

NEW

High Power & Low Noise HV Power Supply

S series

0.1 kV to 30 kV / 1.5 W to 30 W



- ▶ Low ripple and high stability
- ▶ Detachable input connectors (on input side)
- ▶ Optimal for mass spectrometry and electron microscope

S series

— 0.1 kV to 30 kV/
1.5 W to 30 W —



- Low noise, high stability
- Aluminum case
- Detachable input connector
- Compact and light weight
- Both external VR or voltage for control

SUMMARY

The S series is a regulated, versatile, modular HV power supply used in a wide variety of applications including mass spectrometry and electron microscopes. From the OEM to the laboratory, they are an excellent choice when you require a highly stable output. Output can be controlled using either an external control voltage or external variable resistor. An optional output voltage monitor is also available. With a diverse range of models up to 30 kV / 30 W, you will find something for nearly every requirement.

APPLICATIONS

- High voltage testing
- PMT, MCP, radiation counter
- Electron Beam / Ion Beam
- MASS spectrometry
- Electrostatic chuck (ESC)

LINEUP

*P for Positive N for Negative Output Polarity.

Output Voltage (kV)	Output Current (mA)	Output Power (W)	MODEL	Ripple (%p-p)	Regulation		Case HS (heat sink) (See page 4)
					Line (%)	Load (%)	
0 to 0.6	2.5	1.5	S1-0.6*	0.008	±0.005	0.005	C3B
	5	3	S3-0.6*				
	10	6	S6-0.6*				
	25	15	S15-0.6*	0.2	±0.03	0.05	C6
	50	30	S30-0.6*				C6+HS
0 to 1.1	1.4	1.5	S1-1.1*	0.005	±0.005	0.005	C3B
	2.75	3	S3-1.1*				
	5.5	6	S6-1.1*				
	12	15	S15-1.1*	0.01	±0.03	0.02	C6
	25	30	S30-1.1*	0.03			C6+HS
0 to 1.5	1	1.5	S1-1.5*	0.005	±0.005	0.005	C3B
	2	3	S3-1.5*				
	4	6	S6-1.5*				
	10	15	S15-1.5*	0.01	±0.03	0.02	C6
	20	30	S30-1.5*	0.03			C6+HS
0 to 2	0.75	1.5	S1-2*	0.005	±0.005	0.005	C3B
	1.5	3	S3-2*				
	3	6	S6-2*				
	7.5	15	S15-2*	0.01	±0.03	0.02	C6
	15	30	S30-2*	0.03			C6+HS
0 to 3	0.5	1.5	S1-3*	0.005	±0.005	0.005	C3B
	1	3	S3-3*				
	2	6	S6-3*				
	5	15	S15-3*	0.01	±0.03	0.02	C6
	10	30	S30-3*	0.03			C6+HS
0 to 5	0.3	1.5	S1-5*	0.005	±0.005	0.005	C3B
	0.6	3	S3-5*				
	1.2	6	S6-5*				
	3	15	S15-5*	0.01	±0.03	0.02	C6
	6	30	S30-5*	0.03			C6+HS

Output Voltage (kV)	Output Current (mA)	Output Power (W)	MODEL	Ripple (%p-p)	Regulation		Case HS (heat sink) (See page 4)
					Line (%)	Load (%)	
0 to 6	0.25	1.5	S1-6*	0.005	±0.005	0.005	C3B
	0.5	3	S3-6*				
	1	6	S6-6*				
	2.5	15	S15-6*	0.01	±0.03	0.02	C6
	5	30	S30-6*	0.03			C6+HS
0 to 10	0.15	1.5	S1-10*	0.01	±0.01	0.01	C5
	0.3	3	S3-10*	0.02			
	0.6	6	S6-10*				
	1.5	15	S15-10*	0.02	±0.03	0.02	C6A
	3	30	S30-10*	0.03			C6A+HS
0 to 12	0.12	1.5	S1-12*	0.01	±0.01	0.01	C5
	0.24	3	S3-12*	0.02			
	0.46	6	S6-12*				
	1.2	15	S15-12*	0.03	±0.03	0.02	C6A
	2.5	30	S30-12*				C6A+HS
0 to 15	0.2	3	S3-15*	0.02	±0.01	0.01	C6
	0.36	6	S6-15*				
	1	15	S15-15*				
	2	30	S30-15*	0.03	±0.03	0.02	C6A+HS
0 to 20	0.13	3	S3-20*	0.02	±0.01	0.01	C6
	0.26	6	S6-20*				
	0.75	15	S15-20*				
	1.5	30	S30-20*	0.03	±0.03	0.02	C6A+HS
0 to 25	0.1	3	S3-25*	0.02	±0.01	0.01	C6
	0.2	6	S6-25*				
	0.6	15	S15-25*				
	1.2	30	S30-25*	0.03	±0.03	0.02	C6E+HS
0 to 30	0.08	3	S3-30*	0.02	±0.01	0.01	C6A
	0.16	6	S6-30*				
	0.5	15	S15-30*				
	1	30	S30-30*	0.03	±0.03	0.02	C6E+HS

