HIGH VOLTAGE AMPLIFIER

高壓放大器

INSTRUCTION MANUAL

使用說明書

CE

HA-205 *170Vp-p / 450mA / 3MHz*

HA-305 *300Vp-p / 300mA / 100KHz*

TABLE OF CONTENTS 目 次

HA-205
High Voltage Amplifier

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HA-205 高壓放大器

HA-305 高壓放大器

PINTEK High Voltage Amplifier Selection Guide

2010.Apr 05

MODEL	HA-205	HA-305	HA-400	HA-405	HA-800	HA-805
Output DC Voltage (Max.)	± 85V	± 150V	± 200V	± 200V	± 400V	± 400V
Output AC Voltage (Max.)	170Vp-p	300Vp-p	400Vp-p	400Vp-p	800Vp-p	800Vp-p
DC Current (Max.)	± 450mADC	± 300mADC	± 80mADC	± 200mADC	± 35mADC	± 100mADC
AC Current (Max.)	900mAp-p	600mAp-p	160mAp-p	400mAp-p	70mAp-p	200mAp-p
Output Power (Max.)	76 VA	90 VA	32 VA	80 VA	28 VA	80 VA
Power Bandwidth (Typ.)	3 MHz/100Vp-p	100KHz/150Vp-p	600KHz/200Vp-p	1 MHz/200Vp-p	200KHz/400Vp-p	300KHz/400Vp-p
Slew Rate (Typ.)	2500V/us	50V/us	300V/us	500V/us	200V/us	300V/us
Output Resistance (Protection SW OFF)	10Ω	10Ω	50Ω	50Ω	100Ω	100Ω
Output Resistance (Protection SW ON)	500Ω/80watt	500Ω/80watt	4KΩ/40watt	2KΩ/80watt	15KΩ/40watt	7.5KΩ/80watt
Safe Loading	≧190Ω/170Vp-p	≧500Ω/300Vp-p	≧2.5KΩ/400Vp-p	≧1KΩ/400Vp-p	≧11KΩ/800Vp-p	≧4KΩ/800Vp-p
Input Voltage	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p	0~20Vp-p
Voltage Gain	0～35	0～60	0～90	0～90	0～180	0～180
DC OFFSET	0 or ± 80V	0 or ± 150V	0 or ± 200V	0 or ± 200V	0 or ± 400V	0 or ± 400V
Monitor Output	100：1	100：1	100：1	100：1	100：1	100：1
Output Protection	1.Protection Resister 2.Microprocess Control.	1.FUSE 2.Protection Resister 3.Microprocess Control.	1.FUSE 2.Protection Resister	1.FUSE 2.Protection Resister 3.Microprocess Control.	1.FUSE 2.Protection Resister	1.FUSE 2.Protection Resister 3.Microprocess Control.

HA-205

HIGH VOLTAGE AMPLIFIER

1. SUMMARY

HA-205 is a very practical high voltage amplifier in testing and measuring industry. Its dimension is small, light weight and easy operation. The max voltage output is able to reach 170 Vp-p. The various advantages are very useful for users operation.

HA-205 serial current output is able to reach 450 mA, and it has output protection switch. In the output protection mode, it protects HA-205 not damaged when get shorts or overload from outside. This can lower the defects and extend the unit lifetime.

The max voltage gains is 35 times, and the output is able to adjust from 0V ~ 170Vp-p (use 10 turns variable resistor), and maximum frequency is 4MHz (basic voltage output 100 Vp-p). These applications are suitable for different industries,

- Semiconductor High Voltage Driver
- TFT Field High Voltage Driver
- High Voltage Engineering
- MEMS Engineering
- Nano Technology
- PZT Driver
- Static Charge Engineering
- Biomedical Engineering

It is also used for Audio Signal Generator and Function Generator Amplifier.

2. SPECIFICATIONS

(1) Input

Input Voltage:

0 V ~ +/- 2.5 V (5 Vp-p), maximum +/- 10 V (20 Vp-p)

Input Frequency:

DC ~ 4MHz. Over frequency will get attenuate, but not damage the unit.

