



## CO.20A CARCINOTRON

The CO.20A is a millimetric backward wave oscillator, focused by an integral permanent magnet, water cooled and delivering an output power over a frequency range of 150 to 156 GHz.

It can be amplitude modulated through its anode. Frequency modulation can be obtained by line voltage (1) variation, the frequency being independent of the load up to a VSWR of 3 : 1.

The high power obtained at such a high frequency makes it particularly suitable for physical measurements as plasma analysis, parametric resonance, study of the fine structure of the matter. It can be used also for transmission measurements, scaling, etc . . .



In short, the main features of the CO. 20A are :

- Minimum output power : 0.2 W from 150 to 152 GHz  
0.5 W from 152 to 156 GHz  
1.5 W in one point at least between 152 and 158 GHz.
- Frequency and amplitude modulation.

(1) *Line voltage or beam voltage.*

### GENERAL CHARACTERISTICS

Electrical	min.	max.	
Frequency . . . . .	150	156	GHz
Heater voltage (d c) . . . . .	- 8	- 6	V
Heater current (d c) . . . . .	1.8	2.4	A
Wehnelt (2) voltage . . . . .	- 250	0	V
Wehnelt current . . . . .	0	2	mA
Anode (3) voltage for 60 mA line current . . . . .	1100	1800	V
Anode voltage for 40 mA line current . . . . .	800	1500	V
Anode current . . . . .	0	5	mA
Line voltage (at lower frequencies) . . . . .	3000	-	V
Line voltage (at higher frequencies) . . . . .	-	6000	V
Line current . . . . .	40	60	mA
Modulation sensitivity . . . . .	4	10	MHz/V
Pushing . . . . .	20	50	MHz/mA

(2) *Wehnelt or Focusing electrode.*

(3) *Anode or Accelerator.*



**MECHANICAL**

Operating position	horizontal	RF output flange	UG 387/U
Focusing	permanent magnet	Input connector	HT plug (see drawing)
RF output waveguide	RG 138/U	Weight	16 kg

**COOLING**

Inlet water temperature	max. 60 °C	Corresponding pressure drop	0.3 to 0.5 bar
Inlet pressure	max. 1.5 bar	Ambient temperature	max. 60 °C
Flow-rate	1 to 1.5 l/mn	Water interlock	supplied with the tube

**ABSOLUTE RATINGS (1)**

Heater voltage	Vnom ± 3 %	Anode voltage	max. 3 000 V
Surge current	max. 2.5 A	Anode current	max. 10 mA
Warm-up time	min. 4 mn	Line voltage	max. 7 000 V
Wehnelt voltage	max. 0 V	Line current	max. 80 mA
Wehnelt current	max. 5 mA	Load VSWR	max. 5 : 1

**TYPICAL OPERATION (1)**

Heater voltage	- 7.44 V	Line current	60 mA
Heater current	2.1 A	Anode voltage	1 130 V
Warm-up time	4 mn	Anode current	0 mA
Frequency	154.7 GHz	Wehnelt voltage	- 5 V
Line voltage	5 610 V	RF output power	see curves

(1) All voltages are referred to the cathode.

The tube can be operated beyond characteristic frequency range. Ask for information.

**OPERATING INSTRUCTIONS**

**Supply** (see diagram) :

The supply should meet following items :

- the following starting sequence : Heater, Wehnelt, Line, Anode.
- Current limitations :
 

Heater	2.5 A
Wehnelt	5 mA
Anode	5 mA
Line	80 mA
- Protection against shorts or flashes which could occur in the tube.
- Warm-up timing.
- External water interlock for cooling circuit.
- Line overvoltage (Line voltage ≥ Anode voltage + 1500 V) security device.

**Application of voltages :**

- Start the liquid flow through the cooling circuit.
- Apply voltages in the following order : heater (allow four minutes minimum cathode warm-up time), Wehnelt, line, anode.

