

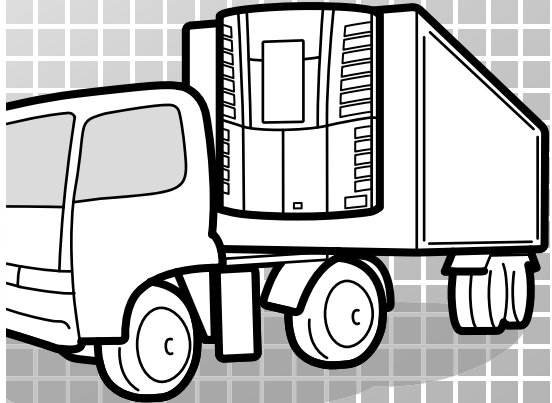
OPERATION MANUAL

MITSUBISHI TRANSPORT REFRIGERATION UNIT TFV150GA

This operation manual is intended to provide users with a good knowledge to use Mitsubishi Refrigeration Unit safely.

Operate or service the refrigeration unit only after you have read this manual and understand its contents.

Carefully store this manual in a fixed place so that it is immediately available for your reference when you need it.



Thank you for your purchase of Mitsubishi Transport Refrigeration Unit.

Purpose of use and application

This Refrigeration Unit is intended to carry the cargo (with the exception of volatile, inflammable, hazardous matter) keeping inside container temperature at a certain degree.

If the Refrigeration Unit is used for any purposes other than this purpose, it may cause accidents or damages.

Important information

- For questions or information, contact your nearest dealer.

- Be sure to follow the contents described in this manual in order to protect yourself and other people from potential risks of this refrigeration unit and to prevent it from getting damaged.

- We are not able to foresee all potential risks of this refrigeration unit or dangers due to mishandling by the customers. Therefore, it is necessary to take measures for safety in addition to the items described in this manual or on warning labels.

- For the following works, contact your nearest dealer. If these works were carried out by customer, the refrigeration unit may lose its performance and we may not be able to ensure the safety of the customer.
 - (a) Installation, modification, specification change and disposal for the refrigeration unit
 - (b) Maintenance of electric appliances
 - (c) Abnormal treatments which are not described in this manual

- This product contains fluorinated greenhouse gases.
 - Refrigerant : R410A (GWP (Global Warming Potential)=2090)
Refer to a label on unit about weight of fluorinated greenhouse gases and CO₂ equivalent. (☞ Refer to page 4.)

Operation manual

- This operation manual is prepared for people who speaks English. In case that person whose native language is not English handles this refrigeration unit, he or she must be instructed on safety by the customer. Furthermore, the warning labels described in their native language must be prepared and stuck on the proper places.
- This operation manual is copyrighted and all rights are reserved by our company. The drawings and technical information described in this manual may not, in whole or part, be published, copied, translated for the purposes other than above-mentioned and reduced to any electronic medium or machine-readable form without prior written consent with our company.
- The contents of this operation manual may differ from that of the refrigeration unit used by a customer due to specification change.
- The contents described in this operation manual may be changed without a prior notice.
- When transferring or lending the refrigeration unit, attach this operation manual together with the unit so that the operators should be able to have a good knowledge on safety.
- Keep this operation manual in the vehicle so that it is available for your reference when you need it.
- Unless otherwise noted, "right" and "left" directions are given as viewed from the front of the refrigeration unit.

For disposal

Contact your nearest dealer when disposing the refrigeration unit. Conform the applicable laws and regulations in your country when disposing refrigerants and engine coolant.

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1 Function of Refrigeration Unit

This refrigeration unit has following functions.

(1) Drive switching function

This is the function to switch the drive (Engine-generator/commercial power) depending on whether the commercial power supply is connected or not. This unit has automatic switching feature.

(2) Operation pattern switching function

This is the function to switch operation pattern (continuous operation/automatic start/stop operation).

Continuous mode may also be considered as strict temperature control mode. Automatic start/stop mode may also be considered as fuel economy mode.

☞ Refer to pages 41 and 42 for how to switch operation pattern.

(3) Defrosting operation function

This is the function to protect evaporator from frosting during cooling/heating operation and to prevent refrigerating power from decreasing. There are following 2 methods to start defrosting operation.

1) Automatic defrosting operation

Defrosting starts automatically by the timer setting.

☞ Refer to page 33 for defrosting timer setting.

2) Manual defrosting operation

Defrosting starts forcibly by pressing the defrost switch of controller.

☞ Refer to page 48 for how to operate.

After the defrosting operation completes, the refrigeration unit stops once and restarts automatically to return to base operation.


Defrosting operation will not start when the evaporator temperature is high even during cooling operation.

(4) Timer operation function

This is the function to set automatic starting time and stopping time of the operation .

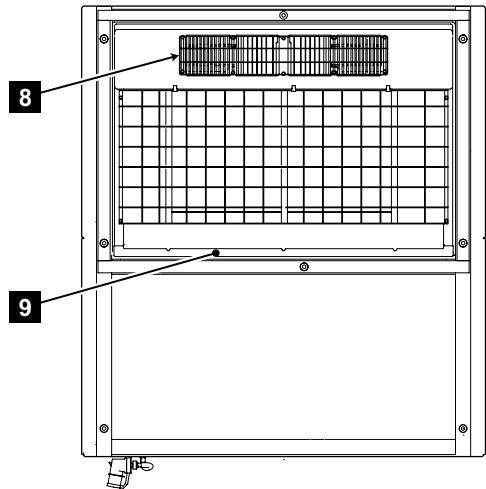
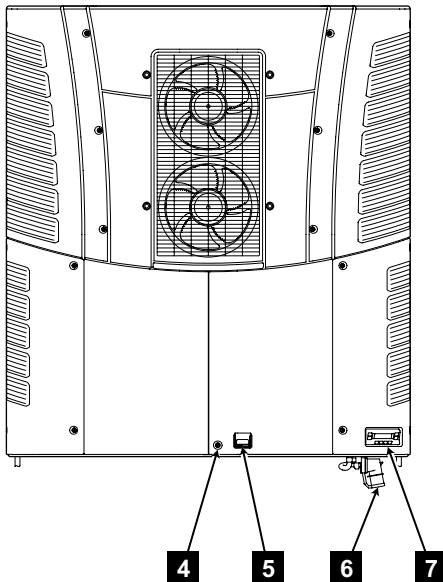
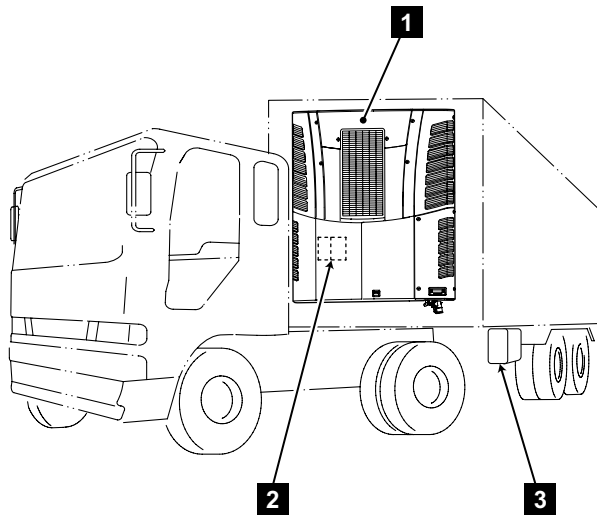
☞ Refer to pages from 49 to 52 for how to set.

