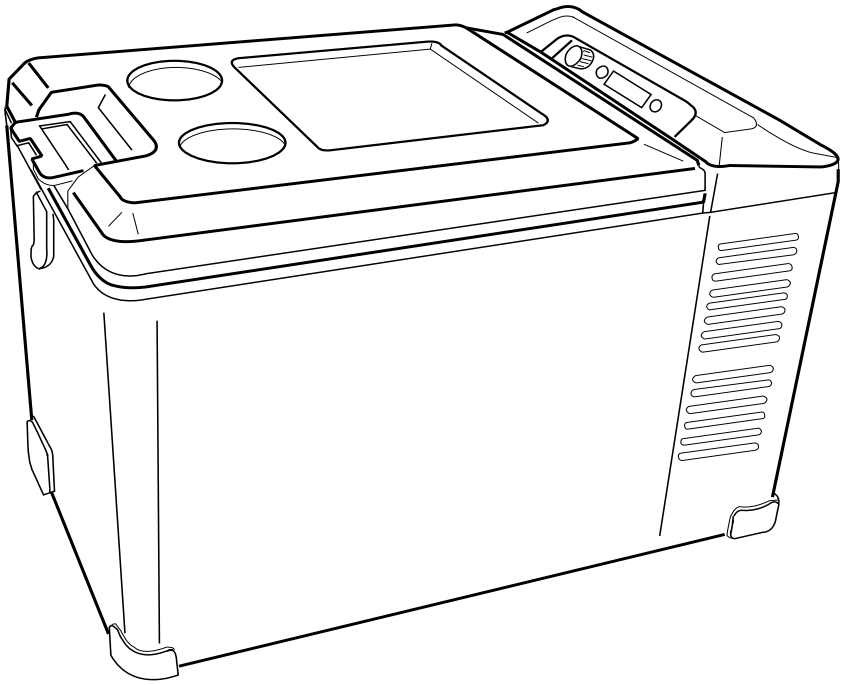
ENGEL

SERVICE MANUAL

MODEL (Digital display type) :

MT35F-G4-P	**0642 032 0T60**
MT35F-U1D-P	**0642 032 0310**
MT45F-G4-G	**0642 042 0T52**
MT45F-G4-P	**0642 042 0T60**
MT45F-U1D-P	**0642 042 0R40**
MT45F-G4-L	**0642 042 0T70**



SAWAFUJI ELECTRIC CO.,LTD.

2020. 02
#1

This service manual describes maintenance procedures for ENGEL refrigerator.

This manual is intended for repair engineers who are familiar with basics service skills and knowledge for ENGEL refrigerator.

This manual does not guarantee correct maintenance when service is done by a non-skilled worker without technical knowledge.

Note that the content of this booklet including product specifications is subject to change for improvement without notice.

● FOR REFRIGERATOR USERS

- Failing to service properly may result in poor reliability of the refrigerator.
- Read this booklet carefully and perform servicing with great care.
- Always comply with the procedures, directions, and work tips in this booklet when servicing the refrigerator.

● FOR SAFETY OF YOURSELF

- To secure safe and correct servicing, read this manual thoroughly in advance and check if there are protective equipment and appropriate tools and service parts ready as well as technical skills necessary to perform servicing.

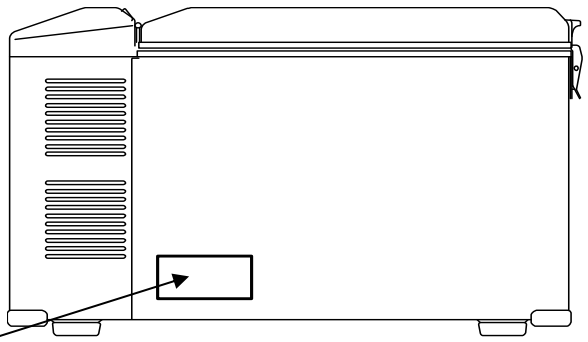
● SAFETY SYMBOLS

- The following warning labels in this booklet indicate precautions for service work. Comply with what each symbol indicates whenever it appears.

⚠ WARNING	May lead to death or serious injury if failed to comply with this precaution
⚠ CAUTION	May lead to injury if failed to comply with this precaution
WORK TIPS	Lead to failure of the refrigerator set or its components if failed to comply with this precaution

● REFRIGERATOR CODE NUMBERS

- This manual is compatible with described model in below. Please check refrigerator model name and number in lable . (Lable place as picture)



NUMBER	MODEL NAME
0642 032 0T60	MT35F-G4-P
0642 032 0310	MT35F-U1D-P
0642 042 0T52	MT45F-G4-G
0642 042 0T60	MT45F-G4-P
0642 042 0R40	MT45F-U1D-P
0642 042 0T70	MT45F-G4-L

CONTENTS

1. SPECIFICATIONS

■ Specifications Table

MODEL		MT35F-G4-P	MT45F-G4-G	MT45F-G4-P	MT45F-G4-L
MODEL CODE		0642 032 0T60	0642 042 0T52	0642 042 0T60	0642 042 0T70
STORAGE VOLUME	ℓ (liter)	32	40		
EXTERIOR DIMENSIONS W×H×D ※1	in	14.3×16.1×25.5	14.3×20×25.5		
	mm	364×408×648	364×508×648		
INTERIOR DIMENSIONS W×H×D ※1	in	10.6×10.6×15	10.6×14.6×15		
	mm	270×270×380	270×370×380		
OUTER ENCLOSURE	CABINET	Painted steel plate			
	DOOR				
INNER ENCLOSURE	CABINET	A.B.S.Resin			
	DOOR				
HEAT INSULATOR	DOOR	Foamed Polyurethane (Cyclopentane)			
	CABINET				
INPUT VOLTAGE	AC	240V			
	DC	12/24V			
RATED AMPERAGE	DC12V	2.6A			
	DC24V	1.3A			
	AC	0.35A			
INPUT VOLTAGE RANGE OF POWER SUPPLY	DC	11V～32V			
COMPRESSOR MODEL		SK511P (K3)			
COMPRESSOR RATING		AC 15V, 1.8A, 27W			
REFRIGERANT		HFC-134a			
AVERAGE INNER TEMPERATURE ※2		8℃±3℃ by Thermostat control NOTCH 1			
TEMPERATURE CONTROL NOTCH 5 OR FREEZE ※2		−18 ℃ or lower			
TEMPERATURE CONTROL		Automatic temperature control by dial setting (Electronic thermostat control type)			
WEIGHT	LBS.	46.3	52.9		
	Kg	21	24		

※1 We took the largest mesurement (including latch and handles)

※2 At an ambient temperature of 30℃ with the refrigerator door closed

1. SPECIFICATIONS

■ Specifications Table

MODEL		MT35F-U1D-P	MT45F-U1D-P
MODEL CODE		0642 032 0310	0642 042 0R04
STORAGE VOLUME	ℓ (liter)	32	40
EXTERIOR DIMENSIONS W×H×D ※1	in	14.3×16.1×25.5	14.3×20×25.5
	mm	364×408×648	364×508×648
INTERIOR DIMENSIONS W×H×D ※1	in	10.6×10.6×15	10.6×14.6×15
	mm	270×270×380	270×370×380
OUTER ENCLOSURE	CABINET	Painted steel plate	
	DOOR		
INNER ENCLOSURE	CABINET	A.B.S.Resin	
	DOOR		
HEAT INSULATOR	DOOR	Foamed Polyurethane (Cyclopentane)	
	CABINET		
INPUT VOLTAGE	AC	120V	
	DC	12/24V	
RATED AMPERAGE	DC12V	2.5A	
	DC24V	1.3A	
	AC	0.71A	
INPUT VOLTAGE RANGE OF POWER SUPPLY	DC	11V～32V	
COMPRESSOR MODEL		SK511P (K3)	
COMPRESSOR RATING		AC 15V, 1.8A, 27W	
REFRIGERANT		HFC-134a	
AVERAGE INNER TEMPERATURE ※2		8℃±3℃ by Thermostat control NOTCH 1	
TEMPERATURE CONTROL NOTCH 5 OR FREEZE ※2		−18 ℃ or lower	
TEMPERATURE CONTROL		Automatic temperature control by dial setting (Electronic thermostat control type)	
WEIGHT	LBS.	46.3	52.9
	Kg	21	24

