



# NATIONAL

2M107A-605  
2M107A-795  
2M107A-825

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## 870 WATT CW MAGNETRON - 2.45GHZ

THIS HIGHLY EFFICIENT, COMPACT CW MAGNETRON WITH INTEGRAL MAGNET IS SUITABLE FOR INDUSTRIAL APPLICATIONS AND CATERING OVENS. THESE MAGNETRONS MEET IEC SAFETY REGULATIONS AND BSI REGULATIONS FOR ELECTRICAL APPLIANCES. STABLE OPERATION IS POSSIBLE UNDER THE MOST SEVERE LOAD CONDITIONS. SPECIAL ATTENTION HAS BEEN PAID TO REDUCE STRAY RADIATION AND SUPPRESS HIGHER HARMONICS THAT MIGHT INTERFERE WITH SATELLITE TV TRANSMISSION. THE COMPACT MAGNETIC CIRCUIT HAS VERY LOW STRAY MAGNETIC FIELD. A MEASURING PROBE IS AVAILABLE WHICH ALLOWS A SIMPLE COLD MEASURING PROCEEDURE.

### QUICK REFERENCE DATA

#### ELECTRICAL

Power Supply: L.C. stabilize halfwave doubler  
Matched load condition:  
Frequency: 2.46 GHz  
Anode voltage: 4.1 kV  
Anode current: 300 mA  
Out power: 870W  
Tube efficiency: 71.0%  
Filament voltage: 3.3V  
Filament current (operating): 10.5A

#### MECHANICAL

Dimensions: See outline drawings  
Mounting position: Any  
R.F. coupler: WR430 system  
Magnetic system: Ferrite magnet, packaged  
Cooling air flow: 800 l/min  
Pressure drop: 4.9 mmAq  
Weight (approx): 0.95 Kg (2.1 lbs)  
Cold filament resistance: 0.047Ω  
Pre-heating time: 0 sec.

### 1. ABSOLUTE MAXIMUM RATINGS

|   | Min.  | Max.   |
|---|-------|--------|
| Filament Voltage .....                          | 2.80V | 3.75V  |
| Mean Anode Current .....                        | —     | 350mA  |
| Peak Anode Current .....                        | —     | 1200mA |
| Anode Temterature (note #2) .....               | —     | 250°C  |
| (at the point indicated on the outline drawing) |       |        |
| Load V.S.W.R. (note #3) .....                   | —     | 4      |
| Storage Temperature .....                       | -35°C | +60°C  |

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## VISUAL & MECHANICAL

- 1) Major Defects:  
Any physical error, omission or dimensional deviation that affects the component function, fit or reliability.
- 2) Minor Defects:  
Any physical error, omission or dimensional deviation that is purely aesthetic and does not affect function, fit or reliability.

## NOTES

- #1. —If during the first snap-on there is evidence of a breakdown during 5 seconds of H.V. application, the test shall be repeated once and there should be no indication of breakdown again.  
(I breakdwon  $\leq 400\mu\text{A}$ , Series resistance  $50\text{K}\Omega$ )
- #2. —For power supply an L.C., single phase half wave doubler should used.
  - The filament voltage should be measured at the terminals.
  - The combination of transformer and capacitor should be chosen such that for nominal line voltage  $I_a$  mean =  $300\text{mA} \pm 1\%$  and  $I_a$  peak 1020 to 1050mA.
  - It is recommended to use a 10-12KV avalanche diode as protection for capacitor and transformer.
  - For wave guide configuration and power supply, see page 7 and 10.
  - A water load of which the V.S.W.R.  $\leq 1.1$  over the frequency band 2425 MHz up to 2475 MHz shall be used.
  - Unless otherwise stated, limits apply for a tube within 15 seconds after application of voltages and at  $25^\circ\text{C}$ .
  - Before testing, the tubes should be "at room temperature" for at least four hours.
  - During test, the magnetron should be cooled with 800 1/min of forced air.
- #3. —After a minimum operation of 30 seconds under the specified conditions, the filament voltage is gradually decreased. The  $V_{fm}$  is the lowest  $V_f$  value at which the tube is still oscillating in the  $\pi$  mode.
- #4. —Starting with minimum operation of 30 seconds at nominal heater voltage and  $I_a = 300\text{mA}$  for V.S.W.R  $\leq 1.1$  and at 2g distance from the tube, the V.S.W.R. must be increased by means of the Rieke transformer while the phase must be varied in the sink area.  
The stability is the highest V.S.W.R. at which the tube is still oscillating in the correct  $\pi$  mode.
- #5. —Transients are measured on a storage scope during the period 0.5 to 2 seconds after switching on the anode voltage and filament voltage simultaneously.
- #6. —Design control tests only.

