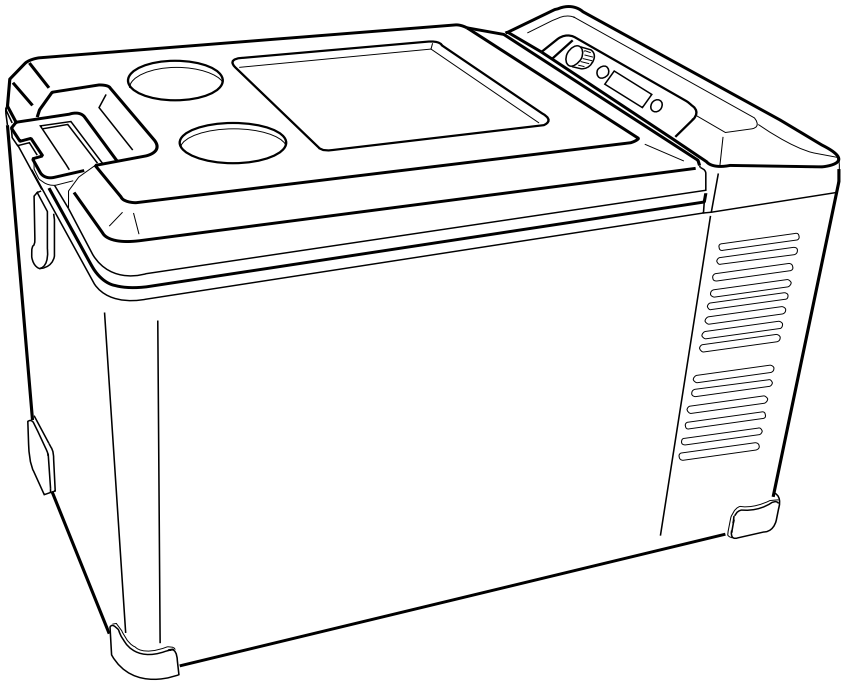
ENGEL

# SERVICE MANUAL

## MODEL (Digital display type) :

| | |
|---|---|
| **MT35F-U1D-P** | **0642 032 0310** |
| **MT45F-U1D-P** | **0642 042 0R40** |
| **MT45F-U1CD-P** | **0642 042 1R00** |



SAWAFUJI ELECTRIC CO.,LTD.

2020. 12
#3

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.

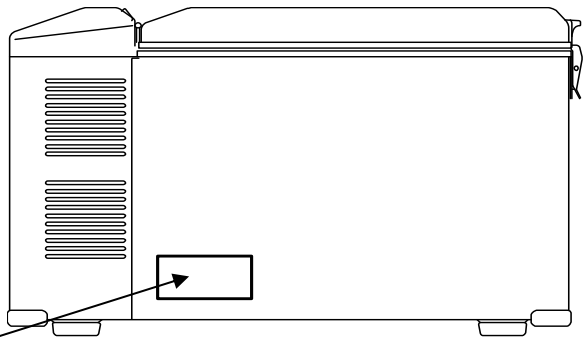
## ● SAFETY SYMBOLS

- 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 0310 | MT35F-U1D-P |
| 0642 042 0R40 | MT45F-U1D-P |
| 0642 042 1R00 | MT45F-U1CD-P |

# CONTENTS

# 1. SPECIFICATIONS

■ Specifications Table

| MODEL | | MT35F-U1D-P | MT45F-U1D-P | MT45F-U1CD-P | |
|---|---|---|---|---|---|
| MODEL CODE | | 0642 032 0310 | 0642 042 0R04 | 0642 042 1R00 | |
| STORAGE VOLUME | ℓ (liter) | 32 | 40 | 40 | |
| EXTERIOR DIMENSIONS W×D×H ※1 | in | 25.5×14.3×16.1 | 25.5×14.3×20 | | |
| | mm | 648×364×408 | 648×364×508 | | |
| INTERIOR DIMENSIONS W×D×H ※1 | in | 15.4×10.8×11.7 | 15.4×10.8×15.7 | | |
| | mm | 390×275×298 | 390×275×398 | | |
| 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 | 2.6A | | 2.7A | |
| | DC24V | 1.4A | | 1.5A | |
| | AC | 0.71A | | 0.76A | |
| 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 | | Fridge side | 5℃ |
| | | | | Freezer side | −15 ℃ 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

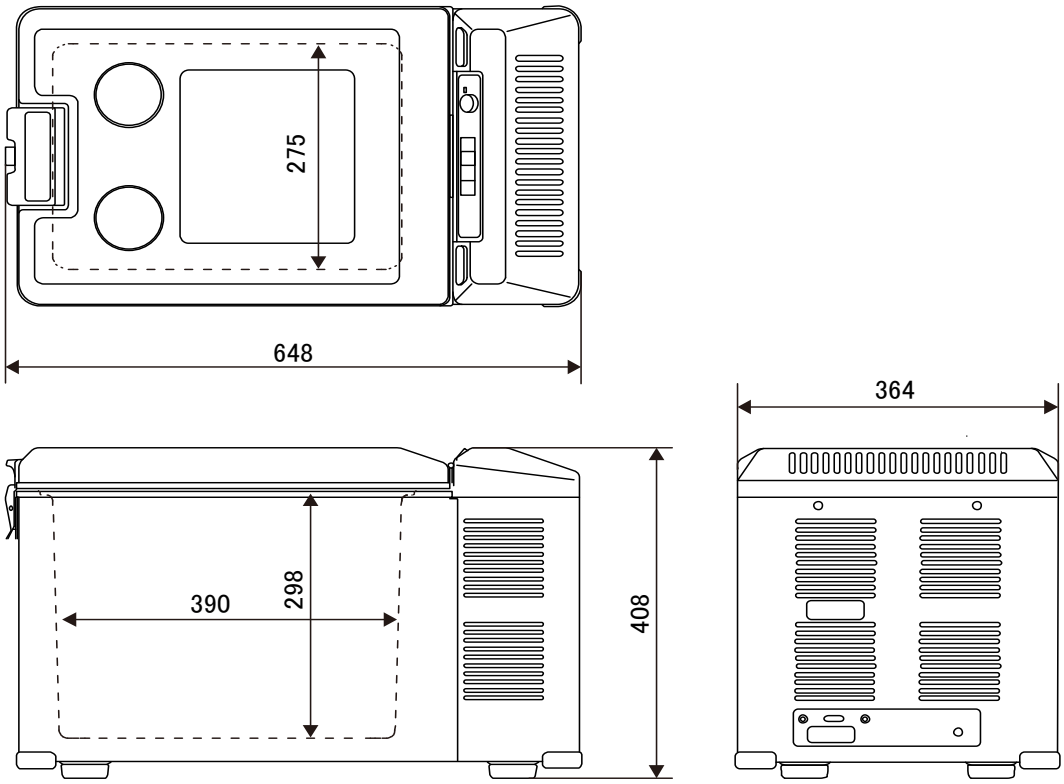
# 1. SPECIFICATIONS

■ Exterior / Interior Dimensions

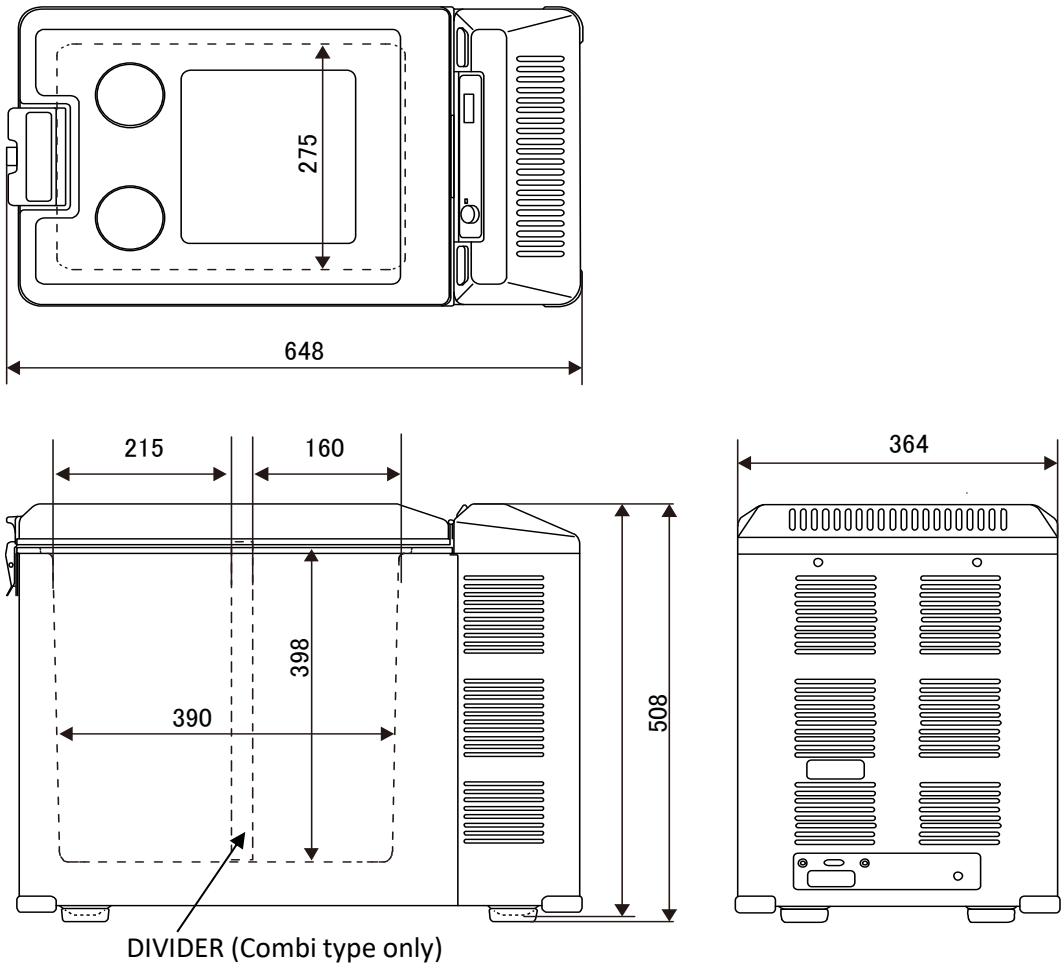
※ Tolerance is omitted

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.

