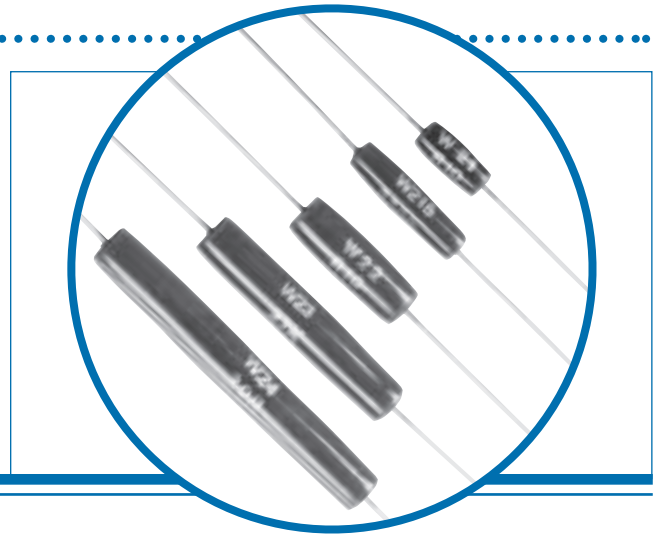
# Vitreous Enamelled Wirewound Resistors

TT electronics
Welwyn Components

W20 Series

- **CECC approved**
- **Suitable for harsh environments**
- **Impervious lead free vitreous enamel coating**
- **Overload characteristics ideal for protection circuits**
- **High stability and reliability**
- **High power dissipation for size**




## Electrical Data

| Commercial | | | W21 | W215 | W22 | W23 | W24 |
|---|---|---|---|---|---|---|---|
| Power rating at 25°C | | watts | 3.0 | 5.0 | 7.0 | 10.5 | 14.0 |
| Resistance range at | 1% tolerance | ohms | 1R to 10K | 1R to 15K | 1R to 22K | 1R to 60K | 1R to 100K |
| | 2% tolerance | ohms | 0R5 to 10K | 0R5 to 15K | 0R5 to 22K | 1R to 60K | 1R to 100K |
| | 5% tolerance | ohms | 0R1 to 10K | 0R1 to 15K | 0R1 to 22K | 0R15 to 60K | 0R2 to 100K |
| TCR (-55° to 200°C) | | pp/°C | Typically: <+-75 | | | Maximum: +-200 | |

| BS CECC 40-201-002 Requirements | | Style | JB | HB | KB | LB | MB |
|---|---|---|---|---|---|---|---|
| Power rating at 25°C | | watts | 2.9 | 5.0 | 7.0 | 10.5 | 14.0 |
| Power rating at 70°C | | watts | 2.5 | 4.3 | 6.0 | 9.0 | 12.0 |
| Resistance range at | 1% tolerance | ohms | 1R to 10K | 1R to 15K | 1R to 20K | 1R to 56K | 1R to 100K |
| | 2% tolerance | ohms | 0R5 to 10K | 0R5 to 15K | 0R5 to 20K | 1R to 56K | 1R to 100K |
| | 5% tolerance | ohms | 0R1 to 10K | 0R1 to 15K | 0R1 to 20K | 0R15 to 56K | 0R2 to 100K |
| TCR (-55° to 200°C) | | ppm/°C | ≥5 ohms < 10 ohms: ±400 | | | ≥10 ohms: ±200 | |

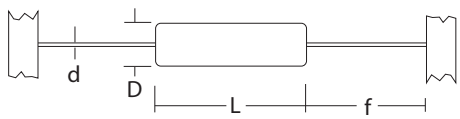
This table indicates the CECC specification requirements, and these are met or exceeded by the corresponding W20 series products

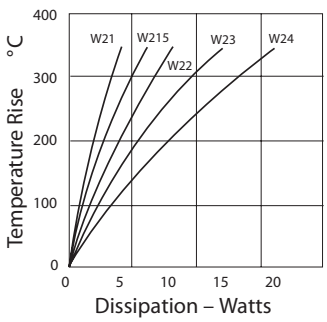
| Applicable to commercial and approved ranges | | | | | | |
|---|---|---|---|---|---|---|
| Limiting element voltage | volts | 100 | 160 | 200 | 500 | 750 |
| Standard values | | E24 preferred. Other values to special order | | | | |
| Thermal impedance | °C/watt | 88 | 58 | 44 | 29 | 22 |
| Ambient temperature range | °C | -55 to 200 | | | | |

## Physical Data

**Dimensions (mm) and Weight (g)**

| Type | L max | D max | f min | d nom | Wt.nom |
|---|---|---|---|---|---|
| **W21** | 12.7 | 5.6 | 22.75 | 0.8 | 1 |
| **W215** | 22.0 | 7.0 | 23.1 | 0.8 | 2 |
| **W22** | 22.0 | 8.0 | 23.1 | 0.8 | 2 |
| **W23** | 38.0 | 8.0 | - | 0.8 | 3.5 |
| **W24** | 53.5 | 8.0 | - | 0.8 | 5 |




### Construction

A high purity ceramic substrate is assembled with interference fit end caps to which are welded the termination wires. The resistive element is wound on the substrate and welded to the caps; the vitreous enamel protective coating is then applied.

