FILES ASSOCIATED WITH THIS SPECIFICATION

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SPC – P331.doc	This Document

CHANGE HISTORY

ORIGINATOR	DATE	DESCRIPTION OF CHANGE
Jenny He	05/11/22	Initial Specification. Modified from P038. - 80-160kV,0.2-3.125mA,500W peak, continuous mode: 400W max. - Symmetrical Fan beam 80°+1°/-3° - Focal Spot Size: 0.8 per IEC60336 - Specialized Pump - HP Radiator - Type C Control box, Firmware P562 - Input Power 220VAC

TITLE: IXS160BP500P331	
GENERATED BY: Jenny He	DOC OWNER: X-ray Eng. & Sales
REVIEWED BY: Joseph Zhou	REVIEW DATE: 5/18/22
APPROVED BY: NY Eng. Team	APPROVAL DATE: 5/26/22

1. OVERVIEW

The IXS160BP500P331 X-ray generator is a 160kV, 500W, High Frequency, Power Factor Corrected generator. It consists of an integrated X-ray tube, a high voltage, and a filament power supply. The Generator is controlled, programmed, and monitored via a RS232 interface or Ethernet interface. The Generator is built in accordance with the following specifications:

2. INPUT POWER

Input Line Voltage Range

- 220VAC±10%, 50/60Hz. Single phase. 3.7Amps RMS max.

3. HIGH VOLTAGE PERFORMANCE

a. Output Power:
Maximum output Power: 80-160kV,0.2-3.125mA,500W peak, continuous mode: 400W max.

b. Tube Voltage Operational Range:
The high voltage is programmed within the range of 80 to 160 kV (+/-40kV to +/-80kV).

c. kV Accuracy:
The High Voltage measured at the X-ray tube is within +/-2% of the selected value.

d. kV Ripple:
The peak-to-peak value of Total kV is +/-1%.

e. Voltage Regulation:
< 0.1% for Line Input changes over specified range
< 0.1% for Load Output changes over specified range

f. kV Rise Time at maximum power:
The kV rise time is < 1s from 10% to 90% of the output voltage.

g. kV Overshoot
The kV Overshoot will be <= 5% of full output voltage.

4. TUBE CURRENT (mA) PERFORMANCE

a. Tube current Operational Range:
0.2mA to 3.125mA @ 160KV peak

b. mA Accuracy:
The X-ray tube current is within +/-1% of the selected value.

c. mA Regulation:
< 0.5% for Line Input changes of 220VAC±10%.
< 0.5% for the output voltage change of 80kV to 160kV.

5. PROTECTION AND SAFETY CIRCUITRY

a. Over-current protection:
The Over-current trip point is set for within 3.2 to 3.3mA. This will disable the high voltage output. A Reset is required to clear this fault.

b. Over voltage protection:
The Over voltage trip point is set within 165kV to 170kV. This will disable the high voltage output. A Reset is required to clear this fault.

c. Over temperature protection:
Over temperature trip point is set within 57°C to 63°C. This will disable the high voltage output. A Reset is required to clear this fault.

d. Arc Detection Fault:
When an Arc occurred, the arc fault LED will be ON. If multiple arcs occurred within 10sec, the arc fault signal will be latched. This will disable the high voltage output & a reset is required to clear this fault.

e. Reg. Fault:
When KV or mA output is out of regulation, the unit will disable the high voltage output. A Reset is required to clear this fault.

f. Power Limit Fault:
When the kV/mA feedback values exceed the maximum rated power limit, this will disable the high voltage output. A Reset is required to clear this fault.

g. X-ray On Relay:
The X-Ray on relay will operate when HV is enabled & there is no faults occurred.
The X-Ray on relay will de-energize when the X-Ray output is OFF.
The maximum rating of this contact is 30V DC ≤200mAmps.

h. Safety Interlock:
J2-1 & J2-2 to close through external interlock switches to satisfy the safety. X-Rays will not be produced & interlock open message will be displayed unless J2-1 & J2-2 are connected through safety switches.

6. FILAMENT POWER SUPPLY

Filament Current Output:
Filament Current = 3.0 to 4.0 Amps RMS

Filament Voltage Output:
Filament Output Voltage 2 to 5VAC

7. SAFETY REQUIREMENTS

a. Safety Compliance: Designed to meet CE, EN/UL 61010-1 and EN 61326-1.
b. X-ray Leakage: Less than 0.5mR/hr at 5cm from the surface of the chassis as per FDA 21 CFR 1020.40.

