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High Voltage Power Supply
XMPG10P10/24

SAFETY AND INSTALLATION INSTRUCTIONS

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Issue	**A**	**1**	
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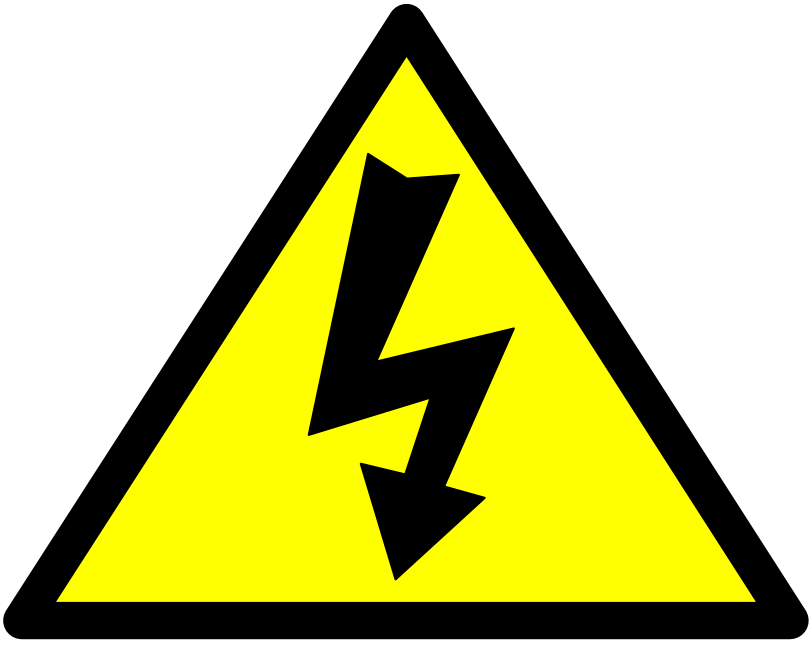
SAFETY



DANGER
HIGH VOLTAGE
RISK OF ELECTROCUTION

Observe extreme caution when working with this equipment

- **High voltage power supplies must always be connected to protective earth**
- **Do not touch connections unless equipment is turned off and the capacitance of both the load and power supply are grounded**
- **Allow adequate time for discharge of internal capacitance of the power supply**
- **Do not ground yourself or work under wet or damp conditions**

Servicing Safety

- **Maintenance may require removing the Instrument cover with the power on**
- **Servicing should only be done by qualified personnel aware of the hazards**
- **If in doubt, return to supplier for servicing**

Change History

Section	Reason for Change	Issue
All	Original	A
3 4 5 7 8	Added regulatory specifications Added environmental conditions Added mechanical Added input and output connections details Added setup and adjustments	1

Contents

1 Unit Description

The XMPF10N5/24 unit consists of one chassis containing the high voltage power supply.
The dimensions are 185mm x 105mm x 33.5mm

The unit is designed for operation from 24Vdc ± 10%. The maximum rated input current is 2A.

The unit provides an HV Cathode output rated at 10kV, 10W. Intended to drive an X-ray tube with a grounded filament, rated at 0V to 3Vdc 5A max.

All control and monitoring is accomplished via a 15 way 'D' connector which also provides input power to the unit.

2 Safety

The HV output of the unit is hazardous and the conditions of this manual must be complied with to maintain safety. Operating the unit in a manner not specified in this manual may impair the protection against electric shock provided by the unit.

The unit is contained in an earthed case, the system protective earth shall be provided to the chassis. The case of the unit shall be properly bonded to the main protective earth termination in the end product.

The unit has been evaluated for use in a Pollution Degree 2, Installation Category II environment.

Consideration should be given to conducting the following tests with the unit installed in the end product:

- Dielectric Voltage Withstand Test, between live parts of the unit and the end product chassis.
- Permissible Limits Tests with the unit installed in the end product.
- Temperatures on power electronic components, transformer windings and accessible surfaces.

There is no relevance to a risk assessment carried out as part of the CE testing on the HV unit. It is recommended that a full assessment is carried out in the end application.

 This symbol on the unit means "read the manual before powering the equipment".

 This symbol on the unit means "Caution; risk of electric shock".

3 Regulatory Specifications

The unit is designed to meet the requirements of EN 61010-1, UL 61010-1 and CAN/CSA-22.2 No. 61010-1. Please consult the factory for further approval information.

As the unit is designed for incorporation within the user's system it is not tested against any specific EMC standards. The user will need to take sensible EMC precautions when designing the unit in and verify the overall system EMC performance against any relevant standards.

4 Environmental conditions

4.1 Operating

Protection: The power supply will be designed to meet IP40 and will be reasonably protected against dust.

Temperature: +5°C to +40°C.

Relative Humidity: 20% to 80% (no condensation)

4.2 Storage

Temperature: -40°C to +70°C.

