

PHILIPS
"Miniwatt"
1938



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THE BRIDGE

TO BETTER RADIO RECEPTION

A suitable Philips Valve is available for every receiver; whether it is an old set, whose valves must be replaced by new ones, or the latest product of radio engineering "Miniwatt" valves always care for sufficient volume in the speaker and "true-to-life" radio music! A tremendous progress has been realised in the creation of the new "Miniwatt" Red E-series; these are valves of small dimensions requiring a considerably lower heating power and which give ideal reception in both A.C. receivers and AC/DC receivers, and also in car-radio sets. New and improved radio valves are a prime condition for modern high efficiency receivers!

"Miniwatt" valves are pillars of the bridge to greater radio enjoyment.



TYPE INDICATION OF THE "MINIWATT" VALVES

| 1st letter: Valve series | 2nd letter: Valve type | Numeral: consecutive number |
|--|---|--|
| A = 4-V A.C. series | A = Single diode | |
| B = 180 mA D.C. series | B = Double diode | |
| C = 200 mA AC/DC series | C = Triode, power valves excepted | |
| E = 6·3-volt A.C. or car- radio series | D = Triode output valve | When a new type of a certain valve construction is introduced this is indicated by the next higher consecutive number. |
| F = 13-volt car-radio series | E = Tetrode | |
| H = 4-V battery series | F = Pentode, H.F. amplifier | |
| K = 2-V battery series | H = Hexode | |
| | K = Octode | |
| | L = Output pentode | |
| | M = tuning indicator | |
| | X = Full-wave gasfilled rectifier | |
| | Y = Half-wave H.V. rectifier | |
| | Z = Full-wave H.V. rectifier | |

For the older types the former type indication still applies.

APPLICATION

- 1** = H.F. amplifier
- 2** = L.F. amplifier
- 3** = oscillator
- 4** = Converter valve (oscillator-modulator)
- 5** = Modulator
- 6** = Grid detector followed by transformer
coupling
- 7** = Grid detector followed by resistance
coupling
- 8** = Biased detector followed by resistance
coupling

- 9** = Diode detector and L.F. amplifier
- 10** = L.F. amplifier followed by transformer
coupling
- 11** = L.F. amplifier followed by resistance
coupling
- 12** = Power amplifier
- 13** = Diode detector
- 14** = Tuning indicator
- 15** = Push-pull amplifier driven up to the
grid current point.
- 16** = Push-pull amplifier driven into grid
current.

TYPE INDICATION OF THE CATHODE RAY TUBES

| 1st letter | 2nd letter | Numeral before the stroke | Numeral after the dash |
|--|--|--|--|
| Kind of deflection of the electron ray | Colour of luminous spot on fluorescent screen | Diameter of the fluorescent screen in cm | Consecutive number |
| D = Double electrostatic deflection | G = green | 7 = a tube with a useful screen diameter of 7 cm | When a new make- up of a certain tube construction is intro- duced this is indicat- ed by the next higher consecutive number. |
| S = Electrostatic deflection in one direction only (the de- flection in the other direction can be effected by electro- magnetic means.) | B = blue | | |
| | W = white | | |
| | N = screen with long persist- ence time | 9 = a tube with a useful screen diameter of 9 em. etc. | |
| | | | |
| M = Magnetic de- flection in both directions. | | | |

With this system the first letter indicates the kind of deflection of the electron ray, i.e. whether it is effected by electrostatic or electro-magnetic means. The second letter indicates the colour of the luminous spot on the fluorescent screen and the subsequent numeral states the approximate diameter of the screen in cm. The numeral after the dash is a consecutive number for the different make-ups or newer types. Thus, for instance, the type number DG 16-1 stands for the first make-up of a cathode ray tube with double electro-static deflection, green luminescing screen material and a screen diameter of 16 cm.

RED "MINIWATT" E-VALVES

6·3-volt A.C. valves and 200-mA AC/DC valves with quick-heating cathodes and side-contact bases.

| Type Number | Valve type | Maximum dimensions mm | Base (Connection reference in brackets) ¹⁾ | Application (see p. 2) | Filament data | | | Anode voltage Va | Anode current Ia | Neg. grid bias Vg ₁ | Screen-grid voltage Vg ₂ | Screen-grid current Ig ₂ | Voltage on grids 3 (and 5) Vg ₃₍₅₎ | Voltage on grid 4 Vg ₄ | Mutual conduct. S | Amplification factor μ | Internal resistance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10% distortion Wo Watts | Grid A.C. voltage at the indicated output Vi V R.M.S. | Max. anode dissipation Wa _{max} Watts | Grid anode capacity Cag ₁ μμF | Type Number | | | | |
|--------------|--|-----------------------|---|------------------------|---------------|---------------|---------------|--|------------------------------|--|-------------------------------------|--|---|-----------------------------------|------------------------------|------------------------|--|--|-----------------------------------|---|--|--|-------------|---------------------|-------------|------------|--------------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | | | | |
| EK2 | Octode | 90×32 | P26 (38) | 4 | indir. | 6,3 | 0,200 | 250 | 1,2 ²⁾ <0,015 | 0 | 200 | 2,1 ³⁾ | 50 | -2 | 0,55 ⁴⁾ <0,002 | - | 1,5·10 ⁶ >10 ⁷ | - | - | - | - | - | - | <0,07 ⁵⁾ | | | |
| | | | | | | | | 100 | 1 ⁶⁾ <0,015 | 0 | 100 | 1,5 ⁶⁾ | 50 | -2 | 0,55 ⁴⁾ <0,002 | - | 1,2·10 ⁶ >10 ⁷ | - | - | - | - | - | | | | | |
| | | | | | | | | 250 | 2,1 ⁷⁾ <0,015 | 0 | 200 | 4 ⁸⁾ | 80 | -4 | 0,55 ⁴⁾ <0,002 | - | 0,9·10 ⁶ >10 ⁷ | - | - | - | - | - | | | | | |
| EH2 | Variable-Mu Heptode | 90×32 | P26 (36) | 5 1, 2 | indir. | 6,3 | 0,200 | 250 | 1,85 ⁹⁾ <0,015 | -3 | 100 | Ig ₂ +Ig ₄ = 3,8 mA | Rg ₃ = 0,5 MΩ | 100 | 0,4 ⁴⁾ <0,01 | - | 2,10 ⁶ >10 ⁷ | - | - | - | - | - | - | <0,0015 | | | |
| | | | | | | | | 250 | 4,2 <0,015 | -3 | 100 | Ig ₂ +Ig ₄ = 2,8 mA | -3 | 100 | 1,4 <0,002 | - | 1,10 ⁶ >10 ⁷ | - | - | - | - | - | | | | | |
| EF5 | Variable-Mu Pentode | 90×32 | P26 (34) | 1, 2 | indir. | 6,3 | 0,200 | 250 | 8 <0,015 | -3 | 100 | 2,6 | 0 | - | 1,7 <0,002 | 2000 | 1,2·10 ⁶ >10 ⁷ | - | - | - | - | - | - | <0,003 | | | |
| | | | | | | | | 100 | 8 <0,015 | -3 | 100 | 2,6 | 0 | - | 1,7 <0,002 | 500 | 0,30·10 ⁶ >10 ⁷ | - | - | - | - | - | - | | | | |
| EF6 | H.F. Pentode | 90×32 | P26 (34) | 1, 2, 7 8, 11 | indir. | 6,3 | 0,200 | 250 | 3 | -2 | 100 | 1,1 | 0 | - | 2,0 | 5000 | 2,5·10 ⁶ | - | - | - | - | - | - | - | <0,003 | | |
| EB4 | Duodiode with 2 separate cathodes | 64×32 | P26 (25) | 13 | indir. | 6,3 | 0,200 | 100 | 3 | -2 | 100 | 1,1 | 0 | - | 2,0 | 1600 | 0,8·10 ⁶ | - | - | - | - | - | - | - | EB4 | | |
| EBC3 | Duodiode-Triode | 90×32 | P26 (28) | 9 | indir. | 6,3 | 0,200 | 250 | 5 | -5,5 | - | - | - | - | 2,0 | 30 | 15.000 | - | - | - | - | - | - | - | 1,4 | | |
| EBL1 | Duodiode and High-sensitivity Pentode | 130×52 | P35 (33) | 13, 12 | indir. | 6,3 | 1,5 | 250 | 36 | Rk=10 ¹⁰ 150 Ω | 250 | 5 | - | - | 9,5 | - | 50.000 | 7000 | 4,3 | 3,6 | 9 | - | - | - | EBL1 | | |
| EL2 | Power Pentode for car receivers | 95×37 | P30 (32) | 12 | indir. | 6,3 | 0,2 | 250 | 32 | -18 | 250 | 5 | - | - | 2,8 | - | 70.000 | 8000 | 3,6 | 10 | 8 | - | - | - | EL2 | | |
| EL3 | High-sensitivity Power Pentode | 120×37 | P35 (31) | 12 | indir. | 6,3 | 1,2 | 250 | 36 | Rk=10 ¹⁰ 150 Ω | 250 | 5 | - | - | 9,5 | - | 50.000 | 7000 | 4,3 | 3,6 | 9 | - | - | - | EL3 | | |
| EL5 | High-sensitivity Power Pentode | 117×51 | P35 (31) | 12 | indir. | 6,3 | 1,35 | 250 | 72 | -14 | 275 | 7 | - | 8,5 | - | 22.000 | 3500 | 8,8 | 8,2 | 18 | - | - | EL5 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EM1 | Tuning Cross (Electron ray tuning indicator) | 75×28 | P26 (39) | 14 | indir. | 6,3 | 0,200 | 250 ¹²⁾ max. | 0,095 0,021 | 0 ¹³⁾ — 5 ¹⁴⁾ | - | Is=0,13 Is=0,14 | - | - | - | - | - | 2,0·10 ⁶ | - | - | - | - | - | - | - | EM1 | |
| C/EM2 | Electron ray tuning indicator | 75×31 | P30 (40) | 14 | indir. | 6,3 | 0,200 | 250 ¹⁵⁾ 250 ¹⁵⁾ 250 ¹⁵⁾ 250 ¹⁵⁾ 0 ¹⁵⁾ | - | 250 ¹⁶⁾ | 3 | -3,5 | - | - | - | - | 2,0 | 50 | 25.000 | - | - | - | - | - | - | - | C/EM2 |

¹⁾ See page 15. The numeral after the letters indicates the maximum base diameter in mm.
The data of this horizontal column apply for the oscillating condition at $V_{osc} = 9$ V R.M.S. ($Ig_1 = 200$ μA) and for use on long and medium waves. The grid leak resistance amounts to 50,000 ohms and is connected to the cathode.

²⁾ Screen grid current $Ig_3 + Ig_5 = 1\cdot0$ mA.

³⁾ Capacity between anode and grid 4.

⁴⁾ Screen-grid current $Ig_3 + Ig_5 = 1\cdot0$ mA.

⁵⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 6$ V R.M.S. ($Ig_1 = 150$ μA) and for use of this valve in all-wave receivers. The valve must not be controlled by A.V.C. in the short wave range. The grid leak resistance amounts to 50,000 ohms and is connected to the cathode.

⁸⁾ Screen-grid current $Ig_3 + Ig_5 = 1\cdot5$ mA.
The data of this horizontal column apply for the oscillating condition at $V_{osc} = 14$ V R.M.S.

⁹⁾ Only with automatic grid bias. At this value of the cathode resistance the grid bias is about — 6 V.

¹⁰⁾ At 5·1% distortion.

¹¹⁾ Voltage on screen and triode series resistance.

¹²⁾ At this voltage the fluorescent screen is covered with light sectors of 10° (measured at the edge of the screen).

¹³⁾ At this voltage the fluorescent screen is covered with light sectors of 90° (measured at the edge of the screen).

¹⁴⁾ Voltage at the triode anode.

¹⁵⁾ Data for using the triode section for other amplifier purposes.

¹⁶⁾ Light angle, measured at the edge of the screen.