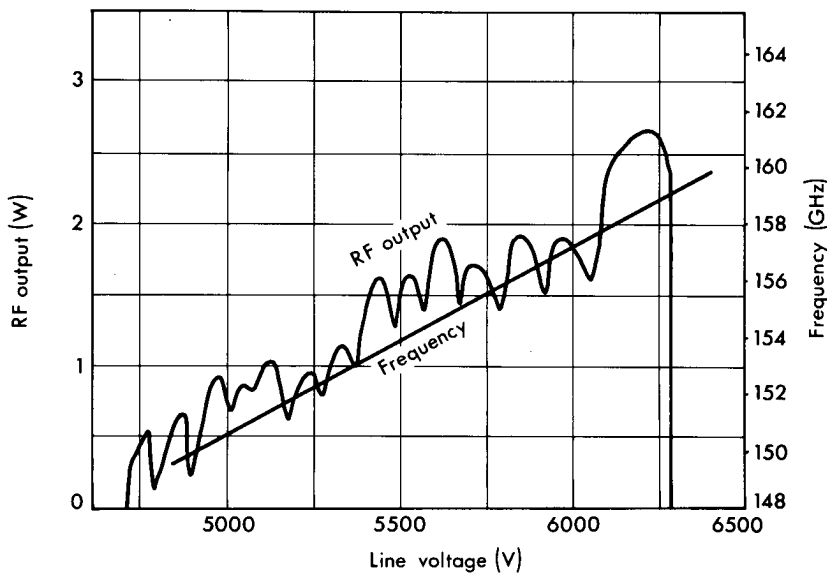
**Protective measures :**

- A minimum distance of 25 cm should be kept between the tube and any magnetic material.
- Do not try to obtain modulation through the Wehnelt voltage.
- Operating parameters are given with each tube particular test data sheets.

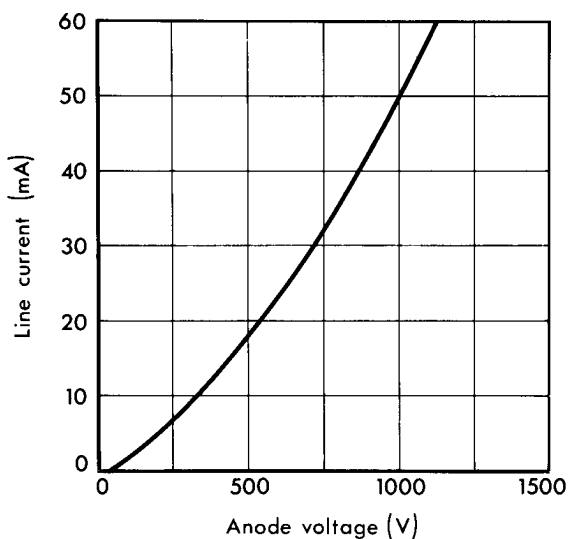


**characteristic curves  
(typical values)**

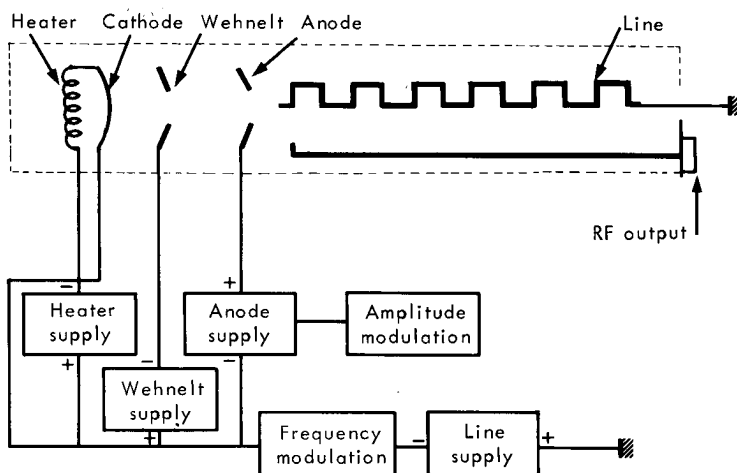
Heater voltage (dc) - 7.4 V  
Heater current (dc) 2.1 A  
Wehnelt voltage (dc) - 5 V  
Anode voltage (dc) 1130 V  
Line current (dc) 60 mA



Heater voltage (dc) - 7.4 V  
Heater current (dc) 2.1 A  
Wehnelt voltage (dc) - 5 V  
Line voltage (dc) 4 kV

