

# KF 4 R.F. pentode

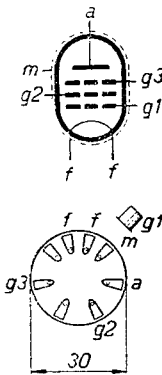


Fig. 2  
Arrangement of  
base connections  
and electrodes.

The R.F. pentode KF 4 has no control characteristic; it can be employed for R.F. or I.F. amplification, anode-bend or grid detection, and as resistance-coupled A.F. amplifier.

When used for the last-mentioned function it should follow the indirectly-heated double-diode KB 2 for driving a Class A output stage using the pentode KL 4 or, with the necessary driver transformer, a Class B stage comprising two valves of the latter type.

The KF 4 gives excellent results on short waves; this is mainly due to the use of the P-type base with which it is fitted, and a separate contact for the suppressor grid connection. In the design of this valve output capacitances have been kept as low as possible.

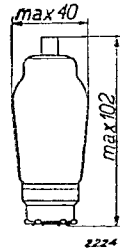


Fig. 1  
Dimensions in mm.

## FILAMENT RATINGS

Heating: direct by battery; parallel supply.

Filament voltage. . . . .  $V_f = 2.0 \text{ V}$

Filament current. . . . .  $I_f = 0.065 \text{ A}$

## CAPACITANCES

$$C_{ag1} < 0.008 \mu\mu\text{F}$$

$$C_{g1} = 6.0 \mu\mu\text{F}$$

$$C_u = 5.0 \mu\mu\text{F}$$

## MAXIMUM RATINGS

$$V_a = \text{max. } 135 \text{ V}$$

$$W_a = \text{max. } 0.5 \text{ W}$$

$$V_{g2} = \text{max. } 135 \text{ V}$$

$$W_{g2} = \text{max. } 0.25 \text{ W}$$

$$I_k = \text{max. } 5 \text{ mA}$$

$$V_{g1} (I_{g1} = +0.3 \mu\text{A}) = \text{max. } -0.2 \text{ V}$$

$$R_{g1k} = \text{max. } 3 \text{ M ohms}$$

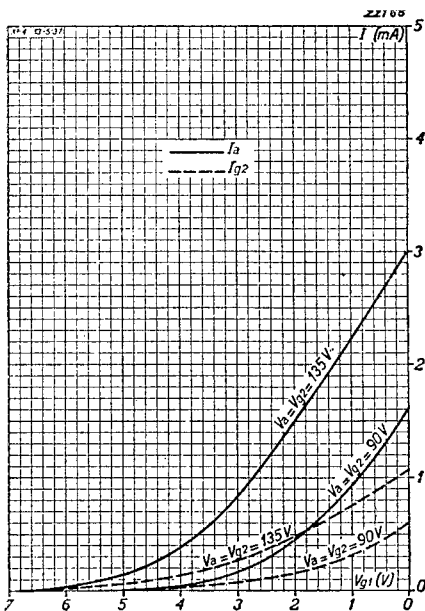


Fig. 3  
Anode and screen-grid current as functions of  
the grid bias.

STATIC DATA

Anode voltage . . . . .	$V_a = 90$ V	135 V
Screen-grid voltage . . . . .	$V_{g2} = 90$ V	135 V
Suppressor-grid voltage . . . . .	$V_{gs} = 0$	0 V
Grid bias . . . . .	$V_{g1} = -0.5$ V	-0.5 V
Anode current . . . . .	$I_a = 1.2$ mA	2.6 mA
Screen-grid current . . . . .	$I_{g2} = 0.4$ mA	1.0 mA
Amplification factor . . . . .	$\mu = 800$	700
Mutual conductance . . . . .	$S = 0.7$ mA/V	0.8 mA/V
Internal resistance . . . . .	$R_i = 0.9$ M ohms	0.8 M ohms

TABLE I

KF 4 used as grid detector with resistance coupling (connected as pentode); grid leak of following valve = 1 megohm.

