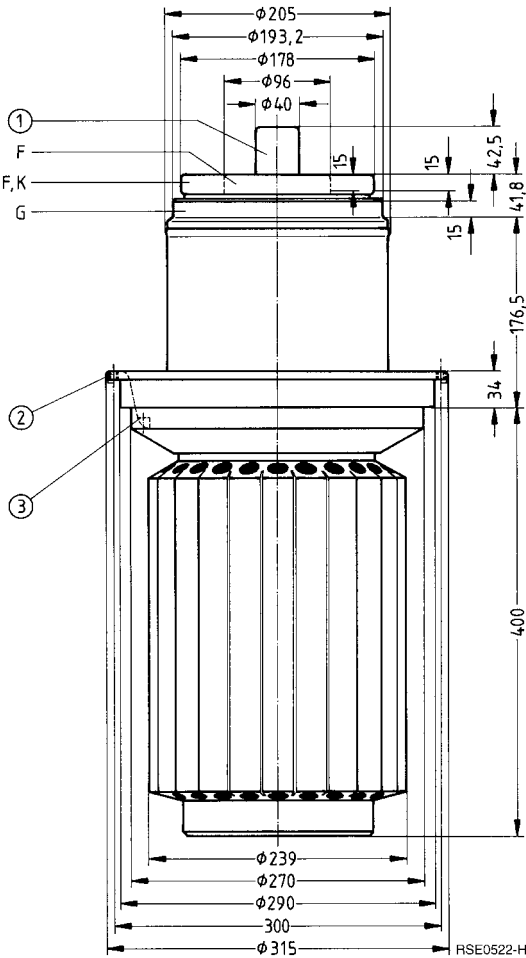


Ordering code Q53-X2041

Coaxial triode in metal-glass-ceramic technology, vapor-cooled, suitable for broadcast transmitters up to 300 kW medium and short wave, for modulators in transmitters up to 600 kW and for RF amplifiers up to 600 kW/up to 30 MHz.



Dimensions in mm

- ① Do not use as terminal
- ② Taphole M8 for screw-in handle R6Zub41V
- ③ Taphole M5 for tube fuse R6Sich4

Approx. weight 66 kg

**Heating**

Heater voltage	$U_F$	21	V
Heater current	$I_F$	≈ 400	A
Heating: direct			
Cathode: thoriated tungsten			

**Characteristics**

Emission current at $U_A = U_G = 1000$ V	$I_{em}$	380	A
Amplification factor at $U_A = 4$ to $10$ kV, $I_A = 10$ A	$\mu$	35	
Transconductance at $U_A = 4$ kV, $I_A = 10$ A	$s$	215	mA/V

**Capacitances**

Cathode/grid	$C_{kg}$	≈ 330	pF
Cathode/anode	$C_{ka}$	≈ 6,5	pF <sup>1)</sup>
Grid/anode	$C_{ga}$	≈ 135	pF

**Accessories**

**Ordering code**

Mounting instruction	RöMo104	
Mounting instruction	RöMo105	
Cathode terminal	RöKat202	C65055-A805-A61
Cathode connecting strip (4 for each tube)	RöKat221	Q81-X1136
Grid terminal	RöGit202b	Q81-X953
MW header socket without blocking	RöKpf241MO	Q81-X1843
Socket wrench for tube fuse	RöZub10	Q81-X2110
Handle	RöZub41V	Q81-X2141
Tube fuse	RöSich4	Q81-X1404
Pull switch for tube fuse	RöKt11	Q81-X1311
Boiler	RöKüV241	Q81-X1691
Insulating pipe at vapor outlet	RöKüV241Zub3	Q81-X1693
Insulating pipe at water inlet	RöKüV241Zub4	Q81-X1694
Insulator	RöKüV241Zub5K	Q81-X1695
Union at water inlet	RöKüV241Zub7	Q81-X1697
Gasket at vapor outlet	RöKüV241Zub8	Q81-X1698
Water level stabilizer with control electrodes	RöZubV4	Q81-X2105
Grid and cathode terminals with protective gaps (complete set)	RöKG241	Q81-X1001
LL electrolytic target	RöEI24	C65055-A667-A24
Gasket ring for boiler	RöN9374	C65051-A202-C553

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

**RF amplifier,  
class C operation, grounded cathode circuit**

**Maximum ratings**

Frequency	$f$	10	30	MHz
Anode voltage (dc)	$U_A$	19	15	kV
Grid voltage (dc)	$U_G$	- 1200	- 1200	V
Cathode current (dc)	$I_K$	60	60	A
Peak cathode current	$I_{KM}$	340	340	A
Anode dissipation	$P_A$	220	220	kW
Grid dissipation	$P_G$	7	5	kW

