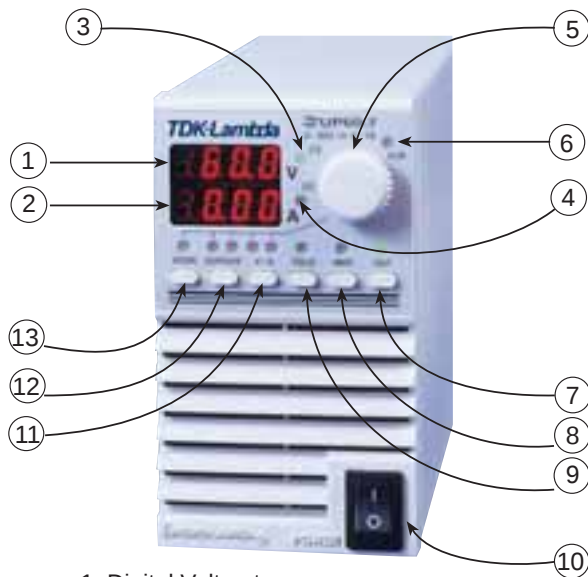
## Product Line Up

| Model      | Output Voltage (VDC) | Output Current (A) | Output Power (W) |
|------------|----------------------|--------------------|------------------|
| ZUP6-33    | 0 ~ 6 VDC            | 0 ~ 33             | 198              |
| ZUP6-66    |                      | 0 ~ 66             | 396              |
| ZUP6-132   |                      | 0 ~ 132            | 792              |
| ZUP10-20   | 0 ~ 10VDC            | 0 ~ 20             | 200              |
| ZUP10-40   |                      | 0 ~ 40             | 400              |
| ZUP10-80   |                      | 0 ~ 80             | 800              |
| ZUP20-10   | 0 ~ 20VDC            | 0 ~ 10             | 200              |
| ZUP20-20   |                      | 0 ~ 20             | 400              |
| ZUP20-40   |                      | 0 ~ 40             | 800              |
| ZUP36-6    | 0 ~ 36VDC            | 0 ~ 6              | 216              |
| ZUP36-12   |                      | 0 ~ 12             | 432              |
| ZUP36-24   |                      | 0 ~ 24             | 864              |
| ZUP60-3.5  | 0 ~ 60VDC            | 0 ~ 3.5            | 210              |
| ZUP60-7    |                      | 0 ~ 7              | 420              |
| ZUP60-14   |                      | 0 ~ 14             | 840              |
| ZUP80-2.5  | 0 ~ 80VDC            | 0 ~ 2.5            | 200              |
| ZUP80-5    |                      | 0 ~ 5              | 400              |
| ZUP120-1.8 | 0 ~ 120VDC           | 0 ~ 1.8            | 216              |
| ZUP120-3.6 |                      | 0 ~ 3.6            | 432              |

## Power Supply Identification / Accessories

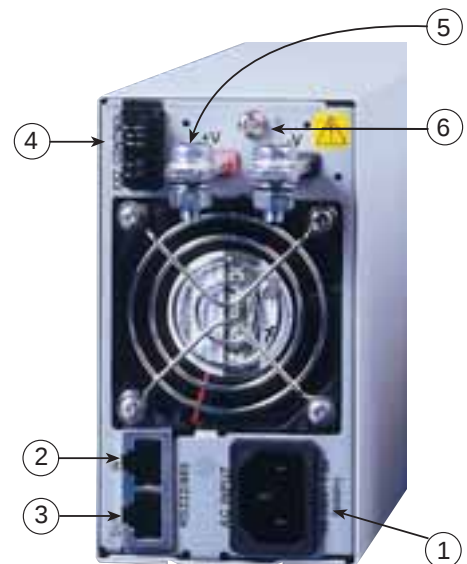


### Front Panel



1. Digital Voltmeter
2. Digital Amperemeter
3. Constant Voltage Mode Indicator
4. Constant Current Mode Indicator
5. Voltage/Current, OVP/UV, Address Adjust
6. Alarm ( OVP, OTP, FOLD )
7. Output ON/OFF Control
8. Local/Remote Select
9. Foldback Protection Control
10. AC Power Switch
11. Voltage/Current Mode Control
12. Overvoltage/Undervoltage Setting
13. Address Setting

### Rear Panel



1. IEC320 AC Input Connectors
2. Remote IN Programming via RS-232/RS-485
3. Remote OUT Via RS-485 Communications Chaining Power Supplies to Serial Communication Bus.
4. External Analog Programming Control Connector
5. Output Bus Bars (6V to 60V) model shown.  
80V to 120V models PHOENIX: PSC Plug Connectors
6. Ground Thread

## ZUP Configurations

### BENCHTOP POWER SUPPLY

Single



Parallel ( Master / Slave )

