



# DATASHEET

**Product Name** Cement Thermal Fusible Resistors

**Part Name** FTR Series

**File No.** DIP-SP-053

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## 1. Scope

- 1.1 This datasheet is the characteristics of Cement Thermal Fusible Resistors manufactured by UNI-ROYAL.
- 1.2 Self-extinguishing
- 1.3 Excellent flame & moisture resistance
- 1.4 Extremely small & sturdy mechanically safe
- 1.5 Non-inductive type available
- 1.6 Circuit protection applied to industrial and motor control
- 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 Cement Thermal Fusible Resistors the 1<sup>st</sup> to 3<sup>rd</sup> digits are to indicate the product type.

Example: PF3=FTR3

- 2.2 The 4<sup>th</sup> digit is to Fusing Temp

Example: A=98°C B=104°C

- 2.3 The 5<sup>th</sup>-6<sup>th</sup> digit is to Wattage

Example: 14=1.4W 15=1.5W

- 2.4 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%

- 2.5 The 8<sup>th</sup> to 11<sup>th</sup> digits is to denote the Resistance Value.

- 2.5.1 For Cement Fixed Resistors the 8th digits will be coded with "W" to denote Wire-wound type respectively of the Cement Fixed Resistor product .The 9th to 11th please refer to point a) of item 4.

Example: W10J=1Ω W120=12Ω

- 2.6 The 12<sup>th</sup> digit is to denote the Packaging Type with the following codes:

B=Bulk /Box

- 2.7 The 13<sup>th</sup> digit is to denote the Packing Qty

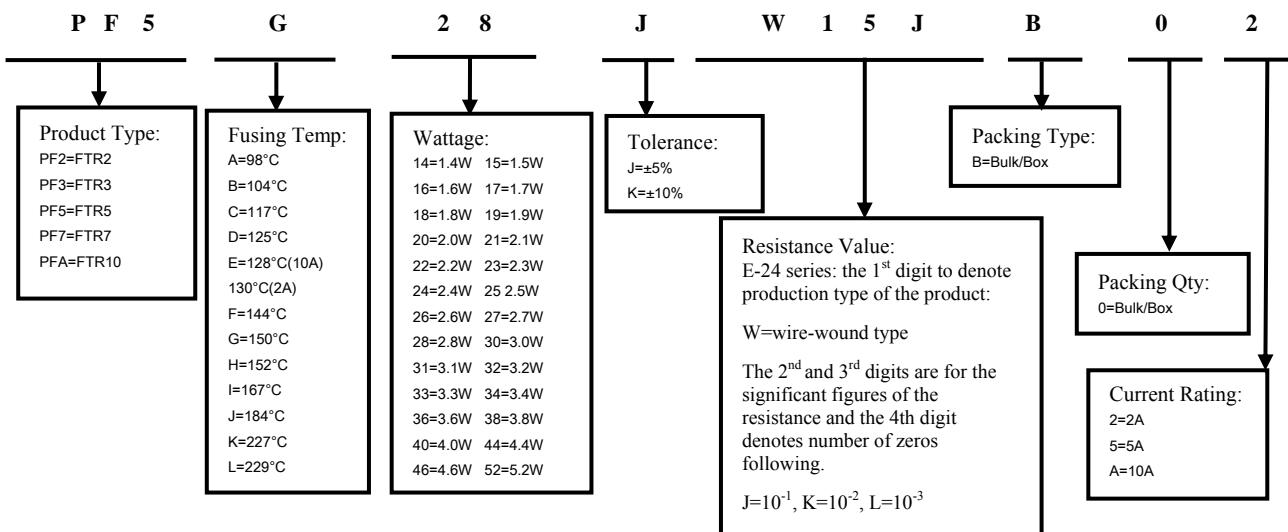
0=Bulk/Box

- 2.8 The 14<sup>th</sup> digit is to denote the Current Rating:

