8. Specification

8.1 Signal area

Unless otherwise specified, the listed values are at no load (open-circuit in constant voltage mode and short-circuit in constant current mode).

■ Internal signal source for DC bias

Output adjustment range from 0 V to ±10 kV.	In constant voltage mode: Equivalent to the output voltage range In constant current mode: Equivalent to the output current range from 0 mA to ±10 mA.With 10 rotation potentiometer
Inversion function:	Available
Signal ON/OFF function	Available (ON/OFF with external signal is also available.)

■ Signal input for oscillator

Input voltage range	±10 Vpk
Input terminal	BNC
Input resistance	10 kΩ ± 10 %
Gain adjustment range	±3 % (Continuously variable with semi-fixed regulator)
Inversion function	Available
Signal ON/OFF function	Available (ON/OFF with external signal is also available.)

■ Signal input for DC bias

Input voltage range	±10 Vpk
Input terminal	BNC
Input resistance	10 kΩ ±10 %
Signal ON/OFF function	Available (ON/OFF with external signal is also available.)
Polarity	Same phase as the output

8.2 Amplifier

8.2.1 Characteristics of constant voltage mode

■ Amplifier gain

1000 V/1 V (60 dB)

■ Gain accuracy when external signal source for DC bias is used

±0.3 % of full scale

■ Gain temperature drift

±100 ppm/□typ

■ Rated load

Resistance load 1000 kΩ

Capacity load 35 pF (including output cable capacity)

■ Maximum output voltage

±10 kVpk (for DC+AC)

■ Maximum output current

Average current ±10 mA (for DC+AC)

Pulse peak current ±60 mA or more

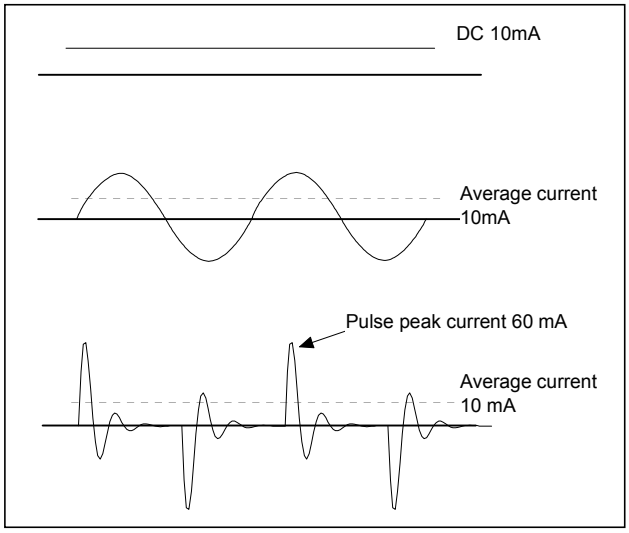

Figure8-1. Output current

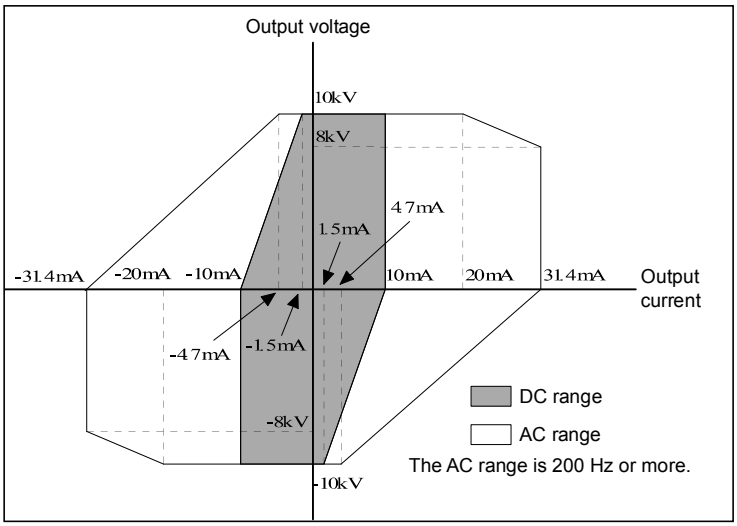

Figure8-2. Voltage and current range allowed for output

■ Frequency characteristics

Major amplitude characteristics DC: Up to 7 kHz

Frequency range allowed for 10 kVpk output

Measured with a high voltage probe (Model P6015A by Tektronix), with connection to the rated resistance load, load connection cable of 10 cm or less, and with the RESPONSE dial turned rightmost.