4-VOLT A.C. VALVES WITH QUICK-HEATING CATHODES AND SIDE-CONTACT BASES

| Type Number | Valve type | Maximum dimensions mm | Base connection reference in brackets (see p. 2) 1) | Application (see p. 2) | Filament data | | | Anode voltage Va Volts | Anode current Ia mA | Neg. grid bias Vg1 Volts | Screen-grid voltage Vg2 Volts | Screen-grid current Ig2 mA | Voltage on grids 3 (and 5) Vg3(5) Volts | Voltage on grid 4 Vg4 Volts | Mutual Conduct. S mA/V | Amplification factor μ | Internal resistance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10% distortion Wo Watts | Grid A.C. voltage at the indicated output Vi V.R.M.S. | Max. anode dissipation Wa_max Watts | Grid anode capacity Cag1 μF | Type Number | | | | | | |
|-------------|---|-----------------------|--|------------------------|---------------|---------------|---------------|--|---------------------|--|--|---|---|-----------------------------|------------------------|----------------------------|---|--|-----------------------------------|---|-------------------------------------|--|----------------------|------|------|-----|--|--|--|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | | | | | | |
| AK2 | Octode | 116×46 | P35 (38) | 4 | indir. | 4,0 | 0,65 | 250 | 1,68) <0,015 | -1,5 | 90 | 2,0*) | 70 | -1,5 -25 | 0,6*) <0,002 | - | 1,6.10 ⁶ >10 ⁷ | - | - | - | - | - | <0,06 ¹⁸⁾ | AK2 | | | | | |
| AH1 | Variable-Mu Hexode | 110×46 | P35 (35) | 5 | indir. | 4,0 | 0,65 | 250 | 1,75) <0,015 | -2,0 -24 | 80 | 2,6*) | Rgs = 0,5 M Ω | 80 | 0,55*) <0,002 | - | 2,0.10 ⁶ >10 ⁷ | - | - | - | - | - | <0,003 | AH1 | | | | | |
| | | | | 1, 2 | indir. | 4,0 | 0,65 | 250 | <0,015 | 3,0 -24 | 80 | 1,1*) | -2,0 -24 | 80 | <0,002 | - | 2,0.10 ⁶ >10 ⁷ | - | - | - | - | - | <0,003 | | | | | | |
| AF3 | Variable-Mu Pentode | 106×43 | P30 (34) | 1, 2 | indir. | 4,0 | 0,65 | 250 | <0,015 | 8,0 -55 | 100 | 2,6 | 0 | - | 1,8 <0,002 | 2200 | 1,2.10 ⁶ >10 ⁷ | - | - | - | - | - | <0,003 | AJ 3 | | | | | |
| AF7 | Duodiode | 106×43 | P30 (34) | 1, 2, 7 8, 11 | indir. | 4,0 | 0,65 | 250 | 3,6 | -2,0 | 100 | 1,1 | 0 | - | 2,1 | 4200 | 2,0.10 ⁶ | - | - | - | - | - | <0,003 | AF7 | | | | | |
| AB2 | Triode | 85×29 | V24 (53) | 13 | indir. | 4,0 | 0,65 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | AB2 | | | | | |
| ABC1 | Duodiode-Triode | 100×37 | P30 (28) | 9 | indir. | 4,0 | 0,65 | 250 | 4,0 | -7,0 | - | - | - | - | 2,0 | 27 | 13.500 | - | - | - | - | - | - | - | ABC1 | | | | |
| AC2 | Triode | 100×37 | P30 (26) | 3, 6 10, 11 | indir. | 4,0 | 0,65 | 250 | 6,0 | -5,5 | - | - | - | - | 2,5 | 30 | 12.000 | - | - | - | - | - | - | 1,7 | AC2 | | | | |
| AL1 | Power Pentode | 115×51 | P35 (30) | 12 | dir. | 4,0 | 1,1 | 250 | 36 | -15 | 250 | 6,8 | - | - | 2,8 | - | 43.000 | 7.000 | 3,1 | 9,7 | 9 | - | - | AL1 | | | | | |
| AL2 | Power Pentode | 115×46 | P35 (32) | 12 | indir. | 4,0 | 1,0 | 250 | 36 | -25 | 250 | 4 | - | - | 2,6 | - | 60.000 | 7.000 | 3,8 | 14 | 9 | - | - | AL2 | | | | | |
| AL4 | High-sensitivity Power Pentode | 115×50 | P35 (31) | 12 | indir. | 4,0 | 1,0 | 250 | 2×33 2×40,5 | Rk = 350 Ω | 250 | 2×3,5 2×7 | - | - | - | - | - | 6600 | 0 11,5 ¹³⁾ | - | - | - | - | - | - | AL4 | | | |
| ABL1 | Duodiode and high sensitivity Power Pentode | 130×52 | P35 (33) | 13, 12 | indir. | 4,0 | 2,25 | 250 | 36 | Rk = 150 Ω^2) | 250 | 5 | - | - | 9,5 | - | 50.000 | 7.000 | 4,3 | 3,6 | 9 | - | - | ABL1 | | | | | |
| AL5 | High-sensitivity Power Pentode | 117×51 | P35 (31) | 12 | indir. | 4,0 | 2,0 | 250 | 72 | -14 | 275 | 7 | - | - | 8,5 | - | 22.000 | 3.500 | 8,8 | 8,2 | 18 | - | - | AL5 | | | | | |
| AD1 | Power Triode | 135×58 | P35 (24) | 12 | indir. | 4,0 | 2,0 | 250 | 2×58 2×65 | Rk = 120 Ω | 275 | 2×6 25 2×10,5 | - | - | - | - | - | 4500 | 0 19,5 ¹⁴⁾ | - | - | - | - | - | - | AD1 | | | |
| AM1 | Tuning Cross *) | 75×28 | P26 (39) | 14 | dir. | 4,0 | 0,95 | 250 | 60 | -45 | - | - | - | - | 4 | 670 | 2.300 | 4,2 ¹⁵⁾ | 30 | 15 | - | - | - | - | AM1 | | | | |
| AM2 | Electron ray Tuning Indicator | 75×31 | P30 (40) | 14 | dir. | 4,0 | 0,95 | 250 | 2×60 2×62,5 | Rk = 375 Ω | - | - | - | - | - | - | 4000 | 0 9,2 ¹⁵⁾ | - | - | - | - | - | - | AM2 | | | | |
| | | | | | indir. | 4,0 | 0,3 | 250 ¹⁰⁾ | 0,095 max. | 0 ¹¹⁾ -51 ¹²⁾ | - | Is = 0,13 Is = 0,14 | - | - | 9,5 | - | - | 2,0.10 ⁶ | - | - | - | - | - | - | | | | | |
| | | | | | | | | 250 ¹⁴⁾ 250 ¹⁶⁾ 250 ¹⁸⁾ | - | Vs = 250 Vs = 250 Vs = 250 | Vg' = +3 Vg' = 0 Vg' = -6 ($\theta = 5^{\circ}18$) | Vg' = 250 $\theta = 160^{\circ}$ $\theta = 150^{\circ}$ $\theta = 5^{\circ}18$) | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | |
| | | | | | | | | 250 ¹⁶⁾ 0 ¹⁸⁾ | - | Vs = 250 Vs = 250 | Vg' = 0 $\theta = 150^{\circ}$ $\theta = 95^{\circ}18$) | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | | |
| | | | | | | | | 250 ¹⁷⁾ | 3 | -3,5 | - | - | - | - | 2,0 | 50 | 25.000 | - | - | - | - | - | - | - | - | | | | |

¹⁾ See page 15. The numeral after the letter gives the maximum base diameter in mm.²⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 8.5$ V.R.M.S. ($Ig_1 = 100 \mu\text{A}$) and for all-wave receivers. In the shortwave range the valve must not be controlled by A.V.C. The grid leak resistance amounts to 50,000 ohms and is connected to the neutral.³⁾ Screen-grid current $Ig_2 + Ig_5 = 3.8$ mA.⁴⁾ Conversion conductance.⁵⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 9$ V.R.M.S.⁶⁾ $Ig_2 + Ig_4$.⁷⁾ Only with automatic grid bias. At this value of the cathode resistance the grid bias is about —6 V.⁸⁾ At 5% distortion.⁹⁾ Electron ray tuning indicator.¹⁰⁾ Voltage at grid and triode anode series resistance.¹¹⁾ At this voltage the fluorescent screen is covered with light sectors of 10° (measured at the edge of the screen).¹²⁾ At this voltage the fluorescent screen is covered with light sectors of 90° (measured at the edge of the screen).¹³⁾ At 3% distortion.¹⁴⁾ At 5.1% distortion.¹⁵⁾ At 1.3% distortion.¹⁶⁾ Voltage at the triode anode.¹⁷⁾ Data for using the triode section for other amplifier purposes.¹⁸⁾ Light angle, measured at the edge of the screen.¹⁹⁾ Capacity between anode and grid 4.

AC/DC AND 13-V CAR-RADIO VALVES WITH SIDE CONTACT BASES

| Type Number | Valve type | Maximum dimensions mm | Base Connection reference in brackets ¹⁾ | Application (see p. 2) | Filament data | | | Anode voltage Va | Anode current Ia | Neg. grid bias Vg ₁ | Screen-grid voltage Vg ₂ | Screen grid current Ig ₂ | Voltage on grids 3 (and 5) Vg ₃₍₅₎ | Voltage on grid 4 Vg ₄ | Mutual conduct. S | Amplification factor μ | Internal resistance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10% distortion Wo Watts | Grid A.C. voltage at the indicated output V.R.M.S. Vi | Grid anode capacity Cag ₁ μF | Max. anode dissipation W _a max Watts | Grid anode capacity Cag ₁ μF | Type Number | |
|---------------------------|---|-----------------------|---|------------------------|---------------|---------------|---------------|--------------------|-----------------------------|--------------------------------|-------------------------------------|--|---|---|-------------------|----------------------------|--|--|-----------------------------------|---|--|---|--|---------------------|-------------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | | |
| CK1 | Octode | 116 × 46 | P35 (38) | 4 | indir. | 13 | 0,200 | 200 | ^{1,6¹⁾} | <0,015 | -1,5 | 90 | 2 ²⁾ | 70 | -1,5 -25 | 0,6 <0,002 | - | 1,5 · 10 ⁶ >10 ⁷ | - | - | - | - | - | <0,06 ³⁾ | CK1 |
| | | | | | | | | 100 | ^{1,6¹⁾} | <0,015 | -2 | 90 | 2 ²⁾ | 70 | -1,5 -25 | 0,55 <0,002 | - | 1,0 · 10 ⁶ >10 ⁷ | - | - | - | - | - | | |
| CH1 | Variable-Mu Hexode | 110 × 46 | P35 (35) | 5 | indir. | 13 | 0,200 | 200 | ^{2,2⁴⁾} | <0,15 | -2 -24 | 100 | 4 ⁵⁾ | -12 ⁶⁾ or Rg ₃ = 0,5 M Ω | 50 | 0,55 <0,002 | - | 2,0 · 10 ⁶ >10 ⁷ | - | - | - | - | - | <0,003 | CH1 |
| | | | | | | | | 100 | 4,0 <0,015 | -2 -24 | 100 | 2,0 ⁷⁾ | -2 -24 | 50 | 2,0 <0,002 | - | 2,0 · 10 ⁶ >10 ⁷ | - | - | - | - | - | | | |
| CF3 | Variable-Mu Pentode | 106 × 43 | P30 (34) | 1, 2 | indir. | 13 | 0,200 | 200 | 8,0 <0,015 | -3 -55 | 100 | 2,6 | 0 | - | 1,8 <0,002 | 1600 | 0,9 · 10 ⁶ >10 ⁷ | - | - | - | - | - | <0,003 | CF3 | |
| | | | | | | | | 100 | 8,0 <0,015 | -3 -55 | 100 | 2,6 | 0 | - | 1,8 <0,002 | 450 | 0,25 · 10 ⁶ >10 ⁷ | - | - | - | - | - | | | |
| CF2 | Variable-Mu Pentode | 109 × 43 | P30 (34) | 1, 2 | indir. | 13 | 0,200 | 200 | 4,5 <0,015 | -2 -22 | 100 | 1,4 | 0 | - | 2,2 <0,002 | 3000 | 1,4 · 10 ⁶ >10 ⁷ | - | - | - | - | - | <0,003 | CF2 | |
| | | | | | | | | 100 | 4,5 <0,015 | -2 -22 | 100 | 1,4 | 0 | - | 2,2 <0,002 | 800 | 0,4 · 10 ⁶ >10 ⁷ | - | - | - | - | - | | | |
| CF7 | H.F. Pentode | 106 × 43 | P30 (34) | 1, 2, 7, 8, 11 | indir. | 13 | 0,200 | 200 | 3 | -2 | 100 | 1,1 | 0 | - | 2,1 | 4200 | 2,0 · 10 ⁶ | - | - | - | - | - | <0,003 | CF7 | |
| | | | | | | | | 100 | 3 | -2 | 100 | 1,1 | 0 | - | 2,1 | 1500 | 0,7 · 10 ⁶ | - | - | - | - | - | | | |
| CF1 | H.F. Pentode | 109 × 43 | P30 (34) | 1, 2, 7, 8, 11 | indir. | 13 | 0,200 | 200 | 3 | -2 | 100 | 0,9 | 0 | - | 2,3 | 4000 | 1,7 · 10 ⁶ | - | - | - | - | - | <0,003 | CF1 | |
| | | | | | | | | 100 | 3 | -2 | 100 | 0,9 | 0 | - | 2,3 | 1400 | 0,6 · 10 ⁶ | - | - | - | - | - | | | |
| CB1 | Duodiode | 89 × 29 | V24 (54) | 13 | indir. | 13 | 0,200 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | CB1 | |
| CB2 | Duodiode | 81 × 29 | V24 (53) | 13 | indir. | 13 | 0,200 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | CB2 | |
| CBC1 | Duodiode-Triode | 100 × 37 | P30 (28) | 9 | indir. | 13 | 0,200 | 200 | 4,0 | -5 | - | - | - | - | 2,0 | 27 | 13.500 | - | - | - | - | - | - | - | CBC1 |
| | | | | | | | | 100 | 2,0 | -2,5 | - | - | - | - | 1,8 | 27 | 15.000 | - | - | - | - | - | - | | |
| CC2 | Triode | 100 × 37 | P30 (26) | 3, 6, 10, 11 | indir. | 13 | 0,200 | 200 | 6,0 | -1,5 | - | - | - | - | 2,5 | 30 | 12.000 | - | - | - | - | - | - | 1,7 | CC2 |
| | | | | | | | | 100 | 2,0 | -1,5 | - | - | - | - | 1,8 | 30 | 16.000 | - | - | - | - | - | - | | |
| CL1 | Power Pentode | 109 × 43 | P30 (32) | 12 | indir. | 13 | 0,200 | 200 | 25 | -14 | 200 | - | - | - | 2,5 | - | 50.000 | 8.000 | 1,7 | 9 | 5 | - | - | CL1 | |
| | | | | | | | | 200 | 40 | -19 | 100 | - | - | - | 3,1 | - | 23.000 | 5.000 | 3,0 | 8,8 | 8 | - | - | CL2 | |
| CL2 ⁸⁾ | Power Pentode | 123 × 46 | P35 (32) | 12 | indir. | 24 | 0,200 | 200 | 40 | -11 | 75 | - | - | - | 3,7 | - | 19.000 | 5.000 | 2,5 | 6,9 | 8 | - | - | CL2 | |
| | | | | | | | | 100 | 50 | -15 | 100 | - | - | - | 3,8 | - | 16.000 | 2.000 | 1,7 | 9,7 | 5 | - | - | CL2 | |
| CL4 ⁸⁾ | High-sensitivity Power Pentode | 127 × 50 | P35 (32) | 12 | indir. | 33 | 0,200 | 200 | 45 | -8,5 ¹⁰⁾ | 200 | 6,0 | - | - | 8,0 | - | 35.000 | 4.500 | 4 | 5 | 9 | - | - | CL4 | |
| | | | | | | | | 200 | 40 | -11 | 75 | - | - | - | 3,7 | - | 19.000 | 5.000 | 2,5 | 6,9 | 8 | - | - | CL4 | |
| CBL1 ⁸⁾ | Duodiode and high-sensitivity Power Pentode | 130 × 52 | P35 (33) | 13, 12 | indir. | 44 | 0,200 | 200 | 45 | -8,5 ¹⁰⁾ | 200 | 6,0 | - | - | 8,0 | - | 35.000 | 4.500 | 4 | 5 | 9 | - | - | CBL1 | |
| | | | | | | | | 0,075 | 0 | -4 | - | I _s = 0,13 I _s = 0,14 | — | — | — | — | 2,0 · 10 ⁻¹⁴ | — | — | — | — | — | EM1 | | |
| EM1 | Tuning Cross ¹³⁾ | 75 × 27 | P26 (39) | 14 | indir. | 6,3 | 0,200 | 200 ¹¹⁾ | 200 ¹¹⁾ | 200 ¹¹⁾ | — | V _s = 200 V _s = 200 V _s = 200 | — | V _{g'} = +3 V _{g'} = 0 V _{g'} = -4,5 | — | — | — | — | — | — | — | — | EM1 | | |
| C/EM2 | Electron ray Tuning Indicator | 75 × 31 | P30 (40) | 14 | indir. | 6,3 | 0,200 | 200 ¹¹⁾ | 200 ¹¹⁾ | 200 ¹¹⁾ | — | V _s = 200 V _s = 200 V _s = 200 | — | V _{g'} = 0 V _{g'} = 0 V _{g'} = 0 | — | — | — | — | — | — | — | — | C/EM2 | | |
| | | | | | | | | 0,020 | 0,020 | 0,020 | — | V _s = 200 V _s = 200 V _s = 200 | — | V _{g'} = 0 V _{g'} = 0 V _{g'} = 0 | — | — | — | — | — | — | — | — | C/EM2 | | |

