

Band Heater
(Silicon Rubber Heater)

Instruction Manual

Export Control Policy

We recommend that ALL customers be sure to follow all rules and regulations such as Foreign Exchange and Foreign Trade Law when exporting or reexporting our products.

Introduction

Thank you for choosing our products. This instruction manual gives information and precautions on handling, installation, operation, and maintenance of the product.

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. To ensure proper use of this product, read this instruction manual carefully and keep this manual close at hand so that you can use for reference during operation.

If you purchased our other products and/or optional devices with this product, read relevant instruction manuals carefully.

1. About the personnel who are involved in handling our products

All personnel involved in handling our products should take a general safety education and training that is officially accepted in the country where our product is used. The personnel are also required to have specialized knowledge/skills and qualification on the electricity, the machinery, the cargo handling, and the vacuum. Especially, the personnel should be familiar with handling a cryopump in order to use it safely. Since we offer a training session (which is subject to fees) as needed for people who use cryopumps for the first time, please do not hesitate to contact our Service Engineering Division to join the training session.

2. Warranty

2.1 Gratis warranty period and Warranty coverage

【Gratis warranty period】

Note that an installation period of less than one year after installation in your company or your customer's premises or a period of less than 18 months (counted from the date of production) after shipment from our company, which is shorter, is selected.

【Coverage】

(1) Failure diagnosis

As a general rule, diagnosis of failure should be done on site by customer.

However, ULVAC CRYOGENICS or our service network can perform this service for an agreed fee upon the customer's request. There will be no charge if the cause

of the breakdown is found to be a fault of ULVAC CRYOGENICS.

(2) Damage during transportation

When damage by delivery/transportation is admitted, the product will be repaired free of charge within the range of the guarantee expressed in the sales contract.

(3) Breakdown repairs

There will be a charge for breakdown repairs, replacements and on-site visits for the following seven conditions. In those cases the cost shall be your own expense even though the product is within the warranty period.

- ① Breakdowns due to improper storage or handling, careless accident, software or hardware design by the customer.
- ② Breakdowns due to modifications of the product without consent of the manufacturer.
- ③ Breakdowns due to maintenance of the product without authentic parts or breakdowns resulting from using the product outside the specified specifications of the product.
- ④ Breakdowns due to contamination or corrosion caused by user's use conditions.
- ⑤ Breakdowns due to natural disasters (such as fire, earthquake, flood, lightning, salt damage, and so on) , environmental pollution, irregular voltage, and /or usage of undesignated power source.
- ⑥ Breakdowns that are outside the terms of warranty.
- ⑦ Consumables and/or replacement service.

Since the above services are limited to within Japan, diagnosis of failures, etc are not performed abroad. If you desire the after service abroad, please contact ULVAC CRYOGENICS and consult us for details in advance.

2.2 Exclusion of opportunity loss from warranty liability

Regardless of the gratis warranty term, compensation to opportunity losses incurred to your company or your customers by failures of ULVAC CRYOGENICS products and compensation for damages to products other than ULVAC CRYOGENICS products and other services are not covered under warranty.

2.3 Repair period after production is discontinued

ULVAC CRYOGENICS shall accept product repairs for seven years after production of the product is discontinued.

3. Service Form

After the products are delivered, please fill out the following information in the blanks. If you have any questions or technical problems, please feel free to contact the nearest Customer Support Center or headquarters. Please refer to "Service Network".

Cryopump/Super trap Model	:	_____
Cryopump/Super trap Serial No.	:	_____
Refrigerator Model	:	_____
Refrigerator Serial No.	:	_____
Compressor Model	:	_____
Compressor Serial No.	:	_____
Temperature controller/Thermal display Model	:	_____
Temperature controller/Thermal display Serial No.	:	_____
Option Part Model	:	_____
Optional Part Serial No.	:	_____

4. Notes for repair and maintenance requests

We may decline your request for the repair or the maintenance of our products if you refuse to give us information about the presence of the hazardous substance and/or contaminant.

Also, please be aware that we do not accept liability for damages by the contaminant, which might be caused during transportation to our office or the nearest customer support center. To avoid such accident, please pay careful attention to packing of the product

5. In case of breakdown and accident

When breakdown or accident occurs, we may ask for keeping the product on site as it is or retrieving the product to investigate its cause. Also we may ask for reporting the detailed process and/or the operating condition. When unidentified malfunction was generated, please contact our Service Engineering Division or

the nearest customer support center with reference to the chapter of Service Network. We ask for cooperation about the above.

