

S94604F Magnetron

Large Power Magnetron - For Industrial Applications

- Ceramic-Metal Construction
- 75 kW at 915 MHz
- All Magnetron Support Equipment Available

The BURLE S94604F is a fixed-tuned, magnetically-focused, air- and liquid-cooled, ceramic-metal magnetron designed for industrial processing applications. It can continuously generate 75 kilowatts of useful power at 915 MHz with very high efficiency. In operation, the tube must be protected against a mismatched load by a circulator located between the waveguide transition and the load. Several accessories necessary for the safe installation and operation of the S94604F are available from BURLE INDUSTRIES, INC. and are listed on page 2.

Instructions contained in the following publications will help to assure longer tube life, safer operation, less downtime, and fewer tube handling accidents.

TP-116 Application Guide for BURLE Large Power Magnetrons.

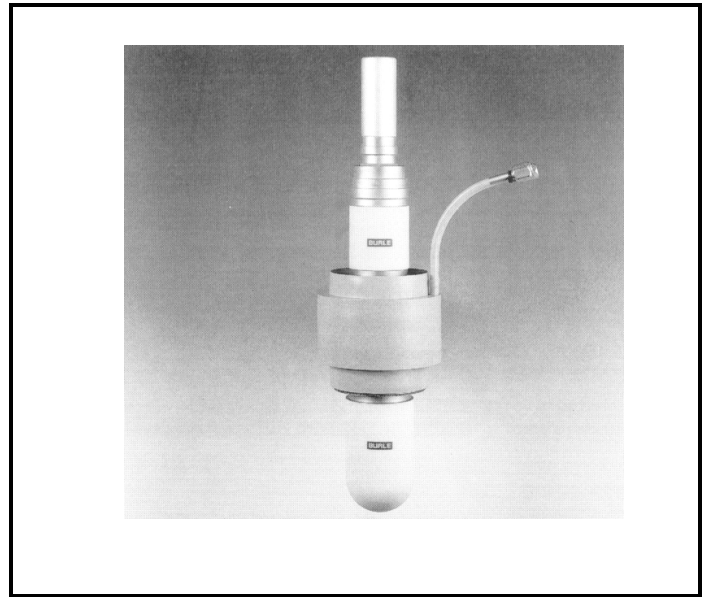
TP-118 Application Guide for Forced-Air Cooling of BURLE Power Tubes.

TP-105 Application Guide for BURLE Power Tubes.

CW Oscillator

Maximum Ratings; Absolute-Maximum Values

Anode Current	5.9	A
Anode Dissipation	15	kW
Load VSWR ^{2,3}	2.0:1	
AC Filament Voltage	8.2	V
Useful Power Output ⁶	75	kW
DC Anode Voltage ¹	16.2	kV
Filament Current ⁴	82	A
Anode Current	5.45	A
DC Electromagnet Current ⁵	4.4	A
Efficiency	85	%



Typical Operation 915 MHz

General Data

Electrical

Filament:

AC supply voltage	11.6 V
Current at 12 volts ⁴	116A
Starting current	Must NEVER exceed 120 amperes
Hot resistance	0.1000 ohm
Minimum heating at nominal voltage	2 min.

Center frequency	915 ± 5MHz
Focusing ⁵	Electromagnet (AJ2194 or equivalent)

Mechanical

Operating Position ⁷	Vertical, either end up
Maximum Overall Length	463.6 mm (18.25 in.)
Maximum Diameter	125.5 mm (4.94 in.)
Terminal Connections	See Dimensional Outline
Weight	7.2 kg (16.0 lb)



Thermal

Ceramic Insulator Temperature	150	max. °C
Metal Surface Temperature	150	max. °C

Air Cooling:

Tube requires uniform, forced-air cooling of output ceramic dome and of filament-terminal stem. Air flow must start before application of filament voltage and, preferably, continue for several minutes after voltage removal. Interlock filament power supply with air flow to prevent tube damage due to inadequate airflow.

Output Dome Cooling (with AJ2192): 0.012 meters³/sec. (25 cfm) at 100 mm (4 inches) of water.
Filament Terminal Cooling (AJ2137V1): 0.0048 meters³/sec. (10 cfm) at 203 mm (8 inches) of water.

Liquid Cooling:

Tube anode requires liquid cooling. Liquid flow must start before application of filament voltage and, preferably, continue for several minutes after removing voltage. Interlock filament power supply with liquid flow to prevent tube damage due to inadequate liquid flow. When liquid is water, use of distilled or filtered deionized water is essential.

Nominal Water Flow (12 kW anode dissipation)	19.0 l/min. (5.0 gpm)
Pressure Drop at Water Flow	1.7 bars (25 psi)
Maximum Outlet Water Temperature	70 °C
Maximum Inlet Water Pressure (Gauge)	6.9 bars (100 psi)

1. The anode is normally grounded.
2. A circulator **MUST** be incorporated between waveguide transition and load to protect the magnetron from high reflected power.
3. Monitor the load VSWR using the signal detected to actuate an interlock system capable of removing anode voltage from the tube less than 10 milliseconds after a fault occurs.
4. The filament is subjected to back-bombardment during tube operation. Back-bombardment increases filament temperature and shortens tube life if left uncorrected. Therefore, during operation, filament current should be reduced to a value that will give the same "hot filament resistance" as when no power is being generated.

Filament voltage and current characteristics differ slightly from tube to tube. Each magnetron is shipped with a test data sheet giving the specific filament characteristics for that tube. Always adhere to this data for best tube life.

