MINI SUBZERO

INSTRUCTIONS

MC-71,81

ULTRA LOW TEMPERATURE CHAMBERS

TABAI ESPEC CORP.

ATTENTION IN HANDLING DURING OPERATION

1. Repeated ON-OFF operation of the refrigerator within 5 minutes and prolonged operation at high heat can seriously impair the service life, and should be avoided.

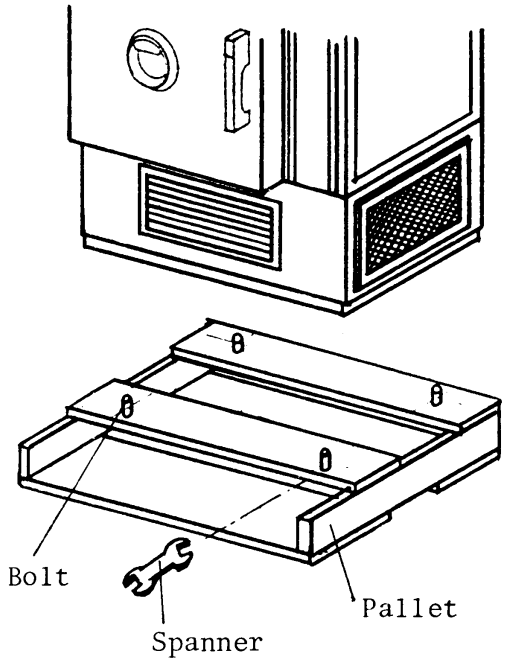
2. Always make sure to use the specimen power control device in the case of loading heat generating specimens into the chamber. (See page 11.)

3. The leak breaker should be confirmed that it acts (functions) normally by operating the [TEST] button about once a month. Also, make sure to accurately ground the earth wire, otherwise, the leak breaker will not function.

C O N T E N T S

1. Condition of Installation Site

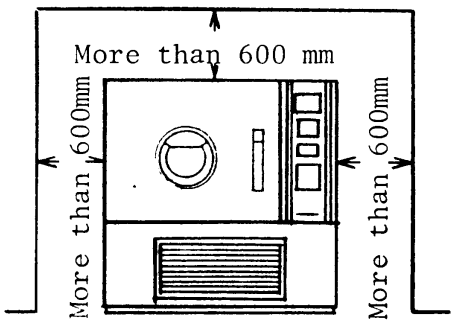
Treatment of Chamber at Time of Haul-in and Installation

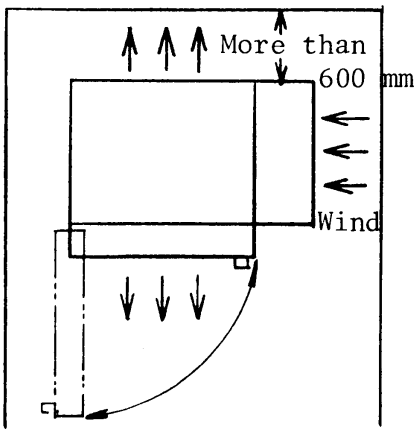


How to Take off the Pallet

The chamber proper and the pallet can be separated when the bolts (M8 flat dia. 13 mm) securing the chamber and the pallet are removed with a spanner or monkey wrench as shown in the sketch.

Installation Site





- A place where the ambient temperature is in the range of 0 ∿ 40°C.
  The ambient temperature range to attain specified performance is 5 ∿ 35°C, otherwise there may be occasions when the specified performance cannot be attained.
  The temperature pull-down time and lowest attainable temperature capacity in the specification are when the ambient temperature is 20°C.
- A place free from moisture and dust.
- A place free from corrosive gases, inflammable gases and high heat generating sources.
- A place where sudden temperature fluctuations in the exess of 5 deg. does not take place at a few minutes' interval.
- A place where the ambient temperature is 10 ∿ 30°C throughout the year is optimum in order to attain the best functions and performance of the chamber.

Installation Space

The test chamber should be installed in a space such as indicated in the drawing so that maintenance and inspection can be readily accomplished as well as to attain favorable ventilation.

Furthermore, a place where the floor is level should be selected.

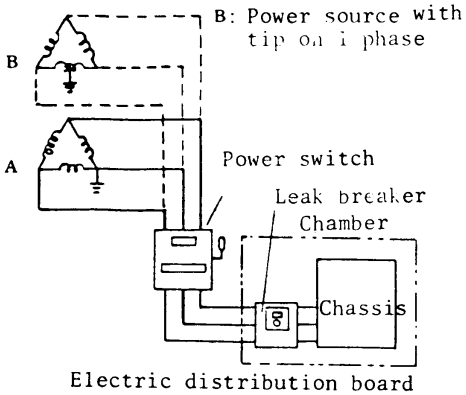
Electric Wiring Work

(1) In case of 3 phase 3-wire system power source

Connect the power cord (white colored) to the neutral conductor of the primary power source followed with connecting of the remaining power cords (red colored and black colored) to the non-grounding power sources of the primary power source. (Refer to Fig.)

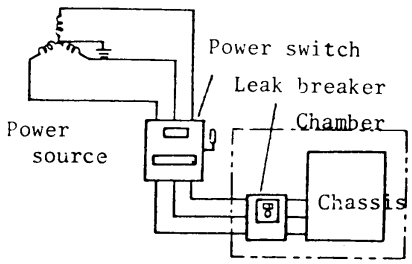
(2) In case of 3 phase 4-wire system power source

Connect the power cord to the 3 voltage wires of the primary power source. (Refer to Fig.)



Order of phases of power source in either case of A or B is without relation.

[3 phase 3 wire system]



[3 phase 4 wire system]

[Caution]

- Primary power source of which the voltage fluctuation is within AC 200V (*AC 220V) ±5% 3φ 50/60 Hz should be used.
- Always confirm the grounding wire in case when the primary power source is of 3 phase 3-wire system.
- Mount a power switch of the prescribed capacity between the primary power source and the chamber power cord by referring to the Power Source Facility Reference Table.

  * AC 220V is special specification.

Power Source Facility Reference Table

Model	Total Load Current (A)	Minimum C.S.A (cabtyre cable mm^2)	Capacity of Fuse (A)	Capacity of Primary Power Switch
MC-71	8.5	2	15	250V 15A
MC-81	12	3.5	15	250V 15A

Grounding Work

Connect the accessory grounding (wire dia. 2 mm^2 green colored) provided with a tip to the grounding terminal on back of the chamber, and connect the other end to the grounding wire or the terminal prepared by the user.
When there is no grounding wire prepared, ground by connecting with a city water pipe or by other means.

[Caution]

- Care shall be necessary when using a city water pipe as a grounding pole since there are cases that non-metallic pipes (PVC pipe) are used in between the piping in which case grounding cannot be done.
- Do not ground to a city gas pipe or LPG pipe.