6. General Precautions

- (1) It is strictly prohibited to duplicate, open, and transfer this instruction manual or any of its parts to a third person without written permission from ULVAC CRYOGENICS.
- (2) Information in this document might be revised without a previous notice for the specification change and the improvement of the product.
- (3) If you have any questions or comments on this document, please do not hesitate to contact us. The phone numbers of local customer support centers are listed at the end of this manual.

Safety Considerations

Our products have been designed to provide extremely safe and dependable operation when properly used. Following safety precautions must be observed during normal operation and when servicing them.

**WARNING**

A warning describes safety hazards or unsafe practices which could result in severe injury or loss of life.

**CAUTION**

A caution describes safety hazards or unsafe practices which could result in personal injury or equipment damage.

**Toxic gas or chemicals used.**

There is a risk of severe injury upon contact.

**Corrosive chemicals used.**

There is a risk of severe injury upon contact.

**Flammable gas used.**

There is a danger of fire or burn injury.

**Explosive gas used.**

There is a risk of fire or explosion.

**Hazardous voltage .**

Electric shock may cause severe injury or loss of life.

**Hot heating part present.**

There is a risk of burn injury.

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Disposal Considerations

Disposal of our products must be done in accordance with applicable national and local laws and regulations.

				WARNING
<p>The cryopumps or cryocoolers may contain residue of hazardous substances resulting from actual use. Contact your safety supervisor and follow the instructions to remove such toxic substances before disposing.</p>				

We provide Safety Data Sheet (SDS) of our products upon your request.
Please contact us if necessary.

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1. Features

- When this product is used in the heating period of the cryopump and the super trap, the moisture that builds up from the dew condensation prevention and heating period are effectively evaporated, shortening the roughing time. Compared to the natural heating period, it is possible to shorten the regeneration time by about 1/3 to 1/2 the time.
- The temperature regulation of this products temperature utilizes a self-recovery bimetallic thermostat. Also, as a safeguard, a thermal fuse is used.
- A customized version is also available with silicon sponge insulation (5mm or 10mm).
- It is possible to design together with the form of the case.

2. Specifications

Table 1 Electricity specifications

	Specifications
Rated Voltage	AC200V ±10%×1φ
Heat Capacity	100W~1500W (Different depending on model and specs of cryopump and super trap)
Thermostat Operating Temperature (Standard Specification)	80°C±5°C OFF, 70°C±5°C ON
Temperature Fuse Operating Temperature (Standard specification)	184°C※ ¹
I Insulation Resistance	DC500V, 100MΩ or more
Dielectric Voltage	AC1500V, 1 minute

※1Cases of 152°C, 167°C, 192°C for customize.