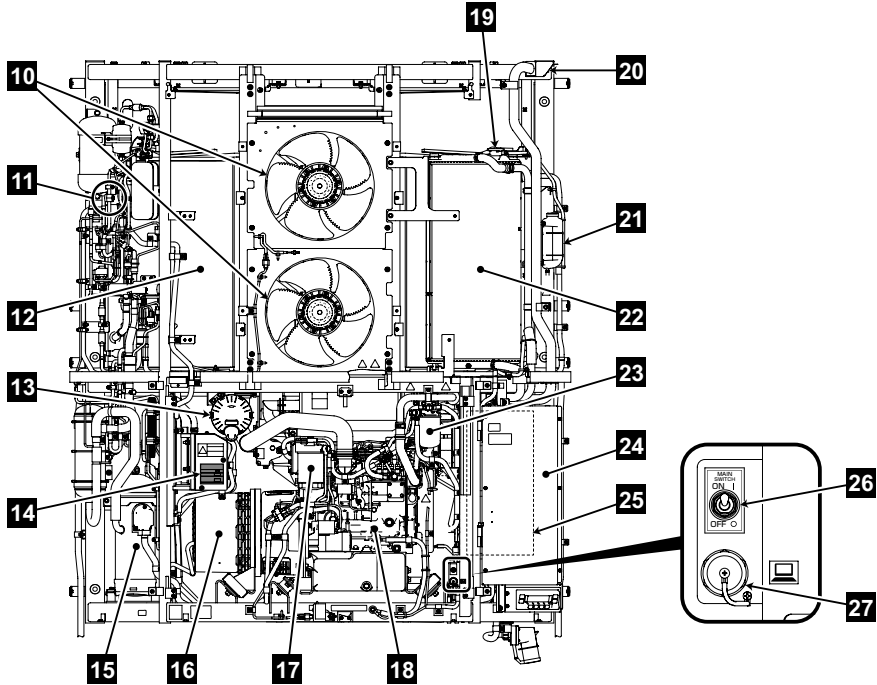
(5) Self diagnosis operation function (PTI operation)

This is the function to diagnose the refrigeration unit automatically to identify if any trouble or not.  Refer to pages 53 to 54 for how to operate.

2 Key components and details

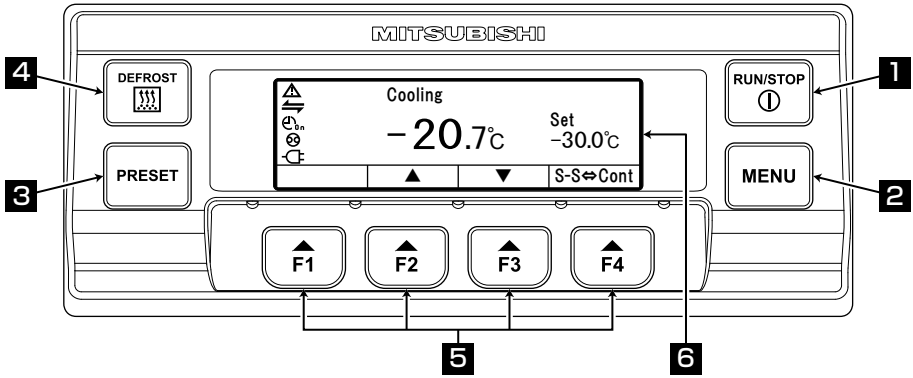
Main parts





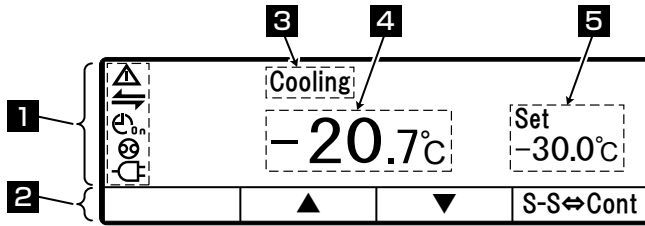
1	Refrigeration Unit	15	Compressor
2	Battery	16	Generator
3	Fuel tank	17	Oil filter
4	Lock for the cover	18	Engine
5	Cover latch	19	Radiator cap
6	Commercial power socket	20	Exhaust pipe outlet
7	Controller	21	Reservoir tank
8	Supply air outlet for evaporator	22	Radiator and right condenser
9	Drain pan	23	Fuel filter
10	Condenser fan	24	AC electric box
11	Sight glass	25	DC electric box
12	Left condenser	26	Main switch
13	Air cleaner	27	Communication port USB
14	Label (F-Gas)		

Controller










1	RUN/STOP switch	Starts and stops the refrigeration unit.
2	MENU switch	Displays Menu mode when pressed. Displays blank screen while the refrigeration unit is stopped.
3	PRESET switch	Display changes to preset setting screen when pressed.
4	DEFROST switch	Starts the manual defrost.
5	FUNCTION switches 1 – 4	Functions corresponding to respective display screen can be selected.
6	LCD	Displays the inside compartment temperature, setting temperature, state of operation, etc.

LCD display area



Description of monitor display item

- 1** Monitor displays following items corresponding to respective setting states. The display items light or blink depending on the operation of respective functions.

- Error display
Lights or blinks when any error occurs.
- Display for the state of external communication.
Lights when the input, such as the remote monitor device, etc., is turned ON.
- Displays for ON/OFF timer.
Lights when the ON timer and the OFF timer are set simultaneously.
- Displays the ON timer.
Lights when the ON timer operation is set.
- Displays for OFF timer.
Lights when the OFF timer operation is set.
- Display for automatic operation start/stop.
Lights when the automatic operation start/stop is selected.
- Display for commercial power supply.
Lights when the unit is connected to the commercial power supply.

- 2** Displays the allocation of function switch corresponding to the screen.

- 3** Displays the operation modes.
<Display contents> Cooling, Heating, Defrost, Stop and Fan.
* There is no display when evaporator fan motor OFF.
Fan is displayed when evaporator fan motor ON.
If temperature is out of adequate range, the Cooling or Heating display blinks.

- 4** Displays the inside compartment temperature.

- 5** Displays the setting temperature.

Protective devices

This refrigeration unit is provided with the following protective devices to ensure the safety of the operators.

(a) Main switch

If engine starts during the work such as inspection, it may cause an accident. In such a case, set this switch to "OFF" so that the safety is secured.