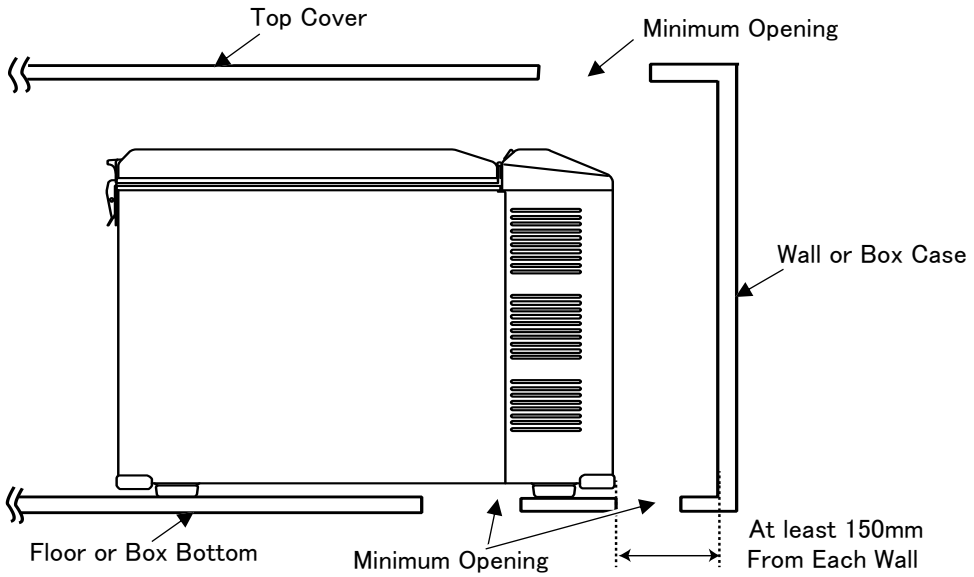
(3) Adequate ventilation and suitable distance from each wall (at least 150mm or more) is necessary for the maximum cooling efficiency and minimum electric current consumption for "free standing use"( see Fig.1 shown below).

(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)



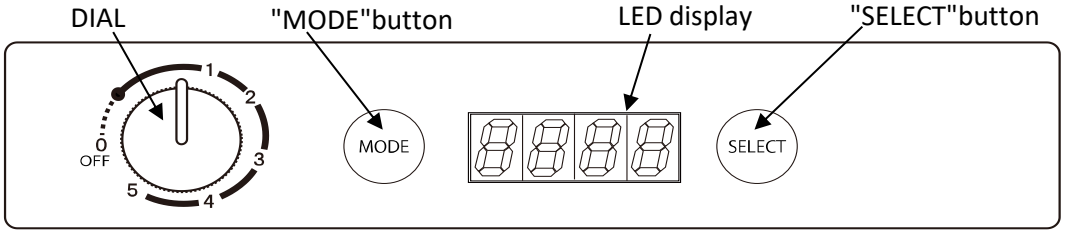

**WORK TIPS**

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

# 2. INSTALLATION A REFRIGERATOR

■ About digital displays

Displays the temperature inside the refrigerator, temperature setting display, error code, etc.




【How to set the temperature in the refrigerator】

Refrigerator temperature setting range is -18 ℃ to + 10 ℃

① Turn the dial to set the temperature inside the refrigerator. (−18 ° C to + 10 ° C)

② After a few seconds after you stop the dial, the temperature display changes from blinking to lit, and the setting is confirmed.

③ After that, the LED display will show the temperature inside the refrigerator.

【How to switch between Celsius (℃) and Fahrenheit (℉)】

① Press the ″MODE″ button. (LED display blinks)

② Press the select button while the LED display is blinking to switch between Celsius and Fahrenheit.

③ After the setting is completed, after a few seconds, the LED will change from flashing to lit and display Celsius or Fahrenheit.

【How to set the battery protection function】

This refrigerator has protection function for battery protection.

Set the operation stop and return of the refrigerator by the input voltage. (See table below)

① Press the mode button twice. (The current setting of the protection function is lit.)

② Every time you press the select button, the LED blinks and switches from “OFF” →“LO” → “HI”.

③ After a few seconds, the LED changes from blinking to lit and the setting is finalized.

④After that, the LED display will show the temperature inside the refrigerator.

| * Operates when the voltage value continues for 10 seconds | Battery protection settings | | |
|---|---|---|---|
| | OFF | LO | HI |
| At DC12V input Operation stop voltage | 7.9V or less | 10.5V | 11.5V |
| At DC12V input Operation automatic return voltage | 9.6V or less | 11.5V | 12.5V |
| At DC24V input Operation stop voltage | 7.9V or less | 21.0V | 23.1V |
| At DC24V input Operation automatic return voltage | 9.6V or less | 23.1V | 25.0V |

【Error message display】

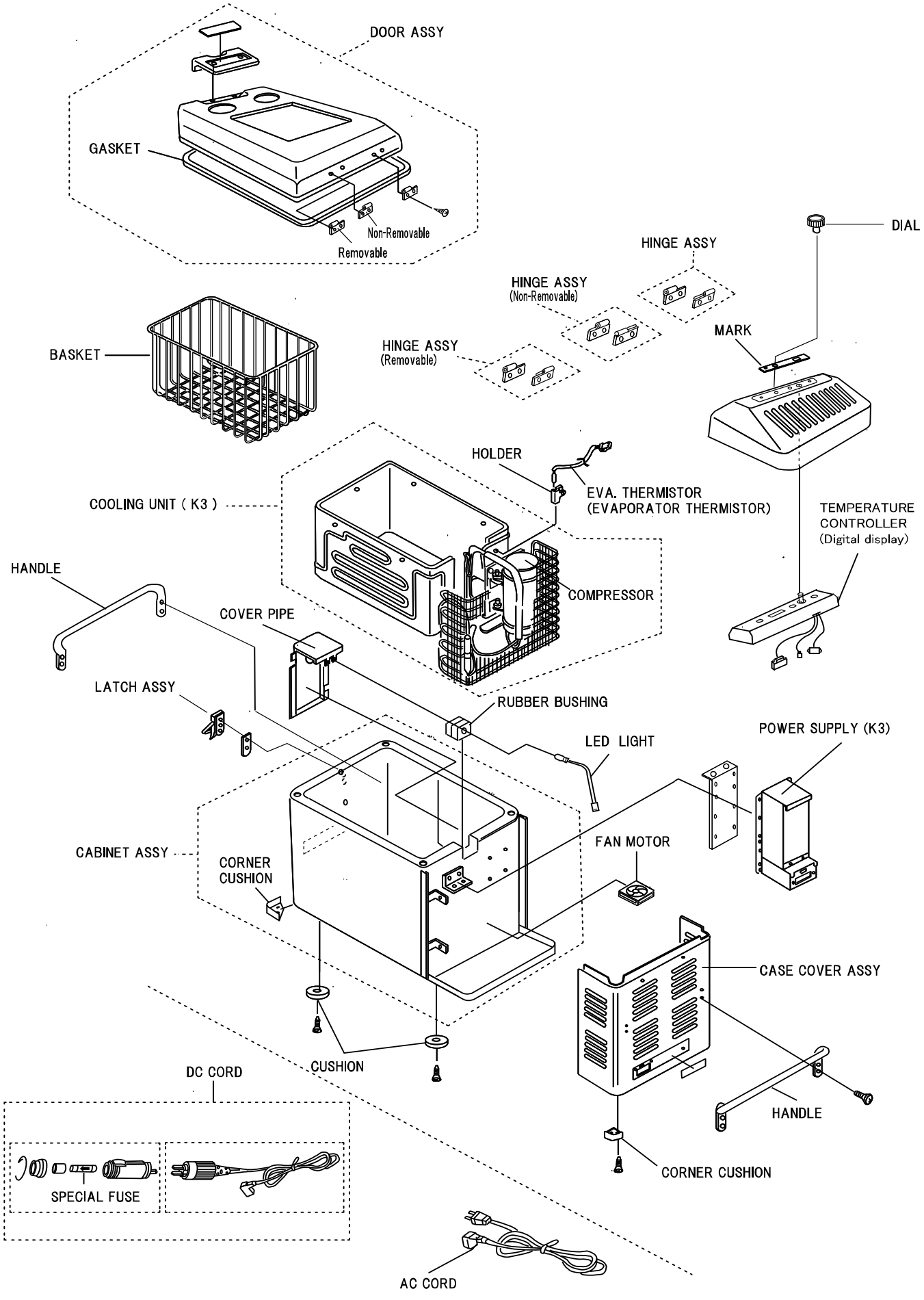
An error message will be displayed on the LED display when the battery voltage is low or the refrigerator is abnormal. (See page 8 for details)

When an error message is displayed, the refrigerator goes into ″standby mode″ and stops operating.

To reset the error, reset the power.

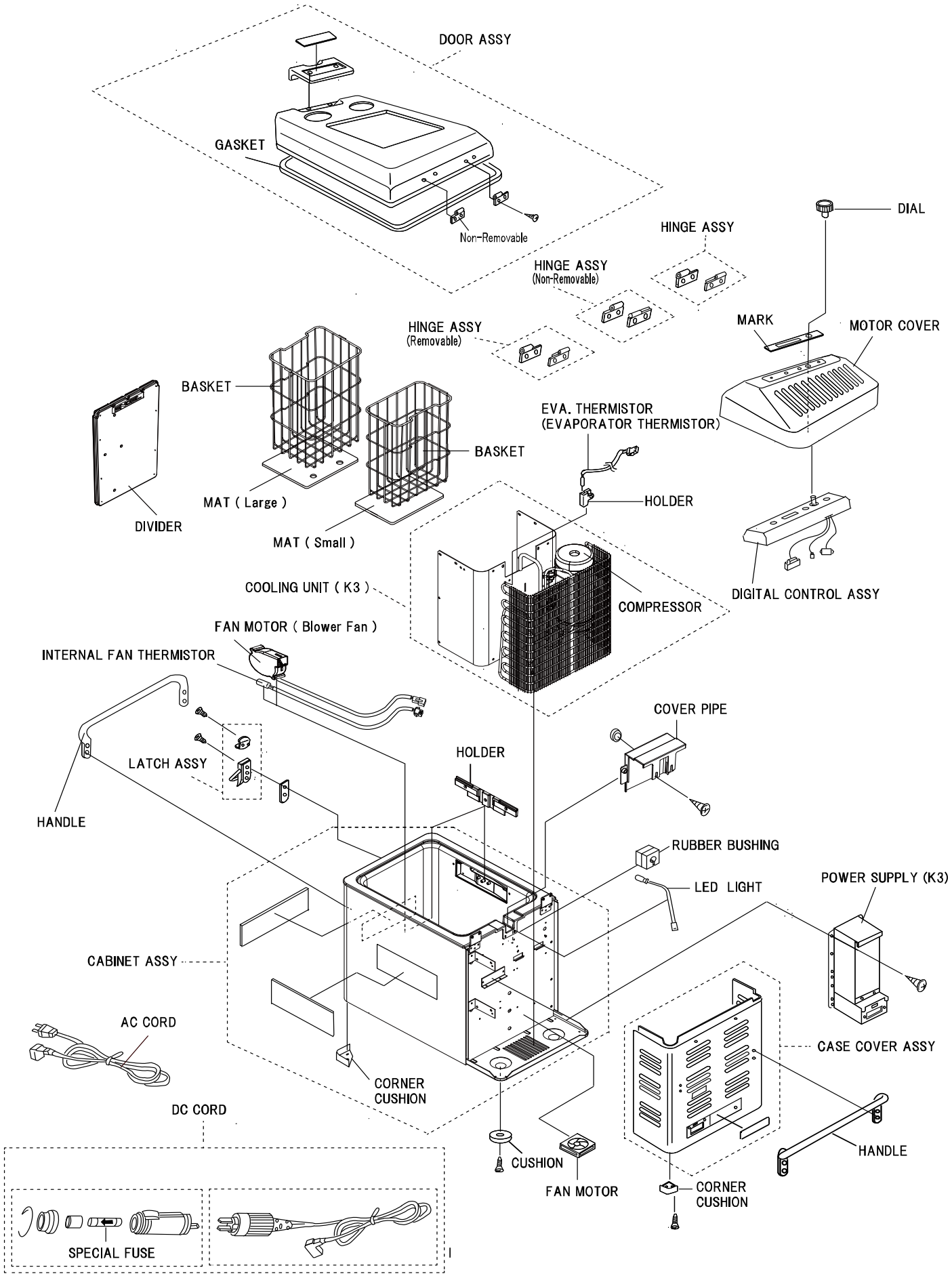
# 3. PART NAME

■ MT35F / MT45F (Non Combi type)