8. X-RAY BEAM REQUIREMENTS

a. X Ray Beam Filtration: <2mm of Ultem
b. X-ray Beam geometry: Fan beam of 80°+1°/-3° x 10º Max (See drawing in Item 15)
c. Focal Spot Size: 0.8 per IEC60336

9. PHYSICAL SPECIFICATIONS

a. **Environmental**
- Maximum operating ambient temperature: 5°C to 40°C.
- Maximum operating housing temperature: 55ºC
- Storage ambient temperature: -20°C to +60°C
- Thermal cut off: 63ºC ± 3ºC of oil temperature.

b. **Humidity**
98% non-condensing

c. **Dimensions**
See figures in Item 15

d. **Weight**
X-ray generator: 50 lbs
Control box: 7 lbs

e. **Cooling method**
Through an integrated cooler.

10. AC POWER INPUT CONNECTOR – J1
- Voltage: 220VAC±10%, 50/60Hz
- Current: 3.7 Amps RMS max.

11. LED INDICATORS

Power (Green)	DS1	Illuminated when Power is present
X-ray On (Red)	DS2	Illuminated when Interlock is closed & HV is enabled
Arc (Yellow)	DS6	ARC-ing fault
OC (Yellow)	DS5	Over Current Fault
OT (Yellow)	DS7	Illuminated when oil temperature exceeds 60±3ºC
OP (Yellow)	DS4	Overpower, Illuminates when selected power exceeds the rated power
OV (Yellow)	DS3	Over Voltage fault

12. CONTROL CABLE AND CONNECTOR

a. **J1 Connector: AC Input**

b. **J2 Connector:** (Interlock 9 Pin Male)

Pin Out	Name
1	Interlock out
2	Interlock In
3	X-Ray On Relay contact Common
4	X-Ray On Relay contact N/C
5	X-Ray On Relay contact N/O
6	N/A
7	N/A
8	N/A
9	N/A

c. **J3 Connector:** (RS232 9 Pin Female)

Pin Out	Name
1	N/A
2	TX-
3	RX+
4	N/A
5	SIGNAL GRD
6	N/A
7	N/A
8	N/A
9	N/A

d. **RJ45 Ethernet Digital Interface:** (USR-TCP232-T)

Pin Out	Name
1	TX+
2	TX-
3	RX+
4	N/A
5	N/A
6	RX-
7	GROUND
8	GROUND

e. **J4 Connector:** 24VDC (Molex 39-30-0040)

Pin In	Name
1	+24VDC@3.0A for Pump and Fans
2	24VDC Return for Pump and Fans
3	+24VDC@1.5A for Control Circuit & Control Fan
4	24VDC Return for Control

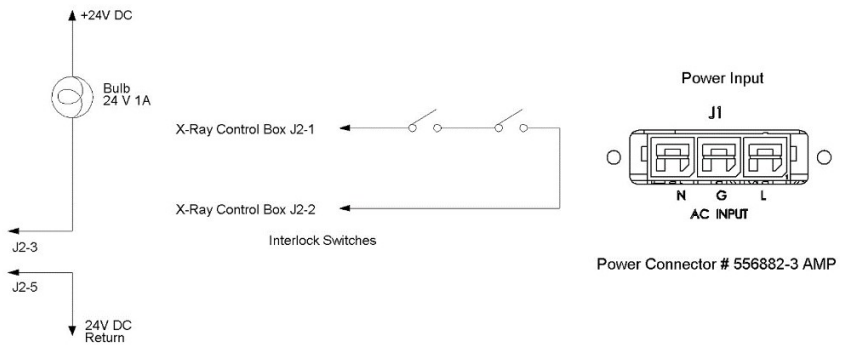
f. **Control Cable:** 4ft standard

13. DIGITAL INTERFACE

Refer to Document P562-IXS-FIRMWARE-P562.