Example:2=2A ; 5=5A; A=10A

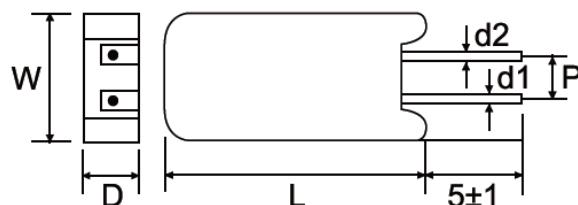
## 3. Ordering Procedure

(Example: FTR-5G 2.8W ±5% 1.5Ω 2A B/B)



#### 4. Ratings & Dimension

##### 4.1 Dimension



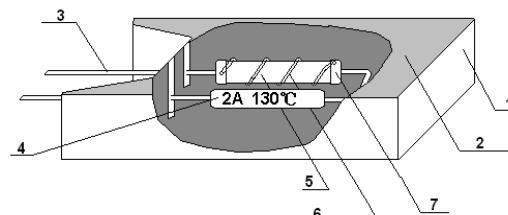
Part No.	Type	W±2	D±2	L±2	P±1	d1±0.05	d2±0.05
PF2	FTR2	12	7	21	5	0.6	0.75
PF3	FTR3	12	8	26	5	0.6	0.75
PF5	FTR5	13	9	26	5	0.6	0.75
PF7	FTR7	13	9	38.5	5	0.6	0.75
PFA	FTR10	16	13	35	7.5	0.6	0.75

##### 4.2 Fusing Temperature Code

Current Rating	Voltage Rating	Fusing Temperature Code				Resistance Range
		C	D	E	G	
		117°C	125°C	130°C	150°C	
2A	250V	1.6W	1.9W	2.0W	2.0W	0.22Ω~270Ω
		1.7W	2.0W	2.1W	2.3W	0.27Ω~680Ω
		1.9W	2.3W	2.4W	2.8W	0.27Ω~680Ω
		2.2W	2.7W	2.8W	3.2W	0.68Ω~1.2KΩ
		2.6W	3.2W	3.3W	3.8W	1Ω~1.8KΩ

Current Rating	Voltage Rating	Fusing Temperature Code										Resistance Range
		A	B	C	E	F	H	I	J	K	L	
		98°C	104°C	117°C	128°C	144°C	152°C	167°C	184°C	227°C	229°C	
10A	250V	1.4W	1.6W	1.8W	2.0W	0.22Ω~270Ω						
		1.5W	1.7W	1.9W	2.1W	2.2W	2.5W	2.8W	3.0W	3.0W	3.0W	0.27Ω~680Ω
		1.7W	1.9W	2.2W	2.4W	2.6W	3.1W	3.3W	3.8W	3.8W	3.8W	0.27Ω~680Ω
		2.0W	2.2W	2.5W	2.8W	3.0W	3.4W	3.8W	4.4W	4.4W	4.4W	0.68Ω~1.2KΩ
		2.4W	2.6W	3.0W	3.3W	3.6W	4.0W	4.6W	5.2W	5.2W	5.2W	1Ω~1.8KΩ

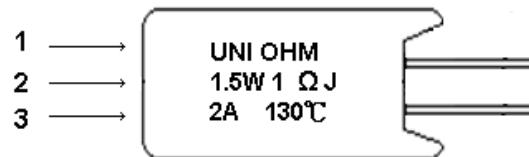
#### 5. Construction



NO.	Name	Material generic name
1	Ceramic case	Stearite
2	Filling materials	Cement
3	Lead	Copper wire
4	Thermal fuse	/
5	Ceramic rod	Al <sub>2</sub> O <sub>3</sub>
6	Alloy	NiCr & CuNi
7	Cap	Iron

## 6. Marking

Example:



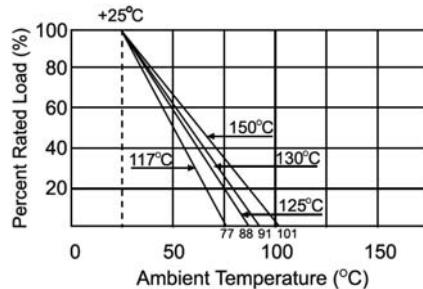
Code description and regulation:

