

# Aluminium Housed Wirewound Resistors

## WH Series

- High power dissipation up to 300W
- All welded construction
- Suitable for severe environments
- Designed for excellent thermal conductivity to heatsink
- Spade terminal option
- RoHS compliant



All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

## Electrical Data

|                      |        | WH5                                           | WH10        | WH25            | WH50              | Notes                |
|----------------------|--------|-----------------------------------------------|-------------|-----------------|-------------------|----------------------|
| Power rating at 25°C | watts  | 10                                            | 15          | 25 <sup>2</sup> | 50 <sup>1,2</sup> | On standard heatsink |
| Resistance range     | ohms   | OR01 to 10K                                   | OR01 to 20K | OR01 to 44K     | OR015 to 120K     |                      |
| TCR (-55° to 200°C)  | ppm/°C | <10R: ±75    ≥10R to <100R: ±50    ≥100R: ±25 |             |                 |                   |                      |
| Resistance tolerance | %      | 1(F), 2(G), 5(J) and 10(K)                    |             |                 |                   |                      |
| Low value limits     | ohms   | 1R at 1%                                      | OR5 at 2%   | OR05 at 5%      | OR01 at 10%       | WH50 OR015 at 10%    |
| Isolation voltage    | volts  | 1500                                          | 1500        | 3000            | 3000              | DC or AC peak        |

Note 1: For load at full rating mount on aluminium heatsink 30.5cm x 30.5cm x 1.5mm

Note 2: WH25T & WH50T are additionally rated at 15A

| CECC 40203-006 Requirements * |        | AA                                  | BA          | CA          | DA          | Notes                |
|-------------------------------|--------|-------------------------------------|-------------|-------------|-------------|----------------------|
| Power rating at 25°C          | watts  | 10                                  | 15          | 25          | 40          | On standard heatsink |
| Resistance range              | ohms   | OR05 to 3K4                         | OR05 to 15K | OR05 to 33K | OR05 to 82K |                      |
| TCR (-55° to 200°C)           | ppm/°C | ≥5R to ≤10R: ± 100    >10R: ±50     |             |             |             |                      |
| Resistance tolerance          | %      | 1(F), 2(G), and 5(J)                |             |             |             |                      |
| Low value limits              | ohms   | 1R at 1%    OR5 at 2%    OR05 at 5% |             |             |             |                      |
| Isolation voltage             | volts  | 1000                                | 1000        | 2000        | 2000        | DC or AC peak        |

\* This table indicates the CECC specification requirements which are met or exceeded by the corresponding WH series products

|                           |         |                     |      |     |      |                       |
|---------------------------|---------|---------------------|------|-----|------|-----------------------|
| Limiting element voltage  | volts   | 150                 | 250  | 500 | 1250 | DC or AC rms          |
| Standard values           |         | E24 preferred range |      |     |      | Other values to order |
| Thermal impedance         | °C/watt | 16.0                | 10.0 | 6.0 | 3.5  | On standard heatsink  |
| Ambient temperature range | °C      | -55 to 200          |      |     |      |                       |

|                           |         | WH100                                                  | WH200       | WH300       | Notes                 |
|---------------------------|---------|--------------------------------------------------------|-------------|-------------|-----------------------|
| Power rating at 25°C      | watts   | 100                                                    | 200         | 300         | On standard heatsink  |
| Resistance range          | ohms    | OR01 to 70K                                            | OR01 to 50K | OR01 to 68K |                       |
| TCR (-55° to 200°C)       | ppm/°C  | ≤1K0: ±100    >1K0: ±25                                |             |             |                       |
| Resistance tolerance      | %       | Standard 5(J) and 10(K). Also available: 1(F) and 2(G) |             |             |                       |
| Low value limits          | ohms    | Typically ≥OR05: ±5%    ≤OR047: ±10%                   |             |             |                       |
| Isolation voltage         | volts   | 6360                                                   | 7070        | 7070        | DC or AC peak         |
| Limiting element voltage  | volts   | 1900                                                   | 1900        | 2500        | DC or AC rms          |
| Standard values           |         | E24 preferred range                                    |             |             | Other values to order |
| Thermal impedance         | °C/watt | 1                                                      | 0.7         | 0.6         | On standard heatsink  |
| Ambient temperature range | °C      | -55 to 200                                             |             |             |                       |

