

# ***PHV Series***

***Precision High Voltage  
AC-DC Power Supply***  
***Voltages from 125V to 300kV***  
***Output Power - 14W to 15kW***  
***Full local control***  
***Optional Interfaces:  
Analog, Isolated Analog,  
LAN, USB, IEEE, RS-232/422***



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# PHV Series Specification

High precision, low ripple, industry standard, programmable High Voltage DC power supplies for a broad range of scientific, research, and industrial applications.

## Features

- Power Rating from 14Watts to 15kWatts
- Output Voltages from 0-125V to 0-300kV
- Ultra low 0.01% peak-peak output ripple, 0.001% optional
- Protected against short circuits and arcs
- Optional electronic reversible polarity up to 35kV, manual at 65kV
- High efficiency > 90%
- Optional Analog and Isolated Analog remote control interface
- Comprehensive digital interface options (LAN, USB, IEEE, RS232)
- CE Mark, EN61010 safety compliant
- Ultra reliable and rugged industry standard design

## Applications

- Photomultipliers
- Insulation Test
- Electrostatics
- Ion Sources
- Gas Discharge/Sputtering
- Electron Microscopes
- Mass Spectrometry
- Nuclear Fusion Research
- Particle Accelerators
- Secondary Electron Multiplier

Average Output Power (Watts)	14, 35, 140, 350, 700, 1400, 2800, 4200, 5000, 10000, 15000 Watts
Output Voltage Range (kV)	0.125, 0.2, 0.35, 0.65, 1.25, 2, 3.5, 6.5, 12.5, 20, 35, 65, 100, 150, 200, 300kV 0.1 to 100% set point range
AC Input	14W to 1400W Models - Single phase 115VAC $\pm 10\%$ - 1P115 2800W to 15kW Models - Three phase 208VAC $\pm 10\%$ - 3P208
AC Input Connector	Single phase - IEC60320, Three phase & 1400W – Phoenix HDFK4 terminal block
Power Factor	Single phase - 0.72, Three phase - 0.92
Efficiency	Better than 90% at full load
Safety/Compliance	CE marked, EN61010-1 compliant, RoHS compliant
EMC	EN61000-6-1 and EN61000-6-3 (for 1P115 input), EN61000-6-2 and EN61000-6-4 (for 3P208 input)
Local Output Control	Continuous adjustment from 0 to rated voltage/current by potentiometers with 10 turn precision scale, and locking control. Option for coarse/fine potentiometers (99% / 1%).
Polarity	Models $\leq 2kV$ have standard Floating return (F), models $> 2kV$ specify Positive (P), Negative (N), or optional electronic polarity reversal (R) up to 35kV, manual polarity reversal at 65kV
Set Point Resolution	$\pm 0.01\%$ of rated
Accuracy	$\pm 0.2\%$ of rated
Line Regulation (current & voltage)	$< \pm 0.001\%$ for $\pm 10\%$ AC line voltage variation
Load Regulation (current & voltage)	$< 0.02\%$ no load to full load
Recovery Time	CV: $< 1ms$ for load changes of 10% to 100% or 100% to 10% CC: $< 10ms$ for output voltage changes $< 10\%$ of rated
Ripple (0-10MHz)	Models $\leq 2kV$ and $\leq 350W$ - $< 0.005\%$ +50mV peak to peak, 0.001% optional Models $\leq 2kV$ and $\geq 700W$ - $< 0.02\%$ +200mV peak to peak, 0.001% optional Models $> 2kV$ - $< 0.01\%$ +50mV peak to peak, 0.001% optional
Stability	$< \pm 0.01\%$ over 8 hours under constant conditions, 0.001% optional
Temperature Coefficient	$< \pm 150ppm$ per $^{\circ}C$ typical
Ambient Temperature	0 to $+40^{\circ}C$ operating
Humidity	0-75%, non-condensing
Altitude	Operating: 6,500ft (2,000m)
HV Output Connection	125V to 350V models - 4mm banana plug terminals 650V to 300kV models - mating HV connector and 9ft cable supplied
HV Insulating Medium	Outputs $< 12kV$ are air insulated, $> 12kV$ use solid dielectric silicone encapsulation
Front Panel	Locking 10-turn Voltage and Current controls with precision scale, $4\frac{1}{2}$ Digit Voltage and Current meters, Power switch, HV ON/OFF switch, View Set button, CC/CV indicator, Temperature Fault LED, Output voltage limit control <sup>(1)</sup> , Local/Remote select, Pos/Neg Polarity <sup>(2)</sup>
Remote Control	Optional Analog interface with 0-10V programming/readback for V/I, HV ON/OFF control/status, Polarity control/status <sup>(2)</sup> , CC/CV status. Isolated Analog <sup>(3)</sup> and Digital interfaces available
Optional Features	Coarse/fine controls for Voltage and/or Current, Reversible Polarity, Low Ripple, High Stability, Low Stored Energy, Power Regulation, Arc Sense with count feature, Interlock loop with AC disconnect, Floating HV return, Overcurrent Trip
Mechanical / Weight	See details opposite and on back page. Half rack units are 8.75" wide, full rack are 17.5" wide
Protection	Open/short circuits, Overloads, Arcs, Overtemp, Overvoltage, Flashover
Warranty	3 years