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**2. TEST SPECIFICATION**

**2-1. ELECTRICAL TEST**

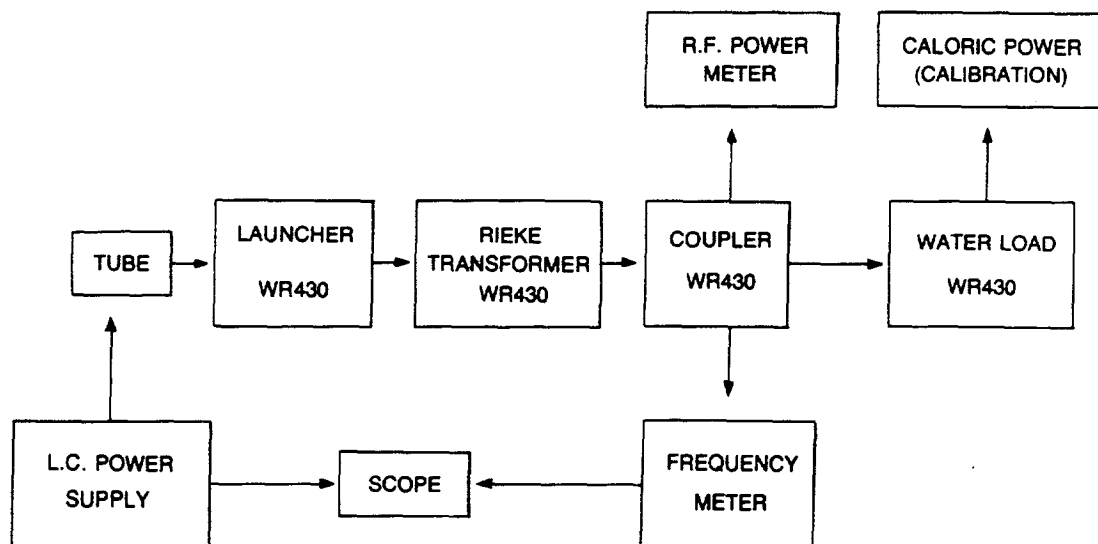
| TERM                           | Test Cond. |        |        |       |       | Limits |       |      |      |       |
|--------------------------------|------------|--------|--------|-------|-------|--------|-------|------|------|-------|
|                                | Vf(V)      | Va(KV) | Ia(mA) | VSWR  | Notes | Min.   | Bogie | Max. | Unit | Notes |
| Breakdown Voltage              | 0          | + 10dc | —      | —     |       |        |       |      |      | #1    |
| Cold start (Voltage transient) | 3.3        | —      | 300    | ≤ 1.1 | #2    |        |       | 8    | KV   | #5    |
| Frequency                      | 3.3        | —      | 300    | ≤ 1.1 | #2    | 2450   | 2460  | 2470 | MHz  |       |
| Peak Anode Voltage             | 3.3        | —      | 300    | ≤ 1.1 | #2    | 4.0    | 4.1   | 4.3  | KV   |       |
| Efficiency                     | 3.3        | —      | 300    | ≤ 1.1 | #2    |        | 71.0  |      | %    |       |
| Mean Output Power (1)          | 3.3        | 4.1    | 300    | ≤ 1.1 | #2    |        | 870   |      | W    |       |
| Emission Stability             |            |        | 300    | ≤ 1.1 | #2    |        |       | 2.5  |      | #3    |
| Stability                      | 3.3        |        |        |       | #4    | 4      |       |      | VSWR | #6    |
| Pulling Figure                 | 3.3        |        | 300    | 1.3   |       |        |       | 10   | MHz  | #6    |

