

NEW

Ultra Compact and Fast Response High Voltage Amplifier

AMJ series

$\pm 500 \text{ V}$ to $\pm 4000 \text{ V}$ / 20 W to 40 W

- ◆ Ultra compact
- ◆ High speed response 75 kHz max
- ◆ Various types of output wave forms



AMJ series

Ultra Compact and Fast Response High Voltage Amplifier



20 W model



30 W, 40 W model

AMJ series is a rack mountable type, fast response high voltage operational amplifier. It provides high voltage and fast response according to its input waveforms including Sine, Triangle, Saw Tooth, Square and more. All models are all solid state power supplies. Output voltage ranges are from ± 500 V to ± 4 kV.

FEATURES

- Ultra compact
- High speed response 75 kHz max
- Various types of output waveforms according to the input wave
- DC bias function
- DC output voltage monitor (3.5-digit digital meter)

APPLICATIONS

- Beam deflection
- Breakdown voltage testing
- Electrophotography process
- Lighting discharge tube
- Corona discharge
- Electrostatic chuck
- Electrorheological fluid
- Various electrostatic testing

LINEUP

Output voltage (Vdc)	Output current (mA)	MODEL	Slew rate	Frequency response (-3 dB)	Dimensions (P.3)
-500 to +500	40	AMJ-0.5B40	150 V / μ s	DC to 75 kHz	A
	80	AMJ-0.5B80		DC to 75 kHz	B
-1 k to +1 k	20	AMJ-1B20		DC to 40 kHz	A
	40	AMJ-1B40		DC to 40 kHz	B
-1.5 k to +1.5 k	20	AMJ-1.5B20		DC to 25 kHz	B
-2 k to +2 k	10	AMJ-2B10		DC to 18 kHz	A
	20	AMJ-2B20		DC to 18 kHz	B
-4 k to +4 k	10	AMJ-4B10		DC to 9 kHz	B

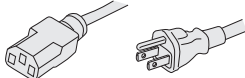
SPECIFICATIONS

Input voltage	85 to 264 Vac 50 / 60 Hz single phase
Output voltage control	External control voltage Vcon-in = -10 to +10 V*1 (Input Impedance greater than 10 kΩ)
DC Bias	Front panel 10-turn potentiometer enables setting between -100 % and +100 %
Regulation	Line : ± 0.05 % (115 V ± 10 % input change) Load : 0.05 % (10 to 100 % load change) *2
Ripple	Less than 0.1 % *2
Stability	0.016 % / H typ *2
DC output voltage display	3.5-digit digital meter *3
Output monitor	Output voltage monitor : -10 to +10 Vdc from BNC terminal on front panel (Output impedance 1 kΩ)
Output current monitor	-10 to +10 Vdc
Remote switch ON / OFF	Output ON / OFF with external contact switch (Short : ON, Open : OFF)
Protection	Over current protection with cut off, over voltage protection, output short circuit, arc protection and blackout protection.
Operating Temp.	0 to +40 °C
Storage Temp.	-20 to +60 °C
Humidity	20 to 80 %RH (no condensation)
Accessories	Input AC cable 2.5 m (1) Output HV cable flying lead 1.5 m (1) Instruction Manual (1)

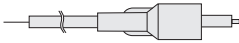
*1 Offset voltage at Vcon-in = 0 V is less than 0.5 % of rated output. *2 At DC operation with resistive load maximum rated output.
*3 At DC output : DC voltage display. At more than 10 Hz output : Average voltage display