(b) Buzzer before start

Buzzer sounds 6 seconds before the engine or the motor starts to announce the start of operation to the surrounding people.

(c) Cover

The cover prevents operators from contacting with the rotating part during operation.

(d) Detector for opening of cover 1

Opening of the cover 1 for the work such as inspection is detected to prevent engine from starting. (☞ Refer to page 62.)

(e) Fin guard

Metal guard is provided on heat exchanger to protect from any damages due to cargo loading or mishandling.

(f) Fan guard

Metal and plastic guard is provided near all fan-motor to prevent damages due to direct human contact with fan-motor.

(g) Safety labels

Labels pointing out potential risks are pasted at all the dangerous locations for safety purposes.

(h) Cover key

Lock is provided to the cover 1 in order to prevent unintended opening and handling of unit. (☞ Refer to pages 62 and 63.)

People who handle this refrigeration unit are requested to understand the functions of these protective devices completely to use it safely. Do not deactivate these protective devices or do not operate the refrigeration unit in the situation that the devices are inactivated. It is most important for safety ensuring to keep functions of the protective devices in normal status continuously.




3 Precaution for safety

In this section, necessary safety precautions are provided to prevent accidents resulting in injuries or death, property damages and environment pollution. Read and understand contents of the cautions before starting to use this refrigeration unit.






Signs on safety

Signs and Symbols on safety in this operation manual and the warning labels call the attention of the people who handle this refrigeration unit.

Signs on safety


Kinds	Description
 DANGER	Indicates imminent potentially dangerous situation, which if mis-handled, will result in death, injury, or serious accident such as damage of the refrigeration unit.
 WARNING	Indicates dangerous situation, which if mis-handled, could result in death, serious injury, and serious accident such as damage of the refrigeration unit.
 CAUTION	Indicates potentially dangerous situation, which if mis-handle, will result in minor injury or moderate property damage.

Symbols

Symbols	Description	Symbols	Description
	Never perform.		Always observe the instructions.
	Disconnect power supply plug from socket.		Never touch.
	Repairs and disassembly must be done only by qualified personnel.		

Other symbol

Other advice for the refrigeration unit is described with the following symbol.

Kind	Description
 NOTE	Useful information for function or performance of equipment

Precaution

Handling of high-voltage

DANGER



If a high-voltage cable or component is exposed, never touch it.

- Otherwise, it may cause electric shock.

To prevent electric shock, do not touch any high-voltage cable, connector, or high-voltage component (electric box, etc.).



Please maintain a safe distance from the vehicle in case a fire occurs from the refrigeration unit.

Always use a fire extinguisher for electric fire when doing fire fighting.

Do not use water or improper fire extinguishers, it may result in serious injury or electric shock.

Do not touch the refrigeration unit or vehicle, in case of accident/damage to unit.

Please contact the nearest dealer and inform the details.

WARNING



When disassembling, removing, or replacing high-voltage cables or components, serious burns or electric shock may occur, causing serious personal injury or death.

Maintenance should only be performed by qualified dealer personnel.

General precautions

WARNING



Do not modify or perform specification change for the refrigeration and vehicle. (This will make refrigeration unit out of warranty.)

- It may cause a serious accident if customer modify the refrigeration unit or change the specification by himself/herself.

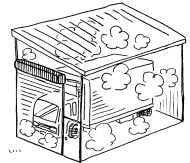
Do not place combustible materials in the vicinity of muffler and exhaust pipe. Do not park on the area where combustibles such as falling leaves accumulate on.



- Otherwise, it may cause a fire because muffler and exhaust pipe will be hot.

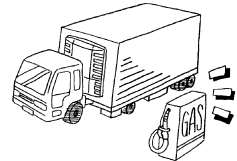
Do not start the engine in poorly ventilated places such as an indoor parking lot.

- Otherwise, it may cause carbon monoxide poisoning due to exhaust gas.



Do not use the refrigeration unit in the atmosphere which could cause explosion at such place like gas station.

- Otherwise, it may cause an explosion or a fire.



When it is necessary to charge or retrieve the refrigerant or refrigerating machine oil, be sure to consult the nearest service center.

- Customer should refrain from attempting to do these on their own. Otherwise, it could result in serious accident.

Do not pile up the refrigeration unit containers.

- It leads to unit failure or accident, due to waste heat from the engine and heat exchanger.



Make sure that no one left inside the container before closing the door.

- He or she might be frozen to death if the refrigeration unit is operated with someone inside.



CAUTION



Do not paint on cover panel. (This will make refrigeration unit out of warranty.)

- Cracking occurs in panel, which cause a risk of falling down of panel while the vehicle is running.

Never mistake the polarity of the battery cable.

- The electrical parts, may get damaged when connecting + and – terminal of battery in reverse.



Do not insert sticks or fingers into gap between panels and grills.

- Otherwise, it may cause damage of the equipment or injury due to rotating equipment in the unit.



Do not climb up, hang down or put your leg onto the refrigeration unit.

- Otherwise, it may cause damage of the equipment or injury.



Use the refrigeration unit as the equipment for transport refrigeration.

- Otherwise, it may deteriorate quality of the cargo if it is used for any other purpose.

Use specified fuel, engine oil, compressor oil and cooling water. (Refer to page 71.)

- Otherwise, it may cause troubles if any other materials are used.

Be sure to carry out the periodic inspections.

- Otherwise, it may cause troubles of the refrigeration unit or accidents.



During and after the operation

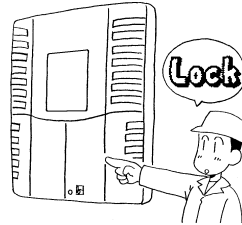
CAUTION



Make sure that the cover of the refrigeration unit is closed before starting the operation.

- Otherwise, it may cause accidents.

In case of abnormal operation, abnormal sound, error indication during a test run, immediately stop the unit, investigate the cause and try again after solving the issue.



Do not touch high temperature parts such as high pressure refrigerant piping, exhaust pipes etc. during operation or immediately after the operation.

- Otherwise, it may cause burns.

Do not open the radiator cap during operation or immediately after the operation.

- High temperature steam may blowout and cause burns.

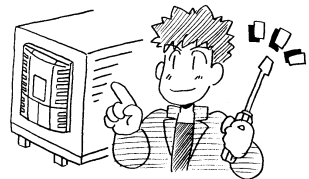
Inspection/Cleaning/Repair

WARNING



Do not disassemble and repair by yourself.

- Otherwise, it may cause damages or an electric shock.



CAUTION



When inspecting unit, stop the unit and wait until the engine has cooled down.

- High temperature parts such as engine exhaust pipe, compressor, refrigerant high pressure piping, etc may cause burns.

When refrigerant and compressor oil leak out or when you handle antifreeze coolant or engine oil, be careful not to have them get in your eyes, not to have them contact with your skin, not to inhale them or not to drink them by mistake.

- Otherwise, it may cause health disorders such as frostbite, loss of eyesight and pneumonia.