2. Main Specifications

Product Name	ULTRA LOW TEMPERATURE CHAMBERS	
Model	MC - 71	MC - 81
Power Source	AC 200V ±10% 3ø 3 wire system 50/60 Hz	
Allowable Ambient Temperature for Operation	0 ∿ 40°C	
System	Balanced temperature control system (B.T.C. system)	
Performance	These performances are at the condition of power source AC 200V, ambient temperature of 20°C and non-loaded.	
Temperature Range	-75 ∿ +100°C	-85 ∿ +180°C
Temperature Constancy	±0.5°C	
Temperature Uniformity	±1.0°C	±1.0°C (At time of chamber temp. -85 ∿ +100°C) +2.0°C (At time of chamber temp. +101 ∿ +180°C)
Temperature Pull-down Time	+20 to -70°C approx. 60 min.	+20 to -80°C approx. 70 min.
Temperature Heat-up Time	+20 to +100°C approx. 20 min.	+20 to +180°C approx. 30 min.
Construction		
Exterior	Cold rolled and rust-proof steel plate baked with melamine resin coating	
Interior	Stainless Steel Plate SUS304CP class (2B polish finished)	
Insulation	Rigid polyurethane foam, glass wool, etc.	
Heater	Nichrome strip wire heater	
Cooler	Multi stage plate fin cooler	
Refrigerator	Hermetically sealed compressor (cascade refrigeration system)	
Temperature Controllor	Electronic non-indicating PI temperature controller (R-7659-C101) Sensor: Thermocouple E (CRC)	Electronic non-indicating PI temperature controller (R7659D) Sensor: Thermocouple E (CRC)
Temperature Indicator	Digital temperature indicator (DP-48CS) Sensor: Thermocouple T (CC)	
Air Circulator	Propeller fan 154ø mm four fans	

Product Name	ULTRA LOW TEMPERATURE CHAMBERS	
Model	MC - 71	MC - 81
Inside Dimensions	W40 x H40 x D40 (cm)	
Outside Dimensions	W90 x H98 x D60 (cm)	
Inside Volume	64 ℓ	
Net Weight	approx. 130 kg	approx. 135 kg

3. Accessory Parts

Standard Parts No.	Name	Applications	Q'ty
	Shelf Rack	Stainless steel	Large 3 Small 2
	Shelf	Stainless steel	2
PC-104	Earth Wire	2.5 m long 2.0 mm^2 sectional area	1
*PC-15	Power Cord (Cabtyre Cable)	5.8 m long 2.0 mm^2 sectional area	1
	Rubber Plug	Cable port blind plug	2
	Glass Fuse	Class A AC 250V 3A Control circuit, defrost circuit protection	1
	Room Lamp	24V 5W	1
	Temperature Fuse	MC - 71 119°C MC - 81 226°C	each 1
	External Alarm Connector	Plug 250V, 2P, 6A	1

Temperature Controller for Specification of Option

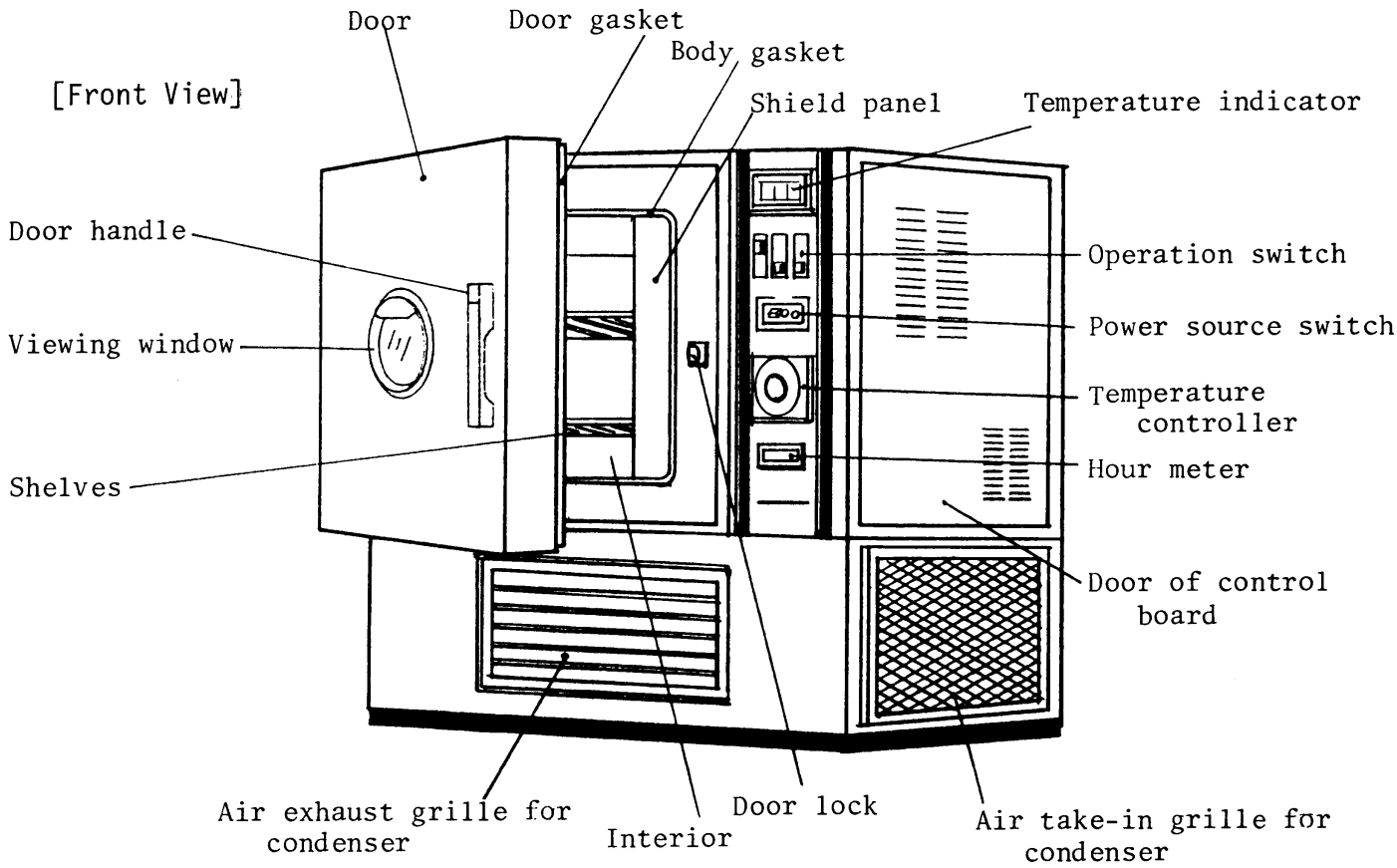
Electronic non-indicating PID temperature controller

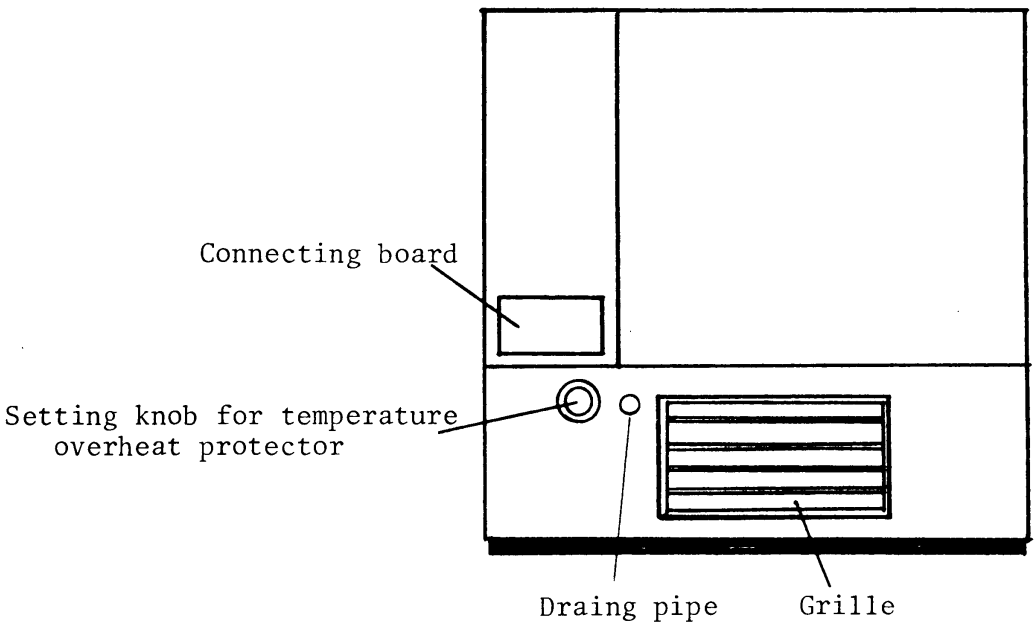
(NC-167TC)

Sensor: Thermocouple T (CC)

4. Name of Respective Parts

[Front View]





[Back View]

5. Explanation of Respective Parts

Main controls required for operation are described hereunder.