※1 We took the largest mesurement (including latch and handles)□

※2 At an ambient temperature of 30℃ with the refrigerator door closed

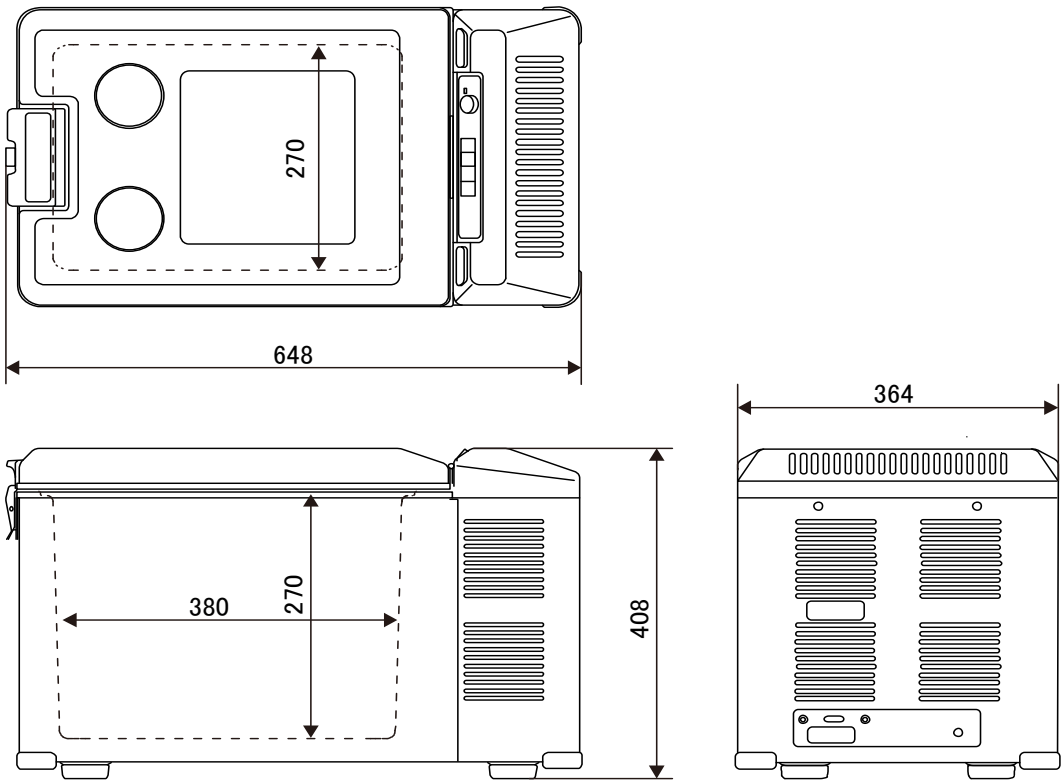
1. SPECIFICATIONS

■ Exterior / Interior Dimensions

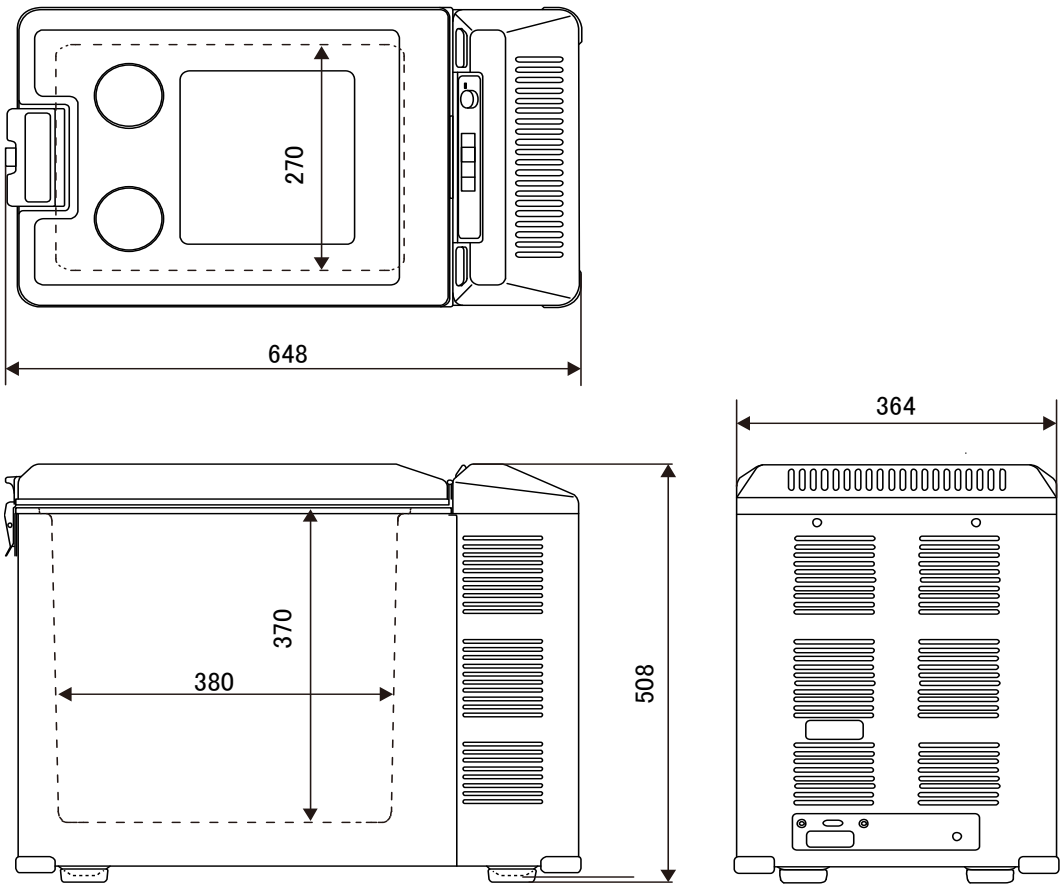
※ Tolerance is omitted

Unit (mm)

・MT35F



・MT45F



2. INSTALLATION A REFRIGERATOR

■ How to Install the Refrigerator.

(1) Your shockproof fridge is best installed on a solid surface.

(2) Be sure your fridge is not placed near a gas stove, heater or other heat-generating appliances.

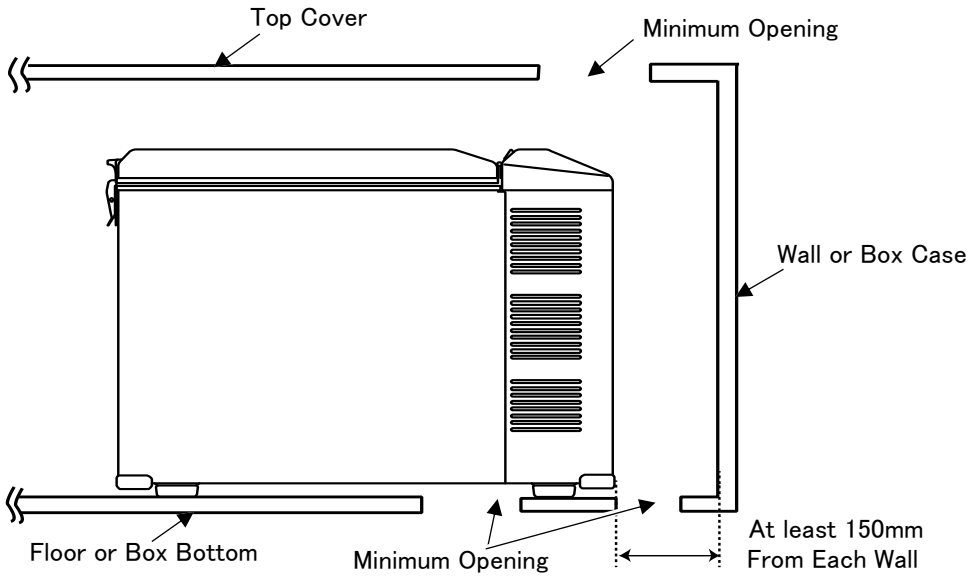
(3) Adequate ventilation and suitable distance from each wall (at least 150mm or more) is necessary for the maximum cooling efficiency and minimum electric current consumption for "free standing use"(see Fig.1 shown below).

(4) Avoid installing your fridge close to kitchen sink or faucet.

(5) If you use the fridge under the counter or in the fixing box, please note the following air ventilation conditions.

① Make vent opening both under fridge or bottom and above fridge top cover.
② Vent opening size must be larger than 160㎠ for each opening (the more air circulation over the condenser, the more efficiently fridge will operate).

(Fig 1)

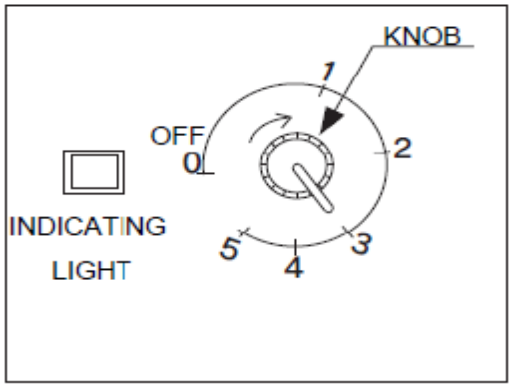


WORK TIPS

Failure to provide the necessary venting will result in poor refrigeration, continuous compressor operation, accelerated battery discharge and sometimes shorten the life of fridge.

■ Temperature Setting

Turn the temperature setting knob to change the air temperature inside the refrigerator.



Temp setting position	Inside temperature *
0	OFF (Stop)
1	Approx. 5℃
2 - 4	Approx. 0℃ - 12℃
5	Approx. -18℃

* at an ambient temperature of 30℃ with the refrigerator door closed

2. INSTALLING A REFRIGERATOR

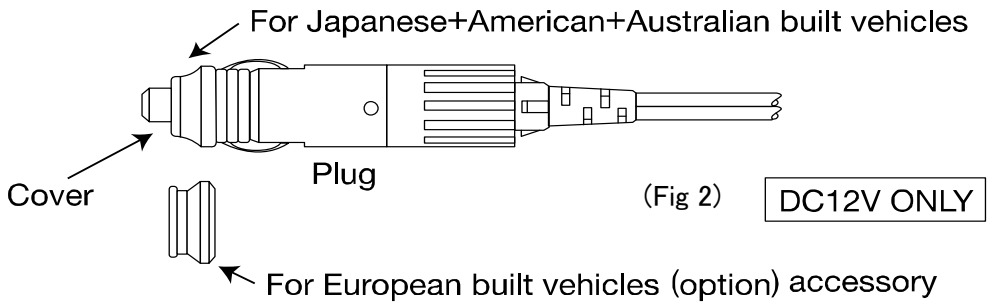
■ Electric Power Sources☐

Connect only to either of the following power sources:
- 240V AC from wall outlet (U1D type is AC120V)
- 12V or 24V DC battery.

AC and DC voltages may be connected simultaneously, when AC will be automatically selected if both voltages are applied.

If the voltage is too high it will damage the product. If it's too low, the cooling efficiency will be reduced, the running time will increase and the battery will be subjected to an increased load.

* This plug is for DC12V only (Fig 2). DC24V is the other cord (option).



(Fig 2) DC12V ONLY

* DC BATTERY OPERATION (POLARITY GUARD)

In order to protect the power supply from damage caused by reversed polarity, the product is fitted with an automatic polarity guard. Should incorrect polarity be applied, the green power lamp will not light up and the product will not operate.

If reverse polarity does occur, the special thermal fuse will blow and become inoperable.

The serviceability of the special thermal fuse can only be checked by testing it's continuity with a multimeter.

Following the correction of the current supply, the green power lamp will light up and normal operation will resume.

* When not using the product, remove the cigarette lighter plug of the cord from the cigarette lighter socket of the vehicle to prevent unnecessary drainage of the car battery.

* Pay due attention to the correct polarity, the inner contact of cigarette lighter socket adapter must be connected to the positive supply, while the outer (negative) contact is connected to earth.

(Most modern vehicles are wired on the negative earth system, but there may still be older vehicles and imported ones with the positive to earth connections).