(1) only available on models rated above 2kV. (2) active with optional Polarity Reversal. (3) INA option must be used if unit has floating outputs. All specifications subject to change without notice.

# PHV Series Model Listing

## Output Voltages - 125V to 1250V

Voltage (Volts)	Current (milliA)	Power (Watts)	Height (U/in)	Width (in)	Depth (in)	Weight (lbs)
0~125V	0~250	35	3U/ 5.25	8.75	14	9
	0~1000	140	3U/ 5.25	8.75	14	11
	0~2500	350	3U/ 5.25	8.75	14	14
	0~5000	700	3U/ 5.25	17.5	14	20
	0~10000	1400	3U/ 5.25	17.5	18	27
	0~20000	2800	3U/ 5.25	17.5	22	51
	0~40000	5000	6U/ 10.5	17.5	26	88
	0~80000	10000	10U/ 17.5	17.5	26	165
	0~120000	15000	12U/ 21	17.5	26	242
0~200V	0~150	35	3U/ 5.25	8.75	14	9
	0~600	140	3U/ 5.25	8.75	14	11
	0~1500	350	3U/ 5.25	8.75	14	14
	0~3000	700	3U/ 5.25	17.5	14	20
	0~6000	1400	3U/ 5.25	17.5	18	27
	0~12000	2800	3U/ 5.25	17.5	22	51
	0~25000	5000	6U/ 10.5	17.5	26	88
	0~50000	10000	9U/ 15.75	17.5	26	165
	0~75000	15000	12U/ 21	17.5	26	242
0~350V	0~100	35	3U/ 5.25	8.75	14	9
	0~400	140	3U/ 5.25	8.75	14	11
	0~1000	350	3U/ 5.25	8.75	14	14
	0~2000	700	3U/ 5.25	17.5	14	20
	0~4000	1400	3U/ 5.25	17.5	18	27
	0~8000	2800	3U/ 5.25	17.5	22	51
	0~14000	5000	6U/ 10.5	17.5	26	88
	0~28000	10000	9U/ 15.75	17.5	26	165
	0~42000	15000	12U/ 21	17.5	26	242
0~650V	0~20	14	3U/ 5.25	8.75	14	9
	0~50	35	3U/ 5.25	8.75	14	9
	0~200	140	3U/ 5.25	8.75	14	11
	0~500	350	3U/ 5.25	8.75	14	14
	0~1000	700	3U/ 5.25	17.5	14	20
	0~2000	1400	3U/ 5.25	17.5	18	27
	0~4000	2800	3U/ 5.25	17.5	22	51
	0~7000	5000	6U/ 10.5	17.5	26	88
	0~15000	10000	9U/ 15.75	17.5	26	165
0~22500	15000	12U/ 21	17.5	26	242	
0~1250V	0~10	14	3U/ 5.25	8.75	14	9
	0~25	35	3U/ 5.25	8.75	14	9
	0~100	140	3U/ 5.25	8.75	14	11
	0~250	350	3U/ 5.25	8.75	14	14
	0~500	700	3U/ 5.25	17.5	14	20
	0~1000	1400	3U/ 5.25	17.5	18	27
	0~2000	2800	3U/ 5.25	17.5	22	51
	0~4000	5000	6U/ 10.5	17.5	26	88
	0~8000	10000	9U/ 15.75	17.5	26	165
	0~12000	15000	12U/ 21	17.5	26	242

