

Thermal links temperature ratings & approval

PART NO.	KC	UL/cUL	VDE	CCC	PSE	T _F (°C)	T _H (°C)	T _M :VDE(UL)
DF50S	-	-	-	-	○	50	30	130
DF57S	-	-	-	-	○	57	37	130
DF66S	○	○	○	○	○	66	42	110(130)
DF72S	○	○	○	○	○	72	50	115(110)
DF77S	○	○	○	○	○	77	55	120(110)
DF84S	○	○	○	○	○	84	60	125(114)
DF91S	○	○	○	○	○	91	67(79)	135(121)
DF98S	○	○	○	○	○	98	76	140(130)
DF100S	○	○	○	○	○	100	78	135(250)
DF104S	○	○	○	○	○	104	80	150
DF110S	○	○	○	○	○	110	88	140
DF115S	-	-	-	-	○	115	95	170
DF119S	○	○	○	○	○	119	95	170
DF121S	-	-	-	-	○	121	95	170
DF128S	○	○	○	○	○	128	106	155
*DF132S	-	-	-	-	○	132	110	155
DF139S	○	○	-	-	○	139	117	(170)
DF141S	○	○	○	○	○	141	117	171
DF144S	○	○	○	○	○	144	120	250
DF152S	○	○	○	○	○	152	128	250(175)
DF167S	○	○	○	○	○	167	142	250(210)
DF169S	○	-	-	-	○	169	145	300
DF170S	○	○	○	○	○	170	146	300(190)
DF179S	○	-	-	-	○	179	155	300
DF184S	○	○	○	○	○	184	160	300(214)
DF192S	○	○	○	○	○	192	162	290(222)
DF216S	○	○	○	○	○	216	191	241(300)
DF222S	○	-	-	-	○	222	195	300
DF228S	○	○	○	○	○	228	193	300
DF240S	○	○	○	○	○	240	200	290(260)
*DF260S	○	-	-	-	○	260	220	350
*DF280S	○	-	-	-	○	280	230	350

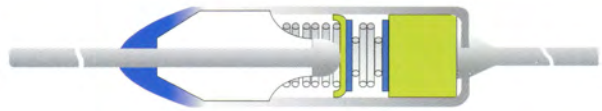
○:APPROVED -:ON APPLYING TOLERANCE (+0°C, -5°C, *: +0°C, -10°C)

Determining the proper series

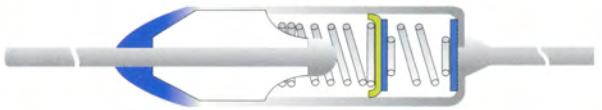
Please refer to the diagram on the right side for proper temperature setting.

- T_P : The highest temperature of the product to which a cutoff is to be attached
- T_S : 24°C (T_F-T_H)(Apply 35°C for T_S value when T_P is higher then 170°C)
- T_D : The heating temperature caused by electrical load
(please refer to temperature / current correlation curve)
- T_H : The safe temperature range for use of the cutoff.
- T_M : Maximum temperature limit which does not cause reclosing of thermal links.
- + α : 1. Self heating of lead wire
2. Structure of ventilation or airtightness
3. Location of connecting terminal
4. Thickness of insulated covering material
5. Best condition value considering electric voltage changes

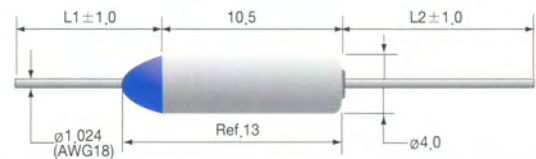
Before fusing off



After fusing off



Dimensions (mm)



Type	L1	L2
S	25.4	35.0
S-L	35.0	35.0
Option	Custom made	Custom made

Rated voltage and current max	
KC	250V/15A
UL/cUL	125V/15A
	250V/10A
VDE	250V/16A
	250V/15A
PSE	125V/15A
	250V/15A
CCC	250V/15A