Temperature Controller

Temperature controller is equipped as described hereunder.

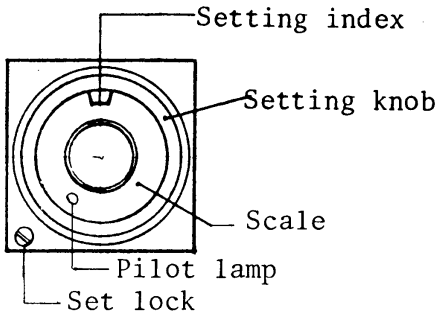
Electronic non-indicating PI temperature controller.

Type R-7659C101 ----- for model MC-71
Type R-7659D129 ----- for model MC-81

Optional specification

Electronic non-indicating PID temperature controller.

Type NC167 ---------- for model MC-81

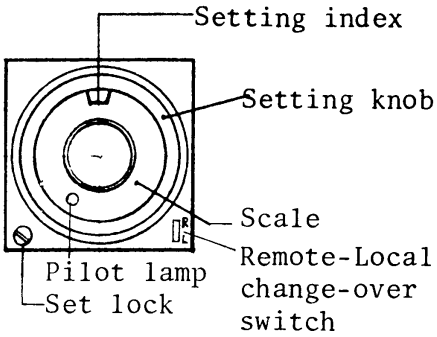


Type R7659C101

Type 7659C101

Only fixed value control is possible.

Program control is not possible.

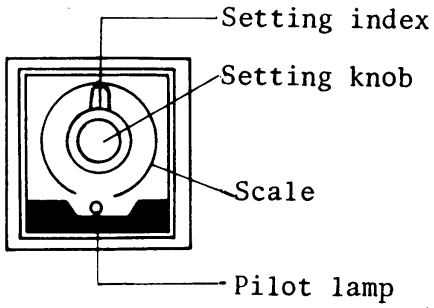


Type R7659D129

Type R7659D129

Program control is possible by use of the Monitor & Programming Unit.

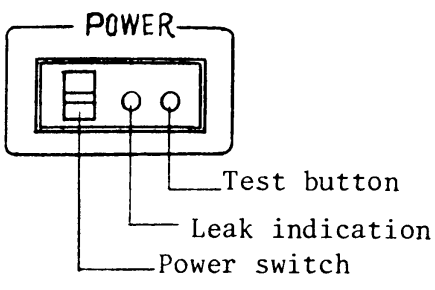
The remote/local select switch should be positioned to [LOCAL] when the Monitor & Programming Unit is not used or positioned to [REMOTE] when used.



Type NC167

Type NC167

Program control is possible by use of the Monitor & Programming Unit.



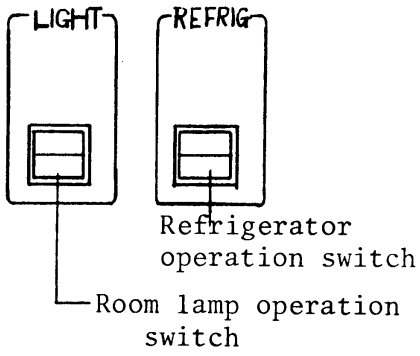
Operation Switch

POWER Switch

This switch is co-provided with the functions of ON-OFF of power to the chamber and as a leak breaker and circuit breaker.

When leaks take place, the "LEAK" button will jump out and shut off power to the chamber. However, power will similarly shut off when the "TEST" button is pushed and the "LEAK" button will jump out. The "TEST" button should be checked about once a month to confirm that it functions normally.

Furthermore, all power will be shut off when trouble takes place in the electric circuit of the chamber proper and overcurrent flows.

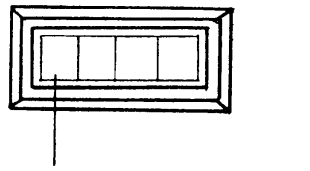


REFRIG (Refrigerator operation switch)

This switch serves to operate the refrigerator. When positioned to "ON", the refrigerator shall operate enabling the chamber to function as a low temperature chamber.

LIGHT (Room lamp operation switch)

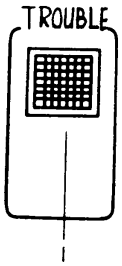
This switch serves to turn the room lamp on and off. In "ON" position the room lamp will turn on.


Digital thermometer

Indicator

Digital thermometer

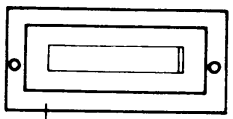
Digital thermometers are equipped on both the MC-71 and MC-81. Directly indicates the chamber temperature.



Trouble indication lamp

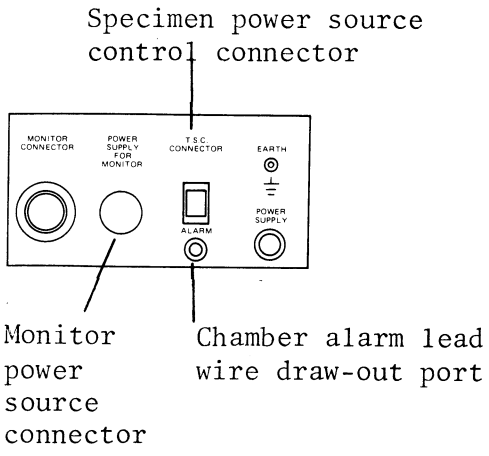
Trouble lamp

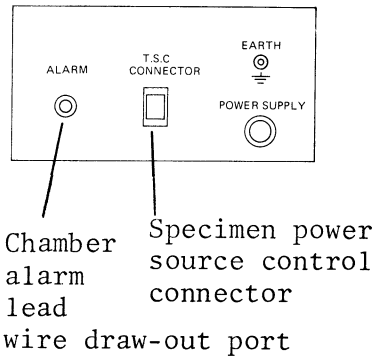
This lamp will light at time when safety devices equipped on the chamber function to indicate abnormal states of the chamber.


Hour meter

Hour meter

Serves to indicate the working hours of the chamber. Functions from time of initial switching on of power and successively integrates the working hours in accordance with the functions of operation and stop.





Connector

Connector for Monitor Connection (Only MC-81)

In case the Monitor & Programming Unit is used, connect the cord to this connector.

Power source connector for Monitor (Only MC-81)

In case the Monitor & Programming Unit is used, connect the power source plug of the Monitor & Programming Unit to this socket.

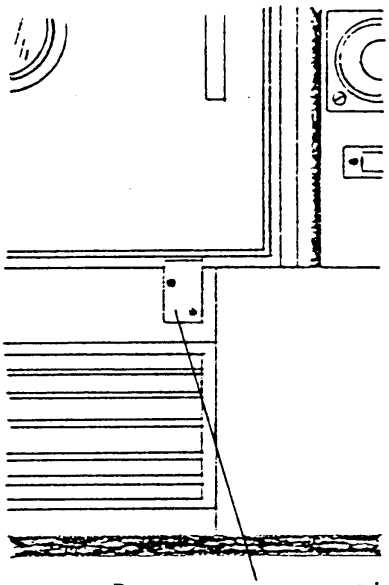
Connector for specimen power source control

This connector is built in the safety circuit of the chamber and interlocks when the safety devices function making it possible to transmit the signal to the outside.

Chamber alarm lead wire draw-out port

This lead wire port is used at time of joint use of the later described specimen power controller and the alarm signal device.