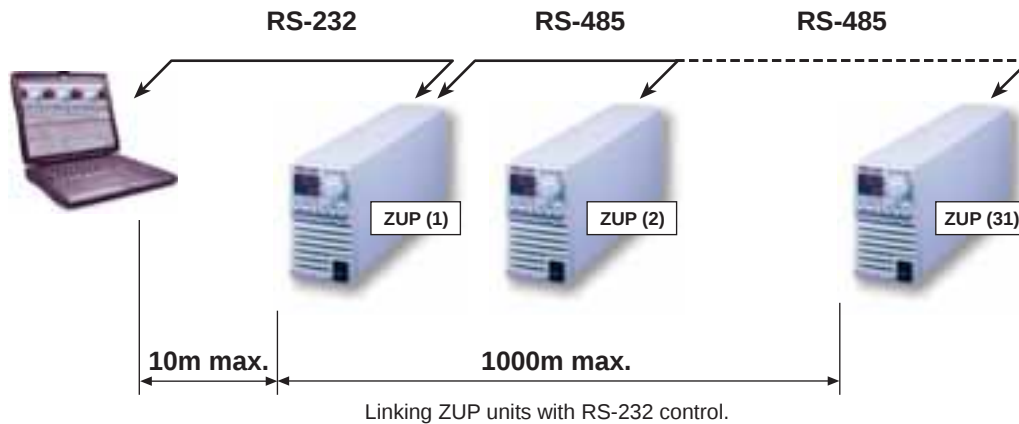


### PARALLEL OPERATION

Master - Slave method: Active current sharing up to 5 units.

### REMOTE PROGRAMMING VIA RS-232

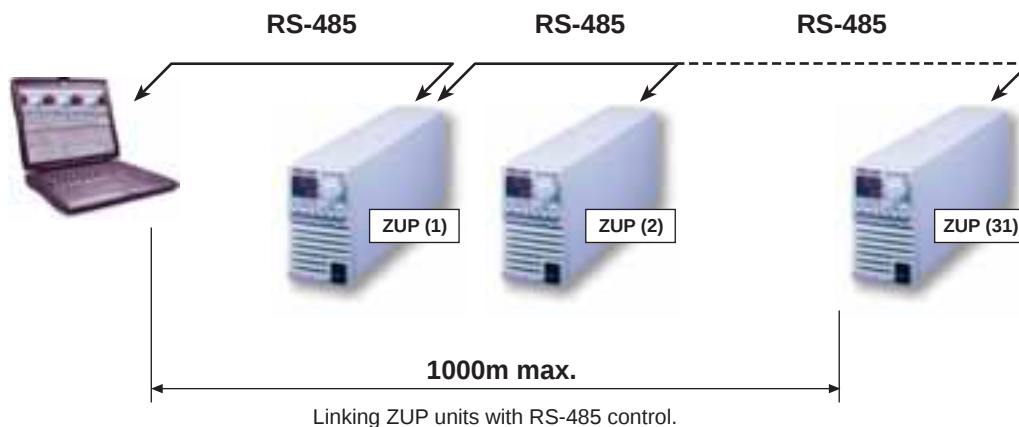
Up to 31 ZUP units can be controlled via RS-232 interface.



### REMOTE PROGRAMMING VIA RS-485

Up to 31 ZUP units can be controlled via RS-485 interface

For operation environments that require high noise immunity or long distance communication, it is recommended to use the built-in RS-485 interface.



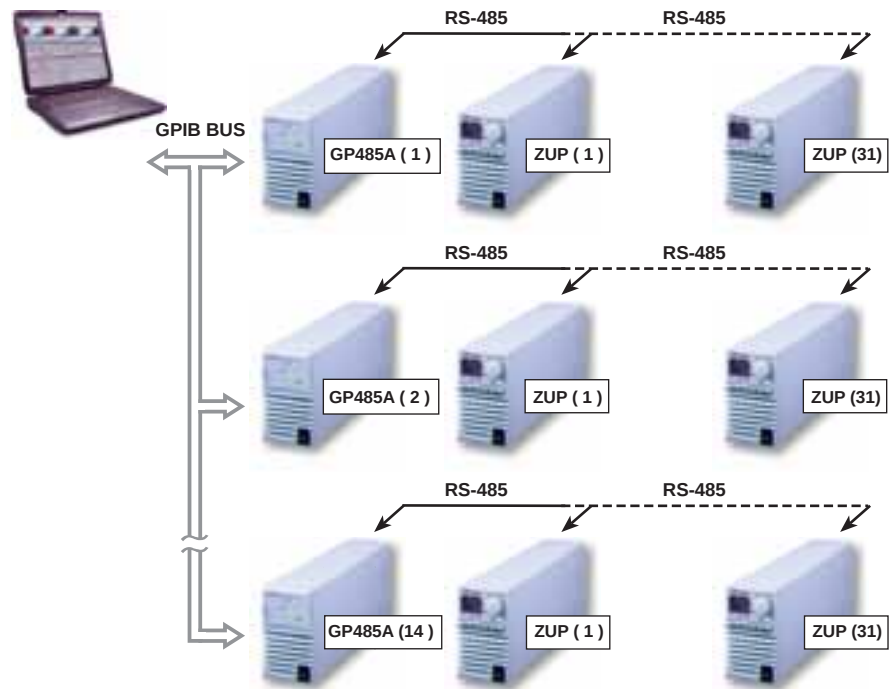
## Remote Programming Via GPIB.

