

X-band 220kW Magnetron

■ GENERAL DESCRIPTION

M1976 is a mechanically tunable frequency pulsed type X-band magnetron designed to operate in the frequency range of 9000MHz to 9600MHz with a nominal peak output power of 220kW.

It is a waveguide output type and is forced air cooled.

A permanent magnet is packaged as part of the magnetron.



■ GENERAL CHARACTERISTICS

ELECTRICAL

PARAMETERS		
Heater voltage (note 4).		13.75 V
Heater current		3.1 A
Minimum preheat time		180 sec

MECHANICAL

PARAMETERS		
Dimensions		See outline drawing
Mounting position		Any
Cooling		Forced air.
Output		WR112 waveguide
Output coupling (note 2).		Mate with UG-52B/U flange

■ MAXIMUM AND MINIMUM RATINGS(ABSOLUTE)

These ratings cannot necessarily be used simultaneously and no individual ratings should be exceeded.

PARAMETERS	Min	Max	Units
Heater voltage	-	15	V
Heater current		3.6	A
Heater surge current		12	A
Cathode preheating time	180	-	sec
Anode voltage (peak)	-	27	kV
Anode current (peak)	12	30	A
Anode input power (peak)	-	680	kW
Anode input power (average)	-	680	W
Rate of rise of voltage pulse (note 6)	-	180	kV/ μ s
Duty cycle	-	0.0013	—
Pulse duration	0.18	3.0	μ s
Pulse recurrence rate	-	5500	pps
Anode temperature	-55	130	$^{\circ}$ C
Cathode terminal temperature	-55	165	$^{\circ}$ C

PARAMETERS	Min	Max	Units
V.S.W.R at load	-	1.5:1	—
Pressurizing of output circuit	0.1	0.31	MPa(abs.)
	1	3.2	kg/cm ² (abs.)

■ ELECTRICAL CHARACTERISTICS

Test conditions	Oscillation	Units
Heater voltage (preheating)	13.75	V
Heater voltage (for test)	0	V
Anode current (average)	27.5	mA
Duty cycle	0.001	—
Pulse duration	2±0.2	µs
V.S.W.R at the output coupler	1.05:1	-
Rate of rise of voltage pulse (note 6)	160max	kV/µs
Pressurizing of output circuit	0.15~0.2	MPa(abs.)
	1.5~2	kg/cm ² (abs.)

Limits	Min	Max	Units	
Anode voltage (peak) (note3)	20	23	kV	
Output power (average) (note3)	200	-	W	
Tunable Frequency	Upper Limit Lower Limit	9600	9000	MHz
R.F.bandwidth at 1/4 power (note 3,5)	-	2.0/tpc	MHz	
Minor lobes (note 3,5)	8	—	dB	
Stability (note2,3,4)	-	0.1	%	
Heater current Ef=13.75V, tk=180sec min	-	3.3	A	

■ LIFE TEST
Life Test conditions

Under the test conditions specified above.

The tube is deemed to have reached end of life when it fails to satisfy the following:

PARAMETERS	Min	Max	Units
Output power (average) (note3)	160	-	W
R.F. bandwidth at 1/4 power (note3,5)	-	2.5/tpc	MHz
Stability (notes 2,3,4)	—	0.5	%

Notes

1. With no anode input power.

During high voltage operation it is essential to operate the heater according to the following schedule:

