

# DATA SHEET

**Product Name** Axial Leaded Type Cement Fixed Resistors

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**Part Name** PRW Series

**File No.** DIP-SP-025

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## 1. Scope:

- 1.1 This datasheet is the characteristics of Axial Leaded Type Cement Fixed Resistors manufactured by UNI-ROYAL
- 1.2 Self-extinguishing
- 1.3 Extremely small & sturdy mechanically safe
- 1.4 Non-inductive type available
- 1.5 Excellent flame & moisture resistance
- 1.6 Too low or too high values on Wire-wound & Power –film type can be supplied on a case to case basis
- 1.7 Compliant with RoHS directive.
- 1.8 Halogen free requirement.

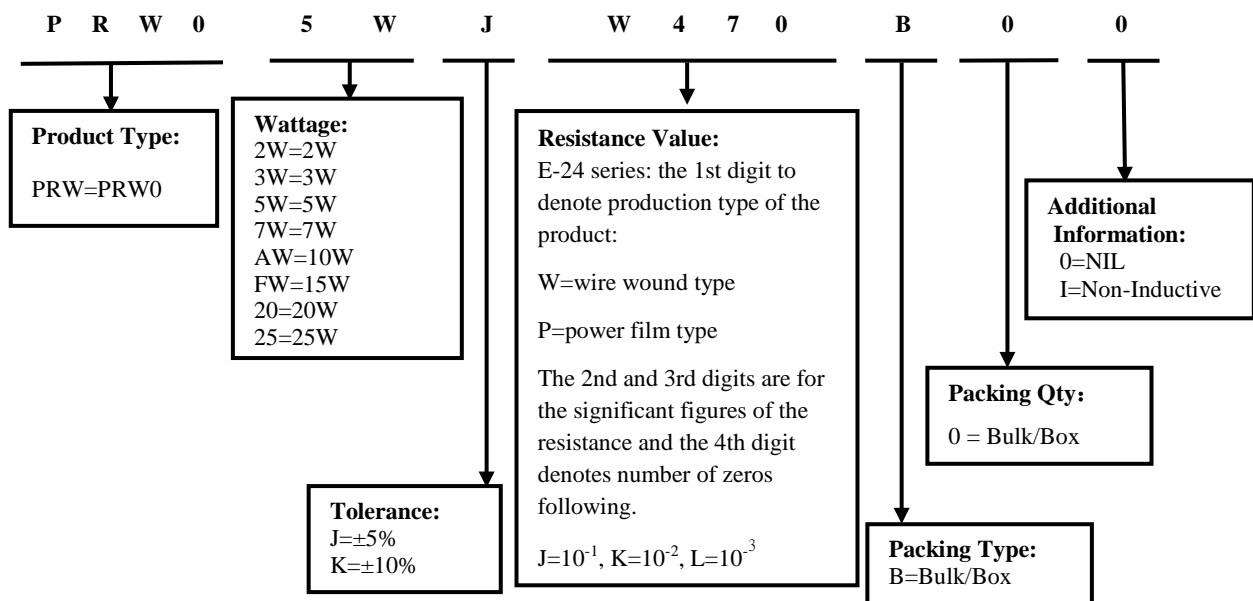
## 2. Part No. System:

The standard Part No. includes 14 digits with the following explanation:

- 2.1 For Cement Fixed Resistors, these 4 digits are to indicate the product type but if the product type has only 3 digits, the 4<sup>th</sup> digit will be “0”  
Example: PRW0=PRW type
- 2.2 5<sup>th</sup>~6<sup>th</sup> digits:
  - 2.2.1 For power of 1 watt to 16 watt ,the 5<sup>th</sup> digit will be a number or a letter code and the 6<sup>th</sup> digit will be the letters of W.  
Example: 5W=5W; AW=10W
  - 2.2.2 For power rating between 20 watt to 99 watt, the 5<sup>th</sup> and the 6<sup>th</sup> digits will show the whole numbers of the power rating itself.  
Example: 20=20W 75=75W
- 2.3 The 7<sup>th</sup> digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.  
J=±5% K= ±10%
- 2.4 The 8<sup>th</sup> to 11<sup>th</sup> digits is to denote the Resistance Value.
  - 2.4.1 For Cement Fixed Resistors the 8<sup>th</sup> digits will be coded with “W” or “P” to denote Wire-wound type or Power Film type respectively of the Cement Fixed Resistor product. the 9<sup>th</sup> & 10<sup>th</sup> digits are to denote the significant figures of the resistance and the 11<sup>th</sup> digit is the number of zeros following.  
Example: W12J=1.2Ω W120=12Ω P273=27KΩ
- 2.5 The 12<sup>th</sup>, 13<sup>th</sup> & 14<sup>th</sup> digits.
  - 2.5.1 The 12<sup>th</sup> digit is to denote the Packaging Type with the following codes: B=Bulk/Box
  - 2.5.2 The 13<sup>th</sup> digit is normally to indicate the Packing Quantity, This digit should be filled with “0” for the Cement products with “Bulk/Box” packing requirements.
  - 2.5.3 For some items, the 14<sup>th</sup> digit alone can use to denote special features of additional information with the following codes or standard product. Example: 0= standard product; I=Non-Inductive

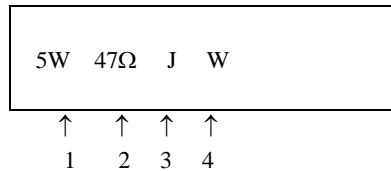
## 3. Ordering Procedure

(Example: PRW 5W ±5% 47Ω B/B )



## 4. Marking

Example:



Code description and regulation:

1. Wattage Rating
2. Nominal Resistance Value
3. Resistance Tolerance. J: ± 5%  
K: ± 10%

4. Pattern:

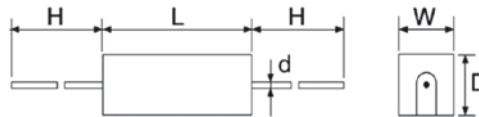
M: Power film

W: Wire wound

Color of marking: Black Ink

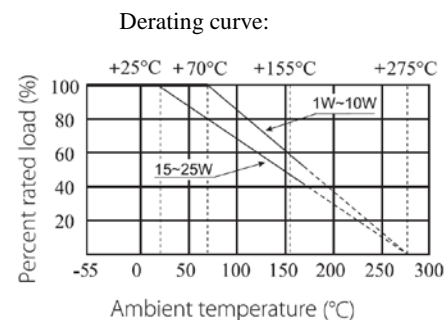
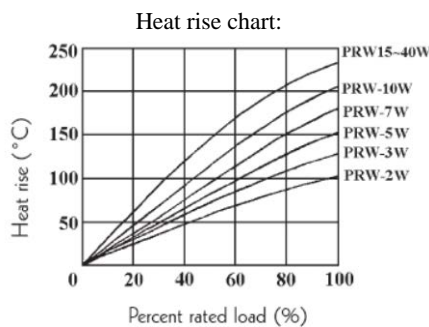
Note: The marking code shall be prevailed in kind!