File no. KC(Korea) : HH05009-2004B~2019B, 5020B, 5021B

UL/cUL : E117626

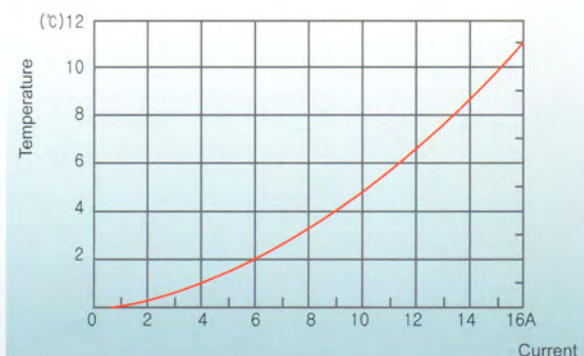
VDE : 40017388

PSE : JET2926-32001-1001~1011

CCC : 2003010205079617

DYE TCOs comply with RoHS directive,
The European Regulation On Hazardous Substances

Temperature/Current correlation curve



Thermal links

Highly Reliable Safety Device

RoHS

ISO-9001

cUL[®] US



Safe temperature range

After operation, the temperature increased by the remaining heat in a fuse should remain below T_M .
Under ordinary conditions, the temperature of the area where a fuse will be attached should not reach over T_H .

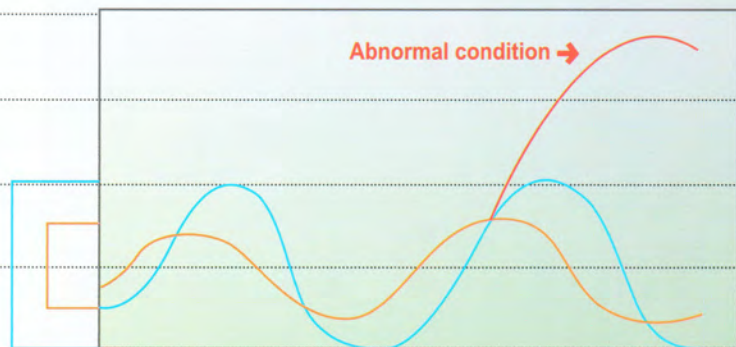
T_M (Maximum Temperature)

T_F (Functioning Temperature)

T_H (Holding Temperature)

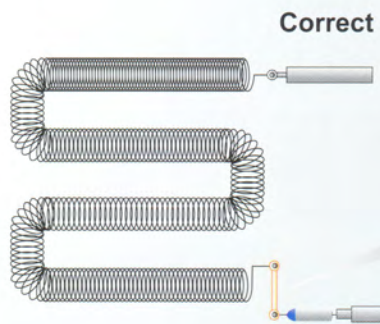
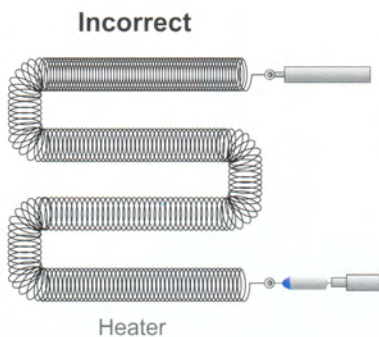
Thermostat's control range

Actual temperature range



Cautions

- Keep the space more than 3mm from the body of a fuse when bending a lead wire.
- Do not heat more than $T_F - 24^\circ\text{C}$ when soldering or welding.
- Be aware that electric current flows on the surface of a fuse.
- Do not use in liquid or poisonous gases such as sulfurous acid, nitric oxide and etc..
- Do not connect heater directly with a fuse.(See below.)



THERMAL CUTOFFS
(THERMAL LINKS)

PACTRA Corporation

1512 Artaius Parkway

Libertyville, IL 60048

TEL: (847)281-0308

E-mail : sales@pactraco.com

FAX: (847)737-7518

<http://www.pactraco.com>

DF Thermal Cutoffs(Organic Thermal Element Type) are used to prevent fires caused by abnormal heat generation from circuits and other heat producing electrical products.

