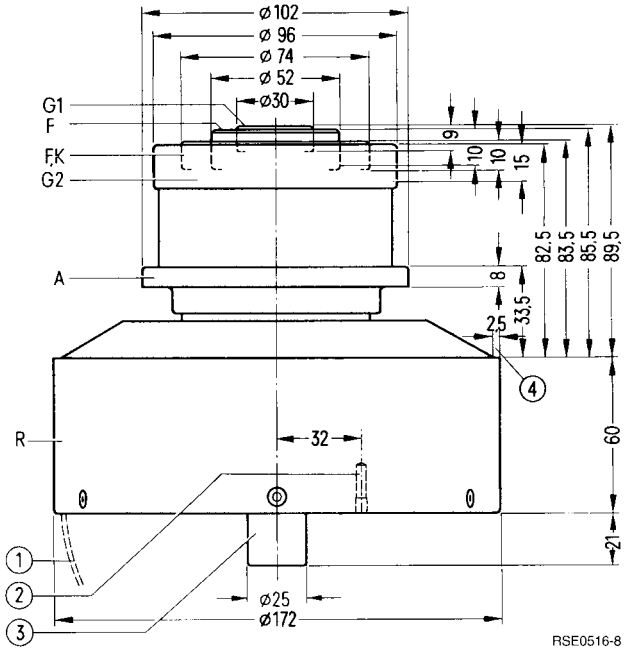
For FM transmitters in grounded cathode circuit Ordering code Q51-X2032

Coaxial metal-ceramic tetrode, forced-air-cooled, particularly suitable for FM transmitters in grounded cathode circuit. For an easy design of the tuned circuit the control grid terminal is coaxially led out within the cathode terminals. A direct dc blocking of the screen grid produced by the external cathode terminal is thereby possible. This arrangement of the terminals also prevents cross coupling of the input and output circuit against the common cathode line inductance. An increased stability against self-excitation has been achieved by integrating an attenuator into the screen grid line. This resistor consumes a power of approximately 30 W for an operating frequency of 110 MHz and an output power of 12 kW.



Dimensions in mm

① Handle, swingable
② Taphole for tube fuse RöSich7
③ Do not use as terminal
④ Free for anode support

Approx. weight 6,7 kg

The radiator and the terminals are of concentric design with the following diameters:

Radiator	∅ 173,5	Control grid terminal	∅ 30,6
Anode terminal	∅ 103,0	Heater/cathode terminal	∅ 74,6
Screen grid terminal	∅ 96,6	Heater terminal	∅ 52,5

Heating

Heater voltage	U_F	9,5	V
Heater current	I_F	≈ 80	A
Heating: direct			
Cathode: thoriated tungsten			

Characteristics

Emission current at $U_A = U_{G2} = U_{G1} = 300$ V	I_{em}	35	A
Amplification factor of screen grid at $U_A = 2$ kV, $U_{G2} = 600$ to 1000V, $I_A = 2$ A	μ_{g2g1}	8,0	
Transconductance at $U_A = 2$ kV, $U_{G2} = 800$ V, $I_A = 1,5$ bis 2,5 A	s	53	mA/V

Capacitances

Cathode/control grid	c_{kg1}	≈ 95	pF
Cathode/screen grid	c_{kg2}	≈ 45	pF
Cathode/anode	c_{ka}	≈ 0,04	pF [1)]
Control grid/screen grid	c_{g1g2}	≈ 76	pF
Control grid/anode	c_{g1a}	≈ 0,32	pF [1)]
Screen grid/anode	c_{g2a}	≈ 22	pF

Accessories		**Ordering code**
Socket wrench for tube fuse	RöZub09	Q81-X2109
Tube fuse	RöSich7	Q81-X1407
Pull switch for tube fuse	RöKt11	Q81-X1311

1) Measured by means of a 50 cm diameter screening plate in the screen grid terminal plane.

