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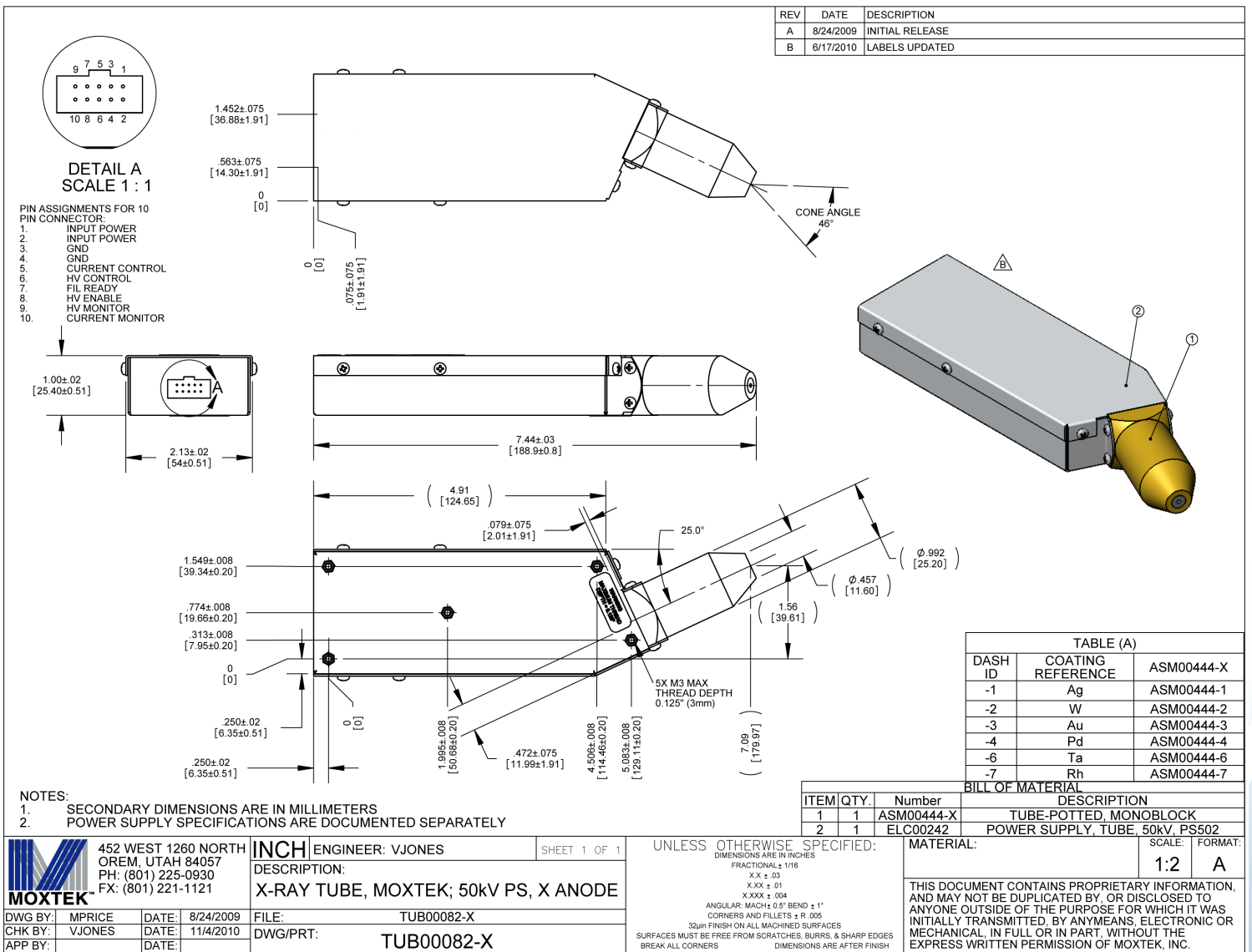
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Mechanical Specifications

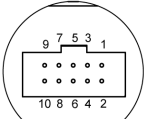
X-ray Tube Characteristics

*Tube Type:* Metal-ceramic  
*Cathode Type:* Tungsten filament  
*Operating Temperature:* -10° to +50°C (for more details see Figure 2, page 3)  
*Storage Temperature:* -40° to +85°C  
*Cooling:* Air  
*HV Insulation:* Silicone potting  
*Weight:* 0.7 lb. (350g)  
*Available Targets:* Ag, W, Au, Pd, Ta, Rh