# 3. PART NAME

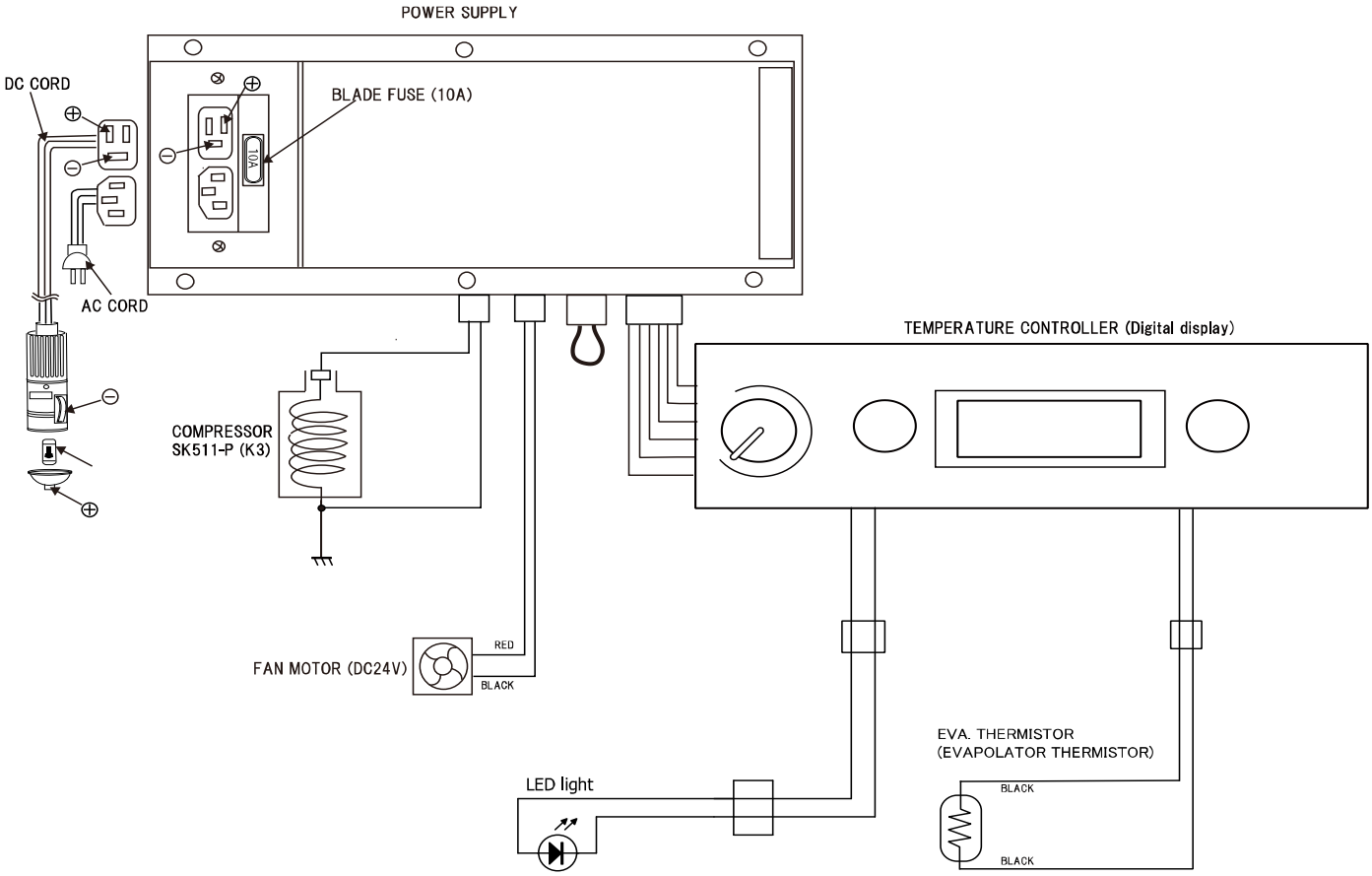
■ MT45F (Combi type)



