

# 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.

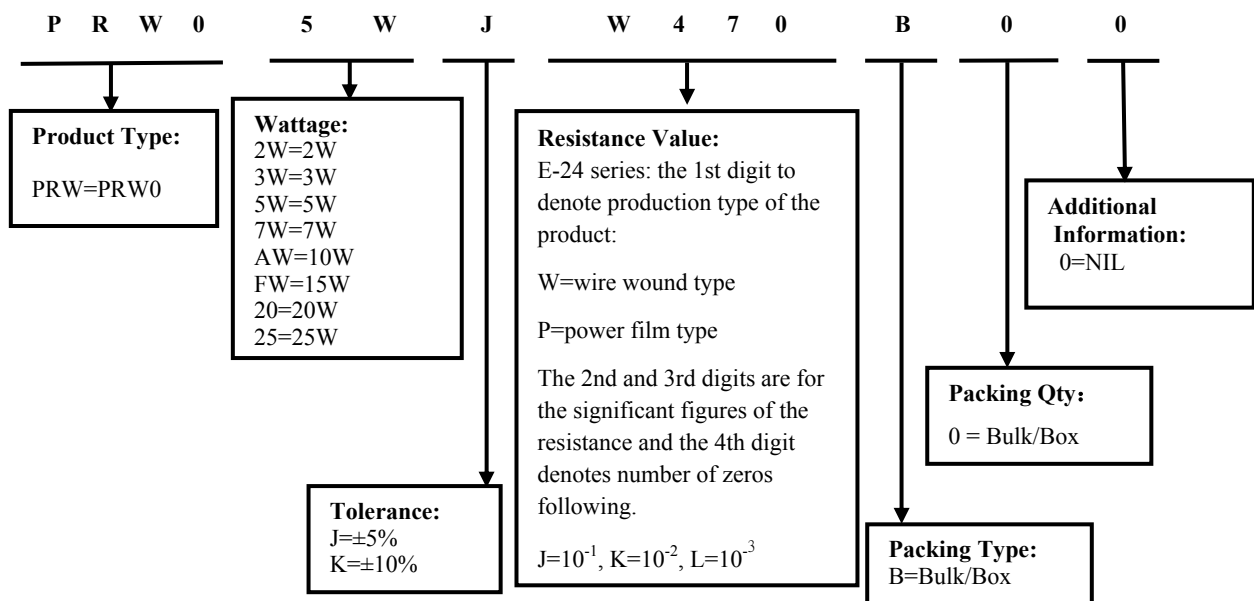
## 2. Part No. System:

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 3digits, 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 between20 watt to99 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

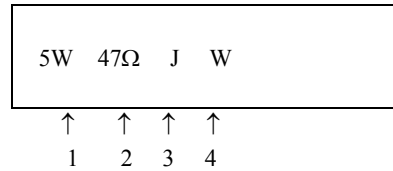
## 3. Ordering Procedure

(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%

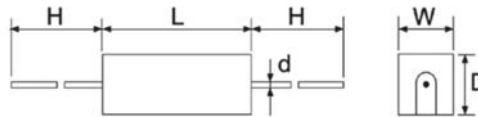
4. Pattern:

- M: Power film
- W: Wire wound

Color of marking: Black Ink

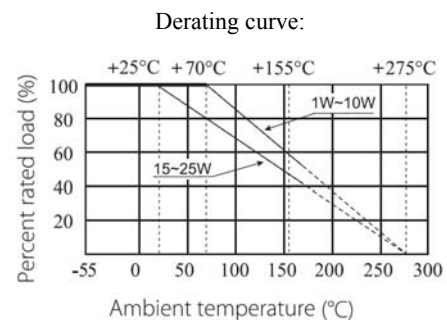
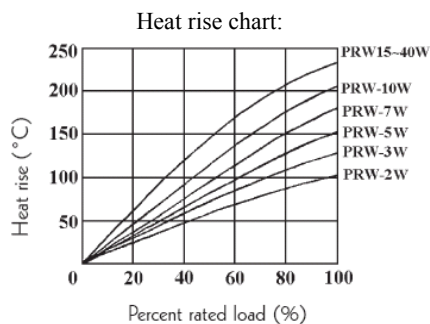
Note: The marking code shall be prevailed in kind!

## 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:

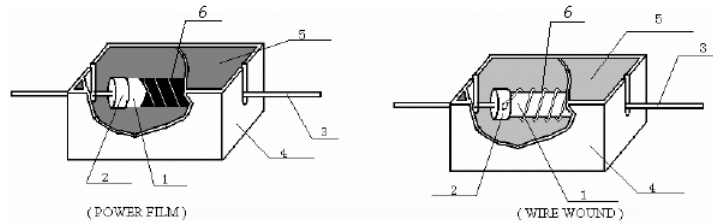
$$RCWV = \sqrt{P \times R}$$

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 (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	$\cong 20\Omega$ : $\pm 350\text{PPM}/^\circ\text{C}$ $< 20\Omega$ : $\pm 400\text{PPM}/^\circ\text{C}$	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^\circ\text{C)}$ R <sub>1</sub> : Resistance Value at room temperature (t <sub>1</sub> ) ; R <sub>2</sub> : Resistance at test temperature (t <sub>2</sub> ) t <sub>1</sub> : +25°C or specified room temperature 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: Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: 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. Test temp. Of solder:245°C $\pm$ 3°C 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: $\Delta R/R: \pm 5\%$ For Power film range: < 100K $\Omega$ $\Delta R/R: \pm 5\%$ $\geq 100K\Omega$ $\Delta R/R: \pm 10\%$	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: $\Delta R/R: \pm 5\%$ For Power film range: < 100K $\Omega$ $\Delta R/R: \pm 5\%$ $\geq 100K\Omega$ $\Delta R/R: \pm 10\%$	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: $\Delta R/R: \pm 5\%$ For Power film range: < 100K $\Omega$ $\Delta R/R: \pm 5\%$ $\geq 100K\Omega$ $\Delta R/R: \pm 10\%$	IEC 60068-2-1 (Aa) Lower limit temperature , for 2H.
High Temperature Exposure	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: < 100K $\Omega$ $\Delta R/R: \pm 5\%$ $\geq 100K\Omega$ $\Delta R/R: \pm 10\%$	MIL-STD-202 108A Upper limit temperature , for 16H.

**9. Note**

- 9.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35°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 Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, 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 2.Modify the load life test conditions	3 5	Sep.26, 2024	Haiyan Chen	Yuhua Xu

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