*HV Polarity:* Grounded anode  
*High Voltage:* -4 to -50 kV  
*Beam Current:* 0 to 0.20 mA  
*Maximum Power:* 4 watts  
*Focal Spot Size:* Typical ~ 300 μm  
*Windows:* Beryllium, 0.25 mm thick  
*Input Power:* 15W max (6-12 VDC)  
*Warranty:* One year

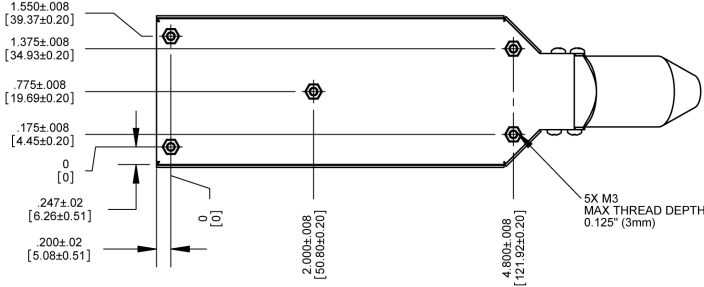
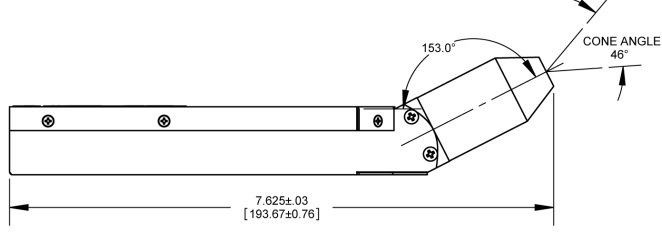
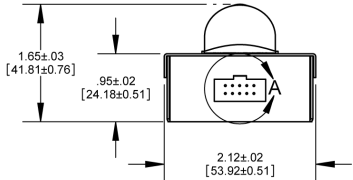
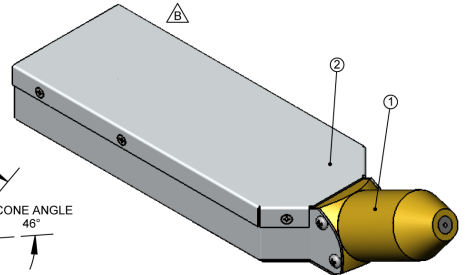
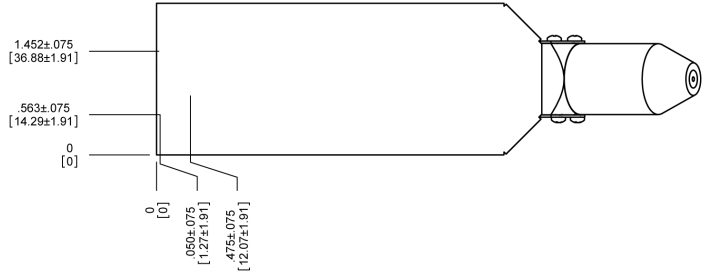


REV	DATE	DESCRIPTION
A	9/2/2009	INITIAL RELEASE
B	6/17/2010	LABELS UPDATED



**DETAIL A  
SCALE 1:1**

- PIN ASSIGNMENTS FOR 10 PIN CONNECTOR:
1. INPUT POWER
  2. INPUT POWER
  3. GND
  4. GND
  5. CURRENT CONTROL
  6. HV CONTROL
  7. FIL READY
  8. HV ENABLE
  9. HV MONITOR
  10. CURRENT MONITOR



DASH ID	COATING REFERENCE	ASM00444-X
-1	Ag	ASM00444-1
-2	W	ASM00444-2
-3	Au	ASM00444-3
-4	Pd	ASM00444-4
-6	Ta	ASM00444-6
-7	Rh	ASM00444-7