### General Note

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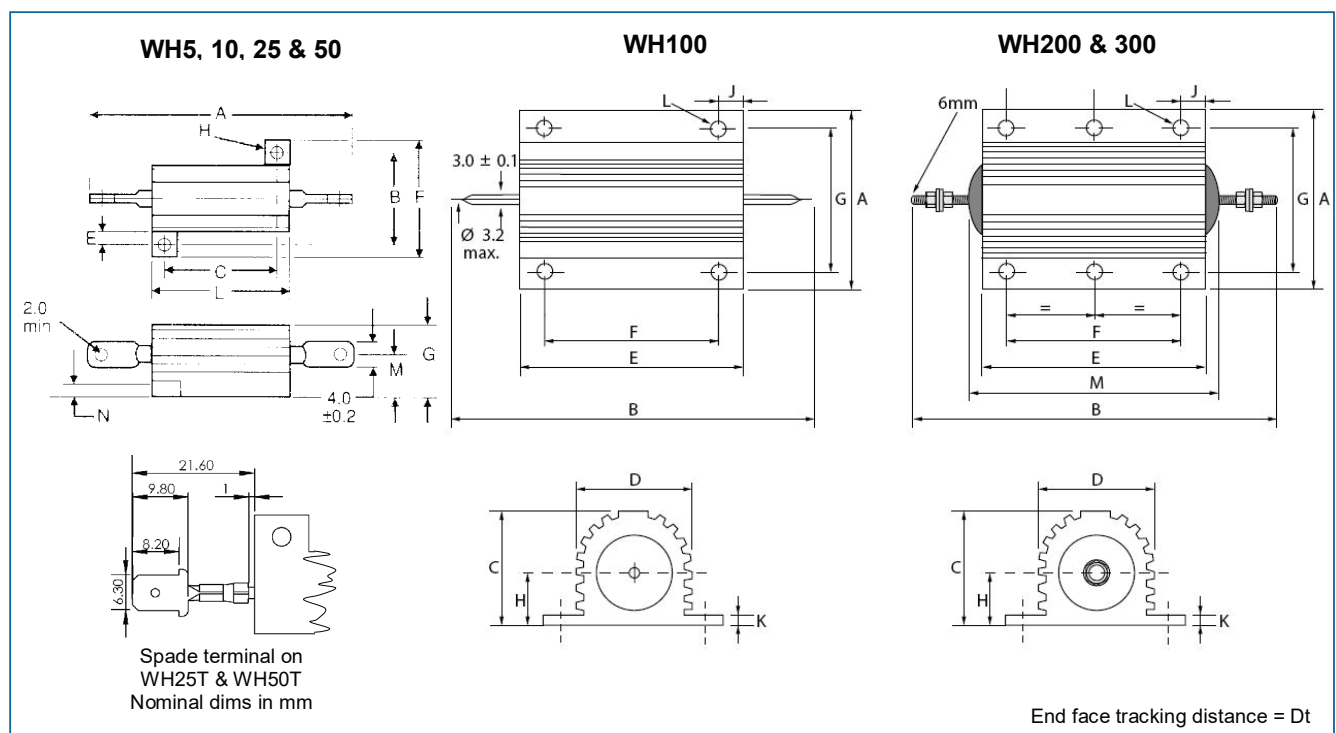
## Physical Data