Input Waveform: Direct current and any waveforms

(2) Output:

Output Voltage:

≦0 V ~ +/- 85 V (170 Vp-p).

Voltage Gain:

≦ 0 ~ 35 times. Front panel indicates AMPL. It is 10 turns adjustable serial resistor.

Maximum Output Current:

≦ 450mA (Protection SW OFF); ≦ 170mA (Protection SW ON)

Output Bandwidth: DC~4MHz (Basic Voltage Output 100Vp-p)

Slow Rate: 2500 V/us(Typ.)

Output Resistance:

10Ω(Protection SW OFF); 500Ω(Protection SW ON)

Output Protection: One switch control

Output protection sets “ON”, the output resistance raise up to 500Ω. At this time, even the positive and negative terminals get short but will not damage the unit.

Output protection sets “OFF”, the output resistance down to 5 Ω. It is PROHIBITED the output terminals get short. The serial output also needs to set under 450mA. (output 170Vp-p, the overload resistance needs 190Ω up, to protect the unit from damage)

DC Voltage Offset: ≦0 ~ +/- 80 V DC, it is controlled by 10 turns adjustable resistor.

DC Voltage Offset Switch: One switch control.

When switch sets OFF, inside DC is 0V.

When switch sets ON, front panel indicates OFFSET control.

Monitor Output:

-40dB, the output voltage are about 1/100 as the main output terminal, resistance is 10KΩ, maximum output ≦1.7 Vp-p. It is able to direct connect to oscilloscope to observe.

(3) Input Power: AC 100 V ~ 240 V +/- 10%, 50 ~ 60 Hz

(4) Power consumption: Max 150 W

(5) Fuse: 3.0A/250V, back panel under power core fuse box

(6) Operation: 0~40°C; 0~80%RH

(7) Storage: -20~60°C; 0~90%RH

(8) Dimension: 270 (W) x 95 (H) x 310 (H) mm

(9) Weight: 5.2 KGs / 11.5 PB

(10) Out Put protection.

(A)Built-in output fuse.

(B)Built-in Output Protect resistor.

Switch "ON" the Protect Switch. The output impedance of the equipment will be raised up to the Desired output resistor. The output current will be limited to protect the equipment even the output was shorted.

(C) Micro Process Overload Protection:

LED Slow Flash：The equipment was under Warming Up after switch ON or re-switch ON.

LED Quick Flash：The Micro Process have detected the Over Load. The equipment will be switch off and re- switch on automatically. The LED will Slow Flash and than quick flash. The process will be continually till the Over Load been Improved.

3. FRONT PANEL INDICATION

Figure 1.

① **Power On:** Turn on Power and LED light on.

② **DC Voltage OFFSET:** use 10 turns adjustable resistor is able to gain precised voltage. The “OFFSET Switch” must be set at ON position.

③ **AMPL adjustment:** use 10 turns adjustable resistor for micro adjustment. It is able to have 0 ~ 35 times voltage gains.

④ **Input:** ≦ 0 ~ +/- 2.5 V. Maximum do not over +/- 10 V.

⑤ **Oscilloscope Monitor:** Attenuate (100:1) -40dB. Maximum voltage output 1.7 Vp-p. It is safe to connect with oscilloscope to observe.

⑥ **Output:** 0 ~ 170 Vp-p or 0~ +/- 85V DC.

⑦ **DC Voltage OFFSET switch:** When the switch sets “ON”, please tune (2) knob. The DC is ≦0~+/- 80V. When switch sets “OFF”, it is back to DC 0V.

⑧ **Output Protection Switch:** Suggest to use this function under "Normal" situation. When switch sets "ON" is able to prevent the unit damage from short. When output connects with high voltage, it can resist the voltage. The bandwidth is not attenuate, but the resistance will raise up to 500Ω. Overload will increase and output current will decrease.