For $P_i \geq 600W$, Heater voltage = 0 V

For $375W \leq P_i < 600W$, Heater voltage = $19.0(1 - P_i/600) V \pm 5\%$

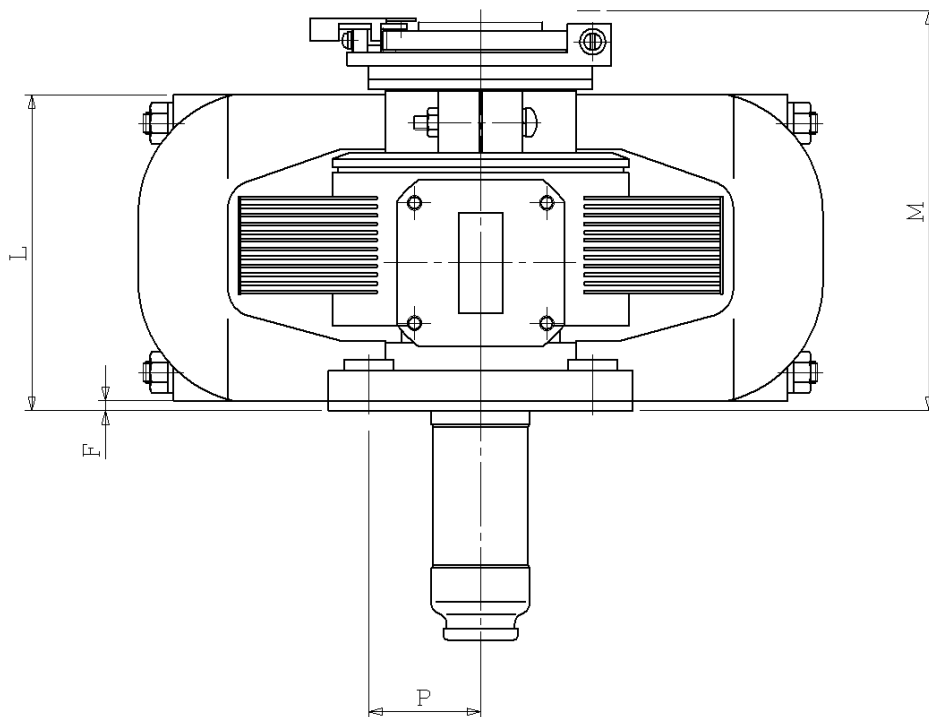
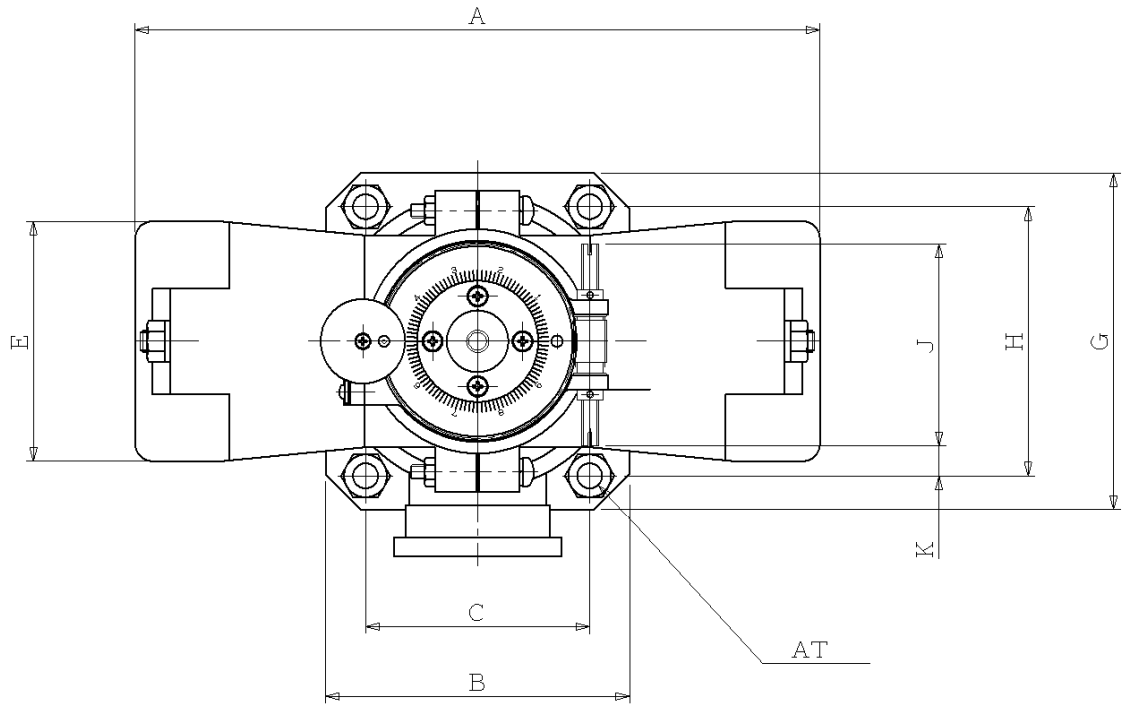
For $375W \leq P_i$, Heater voltage = $13.75(1 - P_i/800) V \pm 5\%$