INPUT / OUTPUT CABLE

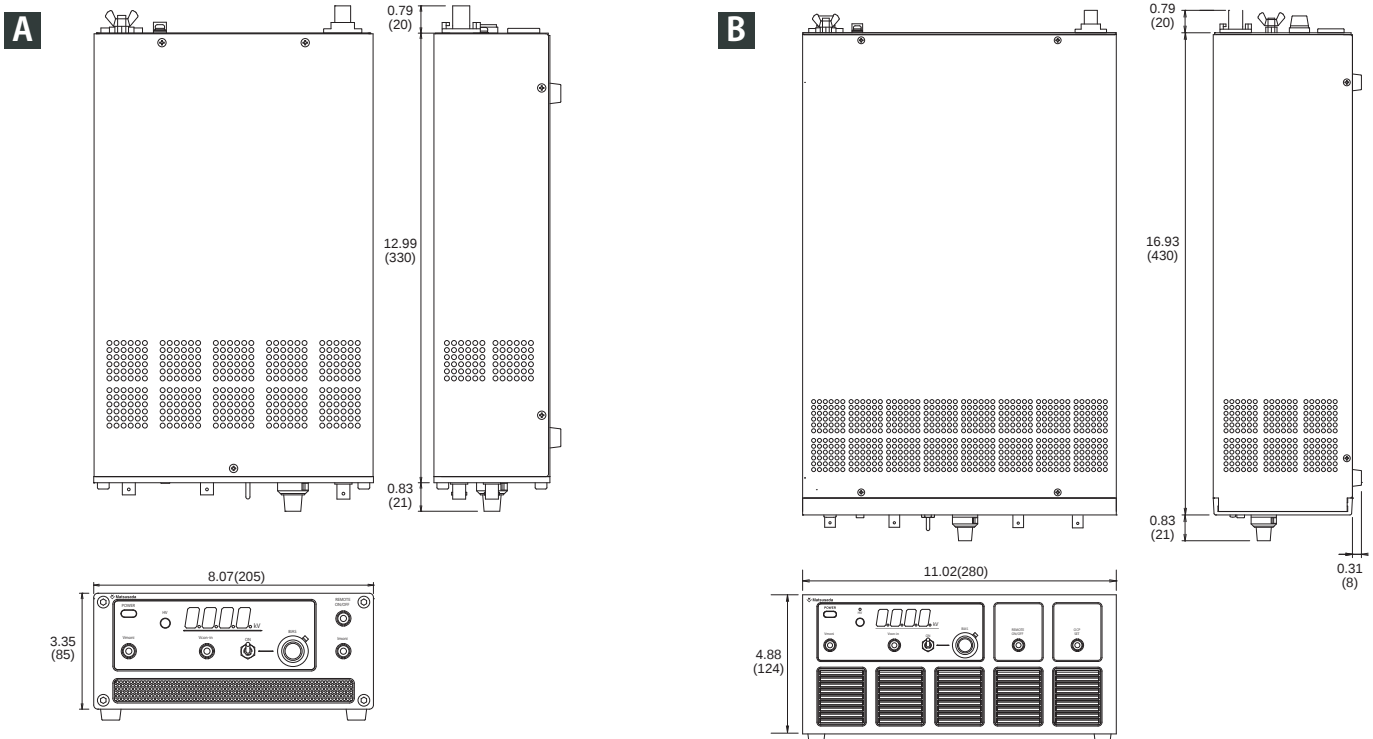
Input

CABLE TYPE 1 (Standard)	CABLE TYPE 3 (Separately) (usable at 200 V input)
3-pin plug (Type A) / Inlet type / 100 V input / Single phase (3-core) / Black	Flying lead / Inlet type / Single phase (3-core) / Black
	

Output

CN-40-AHVP (Standard)	CN-40-AHVP(5) (only for -L(5m) option)
40 kV / 0.5 A	40 kV / 0.5 A
	

DIMENSIONS inch(mm)