When switch sets "OFF", please be careful of using this unit. It is PROHIBITED the output terminals get short.

4. BACK PANEL INDICATION

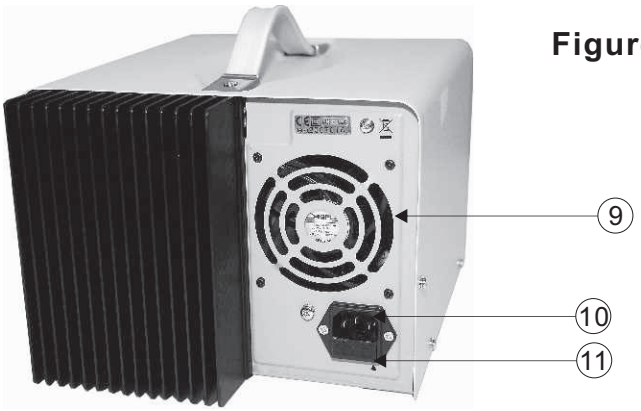

Figure 2.

⑨ **Fans:** suck out type. 24V / DC / 0.11A

⑩ **AC Power plug:** Please connect properly with enclosed power cord.

⑪ **Fuse:**

Power	Frequency	Fuse
100~240V +/- 10%	50/60 Hz	3.0 A/250V

5. OPERATING

5.1 Use Function Generator as input terminal, and directly connect HA-205 Monitor to Oscilloscope to observe the real amplified situation (Figure 3.)

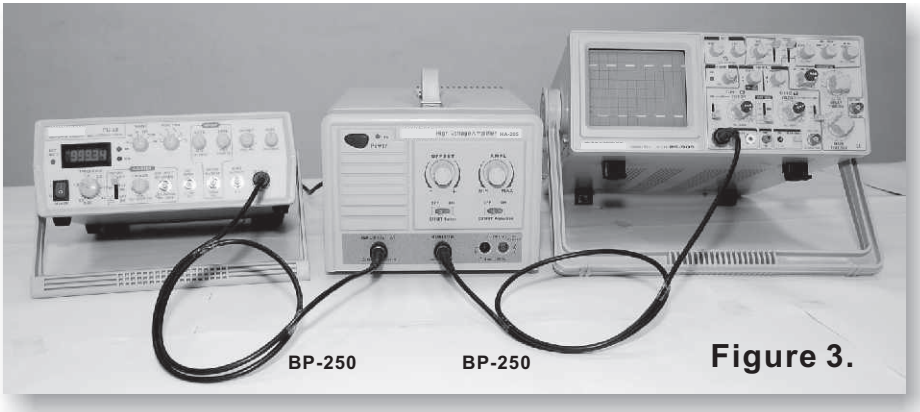

Figure 3.

A. Set Function Generator frequency at 0 ~ 3MHz. (Over frequency will not damage HA-205, but output will be distorted)

B. Waveform Selection: Any

C. Input Amplitude sets within 5Vp-p, but it is safe to set input within 20Vp-p. HA-205 maximum output need to remain at 170Vp-p, over this the waveform will be cut off.

D. Use BP-250 to connect HA-205 Monitor terminal to oscilloscope. The oscilloscope amplitude multiply 100 is HA-205 real output.

E. Monitor terminal maximum output is only 1.7Vp-p, which is not able to damage any kind of oscilloscope. It is very safe to use.

F. OFFSET switch always sets at OFF position. When adjust DC VOLT, the switch sets at ON position. Turn the knob and able to get maximum +/- 80V DC.

G. AMPL knob provides maximum 35 times Voltage Gain, and maximum output 170Vp-p.

H. Please set Protection Switch always at ON position. It will limit the current within 170mA. When use over 170mA, the switch sets at OFF position.

CAUTION!

It is extremely prohibited to get short, and lower than 190Ω (at 170p-p) loaded output.

5.2 Use Function Generator as input, and HA-205 output connects to Differential Probe as interface to transmit signal to oscilloscope to observe. (Figure 4.)