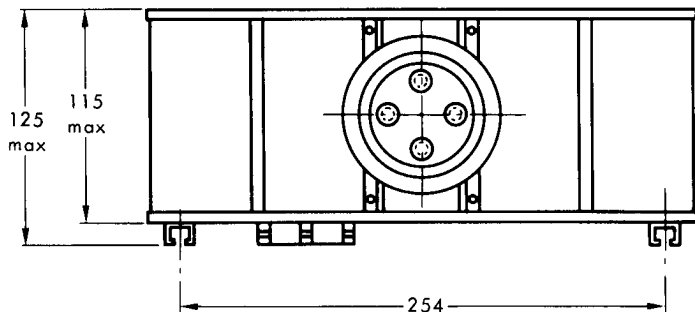


**supply diagram**

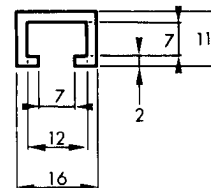




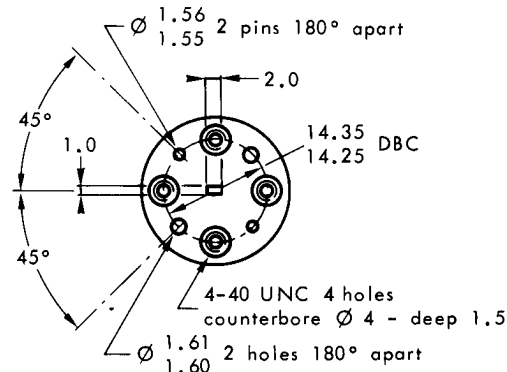
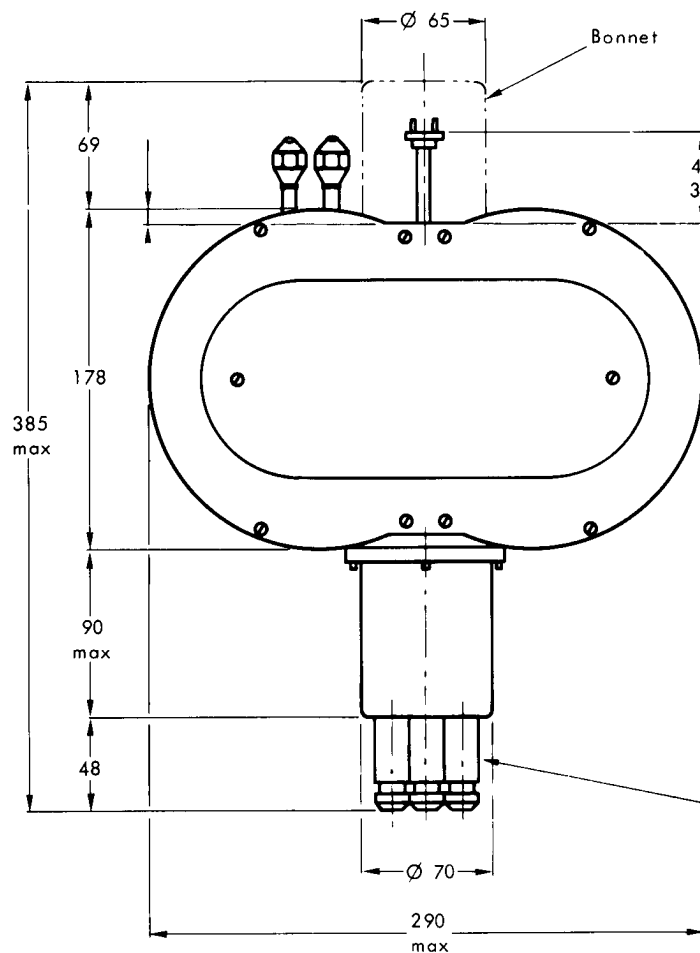
**OUTLINE DRAWING**



POSITIONING RAIL



A



RF OUTPUT  
view A

High voltage connector  
LEMO plug JUPITER type  
ref III C 50 HT 10  
CERN model

Dimensions in mm.