## 5. Ratings & Dimension



| Type    | Dimension(mm) |      |      |      |        | Max. working voltage | Max. Overload voltage | Resistance Range |             |
|---------|---------------|------|------|------|--------|----------------------|-----------------------|------------------|-------------|
|         | W±1           | D±1  | L±1  | H    | d±0.05 |                      |                       | Wire Wound       | Power Film  |
| PRW 1W  | 6             | 6    | 13.5 | 25±3 | 0.70   | 200V                 | 400V                  | 0.1Ω~27Ω         | 28Ω~100KΩ   |
| PRW 2W  | 7             | 7    | 18   | 28±5 | 0.70   | 250V                 | 500V                  | 0.1Ω~27Ω         | 28Ω~120KΩ   |
| PRW 3W  | 8             | 8    | 22   | 32±5 | 0.70   | 300V                 | 600V                  | 0.1Ω~39Ω         | 40Ω~150KΩ   |
| PRW 5W  | 10            | 9    | 22   | 35±5 | 0.75   | 350V                 | 700V                  | 0.1Ω~47Ω         | 48Ω~150KΩ   |
| PRW 7W  | 10            | 9    | 35   | 35±5 | 0.75   | 500V                 | 1000V                 | 0.1Ω~680Ω        | 681Ω~200KΩ  |
| PRW 10W | 10            | 9    | 49   | 35±5 | 0.75   | 700V                 | 1400V                 | 0.1Ω~910Ω        | 911Ω~200KΩ  |
| PRW 15W | 12.5          | 11.5 | 49   | 35±5 | 0.75   | 700V                 | 1400V                 | 1Ω~1KΩ           | 1.1KΩ~200KΩ |
| PRW 20W | 14.5          | 13.5 | 60   | 35±5 | 0.75   | 750V                 | 1500V                 | 2Ω~1.2KΩ         | 1.3KΩ~200KΩ |
| PRW 25W | 14.5          | 13.5 | 64   | 35±5 | 0.75   | 750V                 | 1500V                 | 2Ω~1.2KΩ         | 1.3KΩ~200KΩ |

## 6. Derating Curve



### 6.1 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

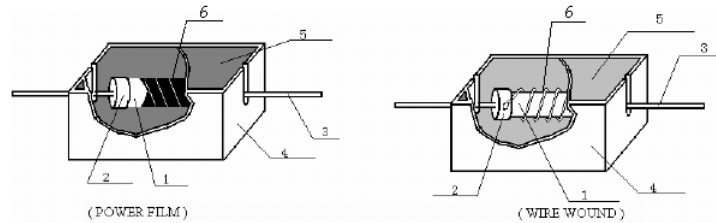
$$RCWV = \sqrt{P \times R}$$

Where: RCWV = rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

P = power rating (WATT.)

R = nominal resistance (OHM)

## 7. Structure



| No. | Name               | material generic name              |
|-----|--------------------|------------------------------------|
| 1   | Body               | Al <sub>2</sub> O <sub>3</sub>     |
| 2   | Cap                | Tin plated iron                    |
| 3   | Lead               | Copper Wire                        |
| 4   | Ceramic Case       | Al <sub>2</sub> O <sub>3</sub> CaO |
| 5   | Filling Materials  | SiO <sub>2</sub>                   |
| 6   | Resistance element | Power film: Metal Oxide Film       |
|     |                    | Wire-wound: Alloys                 |

## 8. Performance Specification

| Characteristic                  | Limits  | Test Methods<br>(GB/T5729&JIS-C-5201&IEC60115-1)   |
|---------------------------------|---|--|
| Temperature Coefficient         | $\geq 20\Omega$ : $\pm 350\text{PPM}/^\circ\text{C}$<br>$< 20\Omega$ : $\pm 400\text{PPM}/^\circ\text{C}$ | 4.8 Natural resistance changes per temp. Degree centigrade<br>$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^\circ\text{C)}$ R <sub>1</sub> : Resistance Value at room temperature (t <sub>1</sub> ) ;<br>R <sub>2</sub> : Resistance at test temperature (t <sub>2</sub> )<br>t <sub>1</sub> : +25°C or specified room temperature<br>t <sub>2</sub> : Test temperature (-55°C or 125°C) |
| Short-time overload             | Resistance change rate must be in $\pm(5\%+0.05\Omega)$ ,and no mechanical damage.                        | 4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max.Overload Votage whichever less for 5 seconds.   |
| Dielectric withstanding voltage | No evidence of flashover mechanical damage, arcing or insulation break down.                              | 4.7 Resistors shall be clamped in the trough of a 90°metallic V-block and shall be tested at AC potential respectively specified in the above list for 60-70 seconds.for cement fixed resistors the testing voltage is 1000V.  |
| Terminal strength               | No evidence of mechanical damage  | 4.16 Direct load:<br>Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads.<br>Twist test:<br>Terminal leads shall be bent through 90°at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations.            |
| Resistance to soldering heat    | Resistance change rate must be in $\pm(1\%+0.05\Omega)$ ,and no mechanical damage.                        | 4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C $\pm$ 5°C solder for 10 $\pm$ 1 seconds.  |
| Solderability                   | 95% coverage Min.   | 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes.<br>Test temp. Of solder:245°C $\pm$ 3°C<br>Dwell time in solder: 2~3seconds.  |
| Humidity (Steady state)         | Resistance change rate must be in $\pm(5\%+0.05\Omega)$ ,and no mechanical damage.                        | 4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40 $\pm$ 2°C and 90~95%RH relative humidity   |