Where P_i = average input power in watts.

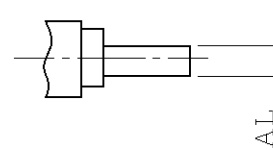
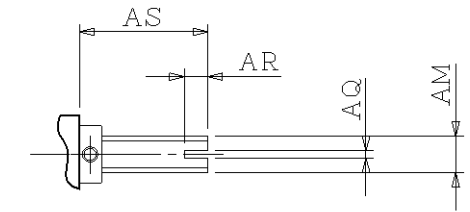
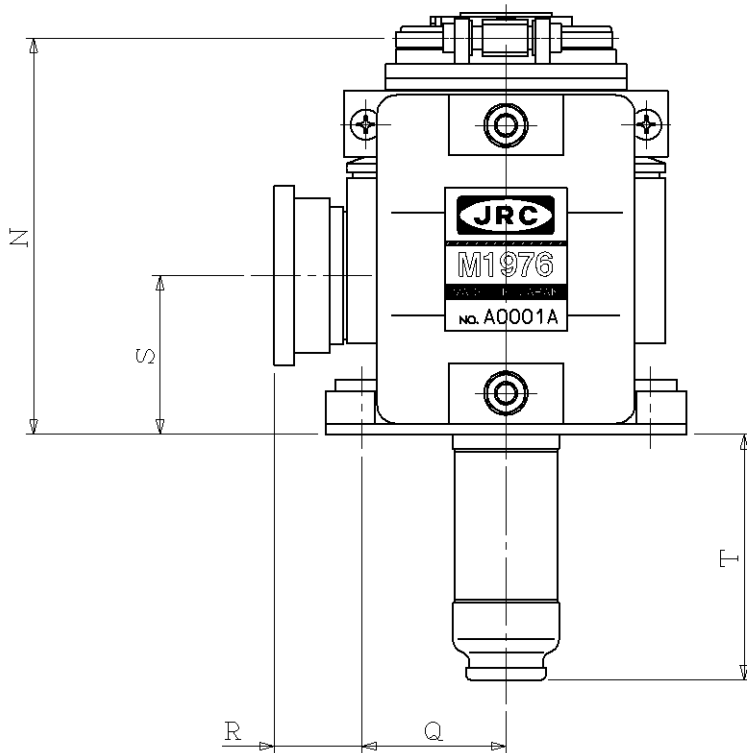
The magnetron heater shall be protected against arcing by use of a minimum capacitance of 4000pF shunted across the heater directly at the terminals.

2. Pulses are defined as missing when the r.f. energy level is less than 70% of the normal energy level in the rated frequency range of the magnetron. Missing pulses are expressed as a percentage of the number of input pulses applied during the last 3 minutes of a test interval not to exceed 6 minutes.
3. These tests are carried out at
 - F1=9000±5MHz,
 - F2=9300±5MHz,
 - F3=9600±5MHz.
4. With the magnetron operating into a V.S.W.R. of 1.3:1 phased to give maximum instability.
5. With the magnetron operating into a V.S.W.R. of 1.3:1 phased to give maximum spectrum degradation.
6. The rate of rise of voltage is the slope of the steepest tangent to the leading edge of the voltage pulse above 70% amplitude. Any capacitance used in the viewing system must not exceed 6.0pF.