- #1. AVAILABLE IN TWO MECHANICAL OUTLINES  
2M107A-795 MOUNTING & COOLING IN LINE WITH FASTON CONNECTOR.  
2M107A-825 MOUNTING & COOLING NOT IN LINE WITH CONNECTOR.  
(OTHER OUTLINES AVAILABLE UPON REQUEST)
- #2. IN AN ABNORMAL OPERATION, THE MAXIMUM ALLOWABLE TEMPERATURE FOR ANODE IS 280 DEGREES C, PROVIDED THAT THE DWELL TIME THE OF THE MAXIMUM TEMPERATURE DOES NOT EXCEED 2 HOURS OPERATION NOR 25 HOURS IN TOTAL.
- #3. THE LOAD CONDITION IN WHICH INSTANTANEOUS V.S.W.R. IS 4 - 10 MAY BE ALLOWED ONLY IF THE DWELL TIME UNDER THOSE CONDITIONS IS SHORT.

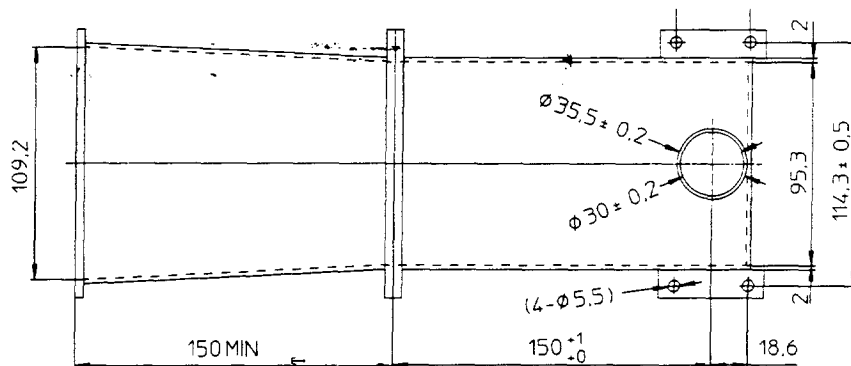
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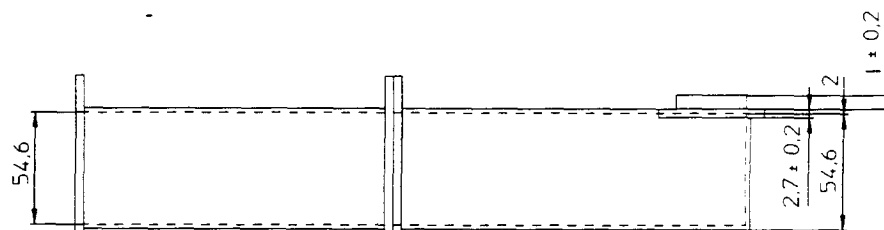
### 3. WAVEGUIDE CONFIGURATION