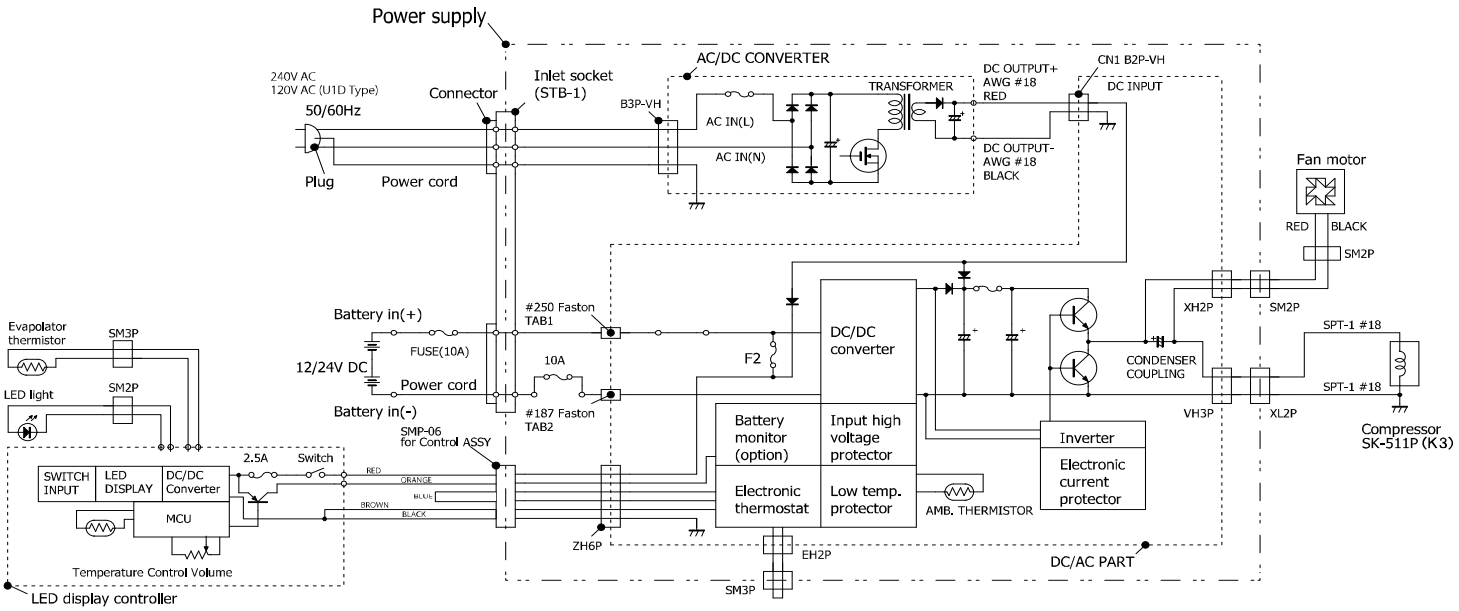
# 4. CONNECTING DIAGRAM

## ■ MT35F / MT45F (Non Combi type)

### ● Block Diagrams



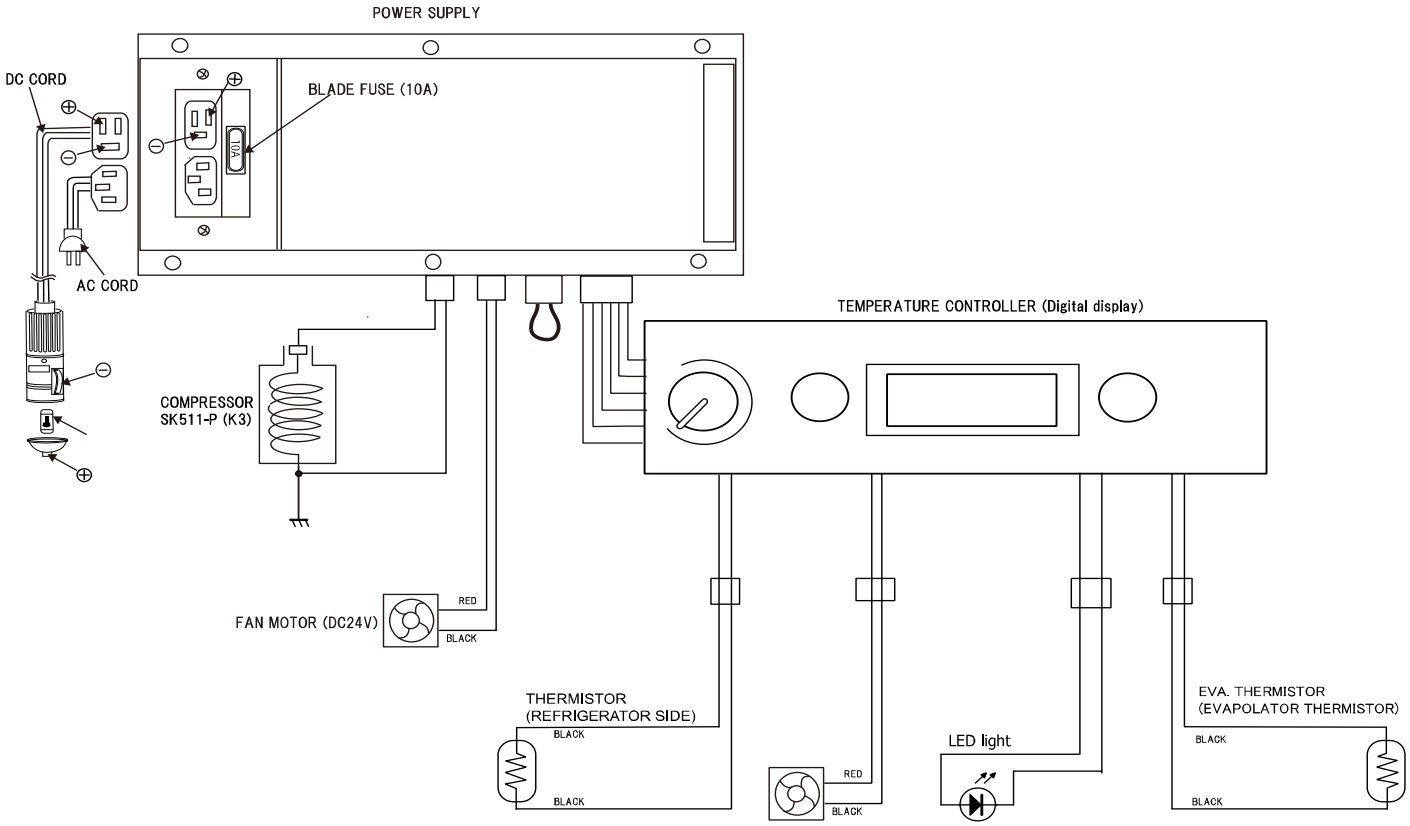

### ● Wiring Diagrams



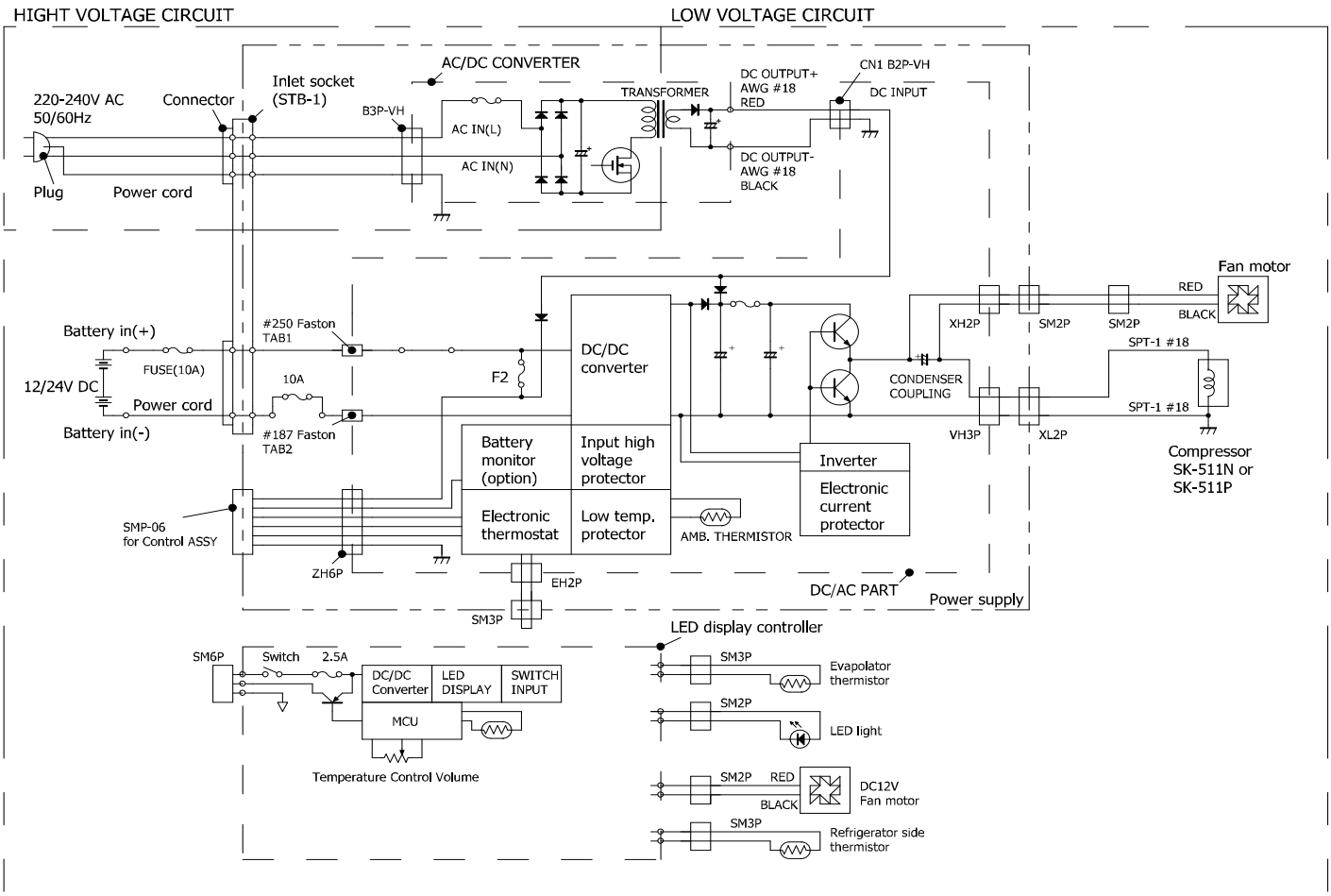
# 4. CONNECTING DIAGRAM

## ■ MT45F (Combi type)

### ● Block Diagrams




### ● Wiring Diagrams

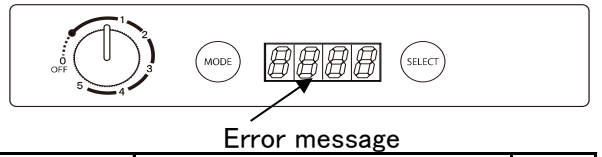


# 5. TROUBLE SHOOTING

■ 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 troubles – (see table below).

To reset the error, reset the power




| ERROR CODE | Error code existence | | CAUSE | | | Judgment criteria | Return condition | SOLUTIONS | SEE PAGE |
|---|---|---|---|---|---|---|---|---|---|
| | Other than combi type | Combi type | | | | | | | |
| no display | ○ | ○ | Abnormal input DC voltage | Battery Protection | OFF | Voltage(※1)≦ 7.9V (10s continuous) | 9.6V or more | Check battery | – |
| The dot <.> Flashes | ○ | ○ | | | LO | Voltage(※1)≦ 9.6V (10s continuous)<br>17.0V ≦ voltage(※ 1)≦ 20.4V (10s continuous) | See the table below (battery protection settings) | | |
| | | | | | HI | Voltage(※1)≦ 10.6V (10s continuous)<br>17.0V ≦ voltage(※ 1)≦ 22.5V (10s continuous) | | | |
| E-4 | ○ | ○ | Ambient temperature is too low (Substrate ambient temperature) | | | Temperature ≦ −20 ℃ (5s continuous) | Power reset | Increase ambient temperature or move to a warmer place. | – |
| E-5 | ○ | ○ | Thermistor short or Internal temperature overheating abnormality | | | Temperature ≧ 75 ℃ (5s continuous) | Power reset | EVA.Thermistor inspection | 14 |
| E-6 | ○ | ○ | Thermistor disconnection or internal temperature drop abnormal | | | Temperature ≦ −40 ℃ (5s continuous) | Power reset | EVA.Thermistor inspection | 14 |
| E-7 | ○ | ○ | Abnormal input DC voltage (too high) | | | 32.0V≦voltage(※1)≦35.0V (10s continuous)<br>Voltage(※1)≧45.0V (10s continuous) | Power reset | Check battery | – |
| E-8 | – | ○ | Internal thermistor short or internal temperature overheating | | | Temperature ≧ 75 ℃ (5s continuous) | Power reset | Internal thermistor inspection | 14 |
| E-9 | – | ○ | Internal thermistor disconnection or internal temperature drop abnormal | | | Temperature ≦ −40 ℃ (5s continuous) | Power reset | Internal thermistor inspection | 14 |
| E-10 | – | ○ | Internal fan motor disconnection | | | ※2, FAN voltage ≦ 1V or less (5s continuous) | Power reset | Inspection of internal fan motor | 15 |

※1 The voltage detection position is the terminal block of the refrigerator. (The voltages at the battery and terminal block are different to include the wiring drop.)

※2 No error is displayed if the fan is disconnected during operation. An error will occur at startup when the refrigerator is disconnected while the refrigerator is off.

■ About the battery protection function

This refrigerator has a battery protection function for battery protection.

(The above error code <.>)

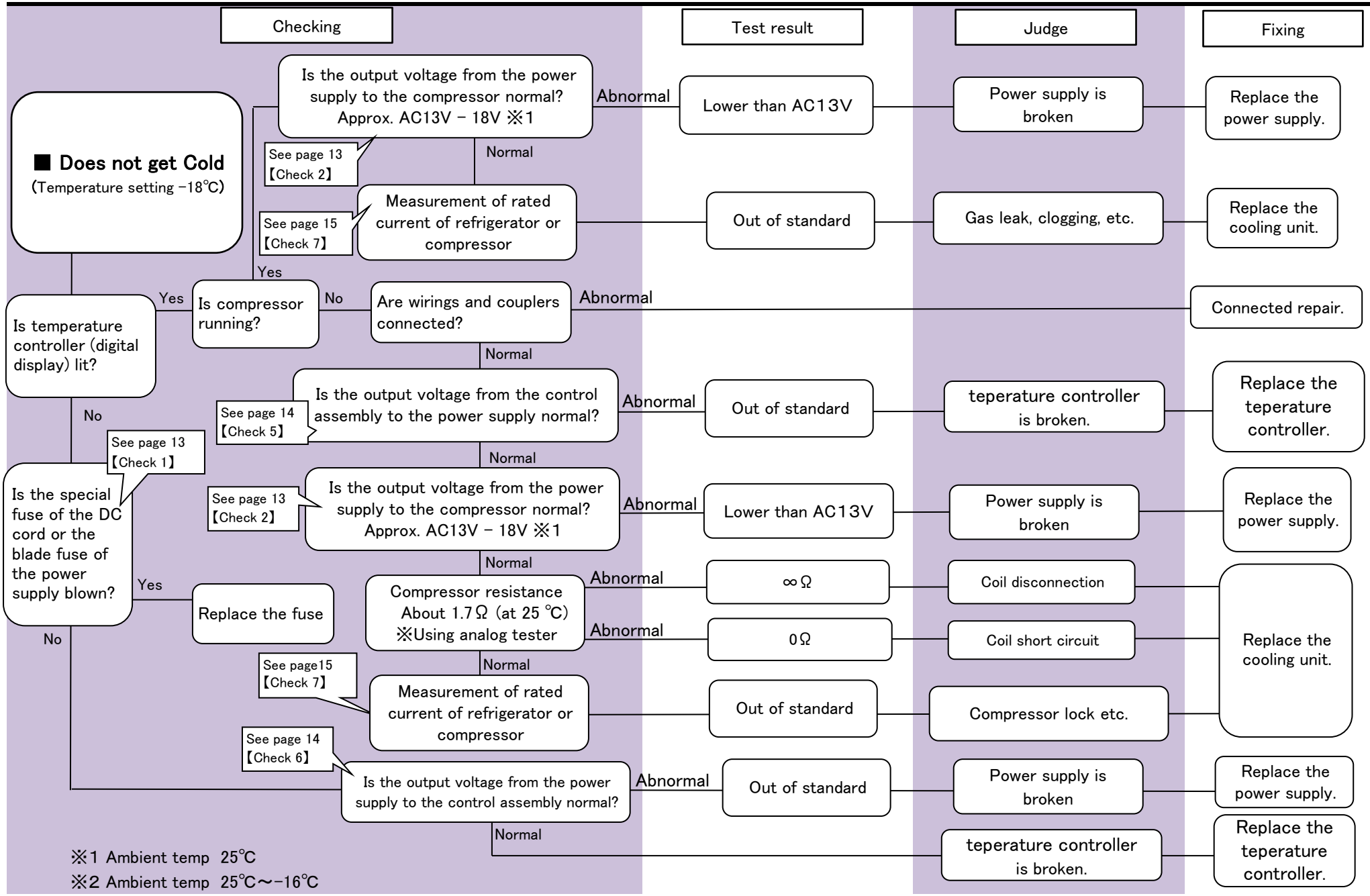
If the battery voltage is low, the refrigerator stops as shown in the table on the right.

