ULVAC

INVERTER

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.

D/N.MGINV00E, 2018MH06 **ULVAC CRYOGENICS INCORPORATED**

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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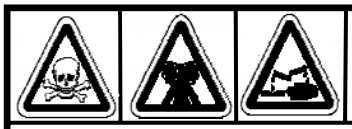
Disposal Consideration

Regulations and the ordinance concerning industrial waste treatment are provided in the country and region to discard. When disposing our products, please process abandonment according to relevant regulations and ordinance, etc.



WARNING

When it seems that the cryopump or refrigerator has been used to evacuate a toxic or dangerous material, you must contact a safety supervisor before discarding, and discard it after removing the poisonous material according to directions of the safety supervisor.

We will offer you Material Safety Data Sheet (called MSDS) of our products upon your request. If you have any questions, please contact our Service Engineering Division or the nearest customer support center.

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FIGURES & TABLES

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1. Descriptions

The inverter is used to change the cold head motor rotation to the frequency different from that of the power supply in order to improve performance, reduce vibration and cooldown time, and optimize cryopumps, cold traps and refrigerators.

(Please refer to the specifications or external drawings for the information on the set frequency.)

2. Specifications

Model : FR-E720 – 0.4K ····· for C30VR, C30PVRT, C15R, C10

: FR-E720 – 0.75K ····· for C30MVR, C30MVRT

Manufacturer : Mitsubishi Electric Corporation

Default : Settings will be done by Ulvac Cryogenics Inc. based on the customers' specifications.

3. Protective Function (Refer to the manufacturer's instruction manual for details.)

Table 1 shows the functions to protect the inverter itself. These functions may also be activated by a failure of the inverter. For information on functions other than listed below, please refer to the instruction manual of the manufacturer.

Table 1 Protective Functions

Name	Description		Indication
Overcurrent shut-off	When the inverter output current reaches or exceeds approximately 230% of the rated current during constant speed, acceleration or deceleration, the protective circuit is activated to stop the inverter output.	During acceleration	E.OC1(OC1)
		During constant speed	E.OC2(OC2)
		During deceleration	E.OC3(OC3)
Regenerative overvoltage shut-off	If regenerative energy causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protective circuit is activated to stop the inverter output. It may also be activated by a surge voltage generated in the power supply system.	During acceleration	E.OV1(OV1)
		During constant speed	E.OV2(OV2)
		During deceleration	E.OV3(OV3)

NOTE: When the protective function is activated, a cryopump(cold head motor), a cold trap, or a refrigerator stops operation and the output signal of the compressor unit remains ON mode.

4. Setting the inverter (Refer to the manufacturer's instruction manual)

The procedure to input 60Hz as the third speed (low speed) is explained below as an example of the settings.

CAUTION

Changing the value settings occasionally results in malfunction. Please contact us when you make changes to the settings.

CAUTION

Acceleration time is required to be changed to avoid output stop with "E.OC1" display resulting from activated overcurrent breaker during acceleration.

CAUTION

Since the inverter is mounted on outside of the compressor unit, parameter input should be disabled to avoid modification after installation at customers' sites.

CAUTION

When the compressor stops, the current to the inverter is cutoff, but it takes 2 to 3 seconds for the condenser inside the inverter to discharge (LED indicator light goes off). Conduct the steps (1) and (18) a few seconds after stopping the compressor.

【1. Prior to change the settings】

1) Open the front cover of the inverter and disconnect STF signal wire.
2) Turn on the compressor and follow the steps below.

【2. Select operation mode】

3) Display parameter “P79” in flash.
4) Press SET key. When “2” is displayed in flash, turn the dial to display “1”.
5) Press SET key again to blink “P79” and “1” alternately.

【3. Cancel the parameter write inhibit setting】

6) Display parameter “P77” in flash.
7) Press SET key. When “1” is displayed in flash, turn the dial to display “2”.
8) Press SET key again to blink “P77” and “2” alternately.