### GPIB ↔ RS-485 CONTROLLER

The GP485A is a high performance serial to GPIB Interface

It enables a ZUP series with RS-485 port to be a Talker, Listener, or controller on the GPIB

- \* Controls up to 31 ZUP units through a single GPIB address.
- \* Conforms to all versions of the IEEE488 standard, including IEEE488.2.
- \* 19" racking possibility.
- \* Application software - LabView, LabWindows.



## Rack Mounted ATE and OEM up to 2.4KW

Six units can be assembled into 19-inch rack / 3U high to meet your configuration requirements

### Power Modules Table

| Module Type   | 200W        | 400W        | 800W        |
|---------------|-------------|-------------|-------------|
| 0 ~ 6V        | 33A         | 66A         | 132A        |
| 0 ~ 10V       | 20A         | 40A         | 80A         |
| 0 ~ 20V       | 10A         | 20A         | 40A         |
| 0 ~ 36V       | 6A          | 12A         | 24A         |
| 0 ~ 60V       | 3.5A        | 7A          | 14A         |
| 0 ~ 80V       | 2.5A        | 5A          |             |
| 0 ~ 120V      | 1.8A        | 3.6A        |             |
| 19"rack width | 1 / 6 width | 1 / 6 width | 2 / 6 width |



| MODEL                           |                                     |            | ZUP6-33 | ZUP6-66                                                                                                                 | ZUP6-132  | ZUP10-20   | ZUP10-40   | ZUP10-80  | ZUP20-10   | ZUP20-20   | ZUP20-40  | ZUP36-6    | ZUP36-12   | ZUP36-24  | ZUP60-3.5  | ZUP60-7    | ZUP60-14  | ZUP80-2.5  | ZUP80-5    | ZUP120-1.8 | ZUP120-3.6 |            |  |  |  |
|---------------------------------|-------------------------------------|------------|---------|-------------------------------------------------------------------------------------------------------------------------|-----------|------------|------------|-----------|------------|------------|-----------|------------|------------|-----------|------------|------------|-----------|------------|------------|------------|------------|------------|--|--|--|
| OUTPUT VOLTAGE ( *1)            |                                     |            | V       | 0-6                                                                                                                     |           |            | 0-10       |           |            | 0-20       |           |            | 0-36       |           |            | 0-60       |           |            | 0-80       |            |            | 0-120      |  |  |  |
| OUTPUT CURRENT ( *2)            |                                     |            | A       | 0-33                                                                                                                    | 0-66      | 0-132      | 0-20       | 0-40      | 0-80       | 0-10       | 0-20      | 0-40       | 0-6        | 0-12      | 0-24       | 0-3.5      | 0-7       | 0-14       | 0-2.5      | 0-5        | 0-1.8      | 0-3.6      |  |  |  |
| RATED OUTPUT POWER              |                                     |            | W       | 198                                                                                                                     | 396       | 792        | 200        | 400       | 800        | 200        | 400       | 800        | 216        | 432       | 864        | 210        | 420       | 840        | 200        | 400        | 216        | 432        |  |  |  |
| CONSTANT VOLTAGE                | LOAD REGULATION                     |            | -       | 0.005%+2mV From No load to Full load, constant input voltage.                                                           |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            | 0.005%+4mV |  |  |  |
|                                 | LINE REGULATION                     |            | -       | 0.005%+1mV From 85-132VAC or 170-265VAC, constant load.                                                                 |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            | 0.005%+2mV |  |  |  |
|                                 | RMS RIPPLE (5Hz-1MHz Bandwidth)     |            | mV      | 5                                                                                                                       | 5         | 8          | 5          | 5         | 8          | 5          | 5         | 5          | 5          | 5         | 5          | 5          | 5         | 5          | 20         | 20         | 20         | 20         |  |  |  |
|                                 | RIPPLE (pk to pk) (20MHz Bandwidth) |            | mV      | 50                                                                                                                      | 50        | 100        | 50         | 50        | 90         | 50         | 50        | 80         | 50         | 50        | 70         | 50         | 50        | 60         | 70         | 70         | 80         | 80         |  |  |  |
|                                 | RECOVERY TIME ( *3)                 |            | mS      | 1                                                                                                                       |           |            | 0.5        |           |            | 0.2        |           |            | 0.2        |           |            | 0.2        |           |            | 0.2        |            | 0.2        |            |  |  |  |
|                                 | TEMPERATURE COEFFICIENT             |            | -       | 30ppm/°C from rated voltage following 30-minute warm-up.                                                                |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | TEMPERATURE DRIFT                   |            | -       | 0.01%+2mV Change in output over 8-hour interval under constant line, load and ambient temp following 30-minute warm-up. |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | UP PROGRAMMING RESPONSE TIME (*4)   |            | mS      | 50                                                                                                                      | 50        | 60         | 50         | 50        | 60         | 50         | 50        | 60         | 50         | 50        | 60         | 50         | 50        | 60         | 100        | 100        | 100        | 100        |  |  |  |
| CONSTANT CURRENT                | DOWN PROGRAMMING                    | FULL LOAD  | mS      | 50                                                                                                                      | 50        | 50         | 50         | 50        | 50         | 50         | 50        | 50         | 50         | 50        | 50         | 50         | 50        | 70         | 60         | 60         | 80         | 80         |  |  |  |