The refrigerator automatically returns when the battery voltage returns to normal voltage.

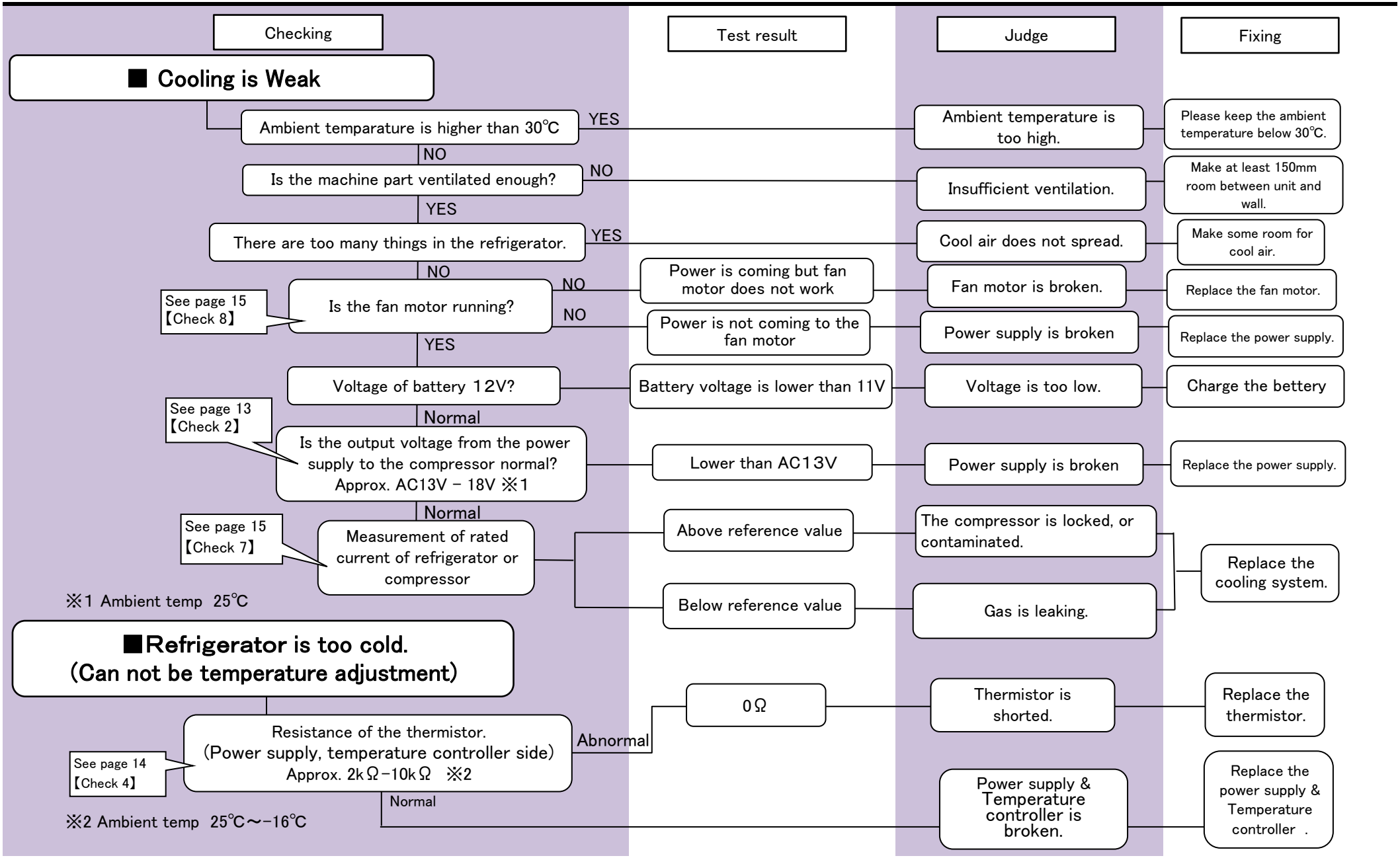
(Refer to page 8 for setting method)

| * Operates when the voltage value continues for 10 seconds | Battery protection settings | | |
|---|---|---|---|
| | OFF | LO | HI |
| At DC12V input Operation stop voltage | 7.9V or less | 10.5V | 11.5V |
| At DC12V input Operation automatic return voltage | 9.6V or less | 11.5V | 12.5V |
| At DC24V input Operation stop voltage | 7.9V or less | 21.0V | 23.1V |
| At DC24V input Operation automatic return voltage | 9.6V or less | 23.1V | 25.0V |

# 5. TROUBLE SHOOTING



# 5. TROUBLE SHOOTING



# 5. TROUBLE SHOOTING

■ Technical Data

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

| Checking items | Checking Points | Normal data | See page |
|---|---|---|---|
| Output voltage from power supply to compressor | Between outgoing cords from power supply (by ditaching from terminal of compressor) | Approx. AC 13V – 18V ※1 | See page 13【Check 2】 |
| Output voltage from temperature controller to power supply | 6P coupler terminal orange (+) terminal and black (−) terminal | Use DC12V → DC12V<br>Use DC24V → DC24V<br>Use AC100V → DC40V | See page 14【Check 5】 |
| Output voltage from power supply to temperature controller | Red (+) terminal and black (−) terminal of 6P coupler terminal | Use DC12V → DC12V<br>Use DC24V → DC24V<br>Use AC100V → DC40V | See page 14【Check 6】 |
| Output voltage from power supply to fan motor | Red (+) terminal and black (−) terminal of 2P fan power coupler | DC18V | See page 15【Check 8】 |
| Resistance of the compressor | Between incoming cords to compressor (by detaching from terminal of compressor) | Approx. 1.7Ω(K3) ※1 | See page 13【Check 3】 |
| Resistance of thermistor | Between two pin of the coupler | Approx. 2KΩ – 10KΩ ※2 | See page 14【Check 4】 |
| Rated current of compressor | Measure the motor input code with a clamp meter. | 2.1A–2.3A ※1 | See page 15【Check 7】 |
| Special fuse | Special fuse of DC cord | 0Ω | See page 13【Check 1】 |

# 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.

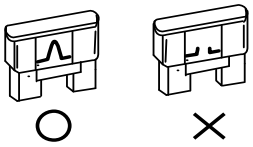
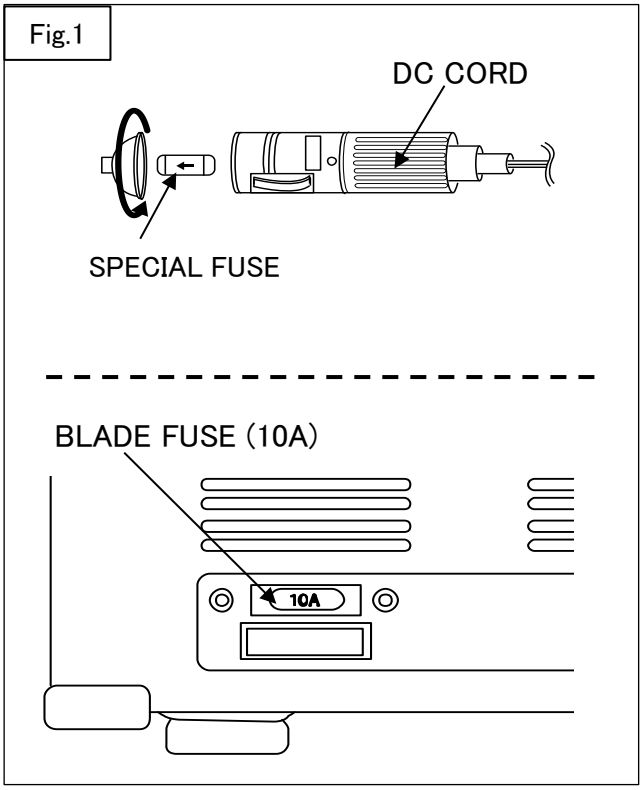



Fig.1



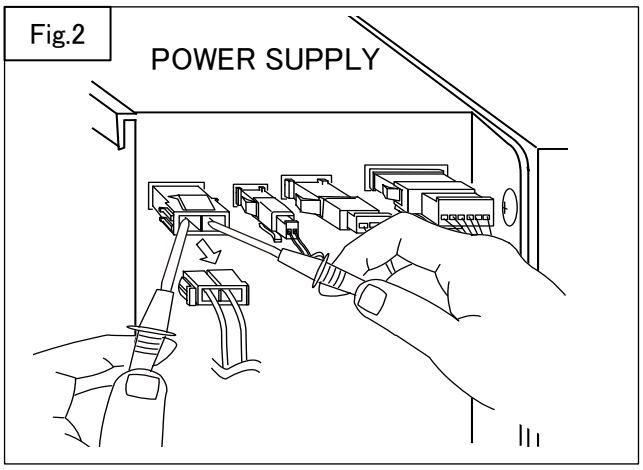

【Check 2】AC output voltage from power supply to compressor. (Fig.2)

◇ Checking point

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

| Test result | Judge |
|---|---|
| Approx. AC14 – 18V | Normal |
| AC 0 V | Power Supply is broken |
| Approx. AC14V or lower | |

Fig.2




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

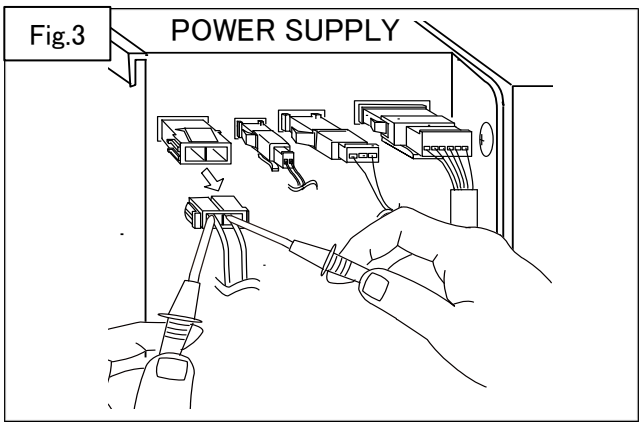
◇ Checking points

Remove two pin coupler at motor cord, and check.

