



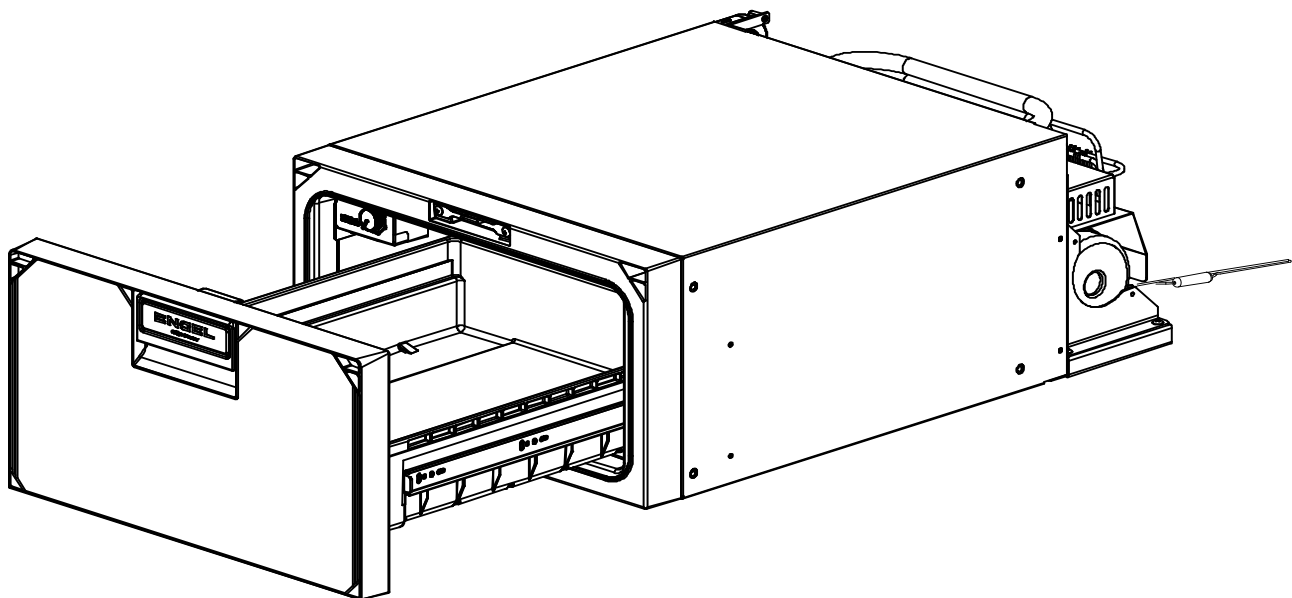
ENGEL

SERVICE MANUAL

MODEL :

SB30F-N-W 0643 030 3210

SB30F-N-U 0643 030 3220



SAWAFUJI ELECTRIC CO., LTD.

2021.12#0

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.

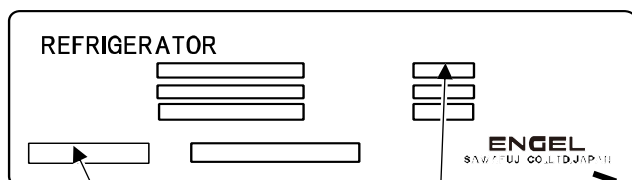
● SAFETY SYMBOLS

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

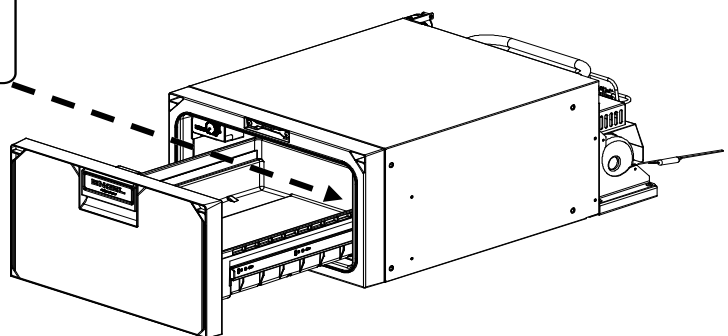
 WARNING	May lead to death or serious injury if failed to comply with this precaution
 CAUTION	May lead to injury if failed to comply with this precaution
WORK TIPS	Lead to failure of the refrigerator set or its components if failed to comply with this precaution

● REFRIGERATOR CODE NUMBERS

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



NUMBER	MODEL NAME
0643 030 3210	SB30F-N-W
0643 030 3220	SB30F-N-U



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1. SPECIFICATIONS

■ Spec Table

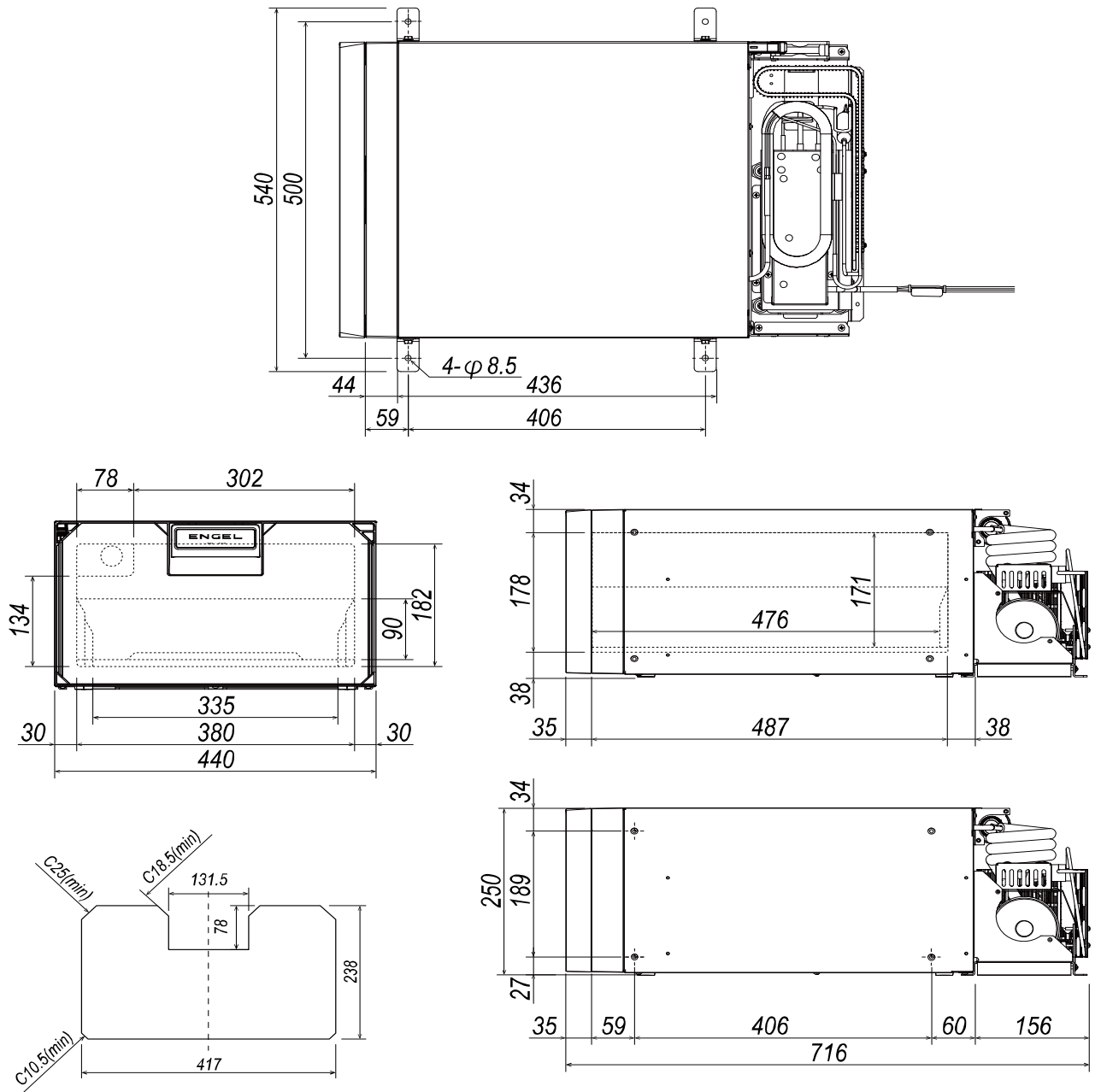
Model		SB30F-N-W	SB30F-N-U
Model code		0643 030 3210	0643 030 3220
Storage volume	ℓ (liter)	30	
Exterior dimensions W × D × H	in	17.3 × 28.2 × 9.8	
	mm	440 × 716 × 250	
Interior dimensions W × D × H		See page 3	
	mm		
Outer enclosure	Cabinet	Case	SPCC powder coating, SGCC
		Cover	ABS resin
	Door		
Interior enclosure	Cabinet	Case, inner	Coating Aluminum
		Evaporator	
	Door	ABS resin	
	Tray		
Heat insulator	Cabinet	Foamed POLY URETHANE (CYCLOPENTANE)	
	Door		
Input voltage	DC	12V / 24V	
Rated amperage	DC12V/24V	3.4A / 1.7A	
Compressor model		SK511N	
Compressor rating		AC15.0V, 1.8A, 27W	
Refrigerant		HFC-134a	
Average inside room temperature (Dial position: "1", Ambient temp. 30°C)		8±3°C	
Average inside room temperature (Dial position: "5", Ambient temp. 30°C)		-8°C	
Temperature control		Automatic temperature control by dial setting (Electronic thermostat control type)	
Weight	LBS.	47.4	
	Kg	21.5	

1. SPECIFICATIONS

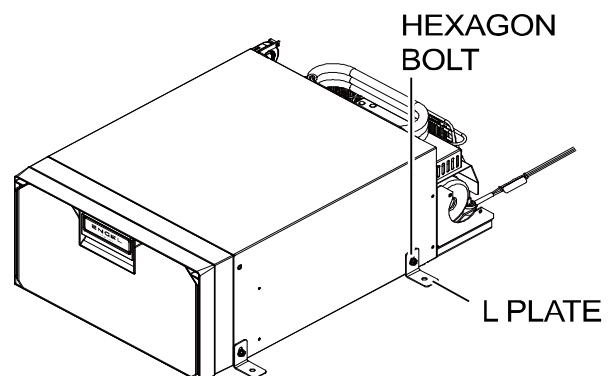
■ Dimensions

● SB30F-N-/W/U

※ Tolerance is omitted Unit (mm)