2. INSTALLATION A REFRIGERATOR

■ Onboard Direct Wiring with Optional Kit

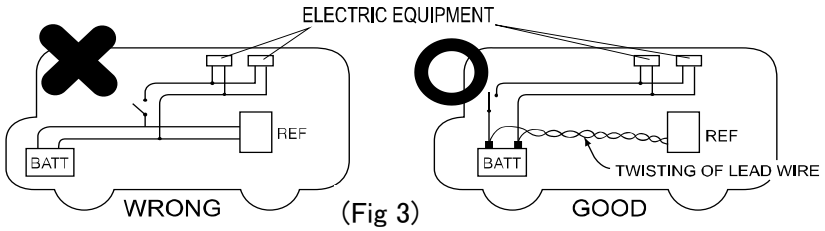
(1) Twisting lead wire

To further reduce the radio interference during DC operation, twist the negative and positive cables (use separate cables) together into a spiral form, between thebattery and the DC outlet socket.

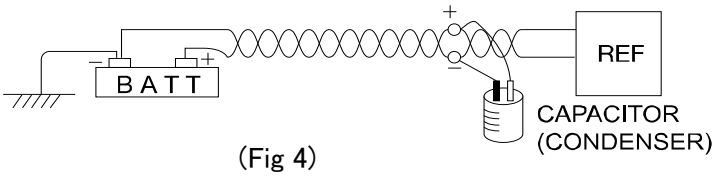
(2) Connecting refrigerator directly to battery

Any switches and lead wires for other electrical equipment should not be shared with the wiring between the refrigerator and the battery. (Other equipment can generate high voltage pulses which may cause transistor damage to the refrigerator power supply. (See Fig 3)

(3) To prevent radio noise and avoid absorbing high surge frequency, insert a capacitor of 10000 μ –F as shown in fig 4 below.



(Fig 3)



(Fig 4)

(4) Selecting the correct gauge for wiring is important to avoid voltage drop. Follow the chart below when wiring the refrigerator to the battery.

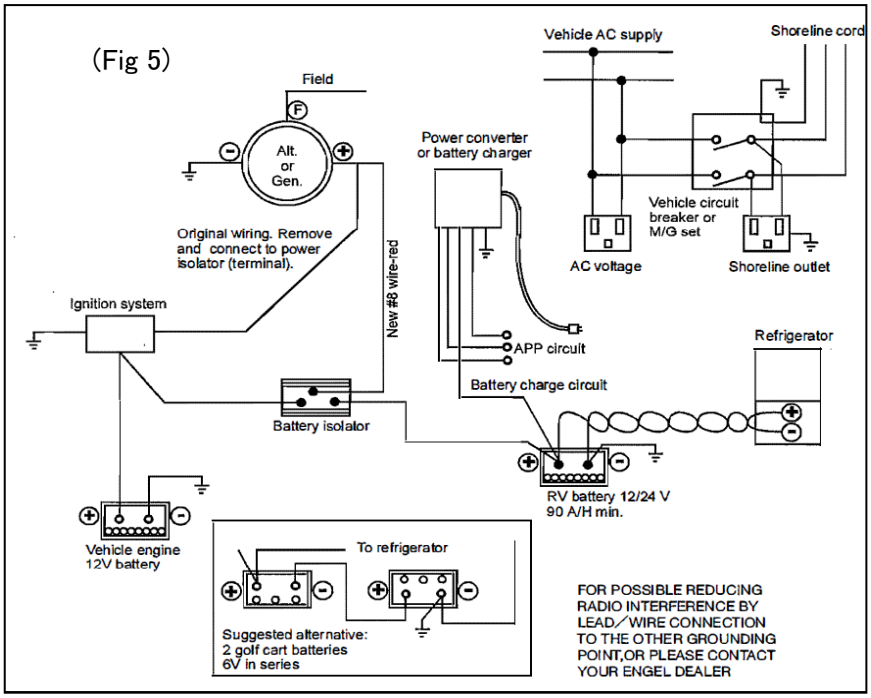
Distance Between Refrigerator And Battery	Wire Gauge DC 12 VOLT SERIES	Wire Gauge DC 24 VOLT SERIES
Less than 6m	SWG#16 (AWG#14) / 2.1㎟	SWG#18 (AWG#16) / 1.25㎟
From 6m to 10m	SWG#14 (AWG#12) / 3.3㎟	SWG#16 (AWG#14) / 2.1㎟
More than 10m (Not recommended – too long)	SWG#12 (AWG#10) / 5.3㎟	SWG#14 (AWG#12) / 3.3 ㎟

(5) To avoid burn of wires between the battery and the refrigerator in the event of a short circuit, install a 10A fuse in the wiring circuit nearer to the battery.

■ Wiring Diagram of Dual Battery Hookup

The wiring diagram shown below is recommended for dual battery hookup. (See Fig 5)

(Fig 5)

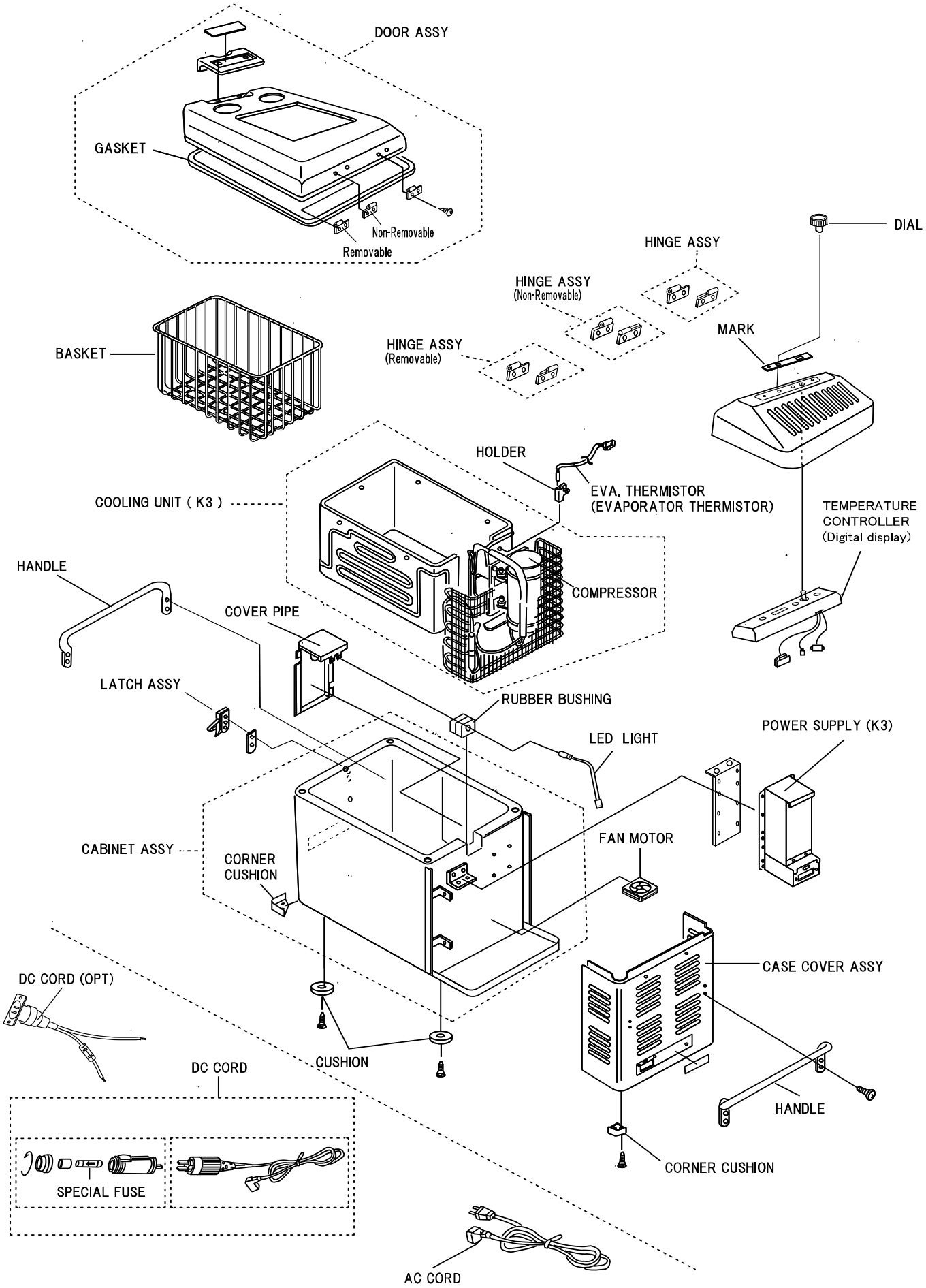


WORK TIPS

To avoid damage to the refrigerator in the event of reverse polarity or short circuit, install a 15A fuse (12V DC) or a 10A fuse (24V DC) in the wiring circuit nearer to the battery.