(at25℃)

| Test result | Judge |
|---|---|
| Approx. 1.7 Ω | Normal |
| ∞Ω | Disconnection of compressor coil |
| 0Ω | Coil of compressor is short circuit |

Fig.3

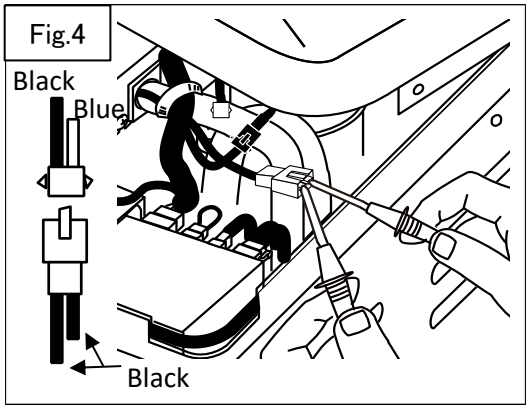


# 6. CHECK POINT & CHECK METHOD

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

＜EVA.Thermistor resistance measurement＞

Remove the EVA / thermistor coupler (white) and measure the resistance between the terminals. (Fig4)



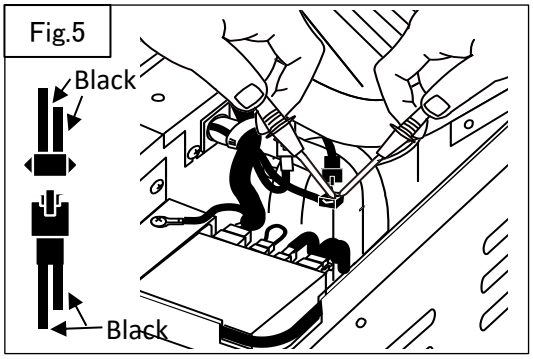

(at25℃ ～ -16℃)

| Test result | Judge |
|---|---|
| 2 kΩ - 10 kΩ ※1 | Normal |
| 0Ω | Thermistor short (Error display E-05) |
| ∞Ω | Thermistor disconnection (error display E-06) |

※1 The resistance increases when the thermistor body is cold.

＜Internal thermistor resistance measurement＞ (Combi type only)

Remove the coupler (black) of the internal fan thermistor and measure the resistance between the terminals. (Fig5)



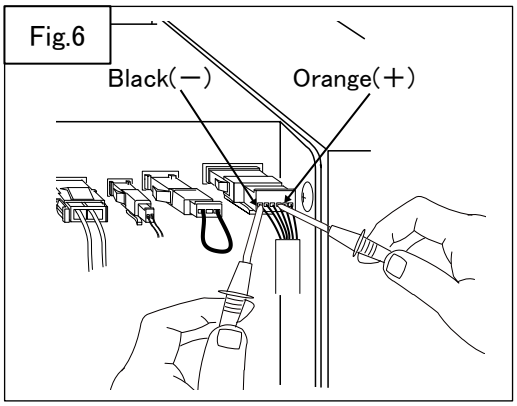

(at25℃ ～ -16℃)

| Test result | Judge |
|---|---|
| 2 kΩ - 10 kΩ ※1 | Normal |
| 0Ω | Thermistor short (Error display E-08) |
| ∞Ω | Thermistor disconnection (error display E-09) |

※1 The resistance increases when the thermistor body is cold.

【Check 5】 Output DC voltage measurement from control assembly to power supply

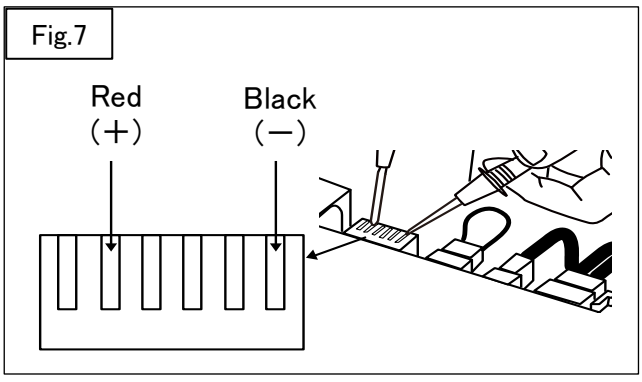
DC voltage is measured between the black (-) terminal and the orange (+) terminal of the power supply 6P coupler (Fig. 6)




| Power supply used | Test result | Judge |
|---|---|---|
| DC12V | DC11-14V | Normal |
| DC24V | DC23-26V | |
| AC100V | DC39-41V | |

【Check 6】 Output DC voltage measurement from power supply to control assembly

Remove the power supply 6P coupler and measure the DC voltage between the black (-) wiring section and the red (+) wiring section on the power supply side 6P coupler section (Fig. 7)




| Power supply used | Test result | Judge |
|---|---|---|
| DC12V | DC11-14V | Normal |
| DC24V | DC23-26V | |
| AC100V | DC39-41V | |

# 6. CHECK POINT & CHECK METHOD

【Check 7】Compressor Rated Current. (Fig.8)

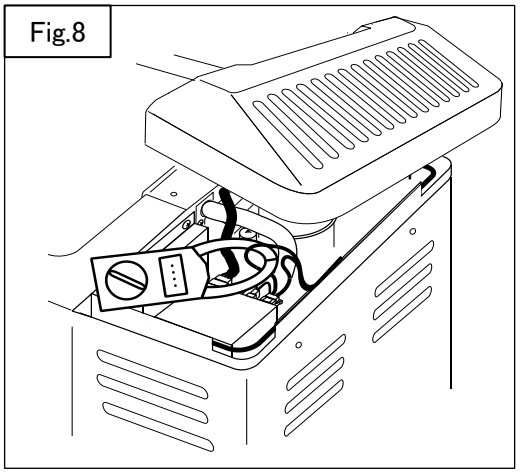
◇Checking point

Current value measurement with clamp meter between input cord terminals.

| Test result | Judge |
|---|---|
| 2.1 – 2.3A | Normal |
| Higher than 2.3A | Compressor is locked, or contaminated. ※ |
| Lower than 2.1A | Gas is leaking. ※ |

※If the refrigerator does not cool down, or if the coldness is weak

Fig.8



**WORK TIPS**

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

【Check 8】Resistance of Fan motor.

<Compressor-side fan motor>

Check DC voltage from power supply to fan motor
◇Remove the fan motor coupler (white) on the compressor side and measure the DC voltage between the coupler terminals on the power supply side (Fig. 9)

| Test result | Judge |
|---|---|
| DC18V | Normal |
| 0V | Power supply failure |

When directly checking the operation of the fan motor
◇You can check by directly connecting 18V to 24V DC, but follow the precautions (Fig. 10)

**⚠ CAUTION**

・Prepare a support coupler and perform measurement.
・ Be careful not to mistake the polarity.

<Inside fan motor> (combi type only)

DC voltage confirmation from the control ASSY to the internal fan motor
◇Remove the internal fan motor coupler (black) and measure the DC voltage between the control ASSY side coupler terminals (Fig. 11)

| Test result | Judge |
|---|---|
| DC12V | Normal |
| 0V | Control ASSY failure |

When directly checking the operation of the fan motor
◇You can check by directly connecting 12V DC, but follow the precautions (Fig. 12)

Fig.9

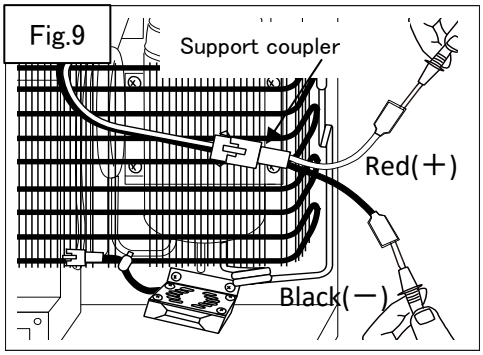



Fig.10

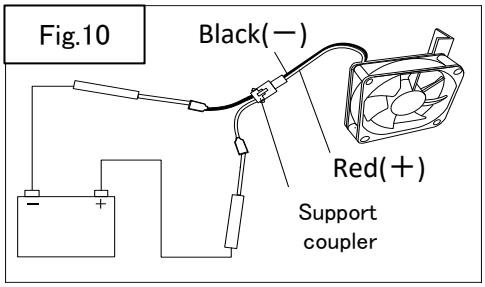



Fig.11

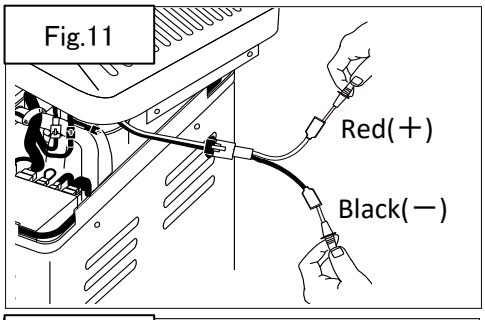
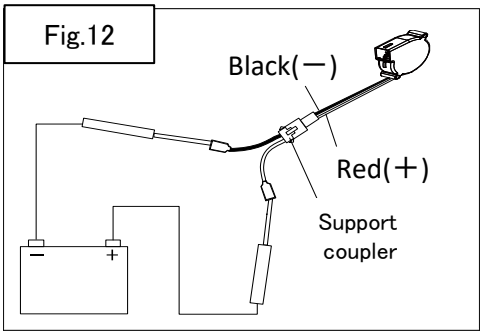



Fig.12



# 7. REPLACING PARTS

【How to Replace Cooling Unit】

1. Remove the door.
   - ・Open the door and take out the basket.
   - ・Remove the Divider. (Combi type only)
   - ・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.

