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Ideal Power Solution

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HP Series High Power High voltage DC Power Supply

- Power range: 5 ~ 15KW
- Voltage range: 1KV ~ 60KV
- Current range: 100mA ~ 10A
- Industrial-grade chassis, rugged and reliable.
- Precise voltage and current setting and measurement capabilities
- OVP, OCP, short circuit and load discharging protections etc.

Overview

HP series high-voltage power supply is the first-generation high-power high-voltage power supply product designed by iDealTek-Electronics. It adopts standard 19-inch chassis structure to facilitate the integration and installation of high-power high-voltage systems. The single-unit power ranges from 5kW to 15kW with the high voltage output range from 1KV to 60kV.

The high-power inverter used in the HP series high-power high-voltage power supplies adopts the series resonant inverter independently designed by iDealTek. The input terminal adopts an ultra-low loss filter capacitor and is directly installed on the top of the power module. The input rectification, filtering, and inverter are all integrated on the heat sink. According to the voltage level and power level, it is decided to use air cooling or water cooling or oil plus water cooling mode to ensure good heat dissipation of the power supply. The high-voltage transformer uses a distributed rectifier transformer. These two characteristics determine that this series of

high-voltage power supplies
have very high reliability and very low energy storage.

The output voltage and current of the high-voltage power supply can be controlled and read through the front panel of the power supply. And, this series of power supplies are equipped with a DB25 interface as standard. Customers can edit the control software according to our communication protocol or apply 0 - 10V signal and dry contact signal on the interface according to our interface definition to achieve control and monitoring of the power supply, such as high voltage start/stop, output settings and readings.

Features

- Professional high voltage power supply with continuous HV output ability.
- Output voltage: 1KV / 2KV / 5KV / 10KV / 20KV / 30KV / 40KV / 50KV / 60KV available.
- Output power: 5KW / 10KW / 15KW available.
- Output voltage & current both 0 ~ 100% rated value continuously adjustable.
- CV & CC working modes
- Max. charging/discharging repetition frequency: 50Hz
- Charging/discharging repetition accuracy: <2% (@50Hz)
- Forced air cooling / Oil-immersed cooling with rugged design.

Optional functions

- 0 ~ 10V analog signal control (DB25 interface) (+AC)
- RS communication interface (RS232 / RS485 optional) (+RC)

Block diagram & Principle description

Working principle

The IGBT full bridge inverter and the Series Resonant Tank circuit are the key components in this power supply.

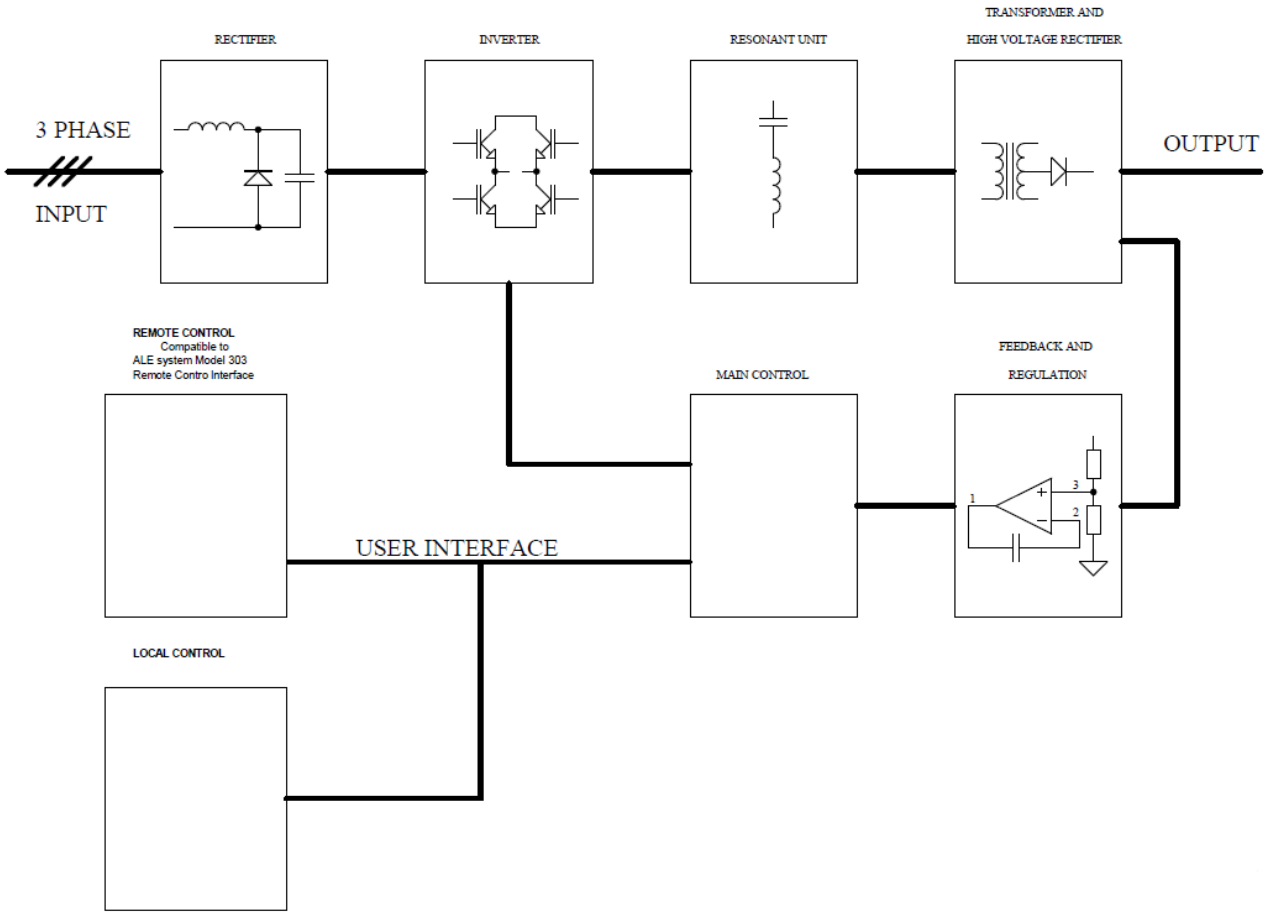
The series resonant inverter converts input voltage source to a equivalent current source, each pulsing is equivalent to an energy pack, which is sent to output load or output filtering capacitor

