

ISSUE: 2007/8/20

Trans tekne international co., ltd

SPECIFICATION FOR SUPPLY

New Revise

Product name DM-Series Thermal Cutoff	Customer's parts code
Type No. DM120H	File number of specification for supply SS07082001

Number of sheets including cover sheets and appendix:

Received by:

Supplier's Name:



Manufacturer's name: ORIENT CO., LTD.

Approved by	Checked by	Compiled by
		

Manufacturing plant: 2-7-41 Mukaibaru-nishi
Oita-shi, Oita-ken Japan
ORIENT CO., H. Q. Factory

HISTORY OF REVISION

P - 1 / 1

Item	Date	Page	Description	Approved by	Checked by	Compiled by
1	2007/ 8/20		issued			

1. SCOPE

This specifications relate to the thermal-link of non-resetting and normally-closed type and apply to the DM-Series of following type No.

Type No.: DM120H
Type of terminal: #250 Horizontal type

2. RATING

Electrical Rating	Rated Voltage (Un)	2 5 0 V
	Rated Current (In)	1 5 A
Temperature Rating	Rated Functioning Temperature (TF)	1 2 0 °C
	Rated Holding Temperature (TH)	9 6 °C
	Maximum Temperature Limit (TM)	2 5 0 °C

Note① Tolerance of TF is +0, -7°C.

Note② CTI of insulation materials used in this device are 160.

Note③ For the signification of each rating, refer to Paragraph 11.1.

3. APPLICABLE SAFETY STANDARD AND APPROVAL NUMBER

- * Technical Requirements of Electrical Appliance : JET0059-32001-1002
and Material Safety Law in Japan
- * UL 1020 : UL File No.E102223
- * CSA C22.2 No.209 : CSA File No. LR90576
- * DIN,EN 60691(VDE0821) : VDE License No.40020964

4. CONSTRUCTION

4.1 SHAPE, MATERIAL AND DIMENSIONS

Shape, material, and dimensions are shown in attached drawing.

Title Specification of DM-Series Thermal Cutoff					Type No. DM120H	
Approved By	Checked By	Drawn By	Edition	Date	Type	Page
		Yoshino		1-4-2003	#250 Horizontal Type	1/9
				Revision 1-4-2005	Spec.No. SP01304E	

4.2 APPEARANCES

This device has no defect that can be acknowledged to be harmful, on actual use, to the performance described in this specification, such as appreciable deformation, scratch, rust, stain, looseness of terminals or cover, etc., and the marking is certainly legible.

5. PERFORMANCE

5.1 TEST CONDITIONS

- (1) Each characteristic described in this specification is as the test is conducted under the test method and conditions specified in each following items, and unless otherwise specified, the test is to be carried out at the surrounding air temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- (2) In each of the following items, the tests of carrying current are to be conducted on the mounting condition that is shown in below—The normal use condition—, as it is specified in [Technical requirements of electrical appliance and material, attached 3 of table-3]

In case the test is conducted on two or more samples in series, each sample is to be so located that there is a spacing of not less than 10 cm between any two samples and to be connected by conductor of not less than 20 cm length.

The normal use condition;

Mounted on the flat metal plate (1 mm thick, 100 mm by 100 mm wide) with screws and connected to each other by means of a 1.25 mm^2 copper building wire which is capable to resist the test temperature sufficiently with the #250 quick-connect receptacles.

- (3) The surrounding air temperature described in this specification is the temperature of near the device, which is measured at the position of 5 cm to 10 cm above the sample.

5.2 THERMAL PERFORMANCE

During or after each of the following thermal tests, the device does not show any defect that might affect the operation of the device considerably, such as displacement of terminal or cover and transformation of case.

5.2.1 Functioning Temperature

The functioning temperature is within the range of TF $+0^{\circ}\text{C}$, -7°C when tested in an air oven increasing the temperature from $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ at a rate of $0.5^{\circ}\text{C} - 1.0^{\circ}\text{C}$ per minute.

[Note] This test is to be carried with no current load, but only detecting current of 0.1 A or less is used.

Type No.	DM1 2 OH	Page
Spec. No.	SP01304E	2/9

5.2.2 Temperature Rise

When the rated current has been carried for a time sufficient to reach temperature as mounted on normal use condition, the temperature rise of thermal sensing part is not more than 10 K, and that of terminal is not more than 30 K.

