

# TFX-9100-EWC-UNI-S

## MicroFocus Integrated X-Ray Source

# Sub-System Data Sheet

### Sub-System Specification

System Parameters	Specifications	Note
Target Voltage	25 to 100 kV	Contact Trufocus for applications requires < 25kV
Tube Current	0.02 to 1 mA	
Focal Spot Size	<= 8 um	
Tube Power	8* W	
Tube type	End Window Cone(EWC)	

\*Maximum Tube Power depends on Focus Spot Size and target material. 8 W for 8 um

### Parts needed to build the Sub-system

Modules	TruFocus Ordered P/N	QTY
9000 series MicroFocus X-ray Source	<b>TFX-9100-EWC-UNI-S</b>	<b>1</b>
9000 Series Digital MicroFocus Controller*	MFX-CTR-9000-100-1-D	1
9000 Series Analog MicroFocus Controller*	MFX-CTR-9000-100-1-A	1
PC Software Driver	Included	

\* Only need one Controller ( Analog or Digital)

Enclosed please find Data Sheets of individual parts in the Sub-system.

# TFX-9100-EWC-UNI-S

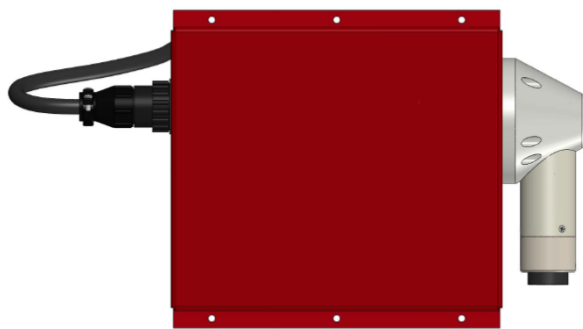
## MicroFocus Integrated X-Ray Source

(End Window Cone)

Contact TruFocus for any modification of Specifications for your application

FAMILY	TruFocus Ordered P/N	Min/Max Target Voltage (kV)	Min/Max Target Current (mA)	Maximum TUBE Power (W)	Focal Spot Size (um)	Beam Angle	Focus to Object Distance (S) (FOD, mm)	Operation
TFX	TFX-9100-EWC-UNI-S	25 / 100	0.02 / 1	8*	<= 8	59° +- 0.5°	22.3	Continuous

\*Maximum Tube Power depends on Focal Spot Size (FSS) and target material. See Tube Operating Power table below. 8 W for 8 um.



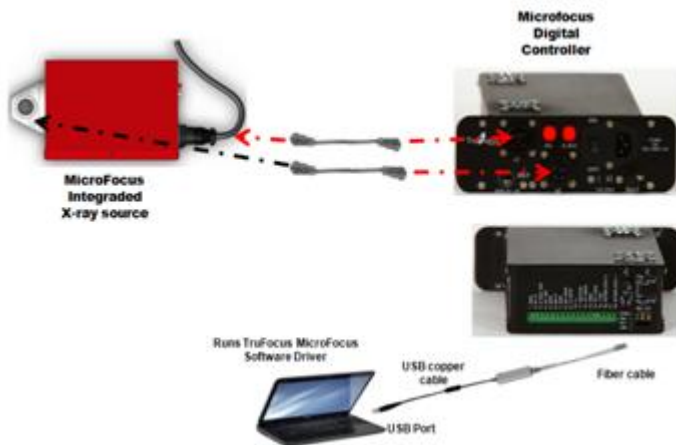
Top View



Side View

**TFX-9100-EWC-UNI-S** X-Ray source is part of the TruFocus 9000 series MicroFocus Tube family. The unit integrates a MicroFocus X-ray tube (<=8 μm in Focal Spot Size) and a High Voltage Power Supply (100kV, 1 mA) in one unit. This unit was developed to fulfill the need for high resolution imaging for Industrial, Medical (Specimen Radiography), Aerospace and Analytical applications. The Sub-system produces exceptional image quality and focus sharpness.

### Sub-System Overview



TruFocus has developed Microfocus controllers, both digital and analog, to interface with this integrated power supply x-ray tube unit for monitoring and controlling the operation of this system when properly connected with an appropriate computer system.