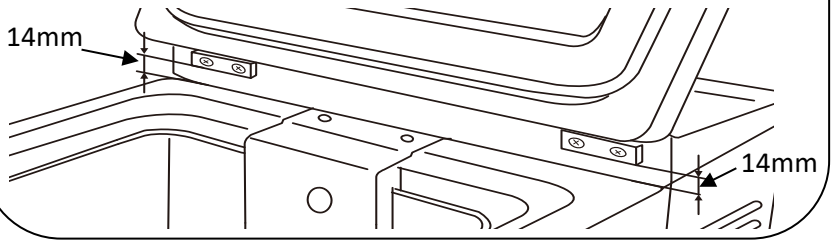
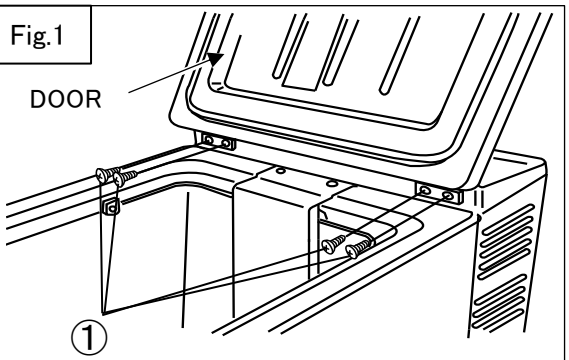
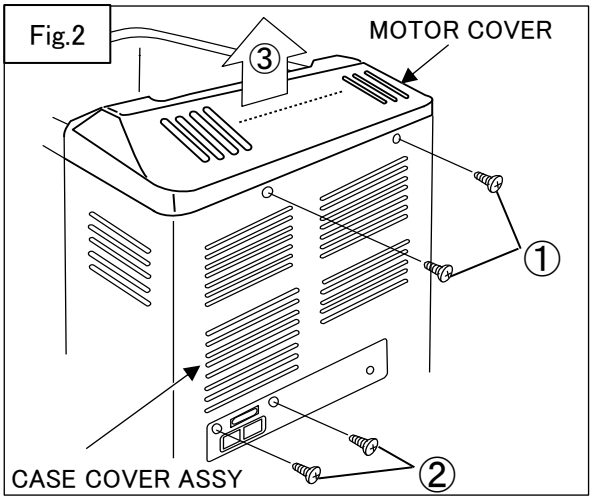



Fig.1



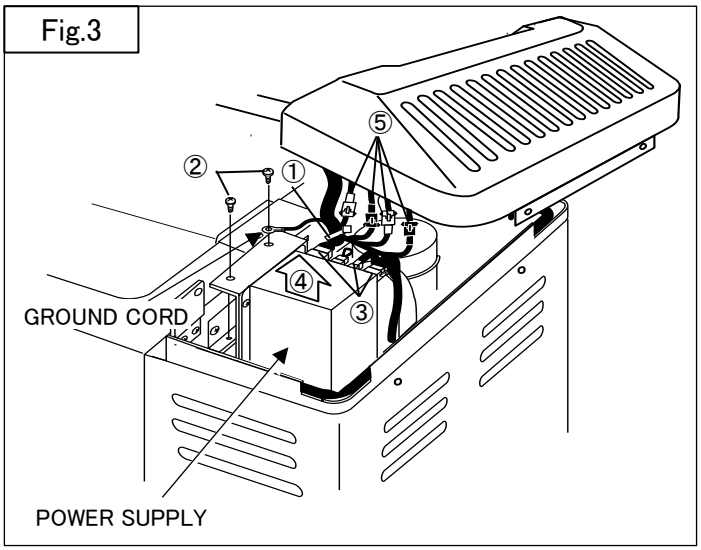

2. Remove the motor cover.
   - ・Remove two screws of motor cover. (Fig.2-①)
   - ・Remove two screws of case cover assy. (Fig.2-②)
   - ・Remove the motor cover from the main unit. (Fig. 2-③)

Fig.2



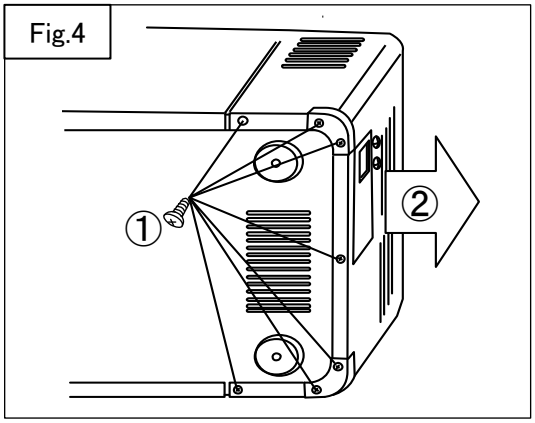

3. Take out the power supply.
   - ・Cut the fastener. (Fig.3-①)
   - ・Remove two screws of power supply. (Fig.3-②)
   - ・Lift the power supply and remove the three couplers. (Fig. 3-③)
   - ・Take out the power supply. (Fig.3-④)
   - ・Remove all couplers of temperature control assembly. (Fig. 3-⑤) (4 couplers for combi type, 3 couplers for non-combi type)
   - ・Remove the temperature control assembly from the main unit.

Fig.3




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

Fig.4



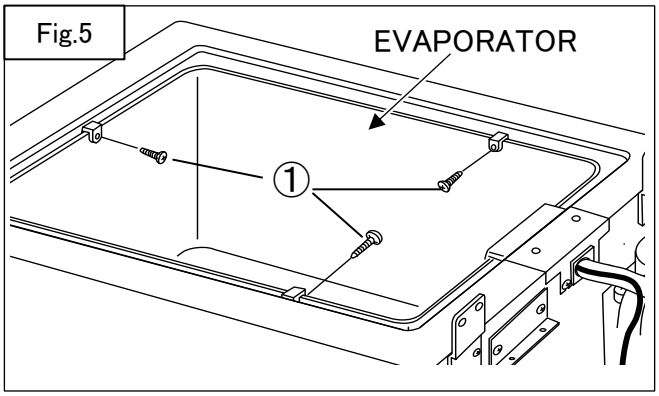
# 7. REPLACING PARTS

5. Remove screws of evaporator.

〈For non combi type〉

・Remove the 3 screws (Fig. 5-①)

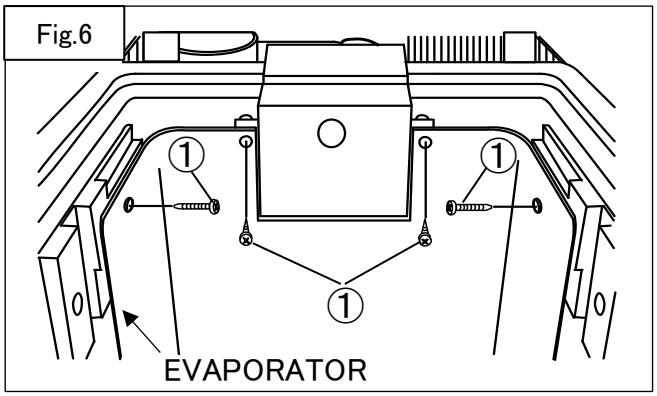
Fig.5




＜For combi type＞

・Remove the 4 screws (Fig. 6-①)

Fig.6




6. Remove the cover pipe.

〈For non combi type〉

・Remove two screws of cover pipe. (Fig.7-①)

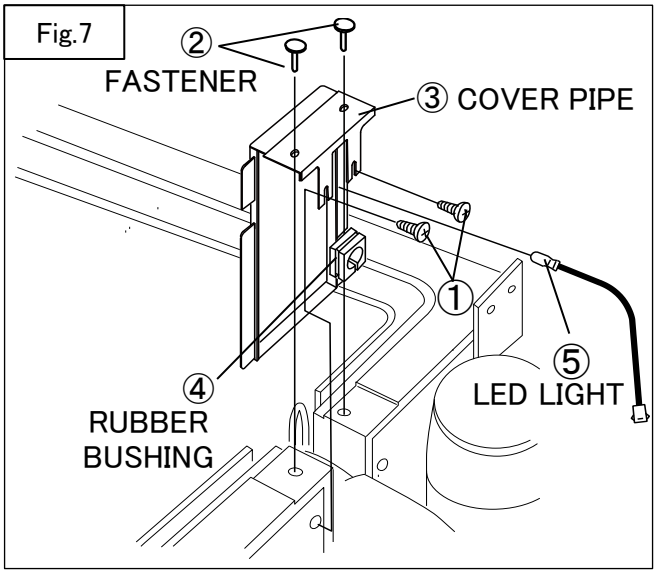
・Remove two  fasteners of cover pipe. (Fig.7-②)

・Remove the cover pipe. (Fig.7-③)

・Remove the rubber bushing. (Fig.7-④)

・Remove LED light.  (Fig.7-⑤)

Fig.7




〈For combi type〉

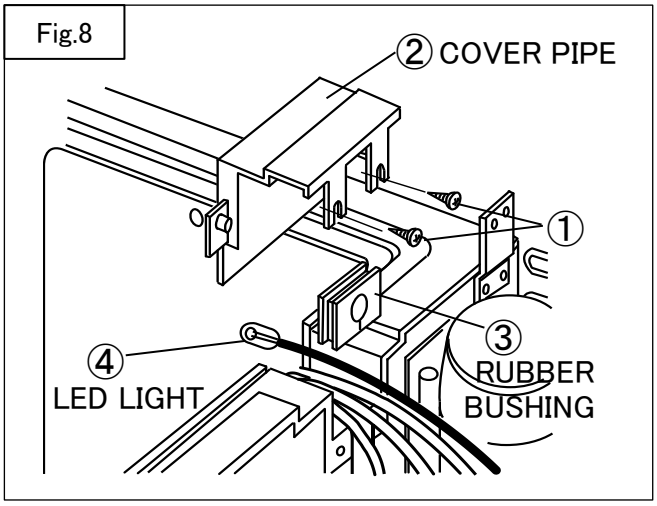
・Remove two screws of cover pipe. (Fig.8-①)

・Remove the cover pipe. (Fig.8-②)

・Remove the rubber bushing. (Fig.8-③)

・Remove LED light.  (Fig.8-④)

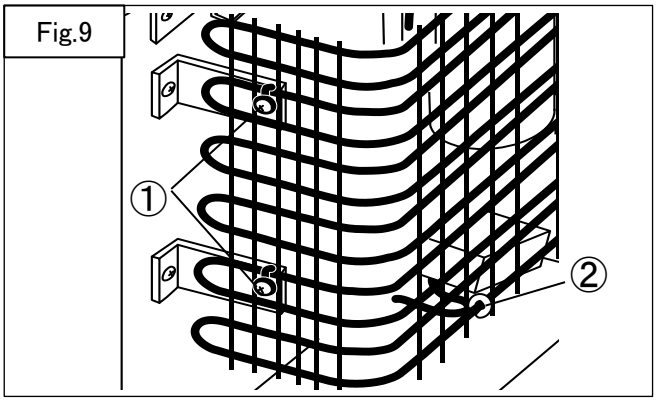
Fig.8



# 7. REPLACING PARTS

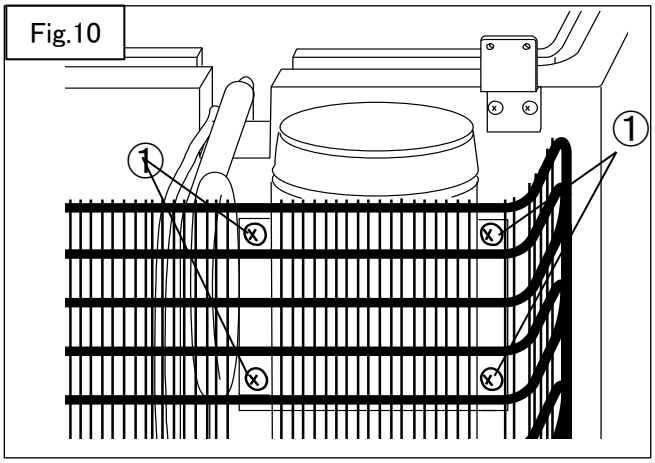
7. ・Remove two screws of wire condenser. (Fig.9-①)
   ・Cut the fastener. (Fig.9-②)