- NOTES:
1. SECONDARY DIMENSIONS ARE IN MILLIMETERS
  2. POWER SUPPLY SPECIFICATIONS ARE SHOWN ON SEPARATE PAGE

ITEM	QTY	Number	DESCRIPTION
1	1	ASM00444-X	TUBE-POTTED MONOBLOCK
2	1	ELC00249	POWER SUPPLY, TUBE, 50KV, 200µA, PS512

**MOXTEK**  
 452 WEST 1260 NORTH  
 OREM, UTAH 84057  
 PH: (801) 225-0930  
 FX: (801) 221-1121

INCH ENGINEER: VJONES SHEET 1 OF 1  
 DESCRIPTION: X-RAY TUBE, MOXTEK, 50KV PS, X ANODE  
 FILE: TUB00083-X  
 DWG/PRT: TUB00083-X

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 FRACTIONAL ± 1/16  
 X.X ± .03  
 X.XX ± .01  
 X.XXX ± .004  
 ANGULAR: MACH ± 0.5° BEND ± 1°  
 CORNERS AND FILLETS ± R .005  
 32µR FINISH ON ALL MACHINED SURFACES  
 SURFACES MUST BE FREE FROM SCRATCHES, BURRS, & SHARP EDGES  
 BREAK ALL CORNERS  
 DIMENSIONS ARE AFTER FINISH

MATERIAL: SCALE: 1:2 FORMAT: A  
 THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION, AND MAY NOT BE DUPLICATED BY, OR DISCLOSED TO ANYONE OUTSIDE OF THE PURPOSE FOR WHICH IT WAS INITIALLY TRANSMITTED, BY ANYMEANS, ELECTRONIC OR MECHANICAL, IN FULL OR IN PART, WITHOUT THE EXPRESS WRITTEN PERMISSION OF MOXTEK, INC.

**Drawing 1 Monoblock Source Dimensions**



### Monoblock X-ray Source:

The Monoblock X-Ray Source is small, lightweight, and can be packaged into custom enclosures. The Monoblock X-Ray Source package includes an x-ray tube and a high voltage power supply that operates at up to 50 kV and 200  $\mu$ A. The low power consumption Monoblock X-Ray Source is ideal for battery-powered applications. The tube anode is grounded allowing placement close to the sample.

### Initial Inspection:

When a Monoblock X-Ray Source is received, it should be unpacked and inspected as soon as possible. A standard Monoblock X-Ray Source consists of a high voltage power supply and an x-ray tube enclosed in a brass shield (Figure 1). Inspect the high voltage power supply and the tube shield assembly for any damage that may have occurred during shipping. If a tube has been damaged, please contact Moxtek immediately. The serial number is located on the sticker on the high voltage power supply.

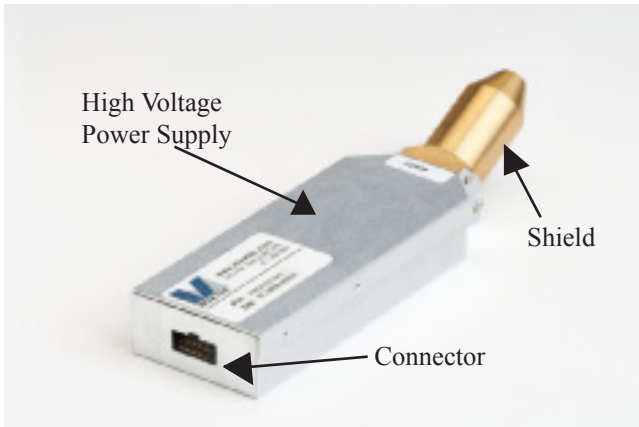


Figure 1

Monoblock X-ray Source

### Handling:

Care must be taken not to touch or damage the beryllium window at the end of the tube shield (Figure 2).

### Tube Setup:

#### (Mechanical)

The Monoblock X-Ray Source assembly may be mounted with the exit collimator facing any direction. The high voltage power supply has five threaded holes M3x3 mm on the bottom side (no stickers) of the metal case. These holes may be used for mounting.

#### (Cooling)

The Monoblock X-Ray Source does not require forced convection or liquid cooling. The tube should be operated in an environment that allows free air convection or conduction to secondary parts. Please refer to page 2 of this manual for operating and storage temperature specifications. The specified temperature is measured at the surface of the aluminum can containing the high voltage power supply unit.