DF Thermal Cutoffs are non-resettable thermal fuse which open electrical contacts when temperature exceed the rating of Thermal Cutoffs.

1. RATINGS

PART NO.	Tf °C	Th °C	Tm °C VDE(UL)	UL E11762 6	cUL E1176 26	VDE 400173 88	CCC	PSE JET2926-	KC KOREA
DF66S	66°C	42	110(130)	O*	O	O	O	O	O
DF72S	72°C	50	115(110)	O	O	O	O	O	O
DF77S	77°C	55	120(110)	O	O	O	O	O	O
DF84S	84°C	60	125(114)	O	O	O	O	O	O
DF91S	91°C	67(79)	135(121)	O	O	O	O	O	O
DF98S	98°C	76	140(130)	O	O	O	O	O	O
DF100S	100°C	78	135(250)	O	O	O	O	O	O
DF104S	104°C	80	150	O	O	O	O	O	O
DF110S	110°C	88	140	O	O	O	O	O	O
DF115S	115°C	95						O	
DF119S	119°C	95	170	O	O	O	O	O	O
DF121S	121°C	95	170					O	
DF128S	128°C	106	155	O	O	O	O	O	O
DF132S	132°C	106						O	
DF139S	139°C	117	(170)					O	O
DF141S	141°C	117	171	O	O	O	O	O	O
DF144S	144°C	120	250	O	O	O	O	O	O
DF152S	152°C	128	250(175)	O	O	O	O	O	O
DF154S	154°C	130						O	
DF167S	167°C	142	250(210)	O	O	O	O	O	O
DF170S	170°C	146	300(190)	O	O	O	O	O	O
DF184S	184°C	160	300(214)	O	O	O	O	O	O
DF192S	192°C	162	290(222)	O	O	O	O	O	O
DF198S	198°C	162							
DF216S	216°C	191	241(300)	O*	O.	O	O	O	O
DF228S	228°C	193	300	O	O	O	O	O	O
DF240S	240°C	200	290(260)	O	O	O	O	O	O
DF280S	280°C	230	350					O	O

O* Electrical rating for UL : 250V/10A

UPDATED 2017.07.10

1. Global ratings include UL, cUL, VDE, PSE, CCC, KC.
2. TF, Tf : Rated operating temperature.
3. TH, Th, Tc : Maximum continuous exposure temperature .
4. TM, Tm : Maximum temperature limit.

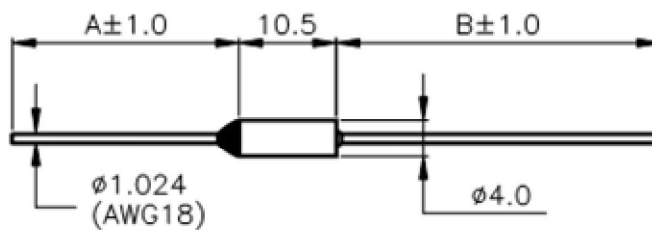
Certificate file no. (KC, UL/cUL, VDE, PSE , CCC)

1. KC : 1) HH05009-2004B
 2) HH05009-2013B
 3) HH05009-5020B
 4) HH05009-2019B
 5) HH05009-5021B
2. UL/cUL : E117626
3. VDE : 40017388
4. PSE : JET2926-32001-1001~1011
5. CCC : 2003010205079617

Electrical ratings (Max. voltage and current)