5. The magnetic field must be turned "on" before application of anode voltage and turned "off" only after removal of anode voltage. Refer to publication TP-116 "Application Guide for BURLE Large Power Magnetrons" for further details.
6. At a load VSWR not exceeding 1.1:1.
7. Mounting the magnetron with filament connector UP, output ceramic dome DOWN, permits convenient installation of the tube and helps to assure good RE contact between the tube's output terminal contact surface, the RE gasket, and the electromagnet. The tube will operate satisfactorily with the output ceramic dome UP but is less convenient to install in that position.

Magnetron Support Equipment

For safe and satisfactory operation of the BURLE S94604F Magnetron, BURLE recommends the use of the following parts and assemblies

BURLE Type Number	Description
AJ2135	Magnetic Pole Piece
AJ2136V2	Filament-Cathode Connector
AJ2137V1	Filament Connector
AJ2138	RF Gasket
AJ2192	Waveguide Transition
AJ2 194	Electromagnet

One unit of each of the recommended parts and assemblies is required for the proper operation of a S94604F. All items except the RF gasket may be used in the subsequent installation of replacement tubes. Do NOT reuse RF gaskets. Keep several on hand for possible use in reinstalling tubes.

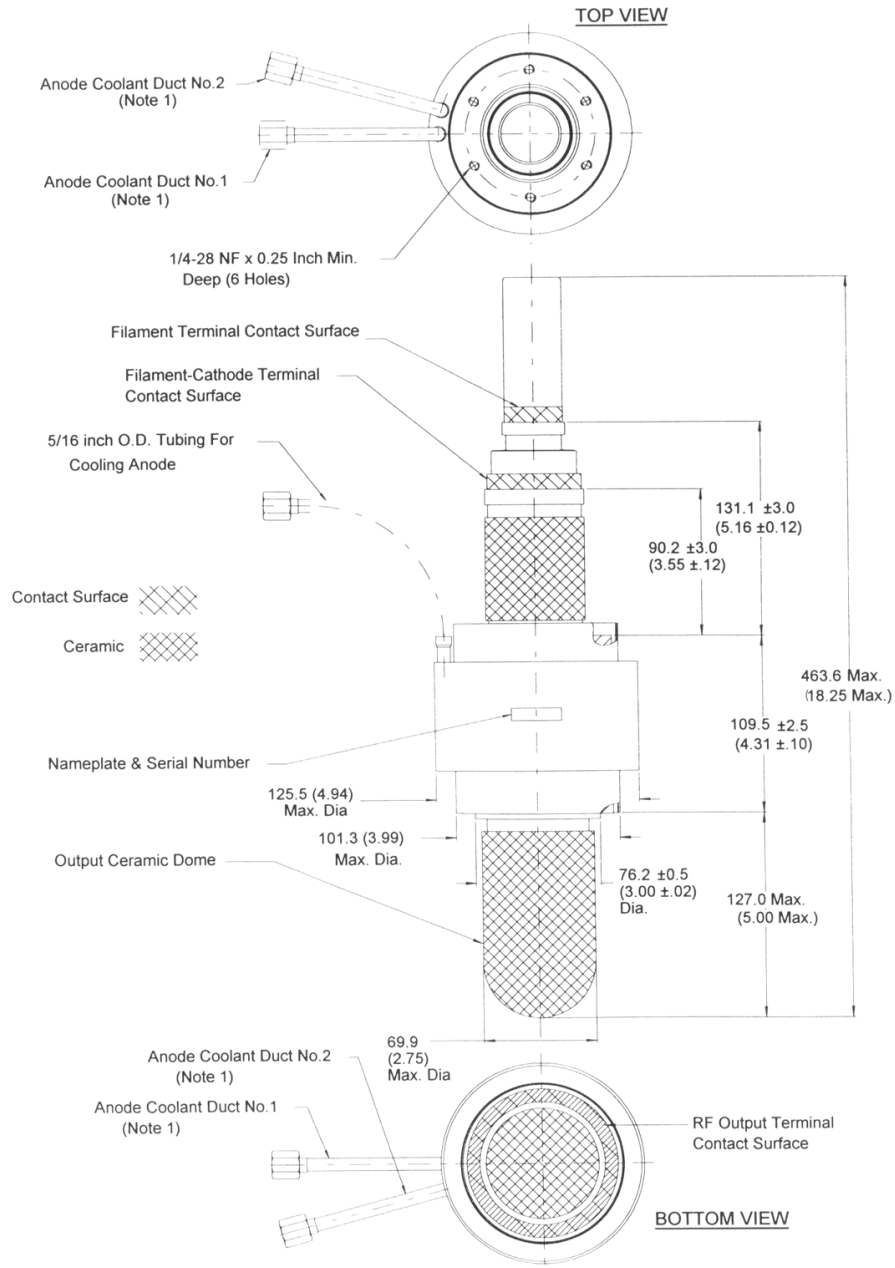
Warning - Personal Safety Hazards

Radio Frequency Radiation - This device, in operation, produces radio frequency radiation which may be harmful to persons.

Thermal - This device may have exposed surfaces heated to high temperatures during operation creating thermal hazards. Touching these surfaces during or immediately following operation can cause burns. Sufficient time for cool down should be allowed before handling.

X-Ray Warning - This device, in operation, can produce x-rays which may constitute a health hazard unless the device is adequately shielded for radiation.

High Voltage - Although the user of this product is normally protected from the high voltage hazard by the equipment design, the voltages applied to this unit in normal operation are hazardous. High voltage safety precautions must be followed. Equipment caution labels and safety features must not be disregarded.



Dimensions in millimeters. Dimensions in parentheses are in inches.

Note 1: Recommended direction of anode Coolant flow: Duct No.2 is "IN" and Duct No.1 is "OUT" when tube is operated with Output Ceramic Dome DOWN. With Output Ceramic Dome UP, the flow should be reversed.

Figure 1 - Dimensional Outline