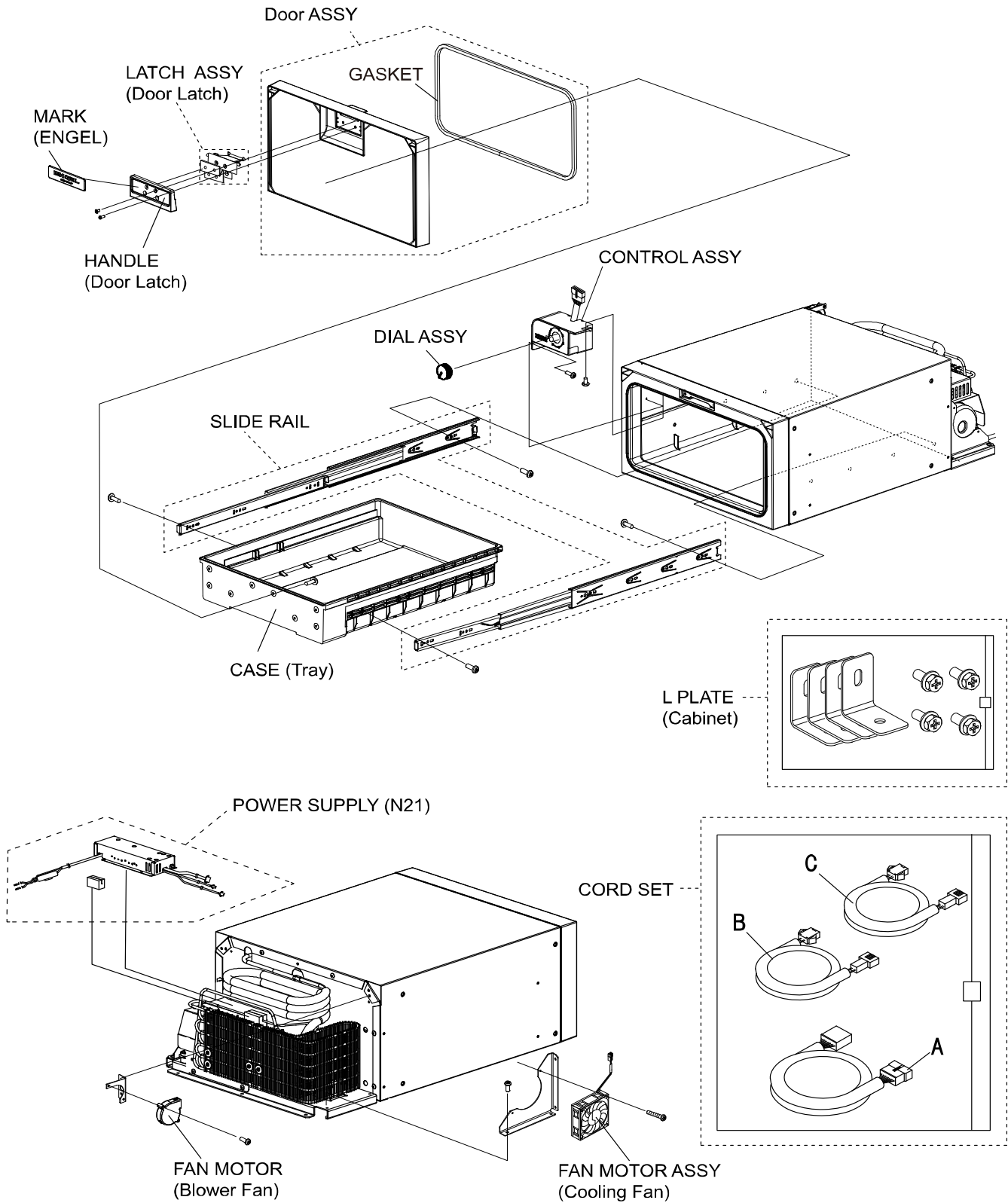


To customize the drawer front please use these measurements to cut your panel or sticker for best fit.



1. SPECIFICATIONS

■ SB30F part name



2. INSTALLING A REFRIGERATOR

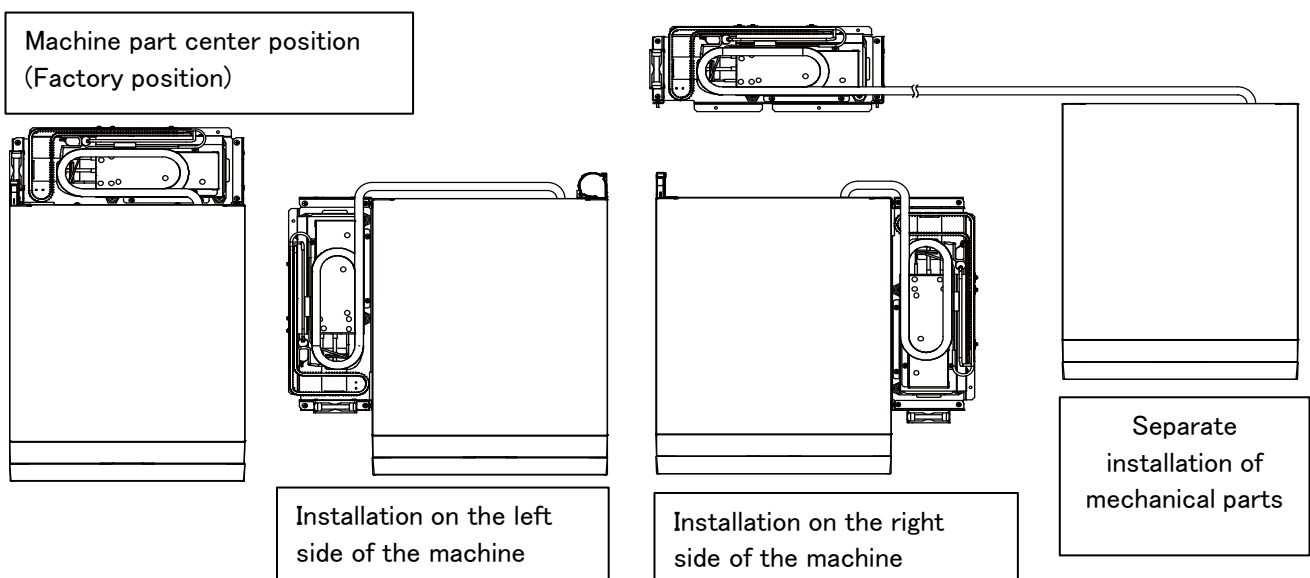
■ Precautions regarding the installation of the refrigerator

- 1) Make sure to install the product horizontally.
When installing in the Vehicle or Boat, make sure the product does not install an unstable place.
- 2) Make sure to install the product where the air flow is available.
If the Machine parts air flow contaminated, the cooling system will degrades.
- 3) Avoid from direct Sunlight, Stove, or anything related to heat.
If you install the product near a gas stove, a heater, any other heat-generating appliances or place in direct sunlight, the cooling performance is deteriorated. And there is a risk of discoloration or deformation.
- 4) Avoid installing the product close to a kitchen sink or water faucet.
Easily with the dew on the outer case and inner case and then installed in wet locations.
If installed in locations subject to water will damage the electrical circuits and other.

■ How to install the refrigerator

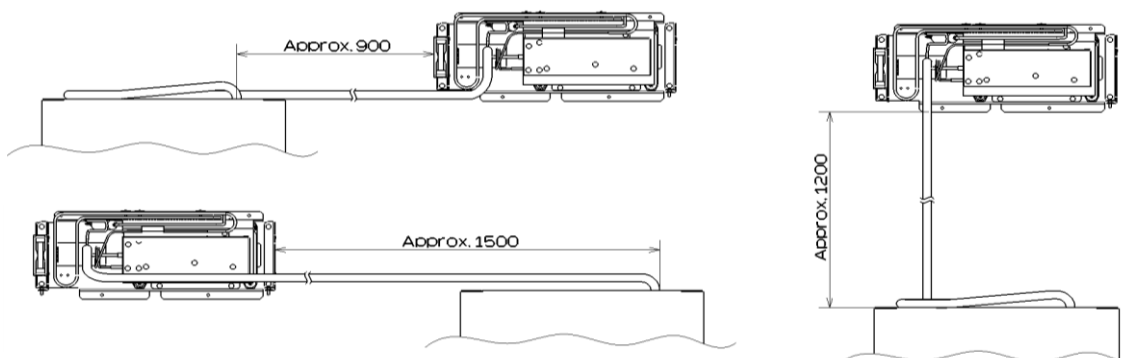
<Moving the compressor unit>

The compressor unit of this refrigerator can be placed in four different locations.



<Dimensions when the mechanical part is placed separately>

Please note that the length of the pipe varies depending on the position where it is placed separately.



2. INSTALLING A REFRIGERATOR

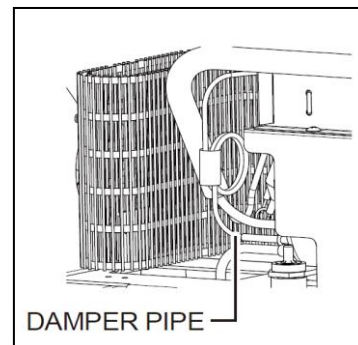
■ How to move the compressor unit

⚠ CAUTION

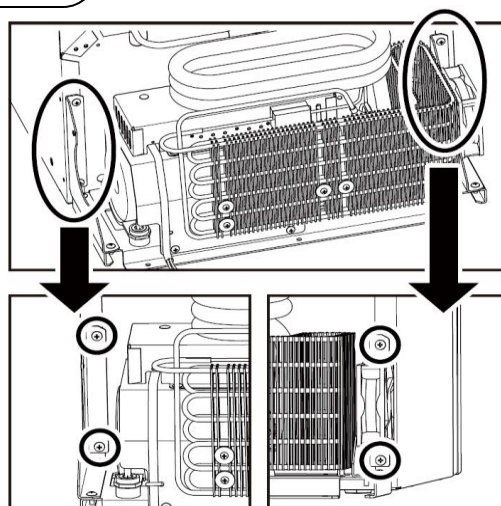
- When working, wear gloves to avoid injury.

WORK TIPS

- Be careful not to bend or crush the suction pipe. In the unlikely event that it is damaged, the manufacturer's warranty cannot be obtained.
- Do not move the damper pipe. (See the figure on the left)



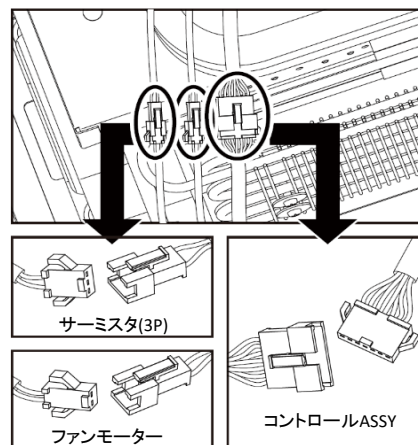
- ① Remove the four screws with a screwdriver.



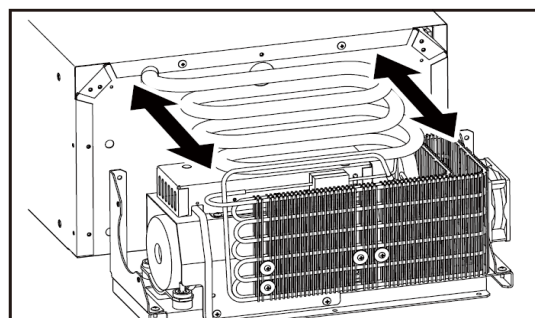
- ② Cut the fastener.

- ③ Remove the three couplers. □
※Only when placed separately.

It is not necessary to remove it when fixing it to the left and right of the cabinet.