【4. Cancel the parameter write inhibit setting】

9) Display the parameter you wish to change (in this case “P6”)
10) Press SET key to display the default value in flash. Turn the dial to change the value (in this case select “60”).
11) Press SET key again to blink “P6” and “60” alternately.

【5. Select the parameter write inhibit setting】

12) Display parameter “P77” in flash.
13) Press SET key. When “2” is displayed in flash, turn the dial to display “1”.
14) Press SET key again to blink “P77” and “1” alternately.

【6. Select the operation mode】

15) Display parameter “P79” in flash.
16) Press SET key. When “1” is displayed in flash, turn the dial to display “2”.
17) Press SET key again to blink “P79” and “2” alternately.

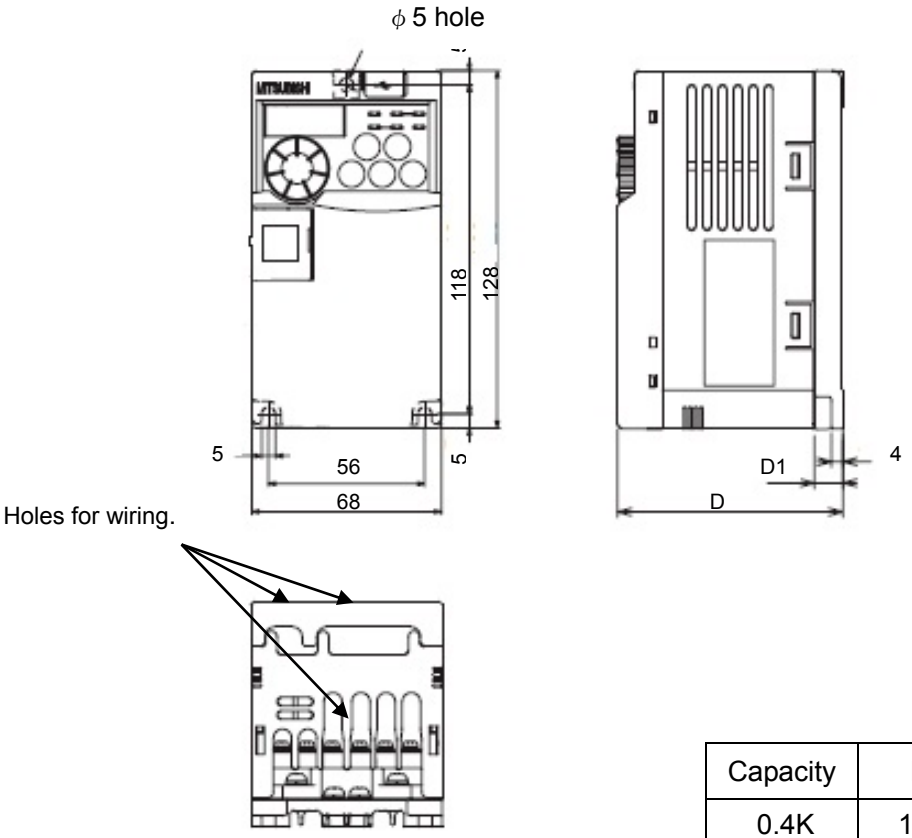
【7. Change of the settings complete】

18) Shut down the compressor and return the STF wiring to the original state (short-circuit of STF-SD).
19) Turn on the compressor and confirm that 60Hz is displayed (When RH signal is OFF) on the LED indicator.

The setting is completed by the procedures above. Once completed, no additional changes can be made from the key.

Close the front cover of the inverter.