OPTIONS

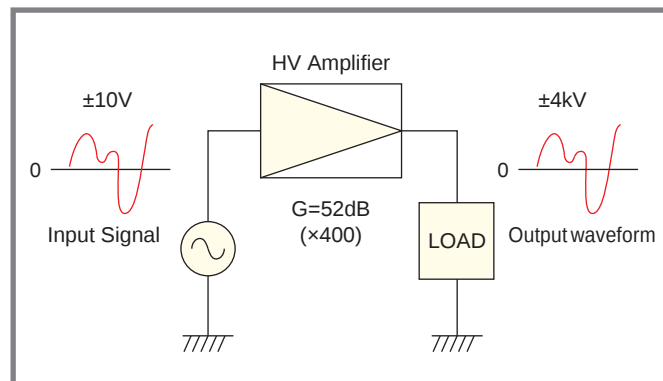
- LCs** Over current protection setting function The over current value is set by external voltage +0.5 to +10.5 Vdc. When this option is chosen, please be sure to output, where external voltage is impressed to AMJ.
- L(5m)** The length of HV output non-shielded cable is changed into 5 m to 1.5 m of a standard.
- L** Output current monitor
Output voltage : -10 to +10 Vdc from BNC terminal on front panel The Output impedance is 1 kΩ with up to 2kHz of bandwidth.

How to order When ordering, suffix the above option number to the model number. Note that selecting -LCs and -L1 together is not allowed.
<e.g.>AMJ-4B10-LCs(5m) AMJ-0.5B40-L1(5m) in alphabetical, cable length order

HIGH SPEED HIGH VOLTAGE AMPLIFIER

HV Amplifier

High voltage amplifier converts input voltage to high voltage waveform as it is as shown in fig. 1. These days the demand of HV amplifier is growing more and more, and now becoming an indispensable tool for research and development, experiments and integrating to a system for such fields as electronics, physics, biochemical and medical industries. With high voltage technologies Matsusada Precision Inc. manufactures various HV amplifiers to meet all requirements from customers.



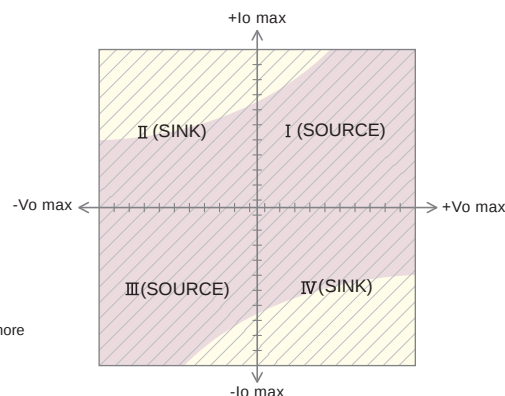
(fig.1)

Four-quadrant Output Range

HV amplifier is generally equipped with the "sink" function for output currents that provides constant voltage operation even if the type of the load is capacitive, inductive or combined (capacitive load + inductive load). (Fig.2) As it gives fast response, it is an ideal power supply for applications which require AC output.

This AMJ series is bi-polar type and can be operated in full four-quadrant area.(I · II · III · IV area)

- Vomax : Rated output voltage
Iomax : Rated output current
- AC operating range(with 50 Hz or more frequency, 50 % of duty cycle and without any DC bias)
 - DC operation range

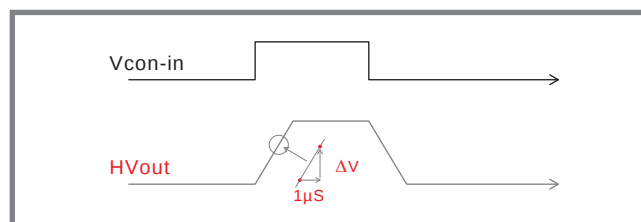


(fig.2) Voltage and Current operation range

Slew Rate

The responsibility of our high speed amplifier is determined with slew rate(SR). The step responsibility of our amplifier is as shown in fig.3.

$SR = \Delta V / \mu S$ In case of output amplitude is smaller the response time become shorter.



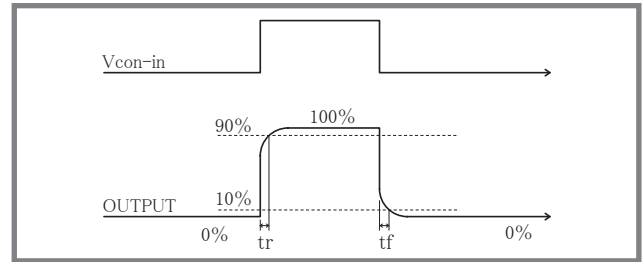
(fig.3)

■ Rise Time(step response)

Step response can be indicated with rise time. (fig.4) Usually the rise time of amplifier of response (= bandwidth) f_c (Hz) is given by a formula below.

$$tr \doteq 0.35 / f_c$$

The fall time t_f is equal to tr .