3. PART NAME

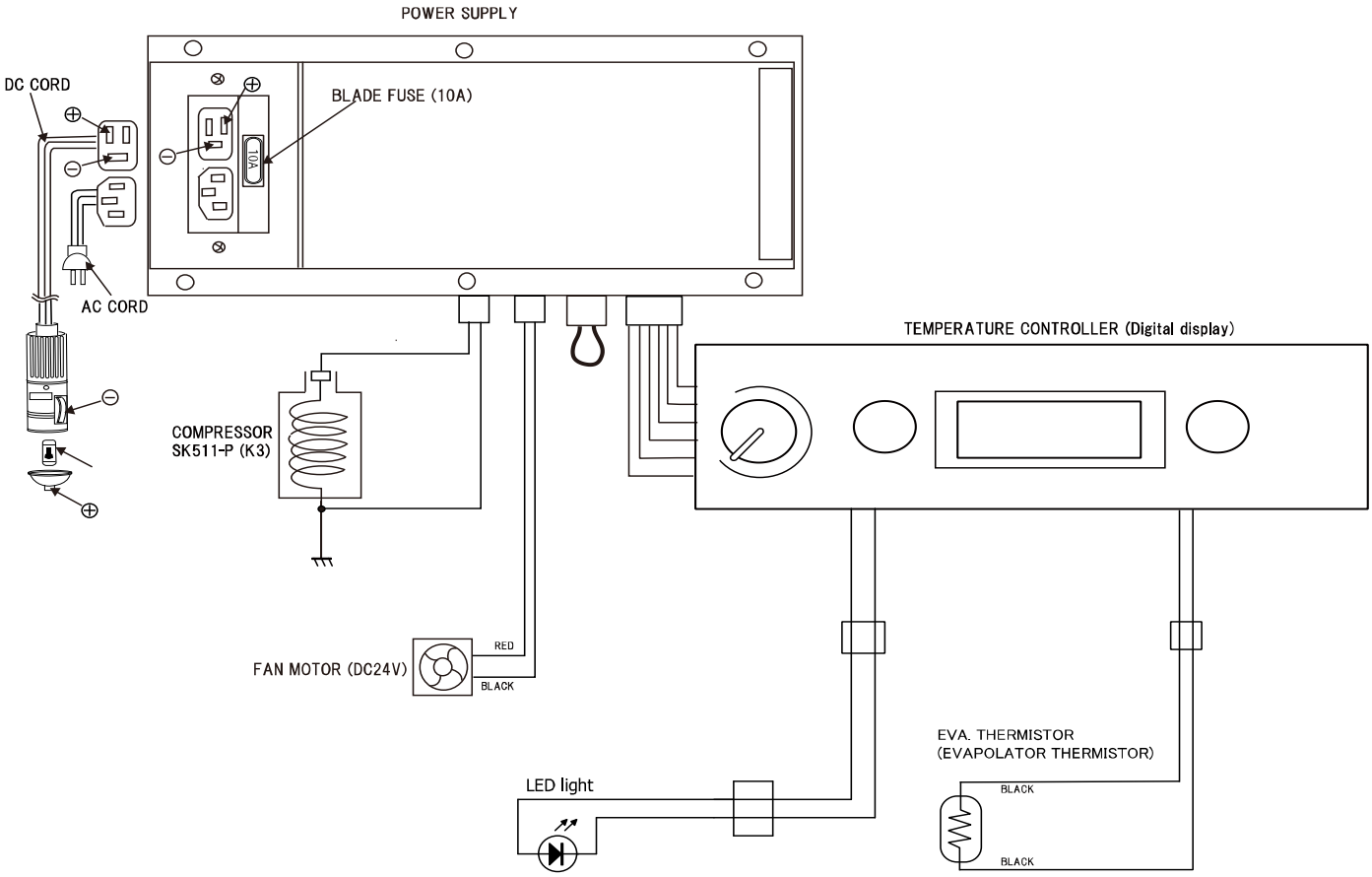
■ MT35F / MT45F



4. CONNECTING DIAGRAM

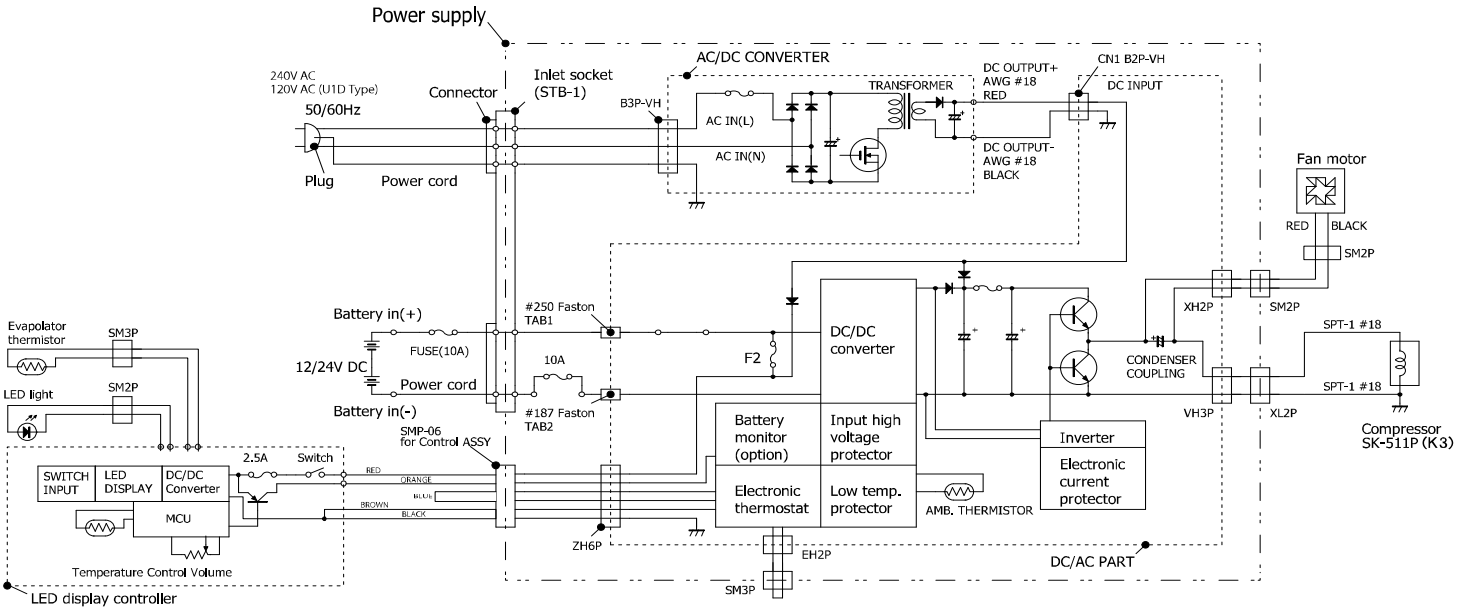
● Block Diagrams 1

MODEL: MT35F-G4-P, MT35F-U1D-P,
MT45F-G4-P, MT45F-G4-L, MT45F-G4-G, MT45F-U1D-P



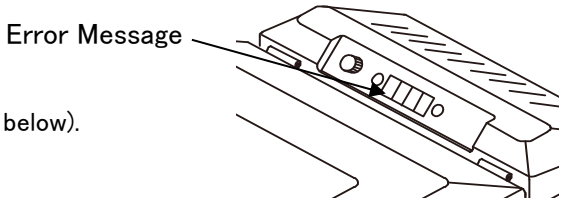
● Wiring Diagrams 1

MODEL: MT35F-G4-P, MT35F-U1D-P,
MT45F-G4-P, MT45F-G4-L, MT45F-G4-G, MT45F-U1D-P



4. TROUBLE SHOOTING

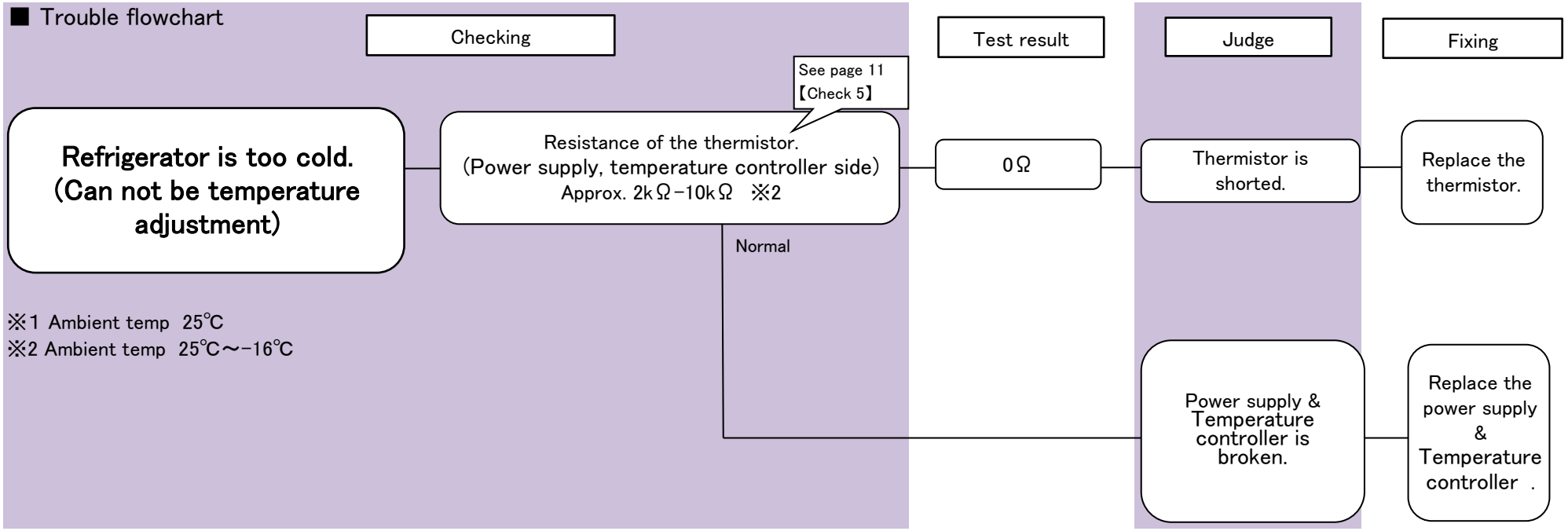
■ Error Message (Digital display of temperature controller)