¹⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 8.5$ V.R.M.S. ($I_{g1} = 190 \mu\text{A}$) and for all-wave receivers. The valve must not be controlled by A.V.C. in the short wave range. The grid leak resistance amounts to 50,000 ohms and is connected to the neutral. The figure given in column Mutual Conductance indicates the conversion conductance.

²⁾ Screen-grid current $I_{g3} + I_{g5} = 3.8 \text{ mA}$.

³⁾ Capacity between anode and grid 4.

⁴⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 9$ V.R.M.S. The figure in column Mutual Conductance gives the conversion conductance.

⁵⁾ $I_{g1} = 0.1 \text{ mA}$.
⁶⁾ With fixed bias.
⁷⁾ $I_{g1} = 0.25 \text{ mA}$.
⁸⁾ Not for car-radio.
⁹⁾ Only for high anode voltages.
¹⁰⁾ Only for automatic grid bias ($R_k = 167 \text{ ohms}$).

¹¹⁾ Voltage on the triode anode.
¹²⁾ Data for using the triode section for other amplifier purposes.
¹³⁾ Electron ray tuning indicator.
¹⁴⁾ Light sector, measured at the edge of the screen.
¹⁵⁾ See page 15.

4-VOLT A.C. VALVES WITH PIN BASES (INITIAL STAGES)

| Type Number | Valve type | Maximum dimensions ¹⁾ mm | Base connection reference in brackets | Application (see p. 2) | Filament data | | | Anode voltage Va | Anode current Ia | Neg. grid bias Vg ₁ | Screen-grid voltage Vg ₂ | Screen-grid current Ig ₂ | Voltage on grids 3 (and 5) Vg ₃₍₅₎ | Voltage on grid 4 Vg ₄ | Mutual conductance S | Amplification factor μ | Internal resistance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10% distortion W _o Watts | Grid A.C. voltage at the indicated output V ₁ V.R.M.S. | Max anode dissipation W _a max Watts | Grid anode capacity Cag ₁ $\mu\mu F$ | Type Number | |
|--------------|-------------------------------|--|--|---------------------------|---------------|---------------|---------------|------------------|-----------------------------|--------------------------------|-------------------------------------|-------------------------------------|---|-----------------------------------|----------------------|------------------------------|-----------------------------|--|---|---|--|---|--------------|-------------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | |
| AK1 | Octode | 118×46 | C35 (12) | 4 | indir. | 4,0 | 0,65 | 200 | 1,6 ²⁾ <0,015 | —1.5 | 90 | 2,0 ⁴⁾ | 70 | —1.5 —25 | — | 0,6 ⁷⁾ <0,002 | — | 1,6·10 ⁶ >10 ⁷ | — | — | — | <0,06 ⁵⁾ | AK1 | |
| ACH1 | Triode-Hexode | 130×50 | C35 (13) | 4 | indir. | 4,0 | 1,0 | 300 | 2.5 0.01 | —2.0 —20 | 70 | — | V _{osc} = 15 V ⁶⁾ | 70 | — | 0.75 ⁷⁾ <0,002 | — | >0.8·10 ⁶ >10 ⁷ | — | — | — | <0,1 ⁸⁾ | ACH1 | |
| E448 | Hexode (oscillator-modulator) | 130×50 | C35 (11) | 4 | indir. | 4,0 | 1,2 | 200 | 3,0 | —7.5 | 120 | 8,5 ⁹⁾ | 200 | —4 ¹⁰⁾ | — | 0,58 ¹¹⁾ | — | >0,15·10 ⁶ | — | — | — | — | E448 | |
| E449 | Variable-Mu Hexode | 130×50 | C35 (11) | 1, 2 | indir. | 4,0 | 1,2 | 200 | 3,0 | —2 —8 | 80 | — | —2 —8 | 80 | 3,0 | 1,8 <0,002 | — | 0,45·10 ⁶ >50·10 ⁶ | — | — | — | <0,002 | E449 | |
| E446 | H.F. Pentode | 138×51 | O35 (1, 2, 5, 7, 8, 11) | | indir. | 4,0 | 1,1 | 200 | 3,0 | —2.0 | 100 | 1,1 | — | — | 3,5 | 2,3 | 5000 | 2,2·10 ⁶ | — | — | — | <0,006 | E446 | |
| AF2 | Variable-Mu Pentode | 138×51 | O35 (23) | 1, 2, 5 | indir. | 4,0 | 1,1 | 200 | 4,25 <0,015 | —2.0 —22 | 100 | 1,8 | — | — | 3,2 | 2,5 <0,002 | 3500 | 1,4·10 ⁶ >10 ⁷ | — | — | — | <0,006 | AF2 | |
| E447 | Variable-Mu Pentode | 138×51 | O35 (23) | 1, 2, 5 | indir. | 4,0 | 1,1 | 200 | 4,5 0,01 | —2.0 —50 | 100 | 1,8 | — | — | 3,5 | 2,3 <0,002 | 2300 | 1,0·10 ⁶ >10 ⁷ | — | — | — | <0,006 | E447 | |
| E452T | Tetrode | 129×51 | O35 (22) | 1, 2, 8, 7, 11 | indir. | 4,0 | 1,0 | 200 | 3,0 | —2.0 | 100 | 0,7 | — | — | 3,0 | 2,0 | 900 | 450.000 | — | — | — | 0,003 | E452T | |
| E455 | Variable-Mu Tetrode | 127×51 | O35 (22) | 1, 2, 5 | indir. | 4,0 | 1,0 | 200 | 3,0 0,01 | —1.5 —40 | 100 | 0,8 | — | — | 3,0 | 2,0 0,005 | 700 | 350.000 >10 ⁷ | — | — | — | 0,003 | E455 | |
| E442 | Tetrode | 112×47 | O35 (22) | 1, 2 | indir. | 4,0 | 1,0 | 200 | 1,5 | —1.3 | 100 | 0,6 | — | — | 1,2 | 0,9 | 700 | 800.000 | — | — | — | 0,005 | E442 | |
| E442S | Tetrode | 120×51 | O35 (1, 2, 8, 11) | | indir. | 4,0 | 1,0 | 200 | 4,0 | —2.0 | 60 | 0,5 | — | — | 1,1 | 1,0 | 400 | 400.000 | — | — | — | 0,02 | E442S | |
| E445 | Variable-Mu Tetrode | 127×51 | O35 (22) | 1, 2, 5 | indir. | 4,0 | 1,1 | 200 | 6,0 0,01 | —2.0 —40 | 100 | 0,8 | — | — | 1,2 | 1,0 0,005 | 300 | 300.000 >10 ⁷ | — | — | — | 0,003 | E445 | |
| AB1 | Duodiode | 91×28 | O24 (21) | 13 | indir. | 4,0 | 0,65 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | AB1 | |
| E444 | Binode (Diode-Tetrode) | 130×51 | B35 (7) | 9 | indir. | 4,0 | 1,1 | 200 | 0,35 0,9 | —2.3 —2.3 | 33 | — | — | — | 3,0 | — | 1000 300 | 2,5·10 ⁶ 1,0·10 ⁶ | 0,3·10 ⁶ 0,1·10 ⁶ | — | — | — | — | E444 |
| E444S | Binode (Diode-Triode) | 115×46 | O35 (20) | 9 | indir. | 4,0 | 1,0 | 200 | 6,0 | —3.5 | — | — | — | — | 2,5 | 2,0 | 30 | 15.000 | — | — | — | — | E444S | |
| E499 | High-Mu Triode | 101×46 | O35 (17) | 7, 8, 11 | indir. | 4,0 | 1,0 | 200 | 0,2 0,08 | —1.6 —1.6 | — | — | — | — | 4,0 | — | 99 | 100.000 330.000 | 0,3·10 ⁶ 1,0·10 ⁶ | — | — | — | 1,5 | E499 |
| E424N | Triode | 100×46 | O35 (17) | 3, 6, 7, 10, 11 | indir. | 4,0 | 1,0 | 200 | 6,0 | —3.5 | — | — | — | — | 3,5 | 2,4 | 30 | 12.500 | — | — | — | 2 | E424N | |
| E438 | Triode | 91×47 | O35 (17) | 7, 8, 11 | indir. | 4,0 | 1,0 | 200 | 0,3 0,1 | —2.5 —2.5 | — | — | — | — | 1,5 | — | 38 | 120.000 400.000 | 0,3·10 ⁶ 1,0·10 ⁶ | — | — | — | 3 | E438 |
| E409 | Triode | 91×47 | O35 (17) | 3 | indir. | 4,0 | 1,0 | 200 | 12 | —16 | — | — | — | — | 4,0 | 1,3 | 9 | 7.000 | — | — | — | 4 | E409 | |

¹⁾ Without pins.²⁾ See page 15. The figure after the letter indicates the maximum base diameter in mm.³⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 8.5$ V.R.M.S. ($Ig_1 = 190 \mu A$) and for all-wave receivers. The valve must not be controlled by A.V.C. in the short wave range. The grid leak resistance amounts to 50,000 ohms and is connected to the neutral.⁴⁾ Screen-grid current $Ig_3 + Ig_5 = 3.8$ mA.⁵⁾ Capacity between anode and grid 4.⁶⁾ Across a resistance of 20,000 ohms.⁷⁾ Conversion conductance.⁸⁾ Capacity between grid 1 and grid 3.⁹⁾ Current of the third grid.¹⁰⁾ $V_{osc} = 6.3$ V.R.M.S.¹¹⁾ Conversion conductance at $V_{osc} = 6.3$ V.R.M.S.