# Specifications

## Order Part Number

TFX	9100	EWC	UNI	S
Product Family Microfocus family	Product Series 9000 series, 100KV	Tube Type End Window Cone	Package Type: Integrated (X-ray source + Power Supply)	S: FOD Distance

Max Target Voltage (KV)	Minimum Target (KV)	Max Target Current (mA)	Minimum Target (mA)	Operating Ambient Temperature (°C)	Maximum TUBE Power (W)	Operating Temperature (°C)	Operating and Storage Humidity (%)	Weight (lb)	HV Power Supply
100	25	1	0.02	40	8*	55	85% RH	22	Build-in

\*Maximum Tube Power depends on Focal Spot Size (FSS) and target material. See Tube Operating Power table below. 8 W for 8  $\mu$ m

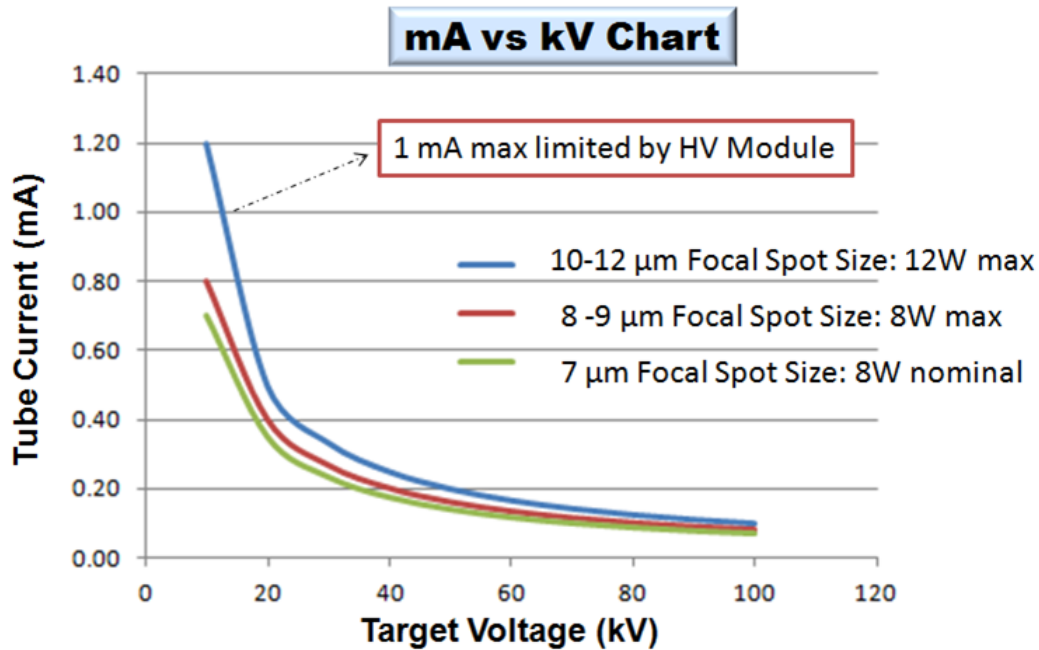
Focus to object Distance (FOD, mm)	Focal Spot Size ( $\mu$ m)	Beam Angle	Operation	Input Supply (V)
22.3	$\leq 8$	59° +- 0.5°	Continuous	From TruFocus MicroFocus Controller . See Specification section

Tube Target Material	Tube Window Material	Tube Window Thickness	Tube Window type	Cooling Method	Flux Stability
Tungsten	Beryllium	0.01 "	End Window Cone	Air	<0.2%*