6. Manner to Operate



Matters to be Confirmed Prior to Operation

Confirmation of Installation

Confirm if the matters of installation stated under "Condition of Installation Site" are completed.

How to Remove Door Say Prevention Metal Piece

A metal piece is fastened under the door to prevent the door from sagging during transportation. Always remove it by unsrewing the screws prior to opening of the door.

Procedure of Operation

Carefully reak the separate instruction manual on "TEMPERATURE CONTROLLERS" prior to operation.

Local (Fixed Value) Temperature Control

1. Set the dial of the temperature controller to the desired temperature.
2. Place the power source switch into "ON" position.
3. In case the required temperature is higher than the ambient temperature plus 10 deg., place the "REFRIG" switch in "OFF" position. When lower, place the refrigeration switch into "ON" position.
   In addition, when rapid cool down from high temperature to low temperature range is required, place the refrigeration switch into "ON" position.
   In the case of remote control (only Model MC-81) read instructions given in the "Instruction Manual for Monitor & Programming Unit".

Attention in Use

1. Repeated ON-OFF manipulation of within less than 5 minute intervals of the "REFRIG" switch should be avoided.
2. Continuous use of the refrigeration switch in

"ON" state in case of ambient temperature in the exess of 35°C or temperature setting in the exess of ambient temperature plus 10 deg. should be avoided.

3. Specimens producing strong alkaline gas, inorganic acid and combustible objects should not be placed inside the test chamber.

Note) "Manner to Operate" shows standard mode of operation when non-loaded and without specimens.

7. Safety Devices

The safety devices serve to protect the equipment and specimens in the event abnormalities take place in the control system.
Safety devices such as overheat protector, motor overload relay, temperature switch for ventilator protection, high-speed breaker for AC thyristor protection are provided.
The test chamber becomes of the following state in the event safety devices function and this state is maintained until the switch is placed into "OFF" position.

1. Control circuits and load circuits are shut off.
2. "TROUBLE" lamp lights (This abnormal signal can also be remotely indicated. Refer to Alarm Signal Device on page 13)
3. The digital temperature indicator continues to function.

In case of resuming operation, place the "POWER" switch into "OFF" position and follow the sequence of operation after eliminating the cause for functioning of safety devices.

Overheat Protector

The overheat protector of the Model MC-71 is set at 110°C and the Model MC-81 is set at 190°C, which can respectively be changed in setting between the range of 15 ∿ 120°C, and 90 ∿ 200°C. In case of changing the setting,

it should be set 10 deg. higher than the set value of the temperature controller.

Motor Overload Relay

This relay functions in the event the motor of the refrigerator becomes over-loaded. The functioning current value is pre-set and should not be changed. In case of functioning of over-load relay, push the re-set knob in order to re-set.

Temperature Switch for Air Circulator Protection

Functions when the air circulator motor over-heats due to overloaded operation.

Other Safety Devices

The following safety devices are provided in addition to the forestated safety devices. Alarm (trouble) lamp, however, will not function when these safety devices function.

Burn out Circuit of Temperature Controller

This circuit is built in the input circuit of the controller thermocouple and functions so that electricity is disconnected from the heater when the sensor breaks.

Fuse (F_1)

Blows when over-current flows due to troubles taking place in the electric circuit of the chamber proper so that operation of various equipment is suspended.

Temperature Fuse (F_2)

Blows and shuts off the heater circuits when the heaters overheat due to suspension of air circulation inside the chamber caused by trouble of the air circulator or when circula-

tion of air inside the chamber is excessively obstructed due to loading of extremely large specimens.

How to Use the Specimen Power Controller and the Alarm Device

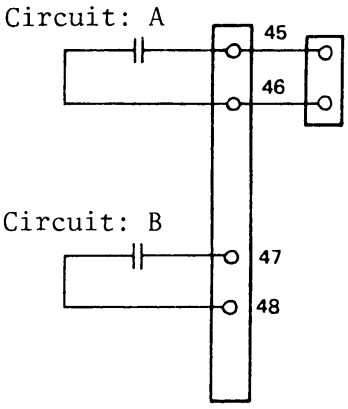
These devices are built-in the safety circuit of the chamber making it possible to transmit the signal to the outside in cases of functioning of safety devices.

The signal is made to be transmittable to the outside by using the connector provided on the backside of the chamber.

It is extremely dangerous to stop operation of the chamber in case of testing while supplying electricity to specimens, therefore, use only after acquiring full knowledge of the following described functions of the circuits.

Specimen power controller (A circuit)

The circuit between 45 and 46 is of connected state during normal operation of the chamber. The circuit between terminals 45 and 46 assumes the open state when safety device of the chamber function. (Refer to Fig.)



T.S.C. connector

Alarm signal device (B circuit)

The circuit between 47 and 48 of the terminals is of open state during normal operation of the chamber. The circuit between 47 and 48 of the terminals assumes the connected state when safety devices of the chamber function.

[Caution]

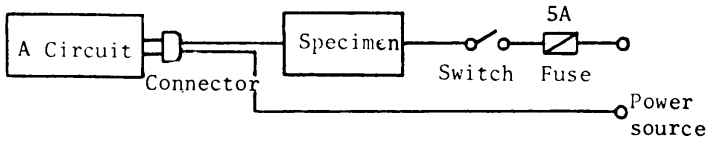
Connection of the connector and the terminals consist of the A circuit with all chambers delivered.

Changing to B circuit and use of counter functioning terminals are done by changing the wiring of the terminal board on the chassis

inside the control panel.

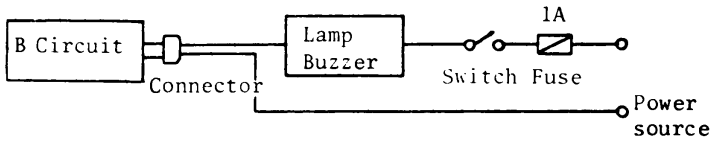
[Example of Application]

Example 1)



The above diagram is an example of the specimen power circuit connected to A circuit.
In this case, power to specimens is shut off when the chamber stops.

Example 2)

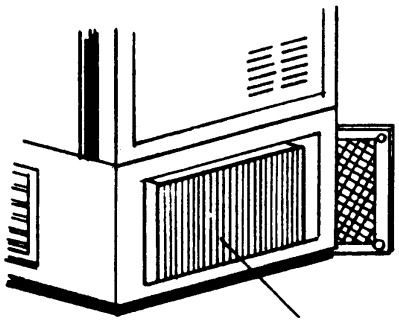


The above diagram is an example of the lamp or buzzer circuit connected to B circuit.
In this case, the buzzer will ring or the lamp will light when the chamber stops.

[Caution]

The rated electric capacity of A and B circuits is respectively up to AC 250V 5A for A circuit and AC 250V 1A for B circuit making it necessary to place attention to the electric capacity of respective devices to be connected to the secondary side from the connector.
Furthermore, it is recommended to use a magnetic switch, etc. and connect its exciter circuit to A circuit or to B circuit in the case of electric capacity in the excess of the rating.

8. Maintenance & Inspection



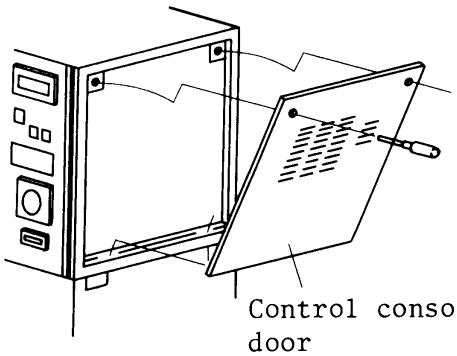
Condenser fin

Cleaning of condenser (every month)

Heat exchange becomes poor when dust accumulates onto the fins of the condenser. As a result, the efficiency of the refrigerator drops and in the extreme case the refrigerator may become inoperative, therefore, periodic cleaning should be observed.