SPECIFICATIONS

Input Voltage/Current

Model	Input Voltage	Input Current (typ.)	
		up to 6 kV	10 kV to 30 kV
S1	+12 Vdc ± 1 V	380 mA	410 mA
S3		330 mA	360 mA
S6		500 mA	550 mA
S15	+24 Vdc $\pm 5\%$	1 A	
S30		2 A	

Output Voltage Control

S1, S3, S6 : By external potentiometer 5 k Ω or external control voltage (Vcon-in 0 to 6 Vdc)
 S15, S30 : By external potentiometer 5 k Ω or external control voltage (Vcon-in 0 to 3 Vdc)

Voltage setting accuracy

$\pm 1\%$ at maximum output

Linearity

Within $\pm 0.5\%$ of control voltage versus output voltage.
 Residue voltage when Vcon 0 V is within 0.3%.

Stability

S1, S3, S6 : 100 ppm / Hr
 S15, S30 : 200 ppm / Hr

Protection

All models : Against input reverse connection
 S1, S3, S6 : Against intermittent output short circuit*
 S15, S30 : Against continuous output short circuit

Instantaneous maximum input voltage

S1 : 16 V max.
 The others : 27 V max.

Temperature Coefficient

80 ppm / $^{\circ}\text{C}$

Input terminal

8-pin connector
 Mating connector and pins are assorted
 (Recommendations : wire for pin ①, ② are AWG18 wire for pin ③ to ⑧ are AWG22 to 18)

(Input Connectors in List)	Manufacturer	Housing	Contact	Manual crimping tool
	J.S.T MFG. CO., LTD.	VHR-8N	BVH-21T-P1.1	YC-160R

Output Cable

HV flying lead 50 cm (1.6 feet)
 When more than 25 cm is required specify the length.
 <e.g.> S1-3P (output cable 1 m)

Temperature range

Operating : 0°C to 50°C
 Storage : -20°C to 60°C

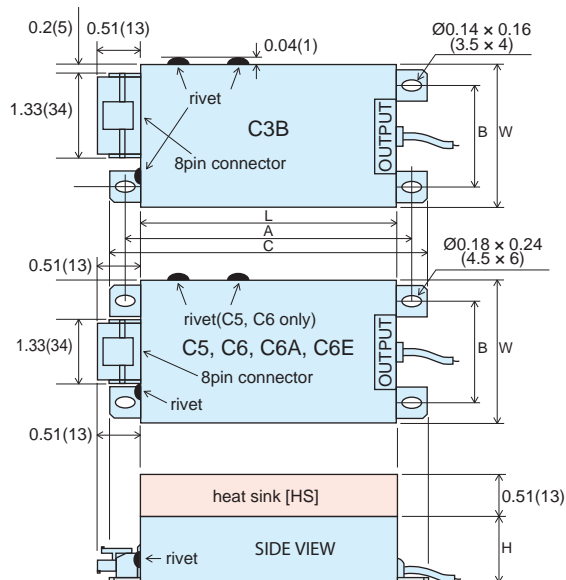
Humidity

20 to 80% RH (no condensation)

Case processing

Dielectric arozone
 * S1, S3, S6 are not equipped with protection against continuous output short circuit.
 Avoid using it in applications where continuous output short circuit is expected, or take measures with the design of the peripheral circuit, as it cause a malfunction.