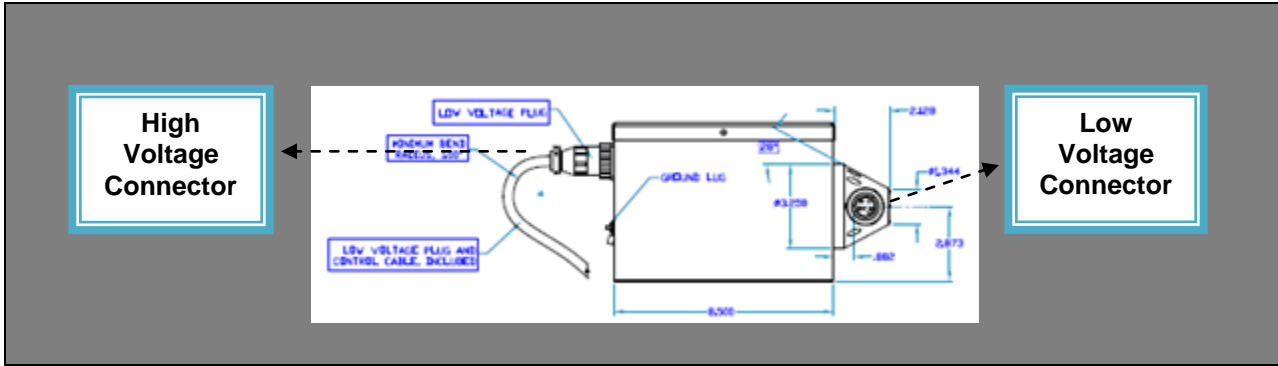
\*Relative Standard Deviation over 4 hours of continued operation.

1W per 1 $\mu$ m Focal Spot Size (FSS) for Tungsten when FSS < 10 $\mu$ m	
Focal Spot Size ( $\mu$ m)	Maximum Target Operating Power (Continuous, W)
8	8
9	9
10	10 - 12

\*Maximum Tube Operating Power (W) of 8000 series is: 12 W



**Control Interface**



**Low Voltage Control Connector Pin out & Functional Description**

Pin #	Signal Names	Note
1	N/A	
2	N/A	
3	GND	
4	Heater +	6.0 V DC & 0.7A Max
5	Heater -	
6	L-1	0 to -20 VDC, Grid 1
7	N/A	
8	N/A	
9	N/A	
10	N/A	
11	N/A	
12	L-2	2000 V DC Max. Contrast Control - Grid 2
13	N/A	
14	L3	3000VDC Max Focus Control - Grid 3

AMP 14-PIN, Female, Circular Plastic Connector  
Standard Cable Length shipped: 8 ft

All Voltages set at TruFocus  
Table provided only for monitoring purpose.

**High Voltage Control Connector Pin out & Functional Description**

Pin #	Signal Names	Note
1	MA-Feedback	mA Feedback
2	NC	
3	KV-Feedback	KV Feedback
4	N/A	
5	GND	
6	N/A	
7	PWM1	HV input 1
8	N/A	
9	PWM2	HV Input 2

AMP 9-PIN, Male, Circular Plastic Connector  
Standard Cable Length shipped: 8 ft

Connection between UNI unit and TruFocus MicroFocus Controller

**MicroFocus Software Driver**

**TruFocus' Full User Graphic Interface (GUI) software driver**

Connection: Via PC USB port

Software Driver supports Window Vista, Window XP and Window 7

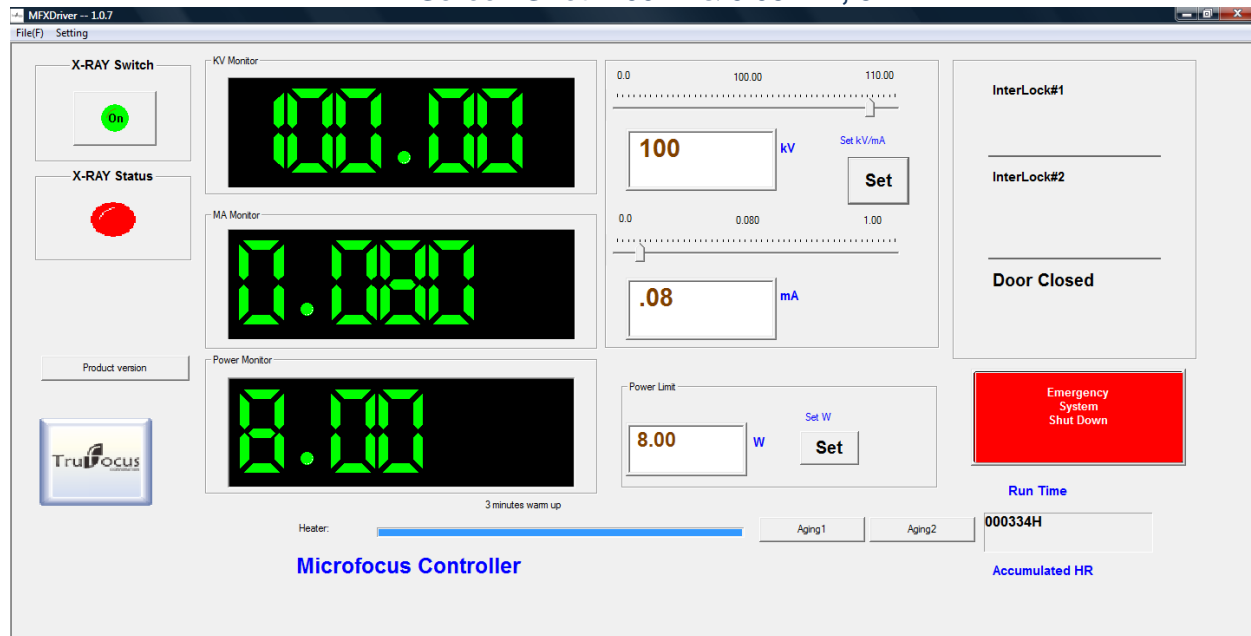
Software Driver shipped with MicroFocus Digital Controller