Function of temperature overheat protector (every month)

Function of leak breaker (every month)



Control console door

How to remove of the control console door

Cleaning of inside chamber (prior to operation)

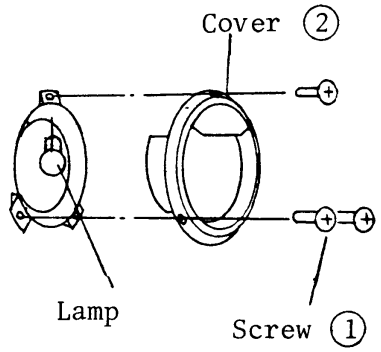
Clean by wiping with cloth.

Cleaning of control console inside (once every year)

Clean by sucking dust with an electric vacuum cleaner.

Cleaning of exterior (once every year)

Clean by wiping with cloth.



Room lamp

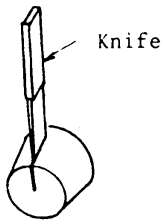
Replacement of the room lamp should be done in the following procedure.

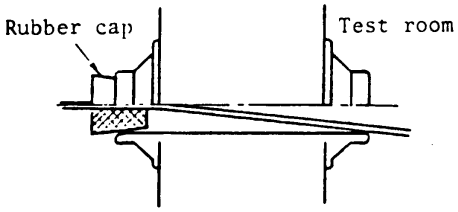
Turn the "LIGHT" switch "OFF", unscrew the screws ① securing the cover of the viewing window and take off the cover ② by which the lamp and socket are uncovered making it possible to replace the lamp.

How to use the Cable Port Rubber Plug (Accessory)

Forsting and dew drops will form around the vicinity of the flange when low temperature operation is performed by putting cables and others through the cable port and without applying a cap or frosting phenomenon of the cooler may take place to cause a drop in cooling efficiency to impart adverse effects onto the compressor. The accessory rubber plug should be used in order to prevent such troubles.

(Example of Use 1)

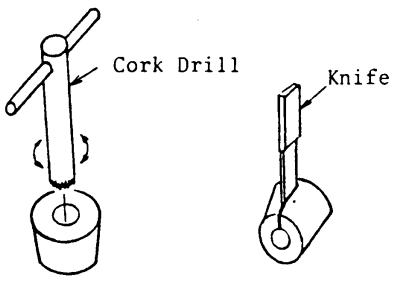


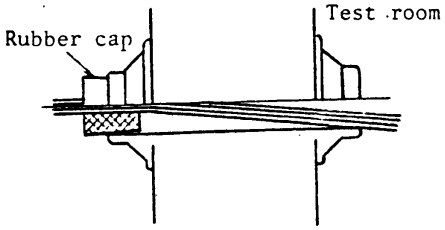


Example of Use 1)

In the case of insertion of parallel vinyl wires (100V, 15A) and slender lead wires into the chamber, slit the rubber plug to only half of the diameter, put the lead wires into the slit and pass through the cable port as shown in the sketch.

(Example of Use 2)

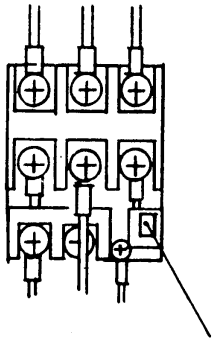
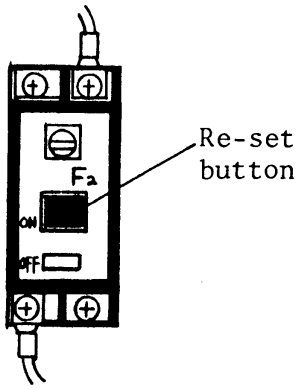


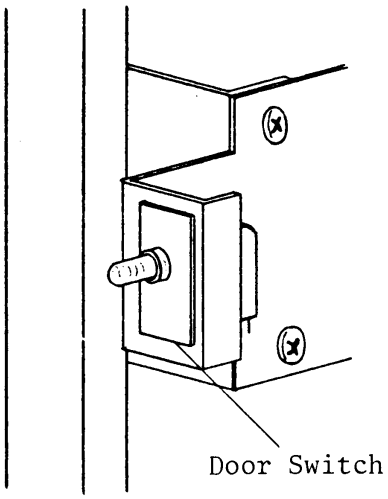
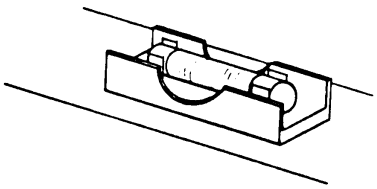


Example of Use 2)

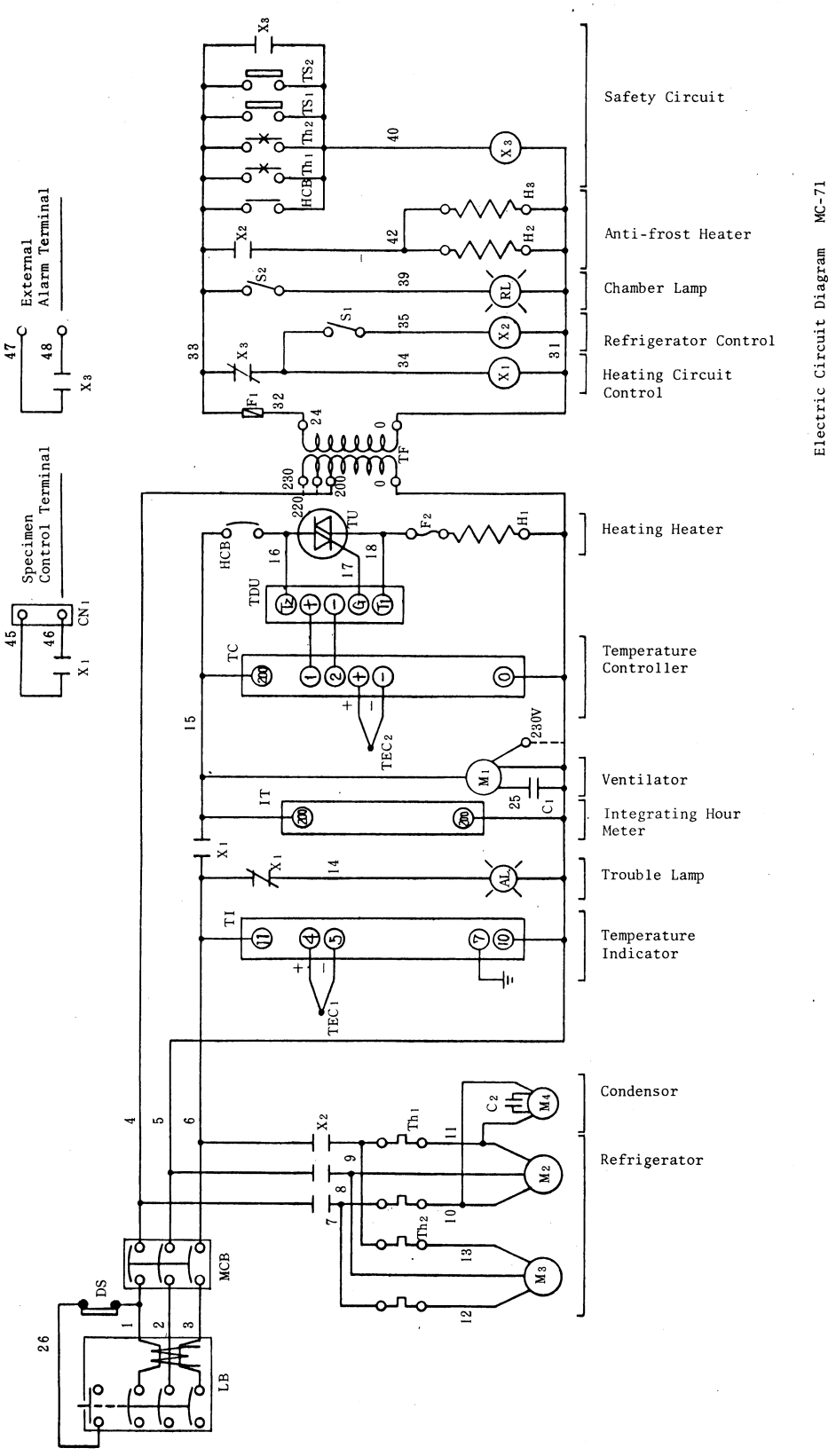
When the number of wires is large or when the wires cannot be put through the slit, open a hole in the rubber plug with use of a boring drill followed with cutting open with a knife and putting the wires through the hole and through the cable port as shown in the sketch.