Do not wash the refrigeration unit with a steam washer or a high pressure jet.

- High pressure may damage various components such as heat exchanger fins etc.
- Steam washer may damage unit panel and internal components.

Be careful not to spill when inspecting engine oil or cooling water.

- It may cause environmental pollution and fire.

Do not overfill the engine oil.

- It may be caused abnormal operation of engine, generating blue smoke, oil splashing, due to abnormal combustion of the oil. In case of white smoke, there may be some issue with cooling system.



Set the "Main switch" to "OFF" to stop the refrigeration unit during the inspection and cleaning.

- Otherwise, it may cause injury or electric shock due to an unexpected start.

Unit switches to engine drive from commercial power supply drive automatically, when a power failure occurs while driven with commercial power supply is being driven.

- The buzzer will sound for 6 seconds and the engine will start.
-

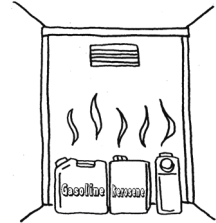
Loading

WARNING



Do not load the volatile or inflammable cargos in the container.

- Otherwise, it may cause an explosion or a fire



CAUTION



Cool down or heat up the cargos to the designated temperature in advance with other refrigerating device.

- If the cargos are not kept in the designated temperature, it may deteriorate quality of the cargos due to inside container temperature rise.

Waterproof the cargos if they need to be.

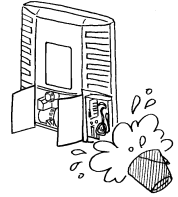
- Otherwise, it may deteriorate quality of the cargos due to the spattering water during defrosting.
-

Handling of electric equipment and power cords

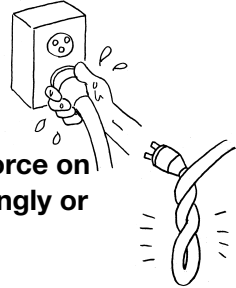
WARNING



- **Do not directly splash water on the electric equipment such as generator, control box, etc. or wash them with water, especially with the cover open.**
- It could result in severe damages to refrigeration unit and this will make refrigeration unit out of warranty.



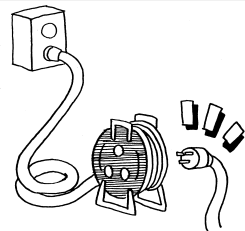
- **Never touch the electric equipment such as power plug and so on or operate the switches with wet hands.**



- **Do not modify the power cord apply force on it by bending it by force, pulling it strongly or twisting it, or do not put cargos on it.**
- **Do not wet the electrical components in the electric box during rain or snowfall.**
- **Do not touch the high voltage section, when opening the inside of electric box.**
- **Do not disassemble the generator.**
- It may cause troubles of electric circuit, damage to power cord or an electric shock.



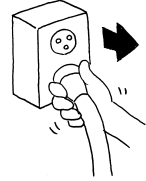
- **Use 4-core cable cables (conductor cross section with 8mm² or more) for power cable. Do not connect it to extension cord.**
- **Use MENNEKES Part no.6 (400V 32A) for power supply plug.**



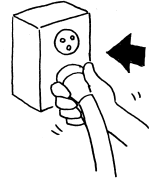
⚠ WARNING



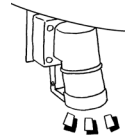
- **Pull out the power cord by holding the plug part at the end of the cord.**



- **Check the plug of the power cord for dust. If there is no dust, insert it firmly.**



- **Surely protect the power socket with a cover when it is not used. When the cover is damaged, repair it immediately.**



- **Do not touch the wiring terminals.**
- Otherwise, it may cause an electric shock or a fire due to breaking of wire and water intrusion, etc.

⚠ CAUTION



Do not start and stop the operation while pulling out or inserting the power supply breaker or power cord.

- Otherwise, it may cause troubles of electric circuit, damages of power supply cord or an electric shock.

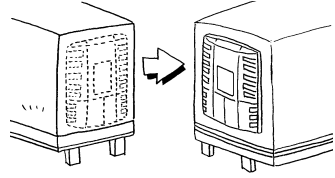
Reinstallation of the refrigeration unit

WARNING



Do not reinstall this refrigeration unit on other container by yourself. Contact your nearest dealer in that case.

- The refrigeration unit may fall down and cause a serious accident due to improper installation or insufficient strength if the work is performed by the customer.



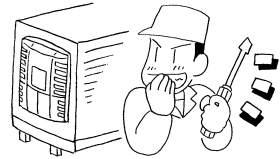
Modification of the refrigeration unit and specification change

WARNING



Do not modify the refrigeration unit or change the specification.

- It may cause a serious accident if customer modify the refrigeration unit or change the specification by himself/herself.



Do not use any refrigerant or refrigerating machine oil other than those specified. (➡ Refer to page 79.)

- Otherwise, it may cause explosion or fire.

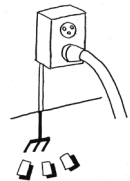
Power supply equipment

WARNING



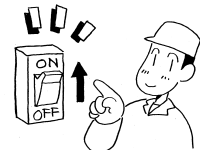
Be sure to earth the power supply equipment to supply the electricity to the refrigeration unit.

- It may cause an electric shock if the earthing work is not carried out properly.



Be sure to provide a dedicated circuit and an earth leakage breaker.

- It may cause an electric shock or a fire if there is capacity shortage of electric circuit .



Emergency measure

(1) Refrigerant

- **When refrigerant gets in your eye**

Wash your eye with clean running water for more than 15 minutes immediately. Wash rear side of the eyelid as well. Then, consult a physician as soon as possible.

- **When refrigerant comes in contact with your skin**

Take off wet clothes, shoes and socks immediately, as it may cause frostbite if you touch the refrigerant. Wash the contact part thoroughly with water. If you still have irritation, consult a physician as soon as possible.

- **When inhaling the gas**

When someone has inhaled high level of gas, move to the place with fresh air immediately holding him/her with a blanket or like to keep warm. Then consult a physician as soon as possible. When he/she has difficulty in breathing, loosen his/her clothes and practice artificial respiration after securing the air passage. Depending on the circumstance, have him/her inhale oxygen and take him/her to a physician as soon as possible.

- **When swallowing refrigerant**

Do not throw up by force and consult a physician as soon as possible.

- * **Precautions for physician**

Use of Catecholamine system medicine such as adrenaline and so on may cause heart arrhythmia. Therefore it is required to use only for the emergency life-sustaining treatment with special consideration.

(2) Compressor oil

- **When compressor oil gets in your eye**

Wash your eye with clean running water for more than 15 minutes immediately. Wash rear side of the eyelid as well. If you still have irritation, consult a physician as soon as possible.

- **When compressor oil comes in contact with your skin**

Wash the part thoroughly with water and soap well and apply conditioning cream on it.