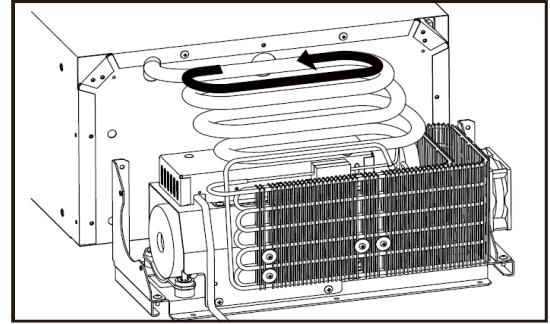


- ④ Separate the cabinet and compressor unit.



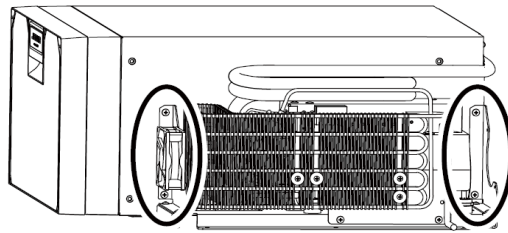
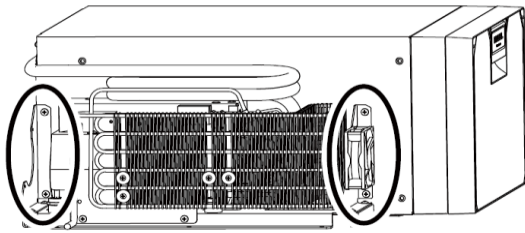
2. INSTALLING A REFRIGERATOR

- ⑤ Bend the suction pipe straight and turn it in the direction of the arrow.



- ⑥ Move the compressor unit to the desired side of the cabinet.

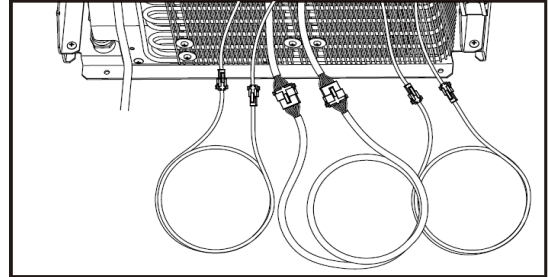
- ⑦ Use a screwdriver to fix the four screws and complete. (Approximately $1.18\text{N} \cdot \text{m}$)
 ※Only when the mechanical part is fixed to either the left or right side of the cabinet



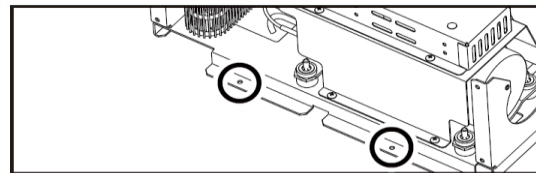
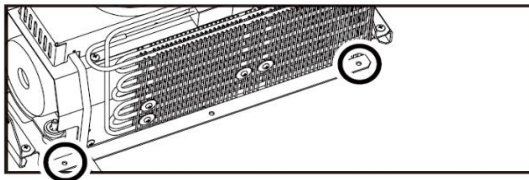
Explanation when placing separately after this

- ⑧ Move and anchor the compressor unit in a well ventilated, level position.

- ⑨ Connect the 3 extension cords sold separately.

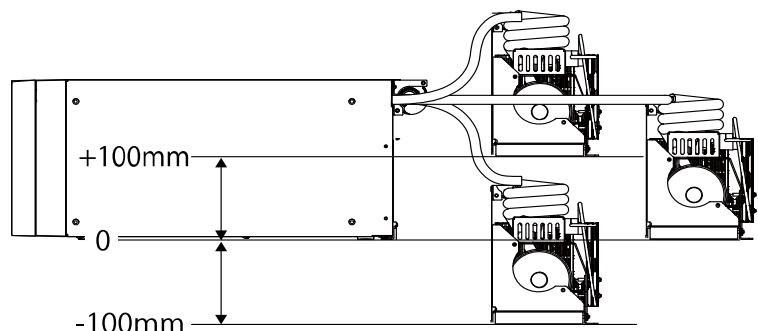


- ⑩ Fix 4 screws by using a screwdriver.



WORK TIPS

Please install the machine part on the same plane.
 If there is a difference in height, keep it within ± 100 mm.
 If the height difference is larger than that, the cooling performance will deteriorate and it may cause a malfunction.



2. INSTALLING A REFRIGERATOR

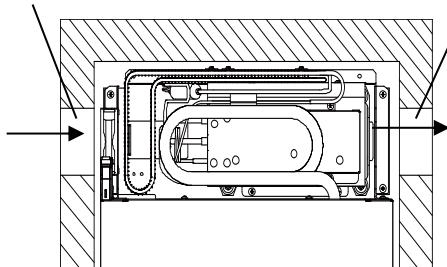
■ Notes on building in

<Notes on ventilation of the refrigerator>

- Heat dissipation from the mechanical part at the rear of the refrigerator flows in the direction of the arrow in the figure below.
- Provide the suction port and the exhaust port as shown in the figure below so that they will not be blocked.
- The recommended opening size is 20 cm in length x 8 cm in width.
- When built-in, change the position and orientation of the fan according to the layout of the mechanical part. (See <Fan orientation at built-in> below) □

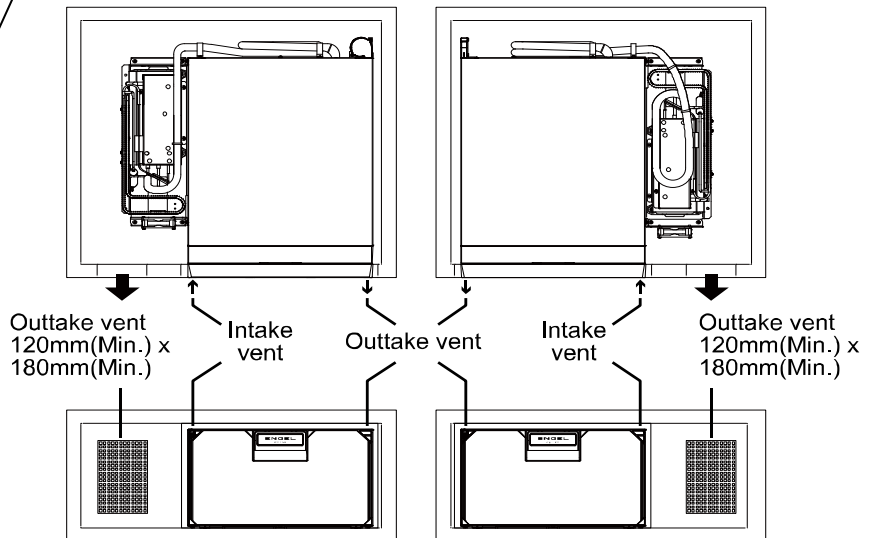
Intake vent
80mm(Min.) x 200mm(Min.)

Outtake vent
80mm(Min.) x 200mm(Min.)



WORK TIPS

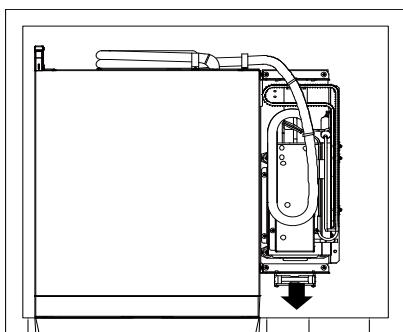
Failure to provide the necessary venting will result in poor refrigeration, continuous compressor operation, accelerated battery discharge and sometimes shorten the life of fridge.



<Fan orientation at built-in>

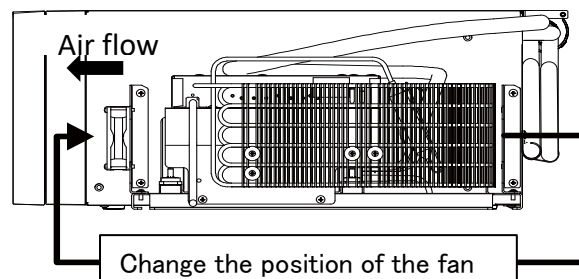
Change the position and orientation of the fan motor according to the following.

- 1) When the mechanical part is installed on the right side of the cabinet

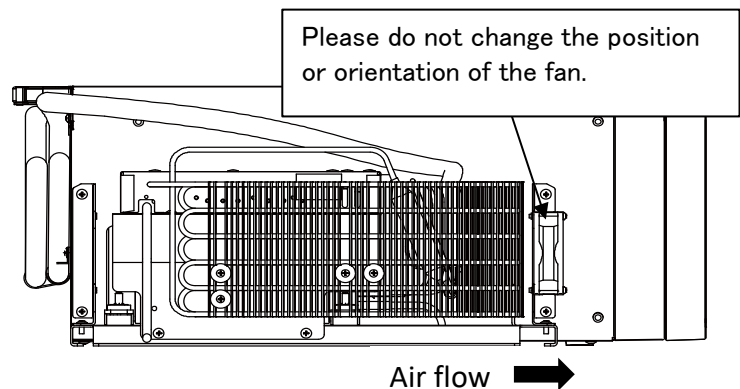
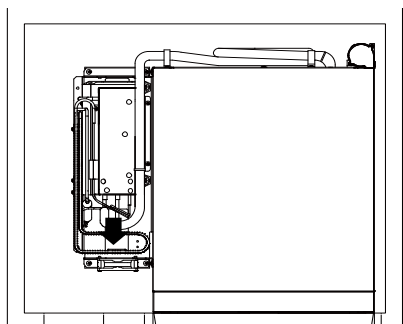


WORK TIPS

If you do not change the position or orientation of the fan, the cooling performance will deteriorate.



- 2) When the mechanical part is installed on the left side of the cabinet

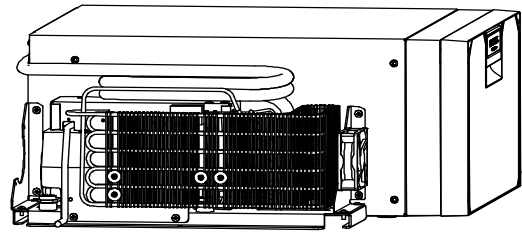


2. INSTALLING A REFRIGERATOR

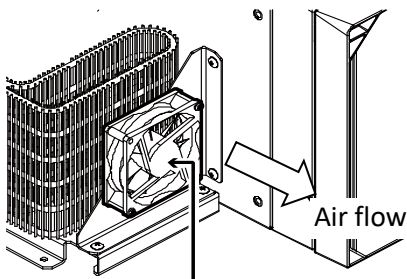
■ Notes on free standing (not built-in)

<Fan direction during free standing>

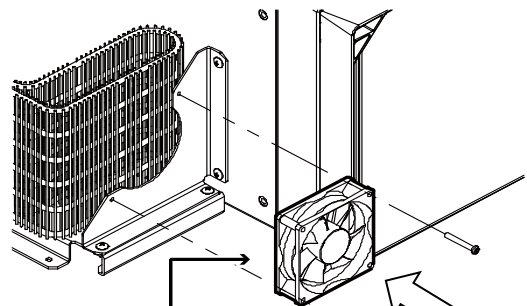
- 1) When attaching the mechanical part to the left side when viewed from the front



When using the refrigerator as a free standing (not built-in) with the mechanical part attached to the left side when viewed from the front, change the direction of the fan motor.