5.2.3 Maximum Temperature Limit

Following the test of paragraph 5.2.1, when the functioned sample is subjected to the condition at TM(=250 °C) for 10 minutes, both insulation resistance of 5.3.3 and electric strength of 5.3.4. are satisfied.

5.3 ELECTRICAL PERFORMANCE

During or after each of the following electrical tests, the device does not show any defect that might affect the operation of the device considerably, such as displacement of terminal or cover and transformation of case.

5.3.1 Internal Resistance

The contacting resistance between each center of both terminals is not more than 3 mili-ohm.

5.3.2 Interrupting Current Characteristics

When AC 250V, 22.5 A is loaded to this device and then this device is heated continuously till it functions, this device interrupt the circuit safely.

5.3.3 Insulation Resistance

- (1)The insulation resistance between terminal and cover is not less than DC 500 V, 100 megohms both before and after having functioned.
- (2)The insulation resistance between both terminals is not less than DC 500 V, 20 megohms after having functioned.

5.3.4 Electric Strength

- (1)This device is able to withstand AC 1500V for 1 minute without damage as a potential is applied between terminal and cover, both before and after having functioned.
- (2)This device is able to withstand AC 500 V for 1 minute without damage as a potential is applied between both terminals after having functioned.

5.4 MECHANICAL STRENGTH

When each of the following mechanical forces has been applied to this device, there is no damage that might affect the operation of this device considerably, such as displacement of terminals, unfastening of cover, crack of case, etc.,and both thermal performance of 5.2 and electrical performance of 5.3 are still satisfied after these mechanical test.

Type No.	DM120H	Page
Spec. No.	SP01304E	3/9

5.4.1 Terminal Secureness Test

Supporting the body case, the axial pull and push force of 98 N(10 kgf) are each applied to the terminal for 15 seconds.

5.4.2 Drop Shock Test

The free drop shock is applied to this device 5 times from 100 Cm above to concrete floor.

5.4.3 Vibration Test

The variable vibration, that the entire frequency range is 10-55 Hz and sweeping cycle time is 1 min. and amplitude (total excursion) is 1.5 mm, is applied to this device for a period for 2 hours to each of 3 mutually perpendicular axis (total 6 hours).

5.5 DURABILITY

After each of the following endurance tests has been carried out, this device dose not function, and also satisfies both thermal performance of 5.2 and electrical performance of 5.3.

5.5.1 Current/Temperature Stresses

Below load test ① or ② is carried out under the—normal test conditions— in an oven at the ambient temperature of (TH)+0°C, -2°C.

- ① The rated current is carried out continuously for 500 hours.
- ② The periodic current carrying cycle, consisted from 45 min.-ON and 15 min.-OFF, is repeated 1000 times.

[Note] In this test, the test results may be influenced by the durability of receptacles, so the crimped portions of receptacle is to be supplemented by soldering.

5.5.2 Current Surge Cycle

Current pulses, with an amplitude of 1500 % of rated current and a duration of 3 ms with 10 s intervals, are applied for 1000 successive cycles.

5.6 RESISTANCE TO THE AMBIENT CONDITIONS

After this device has been exposed to each of the following conditioning tests, it dose not function and its marking is still legible, and it also satisfies both thermal performance of 5.2 and electrical performance of 5.3.

5.6.1 Cold Storage

Stored at an ambient temperature of $-40^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 240 h.

Type No.	DM120H	Page
Spec. No.	SP01304E	4/9

5.6.2 Damp Heat Storage

Stored at an ambient temperature of $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and a relative humidity of 90-95 %RH for 240 h.

5.6.3 Temperature/Humidity Cycle

Subjected to the following cycle and this cycle is repeated 40 times.

$(-30^{\circ}\text{C}, 2 \text{ h}) \rightarrow (\text{Up } 1 \text{ h}) \rightarrow (\text{TF}-20^{\circ}\text{C}, 90-95\% \text{RH } 2 \text{ h}) \rightarrow (\text{Down } 1 \text{ h})$

5.6.4 Salt Mist

Exposed to a fine mist of salt solution for 48 hours under the conditions that the ambient temperature is $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$, the salt solution concentration is 5 % by weight and the mist pressure is 1 Kgf/cm² (100 kPa).