- **When swallowing compressor oil**

Do not throw up the oil by force and consult a physician as soon as possible. When inside of mouth is contaminated, wash it well with water. (When throwing up the oil by force, it easily gets into air passage and causes high fever if it gets into lung. It may cause hardly incurable hemorrhagic pneumonia accordingly.)

(3) Antifreeze coolant

- **When antifreeze coolant gets in your eye**

Wash your eye with clean running water for more than 15 minutes immediately. Wash rear side of the eyelid as well. Then, consult a physician as soon as possible.

- **When antifreeze coolant comes in contact with your skin**

Wipe the antifreeze coolant off his/her skins with a piece of paper or cloth. Wash the part well with lots of water and soap. If any visual changes or pain are observed, consult a physician as soon as possible.

- **When swallowing antifreeze coolant**

Throw it up immediately and consult a physician as soon as possible. When inside the mouth is contaminated, wash it well with water.

(4) Engine oil

- **When engine oil gets in your eye**

Wash your eye with clean running water for more than 15 minutes immediately. Wash rear side of the eyelid as well. If you still have irritation, consult a physician as soon as possible.

- **When engine oil comes in contact with your skin**

Wash the part well with lots of water and soap.

- **When swallowing engine oil**

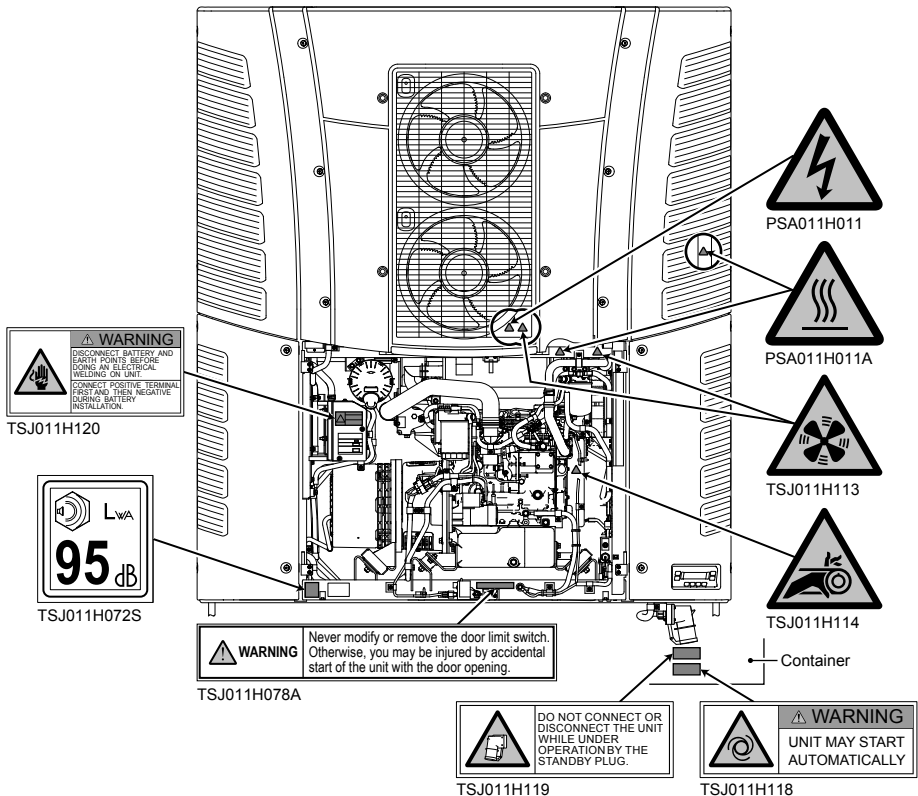
Do not throw up the oil by force and consult a physician as soon as possible. When inside the mouth is contaminated, wash it well with water.

Handling of warning labels

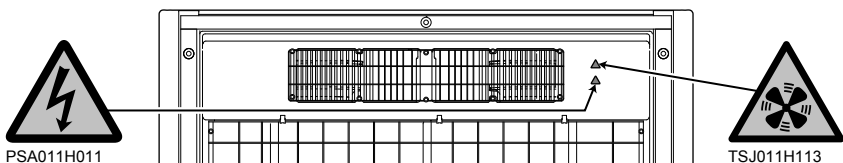
- Important precautions are stated on the warning labels. Never operate the refrigeration unit unless fully understanding the meanings of the warning labels. When you found some difficulties to understand, contact your nearest dealer.
- Always keep the labels in good condition to read. Do not peel off, tear off or damage the labels or do not wipe with solvent or paint them.
- When the labels become illegible, purchase them from your nearest dealer and change them.

Refrigeration unit

■ Front view



■ Back view



Prevention of start during inspection work

While several people are working together for inspection at the same time, it is required to prevent other workers from getting injured by unintended start of refrigeration unit.

- Switch OFF the main switch (☞ Refer to page 4.) and remove the battery terminals before starting work. Prepare a tag which states "WORKING" and hang it on the control panel.

Clothing and protective equipment

Wear proper clothing and use protective equipment to prevent from getting injured.

- Wear the clothing such as long sleeves, long pants, gloves and eye protections.
- Do not wear accessories such as necklaces or a necktie to prevent it from getting rolled in. Fasten the cuffs firmly.

Handling of grease and oil

Follow the precaution as stated in manual on how to handle or dispose the fuel, engine oil and antifreeze coolant etc. to be used for this refrigeration unit. These are harmful to human body or environment when mishandling them.

When abnormal conditions are detected

Refer to "8. For emergency" when abnormal conditions are detected. Please contact your nearest dealer when it is too difficult to handle.

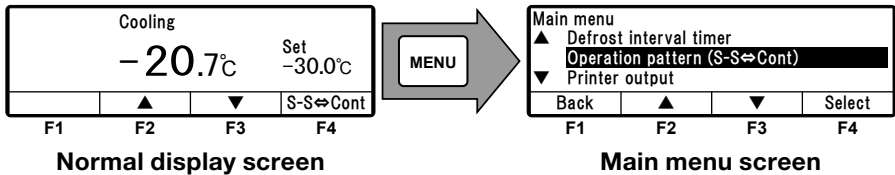
For emergency

Contact the public agencies such as the police or the fire department immediately when an accident could result in serious injury, death, serious property damage or environmental damage occurred. Contact your nearest dealer to prevent second accident.