5. Dimensions

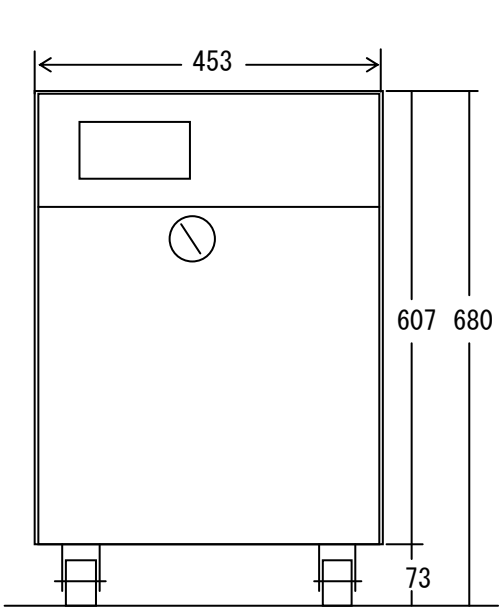


(Unit : mm)

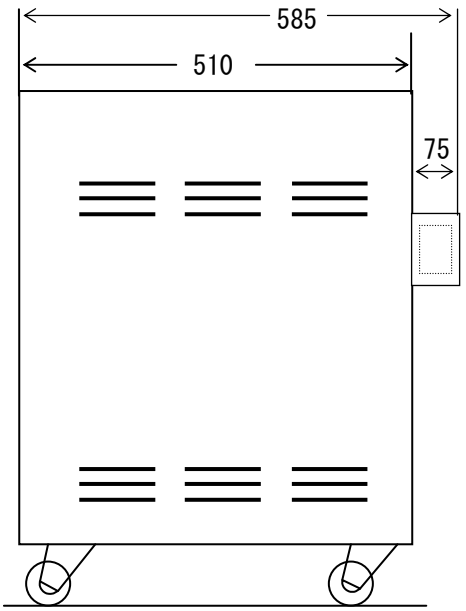
Capacity	D	D1
0.4K	113	42
0.75K	133	62

Figure 1 Dimensions

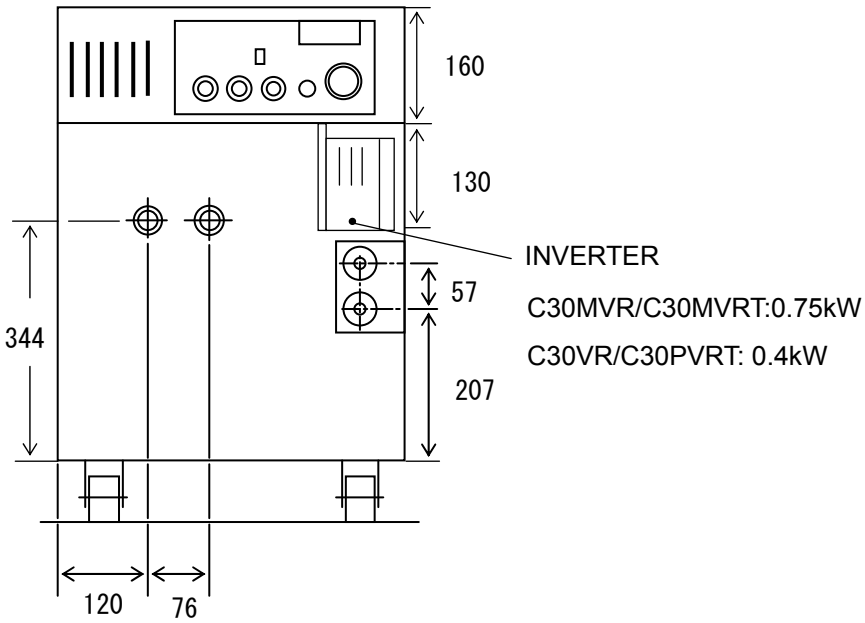
6. External View (When mounted on a C30VR series compressor)