Relative humidity: 5% to 95%

Absolute humidity: maximum 25 gm^{-3}

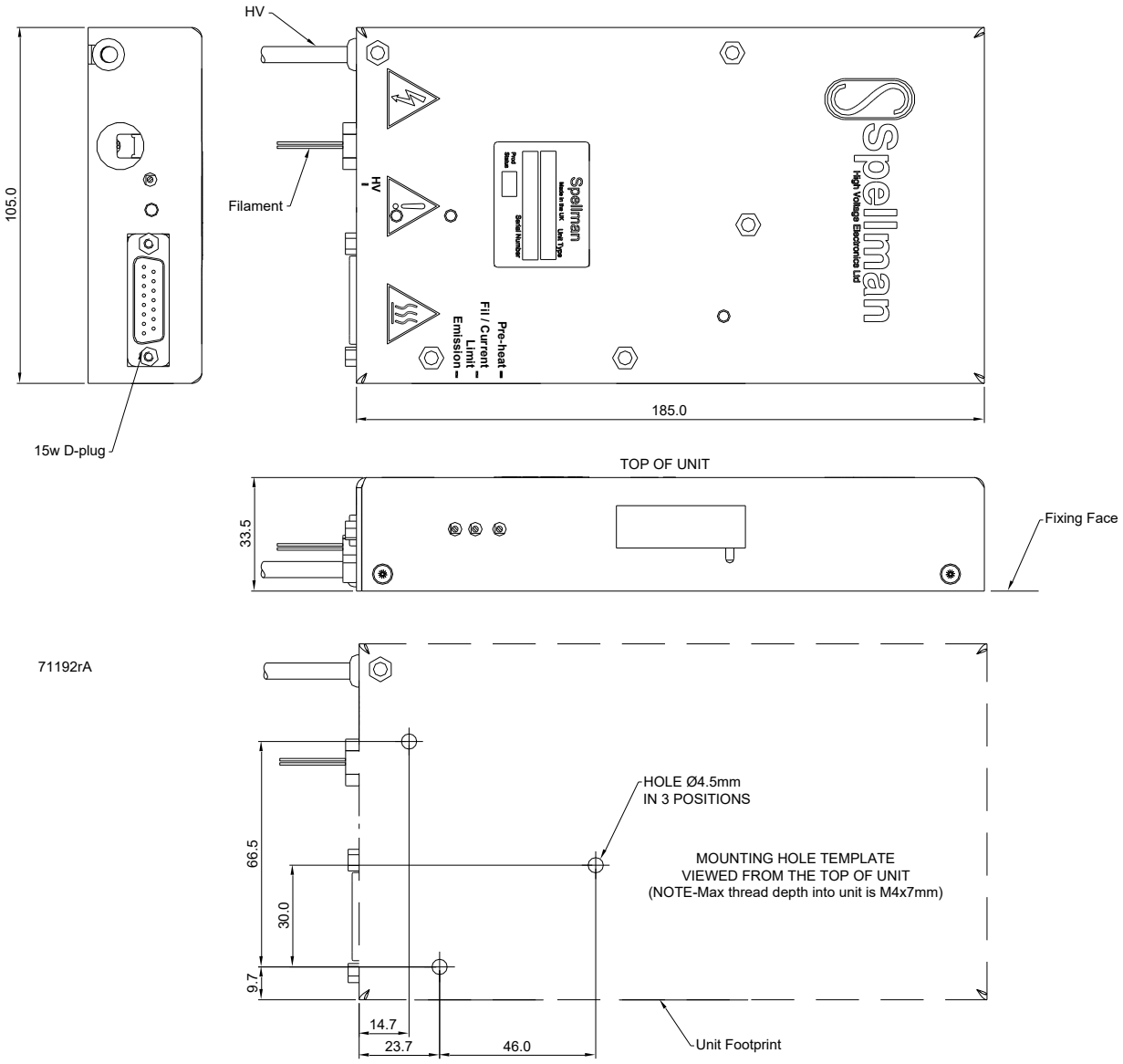
Maximum storage period: >0.25 year (at above conditions)

Long term storage: >3 year (special packaging required)

5 Mechanical

5.1 Mechanical outline: 185mm x 105mm x 33.5mm

The mass of the module is nominally 2kg



6 Installation

6.1 Initial Inspection

Inspect the package exterior for evidence of damage due to handling in transit. Notify the carrier and Spellman immediately if damage is evident. Do not destroy or remove any of the packing material used in a damaged shipment.

After unpacking, inspect the panel and chassis for visible damage.

Note: Failure to comply with the above could compromise the safe operation of the unit and invalidate the warranty.

6.2 Mechanical Installation

The unit should only be used in a Pollution Degree 2 Installation Category II environment.

The input and output connectors are not intended for field connections and should only be connected to internal wiring in the end product. The unit is intended for use as a component and no surface of the unit should be accessible in the end product.

6.3 Electrical Installation

The unit must be terminated safely before operation. Hazardous voltages will be exposed if the connector is removed whilst the unit is enabled.
The 24Vdc input shall be provided by a double insulated, or SELV, UL recognised power supply.

Circuits connected to the unit shall be provided with rated insulation to IEC/UL61010-1.

The unit must be switched off for at least one minute before disconnecting any of the connectors.