DIMENSIONS inch(mm)



Case	A	B	C	W	L	H
C3B	3.86 (98)	1.57 (40)	4.17 (106)	1.97 (50)	3.58 (91)	1.22 (31)
C5	4.72 (120)	1.97 (50)	5.12 (130)	2.76 (70)	4.33 (110)	1.26 (32)
C6	5.12 (130)	2.76 (70)	5.51 (140)	3.94 (100)	4.72 (120)	1.38 (35)
C6A	6.69 (170)	2.76 (70)	7.09 (180)	3.94 (100)	6.3 (160)	1.5 (38)
C6E	7.68 (195)	3.54 (90)	8.07 (205)	4.72 (120)	7.28 (185)	1.69 (43)

* Please add 0.51(13) to H for models with +HS case.

OUTPUT MONITOR

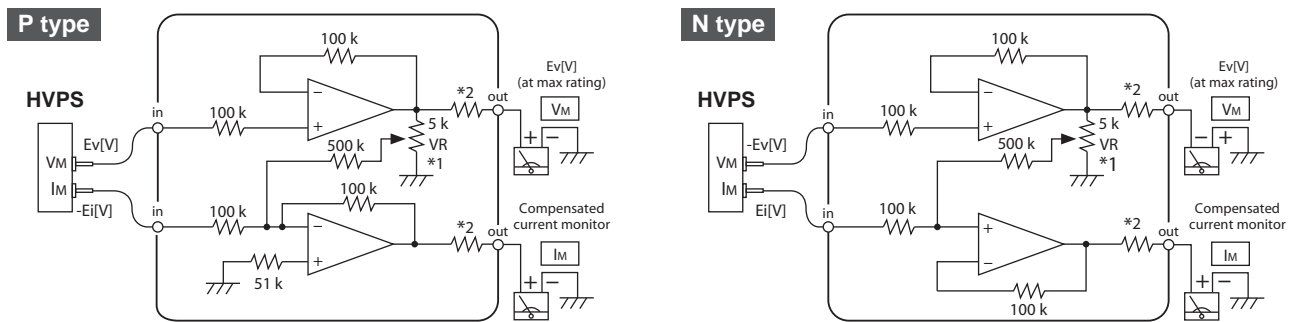
Output value of Voltage (option) / Current monitor

- Polarity of V monitor is same as that of HV output.
- Input current increase by 10 to 20% when V monitor (option) is added.
- Polarity of current monitor is negative for P type(+), and positive for N type(-).
- Current monitor output has off set voltage proportional to output voltage.
- Use voltmeter with input impedance more than 10 M Ω to measure Voltage / Current monitor.

MODEL	Output voltage Vo(kV)	0.6	1.1	1.5	2	3	5	6	10	12	15	20	25	30
S1 S3 S6	I monitor	1 V / @10 mA	1 V / @1 mA						1 V / @100 μA					
	V monitor (option)	1 V / @1 kV						1 V / @10 kV						
S15 S30	I monitor	1 V / @10 mA	0.3 V / @1 mA			1 V / @1 mA			0.3 V / @100 μA			1 V / @100 μA		
	V monitor (option)	1 V / @1 kV						1 V / @10 kV						

Application note: Compensation and amplification circuit of current monitor

Current monitor of S series is a simple monitor mainly for detecting output short circuit and has offset voltage.
Voltage monitor is just buffer AMP. Circuit of current monitor deduct current over voltage detecting resistor inside.