4-VOLT A.C. VALVES WITH PIN BASES (POWER STAGES)

| Type Number | Valve type | Maximum dimensions ¹⁾ mm | Base (Connec- tion reference in brackets) | Appli- cation (see p. 2) | Filament data | | | Anode voltage Va | Anode current Ia | Neg. grid bias Vg ₁ | Screen- grid voltage Vg ₂ | Screen- grid current Ig ₂ | Voltage on grids 3 (and 5) Vg ₃₍₅₎ | Voltage on grid 4 Vg ₄ | Mutual conduct. S | Amplifi- cation factor μ | Internal resist- ance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10 % distortion Wo Watts | Grid A.C. voltage at the indicated output V _i V _{R.M.S.} | Max. anode dissipa- tion W _a _{max} Watts | Grid anode capacity Cag ₁ μμF | Type Number |
|-------------|------------|--|--|-----------------------------------|---------------|------------------|------------------|------------------------|------------------------|---|---|---|---|--|-------------------------|-----------------------------------|---|---|--|--|---|--|----------------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | |
| E453 | Pentode | 105×51 | B35 (8) | 12 | indir. | 4,0 | 1,1 | 250 | 24 | —15 | 250 | — | — | — | 2,5 | 175 | 70,000 | 15,000 | 2,8 | 8 | 6 | — | E453 |
| E463 | Pentode | 119×55 | B35 (8) | 12 | indir. | 4,0 | 1,35 | 250 | 36 | —22 | 250 | — | — | — | 2,7 | 100 | 37,000 | 8,000 | 4,1 | 12,3 | 9 | — | E463 |
| B409 | Triode | 91×46 | A32 (1) | 12 | dir. | 4,0 | 0,15 | 250 | 12 | —18 | — | — | — | — | 1,8 | 9 | 5,000 | 12,000 | 0,65 ^{a)} | 12 | 3 | — | B409 |
| B443 | Pentode | 92×51 | O35 (19) | 12 | dir. | 4,0 | 0,15 | 250 | 12 | —19 | 150 | — | — | — | 1,3 | 60 | 45,000 | 20,000 | 1,35 | 12,1 | 3 | — | B443 |
| B443S | Pentode | 92×51 | O35 (19) | 12 | dir. | 4,0 | 0,15 | 250 | 12 | —12 | 80 | — | — | — | 1,6 | 100 | 60,000 | 22,000 | 1,12 | 6,8 | 3 | — | B443S |
| C443 | Pentode | 92×51 | O35 (19) | 12 | dir. | 4,0 | 0,25 | 300 | 20 | —25 | 200 | — | — | — | 1,7 | 60 | 35,000 | 15,000 | 2,8 | 16 | 6 | — | C443 |
| C443N | Pentode | 89×51 | O35 (19) | 12 | dir. | 4,0 | 0,25 | 300 | 20 | —42 | 200 | — | — | — | 1,5 | 37 | 25,000 | 15,000 | 3,0 | 20 | 6 | — | C443N |
| E443H | Pentode | 123×55 | O35 (19) | 12 | dir. | 4,0 | 1,1 | 250 | 36 | —15 | 250 | — | — | — | 2,8 | 120 | 43,000 | 7,000 | 3,1 | 9,7 | 9 | — | E443H |

¹⁾ Without pins.²⁾ At 5 % distortion.

180-MA D.C. VALVES

| Type Number | Valve type | Maximum dimensions ¹⁾ mm | Base (Connec- tion reference in brackets) | Appli- cation (see p. 2) | Filament data | | | Anode voltage Va | Anode current Ia | Neg. grid bias Vg ₁ | Screen- grid voltage Vg ₂ | Screen- grid current Ig ₂ | Voltage on grids 3 (and 5) Vg ₃₍₅₎ | Voltage on grid 4 Vg ₄ | Mutual conduct. S | Amplifi- cation factor μ | Internal resist- ance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10 % distortion Wo Watts | Grid A.C. voltage at the indicated output V _i V _{R.M.S.} | Max. anode dissipa- tion W _a _{max} Watts | Grid anode capacity Cag ₁ μμF | Type Number | |
|-------------|----------------------------------|--|--|-----------------------------------|---------------|------------------|------------------|------------------------|------------------------|---|---|---|---|--|-------------------------|-----------------------------------|---|---|--|--|---|--|----------------|-------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | |
| B2046 | H.F. Pentode | 138×51 | O35 (23) | 1, 2, 5, 7, 8, 11 | indir. | 20 | 0,180 | 200 | 3,0 | —2,0 | 100 | 1,1 | — | — | 3,5 | 2,2 | 5000 | 2,2,10 ^{b)} | — | — | — | <0,006 | B2046 | |
| B2047 | Variable-Mu Pentode | 138×51 | O35 (23) | 1, 2, 5 | indir. | 20 | 0,180 | 200 | 4,0 | —2,0 —50 | 100 | 1,8 | — | — | 3,0 | 2,0 <0,002 | 2200 | 1,1,10 ^{b)} >10 ^{c)} | — | — | — | <0,006 | B2047 | |
| B2048 | Hexode (oscillator modulator) | 130×50 | C35 (11) | 4 | indir. | 20 | 0,180 | 200 | 3,0 | —1,5 | 120 | 8,5 ^{d)} | 200 | —4 ^{d)} | — | 0,58 ^{d)} | — | > 0,15,10 ^{e)} | — | — | — | — | B2048 | |
| B2049 | Variable-Mu Hexode | 130×50 | C35 (11) | 1, 2 | indir. | 20 | 0,180 | 200 | 3 | —1,5 —8 | 80 | — | —1,5 —8 | 80 | 3 | 1,8 <0,002 | — | 0,45,10 ^{e)} >50,10 ^{e)} | — | — | — | <0,002 | B2049 | |
| B2052T | Tetrode | 127×51 | O35 (22) | 1, 2, 5, 7, 8, 11 | indir. | 20 | 0,180 | 200 | 3,0 | —2,0 | 100 | 0,2 | — | — | 3,0 | 2,0 | 900 | 0,45,10 ^{e)} | — | — | — | 0,003 | B2052T | |
| B2045 | Variable-Mu Tetrode | 120×51 | O35 (22) | 1, 2, 5 | indir. | 20 | 0,180 | 200 | 4,0 0,01 | —2,0 —40 | 60 | 0,9 | — | — | 1,2 | 1,0 0,005 | 400 | 0,4,10 ^{e)} >10 ^{c)} | — | — | — | 0,004 | B2045 | |
| B2044 | Binode (Diode-Tetrode) | 130×51 | B35 (7) | 9 | indir. | 20 | 0,180 | 200 | 0,29 0,76 | —3,2 —4,0 | 40 60 | — | — | — | 2,8 | — | 700 600 | 2,4,10 ^{e)} 1,2,10 ^{e)} | 0,32,10 ^{e)} 0,1,10 ^{e)} | — | — | — | 0,003 | B2044 |
| B2044S | Binode (Diode-Triode) | 108×46 | O35 (20) | 9 | indir. | 20 | 0,180 | 200 | 6,0 | —3,0 | — | — | — | — | 2,0 | 1,8 | 30 | 16,000 | — | — | — | — | B2044S | |
| B2038 | Triode | 105×51 | O35 (17) | 3, 6, 7, 10, 11 | indir. | 20 | 0,180 | 200 | 6,0 | —3,0 | — | — | — | — | 3,5 | 2,3 | 33 | 14,000 | — | — | — | — | B2038 | |
| B2099 | High-Mu Triode | 101×46 | O35 (17) | 11 | indir. | 20 | 0,180 | 200 | 0,08 0,2 | —1,6 —1,6 | — | — | — | — | 3,0 | — | 99 | 330,000 100,000 | 0,32,10 ^{e)} 1,10 ^{e)} | — | — | — | 1,5 | B2099 |
| B2006 | Power Triode | 105×51 | O35 (16) | 12 | indir. | 20 | 0,180 | 200 | 15 | —18 | — | — | — | — | 2,5 | 1,6 | 6 | 4,000 | 16,000 | 0,21 ^{e)} | 5 | — | B2006 | |
| B2043 | Power Pentode | 105×51 | B35 (8) | 12 | indir. | 20 | 0,180 | 200 | 20 | —18 | 200 | 8 | — | — | 2,5 | 1,7 | 70 | 40,000 | 10,000 | 1,7 | 5 | — | B2043 | |

¹⁾ Without pins.²⁾ Current of the third grid.³⁾ V_{osc} = 6·3 V_{R.M.S.}⁴⁾ Conversion conductance at V_{osc} = 6·3 V_{R.M.S.}⁵⁾ At 5 % distortion.

BATTERY VALVES (Low filament current series) WITH SIDE CONTACT BASES

| Type Number | Valve type | Maximum dimensions mm | Base connection reference in brackets ¹¹⁾ | Application (see p. 2) | Filament data | | | Anode voltage Va Volts | Anode current Ia mA | Neg. grid bias Vg ₁ Volts | Screen-grid voltage Vg ₂ Volts | Screen-grid current Ig ₂ mA | Voltage on grids 3 (and 5) Vg ₃₍₅₎ Volts | Voltage on grid 4 Vg ₄ Volts | Mutual conductance S mA/V | Amplification factor μ | Internal resistance Ri Ohms | External anode resist. or optimum matching imped. Ra Ohm | Output at 10% distortion W _o Watts | Grid A.C. voltage at the indicated output V _i V.R.M.S. | Max. anode dissipation W _{max} Watts | Grid anode capacity Cag ₁ μF | Type Number | | |
|-------------|---------------------|-----------------------|--|------------------------|---------------|--------------------------------------|---------------|---------------------------------------|---------------------|--------------------------------------|---|---|---|--|---------------------------|--|-----------------------------|--|---|---|---|--|-------------|------|------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | | |
| KK2 | Octode | 120×46 | P35 (37) | 4 | dir. | 2,0 | 0,13 | 135 ^{0,71) <0,015} | 0 | 135 | 2,1 ^{a)} | 45 | —0,5 —12 | 0,27 ¹⁰⁾ ^{<0,002} | — | 2,5·10 ⁶ ^{>10⁷} | — | — | — | — | <0,07 ⁹⁾ | KK2 | | | |
| | | | | | | 90 ^{0,71) <0,015} | 0 | 90 | 1,3 ⁴⁾ | 45 | —0,5 —12 | 0,27 ¹⁰⁾ ^{<0,002} | — | 2,0·10 ⁶ ^{>10⁷} | | | | | | | | | | | |
| | | | | | | 135 ^{1,0⁸⁾} | 0 | 135 | 2,3 ⁵⁾ | 60 | —1,5 | 0,27 ¹⁰⁾ | — | 1,7·10 ⁶ | | | | | | | | | | | |
| KF3 | Variable-Mu Pentode | 102×40 | P30 (29) | 1, 2, 5 | dir. | 2,0 | 0,045 | 135 ^{2,0 <0,015} | —0,5 —15 | 135 | 0,6 | 0 | — | 0,65 ^{<0,002} | 850 | 1,3·10 ⁶ ^{>10⁷} | — | — | — | <0,006 | KF3 | | | | |
| | | | | | | 90 ^{1,0 <0,015} | —0,5 —10 | 90 | 0,3 | 0 | — | 0,5 ^{<0,002} | 1000 | 2,0·10 ⁶ ^{>10⁷} | | | | | | | | | | | |
| KF4 | H.F. Pentode | 102×40 | P30 (29) | 1, 2, 7, 8, 11 | dir. | 2,0 | 0,065 | 135 ^{2,6} | —0,5 | 135 | 1,0 | 0 | — | 0,8 | 800 | 1,0·10 ⁶ | — | — | — | <0,006 | KF4 | | | | |
| | | | | | | 90 | 1,2 | —0,5 | 90 | 0,4 | 0 | — | 0,7 | 900 | 1,3·10 ⁶ | | | | | | | | | | |
| KB2 | Duodiode | 72×30 | V24 (53) | 13 | indir. | 2,0 | 0,095 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | KB2 | |
| KC1 | Triode | 90×44 | P30 (24) | 7, 11 | dir. | 2,0 | 0,065 | 135 ^{1,2} | —1,5 | — | — | — | — | 0,6 | 25 | 40.000 | — | — | — | 0,5 | 3,5 | KC1 | | | |
| | | | | | | 90 | 0,3 | —1,5 | — | — | — | — | — | 0,4 | 25 | 60.000 | | | | | | | | | |
| KC3 | Triode | 92×43 | P30 (24) | 10 | dir. | 2,0 | 0,21 | 135 ^{3,0} | —2,8 | — | — | — | — | 2,5 | 30 | 12.000 | — | — | — | — | — | — | — | — | KC3 |
| KBC1 | Duodiode-Triode | 112×47 | P35 (27) | 9 | dir. | 2,0 | 0,1 | 135 ^{2,5} | —4,5 | — | — | — | — | 1,0 | 16 | 16.000 | — | — | — | — | — | — | — | KBC1 | |
| | | | | | | 90 | 1,0 | —3,0 | — | — | — | — | — | 0,7 | 16 | 23.000 | | | | | | | | | |
| KL4 | Power Pentode | 100×42 | P35 (30) | 12 | dir. | 2,0 | 0,14 | 135 ^{6,5} | —5 | 135 | 1,0 | — | — | 2,1 | — | 150.000 | 19.000 | 0,44 | 3,3 | 1,0 | — | KL4 | | | |
| | | | | | | 90 | 4,7 | —2,6 | 90 | 0,7 | — | — | — | 1,8 | — | 170.000 | 19.000 | 0,16 | 2,0 | — | — | — | | | |
| KDD1 | Double Triode | 92×43 | P30 (47) | 16 | dir. | 2,0 | 0,22 | 135 ^{2×1,5⁶⁾} | 0 | — | — | — | — | — | — | — | — | 10.000 ⁷⁾ | 2,0 ⁸⁾ | — | — | — | — | — | KDD1 |

¹⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 8,5$ V.R.M.S. ($Ig_1 = 100 \mu\text{A}$) and for long and medium wave reception. The grid leak resistance amounts to 50,000 ohms and is connected to the neutral.