|                           |   |  |
|---------------------------|---|--|
| Load life in humidity     | For Wire-wound: $\Delta R/R: \pm 5\%$<br>For Power film range:<br>< 100K $\Omega$ $\Delta R/R: \pm 5\%$<br>$\geq 100K\Omega$ $\Delta R/R: \pm 10\%$ | 7.9 Resistance change after 1000 hours (1.5hours “ON” , 0.5hours “OFF” ) at RCWV or Max. Working Voltage whichever less in a humidity test chamber controlled at $40\pm 2^{\circ}\text{C}$ and $93\% \pm 3\%$ RH.                  |
| Load life                 | For Wire-wound: $\Delta R/R: \pm 5\%$<br>For Power film range:<br>< 100K $\Omega$ $\Delta R/R: \pm 5\%$<br>$\geq 100K\Omega$ $\Delta R/R: \pm 10\%$ | 4.25.1 Permanent Resistance change after 1000 hours operating at RCWV or Max. Working Voltage whichever less with duty cycle of 1.5 hours “ON” , 0.5 hour “OFF” at $25\pm 2^{\circ}\text{C}$ or $70\pm 2^{\circ}\text{C}$ ambient. |
| Low Temperature Storage   | For Wire-wound: $\Delta R/R: \pm 5\%$<br>For Power film range:<br>< 100K $\Omega$ $\Delta R/R: \pm 5\%$<br>$\geq 100K\Omega$ $\Delta R/R: \pm 10\%$ | IEC 60068-2-1 (Aa)<br>Lower limit temperature , for 2H.  |
| High Temperature Exposure | For Wire-wound: $\Delta R/R: \pm 5\%$<br>For Power film range:<br>< 100K $\Omega$ $\Delta R/R: \pm 5\%$<br>$\geq 100K\Omega$ $\Delta R/R: \pm 10\%$ | MIL-STD-202 108A<br>Upper limit temperature , for 16H.   |

### 9. Note

- 9.1. UNI-ROYAL recommend products store in warehouse with temperature between  $15$  to  $35^{\circ}\text{C}$  under humidity between  $25$  to  $75\%$  RH.  
Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.
- 9.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.
- 9.3. Storage conditions as below are inappropriate:
  - a. Stored in high electrostatic environment
  - b. Stored in direct sunshine, rain, snow or condensation.
  - c. Exposed to sea wind or corrosive gases, such as  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$ ,  $\text{NO}_2$ , Br etc.

### 10. Record

| Version | Description   | Page   | Date         | Amended by  | Checked by  |
|---------|---|--------|--------------|-------------|-------------|
| 1       | First version   | 1~5    | Mar.20, 2018 | Haiyan Chen | Nana Chen   |
| 2       | Modify characteristic   | 4~5    | Feb.26, 2019 | Haiyan Chen | Yuhua Xu    |
| 3       | Modify characteristic   | 5      | Nov.20,2020  | Song Nie    | Yuhua Xu    |
| 4       | Modify the temperature coefficient test conditions                | 4      | Nov.07, 2022 | Haiyan Chen | Yuhua Xu    |
| 5       | 1.Modify derating curve<br>2.Modify the load life test conditions | 3<br>5 | Sep.26, 2024 | Haiyan Chen | Yuhua Xu    |
| 6       | Modify Ordering Procedure   | 2      | Nov.13, 2024 | Junying Ye  | Haiyan Chen |

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