

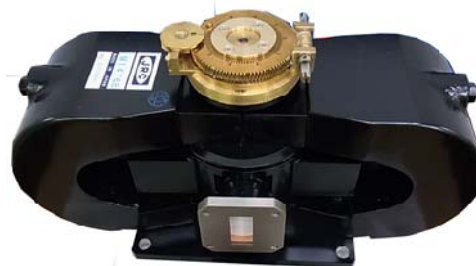
## X-band 300kW Magnetron

### ■ GENERAL DESCRIPTION

M1976B is a mechanically tunable frequency pulsed type X-band magnetron designed to operate in the frequency range of 9300MHz to 9400MHz with a nominal peak output power of 300kW.

It is a waveguide output type and is water 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)                    | -    | 29     | kV          |
| Anode current (peak)                    | 12   | 32     | A           |
| Anode input power (peak)                | 400  | 920    | kW          |
| Anode input power (average)             | -    | 920    | W           |
| Rate of rise of voltage pulse ( note 6) | -    | 180    | kV/ $\mu$ s |
| Duty cycle                              | -    | 0.0013 | —           |
| Pulse duration                          | 0.18 | 3.0    | $\mu$ s     |
| Pulse recurrence rate                   | -    | 5500   | pps         |
| Anode temperature                       | -25  | 130    | °C          |
| Cathode terminal temperature            | -25  | 165    | °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 <sup>2</sup> (abs.) |
| Coolant water flow quantity    | 1   | 5     | L/min                     |

## ■ ELECTRICAL CHARACTERISTICS

| Test conditions                         | Oscillation | Units                     |
|-----------------------------------------|-------------|---------------------------|
| Heater voltage (preheating)             | 13.75       | V                         |
| Heater voltage (for test)               | 0           | V                         |
| Anode current (average)                 | 30          | A                         |
| 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 <sup>2</sup> (abs.) |
| Coolant water flow quantity             | 2           | L/min                     |

| Limits                                            | Min  | Max     | Units |
|---------------------------------------------------|------|---------|-------|
| Anode voltage (peak) (note3)                      | 26   | 29      | kV    |
| Output power (average) (note3)                    | 300  | -       | W     |
| Tunable Frequency      Upper Limit<br>Lower Limit | 9400 | 9290    | MHz   |
| R.F.bandwidth at 1/4 power (note 3,5)             | -    | 2.5/tpc | MHz   |
| Minor lobes      (note 3,5)                       | 10   | —       | dB    |
| Stability (note2,3,4)                             | -    | 0.1     | %     |
| Heater current      Ef=13.75V, tk=180sec min      | 2.8  | 3.5     | 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)        | 240 | -       | W     |
| R.F. bandwidth at 1/4 power (note3,5) | -   | 3.0/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  $I_b \geq 30\text{mA}$ , Heater voltage = 0 V

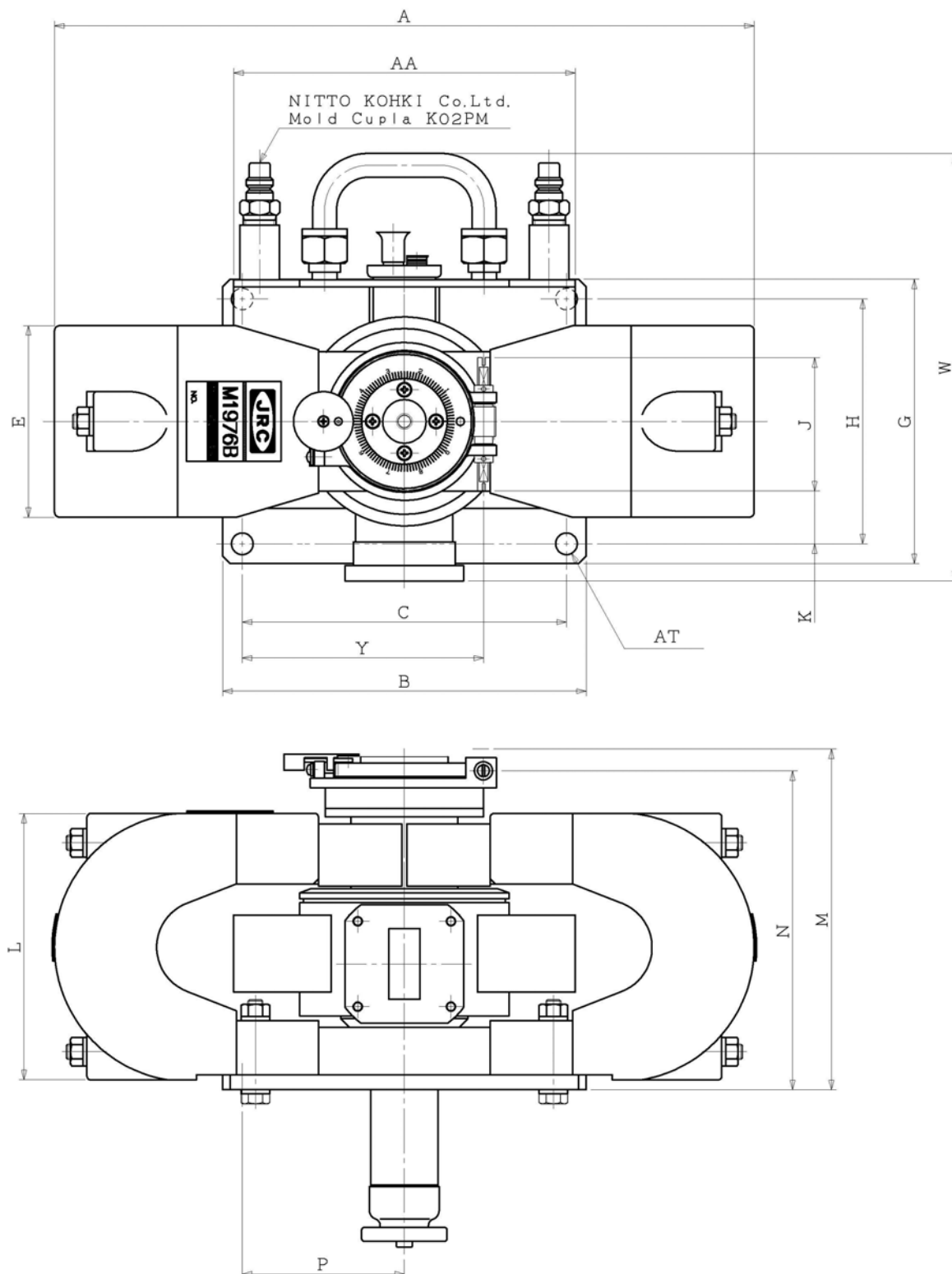
For  $I_b \geq 15\text{mA}$ , Heater voltage =  $15 - 7.5 \times I_b / 15 \text{ V} \pm 5\%$