|                                 | RESPONSE TIME                       | NO LOAD    | mS      | 250                                                                                                                     |           |            | 350        |           |            | 400        |           |            | 500        |           |            | 750        |           |            | 800        |            | 1000       |            |  |  |  |
|                                 | LOAD REGULATION ( *5)               |            | -       | 0.01%+5mA                                                                                                               | 0.01%+5mA | 0.07%+10mA | 0.01%+5mA  | 0.01%+5mA | 0.07%+10mA | 0.01%+5mA  | 0.01%+5mA | 0.07%+10mA | 0.01%+5mA  | 0.01%+5mA | 0.07%+10mA | 0.01%+5mA  | 0.01%+5mA | 0.07%+10mA | 0.01%+5mA  | 0.01%+5mA  | 0.01%+5mA  | 0.01%+5mA  |  |  |  |
|                                 | LINE REGULATION ( *6)               |            | -       | 0.01%+2mA                                                                                                               | 0.01%+2mA | 0.01%+5mA  | 0.01%+2mA  | 0.01%+2mA | 0.01%+5mA  | 0.01%+2mA  | 0.01%+2mA | 0.01%+5mA  | 0.01%+2mA  | 0.01%+2mA | 0.01%+5mA  | 0.01%+2mA  | 0.01%+2mA | 0.01%+5mA  | 0.01%+2mA  | 0.01%+2mA  | 0.01%+2mA  | 0.01%+2mA  |  |  |  |
| RMS RIPPLE (5Hz-1MHz Bandwidth) |                                     |            | mA      | 50                                                                                                                      | 100       | 200        | 25         | 50        | 100        | 15         | 30        | 60         | 7.5        | 15        | 30         | 5          | 10        | 20         | 5          | 5          | 5          | 5          |  |  |  |
| TEMPERATURE COEFFICIENT         |                                     |            | -       | 100ppm/ °C from rated current following 30-minute warm-up.                                                              |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
| TEMPERATURE DRIFT ( *8)         |                                     |            | -       | 0.02%+5mA                                                                                                               | 0.02%+5mA | 0.05%+10mA | 0.02%+5mA  | 0.02%+5mA | 0.05%+10mA | 0.02%+5mA  | 0.02%+5mA | 0.05%+10mA | 0.02%+5mA  | 0.02%+5mA | 0.05%+10mA | 0.02%+5mA  | 0.02%+5mA | 0.05%+10mA | 0.02%+5mA  | 0.02%+5mA  | 0.02%+5mA  | 0.02%+5mA  |  |  |  |
| PROGRAMMING ( *9)               |                                     | RESOLUTION | -       | Better than 0.028% of rated output voltage                                                                              |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | VOLTAGE                             | ACCURACY   | -       | 0.02%+5mV                                                                                                               |           |            | 0.02%+8mV  |           |            | 0.02%+12mV |           |            | 0.02%+20mV |           |            | 0.02%+35mV |           |            | 0.02%+50mV |            | 0.02%+80mV |            |  |  |  |
|                                 |                                     | RESOLUTION | -       | Better than 0.03% of rated output current                                                                               |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | CURRENT                             | ACCURACY   | -       | 0.4%+40mA                                                                                                               |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
| OVERVOLTAGE PROTECTION ( *10)   |                                     |            | V       | 0-7.5                                                                                                                   |           |            | 0-13       |           |            | 0-24       |           |            | 0-40       |           |            | 0-66       |           |            | 0-88       |            | 0-132      |            |  |  |  |
| HOLD-UP TIME                    |                                     |            | -       | 20mS At 100V/200VAC, rated output voltage and output current.                                                           |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
| DISPLAY                         | VOLTAGE                             |            | -       | 3 digits ( 6v; 20v; 36v; 60v; 80v); 3.5 digits ( 10v; 120v ) accuracy: 0.2% +/- 2 digits.                               |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | CURRENT                             |            | -       | 3.5 digits (132A); All others 3 digits, accuracy: 0.5% +/- 3 digits.                                                    |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | STATUS                              |            | -       | CV/CC, Alarm, Fold, Local/Remote, On/Off.                                                                               |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
| OUTPUT PROTECTIONS              |                                     |            | -       | Over Voltage, Over Temperature, Foldback.                                                                               |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
| INPUT                           | INPUT VOLTAGE ( *11)                |            | -       | 85-265Vac Continuous, 47-63Hz                                                                                           |           |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |
|                                 | INPUT CURRENT ( *12 )               |            | A       | 3.0/1.5                                                                                                                 | 5.6/2.7   | 11.2/5.4   | 2.9/1.4    | 5.6/2.7   | 11.2/5.4   | 2.9/1.4    | 5.6/2.7   | 11.2/5.4   | 2.9/1.4    | 5.6/2.7   | 11.2/5.4   | 2.9/1.4    | 5.6/2.7   | 11.2/5.4   | 2.6/1.3    | 4.9/2.4    | 2.9/1.4    | 5.3/2.6    |  |  |  |
|                                 | INRUSH CURRENT ( 100/200Vac )       |            | A       | 15/30 (*7)                                                                                                              | 15        | 30         | 15/30 (*7) | 15        | 30         | 15/30 (*7) | 15        | 30         | 15/30 (*7) | 15        | 30         | 15/30 (*7) | 15        | 30         | 15/30 (*7) | 15         | 15/30 (*7) | 15         |  |  |  |
|                                 | EFFICIENCY ( *12 )                  |            | %       | 69/72                                                                                                                   | 74/77     |            |            |           |            |            |           |            |            |           |            |            |           |            |            |            |            |            |  |  |  |