【Front View】



【Side View】



【Rear View】

Figure 2 External View

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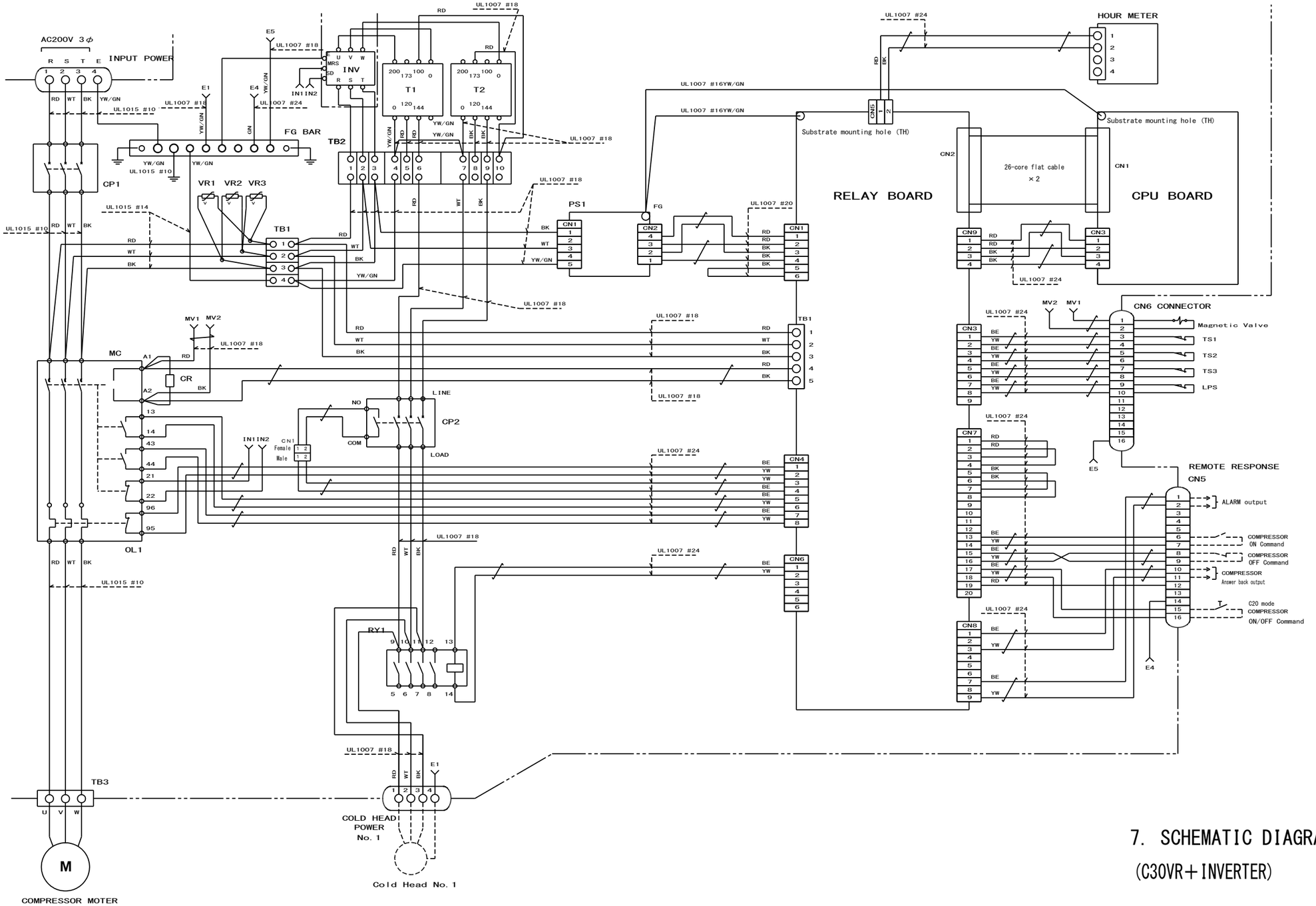
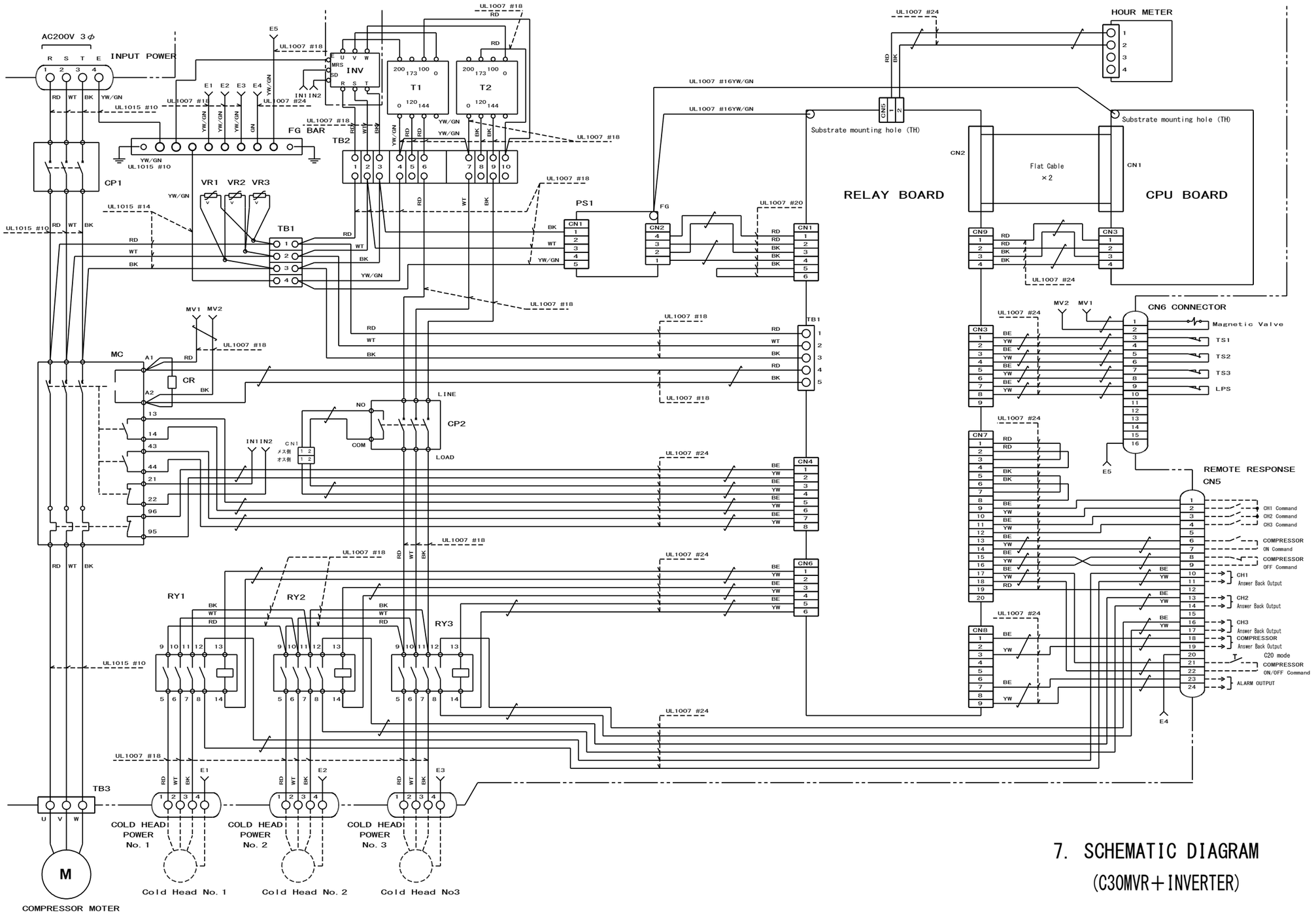