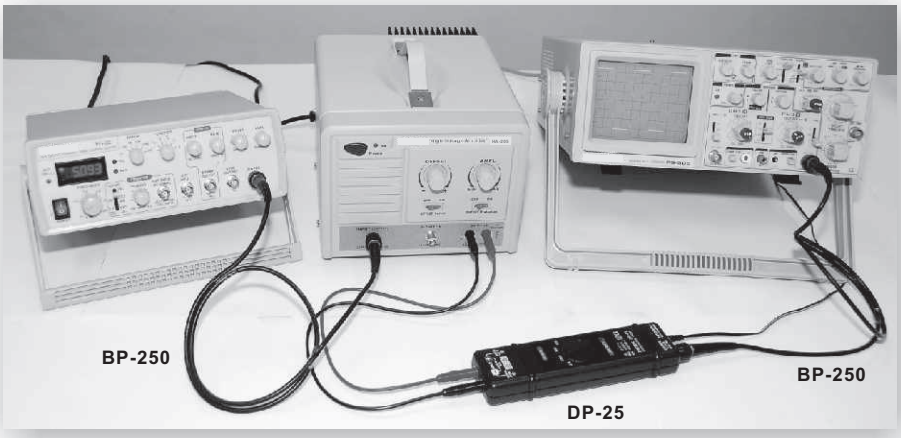

Figure 4.

A. Function Generator and HA-205 setting conditions are the same as 4.1
B. Set Differential Probe maximum input at 1000V. (Please select PINTEK DP-25, maximum input 1400Vp-p)
C. HA-205 output terminal connects with Differential Probe input terminal.
D. Differential Probe output terminal connects to oscilloscope to get the real observation.
E. Oscilloscope indicated value multiply Differential Probe Amplitude is real HA-205 output value.
F. Differential Probe is an isolated tested probe. No matter HA-205 output loaded is positive or negative, HA-205 will not damage any kind of oscilloscopes and very safe to use.

5.3 Use Function Generator as input, to observe the HA-205 Monitor and Output, and the real output situation from oscilloscope. (Figure 5.)

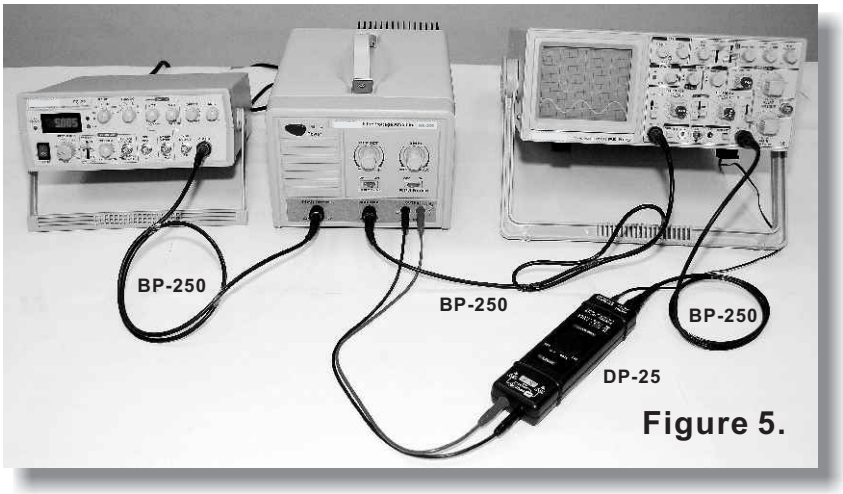

Figure 5.

A. Function Generator and HA-205 setting conditions are the same as 5.1
B. Use BP-250 to connect HA-205 Monitor to oscilloscope CH1.
C. First to connect properly HA-205 output with Differential Probe input. Then, connect Differential Probe output with oscilloscope CH2.
D. Oscilloscope CH1 real measured value needs to multiply 100 times. And CH2 real value is Differential Probe amplitude value multiply oscilloscope vertical voltage value.
E. If connection is properly, CH1 and CH2 values on above “D” procedure shall be the same.

