

100kV 10mA 负高压发生器



1.0 INPUT POWER:

Input Line Voltage Range: 90 - 264 VAC, Single phase, 47-63 Hz

2.0 OUTPUT VOLTAGE PERFORMANCE:

2.1 Tube Voltage Operational Range: The high voltage shall be programmed within the range of -50kV to -100 kV.

2.2 kV rise: To 100kV and 10 mA in less than 5 msec.

2.3 kV overshoot: $< \pm 10\%$ during the 5 msec rise time.

2.4 kV fall time: From 100kV and 10 mA to 25kV in less than 6 msec.

2.5 kV repeatability: $\pm 10\%$.

2.6 kV stability : $\pm .5\%$.

2.7 kV Ripple: $\leq 1\%$ (RMS) from 10Hz to 10kHz across X-ray tube.

2.8 Line Regulation: Output stable within $\pm 0.1\%$ over a range of line voltage from 90 to 264 VAC.

2.9 Load Regulation: Output voltage stable within $\pm 0.1\%$ over a range of emission

current from 1.0mA to 10.0mA (100kV@10mA, 1000 watts maximum)

2.10 KV accuracy: $\pm 2\%$ of target.

3.0 TUBE CURRENT*amperes (mAs) PERFORMANCE:

3.1 mAs range 0.001 mAs to 10.0 mAs.

3.2 mA range 1mA to 10mA.

3.2 mA rise: 5 msec.

3.3 mA fall: 6 msec .

3.4 mA stability : $\pm 0.5\%$.

3.5 exposure time : 1ms~30s.

3.5 Line Regulation: Output current stable within $\pm 0.1\%$ over a range of line voltage from 90 to 264VAC.

3.6 Voltage Regulation: Output current stable within $\pm 0.1\%$ over a range of output voltage from 50kV to 100 kV, (100kV @ 10mA, 1000 watts maximum).

3.7 mAs accuracy: $\pm 2\%$.

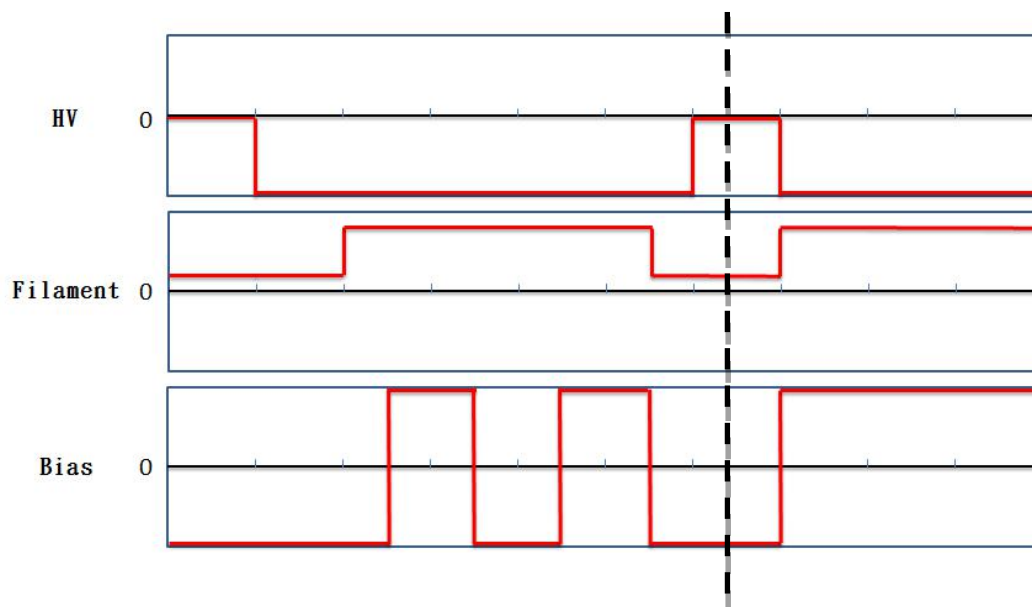
3.8 mA accuracy: $\pm 2\%$.

3.9 mA repeatability: $\pm 10\%$.

4.0 Pulsing operation and Operating Duty Cycle

We need discuss about “ Pulse Mode” .