- \*1. Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
- \*2. Minimum current is guaranteed to maximum 0.4% of the rated output current.
- \*3. Time for recovery to within +/-50mV against current change of 50% to 100%

\*7. At cold start  $T_a=25^\circ\text{C}$ .

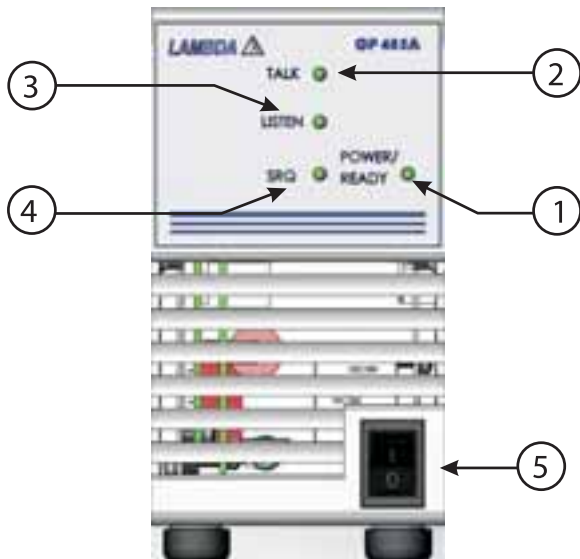
\*10. Inverter shut down method, manual reset (OVP will shut down output)

## GP485A SPECIFICATIONS

The GP485A has all the software and logic required to implement the physical and electrical Specifications of the IEEE488 and RS-485 standards

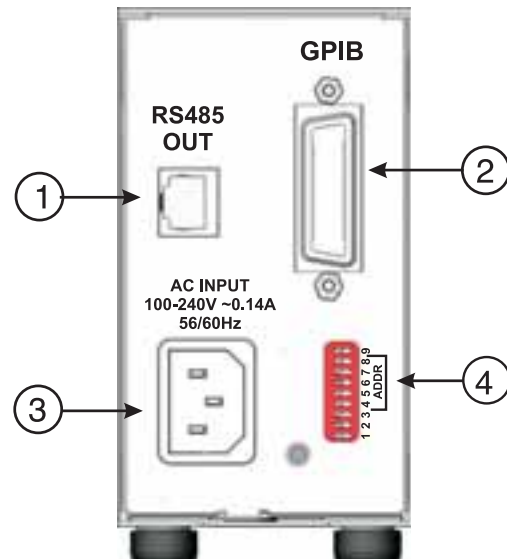
|                     |     |                                                                                                  |
|---------------------|-----|--------------------------------------------------------------------------------------------------|
| Input Voltage /freq | Vac | 85 ~ 265Vac continuous 47 ~ 63 Hz                                                                |
| Input consumption   | W   | 5W                                                                                               |
| IEEE 488 Capability |     | SH1,AH1,T6,TE0,L4,LE0,SR1,RL0,PP1,DC1,DT0,C0,E1,E2                                               |
| Indication LED's    |     | Power /Ready ,Talk ,Listen ,SRQ                                                                  |
| Baud rate           | bps | Optional 300 , 600 ,1200 , 2400 , 4800 , 9600      Default :9600                                 |
| Address             |     | 1 up to 30 can be set using an address switch                                                    |
| Operating temp      | °C  | 0~ 50                                                                                            |
| Storage temp        | °C  | -20 ~ 70                                                                                         |
| Conducted emission  |     | EN5022B,FCC-B                                                                                    |
| Radiated emission   |     | EN5022A,FCC-A                                                                                    |
| Safety standards    |     | UL3111-1 , EN61010-1                                                                             |
| EMC standards       |     | EN61326-1, IEC 61326-1, FCC part 15 (class A).                                                   |
| Withstand voltage   |     | Input - Chassis...2.0kVAC 1min, Input - Output...3.0kVac 1 min, Output - Chassis...500VAC 1 min. |
| Vibration           | G   | 10-55Hz, Amplitude (sweep 1 min ) 2G, X, Y, Z, When mounted with mounting screws.                |
| Size (WxHxD)        | mm  | 70x124x350 (GP 485A has all the mechanical specifications & mounting hole as ZUP200W/400W units) |
| Weight              | Kg  | 1.95                                                                                             |