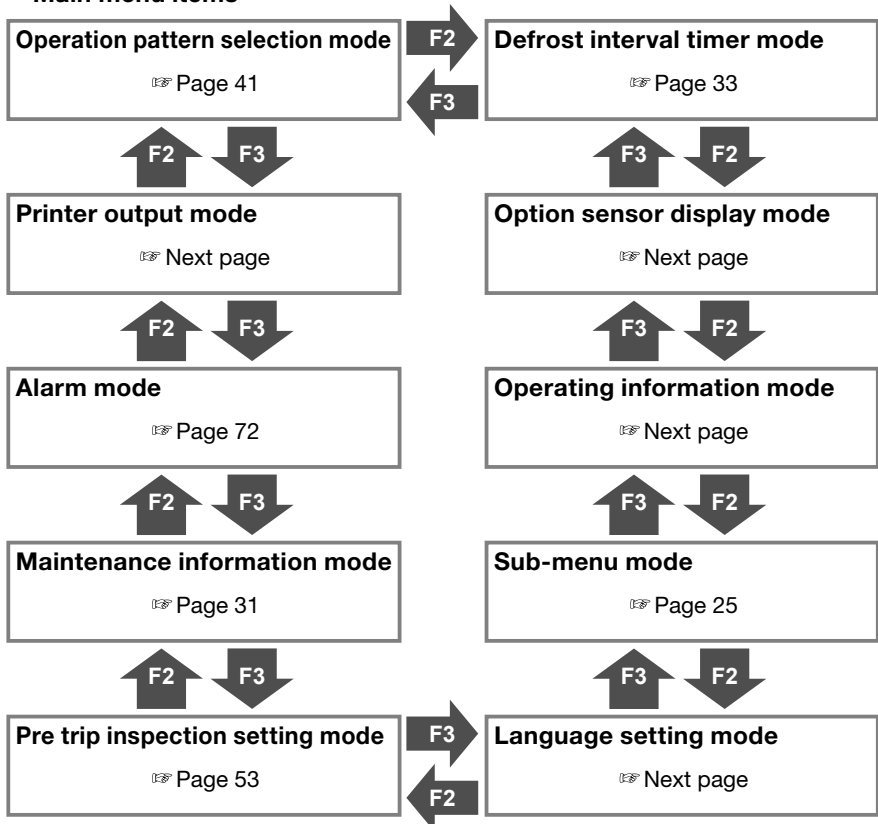
4 Initial setting

Display and function of main menu

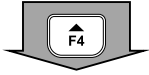
If you press the “MENU” switch once on the “Normal display screen” which is displayed when the refrigeration unit is stopped or operating, the display changes to the “Main menu” screen. Each push on “F2 (▲)” or “F3 (▼)” switch changes the display so that various settings can be made. In the following figure, “F2” switch changes sequence clockwise while “F3” switch changes counter clockwise.



• Main menu items



4 Initial setting



If you press “F4 (Select)” switch on each MAIN menu screen on previous page, the display changes to the following screens.

Current setting			
Start-Stop operation			⊗
Back	Start-Stop	Continuous	Set

Operation pattern selection mode

Mode to select the operation mode start/stop or continuous operation
(☞ Page 41)

Printer output			
Printout period	12Hr		
Temp range	±30°C		
Center temp	0°C		
Back	▲	▼	Next

Printer output setting mode

The temperature graph is printed in this mode. Provide a printer to print the graph.
(Option)

Alarm			
E010	16 Jan 2018 07:10		
E016	15 Jan 2018 08:15		
E013	30 Nov 2017 10:30		
Back		Clear	Next

Alarm display mode

Up to 5 error codes and dates/times of alarm occurred are displayed. These are cleared by pressing “F3 (Clear)” switch.
(☞ Page 72)

Maintenance information			
Engine operation time/4550Hr			
Back			Next

Maintenance information display mode

Operation time and number of operations of each device are displayed in this mode.
(☞ Page 31)

Current setting			
Pre trip inspection(Basic)			
Back	Basic (Min)	Detail (Max)	PTI Start

Pre trip inspection (PTI) setting mode

Mode to set the self diagnosis operation (PTI)
(☞ Page 53)

Language setting			
▲	German		
	English		
▼	French		
Back	▲	▼	Set
F1	F2	F3	F4

Language setting mode

Selects a language (English, French, Italian, Swedish or German). Press “F2 (▲)” or “F3 (▼)” switch to select a language, and finalize the selection by pressing “F4 (Set)” switch.

Sub-menu			
▲	Fuel circulation mode		
	Calendar and clock setting		
▼	Set On Timer		
Back	▲	▼	Select

Sub-menu selection mode

Functions of the controller operability, or other, are displayed and set in this mode.
(☞ Page 25)

Operating information			
C003			
HP	2560kPa	TD	125°C
LP	150kPa	REV	1475/102
AT	38°C		
Back	Unlock	Lock	Next

Operation information display mode

State of operation is displayed in this mode. In the next page, operation mode such as cooling and EVT is displayed.

Option sensor display			
-20.7°C			
Back			

Option sensor temperature display mode

When the optional sensor is installed, the sensor temperature is displayed in this mode. If no option sensor is installed, it displays “Lo”.

Current setting			
6.0Hr			
Back	▲	▼	Set


Defrost interval timer setting mode

The defrost interval is displayed and set in this mode. Factory default is set at “6.0Hr”. The interval can be changed in steps of 1.0Hr.

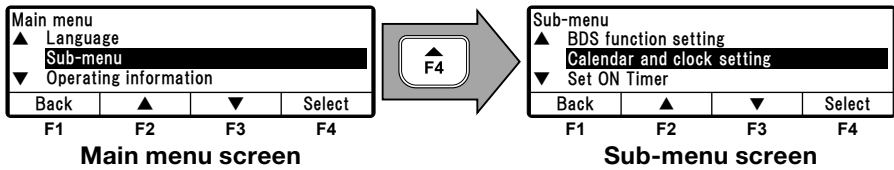
(☞ Page 33)

Display and function of Sub-menu

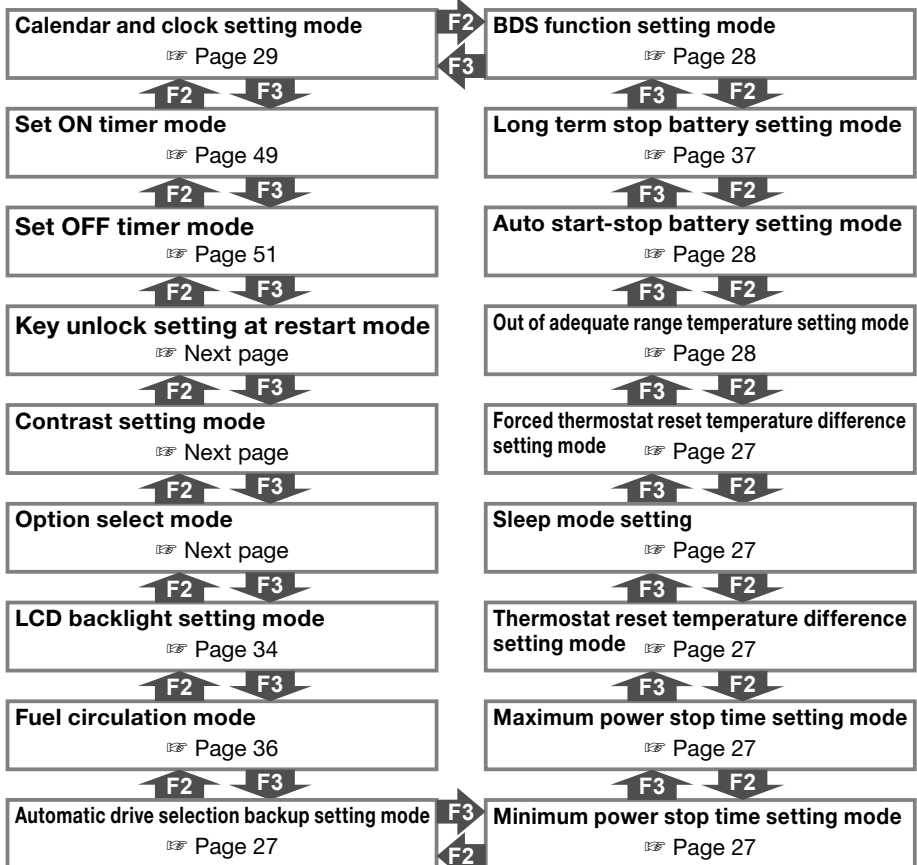
On the “Sub-menu”, the screen changes in the following order at each push on “F2 (▲)” or “F3 (▼)” switch. In the following figure, “F2” switch changes sequence clockwise while “F3” switch changes counter clockwise.