For  $I_b < 15\text{mA}$ , Heater voltage =  $13.75 - 6.25 \times I_b / 15 \text{ V} \pm 5\%$

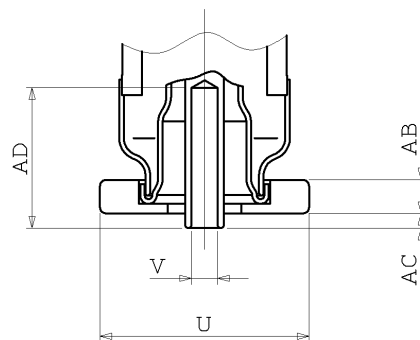
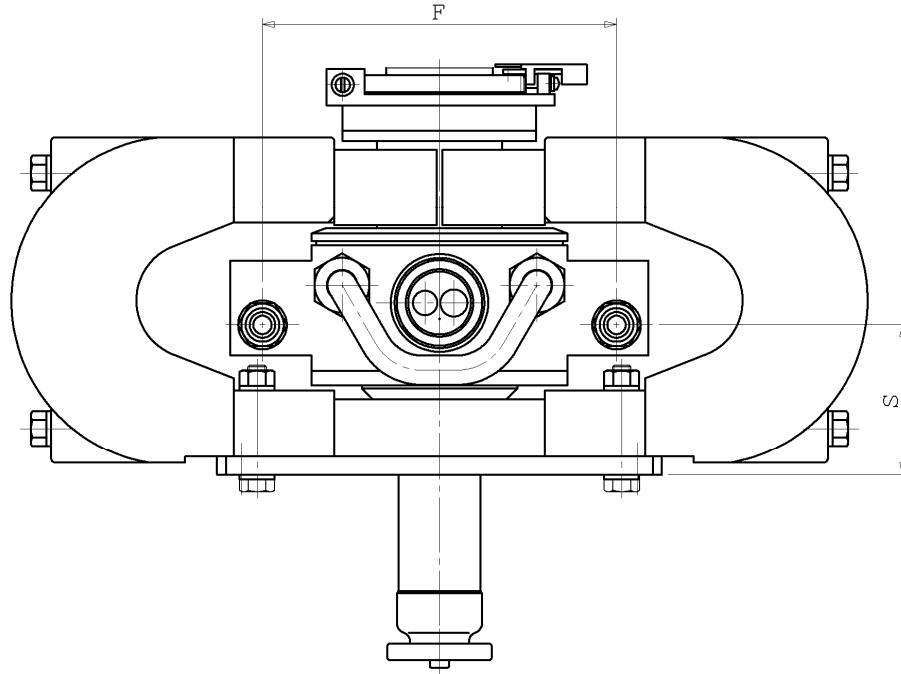
The magnetron heater shall be protected against arcing by use of a minimum capacitance of 4000pF shunted across the heater directly at the terminals.