14. TYPICAL EXTERNAL CIRCUITS

Typical External Circuits



15. MECHANICAL DRAWINGS

Figure 1: X-ray Generator

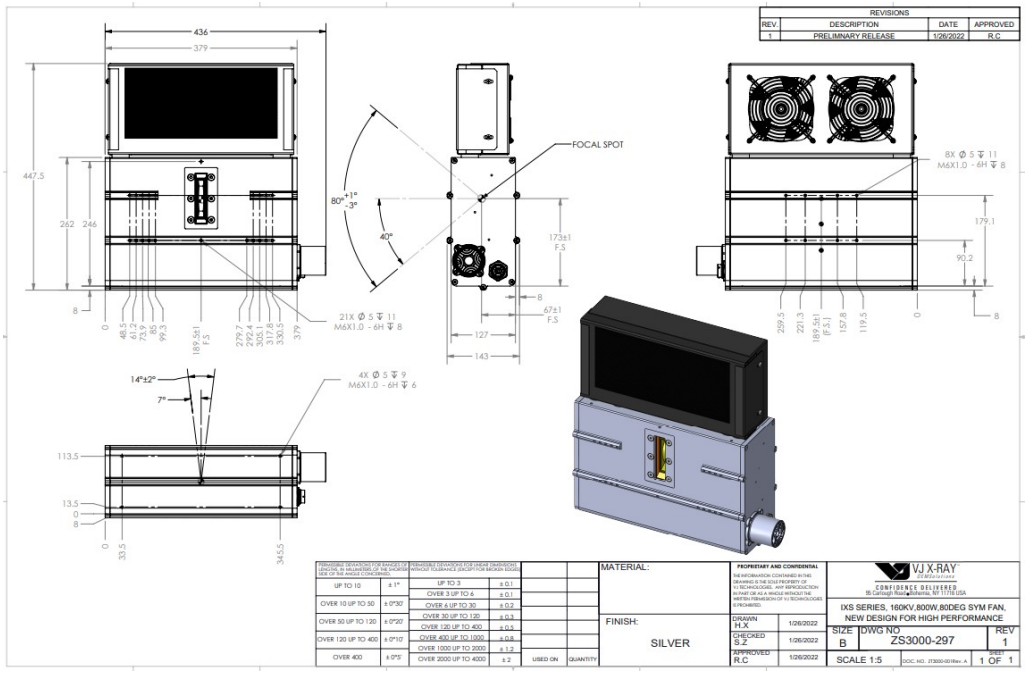
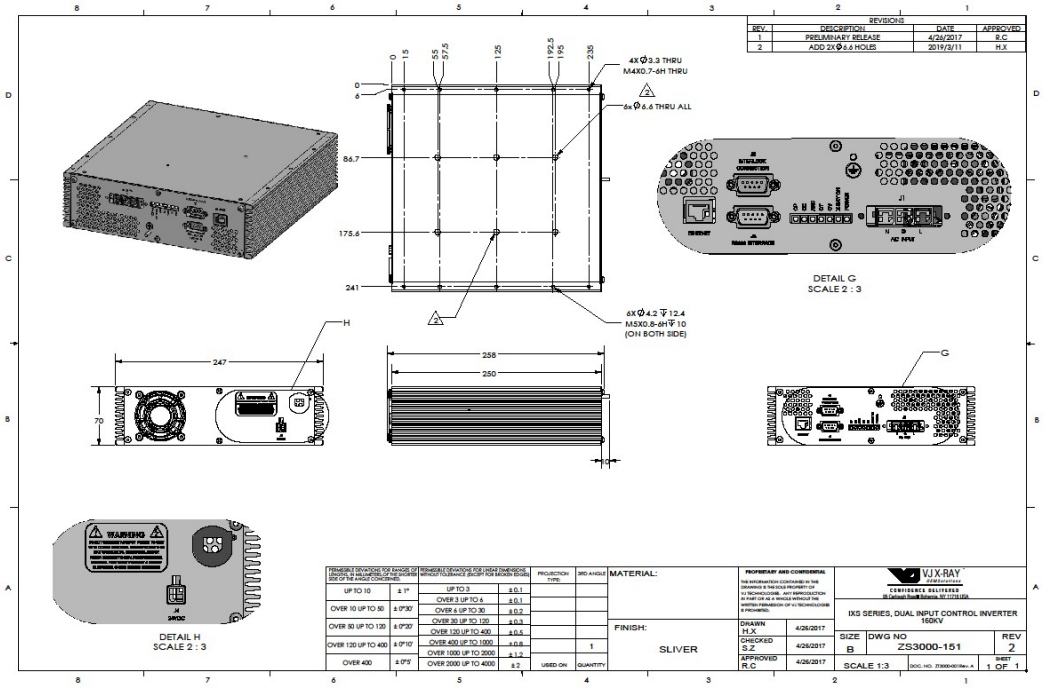


Figure 2: Control Box



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