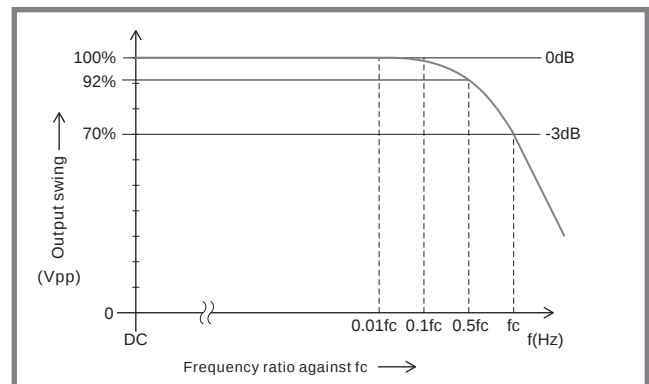


(fig.4)

■ Frequency Response

Response of Matsusada amplifiers are described as "frequency bandwidth". When swing the output with sinusoidal waveform with rated resistive load, output swing (amplitude) is reduced as input frequency become faster. Frequency response in the specification is the frequency f_c is where output swing is 70 % (-3 dB). (fig. 5)

In case clear output waveform is required, please select a HV amplifier which has high enough frequency bandwidth against required frequency. In general 3 to 5 times more frequency bandwidth for sinusoidal waveform, and about 10 times more for rectangular waveform, is required. In case of insufficient frequency bandwidth the output swing shall be reduced, and also the phase difference be large, so some solutions, such as monitoring output waveform, shall be required.



(fig.5) Declination of output swing by frequency

HIGH SPEED HIGH VOLTAGE AMPLIFIER

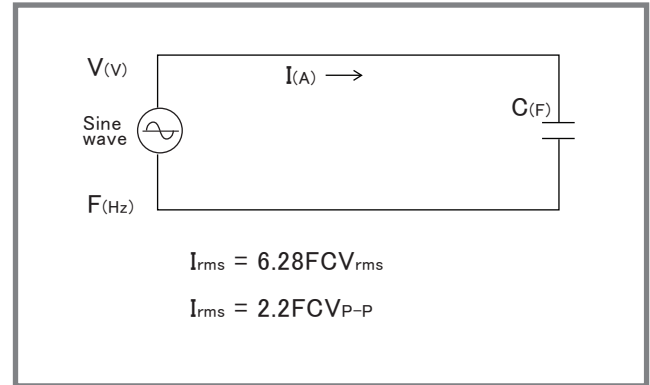
Capacitive Load

When operated with a capacitive load of more than 100 pF(including floating capacity of output cable), the output might oscillate. In such a case put a high voltage resistor of 100 Ω (0.1 μ F) to 1 k Ω (1000 pF) in series to output. Please also note that with capacitive load the bandwidth is limited according to the formula of right note.

In case of corona discharge, larger current than rating can draw and might damage power supply.

In this case too place an output resistor to limit the current as same as in case of with capacitive load.

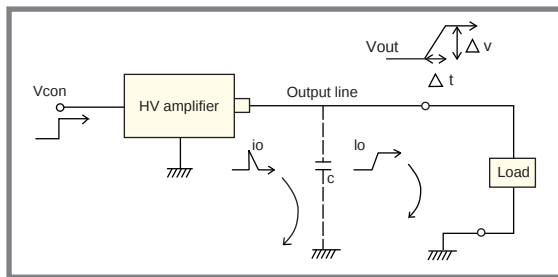
Please do not use AMJ series continuously with inputting high frequency signal which decreases the output frequency. Such a usage increases internal loss and causes damage to AMJ.