9. Trouble Shooting

Abnormal State	Place to Check	Treatment
Trouble lamp lights	Check if the overheat protector has functioned.	Refer to the section on "Safety Devices" and check the set temperature.
	Check if the motor overload relay has functioned.  Re-set button	Push the re-set knob after cleaning the fins of the condenser. Furthermore, confirm that specimens generating heat in excess of the permissable load are not placed inside the chamber.
	Check if the thyristor overload & short circuit protection breaker has functioned. 	Push the "ON" switch button
"POWER" switch does not switch "ON"	Check if the "LEAK" button has jumped out.	Find the leak place and take necessary measures when the "LEAK" button has jumped out.

Abnormal State	Place to Check	Treatment
"POWER" switch does not switch "ON"	Check if the switch of control console door has functioned. 	Properly close the control console door.
Chamber does not operate even when the "POWER" switch is switched "ON"	Check if the operation circuit overload & short circuit protection fuse has blown. 	Exchange with accessory fuse.

Electric Circuit Diagram



部 品 明 細 書 (PARTS LIST)

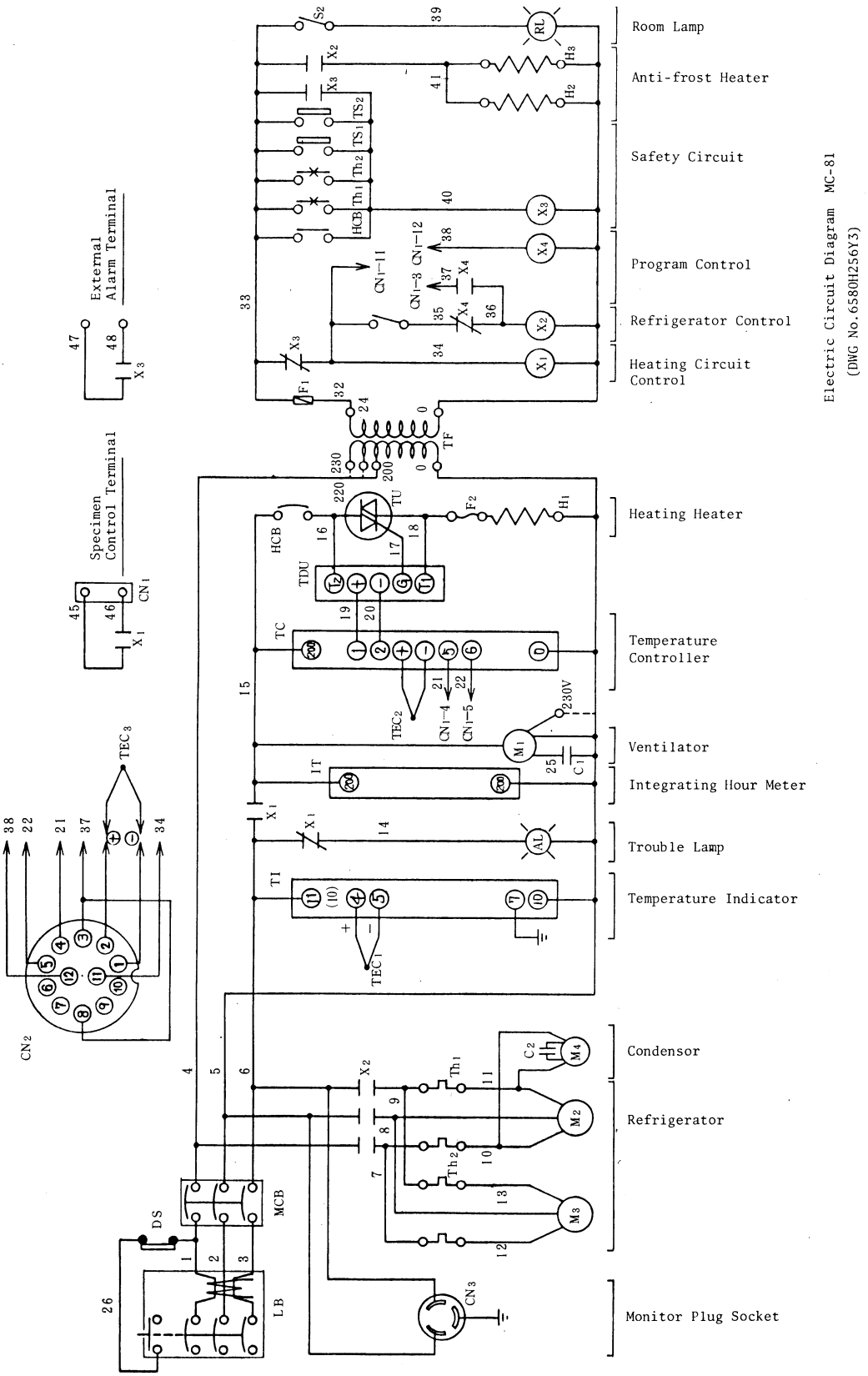
製品名 PRODUCTS NAME	MINI SUBZERO	型式 TYPE	MC − 71	No.	6580H251Y3	1/2

番号 No.	記号 Mark	名称 Name	仕様 Specification	数量 Q'ty	備考 Remark
	LB	Electric Leakage Breaker	AC220V 3P 30A sensing current	1	power operation and leak, electric
			30 mA		shock and over current protection
				1	
	S_1	Corrugated Switch	AC250V 3A 2 poles double throw	1	refrigerator operation
	S_2	Corrugated Switch	AC125V 6A single pole double throw	1	chamber lamp operation
	DS	Door Switch	AC250V 0.5A single pole	1	power shut off at time of opening
					of distribution board door
	TS_1	Fluid Pressure Thermal Switch	15 ∿ 120°C single pole	1	overheat protection
	TS_2	Thermal Switch	On at 120°C single pole	1	air circulator overheat protection
			belong to M_1		
	HCB	Molded Case Circuit Breaker	high speed type AC220V 1P 7A	1	thyristor overcurrent protection
	TI	Digital Temperature Indicator	AC200/230V C.C -100 ∿ 199°C	1	chamber temperature indication
	TEC_1	Thermocouple	C.C belong to temperature sensor	1	chamber temperature detection
					(for indicator)
	TC	Temperature Controller	AC200V (220V) CR.C -80 ∿ 100°C	1	chamber temperature control
			PI control		
	TEC_2	Thermocouple	CR.C belong to temperature sensor	1	chamber temperature detector
					(for controller)
	TU	Thyristor Unit	AC200V(230V) 10A	1	heater control
	TDU	Thyristor Driving Unit	AC200V(230V) zerovolt switch type	1	thyristor control
	IT	Integrating Hour Meter	AC220V 50/60 Hz 99999.9 Hr.	1	running hour integral indication
	H_1	Heater	200V(230V) 700W	1	for chamber heating
	H_2	Cord Heater	24V 16W silicone cord heater	1	for defrosting of viewing window
	H_3	Cord Heater	24V 16W silicone cord heater 14Ω/m	1	for defrosting of door
	M_1	Motor	AC200/230V 1ϕ 10W	1	ventilation of inside of chamber
	M_2	Compressor	AC200V(230V) 3ϕ 600W	1	high temp. side of refrigerator
			Refrigerant R12		
	M_3	Compressor	AC200V(230V) 3ϕ 400W	1	low temp. side of refrigerator
			Refrigerant R13		
	M_4	Motor	AC200V(230V) 1ϕ 12W	1	for condenser fan
	C_1	Condenser	belong to M_1	1	for operation of M_1
	C_2	Condenser	belong to M_4	1	for operation of M_4
	AL	Pilot Lamp	AC220V red neon globe	1	trouble indication
	RL	Room Lamp	incandescent lamp 24V 5W swan type	1	for lighting of inside of chamber
	TF	Transformer	230, 220, 200V/24V 2.5A	1	for power of control circuit
	X_1	Relay	coil AC24V 2 poles 10A	1	heater circuit control
	X_2	Electric Magnetic Switch	Coil AC24V 4 poles 15A	1	refrigerator control
			belong to Th_1		
	X_3	Relay	Coil AC24V 2 poles 3A	1	safety circuit
	Th_1	Thermal Relay	belong to X_2 2E 3.5A single pole	1	refrigerator (M_2) safety