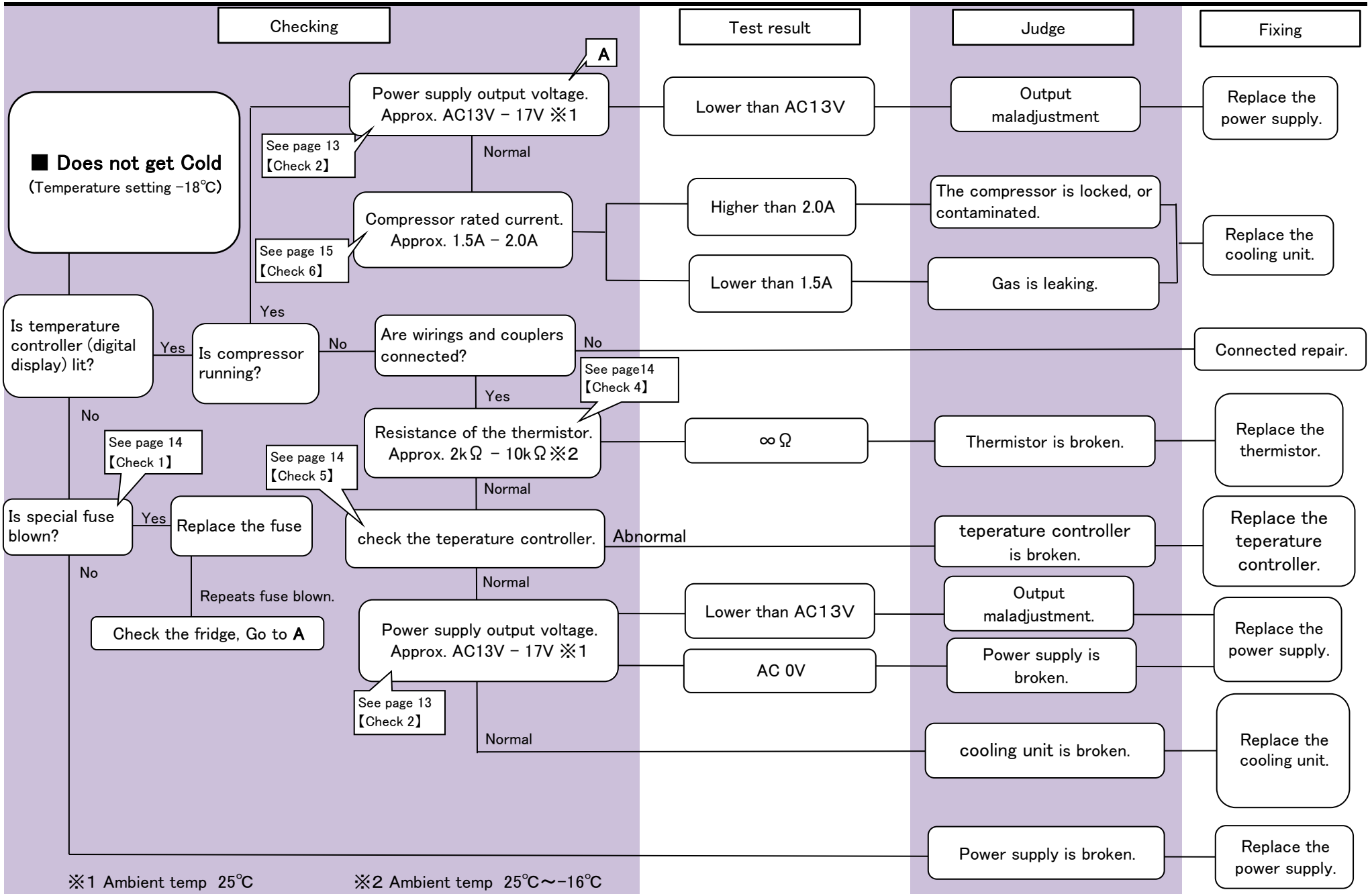
Error message will be displayed if the voltage of the battery is low or in the event of any malfunctions – (see table below).
When error message is displayed, the unit will be on "standby mode". Operations will stop.

ERROR CODE	CAUSE	SOLUTIONS	SEE PAGE
Dot indication Push "MODE" button ⇒E-01 and current voltage display	Abnormal input DC voltage	Check whether the power DC voltage is too low.	–
E-04	Ambient temperature is too low	Check whether the ambient temperature is too low	–
E-05	Thermistor is shorted	Replace the thermistor.	Page 14【Check4】
E-06	Thermistor is open	Replace the thermistor.	
E-07	Abnormal input DC voltage (too high)	Check whether the power DC voltage is too high.	–

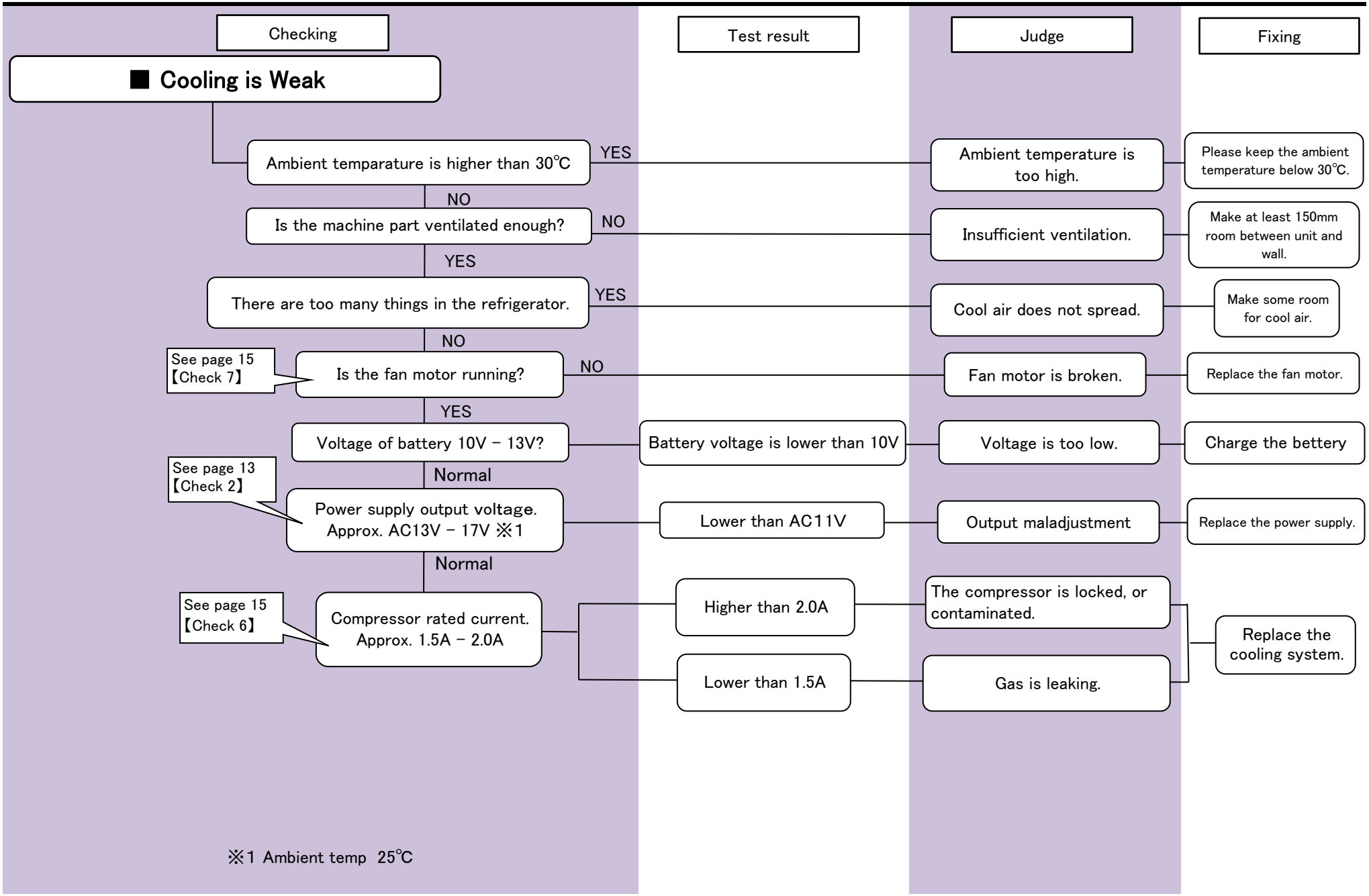
■ Trouble flowchart



5. TROUBLE SHOOTING



5. TROUBLE SHOOTING



5. TROUBLE SHOOTING

■ Typical Problem

※1 Ambient temp 25℃
※2 Ambient temp 25℃ to −16℃

	Symptoms	Cause	Test Result	Treatment
Digital display of temperature controller is lit.	Inside of the fridge does not get cold Compressor does not work	Coil of the compressor is open	Resistance of compressor coil is ∞Ω ・Normal: Approx. 1.69Ω(K3) ※1	Replace the cooling unit
		Power supply is broken	Output voltage of power supply is AC 0V ・Normal: Approx. AC13 − 17V ※1	Replace power supply
		Wire thermisiter is open	Resistance of thermister ・Normal: Approx. 2kΩ− 10kΩ ※2	Replace thermister
	Cooling is weak	* Gas is leaking from Cooling Unit		Replace of cooling unit
		* Fan motor is broken		Replace fan motor
		* Input voltage is lower than 10V		Charge the bettery
		* Ambient temparature is higher than 30℃		
		* Ventilation at mechanical part is not enough		Make at least 150mm room between unit and wall
		* Too many things are put inside		Make some room for cool air
Digital display of temperature controller is not lit.		* The special fuse inside DC cord is open		Replace the fuse
		* Fuse in the vehicle is open		Replace the fuse
		* Socket or other DC power line in the vehicle is bad		Check the vehicle

■ Technical Data

※1 Ambient temp 25℃
※2 Ambient temp 25 to −16℃

Checking items	Checking Points	Normal data
Input voltage at compressor	Between terminals of compressor	Approx. AC 13V − 17V ※1
Output voltage of power supply	Between outgoing cords from power supply (by ditaching from terminal of compressor)	Approx. AC 13V − 17V ※1
Resistance of the compressor	Between incoming cords to compressor (by detaching from terminal of compressor)	Approx. 1.69Ω(K3) ※1
Resistance of thermistor	Between two pin of the coupler	Approx. 2KΩ − 10KΩ ※2
Special fuse	Special fuse of DC cord	0Ω

6. CHECK POINT & CHECK METHOD

【Check 1】Special Fuse & Blade Fuse. (Fig.1)

◇ Check the resistance of special fuse by tester.

Test result	Judge
0Ω	Normal
∞Ω	Broken

WORK TIPS

- Please attach attention to the special fuse of orientation.
- It can not detect the temperature is in the wrong special fuse orientation. (※)

◇ Check the blade fuse.

The blade fuse is in the power supply.

To remove the blade fuse, please remove the power supply.