The maximum recommended operating anode shield temperature is 100 degrees Celsius (see Figure 2).

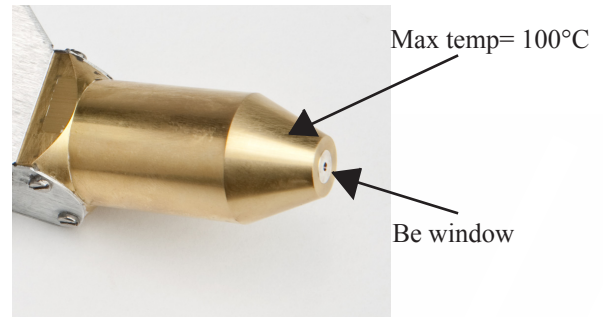


Figure 2

Monoblock's shield details

(Electrical)

The high voltage power supply has a 10 pin connector (Figure 1). This connector is used to power, control and monitor the x-ray tube. Table 1 shows the pin-out for the connector.

An optional 10 lead ribbon cable is available from Moxtek (Figure 3). This ribbon cable has a 10 pin IDC connector on one side that connects to the high voltage power supply and a DB9 connector on the other end that connects to the Moxtek FTC-200 controller (Table 3).

Pin Assignment for 10 Pin IDC Connector			
Function	Pin #	I/O Value	Response
Input power	1	+6 to +12 V	Input power
Input power	2	+6 to +12 V	Input power
Ground	3	Ground	Ground
Ground	4	Ground	Ground
Current control	5	0.0V to +4.0 V	0.0 $\mu$ A to 200 $\mu$ A
HV control	6	+0.32 V to +4.0 V	-4 kV to -50 kV
Filament ready	7	0.0 V or +5 VTTL output	0 Not ready +5 Ready
HV enable	8	0.0 V or +5 VTTL input	0 Disabled, +5 Enabled
HV monitor	9	+0.32 V to +4 V output	Proportional to -4 kV to -50 kV
Current monitor	10	0.0 V to +4 V output	Proportional to 0 to 200 $\mu$ A

Table 1

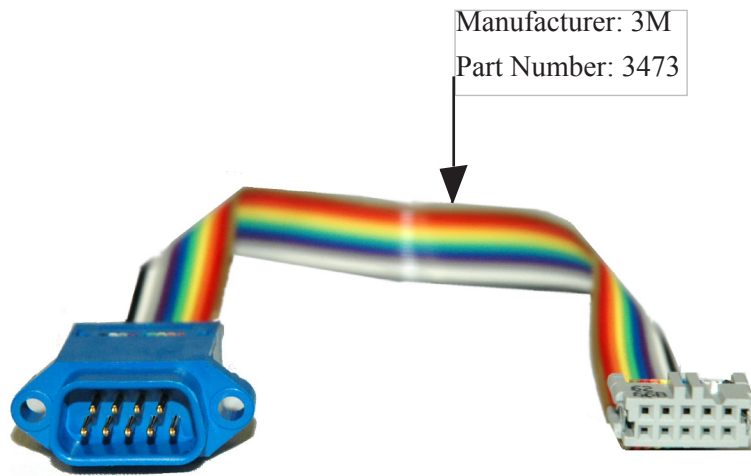


Figure 3: Optional Ribbon Cable (ASM00362)

Pin Assignment for 10 Pin IDC Connector				
Function	Pin #	I/O Value	Response	Ribbon Wire Color
Input power	N/A	+6 to +10 V	Input power	Brown
Input power	1	+6 to +10 V	Input power	Red
Ground	2	Ground	Ground	Orange
HV control	3	+0.32 V to +4.0 V	-10 to 50 kV	Blue
HV enable	4	0.0 V or +5 VTTL input	0 Disabled, +5 Enabled	Grey
Current Monitor	5	0.0 V or +5 VTTL output	-4 kV to -50 kV	Black
Ground	6	Ground	0 Not ready +5 Ready	Yellow
Current Control	7	0.0 V or +4 V	0 Disabled, +5 Enabled	Green
Filament ready	8	0.0 V to +5 V output	Proportional to -4 kV to -50 kV	Violet
HV monitor	9	+0.32 V to +4 V output	Proportional to 0 to 200 $\mu$ A	White

Table 3

Safety Interlock:

To assure safe tube operation, a 5 volt TTL signal is sent to the power supply to enable x-ray generation. Moxtek recommends the use of a safety interlock switch when operating the MAGNUM x-ray tube. Connect the high voltage enable pin (see Table 2) to the customer supplied safety interlock switch.