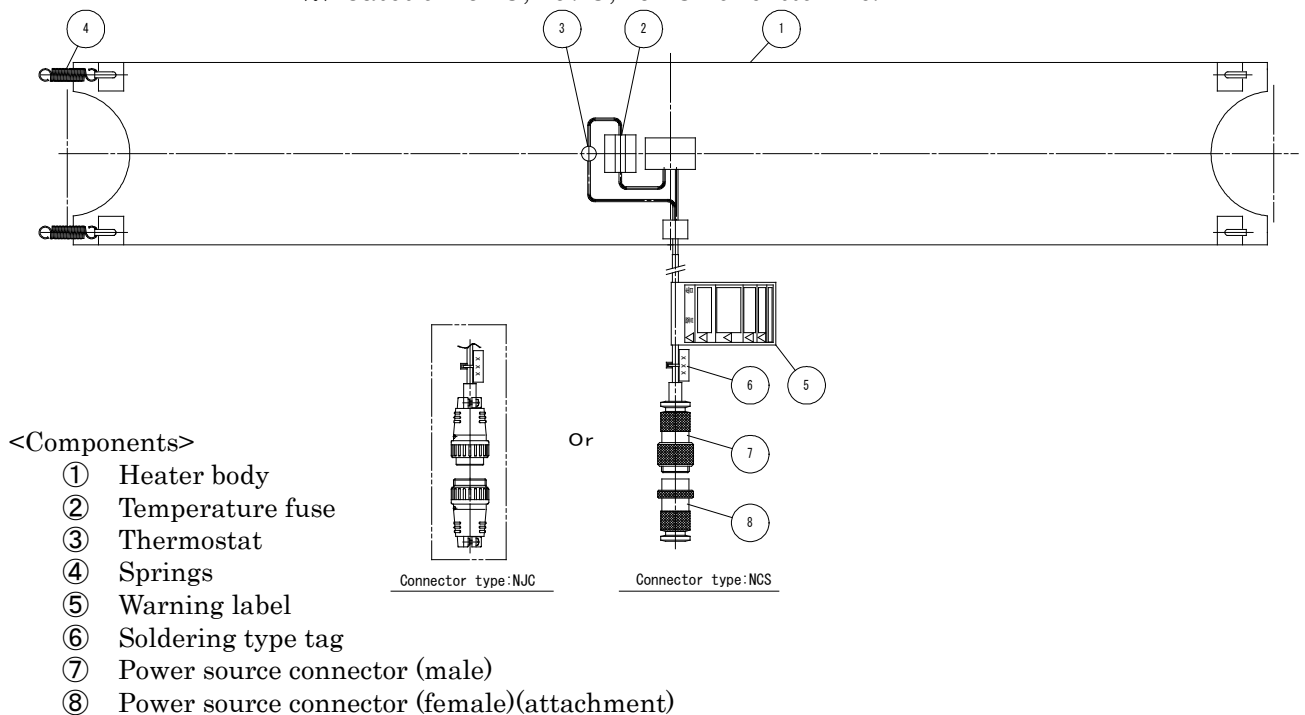


Figure 1 Standard drawing

3. Temperature Characteristic

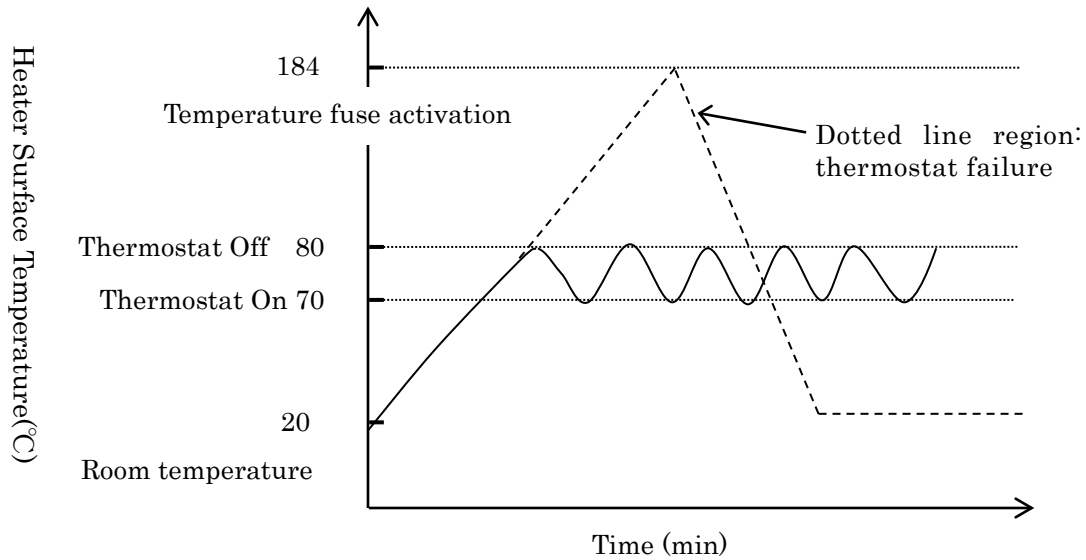



Figure 2 Standard temperature property



WARNING

The surface temperature of the heater becomes approximately 80°C in the vicinity of the thermostat at operation. Please take means to display warning labels and prevent burns by preparing heat insulant as necessary.

4. Operating Life

- The operating life points to electrical deterioration (wire break, conductivity defect, insulation defect). Generally, the operating life is considered over when there is junction failure in the switching operation unit (bimetal) of the thermostat.
- This is a high reliability product with a nominal 100 thousand switches possible. However, the operating life will differ depending on environment and frequency of use.

5. Connector Specifications (Nanaboshi Electric Mfg.co.,Ltd products)

- The standard specification for metal outlets is 3 pins (2 pins are customized specifications).
 - There are two types of configuration for the form: NJC, NCS.
- Refer to table 2 for more details

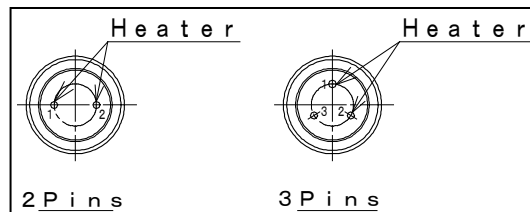


Figure 3 Soldering positions of the pin connector

Table 2 The pin connector list

Terminal type	Power source (Heater side model number)	Power source (Power side model Number) (attachment)
3pins	NCS-253-Ad	NCS-253-P
3pins	NCS-303-Ad	NCS-303-P
2pins	NJC-242-AdM	NJC-242-PF
2pins	NJC-243-AdM	NJC-243-PF

6. Installation

- 1) Cover the pump or trap case surface with the heater.
- 2) Pinch the spring with pincers, place on hook on opposite side and deliberately twist it around hook.
- 3) Solder the electric cable (customer prepared) to the provided power side connector. Be sure to secure the soldered portion with the contraction tube. For the electric cable, use shop bought standard cable (specification cable). Also, be certain to affix with the clamp portion of the power source connector so that the power source cable does not move.