PC requirement: Standard PC, USB, 32 or 64 bit operating system. Minimum 4G RAM

Complete Software Development Kit available with engineering Technical Support

## The main Control Display Screen

Screen Shot: 100kV & 0.08 mA, 8W



Software Function	Description
X-ray Status	Indicating X-ray is actually ON or OFF
X-Ray Switch	Indicating X-ray Switch is currently at ON or OFF position
Product Version	Shows Controller Product version and SN number
KV Set	Type in an operating KV value, then, click on SET icon to set the KV value
mA Set	Type in an operating mA value, then, click on SET icon to set the mA value
Power Limit	Automatic protection function. Type in maximum Power Limit for this Test, then, click on SET Sub-system maximum power is preset to 8W for 8 um focal Spot size. User can change any maximum power lower than or equal 8 w for a given test
Heater	Tube Warm up process. Automatically starts every time software driver is Launched.
Aging1	Click on Aging1 to start Automatic Tube Aging process ( New tube or Tube that was not used for more than 5 days)
Aging2	Click on Aging 2 to start Daily Automatic Aging process
InterLock 1	Interlock #1 status indicator
Interlock 2	Interlock #2 status indicator
Emergency System Shut down	Anytime, Click this icon, system will be shutdown
Run Time	Total X-ray run timer (in HR)



# 9000 Series MicroFocus Digital Controller

## MFX-CTR-9000-100-1-D

Family	TruFocus Ordered P/N	Description	Max. Voltage (kV)	Max. Current (mA)	Max. Power (W)	Cooling Method	Weight	Programmable Control Interface
MFX	MFX-CTR-9000-100-1-D	MicroFocus Digital Controller. For Controlling 9000 Series Integrated X-Ray Source family	100	1	100	Air	4.5 lb	Yes USB



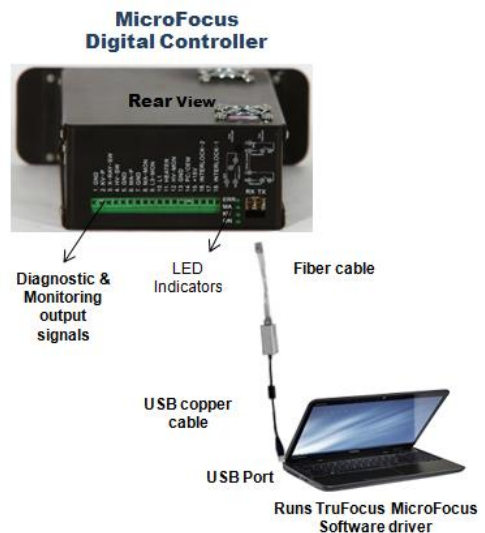
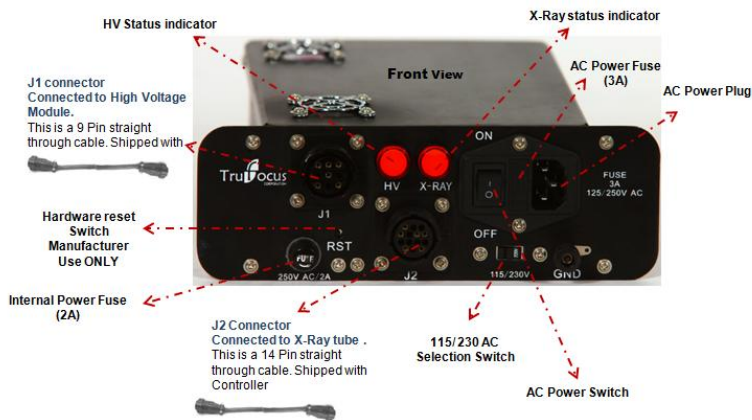
**Front View**