Minor amplitude characteristics DC: Up to 45 kHz ±3 dB

Measured with a high voltage probe (Model P6015A by Tektronix) without load, with 1 kVpk output, and with the RESPONSE dial turned rightmost.

■ Slew rate

500 V/Ω or more

Measured with a high voltage probe (Model P6015A by Tektronix), with 10kVpk output and with the RESPONSE dial turned rightmost.

■ Output residual noise

500 mVrms or less

At 0V output, the output terminal is measured with the RMS value AC voltmeter M-170 (by NF Corporation, bandwidth of 20 MHz) or its equivalent.

■ Output offset voltage

±20 V

When the ON/OFF switch of each signal source is OFF and the signal ON/OFF switch is ON.

8.2.2 Characteristics of constant current mode

■ Amplifier gain
1 mA/1V

■ Gain accuracy when the external signal source for DC bias is used
±0.5 % of full scale

■ Gain temperature drift
±250 ppm/□typ

■ Maximum output current
±10 mApk (for DC+AC)

■ Maximum output voltage
±10 kVpk (for DC+AC)

■ Rated load
Resistance load: 1000 kΩ

■ Frequency characteristics

Major amplitude characteristics	DC: Up to 4 kHz Frequency range allowed for 10 kmApk output Measured with a high voltage probe (Model P6015A by Tektronix) with rated resistance load, with load connection cable of 10 cm or less, and with the RESPONSE dial turned rightmost.
Minor amplitude characteristics	DC: Up to 10 kHz ±3 dB (short-circuit for 10 mApk output)

■ Slew rate
1 mA/μs or more

■ Output residual noise
500 μA rms or less
Measured with the RMS value AC voltmeter M-170 (by NF Corporation, bandwidth of 20 MHz) or its equivalent

■ Output offset current
±50 μA

■ DC superimposing function
By setting the DC BIAS, the DC component may be operated in constant current mode or in constant voltage mode.

■ Remote sensing function of return current
With the remote sensing function, leak current can be ignored and the load current is correctly ignored. However, the maximum average current is up to ±10 mA.

8.3 Output area

■ High voltage output Hi terminal (OUTPUT Hi)

Special high voltage jack (Front panel)
(A400B series by ALDEN)

■ High voltage output Lo terminal (OUTPUT Lo)

Binding post (Front panel)
(Both for total current terminal and load current terminal)

8.4 Monitor output

■ Output voltage monitor

Gain	1/1000 fold
DC gain accuracy	±0.2 % of full scale
Output offset voltage	±20 mV
Output residual noise	2 mVrms or less Measured with the RMS AC voltmeter M-170 (by NF Corporation, bandwidth of 20 MHz) or its equivalent without load at 0V output
Output resistance	50 Ω±10 %
Terminal	BNC (Front panel)

■ Output current monitor

Gain	1V/10 mA
DC gain accuracy	±0.5 % of full scale
Output offset voltage	±3 mV When high voltage output is given
Output residual noise	3 mVrms or less Measured with the RMS AC voltmeter M-170 (by NF Corporation, bandwidth of 20 MHz)

or its equivalent when high-voltage output is given

Output resistance	50 Ω±10 %
Terminal	BNC (Front panel)

8.5 Other input/output signal

■ Remote control signal input (REMOTE CONTROL INPUT)

Function	ON/OFF of internal signal source for DC bias, signal input for oscillator and external signal input for DC bias; and Batch ON/OFF (SIGNAL ON/OFF) of the above signals
Input	Depends on TTL level signal or contact signal. Lo or short-circuit：ON Hi or open：OFF
Input method	BNC (Back panel)

■ Internal high voltage DC power supply ON/OFF signal input (HIGH VOLTAGE POWER SUPPLY ON/OFF)

Function	ON/OFF of internal high voltage DC power supply (When it is OFF, SIGNAL is also OFF.)
Input	Depends on TTL level signal or contact signal. Lo or short-circuit：ON Hi or open：OFF
Input method	BNC (Back panel) BNC for short-circuit is accompanied.