**Operating characteristics**

Frequency	$f$	≤ 10	≤ 30	≤ 30	MHz
Output power	$P_2$	660	530	440	kW <sup>1)</sup>
Anode voltage (dc)	$U_A$	18	14	12	kV
Grid voltage (dc)	$U_G$	- 1000	- 800	- 800	V
Peak grid voltage (ac)	$U_{gm}$	1620	1420	1420	V
Anode current (dc)	$I_A$	45	46	46	A
Grid current (dc)	$I_G$	7,5	7,5	7,5	A
Anode input power	$P_{BA}$	810	650	550	kW
Drive power	$P_1$	11	9,6	9,6	kW <sup>1)</sup>
Anode dissipation	$P_A$	150	120	110	kW
Grid dissipation	$P_G$	3,5	3,6	3,6	kW
Efficiency	$\eta$	81	81	80	%
Anode load resistance	$R_A$	220	160	135	$\Omega$

1) Circuit losses are not included.

**Anode voltage modulation,  
50 % modulated driver stage, grounded cathode circuit**

**Maximum ratings**

Frequency	$f$	10	MHz
Anode voltage (dc)	$U_A$	11,5	kV
Grid voltage (dc)	$U_G$	- 1200	V
Cathode current (dc)	$I_K$	60	A
Peak cathode current	$I_{KM}$	380	A
Anode dissipation	$P_A$	220	kW
Grid dissipation	$P_G$	7,0	kW

**Operating characteristics**

Frequency	$f$	$\leq 10$	$\leq 10$	MHz
Carrier power	$P_{trg}$	330	280	kW <sup>1)</sup>
Anode voltage (dc)	$U_A$	11	11	kV
Grid bias (dc), fixed	$U_{G\ fix}$	- 530	- 430	V
Grid resistance	$R_G$	20	26	$\Omega$
Peak grid voltage (ac)	$U_{g\ m}$	1240	1120	V
Anode current (dc)	$I_A$	37	31,5	A
Grid current (dc)	$I_G$	8,5	8,0	A
Anode input power	$P_{B\ A}$	407	348	kW
Drive power	$P_1$	9,5	8,0	kW <sup>1)</sup>
Anode dissipation	$P_A$	77	68	kW <sup>2)</sup>
Grid dissipation	$P_G$	3,6	2,9	kW
Efficiency	$\eta$	81	81	%
Anode load resistance	$R_A$	160	200	$\Omega$
Modulation factor	$m$	100	100	%
Modulation power	$P_{mod}$	204	174	kW
Grid dissipation at modulation	$P_{G\ mod}$	5,2	4,5	kW <sup>3)</sup>
Peak grid voltage (ac)	$U_{g\ m}$	1860	1680	V <sup>4)</sup>
Grid current	$I_G$	16	15	A <sup>4)</sup>
Drive power	$P_1$	28	24	kW <sup>1)4)</sup>

1) Circuit losses are not included.

2) Even during modulation the indicated maximum ratings must not be exceeded. It has to be observed that during 100 % modulation the anode dissipation increases to about 1,5 times the power dissipation stated for the carrier value.

3) Average value at  $m = 100$  %.

4) Maximum values at peak modulation.

**Anode voltage modulation,  
50 % modulated driver stage, grounded cathode circuit**

**Maximum ratings**

Frequency	$f$	30	MHz
Anode voltage (dc)	$U_A$	11,5	kV
Grid voltage (dc)	$U_G$	- 1200	V
Cathode current (dc)	$I_K$	60	A
Peak cathode current	$I_{KM}$	380	A
Anode dissipation	$P_A$	220	kW
Grid dissipation	$P_G$	5,0	kW