**Rear View**

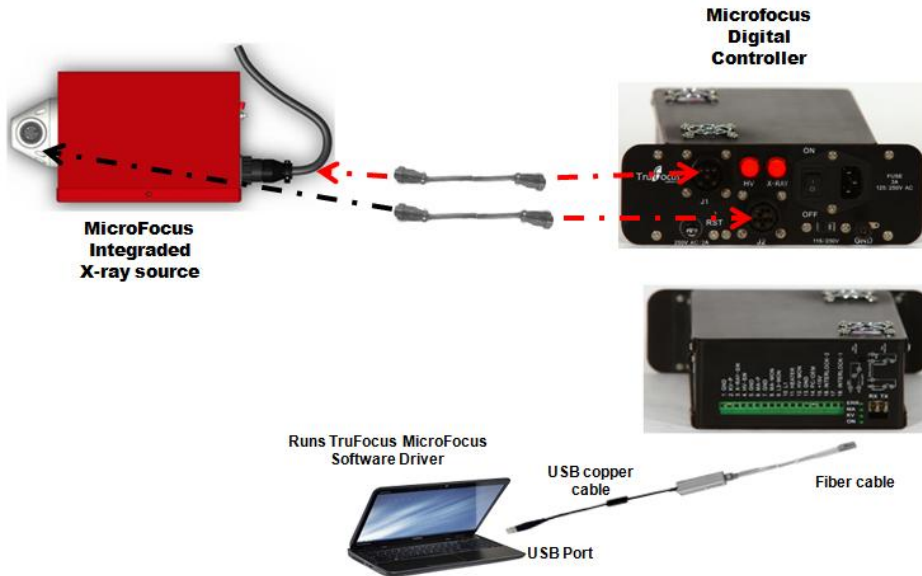
**9000 Series MicroFocus Digital Controller** is specifically designed for controlling TruFocus 9000 Series X-Ray Tube Family. MicroFocus Digital Controller is to be used with TruFocus' 9000 Series Integrated X-ray source to form a fully programmable X-ray sub-system. Achieving highest external EMI & HV surge immunity with Fiber to USB PC interface design. MicroFucs Digital Controller provides X-ray system designers many diagnostic and monitoring functions.

### Functional Overview

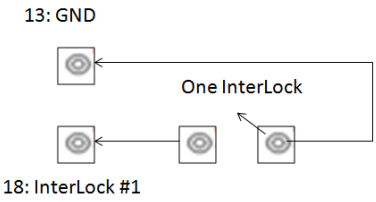
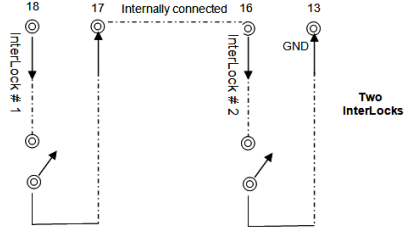


- Software Driver supports Window Vista, Window XP and Window 7
- Software Driver shipped with MicroFocus Digital Controller

## MicroFocus Controller Sub-system connection



### Diagnostic and Monitoring Function (Rear Panel Connector-Bar)

	I/O	Pin Function	Note
1		GND	GND
2	I	KV-P	KV Program, 10V= 100 kV
3	I	X-RAY-SW	X-Ray SW control
4	I	HV-SW	High Voltage control
5		GND	GND
6	I	MA-P	mA Program, 10V = 1 mA
7		GND	GND
8	O	MA-MON	mA Monitor
9	O	L3-MON	L3 Monitor
10	O	L1	L1 Monitor
11	O	HEATER	Heater Monitor
12	O	HV-MON	High Voltage Monitor
13		GND	GND
14	I	PC/OEM	PC/ Manual Mode selection (Input)
15	O	+15	+15V output
16 + 18			
17		Internal	Pin 16, 17, 18 used for InterLock control