■ ON/OFF status contact output (SIGNAL ON/OFF STATUS)

Function	Contact output linked to the ON/OFF status of the signal
Contact rating	Max. AC 250 V 3A or DC 30 V 3A
Output method	Contact C M3 screw, 4P terminal table (back panel)

■ ON/OFF status signal output (SIGNAL ON/OFF STATUS OUTPUT)

Function	Signal to indicate the ON/OFF status of the signal
Output	TTL level Lo：OFF Hi：ON
Output method	BNC (Front panel)

8.6 Protection circuit

■ Limit of output voltage (VOLTAGE LIMITER)

With the digital switch, the maximum output voltage may be independently set for positive and negative.

This is available in both constant voltage mode and constant current mode. However, the set values are approximate values.

Adjustment range

Positive: Set between +5 kV and +10 kV with increments of 1 kV, or no limit

Negative: Set between -5 kV and -10 kV with increments of 1 kV, or no limit

■ Limit of output current (DC CURRENT LIMITER)

The maximum output current (DC and AC average values) may be set continuously with the regulator.

This is available in both constant voltage mode and constant current mode. However, the set values are approximate values.

If the current exceeds the set value, to limit the output current at the set value or to turn OFF the output may be selected with the switch.

Adjustment range: Continuous variation from 0 to ±10 mA (Same value setting for positive and negative)

8.7 Others

■ Signal ON/OFF (SIGNAL ON/OFF)

When the SIGNAL switch (or with remote control input) is OFF, the command value for the high voltage amplifier is set to 0V and 0A.

The output circuit and the output terminal of the high voltage amplifier are not disconnected electrically. Since the output circuit and the output terminal of the high voltage amplifier remain connected, to change load or wiring, turn OFF the internal high voltage DC power supply and the power of the unit before work.

■ Internal high voltage DC power supply ON/OFF switch (HIGH VOLTAGE POWER SUPPLY ON/OFF)

This switch turns ON/OFF the output of the internal high voltage DC power supply. The output status of the internal high voltage DC power supply is indicated by LED.

■ High voltage output lamp

During high voltage output, the LED around the output connector rotates and blinks.

The rotation speed varies according to the output voltage. The LED color is orange for approx. 4.9 kVpk or less and red for approx. 4.9 kVpk or more.

■ Adjustment of step response waveform (RESPONSE CV RESPONSE CC)

The step response characteristics may be independently adjusted in constant voltage mode and constant current mode. A semi-fixed regulator is used for adjustment.The adjustment range varies depending on the load condition. In cases, oscillation may occur.

8.8 General items

■ Input/output ground

All signal input/output (BNC connector) excluding the terminal block for ON/OFF status signal contact output, and the total current terminal of the high voltage output terminal (OUTPUT Lo) are connected to the casing.

■ Power supply

Range of power supply voltage	Single phase AC 100 V ±10 %
Frequency of power supply	50 Hz/60 Hz ±2 Hz
Power supply fuse	AC 250V, 10 A, Time lag ϕ 2 x 20 mm
Power consumption	800 VA or less

■ Installation environment of unit

Installation position of unit	Horizontal (10° or less)
Cooling method of the unit	Forced air cooling (Intake from back, exhaust from sides) Sufficient space is provided at the back and sides of the unit not to disturb air cooling function.

■ Environment condition

Performance guarantee	Temperature	+5℃～+35℃
	Humidity	10～85 %RH (No condensation)
Operation guarantee	Temperature	0℃～+40℃
	Humidity	10～85 %RH (No condensation)
Storage	Temperature	-10 ℃～+50℃
	Humidity	10～80 %RH (No condensation)

■ Insulation resistance

Power supply input to casing	30 MΩ or more (with DC 500 V)

■ Voltage resistance

Power supply input to casing	AC 1500 Vrms for 1 minute

■ External dimensions

440 mm (width) x 177 mm (height) x 450 mm (depth) (excluding handle and protrusions)

■ Weight

Approx. 18 kg