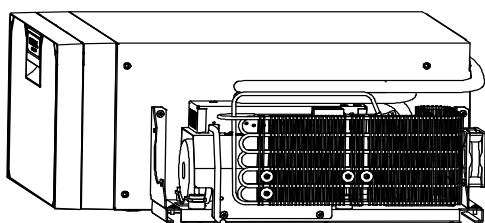
The fan label is on the outside and the wind direction is above.



Assemble the fan inside out with the label inside and change the wind direction

- 2) When attaching the mechanical part to the right side when viewed from the front.

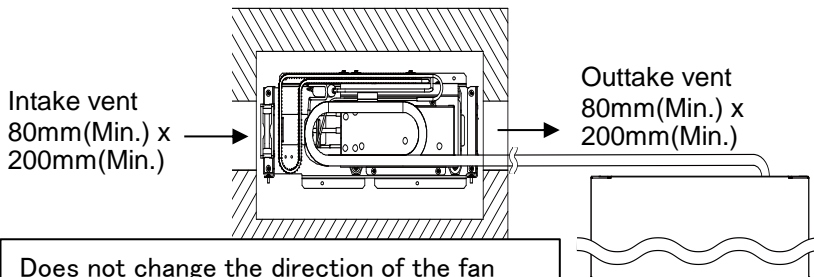
When using the refrigerator as a free standing (not built-in) with the mechanical part on the left when viewed from the front, do not change the direction of the fan motor.



Does not change the direction of the fan.

■ About installing the machine part in another place

<Air flow and fan direction>



Does not change the direction of the fan

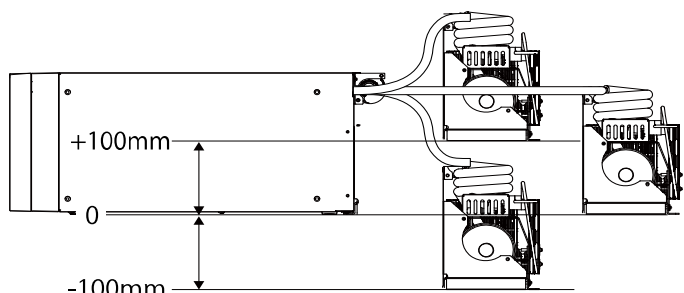
WORK TIPS

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

<About the height difference when the mechanical part is placed in another place>

WORK TIPS

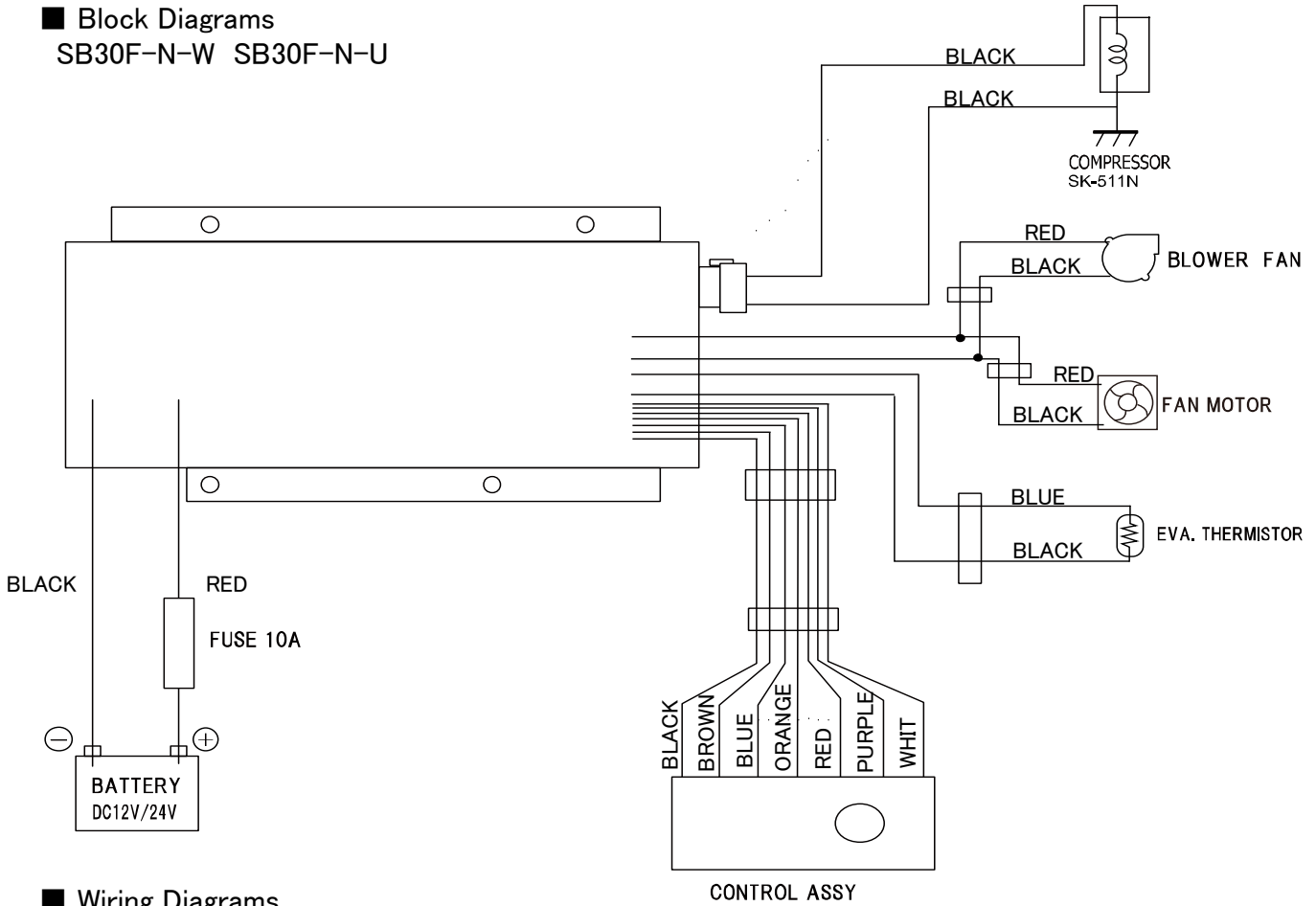
Please install the machine part on the same plane. If a height difference is inevitable, keep it within ± 100 mm. If the height difference is larger than that, the cooling performance will deteriorate and it may cause a malfunction.



3 .CONNECTING DIAGRAM

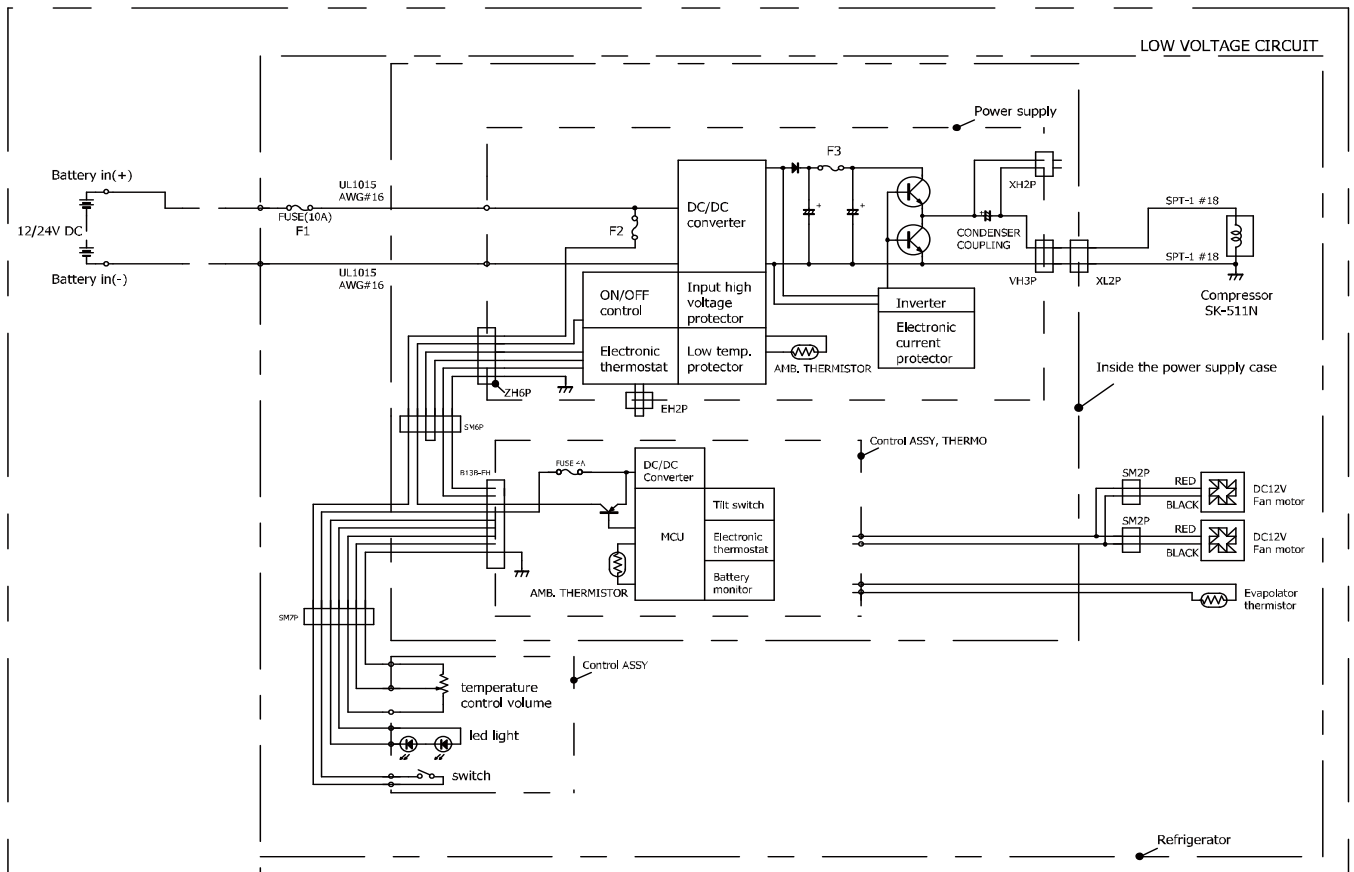
■ Block Diagrams

SB30F-N-W SB30F-N-U



■ Wiring Diagrams

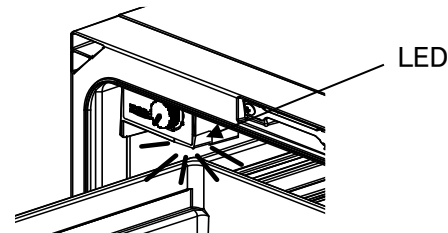
SB30F-N-W SB30F-N-U



4. TROUBLE SHOOTING

■ Error Display List (Slowly LED flashing)

If the LED is flashing, it is considered the cause of the table below.