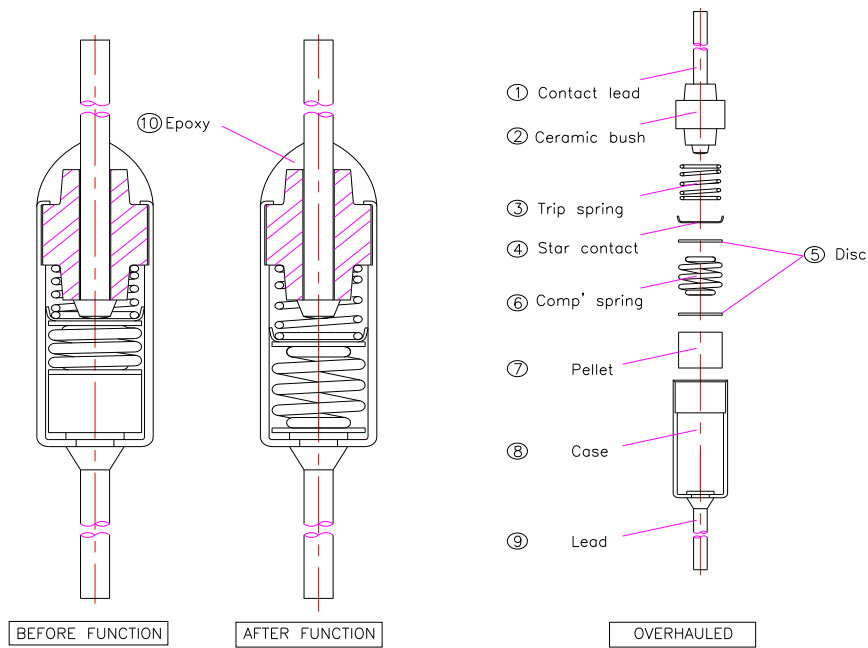
UL/cUL	VDE	CCC	PSE	KC
125V/15A 250V/10A(DF66S,DF216S only) 250V/16A	250V/15A	250V/15A	250V/15A	250V/15A

2. DIMENSIONS



DIMENSION	A	B
STANDARD	25.4	35.0
LONG	35.0	35.0

3. OPERATING PRINCIPLE & CONSTRUCTIONS



NO	DESCRIPTION	RAW MATERIAL	REMARKS
1	CONTACT LEAD	COPPER WIRE	SILVER-PLATED
2	CERAMIC BUSH	CERAMIC	
3	TRIP SPRING	STAINLESS STEEL WIRE	
4	STAR CONTACT	SILVER STRIP	
5	DISC	PHOSPHOR BRONZE STRIP	
6	COMPRESSION SPRING	STAINLESS STEEL WIRE	
7	THERMAL PELLETT	ORGANIC CHEMICAL	
8	CASE	YELLOW BRASS STRIP	SILVER-PLATED
9	LEAD	COPPER WIRE	TIN-PLATED
10	SEAL	EPOXY	

4. CALIBRATION VERIFICATION

- a. The samples of TCO are to be tested using electrically heated static-air oven.
- b. Equilibrium conditions of oven temperature prior to the starting of the test are to be established 10°C below the rated T_f for 2 hours.
- c. The temperature is then to be increased at a rate of $0.5^{\circ}\text{C}/\text{minute}$ until the TCO opened.
- d. The opening temperature of each TCO shall not differ by more than plus 0°C and minus 5°C from the rated T_f . except DF132S, DF139S, DF260S & DF280S
DF132S : +0 and -7 (PSE)
DF139S : +0 and -7 (KC, PSE)
DF260S & DF280S : +0 and -10 (KC, PSE)

5. THERMAL ELEMENT STABILITY(Aging)TEST

TCO are to be subjected to the following series of tests. Each sample shall function at some time during the test steps.

Samples remaining intact at the conclusion of each step are to be submitted to the next step.

STEP 1.

The samples are to be subjected to a temperature T_f minus 15°C for 3weeks.

At the conclusion, at least 50% of the samples shall not have functioned.

STEP 2.

T_f minus 10°C for 2 weeks

STEP 3.

T_f minus 5°C for 1 week

STEP 4

T_f minus 3°C for 1 week

STEP 5.

T_f plus 3°C for 24hours

6. INSULATION RESISTANCE

After the fusing test of TCO, insulation resistance between lead and contact lead of the test sample shall be more than $0.2\text{M}\Omega$. The insulation resistance to be measured with a DC voltage of twice the rated voltage.