6. MAINTENANCE

For maintenance, only use specified spare parts.
The manufacturer can not be held responsible for any accident arising following a repair made other than its after sales service or approved repairers.

7. CLEANING

Remove any dirt, dust and grime whenever they become noticeable cleaning the outside cover with a soft cloth moistened with a mild cleaning solution.

8. WARRANTY

Unless notified to the contrary, our instruments are guaranteed against any manufacturing defect or material defect. They do not bear the specification known as the safety specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, goes no further than the repair of our faulty equipment, carriage paid to our workshops.

It is applicable for normal use of our instruments, and does not apply to damage or destruction caused, notably by error in mounting, mechanical accident, faulty maintenance, defective use, overload or exceed voltage.
Our responsibility being strictly limited to the pure and simple replacement of the faculty parts of our equipment, the buyer expressly renounces any attempt to find us responsible for damages or losses caused directly or indirectly.

Our guarantee is applicable for twelve (12) months after the date at which the equipment is made available. The repair, modification or replacement of a part during the guarantee period will not result in this guarantee being extended.

9. REPAIR

Maintenance, repairs under or out of guarantee. Please return the product to your distributor.

HA-305

HIGH VOLTAGE AMPLIFIER

1. SUMMARY

HA-305 is a very practical high voltage amplifier in testing and measuring industry. Its dimension is small, light weight and easy operation. The max voltage output is able to reach 300 Vp-p. The various advantages are very useful for users operation.

HA-305 serial current output is able to reach 300 mA, and it has output protection switch. In the output protection mode, it protects HA-305 not damaged when get shorts or overload from outside. This can lower the defects and extend the unit lifetime.

The max voltage gains is 60 times, and the output is able to adjust from 0V ~ 300Vp-p (use 10 turns variable resistor), and maximum frequency is 100KHz (basic voltage output 150 Vp-p). These applications are suitable for different industries,

- Semiconductor High Voltage Driver
- TFT Field High Voltage Driver
- High Voltage Engineering
- MEMS Engineering
- Nano Technology
- PZT Driver
- Static Charge Engineering
- Biomedical Engineering

It is also used for Audio Signal Generator and Function Generator Amplifier.

2. SPECIFICATIONS

(1) Input

Input Voltage:

0 V ~ +/- 2.5 V (5 Vp-p), maximum +/- 10 V (20 Vp-p)

Input Frequency:

DC ~ 100KHz. Over frequency will get attenuate, but not damage the unit.

Input Waveform: Direct current and any waveforms

(2) Output:

Output Voltage:

≦0 V ~ +/- 150 V (300 Vp-p). Direct connect to oscilloscope is PROHIBITED. It is necessary to connect with over 300 V differential probe to observe. For instance, PINTEK DP-25 and DP-50.

Voltage Gain:

≦ 0 ~ 60 times. Front panel indicates AMPL. It is 10 turns adjustable serial resistor.

Maximum Output Current:

≦ 300mA (Protection SW OFF); ≦300mA (Protection SW ON)

Output Bandwidth: ≦100KHz (Basic Voltage Output 150Vp-p)

Slow Rate: 50 V/us

Output Resistance:

10Ω(Protection SW OFF); 500Ω(Protection SW ON)

Output Protection: One switch control

Output protection sets “ON”, the output resistance raise up to 500Ω. At this time, even the positive and negative terminals get short but will not damage the unit.

Output protection sets “OFF”, the output resistance down to 10Ω . It is PROHIBITED the output terminals get short. The serial output also needs to set under 300mA. (output 300Vp-p, the overload resistance needs over 500Ω up, to protect the unit from damage)

DC Voltage Offset: ≦0 ~ +/- 150 V DC, it is controlled by 10 turns adjustable resistor.

DC Voltage Offset Switch: One switch control.

When switch sets OFF, inside DC is 0V.

When switch sets ON, front panel indicates OFFSET control.