 **NOTE**

- If “MENU” switch is pressed for more than 1 second on the way of changing setting, the display returns to the normal display screen, and the change content is not reflected. The change content will be lost also when the setting change is aborted on the way.



• **Sub-menu items**





If “F4 (Select)” switch is pressed on each Sub-menu screen on previous page, the display changes to following screens.

Calendar and clock setting			
01 Jan 2019 00:00			
Back	▲	▼	Next

Calendar and clock setting mode

Date, Month, Year and current time are set in this mode.

(☞ Page 29)

Set ON timer			
ON timer disable			
Back	Enable	Disable	Set

Set ON timer mode

Date and time to start the refrigeration unit automatically is set in this mode.

(☞ Page 49)

Set OFF timer			
OFF timer disable			
Back	Enable	Disable	Set

Set OFF timer mode

Date and time to stop the refrigeration unit automatically is set in this mode.

(☞ Page 51)

Key unlock setting at restart			
ON			
Back	ON	OFF	Set
F1	F2	F3	F4

Key unlock setting at restart mode

Key unlock at restart is set in this mode.

Press “F2 (ON)” or “F3 (OFF)” switch to select ON or OFF, and press “F4 (Set)” switch to finalize the selection.

(Default: ON)

ON: Key lock is cancelled when RUN/STOP switch is turned ON and OFF.

OFF: Key lock is NOT cancelled even when RUN/STOP switch is turned ON and OFF.

Contrast setting			
Back	▲High	▼Low	Set
F1	F2	F3	F4

Contrast setting mode

Screen contrast is adjusted in this mode.

Use “F2 (▲)” switch to increase the contrast or “F3 (▼)” switch to reduce the contrast.

Option select			
Option1 setting		OFF	
Back	Previous	Next	Select

Option select/set mode

Press “F2 (Previous)” or “F3 (Back)” switch to select options 1 to 8.

Press then “F4 (Select)” switch to change to Option1 (~ 8) setting mode. Press then “F2 (ON)” or “F3 (OFF)” switch to select ON or OFF, and press “F4 (Set)” switch to finalize the selection.

Option1 setting			
OFF			
Back	ON	OFF	Set
F1	F2	F3	F4

4 Initial setting

LCD backlight setting			
▲ Always OFF			
Always ON			
▼ Lit at key operation only(20sec)			
Back	▲	▼	Select

LCD backlight setting mode

LCD backlight is set in this mode.

(☞ Page 34)

Fuel circulation mode			
ON Remaining time 10 min			
OFF			

Fuel circulation mode

Mode to circulate fuel forcibly in order to supply fuel to the engine and also to purge air trapped in the fuel system.

(☞ Page 36)

Automatic drive selection backup setting			
Disable			
Back	Enable	Disable	Set

Automatic drive selection backup setting mode

Setting automatic switching from motor drive to engine drive when power failure happens.

(Setting option)

OFF: Disable (Default)

ON : Enable

Minimum power stop time setting			
8min			
Back	▲	▼	Set

Minimum power stop time setting mode

Setting minimum time before starting operation after thermostat OFF to improve fuel consumption by reducing frequent starting actions.

(Setting option)

1~30 minutes, which can be changed minute by minute.

(Default: 8 minutes)

Maximum power stop time setting			
OFF			
Back	▲	▼	Set

Maximum power stop time setting mode

Setting maximum time to restart unit forcibly after thermostat OFF to prevent no start trouble due to sensor failure or the like.

(Setting option)

OFF, 10~240 minutes which can be changed minute by minute.

(Default: OFF)

Thermostat reset temp. diff. setting			
2.0°C			
Back	▲	▼	Set

Thermostat reset temperature difference setting mode

Setting temperature difference from target temperature to be used as thermostat resetting condition.

(Setting option)

1~6°C which can be changed in the unit of 0.5°C.

(Default: 2°C)

Sleep mode setting			
Disable			
Back	Enable	Disable	Set

Sleep mode setting mode

Mode to start automatically unit operation without pressing the RUN/STOP switch of controller when commercial power supply is started from the unit stopping.

(Setting option)

OFF: Disable (Default)

ON: Enable

Forced thermostat reset temp. diff. setting			
4.0°C			
Back	▲	▼	Set

Forced thermostat reset temperature difference setting mode

Setting temperature difference from target temperature to be used as forced thermostat restarting condition after thermostat OFF.

(Setting option)

2~10°C which can be changed in the unit of 0.5°C.

(Default: 4°C)

Out of adequate range temp. setting			
4.0°C			
Back	▲	▼	Set

Out of adequate range temperature setting mode

Setting allowable temperature range which can be recognized as adequate around the target temperature.

(Setting option)

2~6°C which can be changed in the unit of 0.5°C.

(Default: 4°C)

Auto start-stop battery setting			
12.5V			
Back	▲	▼	Set

Auto start-stop battery setting mode

Setting for battery charging operation during thermostat OFF.

(Setting option)

12.0~12.5V which can be changed in the unit of 0.1V.

(Default: 12.5V)

Long term stop battery setting			
12.2V			
Back	▲	▼	Set

Long term stop battery setting mode

Setting for battery charging operation during unit stop.

(☞ Page 37)

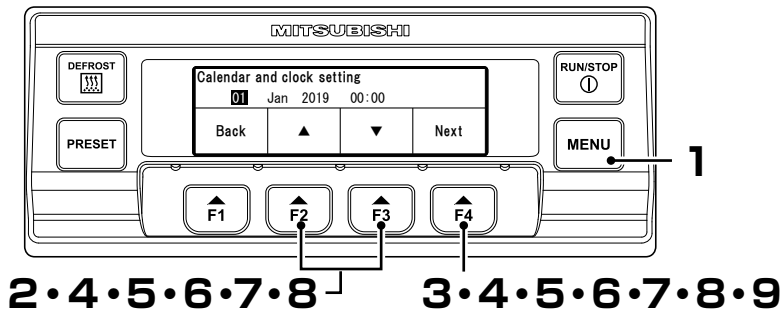
BDS function setting			
ON			
Back	ON	OFF	Set
F1	F2	F3	F4

BDS function setting mode

BDS function is set in this mode.