RF amplifier,
class B operation, grounded cathode circuit

Maximum ratings

Frequency	f	110	MHz
Anode voltage (dc)	U_A	9,0	kV
Screen grid voltage (dc)	U_{G2}	1000	V
Control grid voltage (dc)	U_{G1}	– 250	V
Cathode current (dc)	I_K	6,0	A
Peak cathode current	$I_{K\,M}$	35	A
Anode dissipation	P_A	12	kW
Screen grid dissipation	P_{G2}	270	W
Control grid dissipation	P_{G1}	70	W

Operating characteristics

Frequency	f	≤ 110	MHz
Output power	P_2	12	kW [1])
Anode voltage (dc)	U_A	7,5	kV
Screen grid voltage (dc)	U_{G2}	800	V
Control grid voltage (dc)	U_{G1}	– 100	V [2])
Peak control grid voltage (ac)	$U_{g1\,m}$	110	V
Anode current (dc)	I_A	2,3	A
Screen grid current (dc)	I_{G2}	200	mA
Control grid current (dc)	I_{G1}	50	mA
Anode input power	$P_{B\,A}$	17,2	kW
Drive power	P_1	30	W [3])
Anode dissipation	P_A	5,2	kW
Screen grid dissipation	P_{G2}	160	W
Efficiency	η	70	%
Anode load resistance	R_A	1800	Ω

1) Circuit losses are not included.
2) For zero signal dc anode current $I_{A\,0}$ = 0,4 A.
3) Additional loss in the grid circuit is not taken into consideration.

Tube mounting

Axis vertical, anode up or down.

The cavity TK 4470 is available for tube operation in the VHF range (accessories).

Maximum tube surface temperature

The metal-ceramic seals of the tube must not exceed a temperature 220 °C at any point, except of the centrally located control grid terminal, the temperature of which must not exceed 280 °C. These requirements can only be met without additional cooling of the terminals if an appropriate air duct and sufficient space between the individual contact springs is provided so that enough cooling air can pass through.

Forced-air cooling

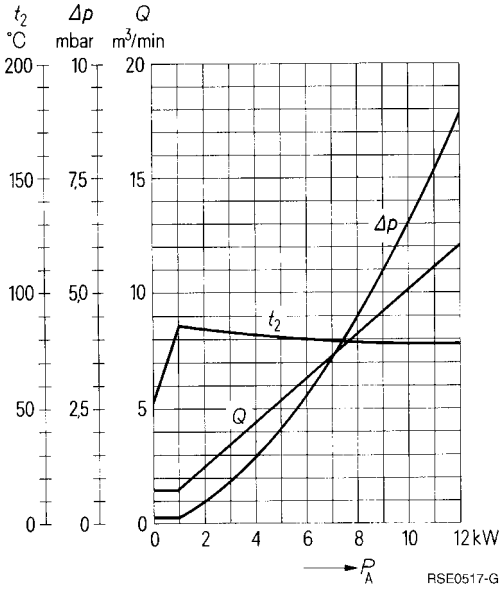
The minimum air flow rate required for maximum anode dissipation is given in the cooling air diagram valid for 25 °C inlet temperature at a normal air pressure of 1 bar (sea level). The cooling air must be supplied from the side of the electrode terminals. For further information on forced air cooling refer to “Explanations on Technical Data”.

Safety precautions

The section “Safety precautions” under “Explanations on Technical Data” describes how the tube is to be protected against damage due to electric overload or insufficient cooling. A copper wire with 0,20 mm diameter should be used to test the anode overcurrent trip circuit.

For protection against thermal anode overload the tube fuse RöSich7 is recommended. In conjunction with pull switch RöKt11 it disconnects the voltages at the tube in case of overload (accessories).

Cooling air diagram



The cooling air is supplied from the electrode terminal side.

Air pressure = 1 bar
t_1 = 25 °C

$U_{G1} = f(U_A)$
U_{G2} = 800 V

Parameter = I_A ——————
Parameter = I_{G2} — — — — — — —
Parameter = I_{G1} —·—·—·—·—·—