### 4. COUPLING SECTION WAVEGUIDE WR430



The flange mates with japanese standard BRJ-2



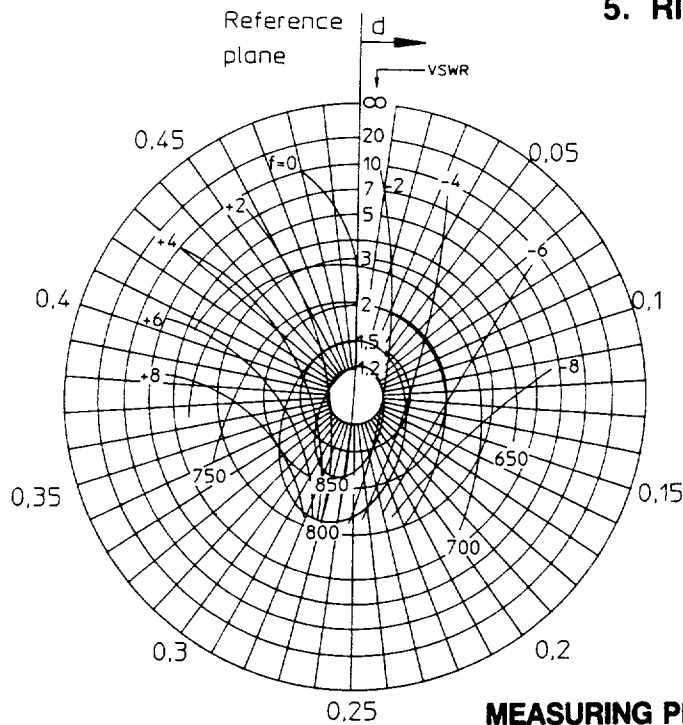


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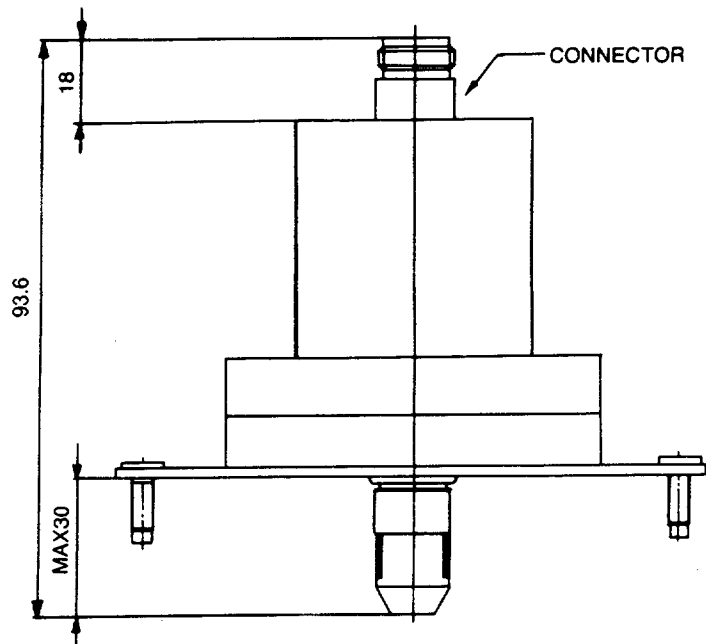
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**5. RIEKE DIAGRAM IN WAVEGUIDE WR430**



Power Supply: half-wave doubler L.C. type  
 Filament Voltage ..... 3.3V  
 Average Anode Current ..... 300mA  
 Peak Anode Voltage ..... 4.1KV  
 Frequency at Matched Load ..... 2460MHz  
 d: distance of VSWR-minimum from reference plane towards load.  
 Diagram measured under cold condition.

**MEASURING PROBE FOR OVEN DESIGN MEASUREMENTS**



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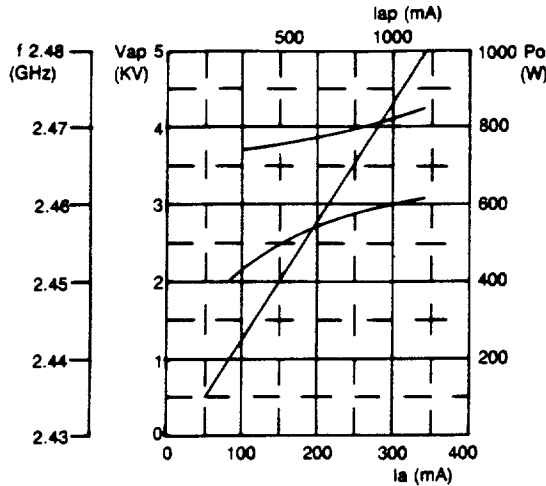