# MFX-CTR-9000-100-1-A

## MicroFocus Analog Controller

Family	TruFocus Ordered P/N	Description	Max. Voltage (kV)	Max. Current (mA)	Max. Power (W)	Cooling Method	Weight	Programmable Control Interface
MFX	MFX-CTR-9000-100-1-A	MicroFocus Controller. For controlling 9000 Series MicroFocus Integrated X-Ray source (UNI)	100	1	100	Air	4.5 lb	Yes



Rear View



Front View

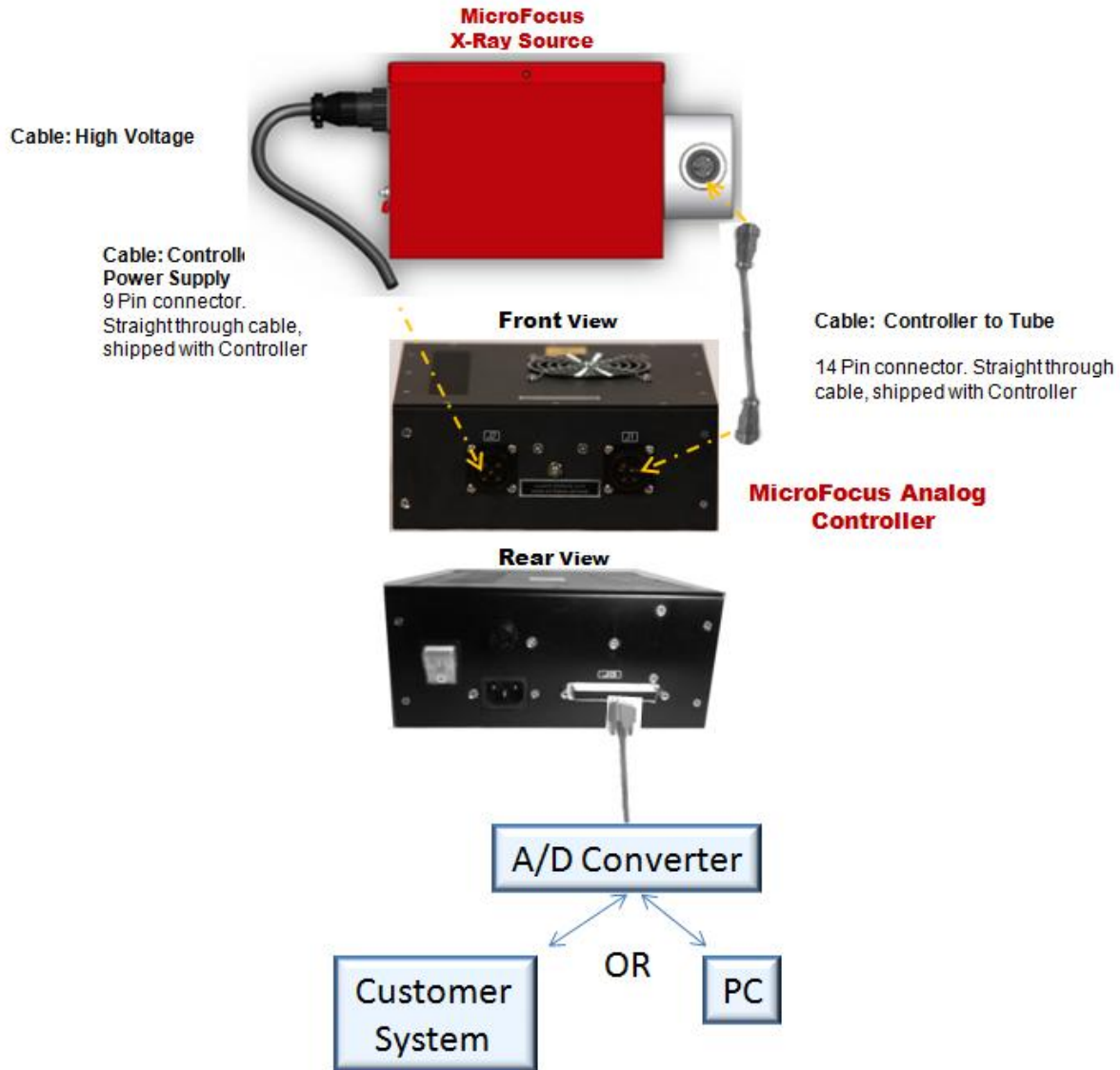
**MicroFocus Analog Controller** is specifically designed for controlling TruFocus 8000 Series X-Ray Tube Family. MicroFocus Analog Controller is to be used with TruFocus' High Voltage (HV) Module to form a programmable X-ray High Voltage Power Supply and Control sub-system.