| Dimensions (mm) & Weight (g) |                   |           |           |          |          |           |               |          |           |          |                       |           |           |            |
|------------------------------|-------------------|-----------|-----------|----------|----------|-----------|---------------|----------|-----------|----------|-----------------------|-----------|-----------|------------|
| WH5, 10, 25 & 50             |                   |           |           |          |          |           |               |          |           |          |                       |           |           |            |
| Type                         | A<br>Max          | B<br>±0.3 | C<br>±0.3 | E<br>Min | F<br>Max | G<br>Max  | H<br>Dia ±0.2 | L<br>Max | M<br>±0.5 | N<br>Max | Dt<br>Min             | Wt<br>Nom |           |            |
| WH5                          | 30                | 12.4      | 11.3      | 1.9      | 17       | 9         | 2.4           | 17.0     | 4.3       | 1.8      | 2.5                   | 3.6       |           |            |
| WH10                         | 36.5              | 15.9      | 14.3      | 1.9      | 21       | 11        | 2.4           | 21.0     | 5.2       | 2.2      | 2.9                   | 5.6       |           |            |
| WH25                         | 51 <sup>1</sup>   | 19.8      | 18.3      | 2.8      | 28       | 15        | 3.3           | 29.0     | 7.2       | 2.6      | 4.3                   | 13        |           |            |
| WH50                         | 72.5 <sup>2</sup> | 21.4      | 39.7      | 2.8      | 30       | 16        | 3.3           | 51.0     | 7.9       | 2.6      | 5.1                   | 29        |           |            |
| WH100, 200 & 300             |                   |           |           |          |          |           |               |          |           |          |                       |           |           |            |
|                              | A<br>Max          | B<br>Max  | C<br>Max  | D<br>Max | E<br>Max | F<br>±0.3 | G<br>±0.3     | H<br>Max | J<br>Max  | K<br>Max | L<br>Nom <sup>3</sup> | M<br>Max  | Dt<br>Min | Wt.<br>Nom |
| WH100                        | 47.5              | 88        | 24.1      | 27.3     | 65.2     | 35        | 37            | 11.8     | 15.4      | 3.7      | 4.4                   | -         | 7.0       | 115        |
| WH200                        | 72.5              | 145.7     | 41.8      | 45.5     | 89.7     | 70        | 57.2          | 20.5     | 10.4      | 5.5      | 5.1                   | 103.4     | 15        | 475        |
| WH300                        | 72.5              | 184.4     | 41.8      | 45.5     | 127.7    | 104       | 59            | 20.5     | 12.4      | 5.5      | 6.6                   | 141.4     | 15        | 700        |

Note 1: A<sub>max</sub> for WH25T is 71.3

Note 2: A<sub>max</sub> for WH50T is 95.5

Note 3: WH100: ±0.25, WH200 & 300: ±0.45



### Construction

Cap and lead assemblies are fitted to a high purity ceramic substrate. The resistive element is wound onto the substrate and welded to the caps. The wound rod is then moulded and fitted into aluminium housing to give optimum stability and reliability.

### Marking

The resistors are legend marked with type reference, resistance value and tolerance which will withstand all accepted industrial cleaning fluids. Values are marked in accordance with IEC 62.

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## WH Series

### Terminations

#### WH5-100

**Material** Pb-free solder dipped, copper clad steel

**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

**WH25T & 50T** 6.35mm (¼") spade terminal

#### WH200 & 300

**Material** M6 threaded steel terminal with a set of four nuts and washers

**Strength** Termination robustness 50N max  
Tightening torque 5Nm max

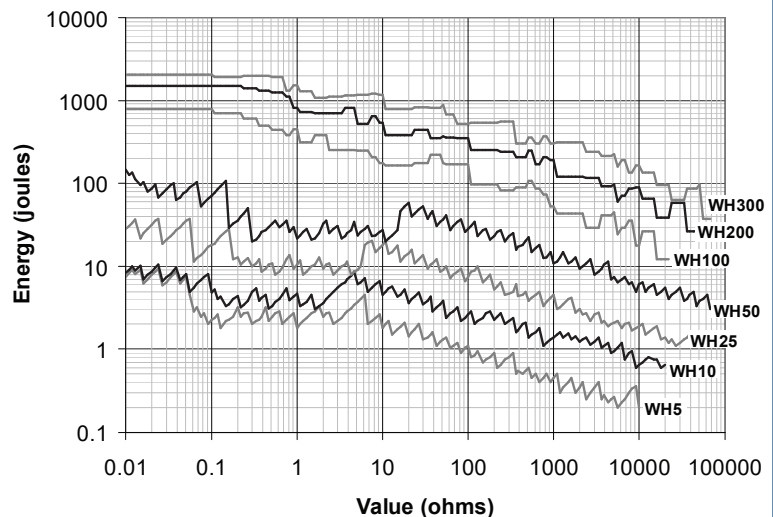
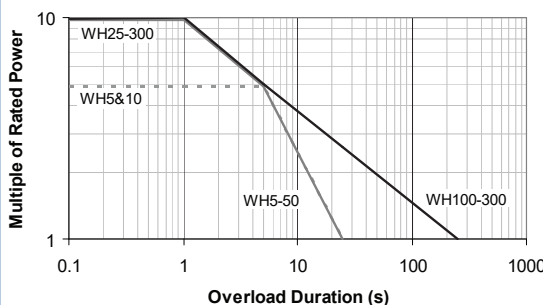
## Performance Data