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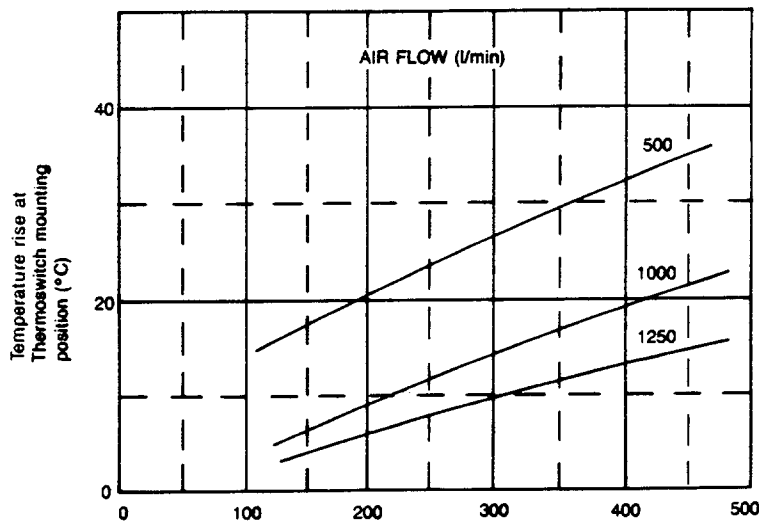
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## 6. PERFORMANCE



- Power supply: single phase half-wave doubler
- Filament voltage 3.3V
- Load VSWR 1.1 maximum
- Measured within 15 sec. after applying voltage

## 7. ANODE DISSIPATION VS. TEMPERATURE RISE OF THERMOSWITCH MOUNTING POSITION



(Increase in temperature of thermoswitch mounting position above inlet air temperature,  $T_i$ , as a function of anode dissipation,  $W$ .)

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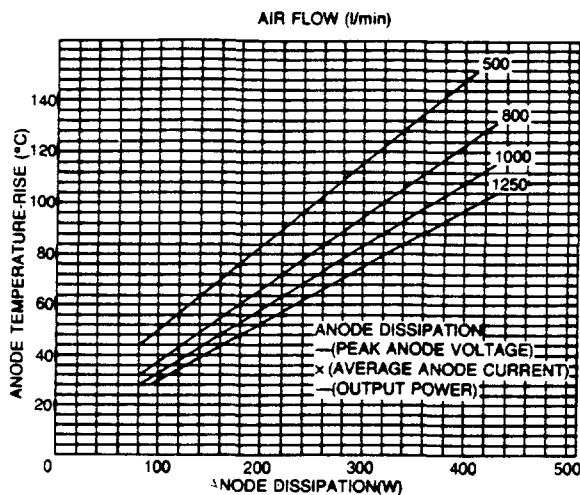


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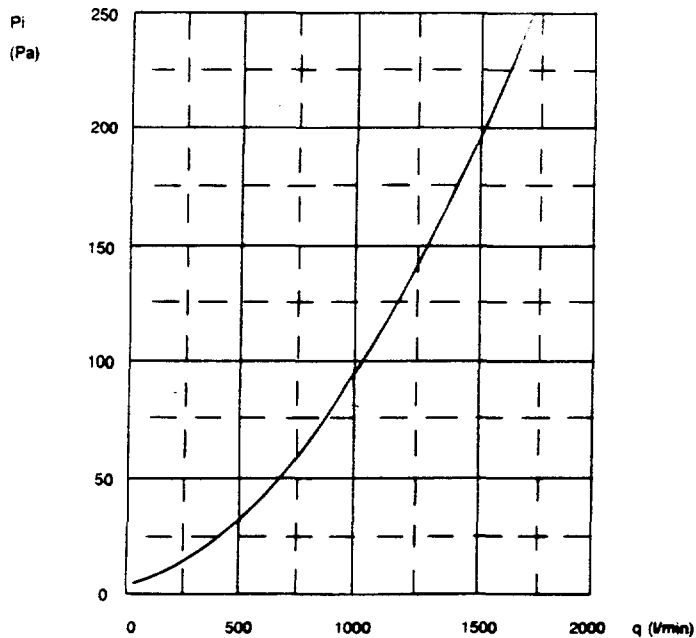
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### 8. ANODE DISSIPATION VS. ANODE TEMPERATURE