Fig.9



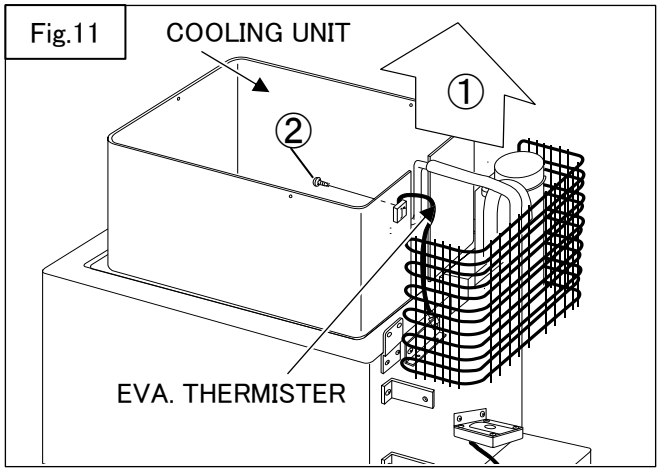

8. ・Remove four screws of compressor. (Fig.10)

Fig.10



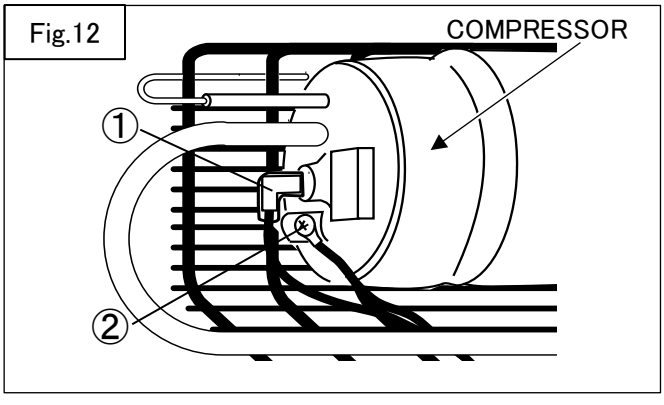

9. Pull out cooling unit.
   ・Take out cooling unit from cabinet assy. (Fig.11-①)
   ・Remove screw of EVA. thermister. (Fig.11-②)

Fig.11




10. Pull out input cord from the compressor.
    Pull out the positive side. (Fig.12-①)
    Pull out the negative side. (Fig.12-②)

Fig.12



# 7. REPLACING PARTS

【How to Replacement of Fan Motor】

＜Compressor side 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.13-①)

5. Cut fastener. (Fig.13-②)

6. Remove 2 screws. (Fig.13-③)

7. Remove four screws. (Fig.14-④)

Fig.13

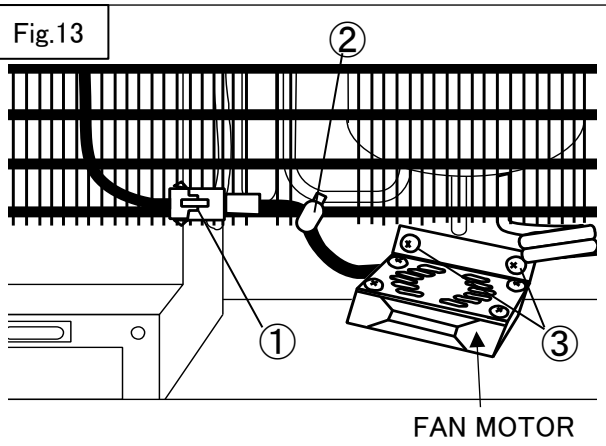
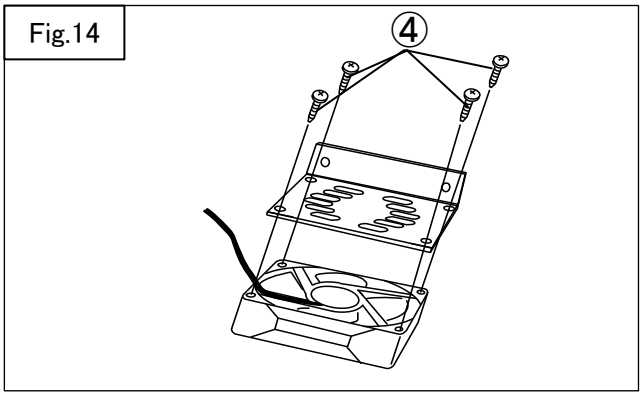



Fig.14




＜Inside fan motor & Inside thermistor＞

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 screws of evaporator.
   (【How to Replace Cooling Unit】
   STEP.5＜For combi type＞ )

4. Remove the cover pipe.
   - Remove 2 screws of cover pipe. (Fig.15-①)
   - Remove the cover pipe. (Fig.15-②)
   - Remove the rubber bushing. (Fig.15-③)

5. Remove the holder
   - Remove 3 screws of holder. (Fig.16-①)

6. Remove the inside fan motor & inside thermistor.
   - Remove screw of inside fan motor. (Fig.17-①)
   - Remove the inside fan mortor. (Fig.17-②)
   - Remove the internal thermistor. (Fig.17-③)

Fig.15

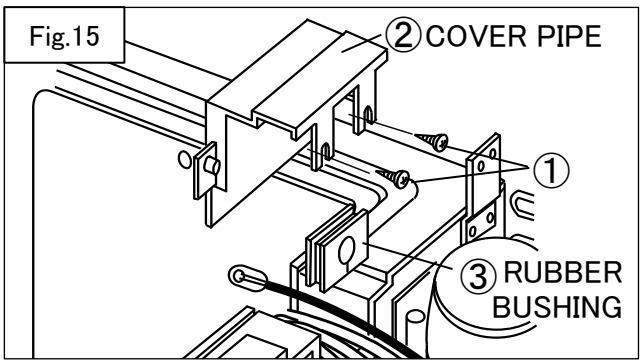



Fig.16

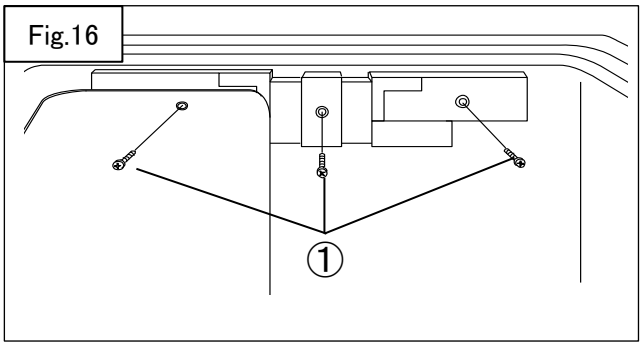
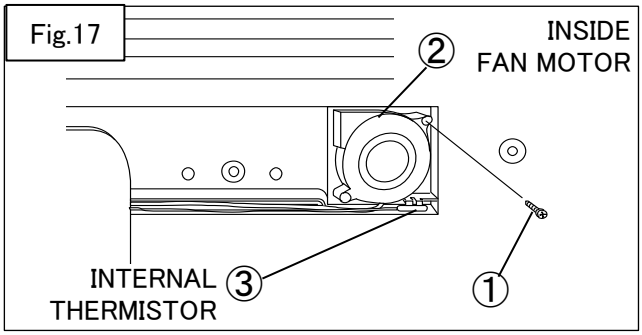



Fig.17



# 7. REPLACING PARTS

【How to Replacement of Power Supply】

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

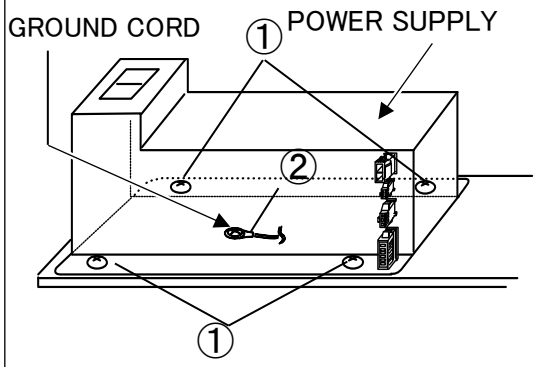
2. Remove the motor cover.
   (【How to Replace Cooling Unit】 STEP.2)

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

4. Remove 4 screws of power supply. (Fig.18-①)

5. Remove ground cord of power supply. (Fig.18-②)

Fig.18




【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.19-①)

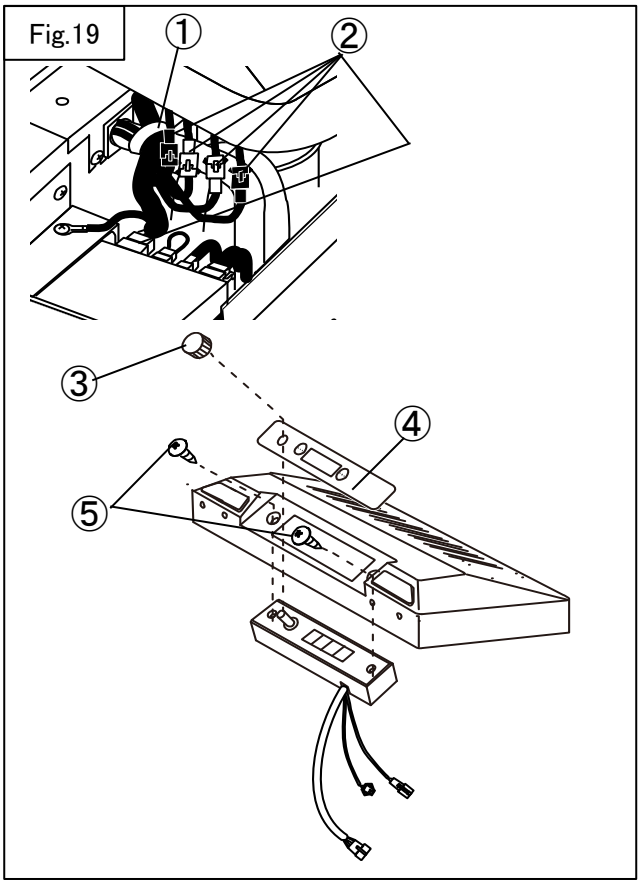
4. Remove all couplers of temperature control assembly. (Fig. 3-⑤) (5 couplers for combi type, 3 couplers for non-combi type)

5. Remove the dial (Fig.19-③)

6. Peel off the mark (Fig.19-④)

7. Remove 2 screws. (Fig.19-⑤)

Fig.19




SAW FUJI