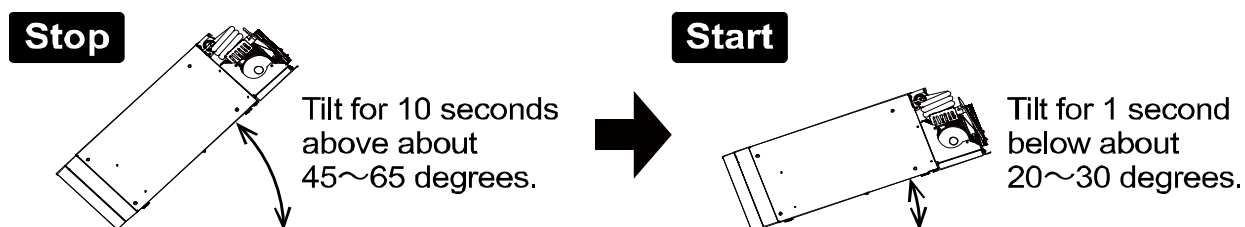
Abnormal item		Test result	Compressor	Fixing	See page
Battery voltage drop	12V battery use	Lower than DC9.6V	Stop	Charge the battery	-
	24V battery use	DC17V ~ 20.4V	Stop	Charge the battery	-
Overvoltage		More than DC32V	Stop	Please use DC12V or DC24V	-
Ambient temperature	LOW	Ambient temperature < -20°C	Stop	-	-
	HIGH	Ambient temperature > 55°C	Stop	-	-
EVA.Thermistor is abnormality (Cabinet side)	Shorted	0 Ω	Running	It can not be removed from the cooling system. Unable to fix.	See page16 【Check 5】
	Disconnection	∞ Ω	Stop		
Blower Fan motor		Disconnection	Running	Replace the blower fan motor	See page17 【Check 8】
Fan motor ✕No LED blinking		Disconnection	Running	Replace the fan motor	

✕It will be reset by turning off the power.

■ Tilt protection

This refrigerator senses the tilt and stops.

✕Tilt protection still works when tilted in all directions. Operating angle changes depending on the tilt speed.

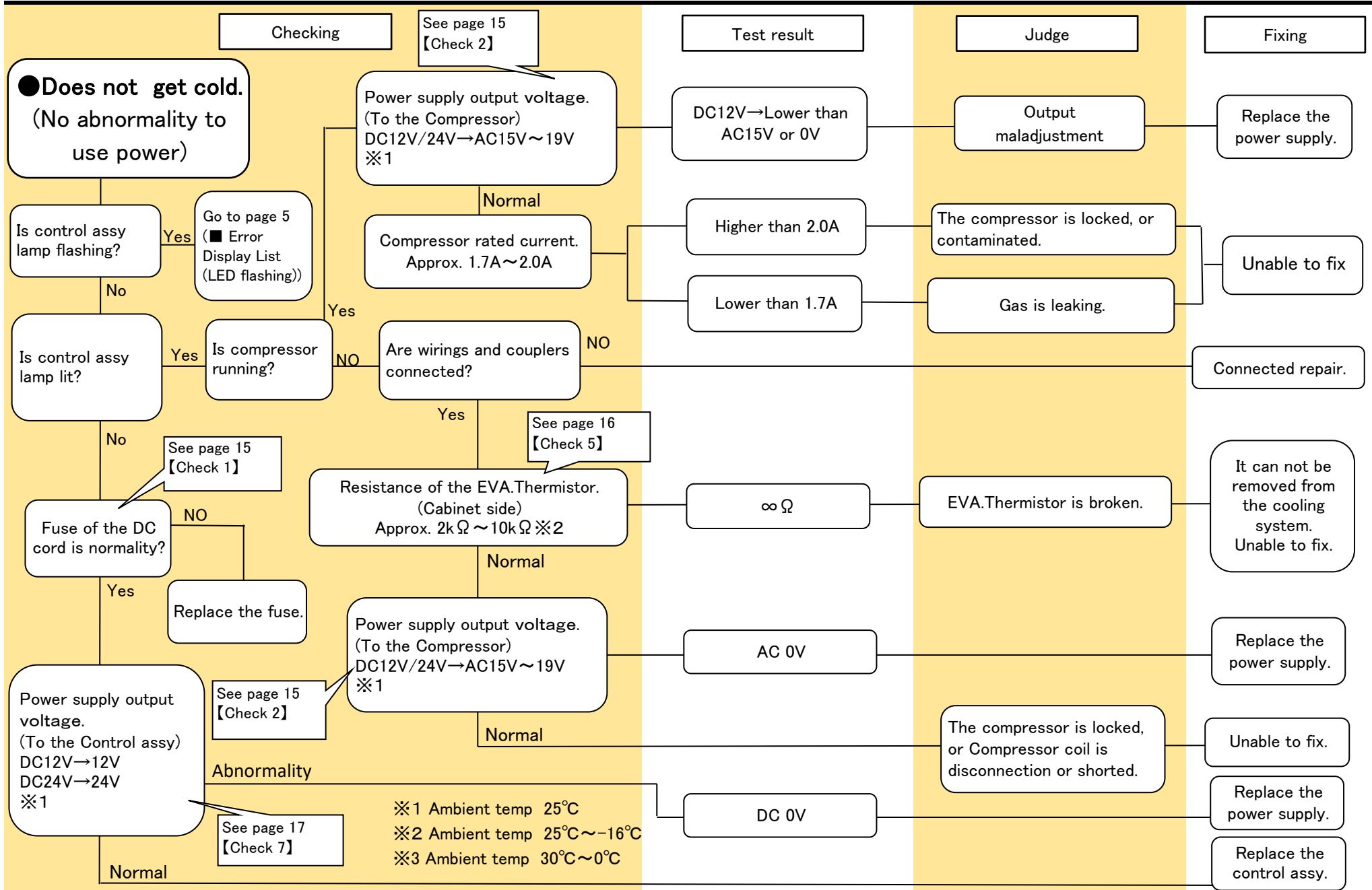


■ Battery protection

This refrigerator is equipped with a battery monitor cutting the compressor in or out in order to protect the battery.

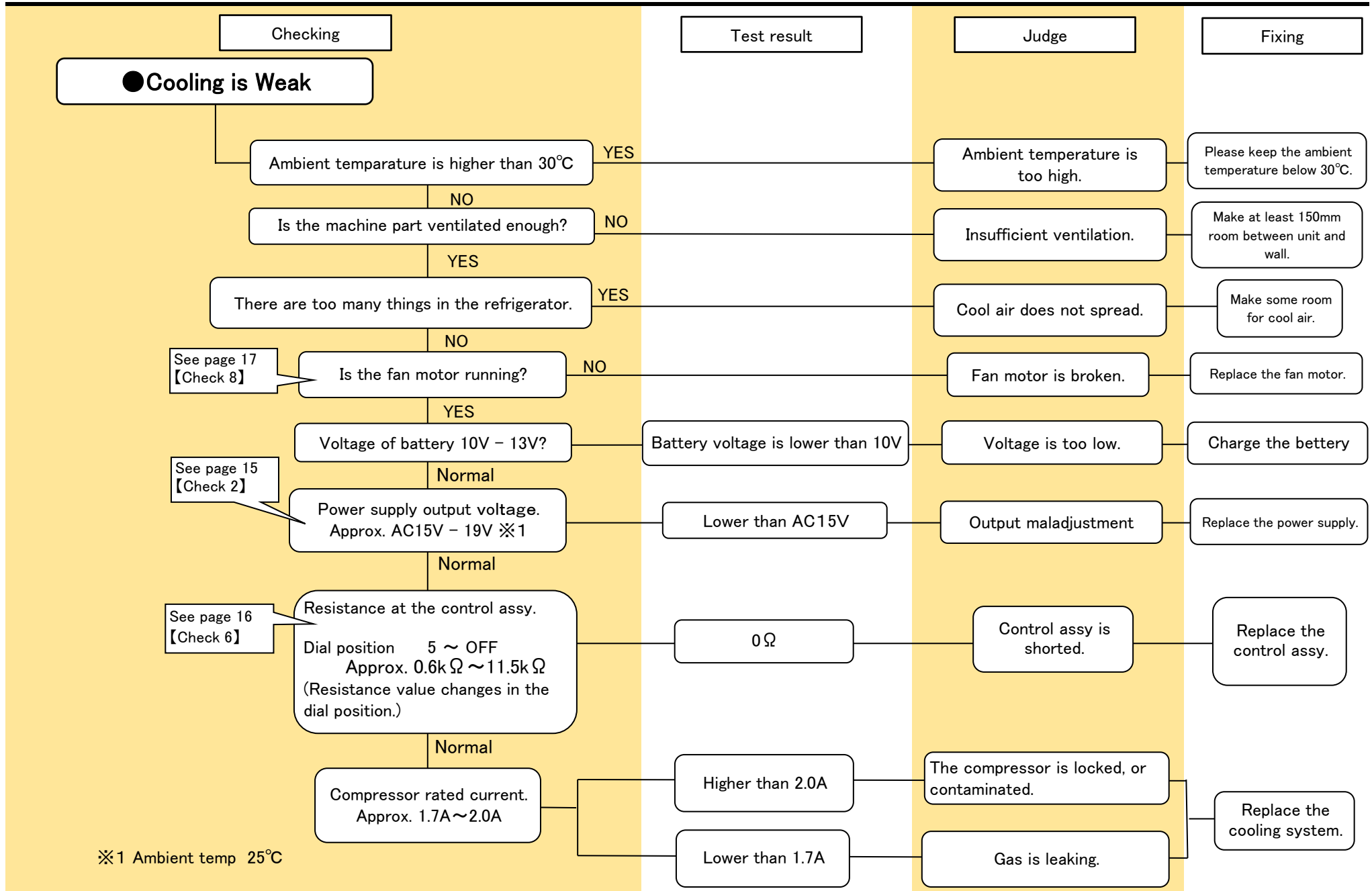
Cut out Voltage 12V	9.6V
Cut in Voltage 12V	11.5V
Cut out Voltage 24V	20.4V
Cut in Voltage 24V	23.1V