(Increase of anode temperature above inlet air temperature, T, as a function of anode dissipation, W. Anode dissipation = (peak anode voltage) x (average anode current) - (output power))

### 9. PRESSURE DROP VS. AIR FLOW



Pressure Drop  $P_i$ , across radiator as a function of air flow.  $q$ .

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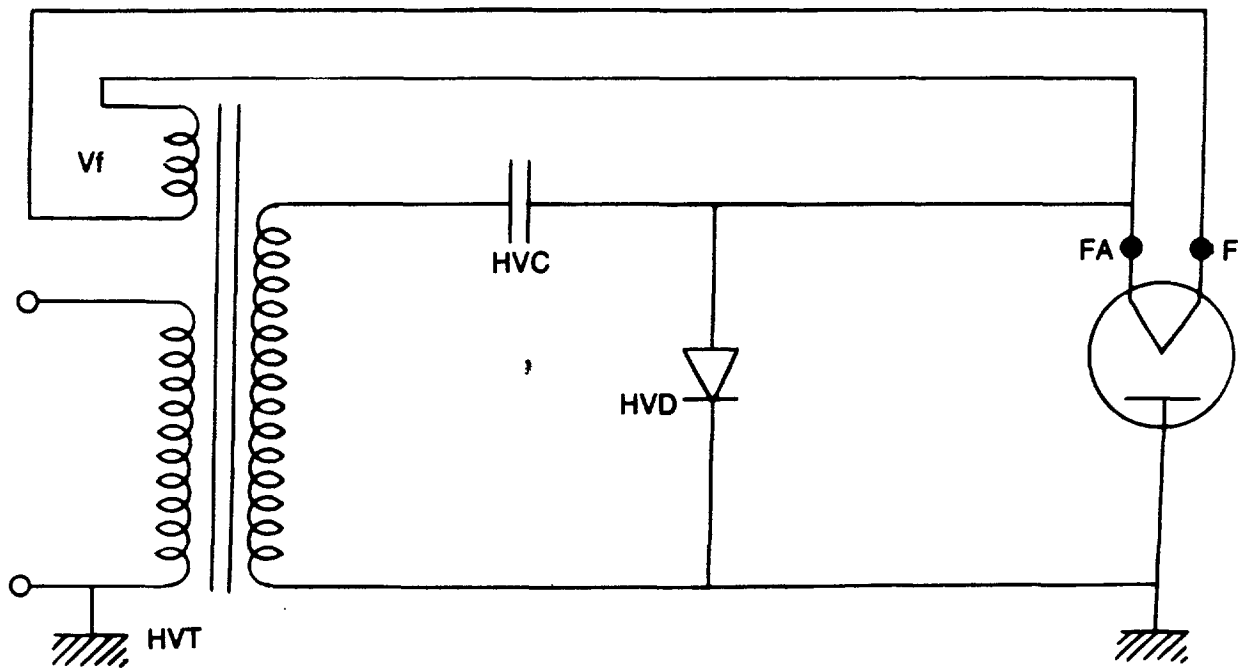


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## 10. POWER SUPPLY CIRCUITS



