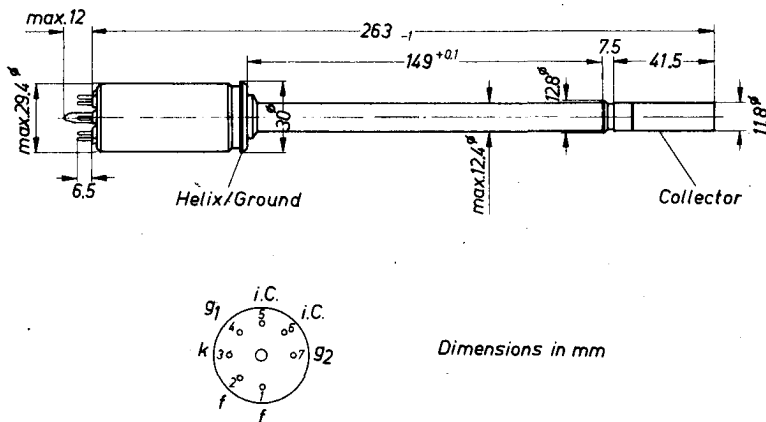


Design and Application

Tentative Data

Power travelling wave tube specially designed for broadband radio relay systems with an average power output of 10 watts and an average gain of 35 db. The RW 4 is a periodic permanent magnet focused travelling wave tube and is replaceable within the magnet system. It is arranged to operate with depressed collector.

The rf power is coupled in and out by way of waveguides.



Base:
Weight of tube:
Weight of magnet system:
Dimensions of magnet system:
Waveguide:
Flange:
Mounting position:

European type base
approx. 100 gm net
approx. 7.5 kg
approx. 100 x 112 x 304 mm
F40, DIN 47302, 58.17 x 7 mm
NF 40, DIN 47303
any

Heating

Heater voltage	=	$6.3 \pm 2\%$	V (1)
Heater current	$\approx$	1	A
Cathode heating time	$\approx$	2	min

indirect by AC, parallel supply

MK dispenser cathode

Characteristics

Frequency range	=	3.3 to 4.3	kMc
Saturation power	$\approx$	16	W
Average gain ($P_O = 10$ W)	=	35	db
Small-signal gain	=	37	db
Reflection factor	$\approx$	5	% (2)
Magnetic field strength	$\approx$	800	Gauss(3)

- (1) If the maximum variation of the heater voltage exceeds the absolute limits of $\pm 2\%$, the operating performance of the tube will be impaired and its life shortened.
- (2) At input and output of cold tube with optimum adjustment of rf matching elements to midband and a bandwidth of ± 10 Mc in the frequency range from 3.3 to 4.3 kMc.
- (3) Peak value of alternating magnetic field.

Typical Operation

Operating frequency	=	4	kMc
Power output	=	10	W
Gain	≈	35	db
Collector voltage	=	1200	Vdc (1)
Helix voltage	≈	1750	Vdc
Grid No. 2 voltage	≈	550	Vdc
Grid No. 1 voltage	=	-20	Vdc
Helix current	≈	2	mAdc
Grid No. 2 current	<	0.1	mAdc
Cathode current	=	60	mAdc
Noise figure	<	25	db
AM/PM conversion	≈	4.5	°/db (2)

Maximum Ratings

(absolute values)

Collector voltage	min	1100	Vdc
Collector voltage	max	1400	Vdc
Collector dissipation	max	85	W
Helix voltage	max	1900	Vdc
Helix current	max	5	mAdc
Helix dissipation	max	8	W
Grid No. 2 voltage	max	800	Vdc
Grid No. 2 dissipation	max	0.2	W
Negative grid No. 1 voltage	max	30	Vdc
Positive grid No. 1 voltage	max	0	Vdc
Cathode current	max	65	mAdc
Collector temperature	max	200	°C

(1) Setting values

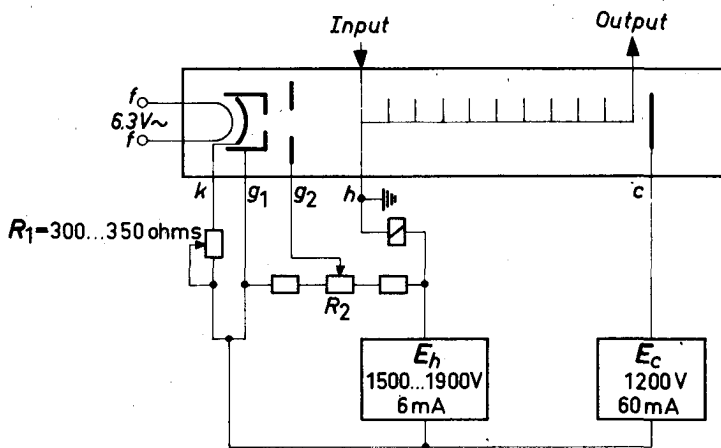
(2) AM/PM conversion is the variation of the phase shift related to a variation of the power input level by 1 db.

