Matsusada Precision

AF series, AE series

1kV to 150kV / 15W to 300W

USB Ethernet RS-232C RS-485 GPIB

AF series is one of the best seller model of Matsusada as high performance standard high voltage power supply.
AE series has even greater ripple noise and stability, and has long been selected from various national laboratories.

We succeed to keep the ripple and spike noise low with our proprietary switching circuit, and it provide highly stable HV output with well-selected components and highly-stabilized circuit. They are well suited for R&D applications which require high accuracy, and among them for Electron Microscope and Mass spectrometer application AF/AE series demonstrate outstanding performance.
Needless to say its reliability has been proved high with its long history, and in addition it has double and triple protections for safer operations. Various remote control and monitor functions are equipped as standard for building systems.

FEATURES

- Low ripple 10ppm, High stability 50ppm/Hr (AE)
- Wide line-up of high voltage power supply from 1kV to 150kV and 15W to 300W
- Local and remote operation
- Front panel adjustable overload trip level
- Remote and front panel monitoring of DC output voltage and current
- Automatic protection against overload, short circuit and arc
- GPIB interface option

APPLICATIONS

● CRT testing ● X-ray tube ● Electron Beams ● Ion Implantation ● Insulator Testing ● All kinds of High-Voltage Testing

LINEUP AF series

Output voltage (kVdc)	Output current (mA)	Output power (W)	MODEL			(*2) Case Type
			Positive polar output	Negative polar output	Reversible polar output (*1)	
1	30	30	AF-1P30	AF-1N30	AF-1R30	Ⓐ
	60	60	AF-1P60	AF-1N60	AF-1R60	
	120	120	AF-1P120	AF-1N120	AF-1R120	Ⓒ
3	10	30	AF-3P10	AF-3N10	AF-3R10	Ⓐ
	20	60	AF-3P20	AF-3N20	AF-3R20	
	40	120	AF-3P40	AF-3N40	AF-3R40	Ⓒ
	60	180	AF-3P60	AF-3N60	AF-3R60	
	80	240	AF-3P80	AF-3N80	AF-3R80	
5	6	30	AF-5P6	AF-5N6	AF-5R6	Ⓐ
	12	60	AF-5P12	AF-5N12	AF-5R12	
	25	125	AF-5P25	AF-5N25	AF-5R25	Ⓒ
	35	175	AF-5P35	AF-5N35	AF-5R35	
	50	250	AF-5P50	AF-5N50	AF-5R50	
10	3	30	AF-10P3	AF-10N3	AF-10R3	Ⓐ
	6	60	AF-10P6	AF-10N6	AF-10R6	
	12	120	AF-10P12	AF-10N12	AF-10R12	Ⓒ
	18	180	AF-10P18	AF-10N18	AF-10R18	
	25	250	AF-10P25	AF-10N25	AF-10R25	
	30	300	AF-10P30	AF-10N30	AF-10R30	
20	1.5	30	AF-20P1.5	AF-20N1.5	AF-20R1.5	Ⓑ
	3	60	AF-20P3	AF-20N3	AF-20R3	
	6	120	AF-20P6	AF-20N6	AF-20R6	Ⓒ
	9	180	AF-20P9	AF-20N9	AF-20R9	
	12	240	AF-20P12	AF-20N12	AF-20R12	
	15	300	AF-20P15	AF-20N15	AF-20R15	
30	1	30	AF-30P1	AF-30N1	AF-30R1	Ⓑ
	2	60	AF-30P2	AF-30N2	AF-30R2	
	4	120	AF-30P4	AF-30N4	AF-30R4	Ⓒ
	6	180	AF-30P6	AF-30N6	AF-30R6	
	8	240	AF-30P8	AF-30N8	AF-30R8	
	10	300	AF-30P10	AF-30N10	AF-30R10	
40	0.75	30	AF-40P0.75	AF-40N0.75	AF-40R0.75	Ⓒ
	1.5	60	AF-40P1.5	AF-40N1.5	AF-40R1.5	
	3	120	AF-40P3	AF-40N3	AF-40R3	
	4.5	180	AF-40P4.5	AF-40N4.5		
	6	240	AF-40P6	AF-40N6		
	7.5	300	AF-40P7.5	AF-40N7.5		
50	0.6	30	AF-50P0.6	AF-50N0.6	AF-50R0.6	Ⓒ
	1.2	60	AF-50P1.2	AF-50N1.2	AF-50R1.2	
	2.5	125	AF-50P2.5	AF-50N2.5	AF-50R2.5	
	3.5	175	AF-50P3.5	AF-50N3.5		
	5	250	AF-50P5	AF-50N5		
60	0.5	30	AF-60P0.5	AF-60N0.5	AF-60R0.5	Ⓒ
	1	60	AF-60P1	AF-60N1	AF-60R1	
	2	120	AF-60P2	AF-60N2	AF-60R2	
	3	180	AF-60P3	AF-60N3		
	4	240	AF-60P4	AF-60N4		
80	0.75	60	AF-80P0.75	AF-80N0.75	AF-80R0.75	Ⓓ
	1.5	120	AF-80P1.5	AF-80N1.5		
100	0.1	10	AF-100P0.1	AF-100N0.1	AF-100R0.1	Ⓓ
	0.3	30	AF-100P0.3	AF-100N0.3	AF-100R0.3	
	0.6	60	AF-100P0.6	AF-100N0.6		
	1	100	AF-100P1	AF-100N1		
	1.2	120	AF-100P1.2	AF-100N1.2		
120	0.5	60	AF-120P0.5	AF-120N0.5		Ⓓ
	1	120	AF-120P1	AF-120N1		
150	0.5	75	AF-150P0.5	AF-150N0.5		Ⓔ
	0.8	120	AF-150P0.8	AF-150N0.8		