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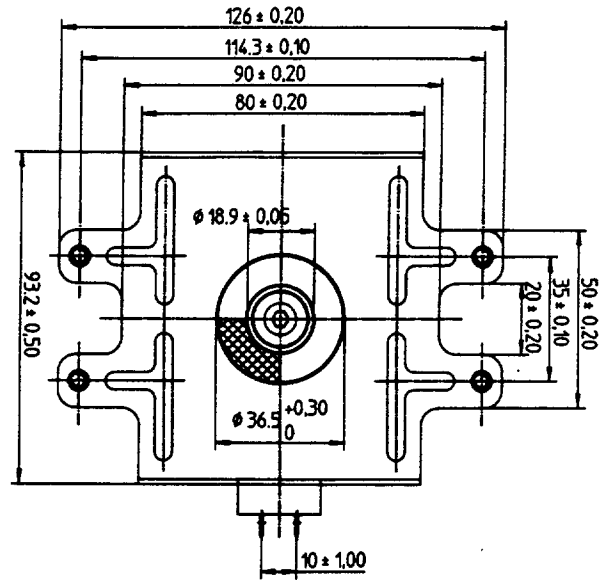
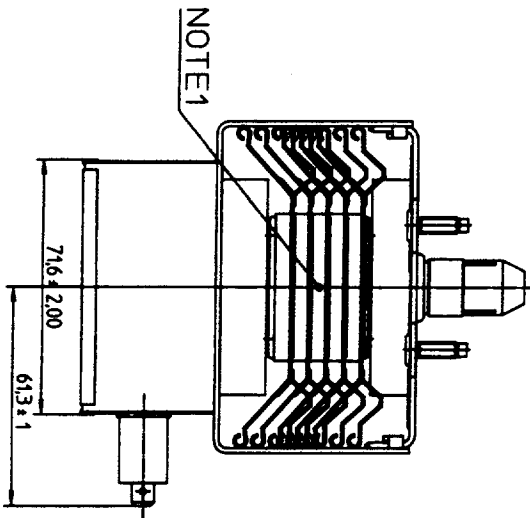
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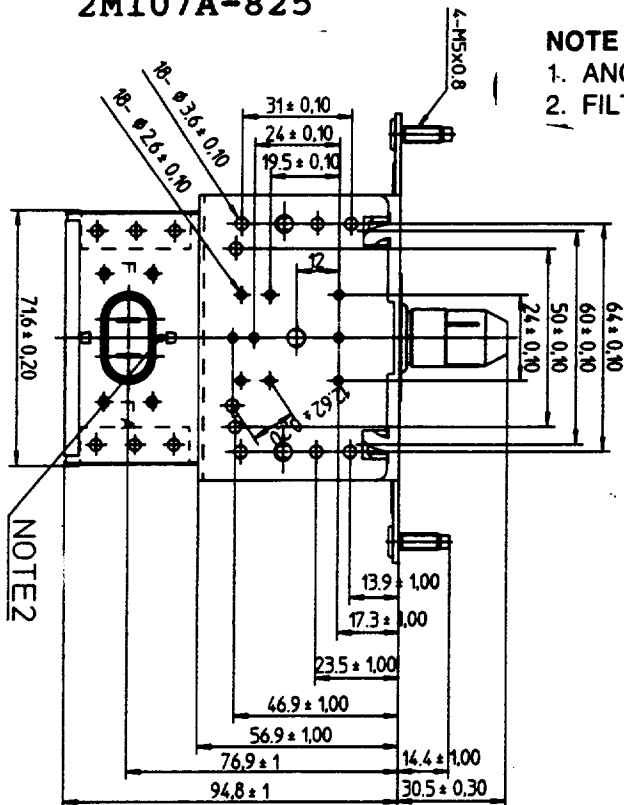
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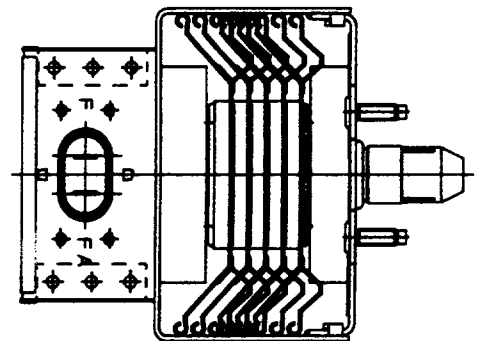