CAUTION

- The soldering type tag (SCN or SAC) in the vicinity of the power connector shows the use of Pb-free solder on the soldered portion. Do not use together with lead solder.
- This heater is made by covering the heating element (nichrome wire) with a silicon rubber sheet. Do not cut or perform hole drilling.

7. Operation

- (1) After shutting off the operation of the cryopump and super trap, switch on the heater.
- (2) Shut off heater electricity when the temperature of the inner kit (panel, baffle, shield, etc.) of the cryopump or the super trap reaches the predefined temperature.
As a rough indication, keep the temperature at 273K (0 °C) when the volume of water is little, and 300K (30°C) when the volume of water is large.
Especially, when the water volume is large it is recommended that the electricity remain on until the roughing complete.

**CAUTION**

- Maximum allowable temperature of our refrigerator unit is 70°C. If it exceeds 70°C, inside of the refrigerator may be damaged by the heat and a refrigerator replacement may be needed. If you use a heater to warm up a pump or trap, make sure to check and control the heater temperature so that the temperature of the cold stages of the refrigerator does not exceed 70°C.
- The temperature of the inner kit may continue to rise from residual heat even after the electricity to the heater is shut off.
- Electricity is shut off when the thermostat is switched to OFF. Electricity will not return until the surface temperature is below the parameter, however it is not a wire break, so take precaution when controlling.
- Compared to temperature increase conducted by injecting inert gas in atmospheric pressure, in the event that temperature is increased in a vacuum, it may take extra time as the heating is done solely by the radiation of the heater.
- Although the heater surface is treated with drip-proof insulation varnish, there is the possibility that moisture will enter the heater interior in the event of the heater surface freezing because of latent heat by liquefied gas generated in the case interior at time of temperature increase, or when it is used in conditions of excessive condensation. This can deteriorate the performance of the insulation.
- This product contains siloxane bond (—Si—O—Si—), at times causing low molecular siloxane gas to emerge. Although thermal treated (age treated) beforehand, a particular odor may be noticed when first used. Regardless, there is no defect in the product.
- Always use a separate circuit breaker exclusively for heaters when used with another device.

8. Troubleshooting

Table 3 shows fault diagnosis and corrective actions of the band heater.

If you need any assistance, please contact us.

Table 3 Fault diagnosis

Fault	Possible Cause	Corrective Action
Circuit breaker cuts off power <ul style="list-style-type: none"> ▪ Wire break ▪ Electric leakage ▪ Short 	① Condensed water penetrates the thermal fuse or it is frozen including the pump case as pumped gases liquefy. ② Electric leakage. ③ The broken wire is protruding from inside of the heater and touching the pump case.	① It is drip proof (varnish treatment) type however if it condenses too much, it should not be used. If it freezes, more frequent regeneration or reconsideration of heater specification is needed. ② Insulation failure and dangerous. Do not use. Heater unit replacement is required. ③ Dangerous. There is a risk of electric shock hazard. Heater unit replacement is required.
Temperature does not increase, or it increases very slowly.	① Disconnection of the wire. ② Wire break of heater wire heater. · Breakdown of thermostat · Breakdown of temperature fuse	① Disassemble the connector to check if there is any damage at the soldering part. If there is, please contact us or service network nearby. When soldering, be careful to check the types of soldering and use the same type. ② Exchanging heaters to a new one is necessary as adjustments are not possible. Exchanging heaters to a new one is necessary as adjustments are not possible.

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SERVICE NETWORK

- For technical support, servicing or additional contact information, visit us at www.ulvac-cryo.com.

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Revision History

Date	Revision No.	Contents
2013/05/15	2013.05	First edition.
2013/09/26	2013SR01	“Introduction” has been revised. Contact information of Osaka office has been revised in “Service Network”.
2013/12/02	2013DR02	“Service Network” has been revised.
2018/03/06	2018MH03	“Service Network” has been revised.
2019/02/04	2019FY04	“5. Connector Specifications” Figure 3 has been modified.

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