7. DIELECTRIC VOLTAGE WITHSTAND

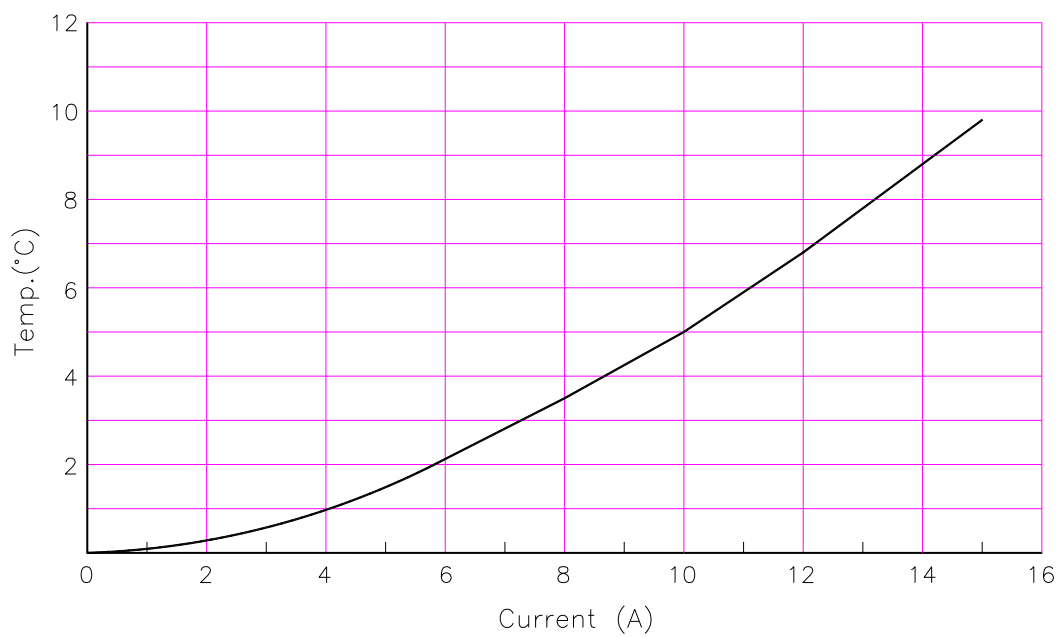
TCO shall withstand for 1 minute without breakdown a 60Hz essentially sinusoidal potential twice the rated voltage applied between leads or terminals of an opened TCO.

8. Electric RESISTANCE

Electric resistance measurement to be done between both leads at the distance of 30mm including the body. Electric resistance shall be less than 1.5m Ω .

9. TEMPERATURE RISE

Temperature rising of TCO shall be not more than 10°C, when the rated current to be passed through the TCO.

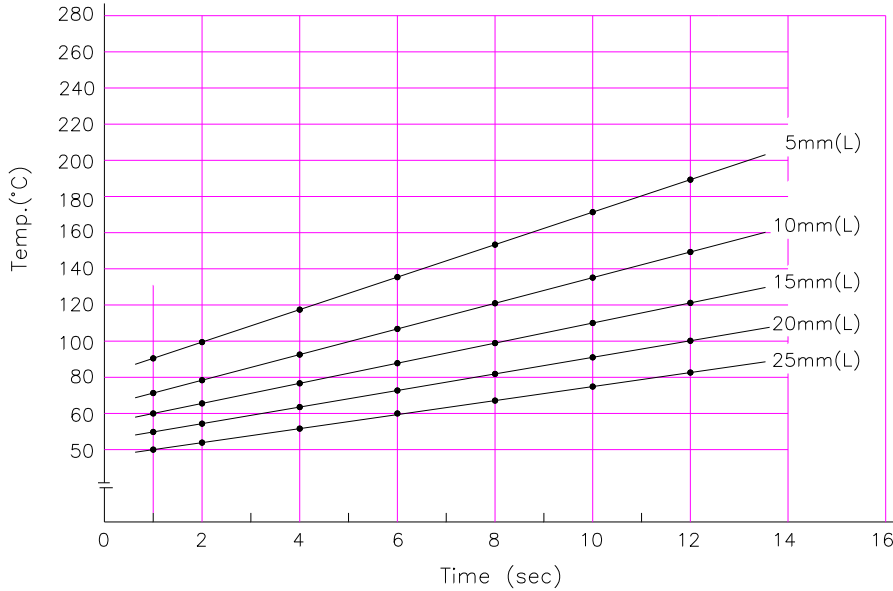
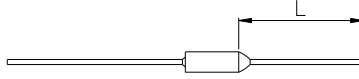