A



5.0 Bias Voltage performance

5.1 Bias Voltage Operational Range:

The Bias voltage shall be programmed within the range of -300V to 800 V

(-300V⁰ , 0^{800V})

5.2 V rise: 0 To 800V in less than 2 msec

5.3 V overshoot: < ±5% during the 2 msec rise time.

5.4 V fall time: From 800V to 0V in less than 2 msec

5.5 kV repeatability: ± 10%

5.6 V stability : ± 2%

5.7 V Ripple: ≤ 1% (RMS) from 10Hz to 10kHz across X-ray tube.

5.8 Frequency : customer can change the bias from negative to positive by fixed Frequency.

5.9 V accuracy: ± 2% of target.

6.0 PROTECTION CIRCUITRY:

6.1 Current protection:

- The OVER CURRENT (High mA) trip point is set at 10% over max. rated current, or at 10% over programmed output current value, or when mA multiplied by kV exceeds 1050 watts for more than 50mS.
- The UNDER CURRENT (Low mA) trip point is set at 18% under programmed output current value.

6.2 Voltage protection:

- The OVER VOLTAGE (High kV) trip point is when the kV output exceeds 110kV for more than 10ms or it set is at 10% over programmed output voltage value.
- The UNDER VOLTAGE (Low kV) trip point is set at 9% under the programmed output voltage value for more than 750mS.

6.3 Tube Arc protection:

- Unit will detect an Arc but HV will not be shutdown, but if multiple arcs occur (4 arc' s in 10 seconds) the unit will shutdown.

6.4 Over temperature protection:

- Over temperature trip point shall be set within 65° C to ± 2° C.

- Over temperature protection sensor

6.5 X-ray Leakage radiation:

- Less than 100mR/hour (or <1mGy/hr) @ 1meter from the Monoblock®

surface. Measured at 10 mA, 90kV with a 100 sq. cm. Probe or equivalent.

7.0 PHYSICAL SPECIFICATIONS

7.1 Environmental Conditions:

7.1.1 Operating ambient temperature: 0 to +40 °C.

7.1.2 Storage ambient temperature: -20 to +70 °C

7.1.3 Altitude: 0 to 8000feet

7.1.4 Humidity, Operating and Storage: 5 to 95%, non-condensing.

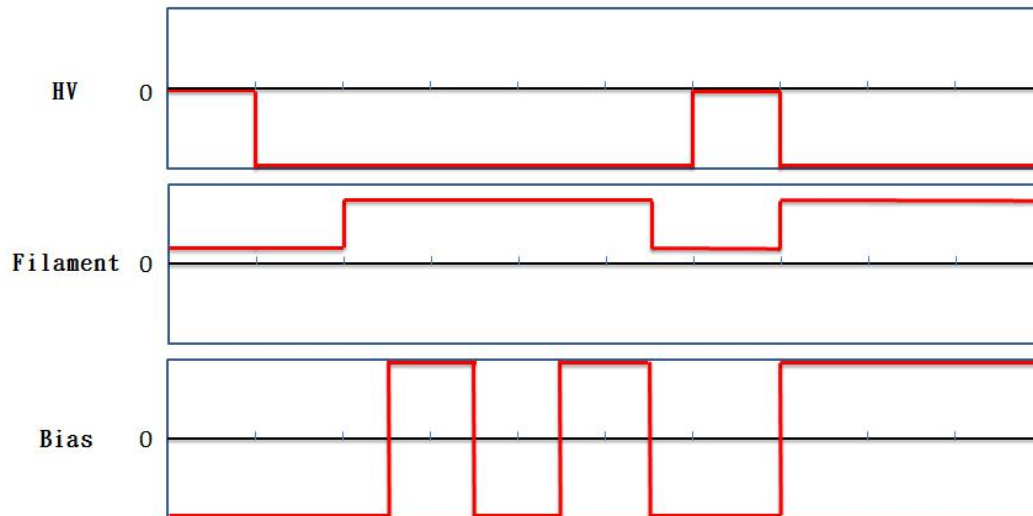
操作流程

1. CT 模式

電源控制其需包含

- mAs 控制：每單位時間收集反饋管電流值乘上單位時間，如果 mAs 設定到達預設值，則正偏壓自動關閉
- 控制管電壓：需提控介面給電腦端控制
- 控制燈絲電流：需提供介面給電腦端控制
- 控制偏壓：需提供介面給電腦端控制

操作模式



- 開啟電源，負偏壓與燈絲電流預熱值自動開啟
 - 電腦控制端輸入管電壓 管電流 偏壓頻率 mAs
 - 按 ON
 - 各控制啟動順序，由電腦端控制
 - 負高壓啟動
 - 燈絲操作在工作電流
 - 正偏壓啟動
- a、b、c 中間的間隔時間由電腦端控制
- 順序
- 先開啟負高壓