**Operating characteristics**

Frequency	$f$	≤ 30	MHz
Carrier power	$P_{trg}$	252 + 28 <sup>2)</sup>	kW <sup>1)</sup>
Anode voltage (dc)	$U_A$	11	kV
Grid bias (dc), fixed	$U_{G\ fix}$	- 370	V
Grid resistance	$R_G$	33	Ω
Peak grid voltage (ac)	$U_{g\ m}$	1040	V
Anode current (dc)	$I_A$	28,4	A
Grid current (dc)	$I_G$	7,0	A
Anode input power	$P_{B\ A}$	312	kW
Drive power	$P_1$	6,6 + 28 <sup>2)</sup>	kW <sup>1)</sup>
Anode dissipation	$P_A$	60	kW <sup>3)</sup>
Grid dissipation	$P_G$	2,4	kW
Efficiency	$\eta$	81	%
Anode load resistance	$R_A$	210	Ω
Modulation factor	$m$	100	%
Modulation power	$P_{mod}$	156	kW
Grid dissipation at modulation	$P_{G\ mod}$	3,4	kW <sup>4)</sup>
Peak grid voltage (ac)	$U_{g\ m}$	1570	V <sup>5)</sup>
Grid current (dc)	$I_G$	13	A <sup>5)</sup>
Drive power	$P_1$	19 + 86 <sup>2)</sup>	kW <sup>1)5)</sup>

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 during 100 % modulation the anode dissipation increases to about 1,5 times the power dissipation stated for the carrier value.  
 4) Average value at  $m = 100$  %.  
 5) Maximum values at peak modulation.

**AF amplifier and modulator,  
class B operation, 2 tubes in push-pull circuit**

**Maximum ratings**

Anode voltage (dc)	$U_A$	15	kV
Grid voltage (dc)	$U_G$	- 1200	V
Cathode current (dc)	$I_K$	60	A
Peak cathode current	$I_{KM}$	340	A
Anode dissipation	$P_A$	220	kW
Grid dissipation	$P_G$	7,0	kW

**Operating characteristics**

at modulator operation for

		600 kW carrier power		
Output power	$P_2$	0	410	kW
Anode voltage (dc)	$U_A$	11	11	kV
Grid voltage (dc)	$U_G$	- 280	- 280	V
Peak control grid voltage (ac) between the 2 tubes	$U_{ggm}$	0	1140	V
Anode current (dc)	$I_A$	2 × 3	2 × 30	A
Grid current (dc)	$I_G$	0	2 × 2,3	A
Peak grid current	$I_{GM}$	0	2 × 14	A
Anode input power	$P_{BA}$	2 × 33	2 × 330	kW
Drive power	$P_1$	0	2 × 1,2	kW
Anode dissipation	$P_A$	2 × 33	2 × 125	kW
Grid dissipation	$P_G$	0	2 × 550	W
Efficiency	$\eta$	—	62	%
Effective load resistance (anode to anode)	$R_{AA}$	—	400	$\Omega$

**Tube mounting**

Axis vertical, anode down.

For connection of the tube use the terminals listed under "Accessories". The complete header sockets are intended for transmitter operation, where as the individual connectors are to be used for modulator operation (complete terminal set R6KG241).

**Maximum tube surface temperature**

The temperature of the glass bulb and of the glass-metal seals must not exceed 180 °C at any point. In SW transmitters using single-sided resonant circuits, the glass bulb will be unilaterally heated by RF reactive currents. Additional cooling of the glass bulb is necessary to ensure that the temperature on this side will not exceed 180 °C.

The maximum temperature of the metal-ceramic seals is 220 °C. When using the individual terminals for modulators, an air flow rate of approx. 5 m<sup>3</sup>/min is required in order to maintain these maximum temperatures.

The header sockets for transmitter operation are provided with a centrally located cooling air terminal allowing uniform cooling air distribution over the terminal parts. The cooling air amount necessary for keeping below the specified temperatures lies between 0,5 and 1 m<sup>3</sup>/min, according to the operating frequency. The pressure drop is approx. 3,5 mbar for 1 m<sup>3</sup>/min.

**Vapor cooling**

Cooling specifications for maximum anode dissipation	$P_{A \text{ max}} = 220 \text{ kW}$
Total power to be dissipated by the cooling system ( $P_A + P_G + 0,8 P_F$ )	234 kW
Equivalent thermal output	14040 kJ/min (3350 kcal/min)
Flow rate of returning water	
at returning water temperature of 20 °C	approx. 5,4 l/min
at returning water temperature of 90 °C	approx. 6,1 l/min
Volume of generated vapor	
at returning water temperature of 20 °C	approx. 9,0 m <sup>3</sup> /min
at returning water temperature of 90 °C	approx. 10,2 m <sup>3</sup> /min

Detailed information on vapor cooling upon request. Please observe 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 0,30 mm diameter should be used to test the anode overcurrent trip circuit.

For protection against thermal anode overload the tube fuse R6Sich4 is recommended. In conjunction with pull switch R6Kt11 it disconnects the voltages at the tube in case of overload (accessories).

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