²⁾ The data of this horizontal column apply for the oscillating condition at $V_{osc} = 6$ V.R.M.S. ($Ig_1 = 60 \mu\text{A}$) and for short wave reception. In this range the valve must not be controlled by A.V.C. The grid leak resistance amounts to 50,000 ohms and is connected to the neutral.

³⁾ Screen-grid current $Ig_3 + Ig_5 = 0,7$ mA.

⁴⁾ Screen-grid current $Ig_3 + Ig_5 = 0,6$ mA.

⁵⁾ Screen-grid current $Ig_3 + Ig_5 = 1,0$ mA.

⁶⁾ Quiescent current, anode current at full load = 2×14 mA.

⁷⁾ From anode to anode.

⁸⁾ Ratio of intervalve transformer = $2 : (1 + 1)$ (primary to secondary turns). Driver valve KC 3, required A.C. voltage on grid of KC 3 = 2 V.R.M.S.

⁹⁾ Capacity between anode and grid 4.

¹⁰⁾ Conversion conductance.

¹¹⁾ See page 15. The numeral after the letter gives the maximum base diameter in mm.

PHILIPS NEON TUNING INDICATOR

| Type Number | Dimensions without pins mm | Base connection reference in brackets | Striking voltage at the auxiliary anode Va Volts | Operating voltage at the main anode Va Volts | Main anode current at fully lighted cathode Va mA | Auxiliary anode current Ia μA |
|-------------|----------------------------|---------------------------------------|--|--|---|--|
| 4662 | 98×13 | Small, 4-pin (XV, see page 12) | 165—190 | 150—170 | 2 | 40—50 |

N E W " M I N I W A T T " V A L V E S M O D E R N I S E Y O U R R E C E I V E R

BATTERY VALVES WITH PIN BASES

| Type Number | Valve type | Maximum dimensions mm | Base connection reference in brackets) | Application (see p. 2) | Filament data | | | Anode voltage Va | Anode current Ia | Neg. grid bias Vg1 | Screen-grid voltage Vgs | Screen-grid current Ig2 | Voltage on grids 3 (and 5) Vg3(5) | Voltage on grid 4 Vg4 | Mutual conductance Ri mA/V | Amplification factor μ | Internal resistance Ri Ohms | External anode resist. most fav. matching imped. Ra Ohms | Output at 10% distortion Wo Watts | Grid A.C. voltage at the indicated output Vi V.R.M.S. | Max. anode dissipation Wa max Watts | Grid anode capacity Cag1 $\mu\mu F$ | Type Number | | |
|--------------|---------------------|-----------------------|--|------------------------|---------------|---------------|---------------|------------------|---------------------|--------------------|-------------------------|-------------------------|-----------------------------------|-----------------------|----------------------------|----------------------------|-----------------------------|--|---|---|-------------------------------------|-------------------------------------|-------------|--------------|-------------|
| | | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | | | | | | | | | |
| KF2 | Variable-Mu Pentode | 118×47 | C35 (10) | 1,2 | dir. | 2,0 | 0,2 | 135 | 3,0 appr 0,01 | 0 -16 | 135 | 1,0 | 0 | — | 1,3 | 1,3 <0,002 | 1400 | 1,1.10 ⁴ >10 ⁷ | — | — | — | <0,01 | KF2 | | |
| | | | | | | | | 90 | 1,4 appr 0,01 | 0 -11 | 90 | — | 0 | — | — | — | — | 1500 | 1,9.10 ⁴ >10 ⁷ | | | | | | |
| KF1 | H.F. Pentode | 118×47 | C35 (10) | 1, 2, 7, 8, 11 | dir. | 2,0 | 0,2 | 135 | 3,0 | 0 | 135 | 1,0 | 0 | — | 1,8 | 1,8 | 1600 | 0,9.10 ⁴ | — | — | — | <0,01 | KF1 | | |
| | | | | | | | | 90 | 1,1 | 0 | 90 | — | 0 | — | — | — | — | 1500 | 1,5.10 ⁴ | | | | | | |
| B228 | Triode | 81×41 | A32 (1) | 7, 11 | dir. | 2,0 | 0,1 | 150 | 2,0 | -2,0 | — | — | — | — | — | 1,3 | 1,2 | 28 | 23.000 | — | — | — | 5,5 | B228 | |
| B217 | Triode | 81×41 | A32 (1) | 3, 6, 10 | dir. | 2,0 | 0,1 | 150 | 4,5 | -3,0 | — | — | — | — | — | 1,4 | 1,3 | 17 | 13.000 | — | — | — | 5,5 | B217 | |
| C243N | Power Pentode | 89×51 | O35 (19) | 12 | dir. | 2,0 | 0,2 | 150 | 9,5 | -4,5 | 150 | — | — | — | — | — | 2,4 | — | 75.000 | 15.000 | 0,58 | 1,5 | — | C243N | |
| B240 | Double Triode | 96×47 | C35 (9) | 16 | dir. | 2,0 | 0,2 | 150 | 2×1,5 ¹⁾ | 0 | — | — | — | — | — | — | — | — | — | 14.000 ^{a)} | 1,0 ^{a)} | — | — | B240 | |
| B442 | Tetrode | 108×46 | A35 (3) | 1, 2 | dir. | 4,0 | 0,100 | 200 | 4,5 | -1,0 | 100 | — | — | — | — | 0,9 | 0,9 | 350 | 0,4.10 ⁴ | — | — | — | 0,005 | B442 | |
| A442 | Tetrode | 105×46 | A35 (3) | 1, 2, 5, 7, 8, 11 | dir. | 4,0 | 0,06 | 200 | 4,0 | -1,0 | 100 | — | — | — | — | 0,8 | 0,7 | 280 | 0,4.10 ⁴ | — | — | — | 0,01 | A442 | |
| B424 | Triode | 92×46 | A35 (1) | 3, 6, 10 | dir. | 4,0 | 0,100 | 200 | 6,0 | -0,3 | — | — | — | — | — | 3,0 | 2,5 | 24 | 9.000 | — | — | — | 4 | B424 | |
| B438 | Triode | 78×38 | A35 (1) | 7, 8, 11 | dir. | 4,0 | 0,100 | 200 | 0,2 0,05 | -2,5 -2,5 | — | — | — | — | — | 2,0 | — | 38 | 170.000 400.000 | 0,32.10 ⁴ 1,0.10 ⁴ | — | — | — | 4 | B438 |
| A415 | Triode | 83×42 | A32 (1) | 3, 6, 10 | dir. | 4,0 | 0,085 | 150 | 4,0 | -4,0 | — | — | — | — | — | 2,0 | 1,5 | 15 | 10.000 | — | — | — | 4,5 | A415 | |
| A425 | Triode | 83×42 | A32 (1) | 7, 8, 11 | dir. | 4,0 | 0,065 | 200 | 0,25 0,1 | -2,5 -2,5 | — | — | — | — | — | 1,2 | — | 25 | 80.000 250.000 | 0,32.10 ⁴ 1,0.10 ⁴ | — | — | — | 3 | A425 |
| A409 | Triode | 83×42 | A32 (1) | 3, 6, 10 | dir. | 4,0 | 0,065 | 150 | 3,5 | -9,0 | — | — | — | — | — | 1,2 | 0,9 | 9 | 10.000 | — | — | — | 4 | A409 | |
| A441N | Double-grid valve | 92×46 | A35b (4) | 4 | dir. | 4,0 | 0,08 | 100 | 4,0 | 0 ¹⁾ | 4,0 ¹⁾ | — | — | — | — | — | — | — | — | — | — | — | — | A441N | |
| B405 | Triode | 91×46 | A32 (1) | 12 | dir. | 4,0 | 0,15 | 150 | 11 | -18 | — | — | — | — | — | 2,0 | 1,6 | 5 | 3.000 | — | — | — | — | B405 | |
| B406 | Triode | 91×46 | A32 (1) | 12 | dir. | 4,0 | 0,1 | 150 | 8 | -15 | — | — | — | — | — | 1,4 | 1,3 | 6 | 4.500 | — | — | — | — | B406 | |
| B409 | Triode | 91×46 | A32 (1) | 12 | dir. | 4,0 | 0,15 | 250 | 12 | -16 | — | — | — | — | — | 2,0 | 1,8 | 9 | 5.000 | 12.000 | 0,65 ^{a)} | 3 | — | B409 | |
| B443 | Power Pentode | 92×51 | O35 (19) | 12 | dir. | 4,0 | 0,150 | 250 | 12 | -17 | 150 | — | — | — | — | — | 1,3 | — | 45.000 | 20.000 | 1,35 | 3 | — | B443 | |

¹⁾ Quiescent anode current for both anodes.²⁾ From anode to anode.³⁾ At Va = 120 volts.⁴⁾ Voltage of the control grid.⁵⁾ Voltage of the space charge grid.⁶⁾ Conductance of control grid.⁷⁾ Conductance of space charge grid.⁸⁾ Without pins.⁹⁾ At 5% distortion.

NEW "MINIWATT" VALVES INCREASE YOUR RADIO ENJOYMENT!