## Operating Conditions:

Monoblock's anodes are grounded to a metal shield (Figure 1).

When operating the 50kV Monoblock X-Ray Source, adhere to the maximum setting below:

- **50 kV, 0.20 mA max, power limited to 4 Watts**

Failure to adhere to these limits may cause damage the x-ray tube and/or high voltage power supply. Failure to adhere to this parameter will forfeit the tube warranty.

When operating Monoblock X-Ray Source, **wait 2 seconds after the tube has been powered off before powering the tube on again.** Failure to wait 2 seconds may damage the filament. Failure to adhere to this parameter will forfeit the tube warranty.

## Operation Precautions and Warnings:

**CAUTION:** Verify that the tube and the high voltage power supply are properly grounded before powering on the FTC-200 tube controller. Also verify that the FTC-200 controller is properly grounded to the power outlet. If you are not using the FTC-200 Controller and using a custom controller, make sure the tube and the high voltage power supply are properly grounded.

**CAUTION:** Monoblock X-Ray Source contains beryllium. Inhaling beryllium dust causes lung disease. Do not touch the beryllium window (Figure 2).

**WARNING:** Monoblock X-Ray Source may become very hot during operation. Temperatures should not exceed 50 degrees Celsius on the power supply box.

**WARNING:** Monoblock X-Ray Source produces x-ray radiation. Monoblock's tubes are shielded with a metal shield(brass) and high-Z potting materials. Extra shielding may be required depending on the application. **ONLY OPERATE X-RAY TUBES IN PROPERLY SHIELDED ENCLOSURES.** It is the responsibility of the operator to ensure that all applicable safety precautions are taken and observed.

**WARNING:** Monoblock sources operate at high voltages up to 50 kV. Refer to the tube handling instructions on page 4. Precautions should be taken to protect the operator while applying high voltages to avoid serious injury or death.

## Operating the Monoblock X-Ray Source without a Moxtek FTC-200 controller:

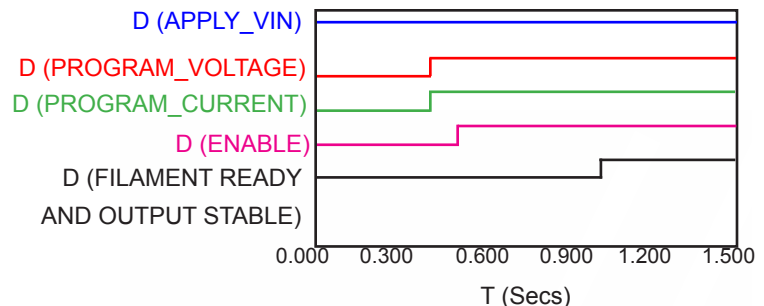
The high voltage power supply uses DC voltages and signals to operate the tube. To operate the tube without using a Moxtek FTC-200 controller, refer to Table 1 and Table 2 for the 10 pin high voltage power supply connector pinouts.

## Timing Diagram:

If the monoblock source is controlled by a device other than the FTC-200 controller please refer to the timing diagram (Figure 4) for the sequence of the input voltages and currents.

## Operating the Monoblock X-Ray Source with a Moxtek FTC-200 Controller:

The FTC-200 controller is designed to power, monitor, and control the Monoblock X-Ray Source. This controller contains all of the necessary electronics to operate the high voltage power supply. The FTC-200 controller provides input power to the high voltage power supply. The FTC-200 controls the high voltage and emission current settings on the x-ray tube. The FTC-200 controller includes built-in meters for convenient monitoring and display of the high voltage and emission current. Refer to the FTC-200 Operation Manual for operating instructions.



**Figure 4**  
**High Voltage Power Supply Timing**

## Technical Support:

For product technical support please contact Moxtek at (801)225-0930 or through the web site at [www.moxtek.com](http://www.moxtek.com).



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TUB-MAN-02050, Rev D  
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