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=9300±5MHz,  
F2=9400±5MHz,
4. With the magnetron operating into a V.S.W.R. of 1.5:1 phased to give maximum instability.
5. With the magnetron operating into a V.S.W.R. of 1.5:1 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 M1976B(1/3)

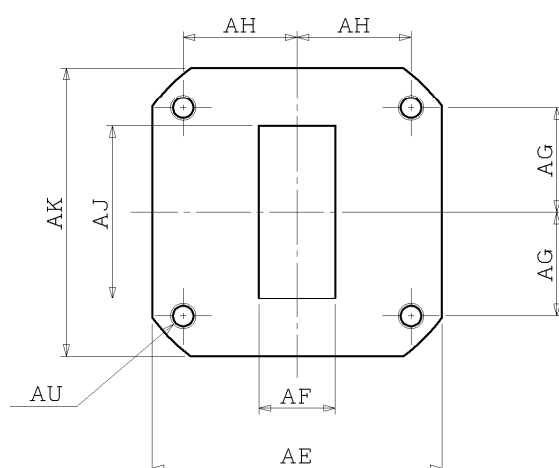
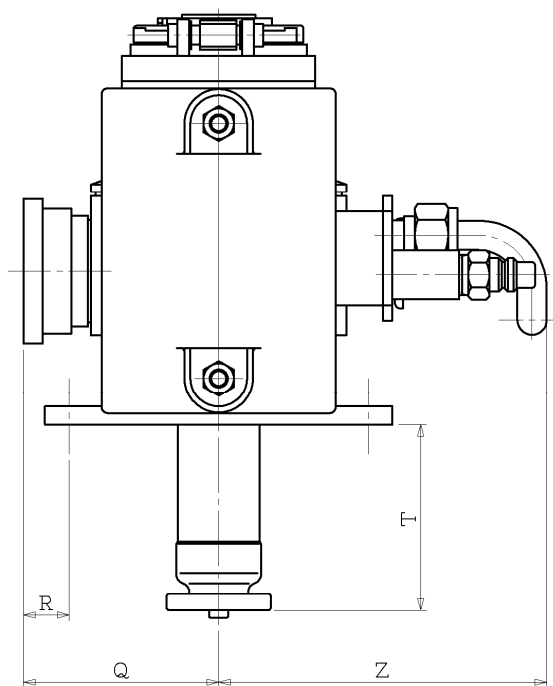


■ OUTLINE M1976B (2/3)

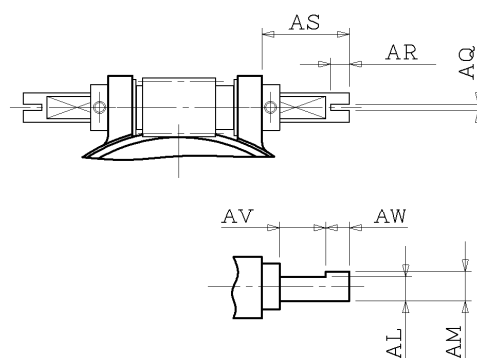


INPUT CONNECTION

## ■ OUTLINE M1976B (3/3)



OUTPUT FLANGE



TUNER SHAFT

## Outline Dimensions (All dimensions without limits are nominal)

| Ref | Min    | Max    | Ref | Min    | Max    | Ref | Min         | Max    |
|-----|--------|--------|-----|--------|--------|-----|-------------|--------|
| A   | —      | 300.0  | R   | 14.95  |        | AG  | 17.07       | 17.27  |
| B   | 14.6   |        | S   | 49.3   |        | AH  | 18.62       | 18.82  |
| C   | 129.95 | 130.45 | T   | 59.5   | 62.5   | AJ  | 28.45       |        |
| E   | —      | 77.0   | U   | φ 34.1 | φ 34.5 | AK  | 47.3        | 47.9   |
| F   | 116.2  |        | V   | 4.16   | 4.42   | AL  | 3.83        | 4.09   |
| G   | 114.3  |        | W   | —      | 180    | AM  | φ 4.73      | φ 4.83 |
| H   | 98.15  | 98.65  | X   | 13.52  | 13.85  | AQ  | 1.02        | 1.16   |
| J   | 53.62  |        | Y   | 95.55  | 98.35  | AR  | 3.1         |        |
| K   | 20.44  | 21.96  | Z   | —      | 140    | AS  | 14.35       |        |
| L   | 107.0  |        | AA  | —      | 3.96   | AT  | φ 8.5       | φ 8.9  |
| M   | —      | 140.0  | AB  | 5.5    |        | AU  | #8-32-UNC-2 |        |
| N   | 128.27 |        | AC  | 2.39   |        | AV  | 7.55        |        |
| P   | 64.0   | 66.2   | AD  | 23     | —      | AW  | 3.58        | 3.98   |
| Q   | 63.2   | 65.2   | AE  | 47.3   | 47.9   |     |             |        |
|     |        |        | AF  | 12.6   |        |     |             |        |

(Dimensions in millimeters)