5.7 THERMAL ELEMENT STABILITY TEST

When the following steps of tests is carried, no sample functions during step-1 and step-2 and all the samples function during step-3 or step-4, and after these tests, the sampls satisfy both insulation resistance of 5.3.3 and electric strength of 5.3.4.

step-1	TF-20 °C	3 weeks
step-2	TF-15 °C	3 weeks
step-3	TF- 0 °C	1 week
step-4	TF+ 3 °C	3 hours

6. MARKING

The following items are marked on the body of this device by the method mentioned below.

① Rated functioning temperature	: 120 °C
② Rated voltage	: 250 V
③ Rated current	: 15 A
④ Manufacturer name(abbreviated name)	: ORIENT
⑤ Type No.	: DM120H
⑥ Manufacturing No.	: Lot No.

Item ① is printed on the top face of case, item ②,③,④, are marked on the front face of cover by punching and the item ⑤,⑥ are printed on the side face of case.

Type No.	DM120H	Page
Spec. No.	SP01304E	5/9

7. QUALITY CONTROL PROCEDURE

- (1) The process quality control is carried out in accordance with the processes and standards of control, which are specified in [ORIENT QC-FLOW-CHART].
- (2) The final inspection is applied per production lot in accordance with the standards of inspection specified in [ORIENT QC-FLOW-CHART], and the [Certificate of Inspection] is provided per delivery.

8. PACKING

The thermal cutoffs are packed in accordance with the separate [packing specification].

9. HOZARDOUS SUBSTANCES

- (1) Every material used in this device does not contain any of the following prohibited substance.
 - ① Brominated flame retardants material : PBB, PBDE
 - ② Asbestos
 - ③ Heavy metals : Mercury, Cadmium, Chromium-frioxide
- (2) This product does not contain any of the following ozone depleting substances and also these substances are not used during the manufacturing process of both product and its component.
 - Specific fleon (CFC-11, 12, 13, 111, 112, 113, 114, 115, 211, 212, 213, 214, 215, 216, 217)
 - Halon 1211, 1301, 2402
 - Carbon tetrachloride
 - 1.1.1-trichloroethane (methyl chloroform)
 - Methyl bromide

10. OTHERS

10.1 UNPRESCRIBED ITEMS

The items not prescribed in this specification are in accordance with each standard described in paragraph 3 (page-1/6). In the event that an impropriety is found beyond this specification, it shall be fixed by mutual agreement between both parties.

10.2 ALTERATION OF SPECIFICATION

In case the alteration of this specification and/or the other major alteration, such as the change of manufacturing plant or manufacturing

Type No.	DM120H	Page
Spec. No.	SP01304E	6/9

process, will be made, the application for the alteration shall be submitted to the customer after it has been evaluated that its alteration does not influence on the quality and reliability of this device. And the alteration shall be done with permission of customer.

11. INSTRUCTIONS IN USE

11.1 THE DEFINITION OF EACH RATING

① Rated Functioning Temperature (TF)

The temperature at which a thermal cutoff functions (open) under the specified conditions. The required tolerance for functioning temperature is $\pm 7\text{ }^{\circ}\text{C}$ in Technical Standard of Electrical Appliance and Material and also it is $+0, -10\text{ }^{\circ}\text{C}$ in other various standards (IEC, UL, CSA, EN etc.). Our declared tolerance is $+0, -7\text{ }^{\circ}\text{C}$, which can satisfy the requirement of any standard. Accordingly the middle of the actual functioning temperature is about TF-3.5 $^{\circ}\text{C}$.

② Holding Temperature (TH)

The maximum surrounding temperature at which a thermal cutoff can be maintained without functioning (opening) while conducting rated current for 168 hours under the specified conditions.

This rating is prescribed not in Technical Standard of Electrical Appliance and Material but in foreign safety standards.

③ Maximum Temperature Limit (TM)

The maximum temperature at which a thermal cutoff which has functioned (opened) can be maintained for a given time (10 minutes) during which no re-closing of contact or impairment of insulation properties occurs.

④ Rated Voltage (Ur)

The maximum voltage which can interrupt the specified interrupting current without impairing. A thermal cutoff does not respond to the voltage, so it can be used in the circuits of which voltage is U_r and under.