4. TROUBLE SHOOTING



※1 Ambient temp 25°C
 ※2 Ambient temp 25°C~-16°C
 ※3 Ambient temp 30°C~0°C

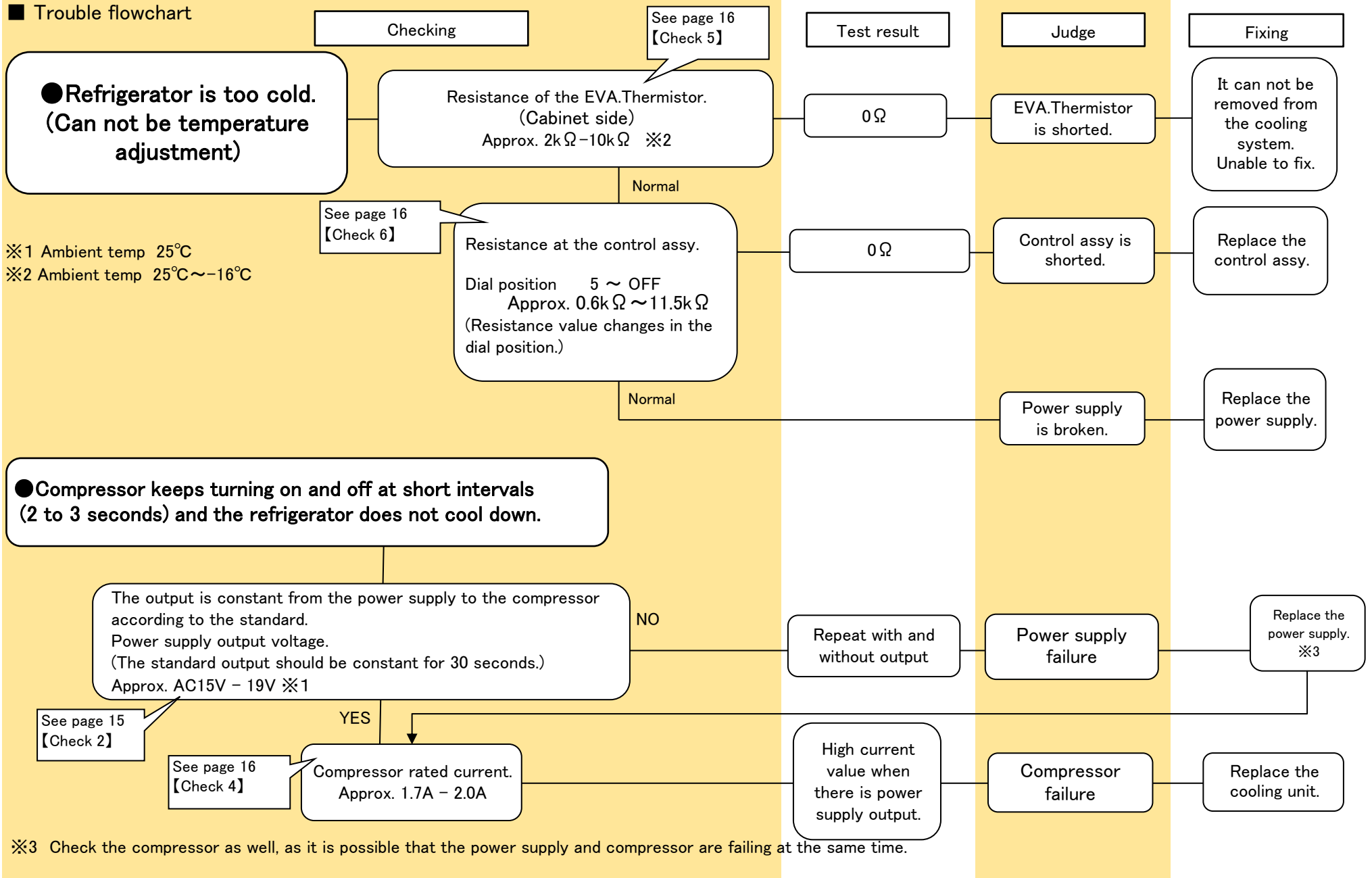
5. TROUBLE SHOOTING



※1 Ambient temp 25°C

4. TROUBLE SHOOTING

■ Trouble flowchart



4. TROUBLE SHOOTING

■ Typical Problem

Symptoms	Cause	Treatment
Does not get cold.	See page 11	
Cooling is weak	* Fan motor is broken	Replace fan motor
	* Blower fan is broken	Replace blower fan
	* Ambient temperature is higher than 30°C	
	* Ventilation at mechanical part is not enough	See page 7
	* Too many things are put inside	Make some room for cool air
	* Gas is leaking from cooling system	Unable to fix.
Lamp of temperature control assembly is not lit.	* The special fuse inside DC cord is open	Replace the fuse
	* DC power line in the vehicle is bad	Check the vehicle

■ Technical Data

※1 Ambient temp 25°C ※2 Ambient temp 25°C ~ -16°C
 ※3 Ambient temp 30°C ~ 0°C ※4 Tester uses the accuracy 10mΩ or less.

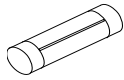
Checking items	Checking Points	Normal data	See page
Output voltage of power supply	Between outgoing cords from power supply (by detaching from terminal of compressor)	DC12V/24V: Approx. AC15V~18V ※1	See page 15 【Check 2】
Resistance of the compressor	Between incoming cords to compressor (by detaching from terminal of compressor)	Approx. 1.23Ω ※1, ※4	See page 15 【Check 3】
Fuse	Check the fuse by visual confirmation or check the continuity with a tester.	That the fuse is not broken.	See page 15 【Check 1】
Resistance of EVA.Thermistor (Cabinet side)	Between two pin of the two poles coupler.	Approx. 2KΩ ~ 10KΩ ※2	See page 16 【Check 5】
Control assy	Between two pin of the seven poles coupler.	Dial position 5 ~ OFF Approx. 0.6kΩ ~ 11.5 kΩ	See page 16 【Check 6】

5. CHECK POINT & CHECK METHOD

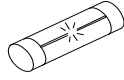
【Check 1】Fuse (Fig.1)

- ◇ Check the fuse by Visual confirmation or check the continuity with a tester.

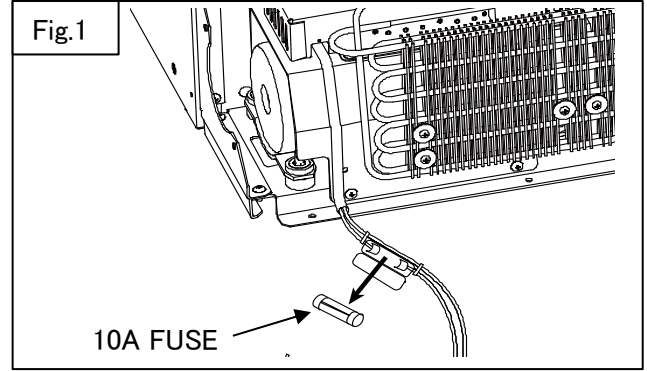
Continuity check	Judge
YES	Normal
NO	Broken



Normal



Broken

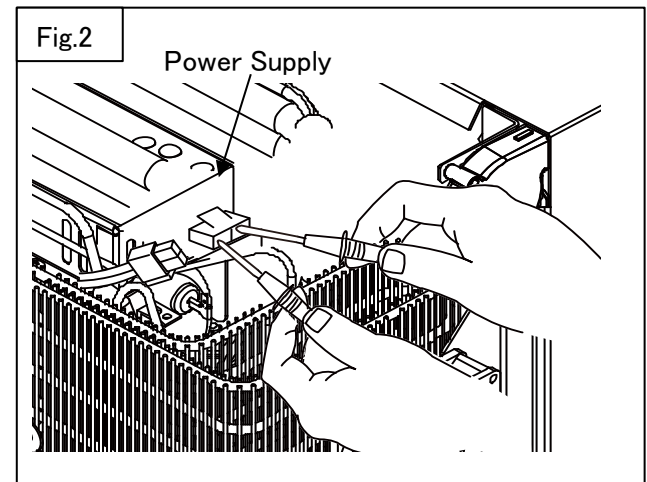


【Check 2】Output Voltage of the Power Supply

- ◇ Checking point
- Check at two poles coupler of power supply. (Fig.2)

<Use power DC12V/24V> (Ambient temp 25°C)

Test result	Judge
Approx. AC15~19V	Normal
AC 0 V	Power Supply is broken
Approx. AC15V less than	



【Check 3】Resistance of the Compressor

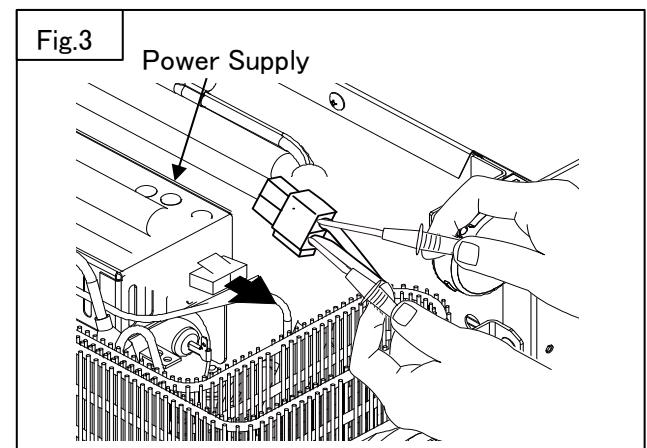
- ◇ Checking points
- Measured between the terminal of the compressor. (Fig.3)

(Ambient temp 25°C)

Test result ※1	Judge
Approx. 1.23Ω	Normal
∞ Ω	Broken ※2
0 Ω	Coil of compressor is short circuit. ※1

※1 Tester uses the accuracy 10mΩ or less.

※2 It can not be removed from the cooling system.
Unable to fix.



5. CHECK POINT & CHECK METHOD

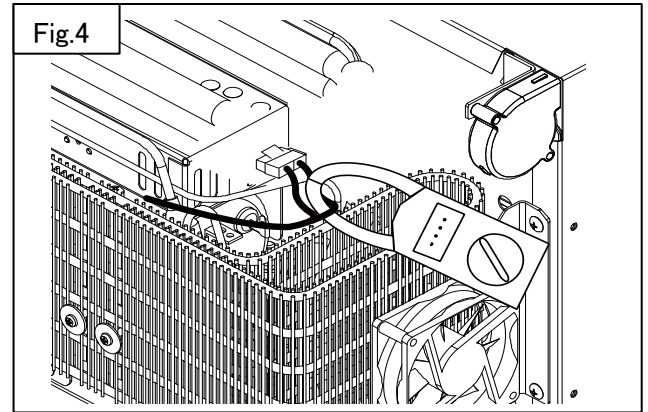
【Check 4】Rated current value of compressor.

◇Checking points

Measure the current value with a clamp meter on the motor cord (Fig.4)

(Ambient temp 25°C)

Test result ※1	Judge
Approx. 1.7A~2.0A	Normal
1.7A or less or 2.0A or more	Compressor failure
0A	Check the output of the power supply



【Check 5】Resistance of the EVA.Thermistor (Cabinet side)

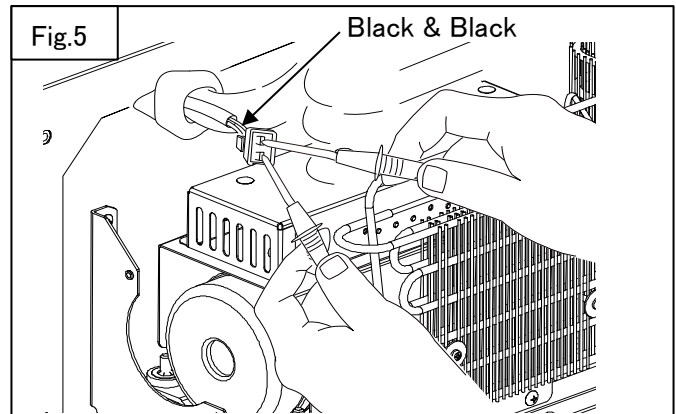
◇Checking points.

Remove the two poles couplers (Fig.5-①)

(Ambient temp 25°C~-16°C)

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

※It can not be removed from the cooling system.
Unable to fix.