部 品 明 細 書 (PARTS LIST)

製品名 PRODUCTS NAME	MINI SUBZERO	型式 TYPE	MC − 71	No.	6580H251Y3	2/2

番号 No.	記号 Mark	名称 Name	仕様 Specification	数量 Q'ty	備考 Remark
	Th_2	Thermal Relay	2E 2.1A single pole	1	refrigerator (M_3) safety
	F_1	Fuse	glass tube 3A	1	control circuit protection
	F_2	Thermal Fuse	119°C	1	chamber overheat protection
	CN_1	Square Type Plug Socket	AC250V 2P 6A	1	for connecting with specimen control terminal


Room Lamp
Anti-frost Heater
Safety Circuit
Program Control
Refrigerator Control
Heating Circuit Control
Heating Heater
Temperature Controller
Ventilator
Integrating Hour Meter
Trouble Lamp
Temperature Indicator
Condensor
Refrigerator
Monitor Plug Socket
External Alarm Terminal
Specimen Control Terminal
Electric Circuit Diagram MC-81
(DWG No.6580H256Y3)

部 品 明 細 書 (PARTS LIST)

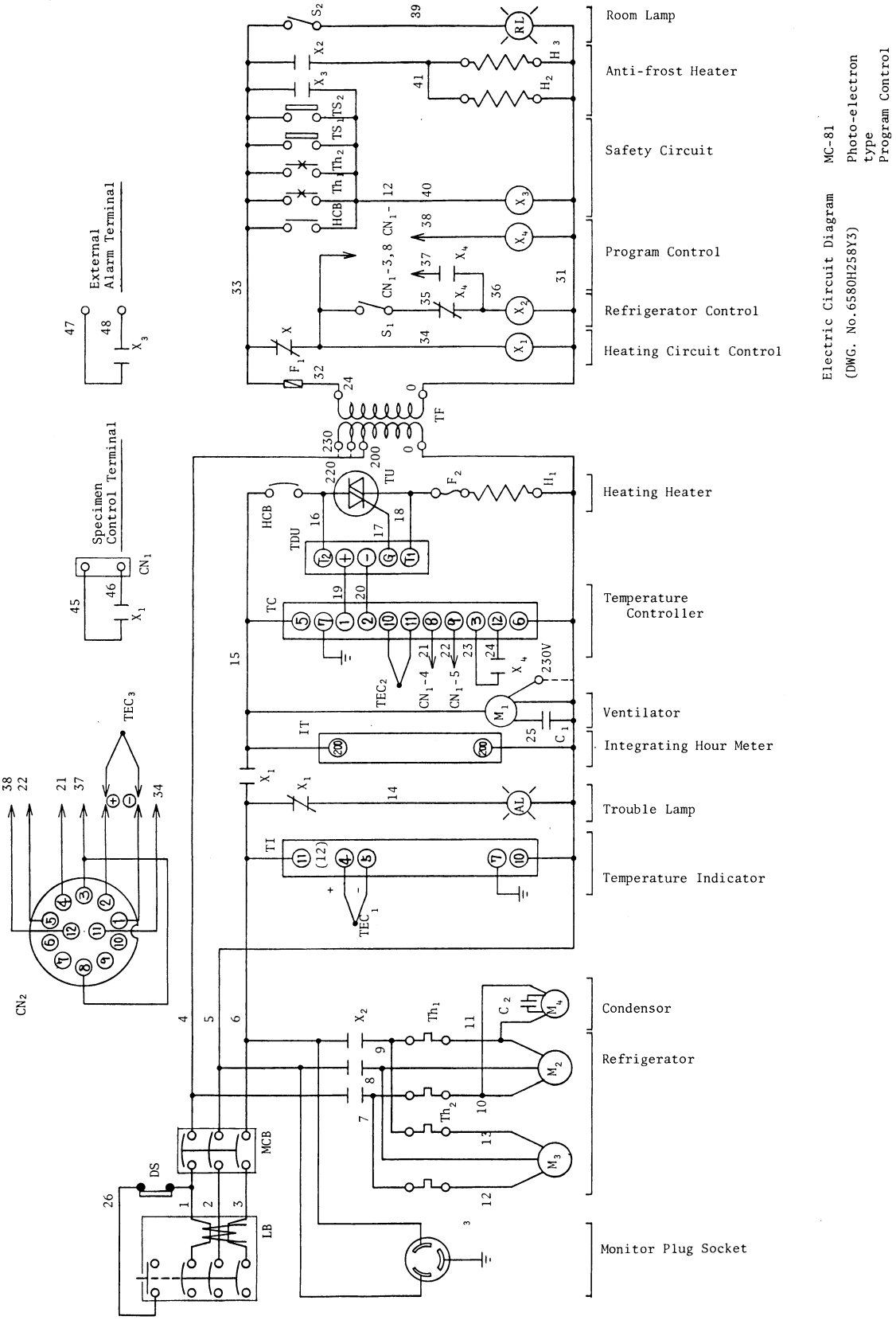
製品名 PRODUCTS NAME	MINI SUBZERO	型式 TYPE	MC − 81	No.	6580H256Y3	1/2