⑤ Rated Current (Ir)

The maximum current which is carried through a thermal cutoff and also that is the maximum current which can perform above TH test.

11.2 LIMIT OF WORKING TEMPERATURE

(1) Each temperature rating of a thermal cutoff is provided on the specified test conditions. Generally the conditions in the actual apparatus are remarkably different from these specified conditions. To avoid the

Type No.	DM1 2 OH	Page
Spec. No.	SP01304E	7 / 9

unexpected functioning, check that the surrounding temperature and the mounting surface temperature do not exceed TH at the maximum loading in the conditions of actual installing, and also check the thermal cutoff surely functions at the intended temperature.

- (2) Where the thermal cutoff is mounted the plate of which surface temperature will be nearly TH, it is necessary to consider the temperature overshooting and it is recommended to carry out the accurate measurement of the temperature by the methods described in 11.5.
TH is specified with a margin. however, it is recommended to take some more margin of the temperature for the variation in your equipment sets.
- (3) Verify that this device never exceed its Maximum Temperature Limit (TH) of 250 °C as a result of overshooting of equipment after it has functioned by overheating.

11.3 CAUTIONS FOR MOUNTING AND WIRING

- (1) This device is the thermal cutoff intended to sense the mounting surface temperature directly. Mount this device rigidly with screws etc. so that the temperature sensing face (underside) of this device is stuck together tightly on the flat face of equipment. In case of installing in the interspace or on the non-flat surface, the heat conducting condition will be different. Please consult us especially in such case.
- (2) This device can be mounted irrespective of its attitude. But the mechanical force exceeding the strength specified in 5.4 should not be applied to this fuse. The abnormal force should not be applied to the terminal in the right angles to the axis of terminal (or connector) after the mounting hole is fixed, as the cover may be unfastened.
- (3) Take precaution that the heat generation caused by poor crimp of the receptacles or loose connection to the terminals would tend to damage severely to the housing of this device. In an ambient of high temperature, the crimped portion of connector will be weak spot and so the deterioration of the crimped portion may cause the heat generation. Accordingly, it is recommended that the crimped portion is supplemented by soldering.

11.4 CAUTIONS FOR PRESERVATION

The current carrying parts of this device such as terminals and contacts are plated with silver. Accordingly the silver plating discolor to yellow-brown in some degree when this device has been preserved exposing to the air directly for a long time. As to the mild discolor of silver plating, there is no problem to the electrical property. But in case it will be preserved for a long time, do not unseal the packing bags.