## Output Voltages - 2kV to 20kV

Voltage (Volts)	Current (milliA)	Power (Watts)	Height (U/in)	Width (in)	Depth (in)	Weight (lbs)
0~2kV	0~6	14	3U/ 5.25	8.75	14	9
	0~15	35	3U/ 5.25	8.75	14	9
	0~60	140	3U/ 5.25	8.75	14	11
	0~150	350	3U/ 5.25	8.75	14	14
	0~300	700	3U/ 5.25	17.5	14	20
	0~600	1400	3U/ 5.25	17.5	18	27
	0~1200	2800	3U/ 5.25	17.5	22	51
	0~2500	5000	6U/ 10.5	17.5	26	88
	0~5000	10000	9U/ 15.75	17.5	26	165
	0~7000	15000	12U/ 21	17.5	26	242
	0~3.5kV	0~4	14	3U/ 5.25	8.75	14
0~10		35	3U/ 5.25	8.75	14	9
0~40		140	3U/ 5.25	8.75	14	14
0~100		350	3U/ 5.25	8.75	18	16
0~200		700	3U/ 5.25	17.5	14	25
0~400		1400	3U/ 5.25	17.5	18	29
0~800		2800	3U/ 5.25	17.5	22	55
0~1500		5000	6U/ 10.5	17.5	26	88
0~3000		10000	9U/ 15.75	17.5	26	165
0~4500		15000	12U/ 21	17.5	26	242
0~6.5kV		0~2	14	3U/ 5.25	8.75	14
	0~5	35	3U/ 5.25	8.75	14	9
	0~20	140	3U/ 5.25	8.75	14	14
	0~50	350	3U/ 5.25	8.75	18	16
	0~100	700	3U/ 5.25	17.5	14	25
	0~200	1400	3U/ 5.25	17.5	18	29
	0~400	2800	3U/ 5.25	17.5	26	55
	0~750	5000	6U/ 10.5	17.5	26	88
	0~1500	10000	9U/ 15.75	17.5	26	165
	0~2300	15000	12U/ 21	17.5	26	242
	0~12.5kV	0~1	14	3U/ 5.25	8.75	14
0~2.5		35	3U/ 5.25	8.75	14	11
0~10		140	3U/ 5.25	8.75	14	16
0~25		350	3U/ 5.25	17.5	18	25
0~50		700	3U/ 5.25	17.5	22	36
0~100		1400	3U/ 5.25	17.5	26	47
0~200		2800	6U/ 10.5	17.5	22	77
0~400		5000	6U/ 10.5	17.5	26	88
0~800		10000	9U/ 15.75	17.5	26	165
0~1200		15000	12U/ 21	17.5	26	242
0~20kV		0~0.6	14	3U/ 5.25	8.75	14
	0~1.5	35	3U/ 5.25	8.75	14	11
	0~6	140	3U/ 5.25	8.75	14	16
	0~15	350	3U/ 5.25	17.5	18	25
	0~30	700	3U/ 5.25	17.5	22	36
	0~60	1400	3U/ 5.25	17.5	26	47
	0~120	2800	6U/ 10.5	17.5	26	77
	0~200	4200	6U/ 10.5	17.5	26	99

35kV to 300kV models are listed on the next page

# PHV Series Model Listing

## Output Voltages - 35kV to 65kV

Voltage (Volts)	Current (milliA)	Power (Watts)	Height (U/in)	Width (in)	Depth (in)	Weight (lbs)
0~35kV	0~1	35	3U/ 5.25	17.5	18	22
	0~4	140	3U/ 5.25	17.5	18	27
	0~10	350	3U/ 5.25	17.5	18	38
	0~20	700	3U/ 5.25	17.5	22	44
	0~40	1400	3U/ 5.25	17.5	26	55
	0~80	2800	6U/ 10.5	17.5	26	99
	0~120	4200	7U/ 12.25	17.5	26	110
0~65kV	0~0.5	35	3U/ 5.25	17.5	18	38
	0~2	140	3U/ 5.25	17.5	18	47
	0~5	350	6U/ 10.5	17.5	18	99
	0~10	700	8U/ 14	17.5	22	121
	0~20	1400	9U/ 15.75	17.5	22	154
	0~40	2800	9U/ 15.75	17.5	22	176