LINEUP AE series

Output voltage (kVdc)	Output current (mA)	Output power (W)	MODEL			(*2) Case Type
			Positive polar output	Negative polar output	Reversible polar output (*1)	
1	15	15	AE-1P15	AE-1N15	AE-1R15	Ⓐ
	30	30	AE-1P30	AE-1N30	AE-1R30	
3	10	30	AE-3P10	AE-3N10	AE-3R10	Ⓐ
	20	60	AE-3P20	AE-3N20	AE-3R20	
5	6	30	AE-5P6	AE-5N6	AE-5R6	Ⓐ
	12	60	AE-5P12	AE-5N12	AE-5R12	
10	3	30	AE-10P3	AE-10N3	AE-10R3	Ⓐ
	6	60	AE-10P6	AE-10N6	AE-10R6	
20	1.5	30	AE-20P1.5	AE-20N1.5	AE-20R1.5	Ⓑ
	3	60	AE-20P3	AE-20N3	AE-20R3	
30	1	30	AE-30P1	AE-30N1	AE-30R1	Ⓑ
	2	60	AE-30P2	AE-30N2	AE-30R2	
40	0.75	30	AE-40P0.75	AE-40N0.75	AE-40R0.75	Ⓒ
	1.5	60	AE-40P1.5	AE-40N1.5	AE-40R1.5	
50	0.5	25	AE-50P0.5	AE-50N0.5	AE-50R0.5	Ⓒ
	1	50	AE-50P1	AE-50N1	AE-50R1	
60	0.5	30	AE-60P0.5	AE-60N0.5	AE-60R0.5	Ⓒ
	1	60	AE-60P1	AE-60N1	AE-60R1	
80	0.3	24	AE-80P0.3	AE-80N0.3		Ⓓ
	0.75	60	AE-80P0.75	AE-80N0.75		
100	0.3	30	AE-100P0.3	AE-100N0.3		Ⓓ
120	0.25	30	AE-120P0.25	AE-120N0.25		Ⓔ
	1	120	AE-120P1	AE-120N1		
150	0.2	30	AE-150P0.2	AE-150N0.2		Ⓔ

★ P···Positive output N···Negative output
<e.g.> *AF-1R30 : 0 to ±1kV / 30mA*
AE-150N0.2 : 0 to -150kV / 0.2mA

★1) Unit less than 50kV, the polarity may be reversed by swapping the internal cable.
Unit over 60kV, by swapping internal high voltage module.
★2) See Dimensions.

SPECIFICATIONS

Input Voltage 115VAC±10% 50/60Hz 1Ø

AC Input power (MAX)

30W models	115VA	Up to 150W models	330VA
60W models	160VA	Up to 300W models	600VA
75W models	230VA		

Output Voltage Control
Local : "Coarse"and"Fine" 10-turn potentiometers on front panel
Remote : External control voltage 0 to 10Vdc (input impedance 10kΩ typ) or by External 5kΩ potentiometer.