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**NOTE**

1. ANODE TEMPERATURE MEASURING POINT.
2. FILTER BOX TEMPERATURE MEASURING POINT.



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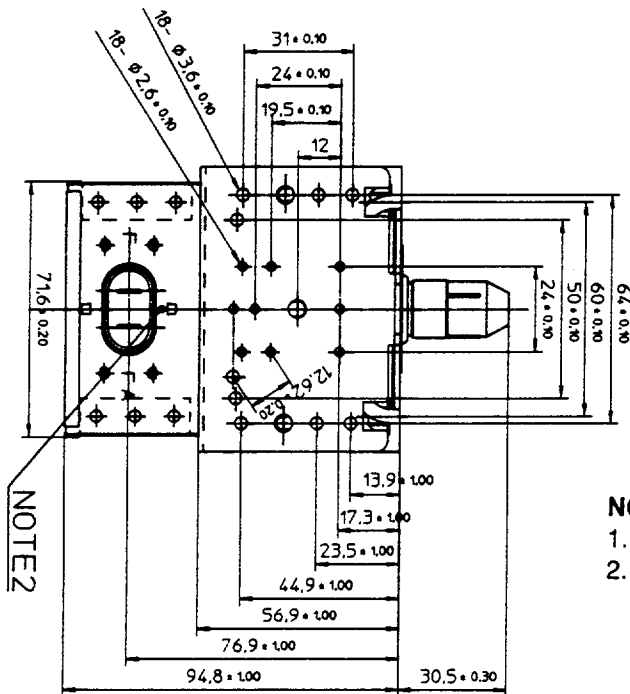
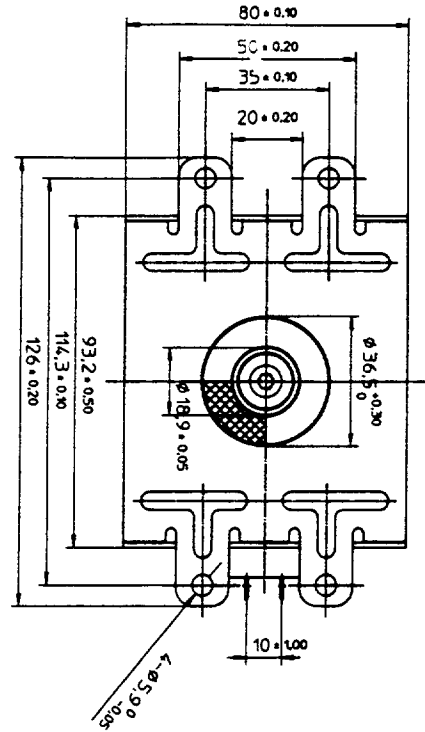
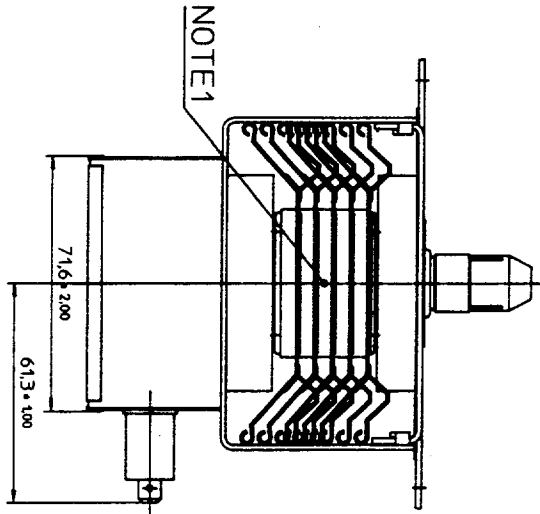


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