after HV rectifying.

Different output voltage and current corresponds to different output pulsing frequency, adjusting pulsing frequency leads to output voltage and current changes.

Functional parts

The HP unit is made up of four different functional parts as shown below:



- Rectifier Part

  This stage takes three-phase 380Vac or 440Vac input, then after rectifies and filters, it creates a 600Vdc pulsing DC output.

- High Frequency DC/AC Part

  This stage uses an IGBT (Insulated Gate Bipolar Transistor) full bridge circuit to convert the pulsing DC to a high frequency AC waveform that feeds the next stage.

- Series Resonant Tank Part

This part is an inductor in series with a capacitor. This LC network defines the characteristic impedance of the system and the frequency at which the AC current resonant.

- High Voltage AC/DC Part

  This part uses a transformer to step up the high frequency AC the necessary high voltage level. A rectifier circuit is then used to convert the high voltage, high frequency AC to the high voltage DC.

Specifications			
Input	Voltage		Three-phase 380Vac (input tolerance: 10%)
	Frequency		50Hz/60Hz
	Current		As per output power.
Output	Rated power		**KW (Max.)
	Output voltage adjusting range		0 ~ **KV
	Output current adjusting range		0A ~ *****mA
	Output polarity		Positive or Negative (both available) Client must choose one output polarity before ordering.
	Line regulation		≤0.1% for ±10% change in input voltage.
	Load regulation		≤0.1% for no load to full load at output.
	Output connection		HV connector and line provided by IdealTek.
	Power factor		≥0.92
	Efficiency		≥90% (measured @ 80% ~ 100% resistive load)
Setting & Display	Output control mode	Local	10-turn potentiometer on front panel.
		Remote	*DB25 analog port & RS485 communication port.*
	Display mode	Display mode	$4^1/_2$ LED digital display
		Display resolution	≤1% (range: 5%~100% of the rated value)
Protection & Monitoring functions	Input protection		Input lack voltage and lack phase protection.
	Output over voltage protection (OVP)		Power supply automatically cuts off output and alarms when output has over voltage.