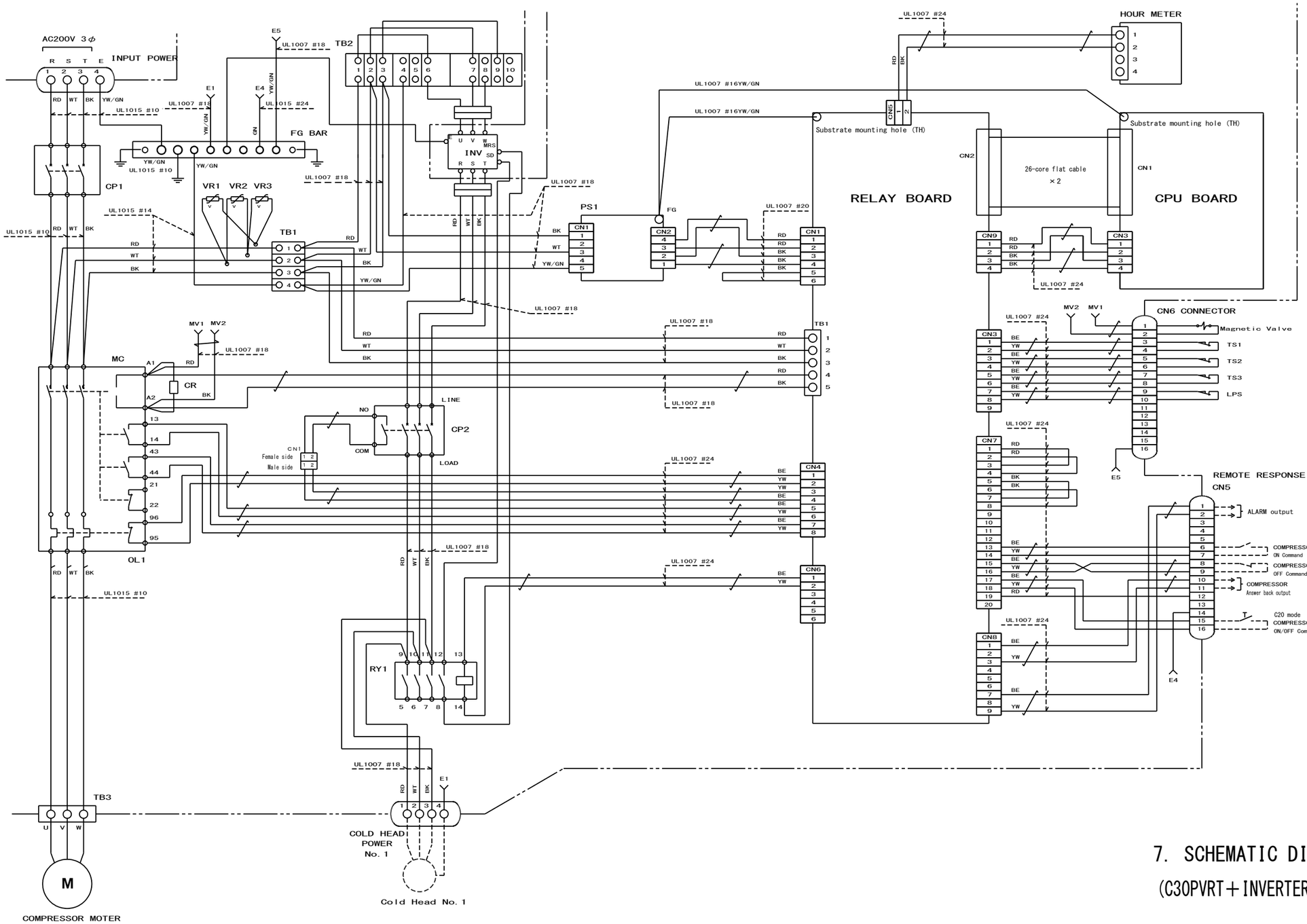
7. SCHEMATIC DIAGRAM

(C30VR+INVERTER)