|                                            |      | WH5, 10, 25 & 50                  |            |         | WH100, 200 & 300 |
|--------------------------------------------|------|-----------------------------------|------------|---------|------------------|
|                                            |      | CECC 40203-006<br>Requirements    | Actual     |         | Maximum          |
|                                            |      |                                   | Maximum    | Typical |                  |
| Load at commercial rating: 1000hrs at 25°C | ΔR%  | 1                                 | 1          | 0.4     | 2                |
| Load at CECC rating: 1000hrs at 25°C       | ΔR%  | 1                                 | 1          | 0.4     | N/A              |
| Dry heat: 1000hrs at 200°C                 | ΔR%  | 1                                 | 1          | 0.4     | 2                |
| Derating from 25°C                         |      | Zero at 200°C, see derating graph |            |         |                  |
| Short-term overload                        | ΔR%  | 1                                 | 1          | 0.2     |                  |
| Climatic sequence                          | ΔR%  | 1                                 | 1          | 0.4     |                  |
| Climatic category                          |      | 55/200/56                         |            |         |                  |
| Long-term damp heat                        | ΔR%  | 1                                 | 0.5        | 0.2     |                  |
| Temperature rapid change                   | ΔR%  | 0.25                              | 0.25       | 0.1     | 0.25             |
| Resistance to solder heat                  | ΔR%  | 0.25                              | 0.25       | 0.05    | WH100: 0.5       |
| Vibration and bump                         | ΔR%  | 0.25                              | 0.25       | 0.025   |                  |
| Noise (in decade of frequency)             | μV/V | Not specified                     | 0          | 0       | 0                |
| Insulation resistance                      | ohms | 1G min                            | 10G min    |         |                  |
| Pulse and overload performance             |      | Not specified                     | See graphs |         |                  |

Note: A 0.05 ohm addition is to be added to the performance of all resistors < 10 ohms.

### Pulse and Overload Performance

For short durations of ≤0.1s the energy graph should be used. For longer durations the overload graph applies.



### Application Notes

After soldering, care should be taken to ensure that there are no flux residues on the end faces of the moulding compound, otherwise insulation resistance will be reduced. The minimum surface tracking distances from termination to casing are shown in the Physical Data tables as dimension Dt.

It is recommended that the resistor base should be coated thinly with heatsink compound before mounting to obtain the stated operating characteristics. The heatsink compound increases thermal conductivity to the heatsink.

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WH Series

The standard aluminium heatsinks are defined in the table below. If smaller heatsinks are used then derating should be applied as indicated in the graph below. If no heatsink is employed, use the ratings for 1cm<sup>2</sup>.

Reference heatsink dimensions

| Type (CECC) | Thickness (mm) | Area (cm <sup>2</sup> ) |
|-------------|----------------|-------------------------|
| WH5 (AA)    | 1              | 410                     |
| WH10 (BA)   | 1              | 410                     |
| WH25 (CA)   | 1              | 544                     |
| WH50 (DA)   | 1              | 544                     |
| WH50 @ 50W  | 1.5            | 930                     |
| WH100       | 3              | 1000                    |
| WH200       | 3              | 3800                    |
| WH300       | 3              | 5800                    |

Derating for reduced heatsink dimensions



Derating for ambient temperature



Packaging

WH resistors are packed in plastic bags and boxed.

Ordering Procedure

Example: WH25 with spade terminals at 100 ohms with a 5% tolerance:

Type WH25T-100RJ I

Termination .....

|   |                |
|---|----------------|
|   | Standard       |
| T | Spade terminal |

Value (use IEC62 code) .....

Tolerance (use IEC62 code) .....

|   |    |   |     |
|---|----|---|-----|
| F | 1% | J | 5%  |
| G | 2% | K | 10% |

Packing .....

|   |            |      |         |          |
|---|------------|------|---------|----------|
| I | WH5, 10    | Bulk | 250/box | Standard |
|   | WH25, 50   |      | 200/box |          |
|   | WH100      |      | 45/box  |          |
|   | WH200, 300 |      | 10/box  |          |

The following options apply to WH5, 10, 25 & 50 only:

For CECC released product state on order the CECC number and style. Example: **WH25-3K3JI CECC40203-006 CA**

For SnPb finish instead of Pb-free replace the packing suffix with PB. Example: **WH25-3K3JPB**

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