Through DB 37 connector (J3), kV and mA programmable input level and kV and mA output level can be monitored in real time. Other tube parameters and safety signals are available to be accessed through MicroFocus Controller control interface. PC control interface can be implemented by using a Parallel to Series (RS 232) converter.

### Functional Overview

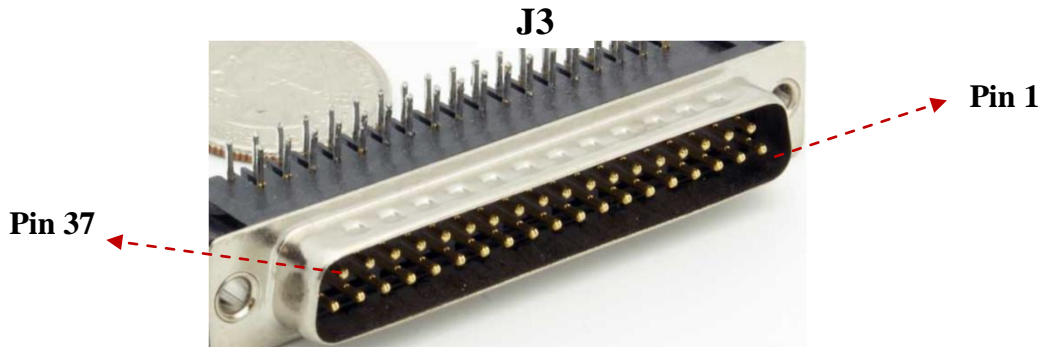


**MicroFocus Analog Sub-System Connection**



Note;  
Customer to provide the A/D converter and or PC.

**37-Pin D-Sub Connector Pin-out and Pin Functional Description**



- 1) AWG size: Minimum 24 AWG
- 2) Not all 37 pins are used
- 3) Straight through connection (1 to 1; 2 to 2...)

Pin #	Signal Names	Note
1	Jumper1.0	Pin 1 and Pin 2 should be jumpered when pin 4, 23, 22 are not used.
2	Jumper 1.1	See note above
5	GND	
7	GND	
9	kV Program	Input – 0 to 10 VDC (Calibrated input for generating desired Anode voltage in kV )
11	kV Monitor	Output - 0 10 VDC
12	L1 Monitor	Output - 0 to -10 VDC
13	L3 Monitor	Output – 0 to 10 VDC
14	HV Interlock #1	Pin 14 & Pin 15 ( Source & return) for Interlock
15		
16	HV Interlock #2	Pin 16 & Pin 17 ( Source & return) for Interlock
17		
18	mA Monitor	Output – 0 to 10 VDC
19	Heater Monitor	Output – 0 to 10 VDC
27	mA Program	Input – 0 to 10 VDC (Calibrated input for generating desired Anode current in mA )