Type No.	DM120H	Page
Spec. No.	SP01304E	8/9

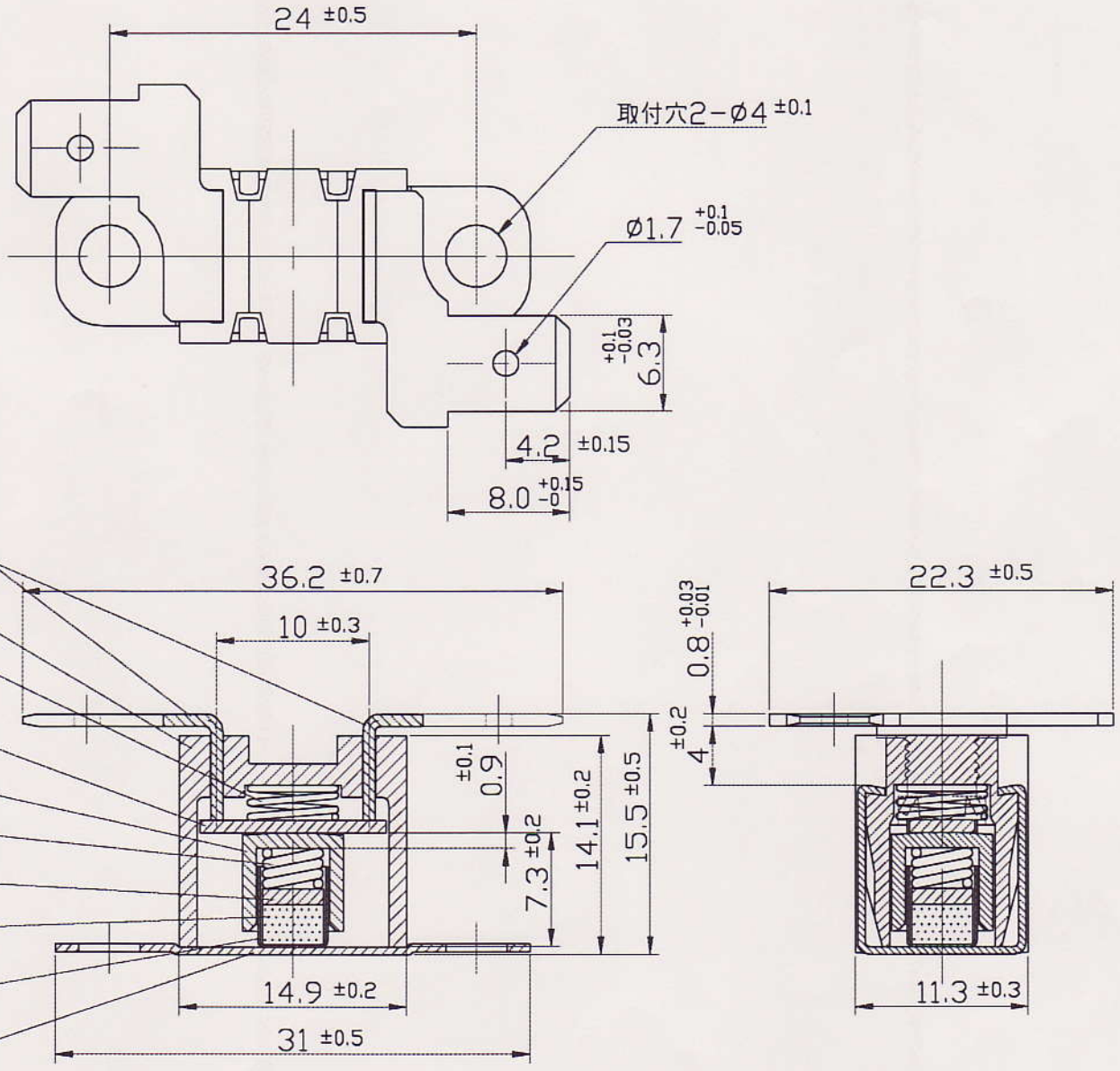
11.5 CAUTIONS FOR THE TEST METHOD

When the temperature of thermal sensing part is measured in the temperature rise test, if the test is conducted inserting the sensor between the mounting face and the samples, it is not the regular test of the [normal test conditions—] because the adhesion of this device to the mounting face become incomplete and the heat conductance is in abnormal state. The temperature should be measured under the conditions that the sample is mounted is stuck together tightly and then the fine sensor is attached on the lower spot of the side of this device.

Type No.	DM1 2 OH	Page
Spec. No.	SP01304E	9 / 9

※1、※2 PPS(Polyphenylene sulfide)
Toray Torelina A310MB
Registered with UL and METI

部番 NO.	部 品 名 PARTS NAME	個数 QTY.	材 質 MATERIAL	備 考 REMARKS
1	Terminal	2	Silver plated brass	#250 Tab
2	Housing	1	Molded PPS	※1
3	Insulating cap	1	Molded PPS	※2
4	Contacting plate	1	Silver plated brass	
5	Interrupting spring	1	Stainless steel	
6	Contacting spring	1	Stainless steel	
7	Disc	1	Stainless steel	
8	Element shell	1	Nickel plated brass	
9	Cover	1	Nickel plated steel	
10	Thermal element	1	Eutectic alloy	Cadmium and lead less



					材 質 MATERIAL	Cadmium and lead less	品 名 NAME	DM Series Thermal-Link #250 Horizontal type		
					处 理 TREATMENT		コ ー ド PARTS CODE			
					原 図 尺 度 SCALE	2.25/1	承 認 APPROVED	検 査 CHECKED	製 図 DRAWN	設 計 DESIGNED
符 号 NO.	訂 正 記 事 REVISION	変 更 日 付 DATE	起 印 SIGN	承 認 APPROVE	投 影 法 PROJECTION	三 角 図 法 3RD ANGLE			エ ト ウ	エ ト ウ
株式会社 オリент ORIENT CO., LTD.					作 成 日 付 DATE	2005.12.17	図 番 DRAWING NO.	02A05121702		