1. Mark: UNI OHM
2. Power rating 1.5W, resistance 10Ω, resistance tolerance  $J = \pm 5\%$
3. Thermal fuse: current rating 2A, rated functioning temperature 130°C

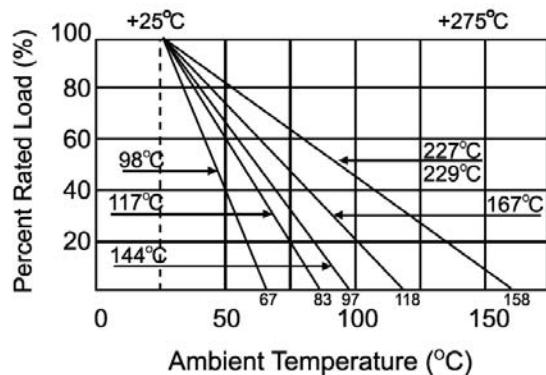
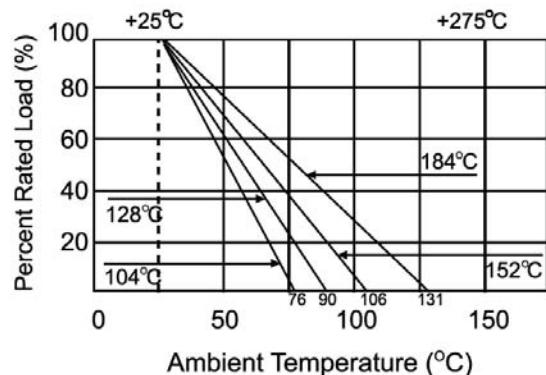
**Note : The marking code shall be prevailed in kind!**

## 7 Derating Curve

Derating Curve(current rating 2A)



Derating Curve(current rating 10A)



### 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)

## 8. Performance Specification

Characteristic	Limits	Test method (GB/T 5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	$\geq 20\Omega: \pm 350\text{PPM}/^\circ\text{C}$ Max $<20\Omega: \pm 400\text{PPM}/^\circ\text{C}$ Max	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^\circ\text{C})$ <p><math>R_1</math>: Resistance Value at room temperature (<math>t_1</math>);  <math>R_2</math>: Resistance at test temperature (<math>t_2</math>)  <math>t_1</math>: <math>+25^\circ\text{C}</math> or specified room temperature  <math>t_2</math>: Test temperature (<math>-55^\circ\text{C}</math> or <math>125^\circ\text{C}</math>)</p>
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.
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: $245^\circ\text{C} \pm 3^\circ\text{C}$ Dwell time in solder: 2~3seconds.
Insulation Resistance	10,000 Megaohm Min	4.6 Apply 100V DC between protective coating and termination for 1 Min then measure
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 $260^\circ\text{C} \pm 5^\circ\text{C}$ solder for $10 \pm 1$ 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 $90^\circ$ 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 $90^\circ$ at a point of about 6mm from the body of the resistor and shall be rotated through $360^\circ$ about the original axis of the bent terminal in alternating direction for a total of 3 rotations.
Humidity (Steady State)	For Wire-wound: $\Delta R/R: \pm(5\%+0.1\Omega)$ Max. With no evidence of mechanical damage.	7.9 Resistance change after 1,000 hours without load in a humidity test chamber controlled at $40^\circ\text{C} \pm 2^\circ\text{C}$ and 90 to 95% relative humidity.
Load life	For Wire-wound: $\Delta R/R: \pm(5\%+0.1\Omega)$ Max. With no evidence of mechanical damage.	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 $70 \pm 2^\circ\text{C}$ ambient.
Fusing test	5min (max)	Set oil bath temperature is the resistor's rated functioning temperature; place the resistor into oil bath, record the time which is from resistor into oil bath to resistor open.

**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:

- Stored in high electrostatic environment
- Stored in direct sunshine, rain, snow or condensation.
- 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	Apr.15, 2019	Haiyan Chen	Yuhua Xu
2	Modify the temperature coefficient test conditions	4	Nov.08, 2022	Haiyan Chen	Yuhua Xu
3	Updated version	1~6	Aug.01, 2023	Haiyan Chen	Yuhua Xu

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