- *1) At maximum output voltage, set I_m to be 0 V without load. * Power supply of OP-AMP is ± 15 V.
*2) Place resistors so that meter become full scale at rated output. (not required when using digital meter)

OPTIONS

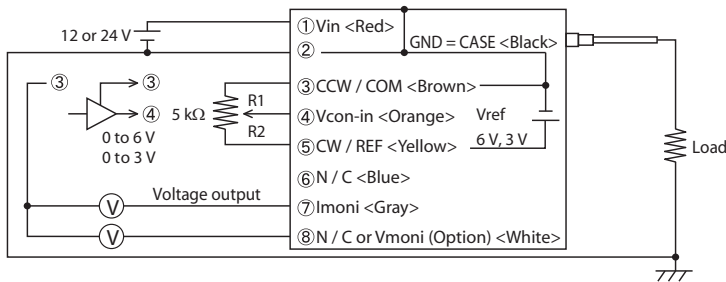
- LW Slow start
- L2 Voltage Monitor Output
up to 6 kV : 1 V / @1 kV
10 k to 30 kV : 1 V / @10 kV
Accuracy $\pm 2.5\%$ F.S.

See the table on page 5 for details
Add "-LW" "-L2" to the Model number at time of order.
(i.e. S1-6P-L2)

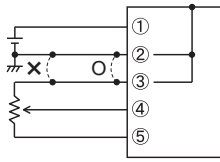
- CN8R Assembled input connector (accessory)
(connector with 25 cm flying leads)

OPERATION

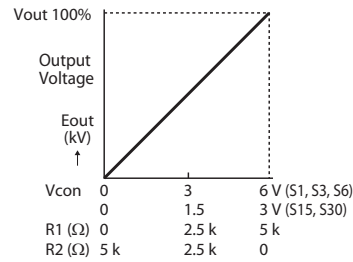
[Connection diagram]



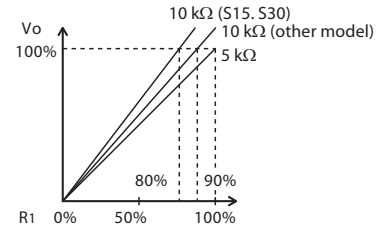
- Left diagram shows the connection inside. Vref is divided by R1 and R2, and output voltage is determined by voltage input to ④.
- When lead wire connected to ③④⑤ is 30cm or longer, or when noise from environment is large, use two-core shielded cable to shield with pin ③.
- For variable resistor use metal film variable resistor or multi-turn potentiometer.



② GND and ③ COM are tied together inside, but do not short them outside. When connected with long wire the load regulation will be larger. If need to short them, do it at close to power supply (O of above fig.)

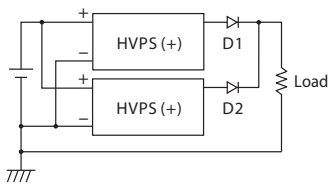


Output voltage can be controlled by varying control voltage or resistor.



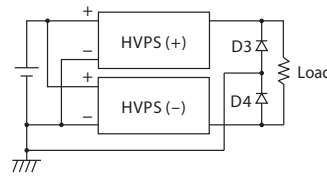
Value of external variable resistor is 5 kΩ 10 kΩ resistor can be used, but output will be about 10% (20% for S15, S30) higher against dividing ratio. Do not use resistor of below 5 kΩ or over 10 kΩ.

[Parallel operation] (Increase output current)



- Put diodes, otherwise output of either unit will not increase.
- Inverse dielectric voltage of D1, D2 shall be more than output voltage.
- Connect P type (+) an N type (-) of same series.

[Dual tracking operation]



- Inverse dielectric voltage of D3, D4 shall be more than output voltage.
- Connect P type (+) an N type (-) of same series.

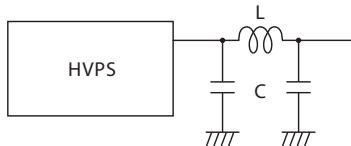
Operation Notes

- Do not touch the HV output cable right after turning off the power supply because there might be residue voltage. Make sure the voltage is 0 V before touching the output.
- Make sure to ground the GND terminal, pin ②, for extra safety, although this series is designed with various safety features as built-in type HV module.
- Avoid continuous short circuit.

OUTPUT RIPPLE

Switching frequency of S series is about 20 kHz to 50 kHz. If ripple (noise or hum) of different frequency is shown, it might be from outside. Have another solution like keep away from noise source.