**Front Panel**



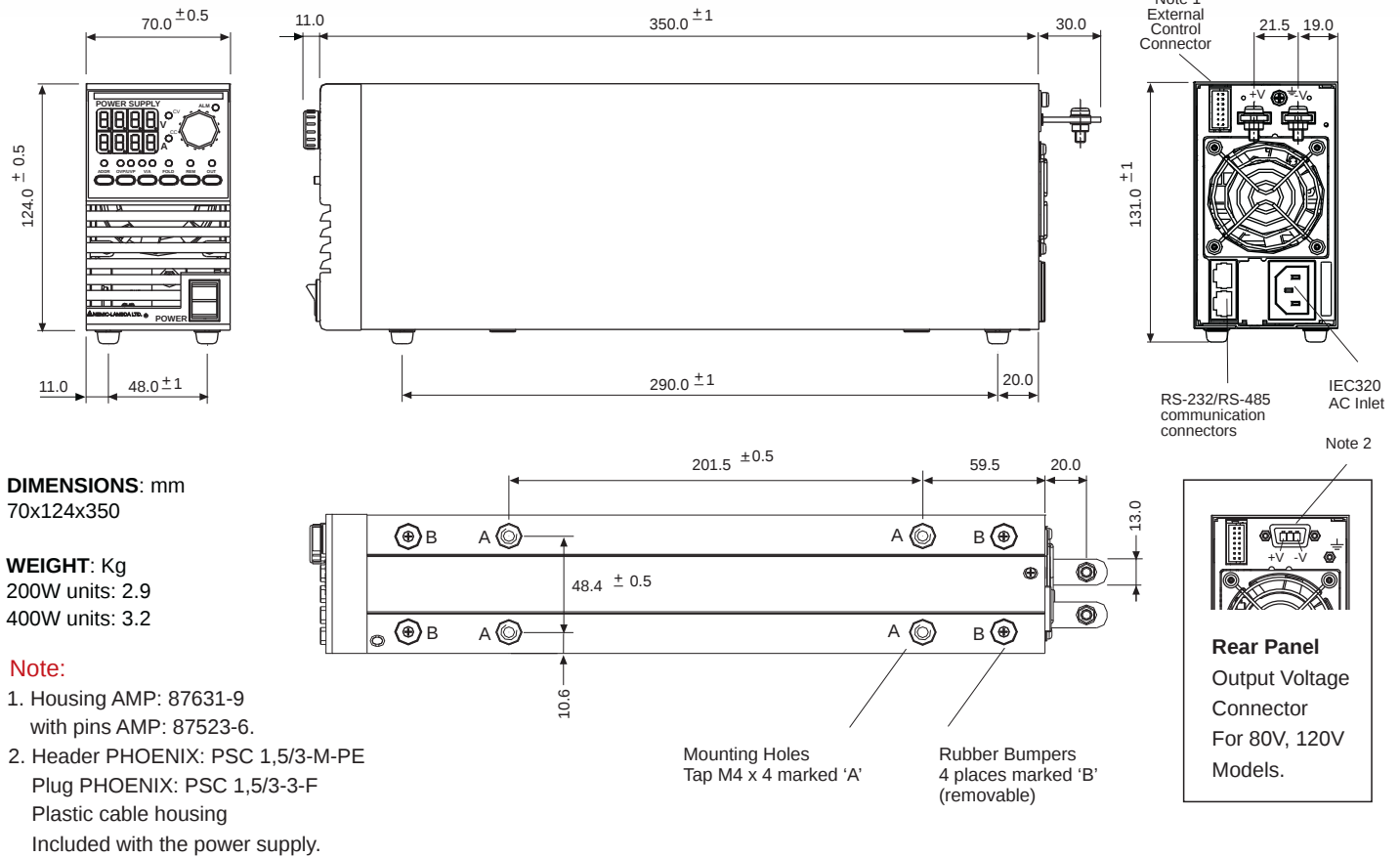
1. Power/Ready: Indicates that the power is "ON" and the self-test has passed successfully. The unit is ready to operate once the LED illuminates.
2. Talk: Indicates that the GP485A is addressed as a GPIB Talker.
3. Listen: Indicates that the GP485A is addressed as a GPIB Listener.
4. SRQ: Indicates that the GP485A signal line SRQ is asserted.
5. AC ON/OFF: Turns AC power On and Off.