Operating Instructions

The travelling wave tube can be operated only in conjunction with its associated magnet system. The particular advantages of the periodic permanent magnetic focusing of the RW 4 are, besides the relatively small dimensions of the magnet system, low sensitivity to temperature changes and extremely small leakage field. The magnetic field is therefore largely insensitive to metal parts located in its vicinity provided these parts are at least 10 mm removed from the magnet system.

All voltages applied to the tube are referred to the cathode. The helix voltage must be regulated between 1500 to 1900 Vdc. The collector voltage does not require stabilization. The grid No. 1 voltage is automatically generated by the cathode current across resistor R_1 . The grid No. 2 voltage is picked off from voltage divider R_2 , whose total series resistance must not exceed 2.5 Meg.

The helix lead must be provided with a protective relay which causes the helix and grid No. 2 voltage to be switched off if the maximum rating for the helix current is exceeded.



Designations of the grids: g_1 = focusing electrode (Wehnelt)
 g_2 = acceleration electrode

Cooling

To dissipate the heat developed, the radiator must be cooled by a low air flow.

If the air flow stops, the supply voltages must automatically cut out.

Starting

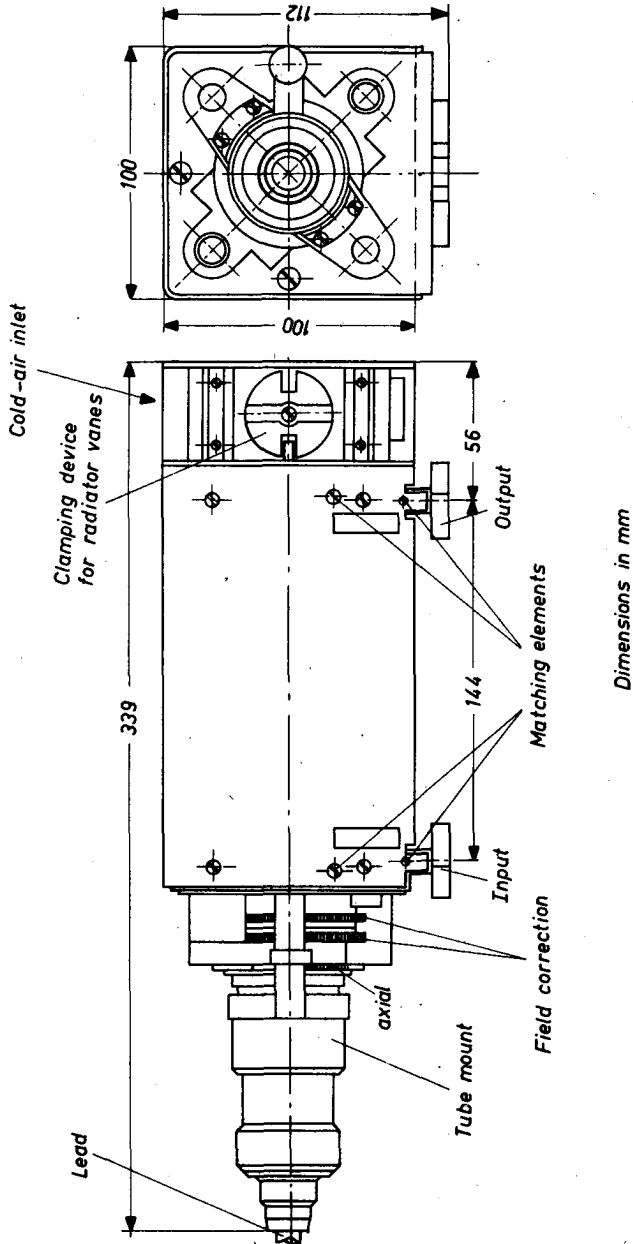
For safe handling of the equipment; the magnet system must be properly grounded. For starting the tube the preliminaries should be performed in the following order:

1. Connect up leads:

Filament	f, f:	brown
Cathode	k:	yellow
Grid No. 1	g1:	green
Grid No. 2	g2:	blue
Collector	c:	black
2. Screw off sleeve and unlock clamping device for radiator vanes.
3. Insert tube in magnet system.
4. Plug in tube socket and screw on sleeve until stop is reached.
Lock clamping device for radiator vanes.
5. Apply heater voltage and preheat tube for at least 2 min.
6. Switch on forced-air cooling.
7. Apply collector voltage.
8. Switch on voltage supply for helix and grid No. 2. Make sure that full voltages are applied immediately and not increased gradually to full value.
9. Adjust cathode current by varying grid No. 2 voltage. Adjust helix voltage to optimum gain.
10. Adjust helix current to minimum with the aid of radial field correction (set-screws at cathode side of magnet system) and axial field correction (cylindrical threaded ring adjustable along axis of tube).

Switching off

The operating voltages can be disconnected either simultaneously or in the reverse order to that in which they were applied.



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