[Reduce output ripple]

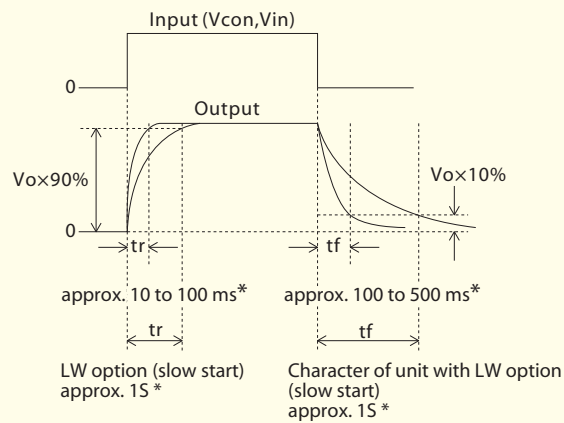


L is about 1 mH to 10 mH.
C is about 0.001 μ F to 0.1 μ F.
(Check the rated voltage)

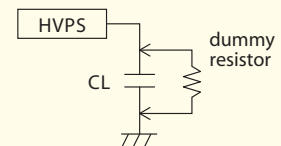
RESPONSE

Typical value at rated load

tr : Rise time
tf : Fall time



tr,tf shall be slow with capacitive load. A dummy resistor shall work for quick fall time.





USA/Canada : ☎1-888-652-8651

other countries : ☎81-6-6150-5089

Customer Inquiry Sheet (S series)

Please copy this page and above fax number after filling out form below.

■ I would like

- ☐ A quotation ☐ An explanation of product ☐ A demonstration ☐ To purchase
- ☐ Other ()

■ Give us your requirement / comment

■ Please fill in below.

Address:	
Company:	
Dept.:	Title:
Name:	
Tel:	Fax:
E-mail:	

Manufacturer warranty

We warrant the specification, unless otherwise specified, at max. rated output after warm up, and scope of application is between 10% and 100% of max. rated output. We warrant that products contained in this catalog (hereinafter, the "Products") are free from defects in material and workmanship under normal use for a period of one (1) year from the date of shipment thereof. However, the warranty period for X-ray detectors and X-ray source shall be either one (1) year from the date of shipment or 1,000 hours, whichever shorter. The above warranty shall not apply to any Product which, at our sole judgment, has been: i) Repaired or altered by persons unauthorized by us; or ii) Connected, installed, adjusted or used otherwise than in accordance with the instructions furnished by us (including being used in an inappropriate installation environment, such as in corrosive gas, high temperature and humidity). We are not liable for any loss, damage or failure of the Products after the shipment thereof caused by external factors such as disasters. We will not inspect, adjust or repair any of our power supply products in the field or at any customer site. If you suspect that there has been a power supply failure in the field, please inspect your whole unit by yourself in an effort to determine that the problem is, in fact, arising out of our power supply products. If it is found that the problem is arising out of such power supply product after inspection, please contact your local sales office for additional troubleshooting. A "Return Merchandise Authorization" is required in case the power supply must be sent back to the factory in Japan for inspection and repair. We, at our sole discretion repair or replace such defective products at no cost to the purchaser. We assume no liability to the purchaser or any third party for special, incidental, consequential, or other damages resulting from a breach of the foregoing warranty. This warranty excludes any and all other warranties not set forth herein, express or implied, including without limitation the implied warranties of merchantability or fitness for a particular purpose. The Products are not designed and produced for such applications as requiring extremely high reliability and safety, or involving human lives (such as nuclear power, aerospace, social infrastructure facility, medical equipment, etc.). The use under such environment is not covered by this warranty and may require additional design and manufacturing processes. No modification or supplement of this warranty shall be binding unless in writing and signed by a duly authorized officer of Matsusada. Matsusada reserves the right to make any changes in the contents of catalogs or specifications at any time without advance notice. Due to compelling reason such as unavailability of components used, products might be unavailable or unable to repair. The products specified in catalogs or specifications are designed for use by the person who has enough expertise or under the control of such person, and not for general consumers. Schematics of products shall not be submitted to users. Test result or test data for the products shall be available upon request with charge.

Make sure you read the specification in the latest catalog before you order. Contact nearby sales office for the latest catalog.

PLEASE SEE THE LINK BELOW FOR THE COMPLETE WARRANTY TERMS

<https://www.matsusada.com/site/warranty.html>

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