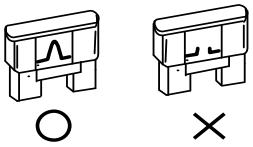
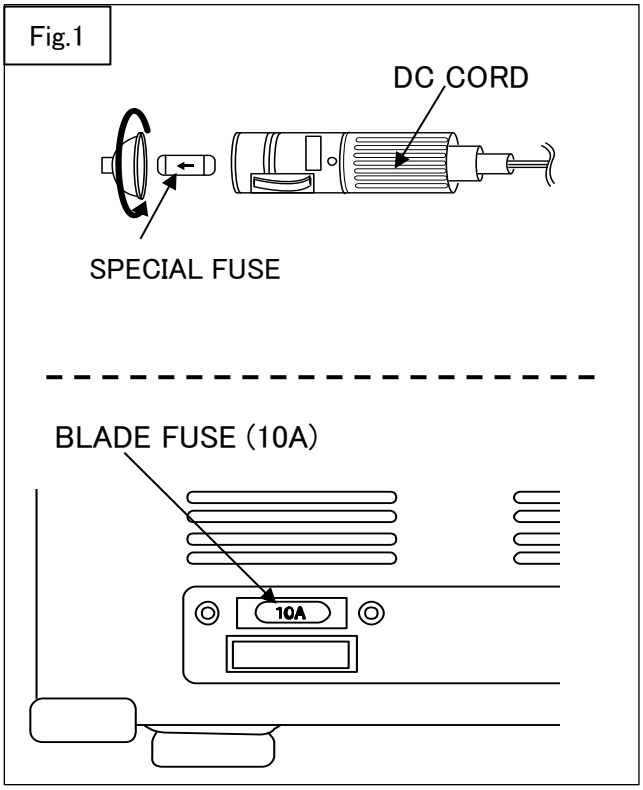


Fig.1



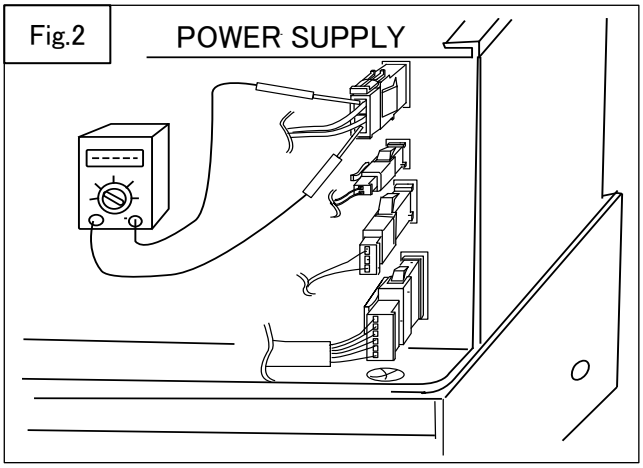
【Check 2】Output Voltage of the Power Supply. (Fig.2)

◇ Checking point

Check at two pin coupler of power supply. (Fig.2)

Test result	Judge
Approx. AC13 – 17V	Normal
AC 0 V	Power Supply is broken
Approx. AC13V or lower	Compressor is locked

Fig.2



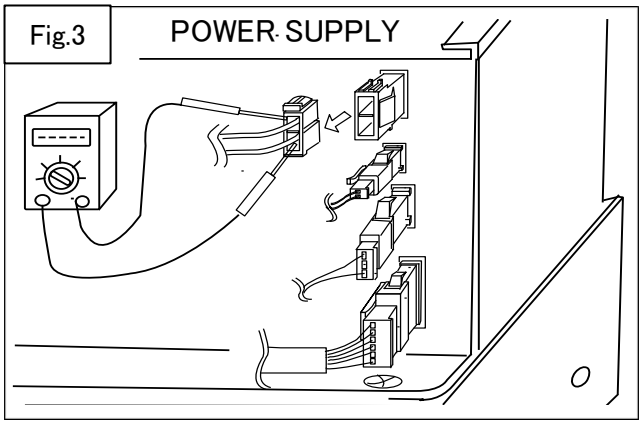
【Check 3】Check the Resistance at the Coil if Compressor.(Fig.3)

◇ Checking points

Remove two pin coupler at motor cord, and check.

Test result	Judge
Approx. 1.69 Ω	Normal
∞Ω	Broken
0Ω	Coil of compressor is short circuit

Fig.3



6. CHECK POINT & CHECK METHOD

【Check 4】Resistance of Thermistor. (Fig.4)

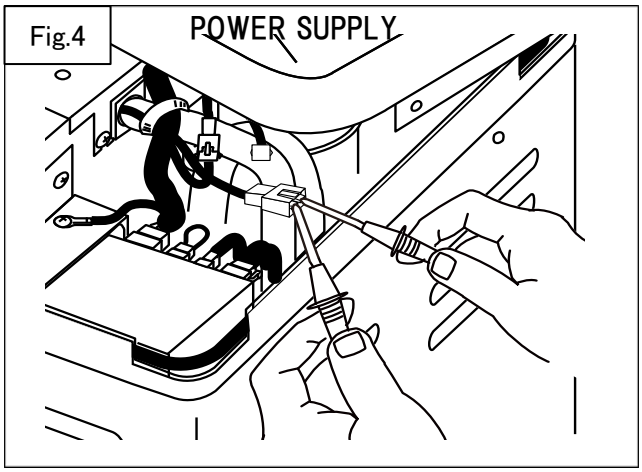
◇ Checking points

Remove the two pin couplers from temperature controller.

Measure resistance between thermistor coupler terminals.

Test result	Judge
Approx. 2 kΩ – 10 kΩ	Normal
∞Ω	Broken
0Ω	Short Circuit

Fig.4



WORK TIPS

・When short circuit, motor runs continuously.

【Check 5】Check the temperature controller. (Fig.5)

◇Checking points

Check the voltage at between terminals ORANGE and BLACK.

<Use power AC100-240V> (Ambient temp 25℃)

Test result	Judge
Approx. DC12-14V	Normal
DC 0 V	Temperature controller is broken
12V less than	

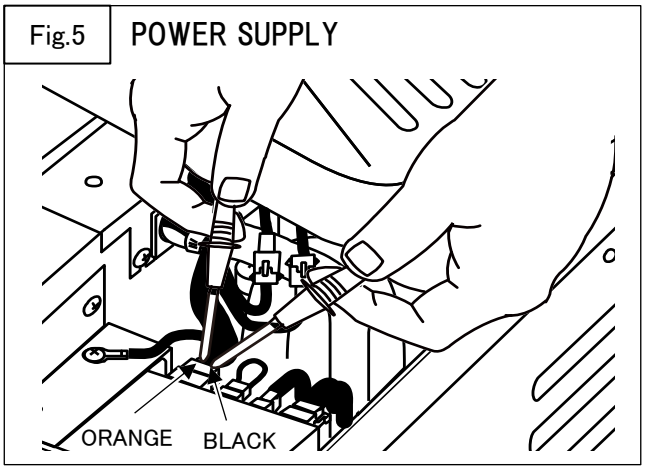
<Use power DC12V> (Ambient temp 25℃)

Test result	Judge
Approx. DC12V	Normal
DC 0 V	Temperature controller is broken
11V less than	

<Use power DC24V> (Ambient temp 25℃)

Test result	Judge
Approx. DC24V	Normal
DC 0 V	Temperature controller is broken
23V less than	

Fig.5



6. CHECK POINT & CHECK METHOD

【Check 6】Compressor Rated Current. (Fig.6)

◇Checking point

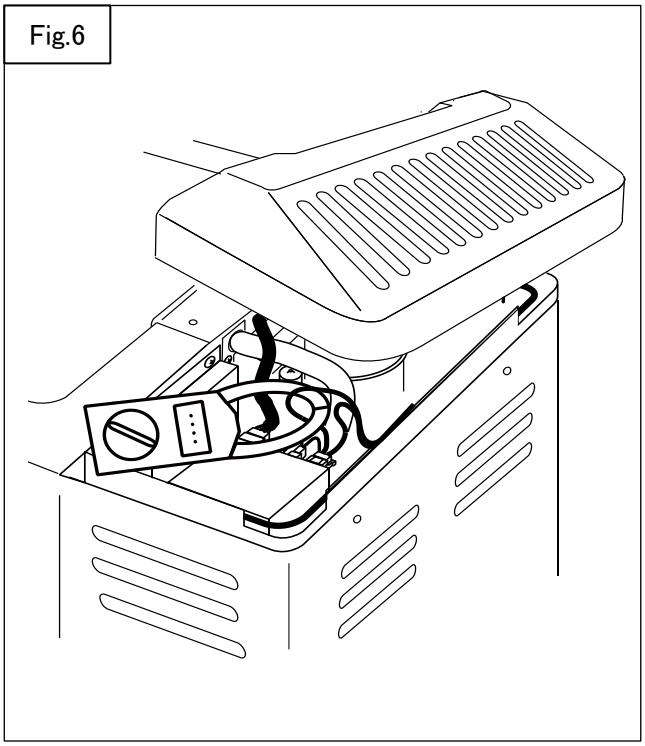
Current value measurement with clamp meter between input cord terminals.

WORK TIPS

To measure the rated current of the compressor, please measure after 15 minutes or more after starting the refrigerator.

Test result	Judge
Approx. 1.5 – 2.0A	Normal
Higher than 2.0A	Compressor is locked, or contaminated.
Lower than 1.5A	Gas is leaking.