PHILIPS POWER AMPLIFIER VALVES

| Type Number | Valve type | Maximum Dimensions ¹⁾ mm | Base (Connection reference in brackets) ²⁾ | Filament data | | | Application | Anode Voltage Va | Screen-grid voltage Vg ₂ | Quiescent anode current I _{a₀} mA | Anode current at full modulat. I _{a_{max}} mA | Quiescent Screen-grid current I _{g₂₀} mA | Screen-grid current at full modulat. I _{g_{max}} mA | Neg. grid bias for fixed bias Vg ₁ Volts | Common cathode resist. with autom. bias R _k Ohms | Mutual conduct. at working point S mA/V | Internal resist. at working point R _i Ohms | Optim. matching imped. (between the two anodes) R _a Ohms | Max. output W _{o_{max}} Watts | Distortion at max. output dtot % | Grid A.C. voltage at full modulat. V _{i_{max}} V.R.M.S. | Max. anode load W _{a_{max}} Watts | Type Number | |
|--------------|-------------------------|--|---|---------------|------------------|-----------------|--------------------|---------------------|---|---|---|--|--|---|--|--|--|--|--|--|---|---|--------------|-------------|
| | | | | Heating | Voltage Volts | Current Amps | | | | | | | | | | | | | | | | | | |
| E406N | Triode | 130×51 | A35 (1) | dir. | 4,0 | 1,0 | Class A, 1 valve | 500 | — | 24 | — | — | — | —68 | — | 3,0 | 2000 | 11.500 | 5.3 | 5 | 45 | 12 | E406N | |
| | | | | | | | Class AB, 2 valves | 500 | — | 2×23 | 2×38 | — | — | —70 | — | — | — | 12.000 | 15 | 1,4 | 43 | 12 | | |
| | | | | | | | Class AB, 2 valves | 500 | — | 2×24 | 2×27 | — | — | — | 1400 | — | — | 16.000 | 13 | 3,3 | 52 | 12 | | |
| E408N | Triode | 121×51 | A40 (1) | dir. | 4,0 | 1,0 | Class A, 1 valve | 400 | — | 30 | — | — | — | —36 | — | 2,7 | 3000 | 6.000 | 2,6 | 5 | — | 12 | E408N | |
| | | | | | | | Class AB, 2 valves | 400 | — | 2×20 | 2×28 | — | — | —40 | — | — | — | 12.000 | 7 | 0,56 | 28 | 12 | | |
| | | | | | | | Class AB, 2 valves | 400 | — | 2×33 | 2×32 | — | — | — | 600 | — | — | 10.000 | 7 | 0,62 | 26,5 | 12 | | |
| E443N | Pentode | 110×57 | O40 (19) | dir. | 4,0 | 1,0 | Class A, 1 valve | 400 | 200 | 30 | — | — | — | —40 | — | 1,9 | 40.000 | 14.000 | 5,4 | 10 | 20,2 | 12 | E443N | |
| | | | | | | | Class AB, 2 valves | 400 | 200 ⁴⁾ | 2×25 | 2×28 | 2×4,7 | 2×10 | — | 720 | — | — | 16.000 | 14 | 4,1 | — | 12 | | |
| | | | | | | | Class A, 1 valve | 250 | — | 22 | — | — | — | —33 ²⁾ | — | 2,4 | 2400 | 6.400 ⁴⁾ | 1,25 | 5 | — | 10 | | |
| E451 | Double-grid power valve | 123×55 | O35 (18) | dir. | 4,0 | 1,1 | Class B, 2 valves | 300 | — | 2×6 | 2×48 | — | — | 0 ³⁾ | — | — | — | 6.000 | 16 | 8,4 ⁵⁾ | — | — | E451 | |
| | | | | | | | Class B, 2 valves | 400 | — | 2×8,5 | 2×56 | — | — | 0 ³⁾ | — | — | — | 6.000 | 22,4 | 5,4 ⁵⁾ | — | — | | |
| | | | | | | | Class A, 1 valve | 800 | — | 40 | — | — | — | —80 | — | 2,0 | 3500 | 11.000 | 10 | 5 | 58 | 32 | | |
| E707 | Triode | 200×51 | W42 (56) | dir. | 7,2 | 1,1 | Class AB, 2 valves | 800 | — | 2×30 | 2×52 | — | — | —87 | — | — | — | 10.000 | 23 | 1,3 | 55 | 32 | E707 | |
| | | | | | | | Class AB, 2 valves | 800 | — | 2×40 | 2×45 | — | — | — | 1000 | — | — | — | 12.000 | 24 | 1,3 | 61 | 32 | |
| | | | | | | | Class A, 1 valve | 550 | — | 45 | — | — | — | —36 | — | 4,0 | 2500 | 7.000 | 5,9 | 5 | 24,5 | 25 | | |
| F410 | Triode | 145×60 | A40 (1) | dir. | 4,0 | 2,0 | Class AB, 2 valves | 550 | — | 2×20 | 2×40 | — | — | —43 | — | — | — | 10.000 | 14,6 | 1,08 | 28 | 25 | F410 | |
| | | | | | | | Class AB, 2 valves | 550 | — | 2×45 | 2×48 | — | — | — | 400 | — | — | — | 10.000 | 14,4 | 0,86 | 25 | 25 | |
| | | | | | | | Class A, 1 valve | 550 | 200 | 45 | — | 1,4 | — | —30 | 647 | 3,2 | 30.000 | 12.000 | 12 | 10 | 12,5 | 25 | | |
| F443N | Pentode | 160×67 | O40 (19) | dir. | 4,0 | 2,0 | Class A, 1 valve | 300 | 300 | 83 | — | 4,6 | — | —40 | 457 | 3,9 | 20.000 | 3.500 | 10,3 | 10 | 20 | 25 | F443N | |
| | | | | | | | Class AB, 2 valves | 550 | 250 ⁶⁾ | 2×45 | 2×53 | 2×0,8 | 2×7,4 | — | 455 | — | — | 12.000 | 41 | 4,3 | 37 | 25 | | |
| | | | | | | | Class AB, 2 valves | 300 | 300 ⁶⁾ | 2×15 | 2×72,5 | 2×0,54 | 2×14,3 | —63 | — | — | — | 4.500 | 26,5 | 3,4 | 46 | 25 | | |
| | | | | | | | Class AB, 2 valves | 300 | 300 ⁶⁾ | 2×64 | 2×72,5 | 2×2,0 | 2×11,9 | — | 340 | — | — | 4.000 | 24 | 2,9 | 39 | 25 | | |
| | | | | | | | Class A, 1 valve | 1000 | — | 25 | — | — | — | —80 | — | 3,2 | 3200 | 25.000 | 11,5 | 5 | 58 | 25 | | |
| 4641 | Triode | 165×66 | W42 (56) | dir. | 4,0 | 2,0 | Class AB, 2 valves | 1000 | — | 2×25 | 2×39 | — | — | —80 | — | — | — | 35.000 | 30 | 0,67 | 56 | 25 | 4641 | |
| | | | | | | | Class AB, 2 valves | 1000 | — | 2×25 | 2×28 | — | — | — | 1600 | — | — | — | 35.000 | 29 | 4,5 | 55 | 25 | |
| | | | | | | | Class B, 2 valves | 1000 | — | 2×5 | 2×45 | — | — | —90 | — | — | — | 18.000 | 41 | 4,0 | 60 | 25 | | |
| | | | | | | | Class A, 1 valve | 1000 | — | 25 | — | — | — | —80 | — | 3,2 | 3200 | 25.000 | 11,5 | 5 | 58 | 25 | | |
| 4682 | Pentode | 115×46 | P35 (32) | indir. | 4,0 | 1,0 | Class AB, 2 valves | 375 | 250 ⁶⁾ | 2×20 | 2×45 | 2×3 | 2×5,5 | —32 | — | — | — | 9.000 | 19 | 1,5 | 21,5 | 9 | 4682 | |
| 4683 | Triode | 135×59 | P35 (24) | dir. | 4,0 | 0,95 | Class AB, 2 valves | 350 | — | 2×35 | 2×69,5 | — | — | —75 | — | — | — | 15.000 | 14 | 5,2 | 16,5 | 9 | 4683 | |
| 4684 | Pentode | 115×50 | P35 (31) | indir. | 4,0 | 1,75 | Class AB, 2 valves | 375 | 250 ⁶⁾ | 2×24 | 2×30 | 2×3,2 | 2×5,3 | — | 142 | — | — | — | 8.000 | 20 | 2,1 | 49 | 15 | 4684 |
| 4688 | Pentode | 117×51 | P35 (31) | indir. | 4,0 | 2,0 | Class AB, 2 valves | 375 | 275 ⁶⁾ | 2×48 | 2×62 | 2×5 | 2×9 | — | 165 | — | — | — | 6.500 | 28,5 | 2,25 | 16 | 18 | 4688 |
| 4689 | Pentode | 117×51 | P35 (31) | indir. | 6,3 | 1,35 | Class AB, 2 valves | 375 | 275 ⁶⁾ | 2×48 | 2×62 | 2×5 | 2×9 | — | 165 | — | — | — | 6.500 | 28,5 | 2,25 | 16 | 18 | 4689 |
| 4694 | Pentode | 120×37 | P35 (31) | indir. | 6,3 | 1,2 | Class AB, 2 valves | 375 | 250 ⁶⁾ | 2×24 | 2×30 | 2×3,2 | 2×5,3 | — | 142 | — | — | — | 13.000 | 12 | 2,3 | 6,9 | 9 | 4694 |

¹⁾ Without pins.²⁾ Anode and grid 2 interconnected, class A as driver valve.³⁾ Grids 1 and 2 interconnected, class B driven into grid current.⁴⁾ Optimum external resistance for maximum power output. About double the value is recommended as load when using this valve as driver valve of class B power stages driven into grid current.⁵⁾ Measured with a valve E 451 as driver (Va = 250 V, Vg = —33 V) and an interstage transformer with a ratio 2:5 : (1 + 1) (primary to secondary turns).⁶⁾ The screen-grid voltage must be maintained as constant as possible in push-pull stages by a chain of neon stabiliser tubes. The tubes type 4687 are very suitable for the purpose.⁷⁾ See page 15. The numeral after the letter gives the maximum base diameter in mm.

PHILIPS RECTIFIER VALVES

for Receivers, Power Amplifiers and Cathode Ray Tubes

| | | Type Number | Maximum Dimensions ²⁾ mm | Base (Connection reference in brackets) | Filament data | | | Anode data | |
|-------------------------------|-----------------------|--------------------------|--|--|---------------|---------------|---------------------|---|----------------------|
| | | | | | Heating | Voltage Volts | Current appr. amps. | Max. A.C. no. load voltage Volts R.M.S. | Max. D.C. current mA |
| For A.C. mains receivers | Full-wave high-vacuum | EZ4 | 85×37 | P30 (45) | indir. | 6,3 | 0,9 | 2×400 | 175 |
| | | AZ1 | 110×53 | P35 (44) | dir. | 4,0 | 1,1 | 2×500 2×300 | 60 100 |
| | | 1801 | 93×47 | A35 (5) | dir. | 4,0 | 0,5 | 2×250 | 30 |
| | | 506 | 105×51 | A35 (5) | dir. | 4,0 | 1,0 | 2×300 | 75 |
| | | 1817 | 160×67 | A40 (5) | dir. | 4,0 | 4,0 | 2×350 | 300 |
| | | 1805 | 116×53 | A35 (5) | dir. | 4,0 | 1,0 | 2×500 | 60 |
| | | 1561 | 125×51 | A35 (5) | dir. | 4,0 | 2,0 | 2×500 2×350 | 120 160 |
| | | 1815 | 145×59 | A40 (5) | dir. | 4,0 | 2,5 | 2×500 | 180 |
| | | 1831 | 145×59 | A35 (5) | dir. | 4,0 | 1,0 | 2×700 | 60 |
| | | 1802 | 92×46 | H32 (14) | dir. | 4,0 | 0,4 | 250 | 30 |
| | | 1803 | 100×52 | H35 (14) | dir. | 4,0 | 0,6 | 500 | 30 |
| | | 1832 | 145×60 | H35 (14) | dir. | 4,0 | 1,3 | 700 | 120 |
| For AC/DC receivers | Half-wave high-vac. | CY1 | 102×43 | P30 (43) | indir. | 20 | 0,200 | 250 | 80 |
| | | CY2 | 100×44 | P30 (46) | indir. | 30 | 0,200 | 1×250 2×127 ¹⁾ | 120 60 |
| For car-radio receivers | Full-wave high-vac. | EZ2 | 85×37 | P30 (45) | indir. | 6,3 | 0,4 | 2×350 | 60 |
| | | FZ1 | 91×37 | P30 (45) | indir. | 13 | 0,25 | 2×250 | 50 |
| For amplifier installations | Full-wave gas-filled | AX1 | 110×47 | A35 (5) | dir. | 4,0 | 2,0 | 2×500 ³⁾ | 125 |
| | | 4646 | 145×60 | W42 (55) | dir. | 4,0 | 1,3 | 1000 | 75 |
| For cathode ray oscilloscopes | Half-wave high-vac. | 1875 | 145×50 | P35 (42) | dir. | 4,0 | 2,3 | 7000 | 5 |
| | | 1876 | 97×52 | P35 (41) | dir. | 4,0 | 0,3 | 850 | 5 |
| | gasfilled | 1018⁴⁾ | — | — | dir. | 1,8 | 1,8 | 16 | 200 |

¹⁾ As voltage doubler. ²⁾ Without pins.

⁴⁾ Rectifier for charging purposes.

PHILIPS HEATING CURRENT REGULATOR TUBES

| | Type Number | Maximum dimensions ⁶⁾ mm | Base (Connection reference in brackets) | Voltage control range Volts | Maximum operating voltage Volts | Regulated current rating mA | Max. voltage across the tube when switching on Volts |
|--|--------------------------|--|--|--------------------------------|------------------------------------|--------------------------------|---|
| | C1 | 125×39 | P30 (48) | 80—230 | 200 | 200 | 250 ²⁾ |
| | C2 | 115×39 | P30 (48) | 35—100 | 100 | 200 | 160 ²⁾ |
| | C8 | 125×39 | P30X (50) | 80—230 | 200 | 200 | 250 ¹⁾ |
| | C9 | 115×39 | P30Z (52) | 35—100 | 100 | 200 | 160 ²⁾ |
| | C10 | 115×39 | P30Y (51) | 35—100 | 100 | 200 | 160 ²⁾ |
| | C12 | 142×41 | P30 (49) | 80—200 35—100 | 200 100 | 200 | 250 ¹⁾ 160 ²⁾ |
| | C3 | 125×39 | P30X (50) | 100—200 | 200 | 200 | 250 |
| | C4 | 105×39 | P30Y (51) | 55—105 | 105 | 200 | 160 |
| | C6 | 125×39 | P30 (48) | 70—140 | 140 | 200 | 160 |
| | C7 | 105×39 | P30 (48) | 35—70 | 70 | 200 | 110 |
| | 1926⁴⁾ | 105×33 | A32 (6) | 16 ⁵⁾ | — | 180 | — |
| | 1927 | 115×38 | A35 (6) | 35—100 | — | 180 | — |
| | 1928 | 125×38 | A35 (6) | 100—225 | — | 180 | — |
| | 1904 | 90×36 | A32 (6) | 50—70 | — | 100 | — |
| | 1911 | 90×36 | A32 (6) | 50—70 | — | 150 | — |
| | 1915 | 115×38 | A32 (6) | 50—70 | — | 240 | — |
| | 1920 | 115×38 | A32 (6) | 50—70 | — | 250 | — |
| | 1941 | 140×50 | A35 (6) | 77—200 | 200 | 300 | 250 ¹⁾ |
| | 1949 | 95×38 | A35 (6) | 30—90 | 90 | 300 | 127 ³⁾ |
| | 1910 | 90×33 | H32 (15) | 4,5—14,5 | — | 1440 | — |

¹⁾ The total heating current of the receiving valves in series with the regulator tube must be at least 52 volts.

²⁾ The total heating current of the receiving valves in series with the regulator tube must be at least 74 volts.

³⁾ The total heating current of the receiving valves in series with the regulator tube must be at least 63 volts.

⁴⁾ Resistance tube.

⁵⁾ Voltage drop in the resistance.

