

# Vitreous Enamelled Wirewound Resistors



## W20 SERIES

- All welded construction
- High purity ceramic substrate
- Impervious lead free vitreous enamel coating
- High power dissipation for size
- High stability and reliability
- Suitable for harsh environments
- Overload characteristics ideal for protection circuits



## Electrical Data

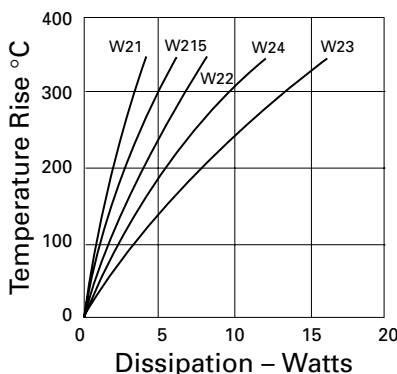
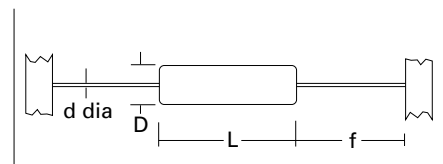
Commercial			W21	W215	W22	W23	W24
Power rating at 25°C	watts		3.0	5.0	7.0	10.0	14.0
Resistance range at	1% tolerance	ohms	1 to 10k	1 to 15k	1 to 22k	1 to 60k	1 to 100k
	2% tolerance	ohms	0.5 to 10k	0.5 to 15k	0.5 to 22k	1 to 60k	1 to 100k
	5% tolerance	ohms	0.1 to 10k	0.1 to 15k	0.1 to 22k	0.15 to 60k	0.2 to 100k
TCR (-55° to 200°C)	pp/°C		Typically: <+75			Maximum: +200	

Approved BS CECC 40-201-002			JB	HB	KB	LB	MB
Power rating at 25°C	watts		2.9	5.0	7.0	10.0	14.0
Power rating at 70°C	watts		2.5	4.3	6.0	9.0	12.0
Resistance range at	1% tolerance	ohms	1 to 10k	1 to 15k	1 to 20k	1 to 56k	1 to 100k
	2% tolerance	ohms	0.5 to 10k	0.5 to 15k	0.5 to 20k	1 to 56k	1 to 100k
	5% tolerance	ohms	0.1 to 10k	0.1 to 15k	0.1 to 20k	0.15 to 56k	0.2 to 100k
TCR (-55° to 200°C)	ppm/°C		≥5 ohms < 10 ohms: ±400			≥10 ohms: ±200	

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) & 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.

### SOLVENT RESISTANCE

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

### 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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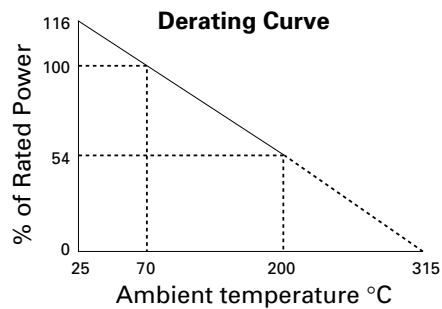
Issue A 07/99

### 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

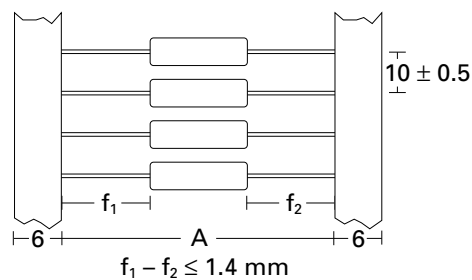
The termination should not be bent closer than 1.6mm from the body, and the recommended minimum bend radius is 1.2mm. The terminations are solderable to within 4mm from the body. When cold, vitreous enamel has excellent insulation resistance. In common with all insulants the specific resistance of the 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 bbe supplied preformed. Contact factory for details.



### STANDARD QUANTITIES PER PACKAGE

Type	W21	W215	W22	W23	W24
Ammo Pack	1000	750	500	N/A	N/A
Reel	1000	750	700	N/A	N/A
Small Box	N/A	N/A	N/A	50	25

Type	A
W21	63±2
W215	73±2
W22	73±2