## Output Voltages - 100kV to 300kV

Voltage (Volts)	Current (milliA)	Power (Watts)	Height (U/in)	Width (in)	Depth (in)	Weight (lbs)
0~100kV	0~1	140	5U/ 8.75	17.5	22	110
	0~3	350	5U/ 8.75	17.5	22	121
	0~6	700	8U/ 14	17.5	22	161
	0~12	1400	9U/ 15.75	17.5	22	198
0~150kV	0~0.5	140	10U/ 17.5	17.5	30	242
	0~2	350	10U/ 17.5	17.5	30	286
	0~4	700	10U/ 17.5	17.5	30	308
	0~8	1400	12U/ 21	17.5	30	352
0~200kV	0~0.75	140	12U/ 21	17.5	30	352
	0~1.5	350	29U/ 50.75	24	24	396
	0~3	700	38U/ 66.5	24	32	440
	0~6	1400	38U/ 66.5	24	32	484
0~300kV	0~0.3	140	29U/ 50.75	24	30	396
	0~1	350	38U/ 66.5	24	24	440
	0~2	700	38U/ 66.5	24	32	484
	0~4	1400	38U/ 66.5	24	32	550

### AC Input Options

Models rated from 14W to 1400W, 115VAC  $\pm 10\%$  1 $\emptyset$  47-63Hz (1P115) standard, 230VAC  $\pm 10\%$  1 $\emptyset$  47-63Hz (1P230) optional

Models rated from 2.8kW to 15kW, 208VAC  $\pm 10\%$  3 $\emptyset$  47-63Hz (3P208) standard, 400VAC  $\pm 10\%$  3 $\emptyset$  47-63Hz (3P400) optional

### Interface Options

ANA	Analog Interface with 0-10V programming/readback	USB	Universal Serial Bus Interface
INA <sup>(3)</sup>	Isolated Analog Interface with 0-10V programming/readback	RS2	RS 232 Interface with hard wire connections
IEEE	GPIB (IEEE 488) Interface	RS4	RS 422 Interface with hard wire connections
LAN	LAN Interface	ROS2	RS 232 Interface with optical fiber connections

### Optional Features

INT	Dry contact interlock terminals with reset	OCP	Overcurrent trip with shut down and reset
VI5	5½ Digit current and voltage displays	VS	Voltage stability < $\pm 0.001\%$ over 8 hours
FPI	Coarse/Fine current potentiometers (99%/1% control)	IS	Current stability < $\pm 0.001\%$ over 8 hours
FPV	Coarse/Fine voltage potentiometers (99%/1% control)	VIS	Voltage and current stability < $\pm 0.001\%$ over 8 hours
LR	Reduced output ripple option $\leq 35W$ - better than 0.001% +10mV pk-pk 140-700W - better than 0.001% + 20mV pk-pk $\geq 1400W$ - better than 0.001% + 100mV pk-pk	R	Electronic Polarity Reversal from 3.5kV to 35kV Manual Reversal at 65kV Manual polarity reversal option adds 2U/3.5" to the unit height and 4" to the unit depth
LRVS	Output ripple & voltage stability <0.001% peak to peak	PR	Power regulation
LRVIS	Output ripple & voltage/current stability <0.001% peak to peak	LN	Temperature controlled fan (not with high stability)
50V	Indicates HV output <50V	RFP	Remote Front Panel
ARC	ARC detect shutdown with count, restart delay and ramp	ARCD	ARC shutdown with adjustable restart delay

### Ordering Information

PHV	20	N	15	-	USB	-	FPV	-	1P115
Series Name	Output Voltage (kV DC)	Output Polarity Pos, Neg Reversible Floating (Standard with $\leq 2kV$ )	Output Current (mA DC)		Interfaces -See above ANA, INA, IEEE, LAN, USB, RS2, RS4, ROS2 (blank for only local controls)		Optional Features -See above (blank for no additional features)		AC Input 1P115 (115VAC single phase) or 3P208 (208VAC three phase)
Ordering examples - PHV12.5N50-LAN-OCP-1P115, PHV0.125F1000-INA-FPI-FPV-1P115, PHV6.5R2300-LRVS-3P208									



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