Important note to utilize the full performance of high speed HV amplifier

Output cable of HV amplifiers is not shielded. If the output cable has some stray capacity against ground(earth ground or metal objects), output voltage will be sinusoidal or step waveform and extra current will be drawn. As this current draw parallel to load, the following appearance might be happened.

(1) Slew rate or response frequency drop (2) The waveform is distorted or changed



When there is output stray capacitance C the leak current by C will be as below.

$$i_o = \frac{dQ}{dt} = C \frac{dV}{dt} \quad Q: \text{capacity}(C)$$

Solution

Make sure to have proper connection to make stray capacitance of HV cable as low as possible.

- (1) Keep the length of output cable as short as possible.
- (2) Keep the output cable away from floor, desks, or metal objects.
- (3) Have no shielding on the output cable.

Introduction; High Voltage Amplifier Series and Low Voltage Amplifier Series (Amplifier for electric power)

We may accept your delivery time.

We may also accept customizing, please contact our sales staff without any hesitations.

Low Voltage Type

Desk Top Size / Four-Quadrant High Speed Bipolar Power Supplies



DJOP series

Output Voltage	0 to ± 60 V
Output Current	0 to ± 5 A
Output Power	50 W, 60 W

- Wonder light weight and compact size as width 140 mm, weight only 3 kg are realized.
- Operable in 2 modes of constant voltage or constant current and can be switched it by one switch.
- DC bias is equipped as standard. (able to set -100 % to +100 %)

High Voltage Type

Ultra High Speed & High Voltage Amplifiers



AMPS / AMP series

Output Voltage	0 to ± 40 kV
Output Current	0 to ± 2 A
Output Power	0 to 1.2 kW

- High voltage amplifiers enabled ultra high speed response of slew rate max. 700 V / μ s.
- Possible to evaluation of I-V characteristic for cell / panel of solar batteries by using current sink function.
- Best fitted to beam deflection or various electrostatic test, corona discharge, piezo drive, etc.

Ultra High Speed Response Four-Quadrant Bipolar Power Supplies



DOS / DOSF series

Output Voltage	0 to ± 60 V
Output Current	0 to ± 100 A
Output Power	0 to 2 kW

- Ultra high speed response, DC to 200 kHz is realized. (at CV operation)
- Function Generator is equipped as standard and possible to generate various waves. (DOSF series)
- Applicable to external control with the digital I / F of USB or Ethernet, RS-232C, etc.

High Speed & High Voltage Amplifiers



AMS series

Output Voltage	0 to ± 20 kV
Output Current	0 to ± 100 mA
Output Power	0 to 200 W

- High voltage amplifiers enabled high speed response of slew rate max. 360 V / μ s.
- Possible to provide high voltage output in reference to its several input wave forms.
- Best fitted to beam deflection or various electrostatic test, corona discharge, piezo drive, etc.

Four-Quadrant High Speed Bipolar Power Supplies



DOP / DOPF series

Output Voltage	0 to ± 300 V
Output Current	0 to ± 100 A
Output Power	0 to 2 kW

- Four-quadrant bipolar power supplies realized high output power, 2 kW and high speed response, DC to 20 kHz
- High reliability and safety are kept surely with entire solid-state and thoroughgoing protection circuit for all models.
- Best fitted to test for electric element for cars or various motors, induced loads, capacitive loads and surface treatment, etc.

Module Type High Speed High Voltage Amplifiers



AP / AS series

Output Voltage	0 to ± 3 kV
Output Current	0 to 10 mA
Output Power	3 W

- High speed response of max. 24 kHz (AS series) is realized despite of module type.
- You can select optimal one unit in the wide line-up of all 10 models to ± 300 V to ± 3 kV.
- Best fitted to beam deflection or corona discharge, electro photographic process, electro rheological fluid, etc.



USA/Canada : +1-888-652-8651
other countries : +81-6-6150-5089

Customer Inquiry Sheet (AMJ 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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