10. SOLDERABILITY

1) CONTACT LEAD

Soldering Bath Temperature ; 300°C

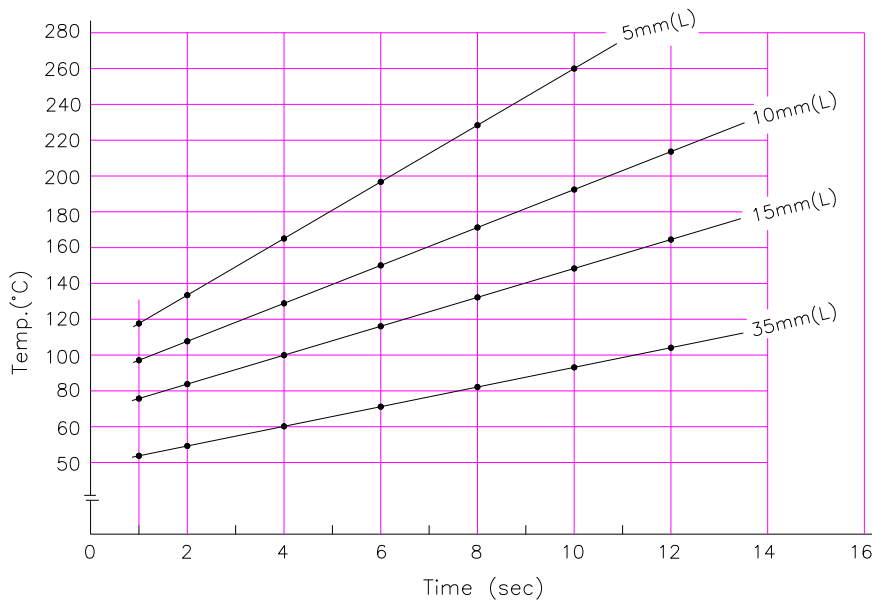
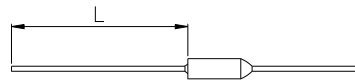
Immersing depth ; 2mm



2) LEAD

Soldering Bath Temperature ; 300°C

Immersing Depth ; 2mm



11. MECHANICAL STRENGTH (LEAD SECURENESS)

1) PULL STRENGTH

When the one end of lead of TCO is held and the other end of lead is pulled up to 5Kg to the axial direction gradually for 10 minutes, TCO must not be damaged.

2) BENDING STRENGTH (applied to the side of epoxy seal)

TCO is to be rigidly supported so as not to damage it. Each lead is to be bent through 90 degrees at a location 10mm from the body of the TCO and then twisted through 180 degrees. When this test is performed, lead wire must not be cut and parted.

12. PRECAUTIONS AND HANDLING INSTRUCTIONS

1) When bending a lead, bend at a location 3mm minimum from the body of TCO.

Take caution not to damage either the TCO body or the epoxy seal.

2) When soldering or joining using heat, do not exposure TCO to heat higher than

T_f minus 24°C.

3) Do not use TCO in a liquid, in a corrosive atmosphere such as sulfurous gas, or in a high humidity environment.

4) Mount the TCO in a location where uniform radiation of heat is sustained over the body of the unit.

5) Do not use TCO in applications exceeding the rated T_f . It is recommended to use TCO under the ambient temperature is not higher than T_h .

6) Do not connect TCO direct to the heat source.

To lessen the heat conducted through the lead to the TCO body, attach the contact lead(epoxy end) rather than the case lead to the heat source direction.

* IMPORTANT NOTICE

All the numbers and conditions described above are just rough guideline.

Since each application is independent from others, it is a customer's own task and responsibility to find and confirm their own suitable application conditions.