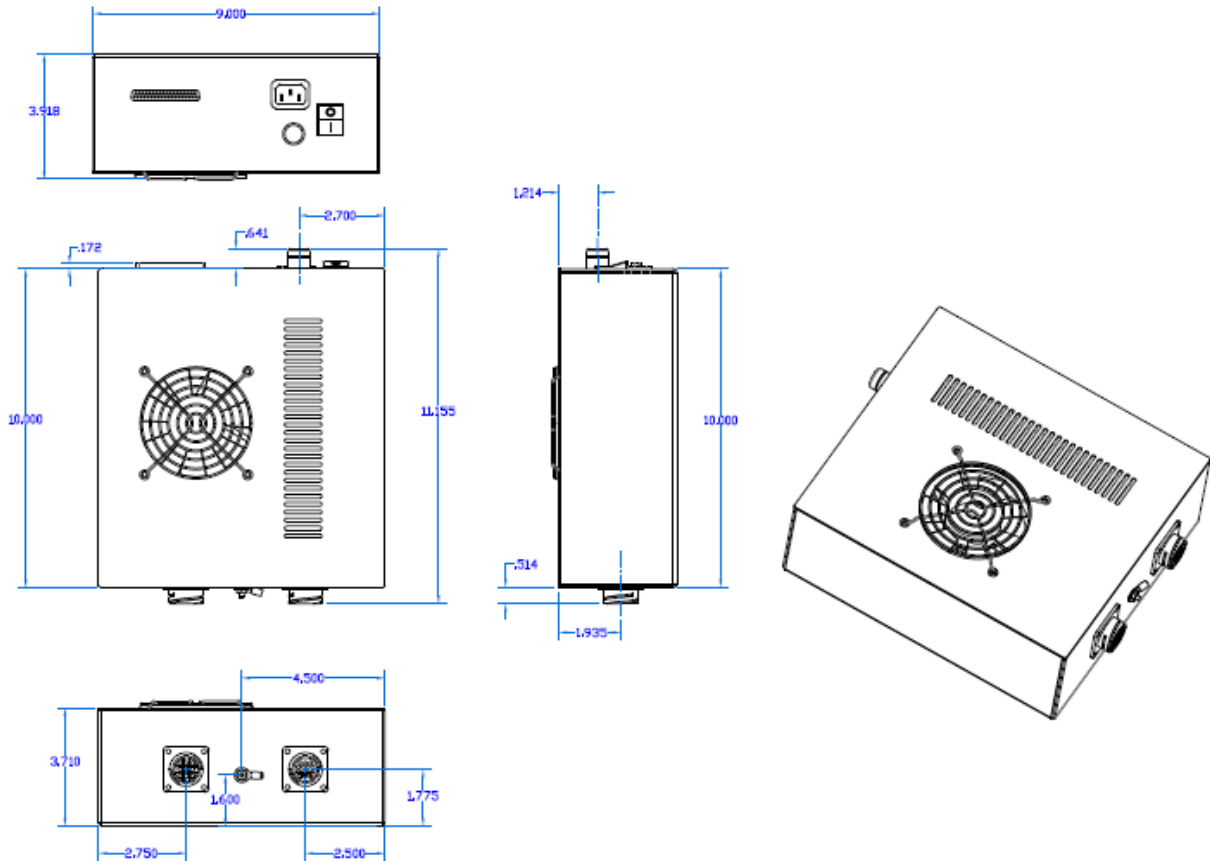
**True Table for Pin 4, 23 and 22**

	HV/ ON	HV/OFF	XRAY/ON	X-RAY/OFF	Note
4	1	0	N/A	N/A	1 is 5V, 0 is 0 V
23	0	1	N/A	N/A	1 is 5V, 0 is 0 V
22	N/A	N/A	0	1	1 is 5V, 0 is 0 V

**Note: Jumper Pins 1 and 2 when NOT using Pins 4, 23, 22**

## OUTLINE DRAWING

Drawing# & Version	DW- MFX-CTR-9000-100-1-A
TruFocus P/N	MFX-CTR-9000-100-1-A
Unit	Inches



ALL HOLES TRUE POSITION

NOTES: (UNLESS OTHERWISE SPECIFIED)

# **Caution**

## **X-Ray Radiation**



1. X-Ray radiation is harmful to the human body. It is necessary to take all safety precautions when operating this device.
2. The x-ray tube should be installed in an x-ray shielded cabinet to avoid exposure. It is recommended that the safety interlock system be used at all times.
3. It is the customer's responsibility to provide shielding for the use of this device.

## **Warranty Information**

This x-ray tube is warranted to be free of defects in materials and workmanship for a period of 365 days (1 year). This warranty is limited to repair or replacement of defective products only. This warranty replacement cost to customer shall be prorated over the duration of the warranty period. The warranty period commences on the date of installation, but no later than 30 days from the date of shipment from TruFocus to the customer. Any loss, damage, failure and/or malfunction relating in any way to accident, abuse, alteration, misuse, neglect, fitting, disassembly, attempted repair, storage, adjustments of the electronics, or failure to use the tube within the specifications or operating instructions provided by TruFocus, or the lack of proper routine maintenance and care of the tube or system in which it is installed are expressly denied coverage under this warranty.

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