Voltage Regulation
AF:Line : ±0.003% of maximum voltage for ±10% input line change
Load : 0.003% of maximum voltage for 10% to 100% load change
AE:Line : ±0.001% of maximum voltage for ±10% input line change
Load : 0.001% of maximum voltage for 10% to 100% load change

Ripple
AF : 0.01%rms
AE : 0.001%rms

Stability
AF : 0.01%/Hr 0.03%/8Hr
AE : 0.005%/Hr 0.01%/8Hr

Temperature Coef.
AF : 100ppm/°C
AE : 50ppm/°C

Overload Trip Level Adjust Front panel 1-turn potentiometer 10% to 105% of maximum output current
(With -LC option, current limit value is adjustable.)

Output Display
AF : Output voltage 3.5-digit digital meter ±1999
Output current 3.5-digit digital meter 1999
AE : Output voltage 4.5-digit digital meter ±19999
Output current 3.5-digit digital meter 1999

Monitor Output
Voltage monitor : ±10V / maximum output voltage (output impedance 1kΩ)
Current monitor : 10V / maximum output current (output impedance 1kΩ)

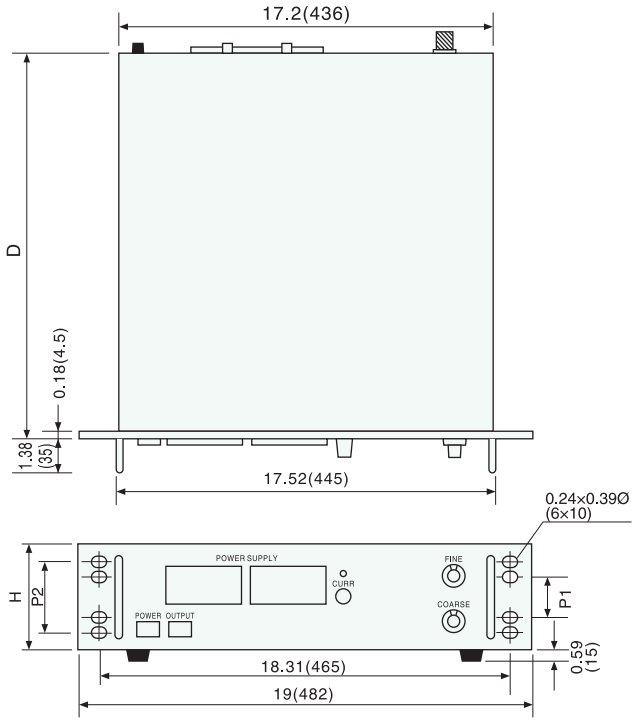
Protections Over voltage protection(limiting when approx. 105% of rating)
Over current protection(standard : High-voltage cut-off, manual recovery or recovery by remote set)
(with -LC option : Limit the output current by dropping output voltage)
Enable to change current by front panel 1-turn dial.
Protection against output short-circuit and arc discharge

Other Functions
Remote switch ON/OFF(by external relay)
Door switch(by external relay)
Remote reset(Reset the Over Current cut off mode by remote signal. Not for models with -LC option)

Temperature
Operating : 0 to +45°C
Storage : −20°C to +75°C
Humidity : 20% to 80%RH(no condensation)

Accessories
AC line input cable 2.5m(1)
Shielded HV output cable 2.5m(flying lead)(1)
Instruction manual(1)

DIMENSIONS inch(mm)



Case Type	H	P1(EIA)	P2(JIS)	D
Ⓐ	5.24(133)	2.25(57.15)	3.94(100)	18.98(482)
Ⓑ	6.97(177)	4(101.6)	5.91(150)	18.98(482)
Ⓒ	6.97(177)	4(101.6)	5.91(150)	21.65(550)
Ⓓ	8.74(222)	5.75(146)	7.87(200)	21.65(550)
Ⓔ	10.47(266)	7.5(190.5)	7.87(200)	24.02(610)

OPTIONS

-LC **Current limiting**
Front panel adjustable 10% to 105% of maximum output current.

-LW **Slow start**
10 second HV output ramp up

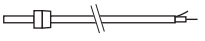
-LG **Connector for GPIB, RS-232C, RS485, USB Interface.**
(CO-HV adapter is required.)