【Check 6】Resistance of the Control Assy

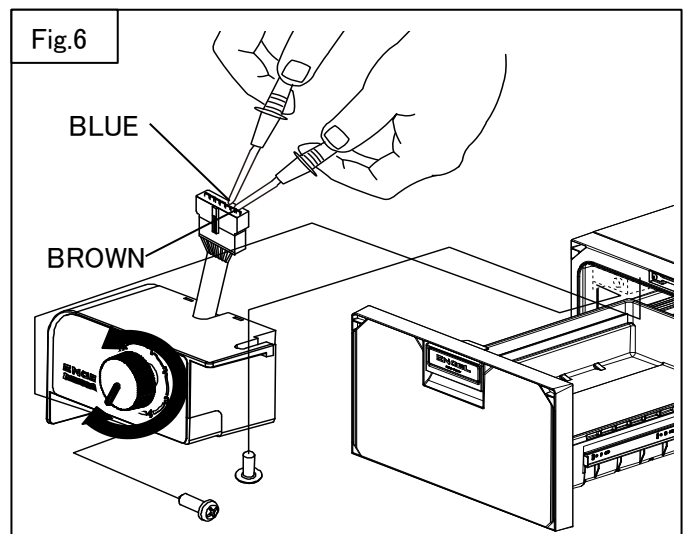
◇Checking points.

Check the resistance at between terminals brown and blue.

(Ambient temp 25°C)

Test result	Judge
Dial position 5 ~ OFF	
Approx. 0.6kΩ ~ 11.5 kΩ	Normal
∞Ω	Broken
0Ω	Short Circuit

※Resistance value changes in the dial position.



5. CHECK POINT & CHECK METHOD

【Check 7】Inspection between power supply and control assembly.

1.<Voltage from power supply to control assembly>

◇Checking points.

Voltage measurement in RED (+) and BLACK (-)

(Fig.7) (Ambient temp 25°C)

Test result	Judge
At DC12V = DC12V	Normal
At DC24V = DC24V	
Different from the above voltage	Power Supply is broken
0V	

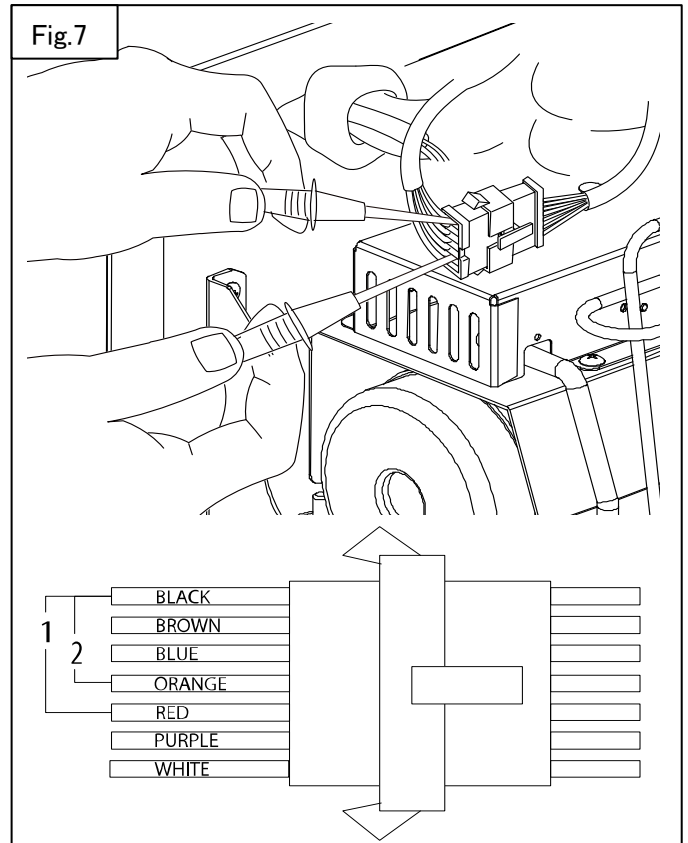
2.<Voltage from control assembly to power supply>

◇Checking points.

Voltage measurement in ORANGE (+) and BLACK (-)

(Fig.7) (Ambient temp 25°C)

Test result	Judge
At DC12V = DC12V	Normal
At DC24V = DC24V	
Different from the above voltage	Control assembly broken
0V	



【Check 8】Inspection of fan motor

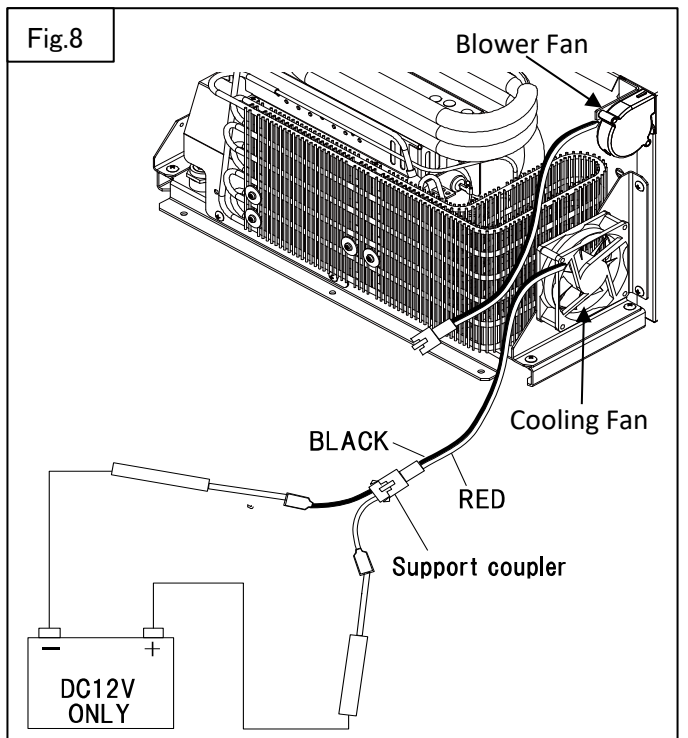
◇Checking point

If want to check the start-up of the fan motor directly, can check by connecting the DC12V directly. (Fig.8)

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.

Test result	Judge
Does not move or rotates slowly	Fan moter broken

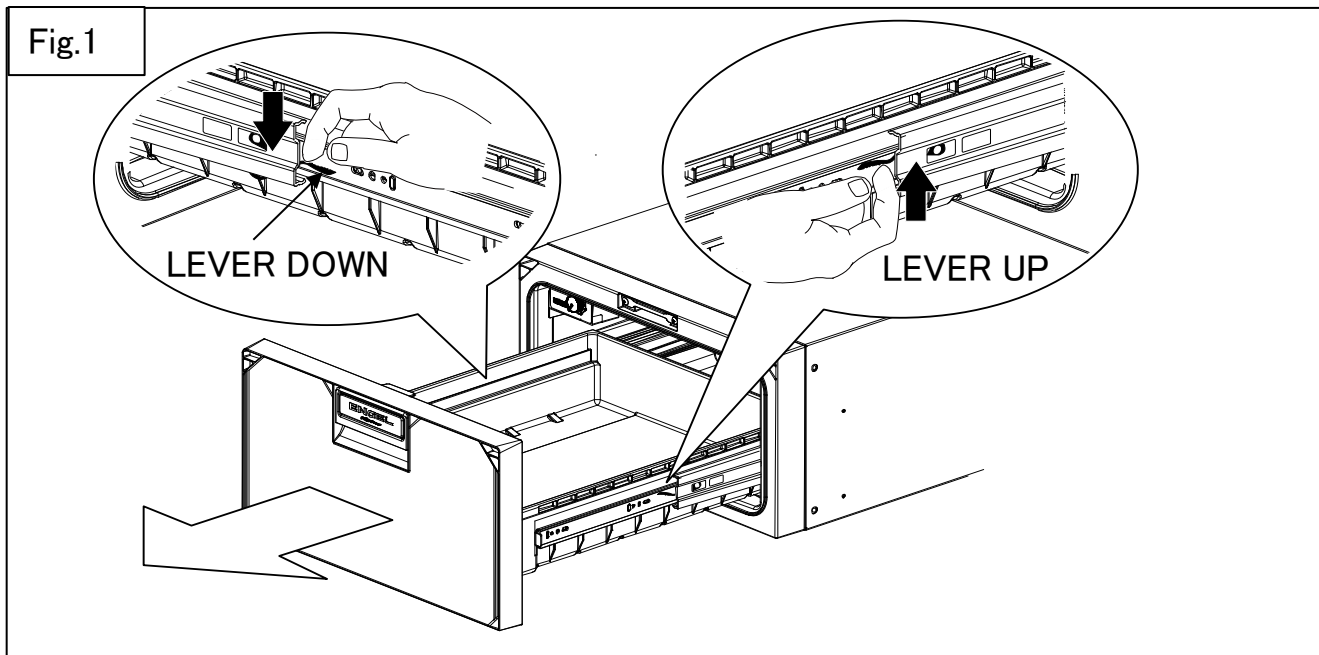


6. REPLACING PARTS

【How to Replace Drawer & Slide Rail】

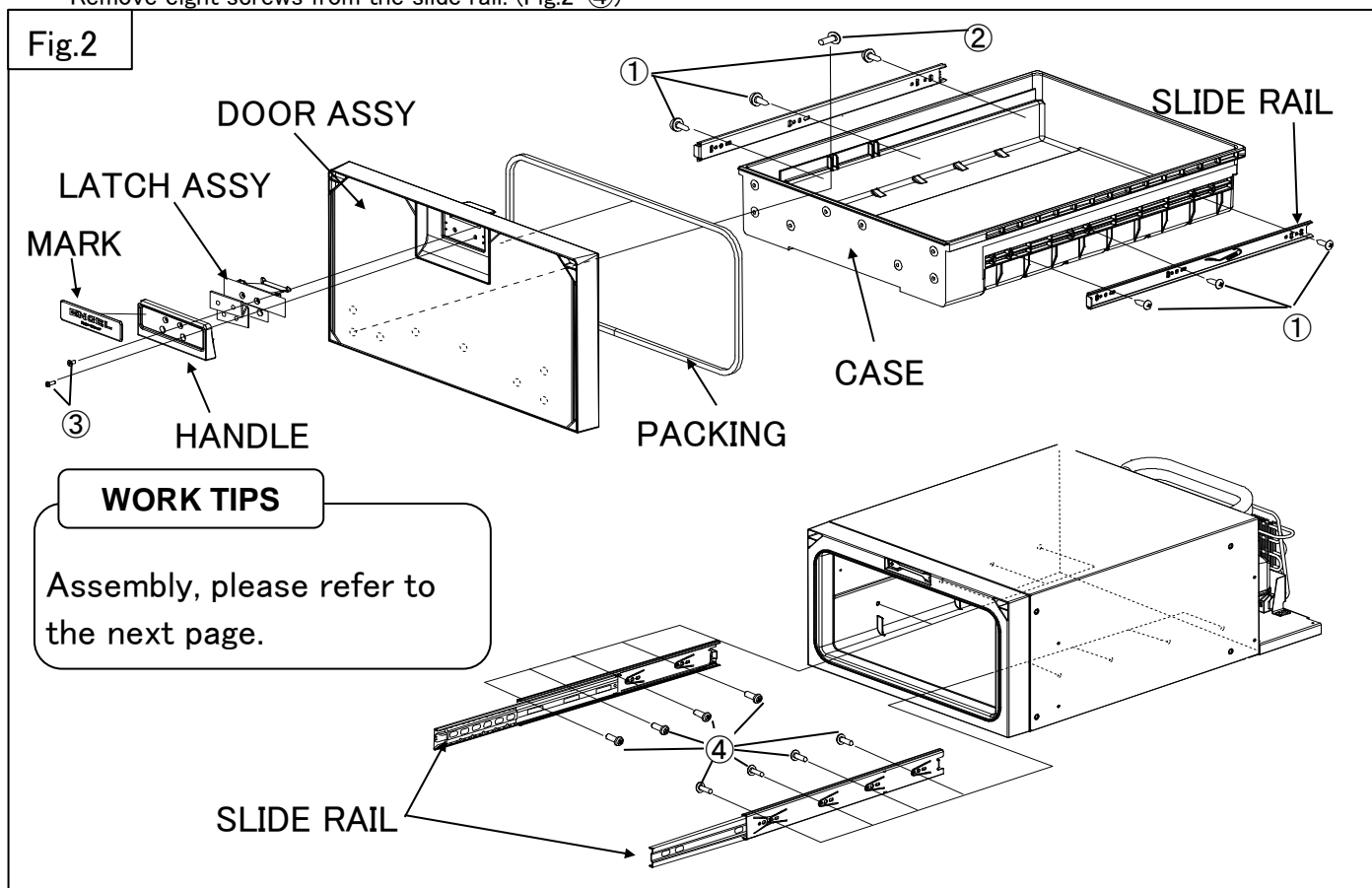
Step 1. Remove the drawer

- While pressing the lever as shown in the figure below, take out the drawer.