**Rear Panel**

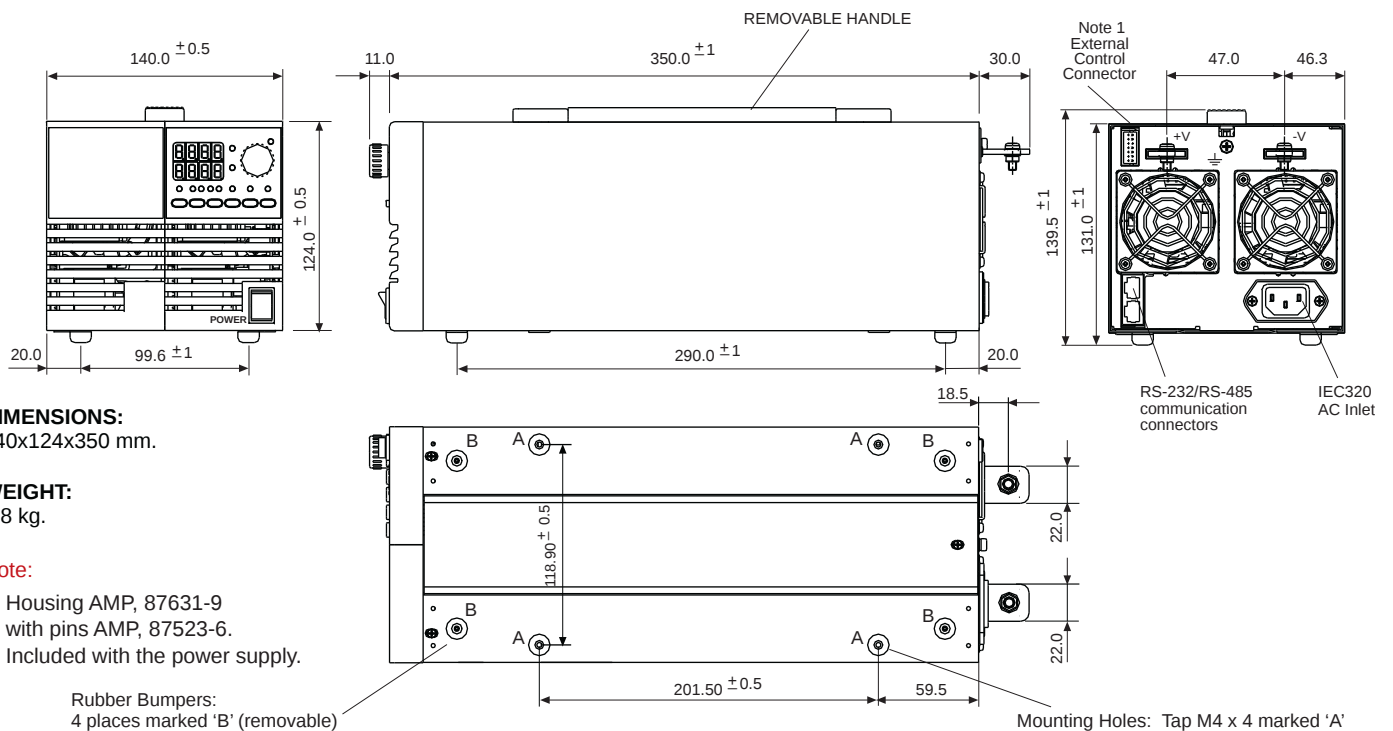


1. RS-485 OUT: EIA-568A shielded type connector, used for RS-485 communication with ZUP power supplies.
2. GPIB: Shielded 24-pin Champ female connector, with metric screwlock. Used for GPIB communication with the GPIB controller.
3. AC Input: IEC type appliance inlet.
4. Address setting Dip switch.

## Outline Drawings ZUP 200W/400W Units



## Outline Drawings ZUP 800W Unit



## Accessories

### 1. AC Cord Sets

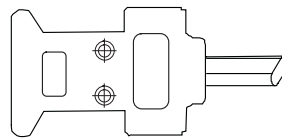
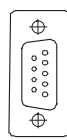
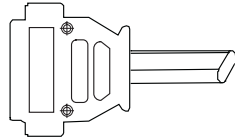
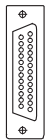
Five optional cords are possible according to order:

| Region                 | Europe          | United Kingdom  | Japan           | Middle East     | North America   |
|------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Output Power           | 850W            | 850W            | 850W            | 850W            | 850W            |
| AC Cords               | 10A/250Vac L=2m | 10A/250Vac L=2m | 13A/125Vac L=2m | 10A/250Vac L=2m | 13A/125Vac L=2m |
| Wall Plug              | INT'L 7/VII     | BS1363          |                 | SI-32           | NEMA 5-15P      |
| Power Supply Connector | IEC320-C13      | IEC320-C13      | IEC320-C13      | IEC320-C13      | IEC320-C13      |
|                        |                 |                 |                 |                 |                 |
| Part Number            | P/N: ZUP/E      | P/N: ZUP/GB     | P/N: ZUP/J      | P/N: ZUP/I      | P/N : ZUP/U     |