Battery voltage $V_b$ (V)	Coupling resistor $R_a$ (M ohm)	Anode current $I_a$ (mA)	Screen-series resistor $R_{g1}$ (M ohm)	Screen-grid current $I_{g2}$ (mA)	Detector amplification; modulation depth 30 %		Alternating output voltage; modulation depth 30 %	
					Altern. output voltage $V_o$ (V <sub>eff</sub> )	Stage gain	Altern. output voltage $V_o$ (V <sub>eff</sub> )	Altern. grid voltage $V_i$ (V <sub>eff</sub> )
135	0.32	0.37	0.64	0.15	2	6.6	4.8	0.64
90	0.32	0.24	0.5	0.11	2	4.8	2.6	0.56
135	0.10	1.05	0.5	0.16	2	7.3	6.4	1.0
90	0.04	2.1	0.032	1.05	2	4.4	5.1	1.6
135	0.10	0.71	0.10	0.41	2	4.9	4.5	1.0
90	0.04	1.5	0.016	0.75	2	3.9	3.8	1.1

TABLE II

KF 4 used as grid detector with reaction and resistance coupling (connected as triode).

Battery voltage $V_b$ (V)	Coupling resistor $R_a$ (Ohms)	Anode current $I_a$ (mA)	Detector amplification at $m = 0.3$		Alternating output voltage at $m = 0.3$			Alternating output voltage at $m = 0.1$		
			Altern. output volts $V_o$ (V <sub>eff</sub> )	Stage gain	Altern. output volts $V_o$ (V <sub>eff</sub> )	Altern. grid volts $V_i$ (V <sub>eff</sub> )	Distortion %	Altern. output volts $V_o$ (V <sub>eff</sub> )	Altern. grid volts $V_i$ (V <sub>eff</sub> )	Distortion %
135	20,000	2.6	0.5	1.9	2.2 <sup>1)</sup>	1.1	2	0.85	1.5	0.9
135	40,000	1.8	0.5	2.2	2.2 <sup>1)</sup>	1.0	3.6	0.86	1.5	2
90	20,000	1.5	0.5	1.6	1.4 <sup>2)</sup>	0.95	5 <sup>3)</sup>	—	—	—
90	40,000	1.1	0.5	2.0	1.4 <sup>2)</sup>	0.8	4	—	—	—

<sup>1)</sup> Max. excitation of the stage KC 3 + KDD 1 at  $V_a = 135$  V is reached at an alternating grid voltage of 2.2V(eff)

<sup>2)</sup> Max. excitation of the stage KC 3 + KDD 1 at  $V_a = 90$  V is reached at an alternating grid voltage of 1.4 V(eff).

<sup>3)</sup> Maximum alternating output voltage.

TABLE III

KF 4 used as A.F. amplifier (connected as pentode). Grid leak of following valve  
1 megohm.

Battery voltage	Coupling resistor	Anode current	Screen series resistor	Screen-grid current	Grid bias	With an alternating output voltage of 10 $V_{eff}$ :		With an alternating output voltage of 14 $V_{eff}$ :	
						Gain factor	Distortion $d$ (%)	Gain factor	Distortion $d$ (%)
$V_b$ (V)	$R_a$ (M ohm)	$I_a$ (mA)	$R_{g_2}$ (M ohm)	$I_{g_2}$ (mA)	$V_{g_1}$ (V)				
135	0.32	0.30	0.64	0.11	-1.5	72	0.5	72	0.7
90	0.32	0.18	0.4	0.10	-1.5	52	1.5	52	1.8
135	0.20	0.41	0.4	0.15	-1.5	62	0.8	62	1.0
90	0.20	0.24	0.25	0.10	-1.5	48	1.2	48	1.9
135	0.10	0.64	0.2	0.23	-1.5	47	0.9	47	1.6
90	0.10	0.50	0.05	0.20	-1.5	37	0.9	37	1.8

TABLE IV

KF 4 used as A.F amplifier (connected as triode). Grid leak of the following valve  
1 megohm.

