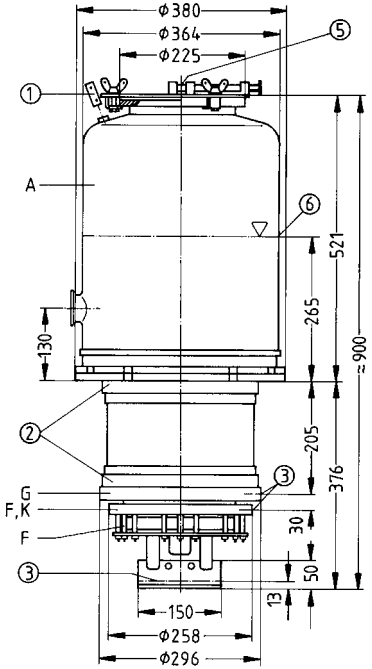
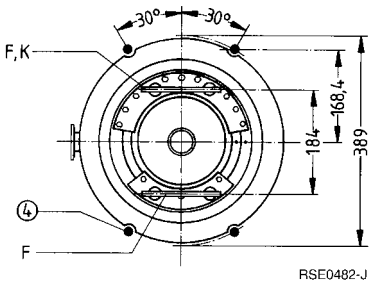
Ordering code Q53-X1828

Coaxial metal-ceramic triode, vapor-cooled with integrated boiler, suitable for broadcast transmitters up to 350 kW medium and short wave.



Bottom view



Dimensions in mm

① Connection of tube fuse RöSich828
② Do not use as terminal
③ Contact surface
④ Slide rods in the transmitter, 20 mm dia.
⑤ Crane suspension
⑥ Max. water level

Approx. weight 123 kg

Heating

Heater voltage	U_F	10	V
Heater current	I_F	≈ 980	A
Permissible starting current	I_{FM}	≤ 2000	A
Heating: direct			
Cathode: thoriated tungsten			

Characteristics

Emission current at $U_A = U_G = 900$ V	I_{em}	500	A
Amplification factor at $U_A = 8$ to 12 kV, $I_A = 10$ A	μ	100	
Transconductance at $U_A = 8$ kV, $I_A = 10$ A	s	250	mA/V

Capacitances

Cathode/grid	c_{kg}	≈ 600	pF
Cathode/anode	c_{ka}	≈ 4,0	pF [1])
Grid/anode	c_{ga}	≈ 225	pF

Accessories		**Ordering code**
Cathode terminal	RöKat828	Q1001-X26
Grid terminal	RöGit491	Q1001-X19
Pressure piece for water inlet	RöZub101	Q1001-X110
Locking piece for water inlet	RöZub102	Q1001-X111
Gasket ring for water inlet	RöZub103	C65055-A670-C503
Gasket ring for vapor inlet	RöZub104	C65055-A670-C504
Tube fuse	RöSich828	C65055-A870-A98
LL electrolytic target	RöEl30	Q1001-X128
Gasket ring for boiler		C65051-A410-C538

1) Measured by means of a 60 cm diameter screening plate in the grid terminal plane.

Anode voltage modulation,
50 % modulated driver stage

Maximum ratings

Frequency	f	30	MHz
Anode voltage (dc)	U_A	12	kV
Grid voltage (dc)	U_G	– 800	V
Cathode current (dc)	I_K	70	A
Peak cathode current	$I_{K\,M}$	480	A
Anode dissipation	P_A	250	kW
Grid dissipation	P_G	7,0	kW