番号 No.	記号 Mark	名称 Name	仕様 Specification	数量 Q'ty	備考 Remark
	LB	Electric Leakage Breaker	AC220V 3P 30A sensing current 30 mA	1	power operation and leak, electric shock and over current protection
	S_1	Corrugated Switch	AC250V 3A 2 poles double throw	1	refrigerator operation
	S_2	Corrugated Switch	AC125V 6A single pole double throw	1	chamber lamp operation
	DS	Door Switch	AC250V 0.5A single pole	1	power shut off at time of opening of distribution board door
	TS_1	Fluid Pressure Thermal Switch	80 ∿ 300°C single pole	1	overheat protection
	TS_2	Thermal Switch	On at 120°C single pole belong to M_1	1	air circulator overheat protection
	HCB	Molded Case Circuit Breaker	high speed type AC220V 1P 7A	1	thyristor overcurrent protection
	TI	Digital Temperature Indicator	AC200/230V C.C -100 ∿ 300°C	1	chamber temperature indication
	TEC_1	Thermocouple	C.C belong to temperature sensor	1	chamber temperature detection (for indicator)
	TC	Temperature Controller	AC200V(220V) CR.C -85 ∿ 180°C PI control	1	chamber temperature control
	TEC_2	Thermocouple	CR.C belong to temperature sensor	1	chamber temperature detection (for controller)
	TU	Thyristor Unit	AC200V(230V) 10A	1	heater control
	TDU	Thyristor Driving Unit	AC200V(230V) zerovolt switch type	1	thyristor control
	IT	Integrating Hour Meter	AC220V 50/60 Hz 99999.9 Hr.	1	running hour integral indication
	H_1	Heater	200V(230V) 1 KW	1	for chamber heating
	H_2	Cord Heater	24V 16W silicone cord heater	1	for defrosting of viewing window
	H_3	Cord Heater	24V 16W silicone cord heater 14Ω/m	1	for defrosting of door
	M_1	Motor	AC200/230V 1ø 10W	1	ventilation of inside of chamber
	M_2	Compressor	AC200V(230V) 3ø 750W Refrigerant R12	1	high temp. side of refrigerator
	M_3	Compressor	AC200V(230V) 3ø 600W Refrigerant R13	1	low temp. side of refrigerator
	M_4	Motor	AC200V(230V) 1ø 12W	1	for condenser fan
	C_1	Condenser	belong to M_1	1	for operation of M_1
	C_2	Condenser	belong to M_4	1	for operation of M_4
	AL	Pilot Lamp	AC220V red neon globe	1	trouble indication
	RL	Room Lamp	incandescent lamp 24V 5W swan type	1	for lighting of inside of chamber
	TF	Transformer	230, 220, 200V/24V 2.5A	1	for power of control circuit
	X_1	Relay	Coil AC24V 2 poles 10A	1	heater circuit control
	X_2	Electric Magnetic Switch	Coil AC24V 4 poles 20A	1	refrigerator control
	X_3	Relay	Coil AC24V 2 poles 3A	1	safety circuit
	X_4	Relay	Coil AC24V 2 poles 3A	1	program control changeover control

部 品 明 細 書 (PARTS LIST)

製品名 PRODUCTS NAME	MINI SUBZERO	型式 TYPE	MC − 81	No.	6580H256Y3	2/2

番号 No.	記号 Mark	名称 Name	仕様 Specification	数量 Q'ty	備考 Remark
	Th_1	Thermal Relay	belong to X_2 2E 4.6A single pole	1	refrigerator (M_2) safety
	Th_2	Thermal Relay	2E 3.5A single pole	1	refrigerator (M_3) safety
	F_1	Fuse	glass tube 3A	1	control circuit protection
	F_2	Thermal Fuse	119°C	1	chamber overheat protection
	CN_1	Square Type Plug Socket	AC250V 2P 6A	1	for connecting with specimen control terminal
	CN_2	Metal Connector	8P + 4P of thermocouple	1	monitor & programming unit connecting
	CN_3	Hook Type Plug Socket	AC250V 3P 10A	1	monitor & programming unit power
	TEC_3	Thermocouple	C.C belong to temperature sensor	1	chamber temperature detecting (for monitor)


Room Lamp
Anti-frost Heater
Safety Circuit
Program Control
Refrigerator Control
Heating Circuit Control
Heating Heater
Temperature Controller
Ventilator
Integrating Hour Meter
Trouble Lamp
Temperature Indicator
Condensor
Refrigerator
Monitor Plug Socket
External Alarm Terminal
Specimen Control Terminal
Electric Circuit Diagram
(DWG. No.6580H258Y3)
MC-81
Photo-electron type Program Control

部 品 明 細 書 (PARTS LIST)

製品名 PRODUCTS NAME	MINI SUBZERO	型式 TYPE	MC − 81 For Program Controller	No.	6580H258Y3	1/2

番号 No.	記号 Mark	名称 Name	仕様 Specification	数量 Q'ty	備考 Remark
	LB	Electric Leakage Breaker	AC220V 3P 30A sensing current 30 mA	1	power operation and leak, electric shock and over current protection
	S_1	Corrugated Switch	AC250V 3A 2 poles double throw	1	refrigerator operation
	S_2	Corrugated Switch	AC125V 6A single pole double throw	1	chamber lamp operation
	DS	Door Switch	AC250V 0.5A single pole	1	power shut off at time of opening of distribution board door
	TS_1	Fluid Pressure Thermal Switch	80 ∿ 300°C single pole	1	overheat protection
	TS_2	Thermal Switch	On at 120°C single pole belong to M_1	1	air circulator overheat protection
	HCB	Molded Case Circuit Breaker	high speed type AC220V 1P 7A	1	thyristor overcurrent protection
	TI	Digital Temperature Indicator	AC200V(230V) C·C -100 ∿ 300°C	1	chamber temperature indication
	TEC_1	Thermocouple	C·C belong to temperature sensor	1	chamber temperature detection (for indicator)
	TC	Temperature Controller	AC200/230V C·C -85 ∿ 180°C	1	chamber temperature detection (for controller)
	TEC_2	Thermocouple	C·C belong to temperature sensor	1	chamber temperature detection (for controller)
	TU	Thyristor Unit	AC200V(230V) 10A	1	heater control
	TDU	Thyristor Driving Unit	AC200V(230V) phase control type	1	thyristor control
	IT	Integrating Hour Meter	AC220V 50/60 Hz 99999.9 Hr.	1	running hour integral indication
	H_1	Heater	200V(230V) 1KW	1	for chamber heating
	H_2	Cord Heater	24V 16W silicone cord heater	1	for defrosting of viewing window
	H_3	Cord Heater	24V 16W silicone cord heater 14 Ω/m	1	for defrosting of door
	M_1	Motor	AC200/230V 1ø 10W	1	ventilation of inside of chamber
	M_2	Compressor	AC200V(230V) 3ø 750W Refrigerant R12	1	high temp. side of refrigerator
	M_3	Compressor	AC200V(230V) 3ø 600W Refrigerant R13	1	low temp. side of refrigerator
	M_4	Motor	AC200V(230V) 1ø 12W	1	for condenser fan
	C_1	Condenser	belong to M_1	1	for operation of M_1
	C_2	Condenser	belong to M_4	1	for operation of M_4
	AL	Pilot Lamp	AC220V red neon globe	1	trouble indication
	RL	Room Lamp	incandescent lamp 24V 5W swan type	1	for lighting of inside of chamber
	TF	Transformer	230, 220, 220V/24V 2.5A	1	for power of control circuit
	X_1	Relay	coil AC24V 2 poles 10A	1	heater circuit control
	X_2	Electric Magnetic Switch	Coil AC24V 4 poles 20A belong to Th_1	1	refrigerator control
	X_3	Relay	Coil AC24V 2 poles 3A	1	safety circuit
	X_4	Relay	Coil AC24V 2 poles 3A	1	program control changeover control

部 品 明 細 書 (PARTS LIST)

製品名 PRODUCTS NAME	MINI SUBZERO	型式 TYPE	MC − 81 For Program Controller	No.	6580H258Y3	2/2

番号 No.	記号 Mark	名称 Name	仕様 Specification	数量 Q'ty	備考 Remark
	Th_1	Thermal Relay	belong to X_2 2E 4.6A single pole	1	refrigerator (M_2) safety
	Th_2	Thermal Relay	2E 3.5A single pole	1	refrigerator (M_3) safety
	F_1	Fuse	glass tube 3A	1	control circuit protection
	F_2	Thermal Fuse	226°C	1	chamber overheat protection
	CN_1	Square Type Plug Socket	AC250V 2P 6A	1	for connecting with specimen control terminal
	CN_2	Metal Connector	8P + 4P of thermocouple	1	monitor & programming unit connecting
	CN_3	Hook Type Plug Socket	AC250V 3P 10A	1	monitor & programming unit power
	TEC_3	Thermocouple	C·C belong to temperature sensor	1	chamber temperature detecting (for monitor)

MINI SUBZERO

MC - 71, MC - 81 INSTRUCTION MANUAL M83005A

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