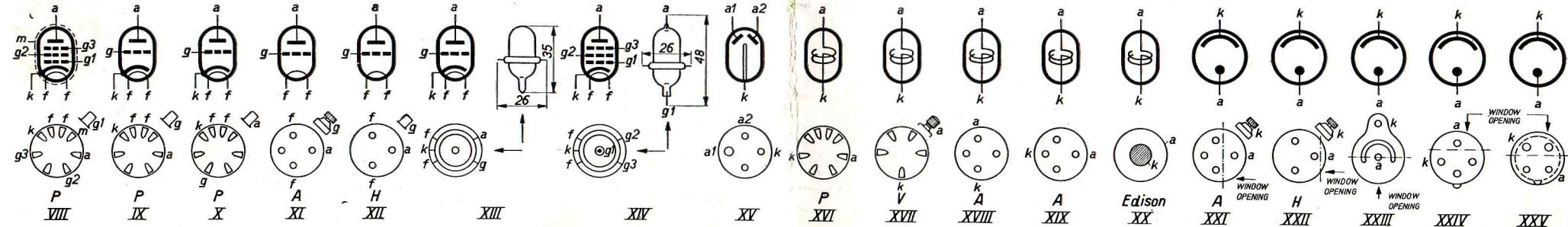
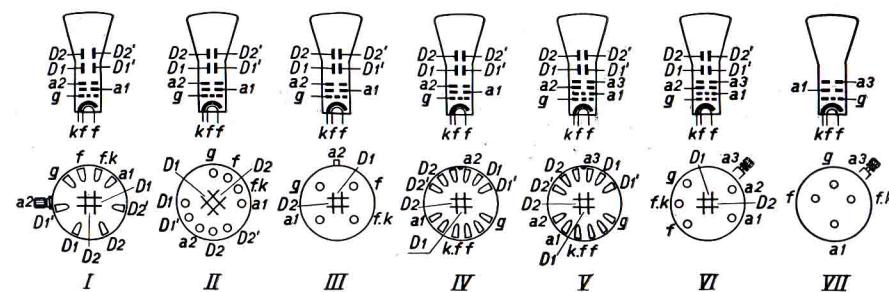
⁶⁾ Without pins.

PHILIPS' HIGH-VACUUM CATHODE RAY TUBES

| Type Number | Tube type | Deflection | Colour of luminous spot | Max. screen diameter mm | Greatest length without pins (max.) | Greatest length without pins (min.) | Base connection | Filament data | | | Max. voltage on 3rd anode $V_{a_3}^{max}$ Volts | Max. voltage on 2nd anode $V_{a_2}^{max}$ Volts | Max. grid bias for suppr. of the ray V_g^{max} Volts | Operating data | | | | | Grid capacity C_g $\mu\mu F$ | Capacity of deflection plates $C_{D_1 D_1'}$ | Capacity of deflection plates $C_{D_2 D_2'}$ | Type Number | |
|---------------|---|----------------------|-------------------------|-------------------------|-------------------------------------|-------------------------------------|-----------------|---------------|---------------|--------------|---|---|--|-------------------------|-------------------------|-------------------------|------------------------|------------------------|--------------------------------|--|--|-------------|--------|
| | | | | | | | | Heating | Voltage Volts | Current Amps | | | | Voltage V_{a_3} Volts | Voltage V_{a_2} Volts | Voltage V_{a_1} Volts | Sensitivity N_1 mm/V | Sensitivity N_2 mm/V | | | | | |
| DG7-1 | Cathode ray tube for oscilloscopes | Double electrostatic | Green | 75 | 165 | 150 | I | indir. | 4,0 | 1,0 | — | 800 | 300 | -30 | — | 800 | 200 ¹⁾ | 0,20 | 0,14 | 7 | 3 | 4 | DG7-1 |
| DG9-3 7) | Cathode ray tube for oscilloscopes | Double electrostatic | Green | 103 | 350 | 320 | II | indir. | 4,0 | 1,0 | — | 1200 | 500 | -40 | — | 500 | 140 ¹⁾ | 0,32 | 0,22 | 6 | 4 | 5,5 | DG9-3 |
| DG16-1 8) | Cathode ray tube for oscilloscopes | Double electrostatic | Green | 167 | 440 | 416 | III | indir. | 4,0 | 1,0 | — | 2000 | 600 | -40 | — | 1000 | 400 ¹⁾ | 0,40 | 0,30 ¹¹⁾ | 10 | 1,5 | 2 | DG16-1 |
| DG16-2 9) | Cathode ray tube for oscilloscopes | Double electrostatic | Green | 167 | 450 | 425 | IV | indir. | 4,0 | 1,0 | — | 2000 | 600 | -40 | — | 2000 | 400 ¹⁾ | 0,27 | 0,20 | 12 | 6 | 7 | DG16-2 |
| DG25-1 10) | Cathode ray tube for oscilloscopes and television receivers | Double electrostatic | Green | 257 | 580 | 550 | V | indir. | 4,0 | 1,2 | 5000 | 1700 | 250 | -60 | 5000 | 1400 ¹⁾ | 0,13 | 0,11 | 15 | 5,5 | 6,5 | DG25-1 | |
| DW31-1 13) | Cathode ray tube for television receivers | Double electrostatic | White | 310 | 640 | 610 | VI | indir. | 4,0 | 1,2 | 6000 | 1200 | 250 | -60 | 5000 | 1000 ¹⁾ | 0,17 | 0,13 | 15 | 4 | 5 | DW31-1 | |
| MW31-2 | Cathode ray tube for television receivers | Double magnetic | White | 310 | 695 | 660 | VII | indir. | 4,0 | 1,2 | 6000 | magnetic concentration | 250 | -60 | 5000 | — ¹⁸⁾ | 1,8 ¹⁴⁾ | 1,8 ¹⁴⁾ | — | — | — | MW31-2 | |
| DW39-1 | Cathode ray tube for television receivers | Double electrostatic | White | 395 | 765 | 735 | VI | indir. | 4,0 | 1,2 | 6000 | 1200 | 250 | -60 | 5000 | 1000 ¹⁾ | 0,18 | 0,14 | 15 | 4 | 5 | DW39-1 | |
| MW39-2 | Cathode ray tube for television receivers | Double magnetic | White | 395 | 745 | 700 | VII | indir. | 4,0 | 1,2 | 6000 | magnetic concentration | 250 | -60 | 5000 | — ¹⁸⁾ | 2,3 ¹⁴⁾ | 2,3 ¹⁴⁾ | — | — | — | MW39-2 | |

¹⁾ Set to spot sharpness.²⁾ Of the deflection plates on the cathode side.³⁾ Of the deflection plates on the screen side.⁴⁾ With respect to all other electrodes.⁵⁾ On the cathode side.⁶⁾ On the screen side.⁷⁾ This tube can also be supplied with a blue screen (type number DB 9-3).⁸⁾ This tube can also be supplied with a blue screen (DW 16-1) or with a white screen (DW 16-1).⁹⁾ This tube can also be supplied with a blue screen (DB 16-2) or a long persistence yellow fluorescent screen (DN 16-2).¹⁰⁾ This valve can also be supplied with a blue fluorescent screen (DB 25-1).¹¹⁾ The deflection of the deflection plates D_2 and D_2' is asymmetrical to enable asymmetrical control by means of a simple time-base voltage or amplifier circuit (control voltage that fluctuates only in one direction with respect to V_{a_2}). The plate D_2' must be connected to anode a_2 . Plate D_2 can then be connected to the asymmetrical time-base voltage or output voltage of the amplifier.¹²⁾ The number of turns required for magnetic concentration is about 500. The distance of the coil centre from the lower edge of the base must be about 140 mm.¹³⁾ The newer type, the DW 31-2, is fitted with deflection plates led out at the base.¹⁴⁾ Expressed in mm deflection per cm coil width (length of the field through which the electrons of the ray pass) per Gauss mean field strength. The distance of the coil centre to the screen is 420 mm for tube MW 31-2 and 540 mm for tube MW 39-2.

The grid voltage may never become positive.
 The grid voltage must never be adjusted to the desired light intensity.



PHILIPS NEON STABILISER TUBES

| Type Number | Maximum dimensions without pins mm | Base (Connection reference in brackets, see p. 12) | Running voltage at the given quiescent current Volts | Striking voltage Volts | Extinction voltage Volts | Quiescent current at the given running voltage mA | Maximum permissible current mA | Lower current limit for stabilisation mA | A.C. resistance Ohms |
|-------------|------------------------------------|--|--|------------------------|--------------------------|---|--------------------------------|--|----------------------|
| 4357 | 106 × 60 | A35 (XVIII) | 90—100 | 100—110 | 83 | 20 | 45 | 10 | 100 |
| 4376 | 115 × 60 | Edison (XX) | 90—100 | 100—110 | 83 | 20 | 45 | 10 | 100 |
| 4377 | 115 × 60 | Edison (XX) | 105—115 | 130—140 | 104 | 20 | 45 | — | 80 |
| 4687 | 94 × 29 | P26 (XVI) | 90 | 105 | 85 | 20 | 40 | 5 | 180 |
| 7475 | 60 × 28 | A25,5 (XIX) | 90—110 | 100—135 | 85—110 | 4 | 8 | 1 | 300 |
| 13201 | 144 × 53 | Ed or A40 (XX),n(XIX) | 90—110 | 100—135 | 85—110 | 100 | 200 | 5 | 80 |

PHILIPS PHOTO-ELECTRIC CELLS

| Type Number | Valve type | Maximum dimensions without pins mm | Base (in brackets base connections, see p. 12) | Anode cathode capacity Cak $\mu\mu F$ | Norm. anode voltage Va Volts | Sensitivity $\mu A/Lm^{-1}$ | Striking voltage Volts | Max. anode voltage Va _{max} Volts | Max. anode current Ia _{max} μA | Min. protective resistance MΩ |
|-------------|---|------------------------------------|--|---------------------------------------|------------------------------|-----------------------------|------------------------|--|--|-------------------------------|
| 3510 | High vacuum cell with potassium cathode | 165 × 60 | H (XXII) | 3 | 100 | 3 | — | 500 | 3 | — |
| 3512 | High vacuum cell with potassium cathode | 118 × 55 | A (XXI) | 3 | 100 | 20 | — | 500 | 5 | — |
| 3530 | High vacuum cell with caesium cathode | 60 × 16 | (XXIII) | 5 | 100 | 150 | ≥ 140 | 100 | 3 | 0,1 |
| 3533 | High vacuum cell with caesium cathode | 60 × 25 | (XXIV) | 5 | 100 | 150 | ≥ 140 | 100 | 3 | 0,1 |
| 3534 | High vacuum cell with caesium cathode | 85 × 25 | (XXV) | 5 | 100 | 150 | ≥ 140 | 100 | 3 | 0,1 |

¹⁾ Measured with a tungsten filament lamp. The temperature of the tungsten filament is 2600° K and the light current measured statically is 0.05 lumen.

PHILIPS GASFILLED TRIODES FOR TIME BASE UNITS

| Type Number | Gasfilled | Maximum dimensions mm | Base (in brackets base connection, see p. 12) | Indirect heating | | Capacity between | | | Arc-voltage (Extinction voltage) Volts | Max. peak value of voltage between 2 electrodes Volts | Max. peak value of anode voltage Volts | Max. peak value of anode current mA | Maximum value of mean anode current in oscillating condition mA ¹⁾ | Minimum resistance in grid circuit per volt peak voltage at grid Ω | Maximum resistance in grid circuit per volt peak voltage at grid Ω | Maximum voltage between filament & cathode Volts ²⁾ | Ratio between striking voltage and grid voltage | Maximum attainable frequency c/sec | Type Number |
|-------------|-----------|-----------------------|---|------------------|---------------|-----------------------------|--------------------------------|-------------------------------|--|---|--|-------------------------------------|---|---|---|--|---|------------------------------------|-------------|
| | | | | Voltage Volts | Current Amps. | Grid & anode Cag $\mu\mu F$ | Anode & cathode Cak $\mu\mu F$ | Grid & cathode Cgk $\mu\mu F$ | | | | | | | | | | | |
| 4686 | Argon | 100 × 37 | P30 (IX) | 4,0 | 1,2 | 2,2 | 3,2 | 3,8 | about 17 | 350 | 300 | 300 | 3 | 1000 | 0,5 | 100 | 21 | 50.000 | 4686 |
| 4690 | Helium | 100 × 43 | P30 (X) | 4,0 | 1,3 | 3,7 | 2,0 | 3,7 | about 50 | 600 | 500 | 750 | 10 | 1000 | 0,5 | 100 | 40 | 150.000 | 4690 |

¹⁾ In a time-base circuit.

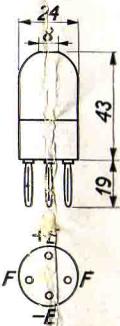
²⁾ Cathode always positive with respect to the filament.