Monitor Output:

-40dB, the output voltage are about 1/100 as the main output terminal, resistance is 10KΩ, maximum output ≦3 Vp-p. It is able to direct connect to oscilloscope to observe.

(3) Input Power: AC 100 V ~ 240 V +/- 10%, 50 ~ 60 Hz

(4) Power consumption: Max 150 W

(5) Fuse: 3.0A/250, back panel under power core fuse box

(6) Operation: 0~40°C; 0~80%RH

(7) Storage: 20~60°C; 0~90%

(8) Dimension: 270 (W) x 95 (H) x 310 (H) mm

(9) Weight: 5.2 KGs / 11.5 PB

(10) Out Put protection.

(A)Built-in output fuse.

(B)Built-in Output Protect resistor.

Switch "ON" the Protect Switch. The output impedance of the equipment will be raised up to the Desired output resistor. The output current will be limited to protect to the equipment even the output was shorted.

(C) Micro Process Overload Protection:

LED Slow Flash : The equipment was under Warming Up after switch ON or re-switch ON.

LED Quick Flash : The Micro Process have detected the Over Load. The equipment will be switch off and re- switch on automatically. The LED will Slow Flash and than quick flash. The process will be continually till the Over Load been Improved.

3. FRONT PANEL INDICATION

Figure 6.

① **Power On:** Turn on Power and LED light on.

② **DC Voltage OFFSET:** use 10 turns adjustable resistor is able to gain precised voltage. The “OFFSET Switch” must be set at ON position.

③ **AMPL adjustment:** use 10 turns adjustable resistor for micro adjustment. It is able to have 0 ~ 60 times voltage gains.

④ **Input:** ≦ 0 ~ +/- 2.5 V. Maximum do not over +/- 10 V.

⑤ **Oscilloscope Monitor:** Attenuate (100:1) -40dB. Maximum voltage output 3 Vp-p. It is safe to connect with oscilloscope to observe.

⑥ **Output:** It is PROHIBITED to connect with oscilloscope to observe. The maximum output is 300 Vp-p is able to damage any kind of oscilloscopes. It is necessary to connect with over 300 V differential probe to observe. For instance, PINTEK DP-25 and DP-50.

⑦ **DC Voltage OFFSET switch:** When the switch sets “ON”, please tune (2) knob. The DC is ≦0~+/- 150V. When switch sets “OFF”, it is back to DC 0V.

⑧ **Output Protection Switch:** Suggest to use this function under “Normal” situation. When switch sets “ON” is able to prevent the unit damage from short. When output connects with high voltage, it can resist the voltage. The bandwidth is not attenuate, but the resistance will raise up to 500Ω. Overload will increase and output current will decrease.

When switch sets “OFF”, please be careful of using this unit. It is PROHIBITED the output terminals get short.

4. BACK PANEL INDICATION

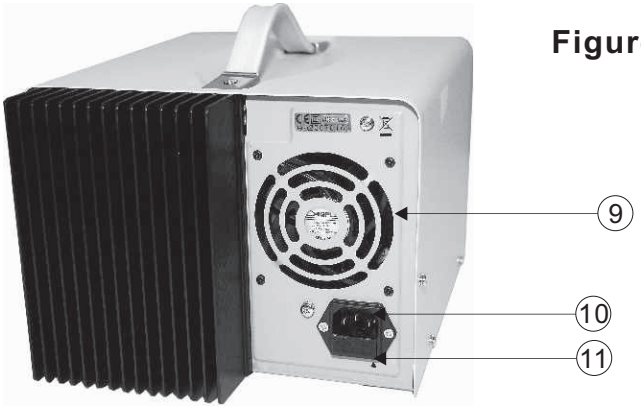

Figure 7.

⑨ **Fans:** suck out type. 24V / DC / 0.11A

⑩ **AC Power plug:** Please connect properly with enclosed power cord.

⑪ **Fuse:**

Power	Frequency	Fuse
100~240V +/- 10%	50/60 Hz	3.0 A/250V