	Over temperature protection (OTP)	Power supply automatically cuts off output and alarms when the internal temperature of the power supply exceeds its threshold value.
	Load discharging protection	When the load has discharging due to insufficient safety distance between load and ground, the power supply shutdown the high voltage output, and then restarts, so cycle like this till the discharging fault is eliminated.
	Short circuit protection	When a short circuit occurs between the load and the ground, the power supply works in constant current mode, the current is limited to the maximum value, and the voltage drops to 0 to protect the internal inverter from damage.
	Over current protection	When the users' load exceeds the rated load and cause over-loading, the power supply works in constant current mode, the power supply output current does not change, and output voltage decreases.
Noise		≤65 ~ 70dB
Protection degree		IP20
Cooling method		Forced air cooling / Oil-immersed cooling.
Working environment conditions	Ambient temperature	-10℃～40℃
	Humidity	10%～90%(non-condensing)
	Height	≤2000m
Storage environment conditions	Ambient temperature	-20℃～60℃
	Humidity	10%～90%(non-condensing)
	Height	≤4000m
Size (W*H*D) (mm)		19" 9 ~ 10U cabinet with 800mm Depth
Weight		Approx. 95 ~ 120Kg (depends on power rating)

- **Note: every power supply has 48 hours full load burn-in test @ 40℃**
- **The product can be customized on demand.**

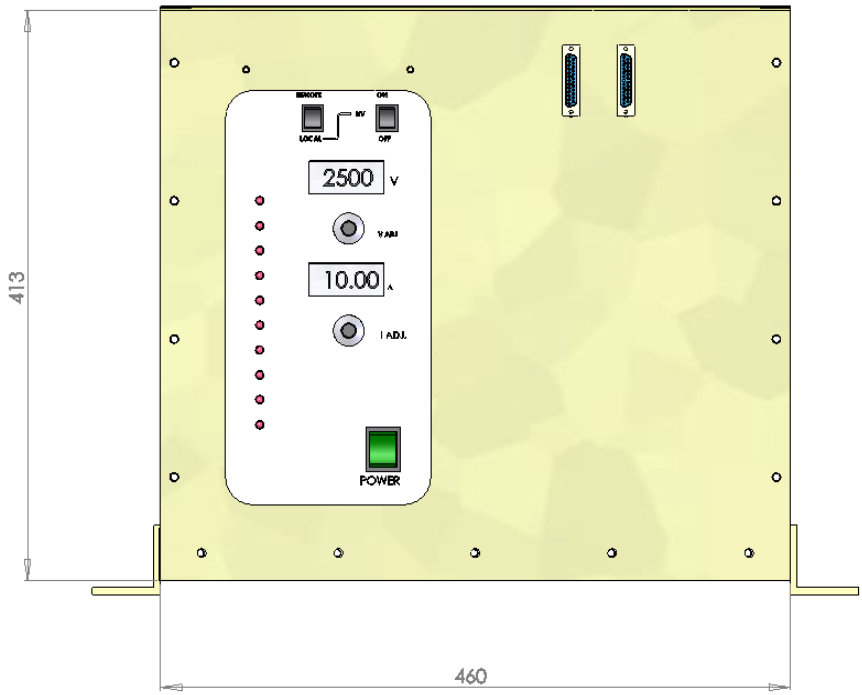
Standard model list

KV	mA	P (KW)	Model	KV	mA	P (KW)	Model
5	2000	10	HP-(N/P)10KW-5KV	5	3000	15	HP-(N/P)15KW-5KV
10	1000	10	HP-(N/P)10KW-10KV	10	1500	15	HP-(N/P)15KW-10KV
20	500	10	HP-(N/P)10KW-20KV	20	750	15	HP-(N/P)15KW-20KV
30	333	10	HP-(N/P)10KW-30KV	30	500	15	HP-(N/P)15KW-30KV
40	250	10	HP-(N/P)10KW-40KV	40	375	15	HP-(N/P)15KW-40KV
50	200	10	HP-(N/P)10KW-50KV	50	300	15	HP-(N/P)15KW-50KV
60	167	10	HP-(N/P)10KW-60KV	60	250	15	HP-(N/P)15KW-60KV

More models are coming soon. ☺

Drawings (for reference only)

19'' 9 ~ 10U cabinet (RAL7035)