7 Input and Output Connections

7.1 Monitoring and Control

7.1.1 HV enable

This is a digital input which controls the HV output. Driving this input low (< 0.8V) will cause the HV output to be enabled and ramp up to its programmed value. The filament current will start to ramp up after the high voltage has reached its programmed value, approximately 3 seconds after the HV output is enabled. Disconnecting or driving this input high (>2.4V) will cause the filament to be turned off and the HV output disabled. The maximum input voltage of this input is 12V.

7.1.2 Filament stable

Open collector digital output indicating that the filament current has stabilised and the tube could be producing X-rays. This should occur 8 – 10s after the HV enable is activated. A low output (<0.8V) indicates that the filament current has not stabilised The maximum rating of this input is 12V.

7.1.3 HV voltage program output

A 10V internal reference voltage and 12 turn 20KΩ potentiometer is provided that can be used to locally control or pre-set the high voltage output. Connecting this output to the high voltage program input will allow the high voltage output to be pre set/controlled using the internal potentiometer.

7.1.4 HV voltage program input

0 – 10V input corresponding to 0 – 10kV output. Accuracy +/-2% of full scale. Z_{in} = 5MΩ.

7.1.5 HV voltage monitor

0 – 10V output corresponding to 0 – 10kV output. Accuracy +/-2% of full scale. Z_{out} = 10kΩ.

7.1.6 Emission current monitor

0 – 10V output corresponding to 0 – 1mA emission current. Accuracy +/-3% of full scale. Z_{out} = 10kΩ.

7.1.7 Filament current monitor

0 – 10V output corresponding to 0 – 5A filament current. Accuracy +/-5% of full scale. Z_{out} = 2k2Ω.

7.1.8 Filament current Pre heat (set value)

Provided for adjustment of the filament Pre heat current level. 0 – 5V output corresponding to a Pre heat current setting of 0.5A – 2.5A filament current.

7.1.9 Filament current Preset Maximum filament current (set value)

Provided for adjustment of the filament current limit value. 0 – 10V output corresponding to a maximum filament current of 0 – 5A.

7.1.10 Emission current program input

0 – 10V input corresponding to 0 – 1mA emission current. Accuracy +/-3% of full scale. Z_{in} = 1MΩ.

7.1.11 Emission current program output

A 10V internal reference voltage and 12 turn 5KΩ potentiometer is provided that can be used to control or pre-set the emission current. Connecting this output to the emission current program input will allow the emission current output to be pre-set using the internal potentiometer.

7.1.12 Pin connections

The monitoring and control is provided through a 15 way ‘D’ connector which also provides input power to the unit.

7.2 Pin connections

The low voltage signal connections are made by a 15 way ‘D’ connector; the pin out is shown below:

Pin #	Signal Name	Range
1	+24V input	
2	Power Ground	
3	Preheat (set value)	0 – 5V from internal pre set
4	Test (Filament Current Direct Program)	Do not connect
5	HV enable	Digital input
6	Filament stable	Digital output
7	High voltage program output	0 – 10V from internal pre set
8	High voltage program input	0 – 10V input
9	High voltage monitor	0 – 10V output
10	Emission current monitor	0 – 10V output
11	Filament current monitor	0 – 10V output
12	Emission current program input	0 – 10V input
13	Emission current program output	0 – 10V from internal pre set
14	Signal ground	
15	Pre-set maximum filament current set value	0 – 10V from internal pre set

The filament Preheat level and current limit are set by internal presets accessible through the case side.
If external high voltage control is not required link pins 7 and 8.
If external emission current control is not required link pins 12 and 13.

7.3 Filament Output

The filament output is via two tri rated 16/02 conductor wires:-

Colour	Name
Red	Filament+
Black	Filament-

7.4 HV output

The HV output is via a 500mm long un-terminated URM76 LSF screened cable.

8 Set Up & Adjustments

8.1 Connect 24V power to the unit, +24V (pin 1), 0V (pin 2), do not Enable the unit.

8.2 Connect a multi-meter to pin 15 with return to pin 14.

8.3 Turn Filament Current Limit adjustment potentiometer on the case side to set a safe value for the maximum filament current. 0 → 10V corresponds to 0 → 5Amp filament current.

8.4 Connect the multi-meter to pin 3 with return to pin 14.

8.5 Turn the Pre heat adjustment potentiometer on the case side to obtain the required filament pre heat current 0 → 5V corresponds to 0.5A → 2.5A filament current.

8.6 If external HV control is required connect the control signal to pin 8 with return to pin 14. 0 → 10V corresponds to 0 → +10kV

8.7 If internal HV control is required link pins 7 and 8 then turn the HV preset adjustment on the case front whilst monitoring the voltage at pin 8 (return to pin 14). Set for the HV potential required.

8.8 If external emission control is required connect the control signal to pin 12 with return to pin 14. 0 → 10V corresponds to 0 → 1mA emission current.

8.9 If internal emission control is required link pins 12 and 13. Turn the Emission adjustment potentiometer on the case side to set the emission current for the value required.