- ii 待高壓升至預設電壓，開啟燈絲至操作電流
 - iii 與 Detector 同步，開啟正偏壓，並依據預設頻率，由電腦端控制開關正偏壓時間
 - iv CT 掃描時間完畢，同時關閉正偏壓並調整燈絲電流至預熱值
 - V 關閉負高壓
5. 由於固定頻率與最大 duty，若 X ray 開啟時間內
- a. 設定的 mAs 達到預設值，則系統自動关闭正高壓
 - b. 設定頻率轉換成單週期的 50%時間到但 mAs 尚未累積至預設值
則系統自動關閉正高壓

软件控制

1.Protocol

The RS232C Serial Communication Specification

No.	Item	Setting
1	Transfer line specification	RS-232C
2	Transfer speed	38400 bps
3	Check sum	Yes
4	Data bits	8 bit
5	Parity check	None
6	Stop bits	1 bit

2.Initialization

- 1). The X-Ray Power restart, all values defined is 0.
- 2). The Microcontroller unit just start all values are preset to 0.
- 3). The Microcontroller unit as long as the disconnection state or InterLock, all values is 0 and stop operation.
- 4). Constantly monitoring the state, you need to set the status request time.
- 5). All Command actual output instruction for hexadecimal.

3.Command Structure

Instruction	Data Message	Checksum	End Character
2-byte		2-byte	2-byte

Checksum is Confirm the Command to Data Message all character, its authentication method. Converted to Binary output instruction after the accumulation of all the bits, and then converted to hexadecimal.

Example : Output Command “6100”

Instruction	Binary	Hexadecimal	Checksum
6100	"0110" + "0001" + "0000" + "0000"	0x03	3

4.Command List

No	Instruction	Soft.	Firm.	Description
1	5100		→	High Voltage Setting
2	510A		←	High Voltage Setting ACK
3	5200		→	Reference Current Value Setting
4	520A		←	Reference Current Value Setting ACK
5	5300		→	Reference BIAS Value Setting
6	530A		←	Reference BIAS Value Setting ACK
7	5400		→	mAs Mode Value Setting
8	540A		←	mAs Mode Value Setting ACK
9	5500		→	Exposure Timeout Setting
10	550A		←	Exposure Timeout Setting ACK
11	5600		→	Filament Preheat Value Setting
12	560A		←	Filament Preheat Value Setting ACK
13	5700		→	Page Value Setting
14	570A		←	Page Value Setting ACK
15	5800		→	Off_time And Mode Setting
16	580A		←	Off_time And Mode Setting ACK
17	6100		→	High Voltage Pin On
18	610A		←	High Voltage Pin On Confirm
19	6200		→	High Voltage Pin Off
20	620A		←	High Voltage Pin Off Confirm
21	6300		→	Filament Current Pin On
22	630A		←	Filament Current Pin On Confirm
23	6400		→	Filament Current Pin Off
24	640A		←	Filament Current Pin Off Confirm
25	6500		→	BIAS Pin On
26	650A		←	BIAS Pin On Confirm
27	6600		→	BIAS Pin Off
28	660A		←	BIAS Pin Off Confirm
29	6000		→	Status Request
30	7000		←	State & Real Value Response
31	7001		←	Hardware restart

5.界面



故障指示区

- 高压出错
- 灯丝出错
- BIAS出错
- 逆变器过流
- 逆变器过温
- 油箱过温
- 放电超调
- 母线电压过低
- IGBT故障
- 逆变器停止
- 恒压模式
- 恒流模式
- 紧急停止
- 连锁故障

设定区

- HV: KV
- FILN: A
- BIAS: V

初始化设定区

- FILP: A
- mAs: mAs
- EXPO: ms
- PAGE:
- OFFTIME: ms

串口参数

- 串口号:
- 波特率:
- 通信状态:

PC_mode DETO_mode

发送区域

send clear

反馈区

- 远程模式 HVreal: KV
- BIAS负极性 HVaver: KV
- 高压开启 TUBEreal: mA
- BIAS开启 TUBEaver: mA
- 灯丝开启 EXPO: ms
- ACK信号 XRAY: N
- mAs到达 0
- 曝光到达
- 故障出现

单步按键开/关 AUTO_BIAS

OFF_AUTO AUTO_INIT

AUTO_DETO

接收区域

clear