Step 2. Decomposition of the drawer

- Remove six screws from the slide rail. (Fig.2-①)
- Remove eight screws from the case. (Fig.2-②)
- After peeling the mark off, remove four screws from the handle. (Fig.2-③)
- Remove eight screws from the slide rail. (Fig.2-④)



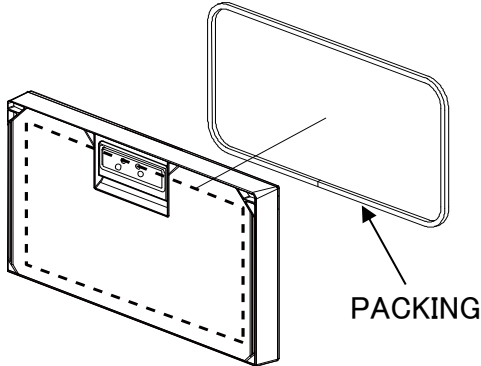
6. REPLACING PARTS

【Note for drawer assembly】

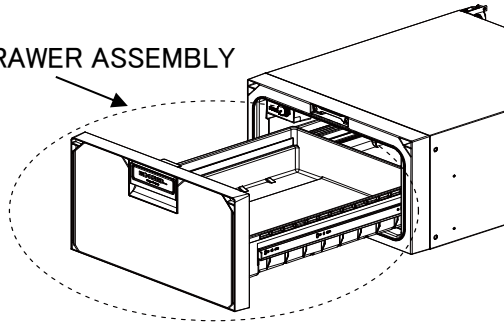
WORK TIPS

Please note below for assembling the drawer assembly.

1) Note for the packing replacement.



DRAWER ASSEMBLY

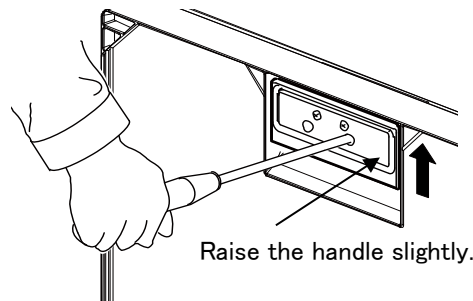
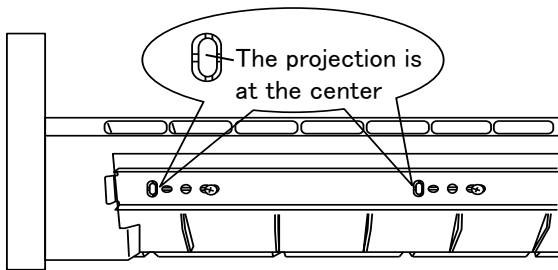


WORK TIPS

New packing tightens the door closing, but it gets to fit after a while.
So please check opening / closing door one hour later after exchanging it. (See 3) below)

2) Note for the slide rail and handle assembly.

•Basic assembly.

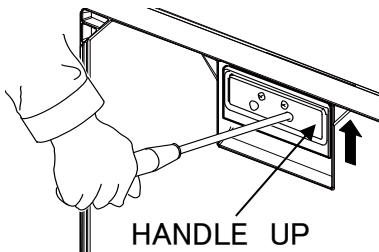


3) Note for opening and closing the door.

Please check and adjust the door as below.

If the latch is loose.

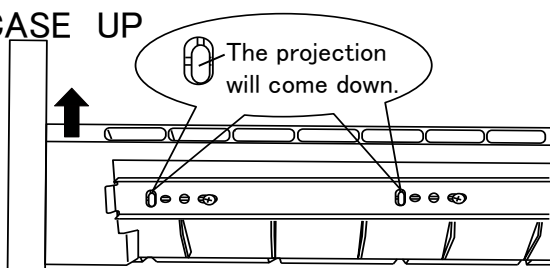
•Slide-up and re-set the handle.



※If still loose.

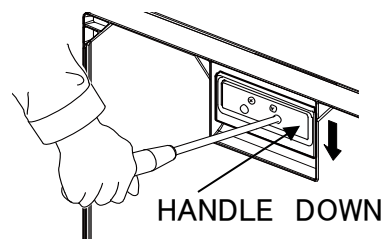
•Push up the case and tighten the screws on slide rail.

CASE UP



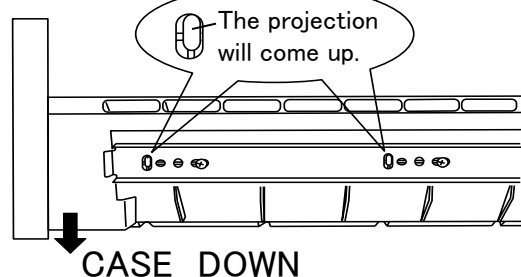
If the latch is stiff.

•Slide-down and re-set the handle.



※If still stiff.

•Push down the case and tighten the screws on slide rail.



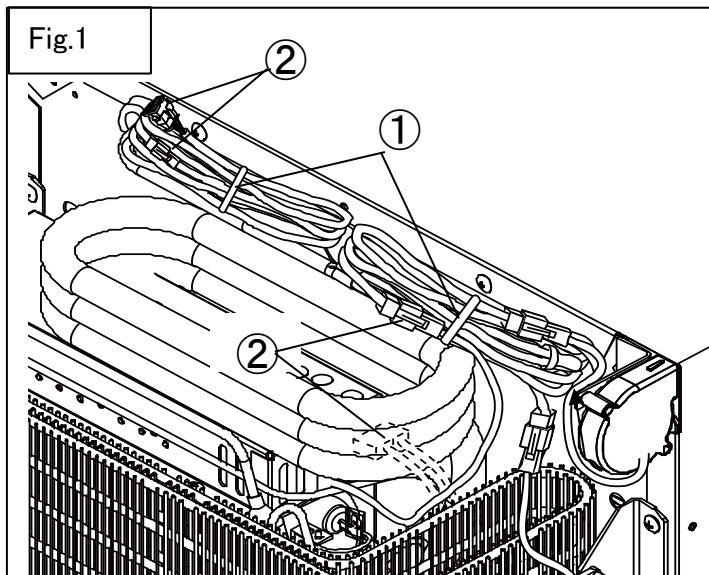
CASE DOWN

6. REPLACING PARTS

【How to Replace Power supply】

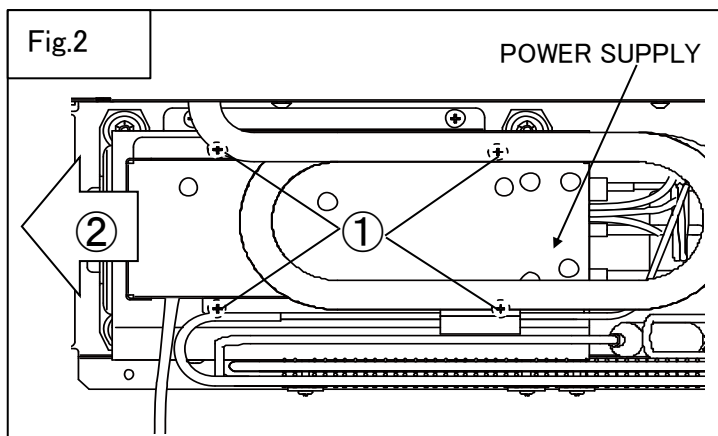
Step 1. Remove fasteners and couplers.

- Cut the fasteners. (Fig.1-①)
- Remove 4 couplers (Fig.1-②)



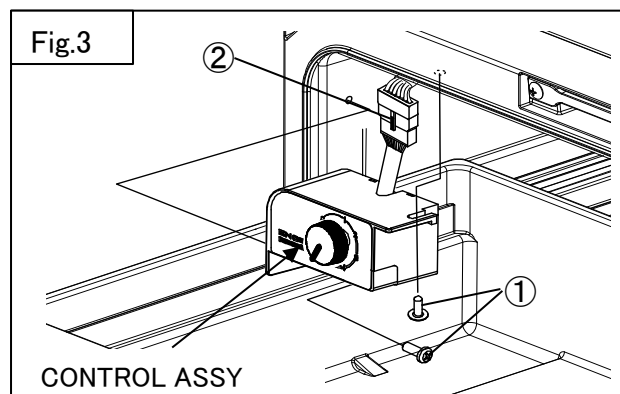
Step 2. Remove the power supply.

- Remove four screws. (Fig2-①)
- Remove four power supply. (Fig2-②)



【How to Replace Control Assy】

- Remove two screws. (Fig.3-①)
- Pull out the coupler. (Fig.3-②)



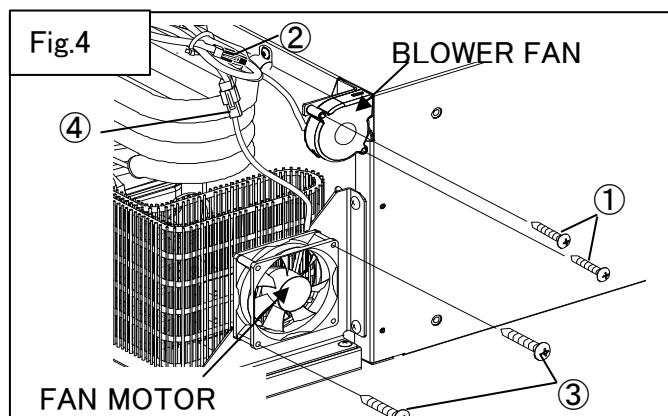
【How to Replace Fan Motor & Blower Fan】

<Blower fan>

- Remove two screws. (Fig.4-①)
- Pull out the coupler. (Fig.4-②)

<Fan motor>

- Remove two screws. (Fig.4-③)
- Pull out the coupler. (Fig.4-④)



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