### Terminations

**Material** Copper clad steel wire, nickel plated and solder-coated.
**Strength** The terminations meet the requirements of IEC 68.2.21.
**Solderability** The terminations meet the requirements of IEC 115-1,– Clause 4.17.3.2.
**Length** W23's and W24's are not supplied on tape. Minimum lead length is 30 mm.

### Marking

The resistors are legend marked with type reference, resistance value and tolerance. Values are marked in accordance with IEC 62.

**General Note**

Welwyn Components reserves the right to make changes in product specification without notice or liability.
All information is subject to Welwyn's own data and is considered accurate at time of going to print.

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W20 Series

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### Solvent Resistance
The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

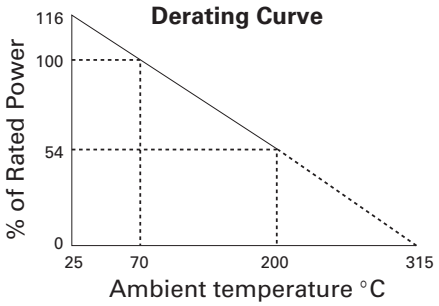
### Flammability
All materials used in the construction of 'W' series resistors are inorganic and inherently non burning.

## Performance Data

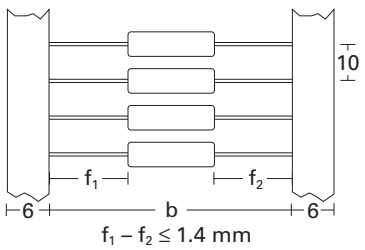
| | | CECC 40201-002 | Actual Performance | |
|---|---|---|---|---|
| | | Requirements | Maximum | Typical |
| Load at commercial rating: 1000 hrs at 25°c | ΔR% | | 5 | 3.5 |
| Load at CECC rating: 1000 hours at 25°c | ΔR% | 5 | 5 | 3.5 |
| Dry heat: 1000 hours at 200°c | ΔR% | 5 | 2 | 1 |
| Shelf life: 12 months at room temperature | ΔR% | not specified | 0.03 | 0.02 |
| Derating | | see derating curve | | |
| Short term overload | ΔR% | 1 | 1.0 | 0.2 |
| Climatic | ΔR% | 5 | 0.5 | 0.2 |
| Climatic category | ΔR% | 55/200/56 | | |
| Long term damp heat | ΔR% | 5 | 0.05 | 0.02 |
| Temperature rapid change | ΔR% | 1 | 0.5 | 0.2 |
| Resistance to solder heat | ΔR% | 1 | 0.25 | 0.03 |
| Vibration and bump | ΔR% | 1 | 0.25 | 0.05 |
| Noise (in decade of frequency) | μv/v | not specified | zero | zero |
| Robustness | ΔR% | 1 | 0.4 | 0.05 |
| Insulation resistance | ohms | not specified | >.1G ohm | >.1G ohm |
| Voltage Proof | volts | not specified | 500 min | 500 min |
| Pulse handling | | | data available by request | |

## Application Notes

The termination should not be bent closer than 1.6mm from the body, and the recommended minimum bend radius is 1.2mm. The terminations are solderable to within 4mm from the body. When cold, vitreous enamel has excellent insulation resistance. In common with all insulants the specific resistance of the enamel decreases with increase in temperature. Therefore, resistors operated at near maximum temperature cannot be classed as insulated and should not be used in contact with any conducting material. Care must be taken when determining clearance distance between the resistor body and the printed circuit board or other components to ensure these are not over heated. Resistance is measured 6mm from body.




### Packaging
For W21 and W215 the standard method of packaging is taped in Ammo Packs. For W22 the standard method of packaging is taped and reeled. Alternatives available by special request are detailed in the table below. W23's and W24's are available only as loose packed in boxes. W series resistors can be supplied preformed. Contact factory for details.




| Type | b |
|---|---|
| **W21** | 63±2 |
| **W215** | 73±2 |
| **W22** | 73±2 |

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# Ordering Procedure

Example: W22 at 3.3 kilohms and 5% tolerance on a reel of 700 pieces –

**W 2 2 – 3 K 3 J I**

Type

Value (use IEC62 code)

Tolerance (use IEC62 code)

| | | | |
|---|---|---|---|
| F | 1% | J | 5% |
| G | 2% | | |

Packing

| | | | | |
|---|---|---|---|---|
| I | Ammo | W21, W215 | 1000/box | Standard |
| | Tape | W22 | 700/reel | |
| | Bulk | W23, W24 | 50/box | |

For CECC released product state on order the CECC number and style. Example: **W22-3K3JI CECC40201-002 KB**
For SnPb finish instead of Pb-free replace the packing suffix with **PB**. Example: **W22-3K3JPB**