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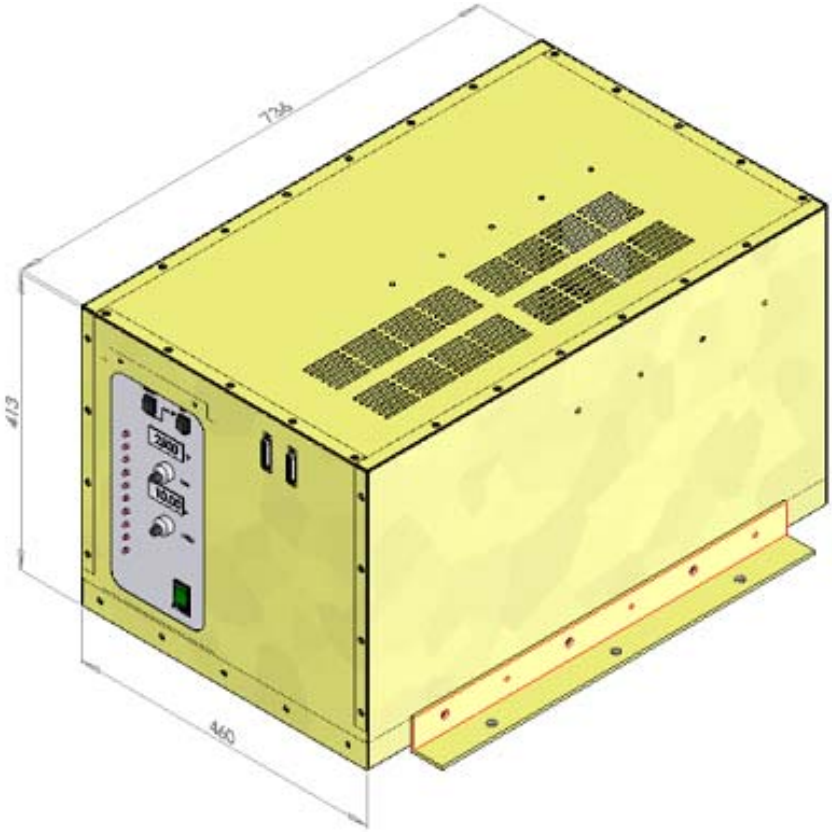

Reference photos

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Safety caution

1. This power supply has HV output, only professional person could operate it.

2. Please check power supply as below before start-up.

   (1). Keep power supply clean and good ventilation.

   (2). HV input & output connectors or HV load no touch anything.

   (3). Please check back current of load well connected with GND bolt at the back of power supply.

Remote DB25 port drawing and definition

Pin No.	Signal name	Input/Output	Description
1	+15V	OUTPUT	15V output power supply, providing current up to 125mA (Max.)
2	EMERGENCY STOP LED	OUTPUT	OC output, indicates emergency stop switch action
3	INHIBIT LED	OUTPUT	OC output, indicates power supply receives a inhibit signal
4	EOC LED	OUTPUT	OC output, indicates power supply charging finishes, which means charging voltage reaches set value
5	IGBT FAULT LED	OUTPUT	OC output, IGBT fault
6	INVERTER OVER CURRENT LED	OUTPUT	OC output, inverter current exceeds set protection threshold value
7	CONSTANT CURRENT LED	OUTPUT	OC output, indicates power supply works under constant current charging.
8	INVERTER OVERTEMPEARTURE	OUTPUT	OC output, indicates inverter heat sink temperature > 60C DEG
9	ISOLATING SWITCH STATE (Vacuum switch state)	INPUT	N/A, float
10	ENABLE/RESET	INPUT	15V = Start HV output, grounding or open circuit = inhibit HV output
11	$V_{PROGRAM}$	INPUT	0-10V = 0 – Max. set voltage (35kV for this unit)
12	I_{ANALOG}	OUTPUT	+10V corresponds to Max. Output current (+/- 1%) (458mA for this unit)
13	V_{ANALOG}	OUTPUT	+10V corresponds to Max. Output voltage (+/- 1%) (35kV for this unit)
14	INTERLOCK LED	OUTPUT	OC output, indicates interlock part not closed

15	VBUS LOW LED	OUTPUT	OC output, indicates inner bus voltage too low (below 550V)
16	SINGLE/MULTI PULSE STATE (single-pulse / multi-pulse state)	INPUT	N/A, float
17	CHARG ENABLED	OUTPUT	OC output, indicates HV output already started
18	Iprogram	INPUT	0-10V = 0 - Max. set current (458mA for this unit)
19	OIL OVERTEMPERATURE LED	OUTPUT	OC output, indicates oil tank temperature > 70C DEG
20	CONSTANT VOLTAGE LED	OUTPUT	OC output, indicates output voltage equals to set voltage
21	DIGITAL GND		Digital GND
22	INHIBIT	INPUT	>5V inhibits HV output, 0V allows HV output (using with pin 10)
23	ANALOG GND		Analog GND
24	+11V DC	OUTPUT	+11V reference signal provided by external
25	VOLT METER	OUTPUT	+10V corresponds to Max. Output voltage (+/- 1%) (35kV for this unit, (the same function as pin 13)