PHILIPS AMPLIFIER VALVES FOR SPECIAL PURPOSES

| Type Number | Valve type and application | Maximum dimensions without pins mm | Base (Connection reference in brackets see p. 12) | Filament data | | | Max. anode voltage Va _{max} Volts | Anode current Ia mA | Neg. grid bias Vg ₁ Volts | Screen-grid voltage Vg ₂ Volts | Voltage on 3rd grid Vg ₃ Volts | Screen-grid current Ig ₂ mA | Conduct. at operating point S mA/V | Amplification factor μ | Internal resistance Ri Ohms | Capacity between | | | Type Number | |
|-------------|--|------------------------------------|---|---------------|---------------|---------------|--|---------------------|--------------------------------------|---|---|--|------------------------------------|----------------------------|--|-----------------------------------|----------------------------------|-------------------------------------|-------------|------|
| | | | | Heating | Voltage Volts | Current Amps. | | | | | | | | | | Anode and 1st grid Cag $\mu\mu F$ | Anode and cathode Cak $\mu\mu F$ | 1st grid and cathode Cgk $\mu\mu F$ | | |
| C408 | Triode for valve voltmeter and other measuring instruments | 150 × 58 | A 35 (XI) | dir. | 4,0 | 0,25 | 150 | 14 | —7 | — | — | — | 2,7 | 8 | 3000 | — | — | — | — | C408 |
| 4060 | Electrometer triode | 152 × 59 | H 35 (XII) | dir. | about 0,5—0,7 | 1,0 | 4 | — | —2,5 | — | — | — | 0,028 | 0,5 | — | < 10 ⁻¹⁴ | — | — | — | 4060 |
| 4671 | Triode for ultra short wave sets | 35 × 26 | without base (XIII) | indir. | 6,3 | 0,15 | 200 | 4,5 | —6 | — | — | — | 2,0 | 25 | 12500 | — | 1,4 | 0,6 | 1,0 | 4671 |
| 4672 | Pentode for ultra short wave sets | 48 × 26 | without base (XIV) | indir. | 6,3 | 0,15 | 250 | 2,0 | —3 | 100 | 0 | 0,7 | 1,4 | 5000 | 3,5.10 ⁴ | — | < 0,007 | 3,0 | 2,7 | 4672 |
| 4695 | Variable-Mu Pentode for ultra short wave sets | 48 × 26 | without base (XIV) | indir. | 6,3 | 0,15 | 250 | 5,5 | —3 —45 | 100 | 0 | 1,8 | 1,8 | 1440 | 0,8.10 ⁶ > 10 ⁴ | — | < 0,007 | 3,5 | 2,7 | 4695 |
| 4673 | Pentode for television receivers | 118 × 47 | P 30 (VIII) | indir. | 4,0 | 0,15 | 250 | 8,0 | —2,5 | 200 | 0 | 1,5 | 5,0 | — | > 1,5.10 ⁴ | — | < 0,012 | 7,5 | 9,6 | 4673 |

PHILIPS THERMO COUPLES

| Type number | Current range (mA) | Resistance of the thermo couple (ohms) | Resistance of the filament | E.M.F. at max. current of the range (mV) |
|-------------|--------------------|--|----------------------------|--|
| TH 005 | 0—5 | 13 | 80 | 5 |
| TH 010 | 0—10 | 5 | 28 | 3.6 |
| TH 020 | 0—20 | 5 | 10 | 3.6 |
| TH 050 | 0—50 | 5 | 3 | 3.6 |
| TH 100 | 0—100 | 5 | 1.2 | 3.6 |



The Philips Thermo Couples are so designed that in conjunction with a measuring instrument for 0—2.4 mV with an internal resistance of $10\ \Omega$ they give maximum deflection at the indicated maximum current. When using the Philips Thermo Couples with a measuring instrument giving purely quadratic reading the deviation is maximum 1.5%. The tolerance of the indicated maximum value of the current is — 20%. The full deflection of the measuring instrument is attained after 8—10 seconds. An overload of up to 100% has no detrimental effect.

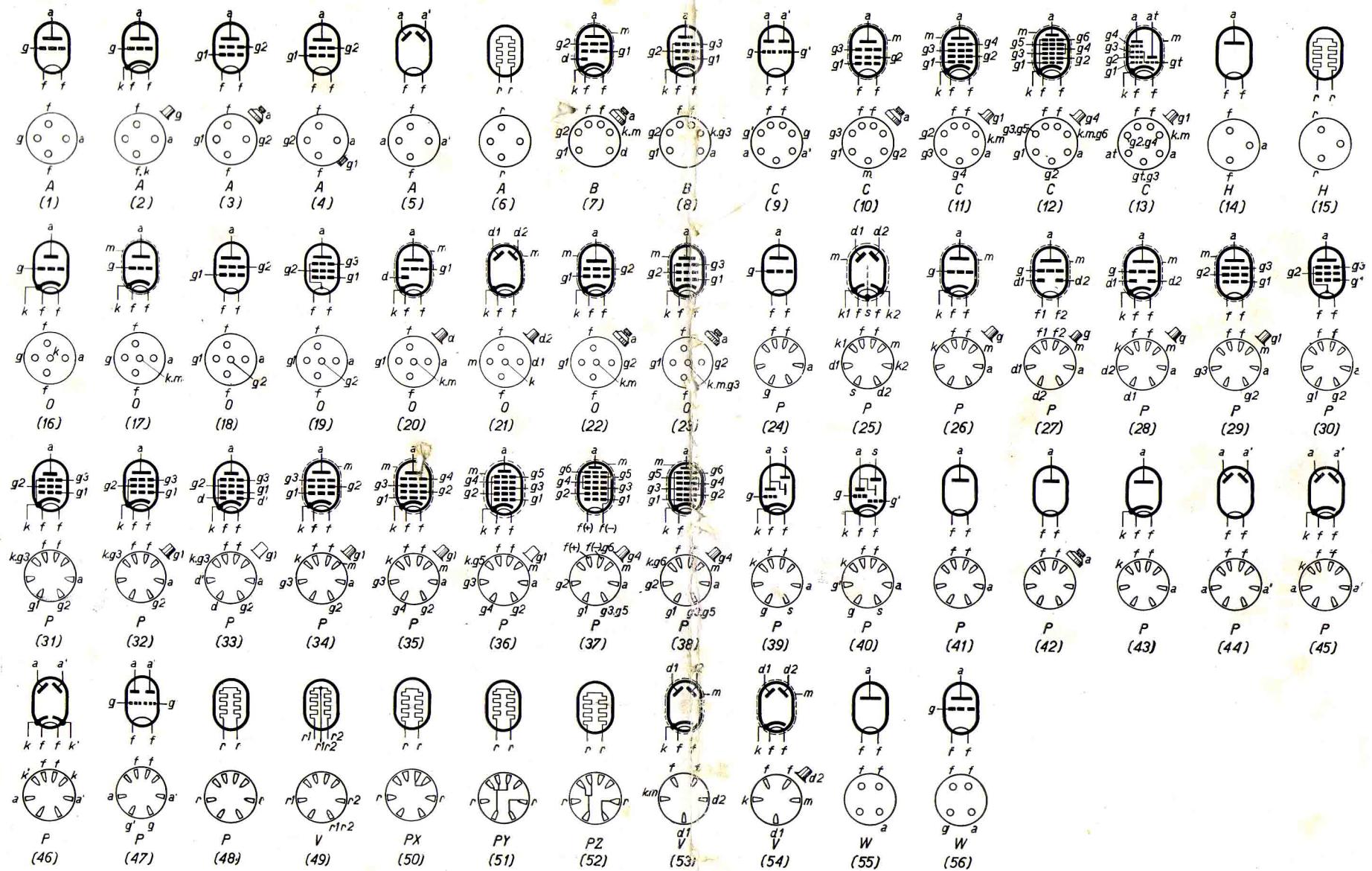
F = filament connections + E = thermo couple (positive pole) — E = thermo couple (negative pole)

SURVEY OF PHILIPS VALVES

| Type | Page | Type | Page | Type | Page | Type | Page | Type | Page | Type | Page | Type | Page | Type | Page |
|--------|------|---------|------|---------|------|--------|------|---------|------|------|------|-------|------|------|------|
| A 409 | 9 | B 438 | 9 | CBL 1 | 5 | E 446 | 6 | KF 3 | 8 | | | 1949 | 11 | | |
| A 415 | 9 | B 442 | 9 | CC 2 | 5 | E 447 | 6 | KF 4 | 8 | | | 3510 | 13 | | |
| A 425 | 9 | B 443 | 7, 9 | C/EM 2 | 3, 5 | E 448 | 6 | KK 2 | 8 | | | 3512 | 13 | | |
| A 441N | 9 | B 443S | 7 | CF 1 | 5 | E 449 | 6 | KL 4 | 8 | | | 3530 | 13 | | |
| A 442 | 9 | B 2006 | 7 | CF 2 | 5 | E 451 | 10 | MW 31-2 | 12 | | | 3533 | 13 | | |
| AB 1 | 6 | B 2038 | 7 | CF 3 | 5 | E 452T | 6 | MW 39-2 | 12 | | | 3534 | 13 | | |
| AB 2 | 4 | B 2043 | 7 | CF 7 | 5 | E 453 | 7 | TH 005 | 14 | | | 4060 | 13 | | |
| ABC 1 | 4 | B 2044 | 7 | CH 1 | 5 | E 455 | 6 | TH 010 | 14 | | | 4357 | 13 | | |
| ABL 1 | 4 | B 2044S | 7 | CK 1 | 5 | E 463 | 7 | TH 020 | 14 | | | 4376 | 13 | | |
| AC 2 | 4 | B 2045 | 7 | CL 1 | 5 | E 499 | 6 | TH 050 | 14 | | | 4377 | 13 | | |
| ACII 1 | 6 | B 2046 | 7 | CL 2 | 5 | E 707 | 10 | TH 100 | 14 | | | 4641 | 10 | | |
| AD 1 | 4 | B 2047 | 7 | CL 4 | 5 | EB 4 | 3 | 506 | 11 | | | 4646 | 11 | | |
| AF 2 | 6 | B 2048 | 7 | CY 1 | 11 | EBC 3 | 3 | 1018 | 11 | | | 4662 | 8 | | |
| AF 3 | 4 | B 2049 | 7 | CY 2 | 11 | EBL 1 | 3 | 1561 | 11 | | | 4671 | 13 | | |
| AF 7 | 4 | B 2052T | 7 | DG 7-1 | 12 | EF 5 | 3 | 1801 | 11 | | | 4672 | 13 | | |
| AII 1 | 4 | B 2099 | 7 | DG 9-3 | 12 | EF 6 | 3 | 1802 | 11 | | | 4673 | 13 | | |
| AK 1 | 6 | C 1 | 11 | DG 16-1 | 12 | EH 2 | 3 | 1803 | 11 | | | 4682 | 10 | | |
| AK 2 | 4 | C 2 | 11 | DG 16-2 | 12 | EK 2 | 3 | 1805 | 11 | | | 4683 | 10 | | |
| AL 1 | 4 | C 3 | 11 | DG 25-1 | 12 | EL 2 | 3 | 1815 | 11 | | | 4684 | 10 | | |
| AL 2 | 4 | C 4 | 11 | DW 31-1 | 12 | EL 3 | 3 | 1817 | 11 | | | 4686 | 13 | | |
| AL 4 | 4 | C 6 | 11 | DW 39-1 | 12 | EL 5 | 3 | 1831 | 11 | | | 4687 | 13 | | |
| AL 5 | 4 | C 7 | 11 | E 406N | 10 | EM 1 | 3, 5 | 1832 | 11 | | | 4688 | 10 | | |
| AM 1 | 4 | C 8 | 11 | E 408N | 10 | EZ 2 | 11 | 1875 | 11 | | | 4689 | 10 | | |
| AM 2 | 4 | C 9 | 11 | E 409 | 6 | FZ 4 | 11 | 1876 | 11 | | | 4690 | 13 | | |
| AX 1 | 11 | C 10 | 11 | E 424N | 6 | F 410 | 10 | 1904 | 11 | | | 4694 | 10 | | |
| AZ 1 | 11 | C 12 | 11 | E 438 | 6 | F 443N | 10 | 1910 | 11 | | | 4695 | 13 | | |
| B 217 | 9 | C 243N | 9 | E 442 | 6 | FZ 1 | 11 | 1911 | 11 | | | 7475 | 13 | | |
| B 228 | 9 | C 408 | 13 | E 442S | 6 | KB 2 | 8 | 1915 | 11 | | | 13201 | 13 | | |
| B 240 | 9 | C 443 | 7 | E 443H | 7 | KBC 1 | 8 | 1920 | 11 | | | | | | |
| B 405 | 9 | C 443N | 7 | E 443N | 10 | KC 3 | 8 | 1926 | 11 | | | | | | |
| B 406 | 9 | CB 1 | 5 | E 444 | 6 | KDD 1 | 8 | 1927 | 11 | | | | | | |
| B 409 | 7, 9 | CB 2 | 5 | E 444S | 6 | KF 1 | 9 | 1928 | 11 | | | | | | |
| B 424 | 9 | CBC 1 | 5 | E 445 | 6 | KF 2 | 9 | 1941 | 11 | | | | | | |

For other valves, such as transmitter valves, large amplifier valves, rectifier valves, valves for industrial purposes, etc. special catalogues are available on demand.

BASE CONNECTIONS OF PHILIPS "MINIWATT" VALVES



In the column "Bases" the first letter refers to the type of base, and the numeral to the base diameter in mm, whilst the number in brackets refers to the base connections as shown on this page. The base connections are those as seen from

the underside of the base. The connection on the top of the bulb also is shown diagrammatically.