Fig.6



【Check 7】Resistance of Thermistor. (Fig.7)

◇Checking point

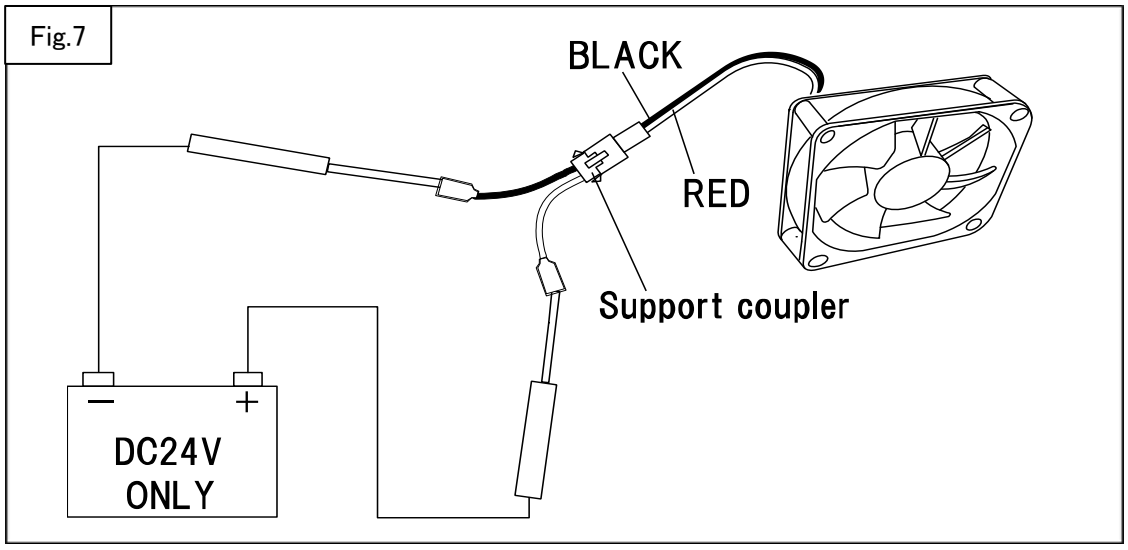
If want to check the start-up of the fan motor directly,

can check by connecting the DC24V directly. (Fig.7)

⚠ CAUTION

- Please be careful not to mistake the polarity of the power supply.
- When connect with DC24V or wrong polarity, fan motor will fail.
- Please use such as support coupler so as not to short-circuit power.

Fig.7



7. REPLACING PARTS

【How to Replace Cooling Unit】

1. Remove the door (Fig.1)

Open the door and take out the basket.

Remove four screws which hold hinges. (Fig.1-①)

WORK TIPS

When re-installing for door and hinges, please be care with placing position of hinge height. Position must be 14mm from the cabinet.
(Please see reference picture in below)

After installation of door, please make sure for interior light not leak from side of door.
If it's possible to see the light, please adjust height of hinges.

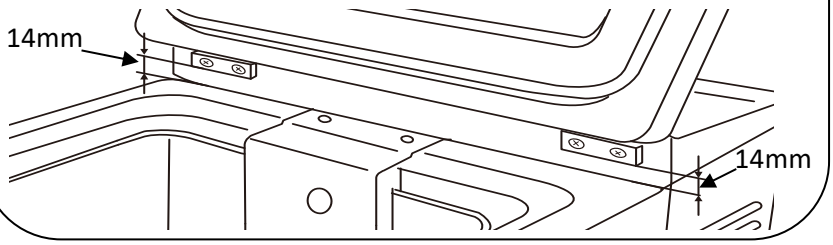
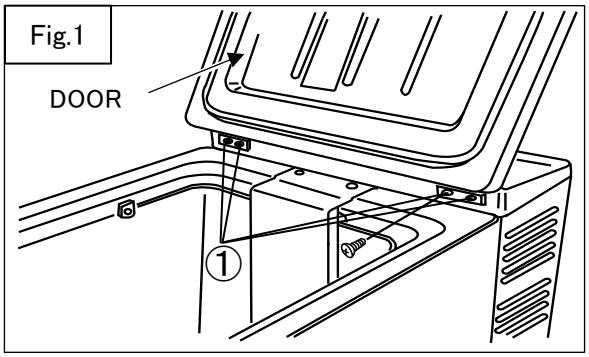


Fig.1

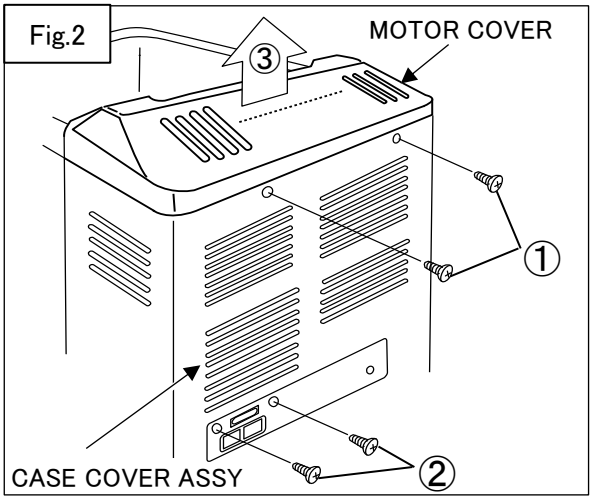


2. Remove the motor cover. (Fig.2)

Remove two screws of motor cover. (Fig.2-①)

Remove two screws of case cover assy. (Fig.2-②)

Fig.2



3. Take out the power supply. (Fig.3)

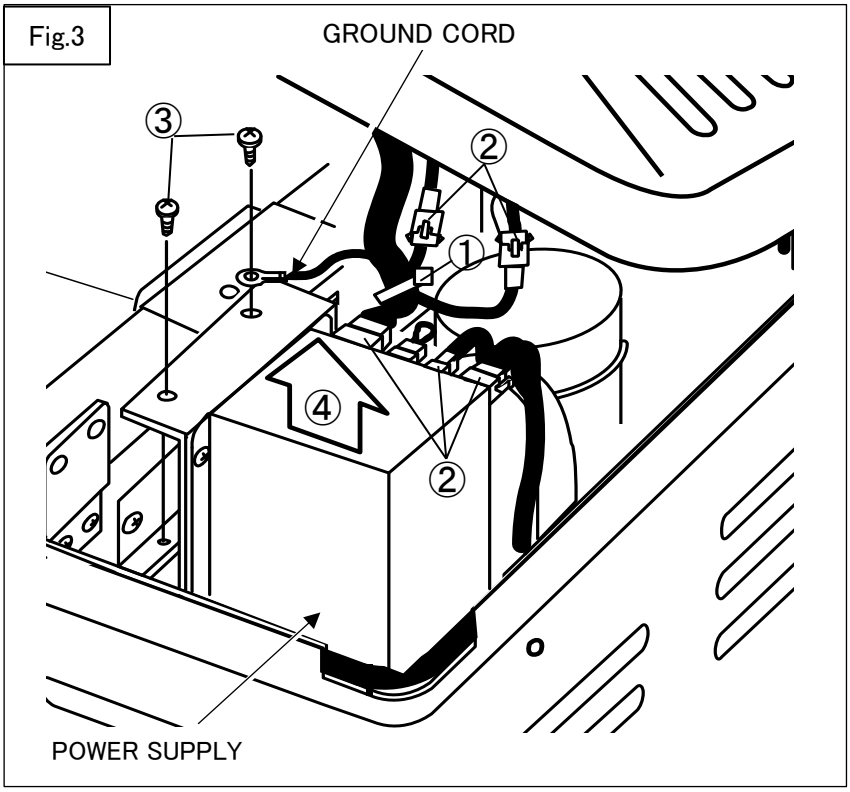
Cut the fastener. (Fig.3-①)

Pull out five couplers. (Fig.3-②)

Remove two screws of power supply. (Fig.3-③)

Take out the power supply. (Fig.3-④)

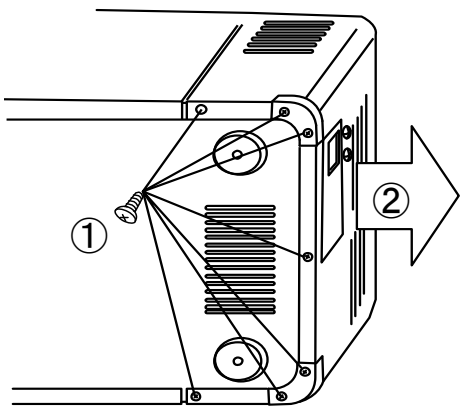
Fig.3



7. REPLACING PARTS

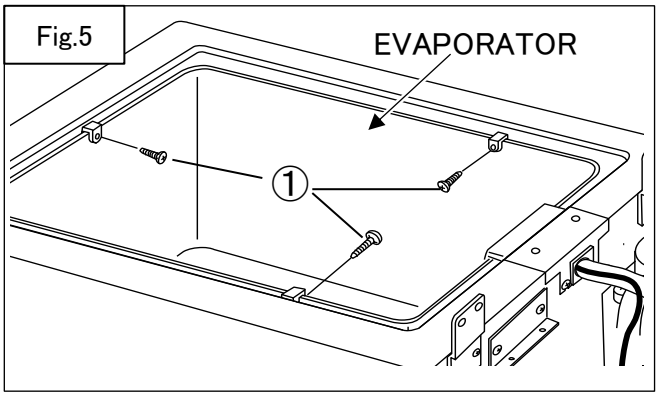
4. Remove the case cover assy. (Fig.4)
   Remove seven screws of case cover assy. (Fig.4-①)
   Remove case cover assy. (Fig.4－②)

Fig.4



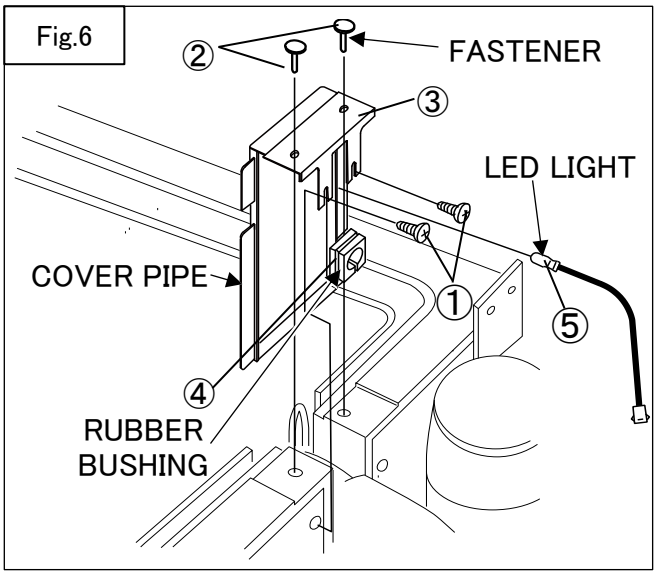
5. Remove three screws of evaporator. (Fig.5-①)