### 2. Communication Cable

RS-232/RS-485 cable is used to connect the power supply to the PC controller

| Mode                   | RS-232               | RS-485               | RS-232               | RS-485               |
|------------------------|----------------------|----------------------|----------------------|----------------------|
| PC Connector           | DB-9F                | DB-9F                | DB-25F               | DB-25F               |
| Communication Cable    | Shield Ground L=1m   | Shield Ground L=1m   | Shield Ground L=1m   | Shield Ground L=1m   |
| Power Supply Connector | EIA/TIA-568A (RJ-45) | EIA/TIA-568A (RJ-45) | EIA/TIA-568A (RJ-45) | EIA/TIA-568A (RJ-45) |
| P/N                    | ZUP/NC401            | ZUP/NC402            | ZUP/NC403            | ZUP/NC404            |



DB-25F (female connector)

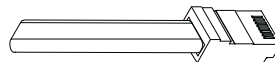
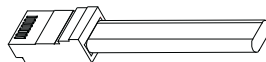
DB-9F (female connector)

EIA/TIA (RJ-45)

### 3. ZUP serial link cable

Used to chain Power Supply to Power Supply from a serial communication bus

| Mode   | Communication cable    | Power Supply Connector Remote IN /OUT | P/N    |
|--------|------------------------|---------------------------------------|--------|
| RS 485 | Shield Ground , L=50cm | EIA /TIA -568 A (RJ-45)               | ZUP/ W |

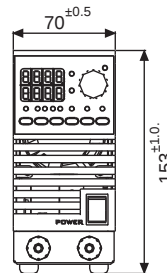


## Options ( 200W, 400W, 800W Models )

### 1. FRONT PANEL OUTPUT JACKS

Up to 60V output models

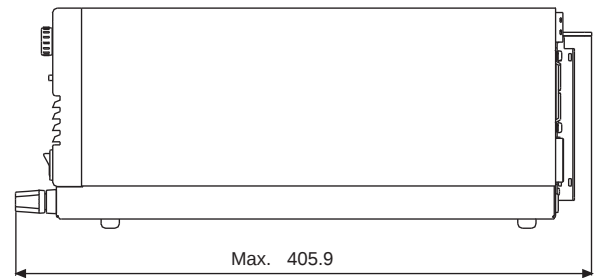
P/N: ZUP / L



Outline Drawing: Physical Dimensions in mm.

ZUP 200W/400W Units: 70x153x405.9

ZUP 800W Units: 140x153x405.9

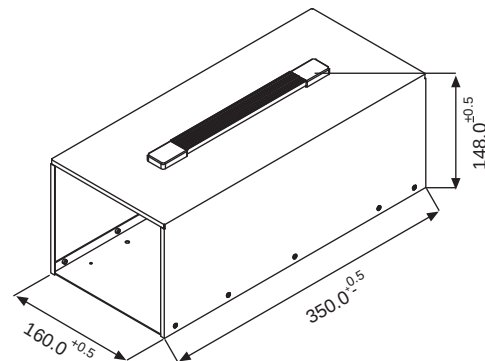


Up to 20A output current via front panel jacks.

### 2. ZUP ASSEMBLIES

Dual Output Packing 200W/400W models

P/N: NL200

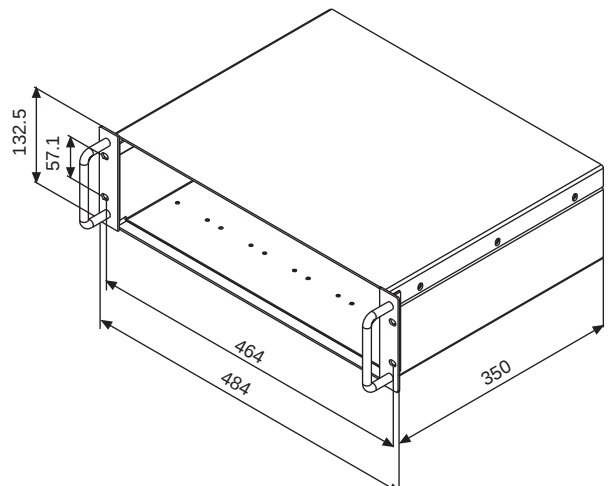


### 3. 19" RACK MOUNTED ATE AND OEM UP TO 2.4 KW

Up to six power units can be assembled into a 19", 3U rack, kit P/N: NL100.

In cases where the entire rack is not occupied with power units, P/N: NL101 blank panels can be installed.

P/N: NL100



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