Battery voltage	Coupling resistor	Anode current	Grid bias	With an alternating output voltage of 7 $V_{eff}$ : <sup>1)</sup>			With an alternating output voltage of 10 $V_{eff}$ : <sup>2)</sup>		
				Altern. grid volts	Stage gain	Distortion	Altern. grid volts	Stage gain	Distortion
$V_b$ (V)	$R_a$ (M ohm)	$I_a$ (mA)	$V_{g_1}$ (V)	$V_i$ ( $V_{eff}$ )		$d$ (%)	$V_i$ ( $V_{eff}$ )		$d$ (%)
135	0.32	0.25	-1.5	0.39	18	0.8	0.56	18	0.8
135	0.32	0.15	-3.0	0.43	16.2	1.5	0.62	16.2	2.8
90	0.32	0.13	-1.5	0.43	16.2	2	—	—	—
90	0.32	0.05	-3.0	0.62	11.5	10	—	—	—
135	0.20	0.35	-1.5	0.39	18	0.8	0.56	18	0.8
135	0.20	0.21	-3.0	0.45	16	1.7	0.63	16	3.0
90	0.20	0.17	-1.5	0.43	16.2	2	—	—	—
90	0.20	0.07	-3.0	0.65	10.5	13	—	—	—
135	0.10	0.56	-1.5	0.42	16.6	0.8	0.60	16.6	1.0
135	0.10	0.33	-3.0	0.48	14.5	2.4	0.70	14.5	4.0
90	0.10	0.28	-1.5	0.48	14.5	1.5	—	—	—
90	0.10	0.09	-3.0	0.76	9.5	18	—	—	—

<sup>1)</sup> Max. excitation of the KL 2 at  $V_a = V_{g_2} = 90$  V is reached at an alternating input of 7  $V_{eff}$ .

Max. excitation of the KL 4 at  $V_a = V_{g_2} = 90$  V is reached at an alternating input of 2  $V_{eff}$ .

<sup>2)</sup> Max. excitation of the KL 2 at  $V_a = V_{g_2} = 135$  V is reached at an alternating input of 10  $V_{eff}$ .

Max. excitation of the KL 4 at  $V_a = V_{g_2} = 135$  V is reached at an alternating input of 3.5  $V_{eff}$ .

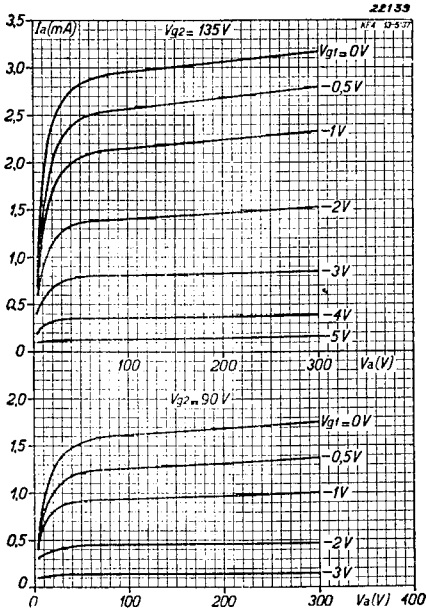


Fig. 4  
Anode current as a function of the anode voltage, with grid bias as parameter, at  $V_{g2} = 90V$  and  $135V$ .

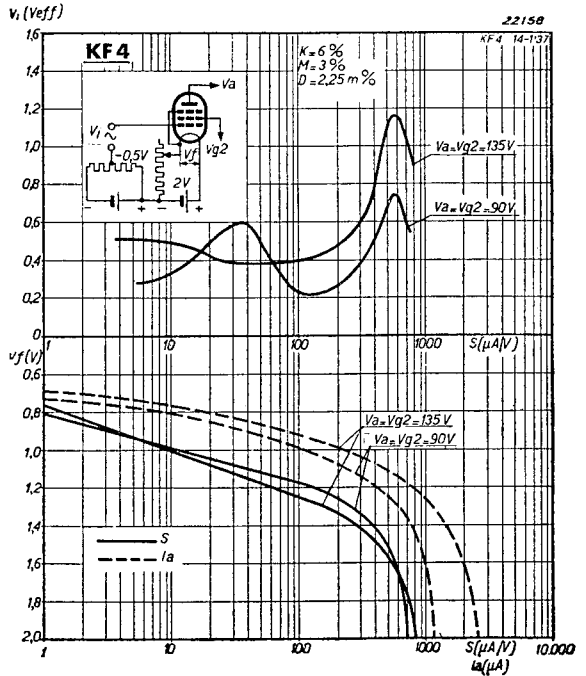


Fig. 5  
Upper diagram. Maximum permissible effective value of the alternating grid voltage with 6% cross-modulation (0.5% 3rd harmonic), as a function of the mutual conductance controlled by varying the filament voltage.  
Lower diagram. Mutual conductance and anode current as functions of the filament voltage.