Fig.5



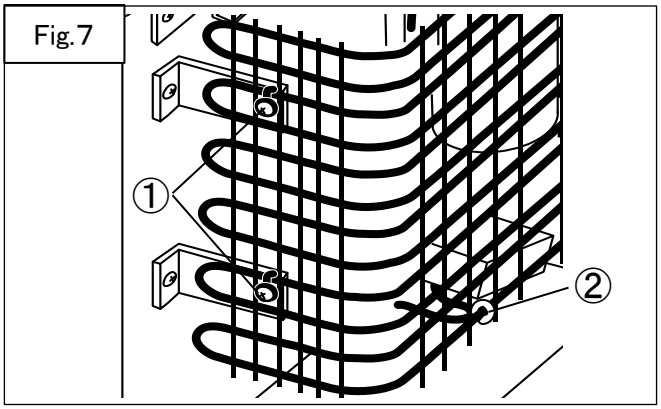
6. Remove the cover pipe. (Fig.6)
   Remove two screws of cover pipe. (Fig.6-①)
   Remove two fasteners of cover pipe. (Fig.6-②)
   Remove the cover pipe. (Fig.6-③)
   Remove the rubber bushing. (Fig.6-④)
   Remove LED light. (Fig.6-⑤)

Fig.6



7. Remove two screws of wire condenser. (Fig.7-①)
   Cut the fastener. (Fig.7-②)

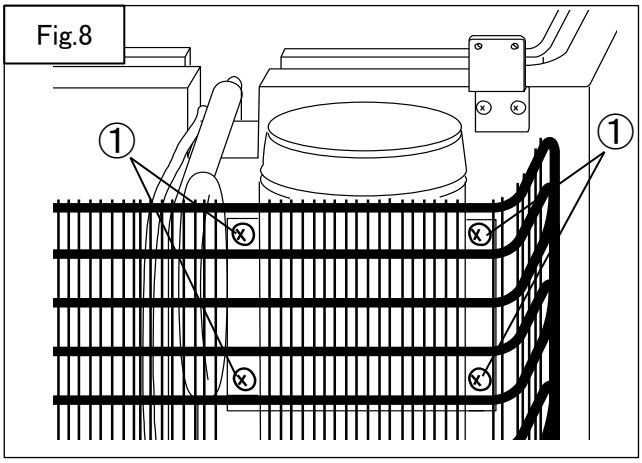
Fig.7



7. REPLACING PARTS

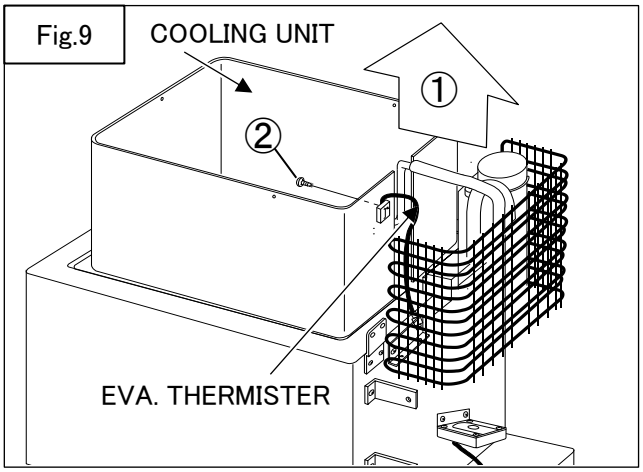
8. Remove four screws of compressor. (Fig.9)

Fig.8



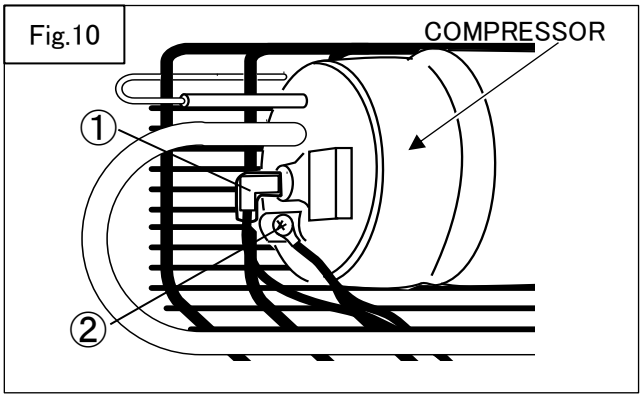
9. Pull out cooling unit. (Fig.9)
   Take out cooling unit from cabinet assy. (Fig.9-①)
   Remove screw of EVA. thermister. (Fig.9-②)

Fig.9



10. Pull out input cord from the compressor. (Fig.10)
    Pull out the positive side. (Fig.10-①)
    Pull out the negative side. (Fig.10-②)

Fig.10



【How to Replacement of Power Supply】

1. Remove the door.
   (【How to Replace Cooling Unit】 STEP.1)

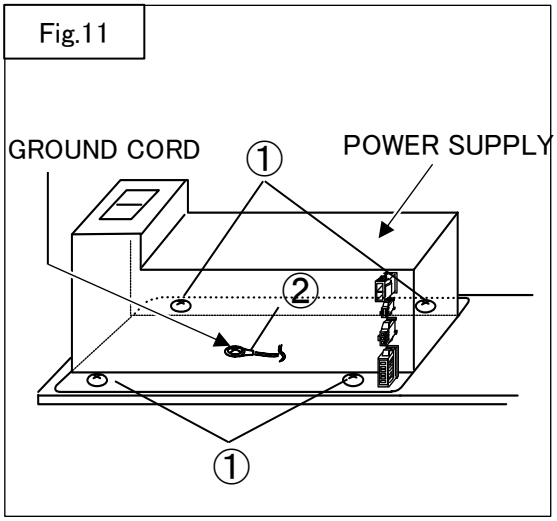
2. Remove the motor cover.
   (【How to Replace Cooling Unit】 STEP.2)

3. Take out the power supply.
   (【How to Replace Cooling Unit】 STEP.3)

4. Remove four screws of power supply. (Fig.11-①)

5. Remove ground cord of power supply. (Fig.11-②)

Fig.11



7. REPLACING PARTS

【How to Replacement of Fan Motor】

1. Remove the door.
   (【How to Replace Cooling Unit】 STEP.1)

2. Remove the motor cover.
   (【How to Replace Cooling Unit】 STEP.2)

3. Remove the case cover assy.
   (【How to Replace Cooling Unit】 STEP.4)

4. Pull out the coupler. (Fig.12-①)

5. Cut fastener. (Fig.12-②)

6. Remove two screws. (Fig.12-③)

7. Remove four screws. (Fig.12-④)

Fig.12

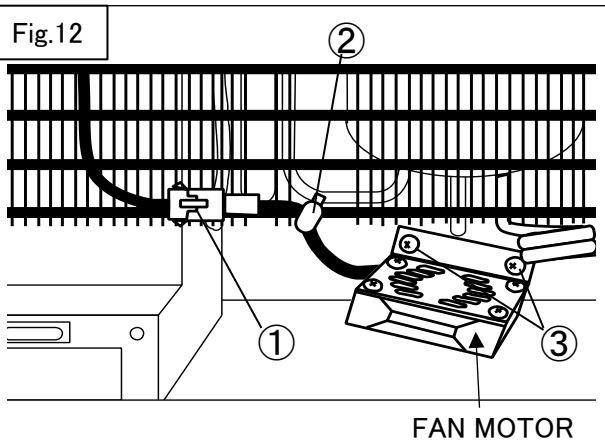
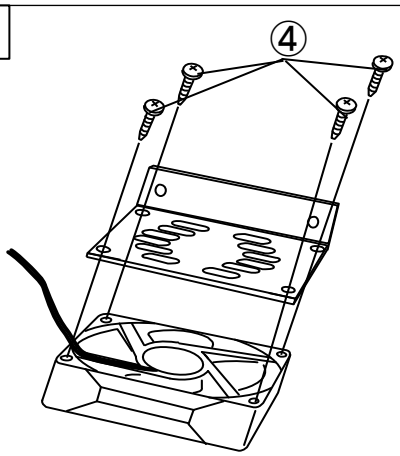


Fig.13



【How to Replacement of Temperature controller】

1. Remove the door.
   (【How to Replace Cooling Unit】 STEP.1)

2. Remove the motor cover.
   (【How to Replace Cooling Unit】 STEP.2)

3. Cut the fastener. (Fig.14-①)

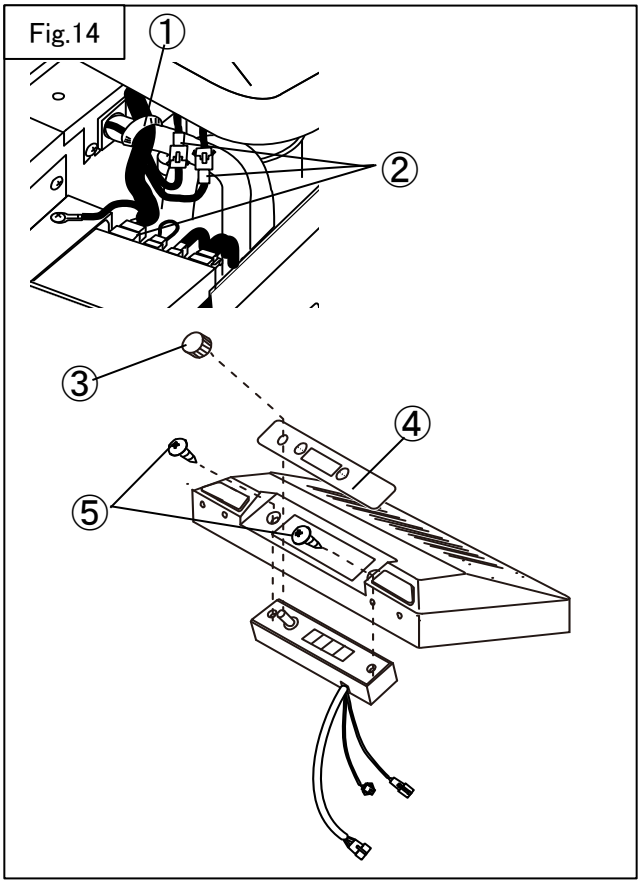
4. Pull out three couplers. (Fig.14-②)

5. Remove the dial (Fig.14-③)

6. Peel off the mark (Fig.14-④)

7. Remove two screws. (Fig.14-⑤)

Fig.14

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