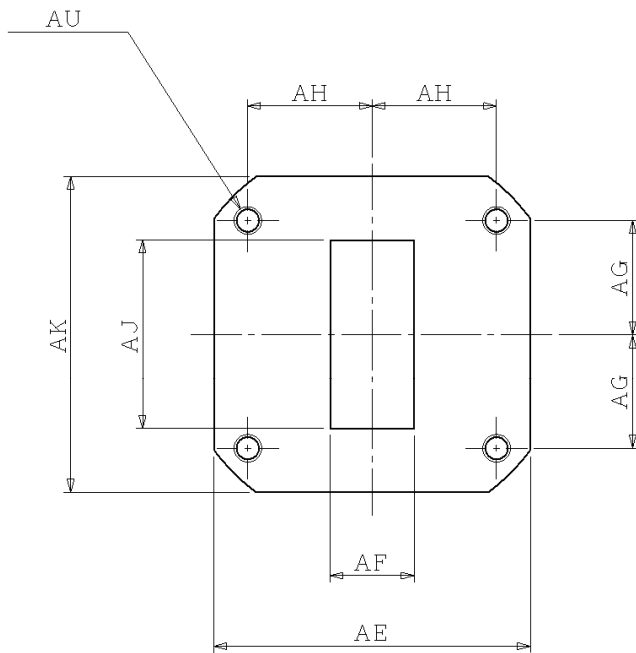
■ OUTLINE M1976 (1/2)



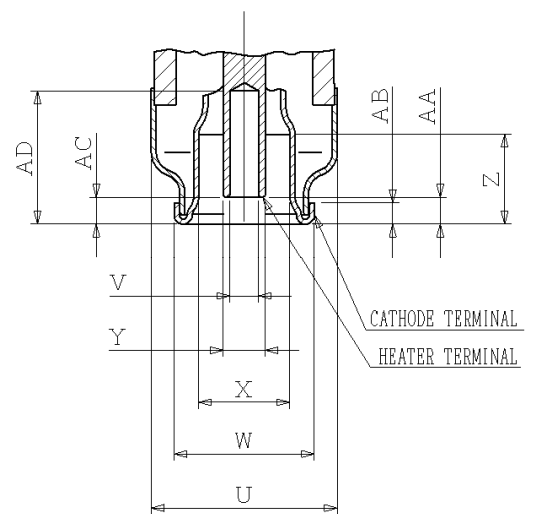
■ **OUTLINE M1976 (2/2)**



TUNER SHAFT



OUTPUT FLANGE



INPUT CONNECTION

Outline Dimensions (All dimensions without limits are nominal)

Ref	Min	Max	Ref	Min	Max	Ref	Min	Max
A	—	195.0	R	22.20	23.82	AG	17.07	17.27
B		86.1	S	40.9	43.2	AH	18.62	18.82
C	63.4	6.66	T	63.67	66.17	AJ		28.45
E	—	70.0	U	27.25	28.75	AK	47.3	47.9
F		2.9	V	4.16	4.42	AL	3.83	4.09
G		95.2	W	20.95	21.28	AM	4.73	4.83
H	76.1	76.3	X	13.52	13.85	AQ	1.02	1.16
J		57.15	Y	5.67	6.73	AR		3.1
K	7.97	8.97	Z	13.1	—	AS		15.93
L		89.5	AA	—	3.96	AT	φ 7.1	φ 7.2
M	—	113.9	AB	2.93	3.43	AU		#8-32-UNC-2
N	103.21	106.35	AC	3.25	4.75			
P	30.5	32.8	AD	19.05	—			
Q	37.0	39.2	AE	47.3	47.9			
			AF		12.6			

(Dimensions in millimeters)