-L(230V) **Input Voltage AC230V±10% 1Ø**

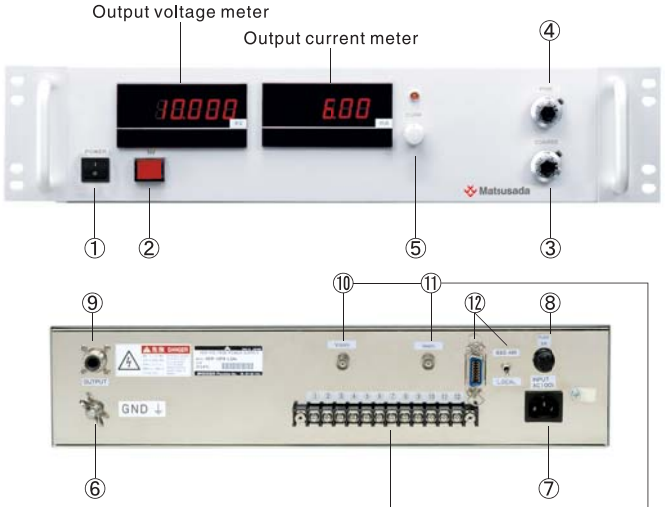
-L(3m)
-L(5m)
-L(7m)
High voltage output shielded cable length change
Please choose high voltage output cable length from 3, 5, 7 meters.
(Please contact nearby sales office if specific length other than above)

When ordering, suffix the above option mark to the model number.
<e.g.>AF-60P1-LCGW4v(230V)(3m)
Alphabetical, input voltage and cable length order

INPUT / OUTPUT CABLE

Input	Standard		CABLE TYPE1 (with 3 pin plug)
Input	with -L(230V) option		CABLE TYPE3 (Flying lead)
Output			CN-□-MHVP

FUNCTIONS



Normal Operation: Output ①→⑤, conversely to stop operation.

① **POWER ON/OFF switch** : This has priority over all operations.

② **HV ON/OFF switch** : Output is enable when this is ON. Remote switch can be turned ON/OFF only when HV switch is ON. This switch is also used for resetting interlock and cut off mode.

③ **COARSE potentiometer** (10-turn, lockable)

④ **FINE potentiometer** (10-turn, lockable)

⑤ **Overload trip level setting dial** : 1-turn LED is lit up when protection circuit is operating.

⑥ **GND Terminal(M6)**

⑦ **AC Inlet**

⑧ **Fuse**

⑨ **Output connector (Matsusada's property)**

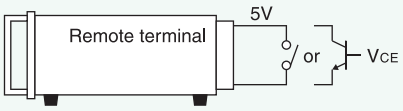
⑩ **Output voltage monitor**

⑪ **Output current monitor**

⑫ **Connector for USB, RS-232C, RS-485, and GPIB interface, and changing-over switch(option)**

REMOTE CONTROL CONNECTOR M4

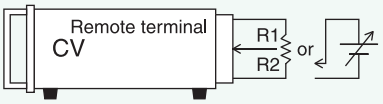
REMOTE SWITCH ON/OFF *



Output	External relay	Open collector
ON	Short	VCE ≦0.4V
OFF	Open	VCE ≧ 2V

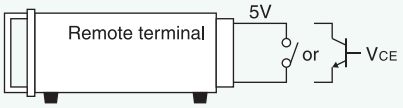
Sink Current ≧ 10mA

OUTPUT CONTROL *



Output voltage	LR	Vcon
0 to MAX	R2 : 0Ω to 5kΩ	0V to 10V Input imp≧10kΩ

DOOR SWITCH

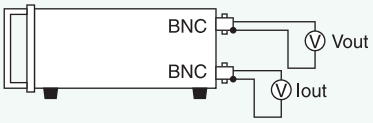


Sink Current ≧ 10mA

Output is possible in external relay short or a status of VCE less than 0.4V.
Output will be cut off when open or 2V or mote.
To output again, tum OUTPUT switch ON after resetting by turning OUTPUT switch OFF in a status of short or 0.4V or less.

* -LG option : When switch ⑫ is on IEEE-488 side, remote switch and output control is not enable from remote terminal, but from only IEEE-488 operation.

OUTPUT MONITOR BNC receptacle *



Vout : 0V to ±10V(0V to +10V)
[standard] Monitor polarity equals output polarity.
[-LG option] Positive polarity regardless of HV polarity.

Iout : 0V to +10V
Output imp is 1KΩ.

* -LG option : Generates output no matter switch ⑫ is on or off.

FAX

USA/canada : +1-888-652-8651

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Customer Inquiry Sheet

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

■ I would like

☐ A quotation ☐ An explanation of product ☐ A demonststration ☐ To purchase

☐ Other ( )

■ Give us your requirement / comment

■ Please fill in below.

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

Warranty

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.If any Product is showed to be defective as satisfactory to us, 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.

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