Operating characteristics		I	I	II	
Frequency	f	1,6	1,6	≤ 30	MHz
Carrier power	P_{trg}	370	320	370+34 [2]	kW [1]
Anode voltage (dc)	U_A	11,5	11	11,5	kV
Grid bias (dc), fixed	$U_{G\,fix}$	– 140	– 140	– 140	V
Grid resistance	R_G	38	40	38	Ω
Peak grid voltage (ac)	$U_{g\,m}$	1000	950	1000	V
Anode current (dc)	I_A	40	36	40	A
Grid current (dc)	I_G	11	10	11	A
Anode input power	$P_{B\,A}$	460	395	460	kW
Drive power	P_1	10	8,5	10+34 [2]	kW [1]
Anode dissipation	P_A	90	75	90	kW [3]
Grid dissipation	P_G	3,9	3,1	3,9	kW
Efficiency	η	81	81	81	%
Anode load resistance	R_A	160	165	175	Ω
Modulation factor	m	100	100	100	%
Modulation power	P_{mod}	230	198	230	kW
Grid dissipation at modulation	$P_{G\,mod}$	5	3,7	5	kW [4]
Peak grid voltage (ac)	$U_{g\,m}$	1500	1420	1500	V [5]
Grid current (dc)	I_G	18	15	18	A [5]
Drive power	P_1	25	19	25+103 [2]	kW [1] [5]

I Grounded cathode circuit
II Grounded grid circuit

1) Circuit losses are not included.
2) Power transition of the grounded grid circuit.
3) Even during modulation the indicated maximum ratings must not be exceeded. It has to be observed that the plate dissipation will increase to about 1,5 times the power dissipation stated for the carrier value during 100 % modulation.
4) Average grid dissipation at 100 % modulation.
5) Maximum values at peak modulation.

Tube mounting

Axis vertical, anode up.

For connection of the tube use the terminals under “Accessories”.

To insert the tube in the fixed tube socket, the slide rods of 20 mm diameter which are attached to the anode flange support bearing must be used as indicated on the dimensional drawing. It is thereby ensured that the tube slips centrically into the grid connection ring, and the contact blades for the heater current come into the right position to the clamping jaws incorporated in the transmitter.

In case of dismounting the tube, care must be taken that the water is removed from the interior of the vapor-cooled anode. For this purpose the hose of the emptying pump must be led into the tube through the vapor outlet and down into the visibly located central pipe.

Maximum tube surface temperature

The temperature of the metal-ceramic seals must not exceed 200 °C at any point. The maximum permissible difference in temperature at the circumference of the ceramic is 50 °C and in the axial direction 80 °C. The temperature gradient must not exceed 10 °C/cm. These limits can usually be observed by leading the air stream, which is required for the cooling of the tube terminals, along the anode ceramic.

In order to keep the temperature limit of 200 °C at the metal-ceramic seals, additional cooling of the tube terminals is necessary. For this purpose an air stream of at least 5 m^3/min at a normal air pressure of 1 bar and 20 °C ambient temperature is conducted through the tube socket. At higher sea levels and ambient temperature the minimum air flow rate must be increased proportionally.

After disconnecting the heater voltage, the tube terminals need an aftercooling time of 10 minutes. Thus the heat flow coming from the tube interior cannot cause impermissible heating up of the terminals and of the spring finger contacts of the connection rings.

The aftercooling time can be reduced to 5 minutes if the cooling air rate for ventilating the tube socket is increased to 7 m^3/min. The temperature of the curved part of the copper-beryllium spring-finger contacts in the connecting rings must not exceed 140 °C.

Vapor cooling

Cooling data for maximum anode dissipation	$P_{A\,max}$ = 250 kW
Total power to be dissipated by the cooling system ($P_A + P_G + 0{,}8\ P_F$)	265 kW
Equivalent thermal output	15900 kJ/min (3800 kcal/min)
Flow rate of returning water	
at returning water temperature of 20 °C	approx. 6,2 l/min
at returning water temperature of 90 °C	approx. 6,9 l/min
Volume of generated vapor	
at returning water temperature of 20 °C	approx. 10,4 m^3/min
at returning water temperature of 90 °C	approx. 11,7 m^3/min

Detailed information on vapor cooling upon request. Please observe the instructions on vapor cooling given under “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 0,25 mm diameter should be used to test the anode overcurrent trip circuit.

$U_G = f(U_A)$ Parameter = I_A ——————————
Parameter = I_G — — — — — — —