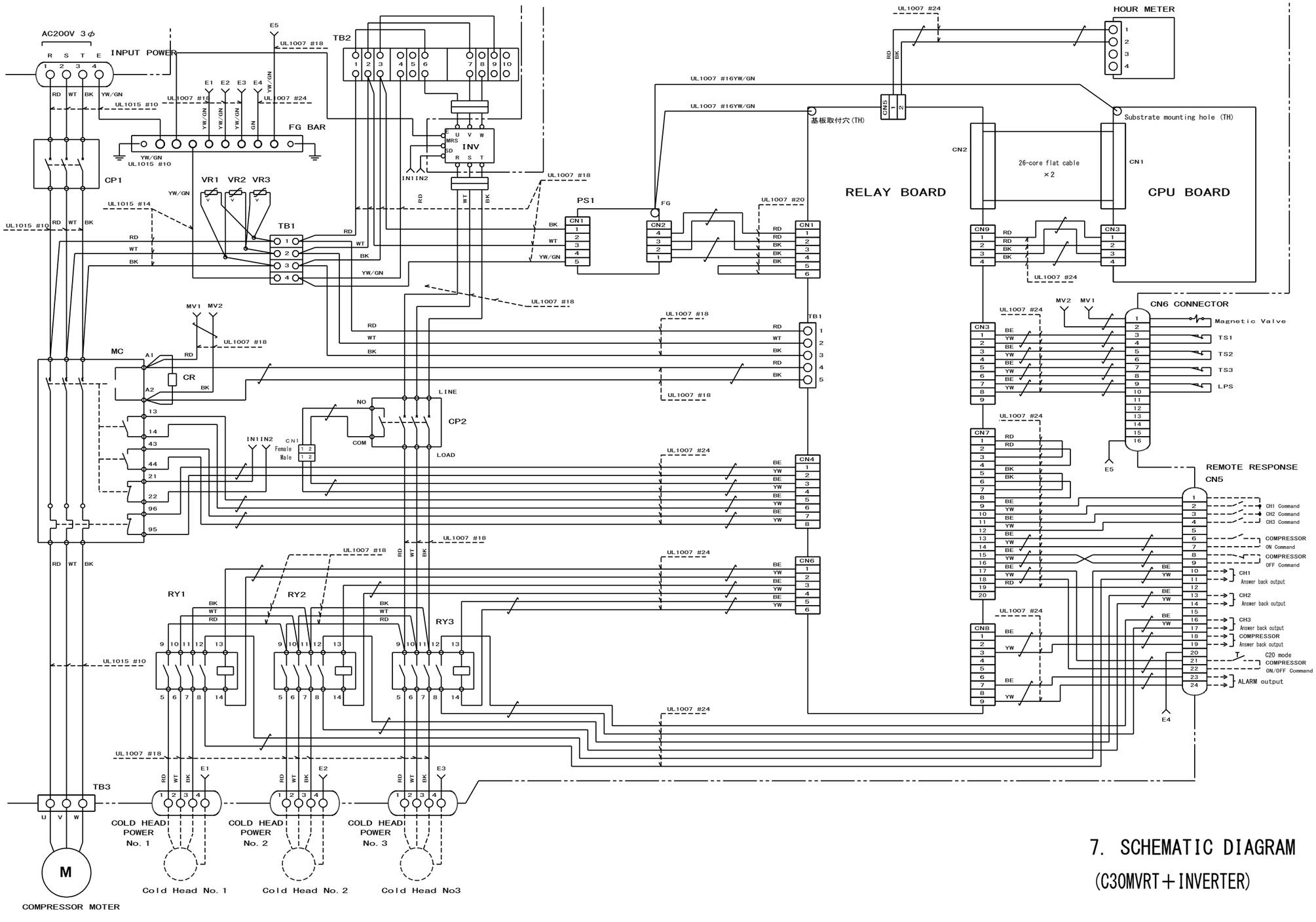
7. SCHEMATIC DIAGRAM

(C30MVR+INVERTER)



7. SCHEMATIC DIAGRAM

(C30PVRT＋INVERTER)



7. SCHEMATIC DIAGRAM

(C30MVRT＋INVERTER)

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
2006-06-22	2006.06	First edition
2007-09-04	2007SR01	Addition of disposal consideration. (P.IW-1)
2009-06-08	2009JE02	“Introduction” has revised.
		UCN address has changed.
		“SERVICE NETWORK” has revised.
2013-11-08	2013NR03	“Introduction” has revised.
		“SERVICE NETWORK” has revised.
2014-04-02	2014AL04	Full-fledged revision
2017-06-21	2017JE05	“2. Specifications”
		Model description has been modified.
2018-03-06	2018MH06	“SERVICE NETWORK” has been revised.

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