Press “F2 (ON)” or “F3 (OFF)” switch to select ON or OFF, and press “F4 (Set)” switch to finalize the selection.

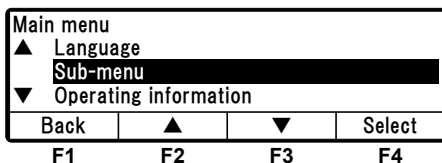
Setting the calendar and clock (Date, Month, Year)



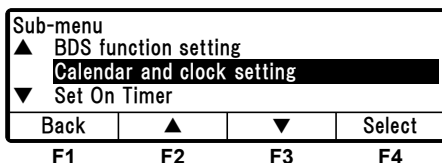
1 Press “MENU” switch.

⇒ The display changes to “Main menu” screen.

2 Press “F2 (▲)” or “F3 (▼)” switch till “Sub-menu” screen is displayed.

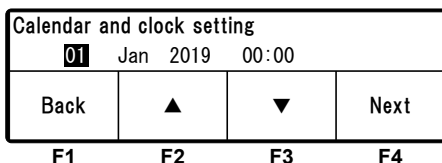


3 Press “F4 (Select)” switch to change to “Sub-menu” screen (Right figure).



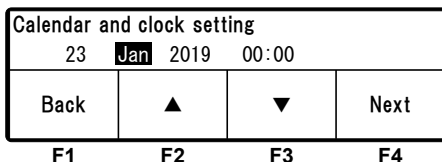
4 Press “F4 (Select)” switch to change to “Calendar and clock setting” mode (Right figure).

⇒ Press “F2 (▲)” or “F3 (▼)” switch to adjust at current date.



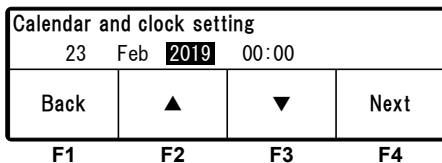
5 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch to adjust at current month.



6 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch to adjust at current year.



7 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch to adjust at current time (Hour).

Calendar and clock setting				
23		Feb	2019	00:00
Back	▲	▼	Next	
F1	F2	F3	F4	

**NOTE**

- Time is displayed in the 24-hour scale. If it is “7 PM”, set as “19:00”.

8 Press “F4 (Next)”.

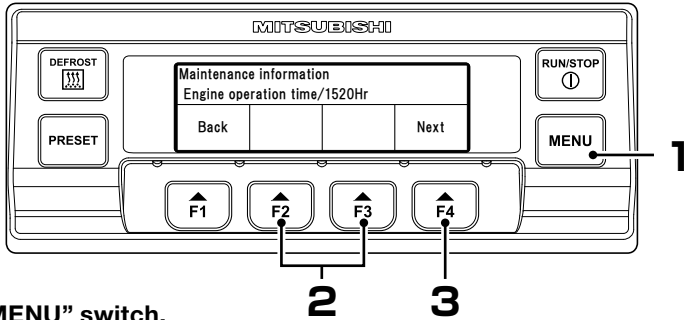
⇒ Press “F2 (▲)” or “F3 (▼)” switch to adjust at current time (Minute).

Calendar and clock setting				
23		Feb	2019	09:00
Back	▲	▼	Set	
F1	F2	F3	F4	

9 Press “F4 (Set)” switch.

⇒ The setting is completed, and the display returns to the screen of Step 3, “Sub-menu”.

Displaying the maintenance information



1 Press “MENU” switch.

⇒ The display changes to the “Main menu” screen.

2 Press “F2 (▲)” or “F3 (▼)” switch till the display changes to the “Maintenance information” mode.

Main menu			
▲ Alarm	Maintenance information		
▼ Pre trip inspection			
Back	▲	▼	Select
F1	F2	F3	F4

3 Press “F4 (Select)” switch.

⇒ “Engine operation time” is displayed.

Maintenance information			
Engine operation time/4550Hr			
Back			Next
F1	F2	F3	F4

Display of Time to replace parts.

- If the operation time or number of operations reaches the “Maintenance required time” on each device, this screen (Right figure) is displayed for 10 seconds after the start of operation of the refrigeration unit. In case of oil replacement interval, “Time to change oil” is displayed.

Time to replace parts.			

- If you press “F4 (Next)” switch, the display changes to each parts in the table next page. In case part other than listed in the table is displayed when pressing “F4 (Next)”, it is the maintenance required part. The replacement of part that is listed in the table should be done based on the interval of the table.

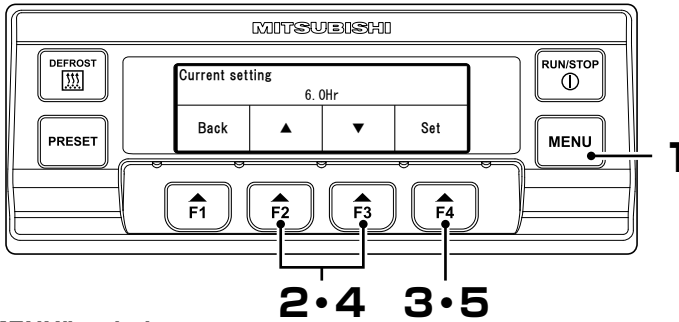
Maintenance information			
CF1 operation time/****Hr			
Back	Reset		Next
F1	F2	F3	F4

- If you press “F2 (Reset)” switch after replacing the part, the operation time and the number of START/STOP cycles are reset.

•Parts replacement time/cycle.

Display item	Replacement interval
Engine oil inspection	1,500 hours or more
Engine operation time	-
Standby operation time	-
Water pump belt operate time	9,000 hours or more
Engine overhaul	9,000 hours or more
Starter start-stop cycles	30,000 cycles or more
Compressor operation time	30,000 hours or more
CF1 operation time	30,000 hours or more
CF2 operation time	30,000 hours or more
EF1 operation time	30,000 hours or more
EF2 operation time	30,000 hours or more

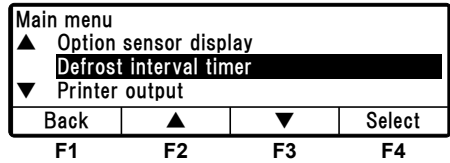
Setting the defrost interval



1 Press “MENU” switch.

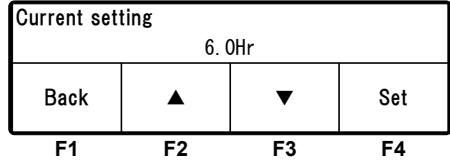
⇒ The display changes to “Main menu” screen.

2 Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Defrost interval timer”.

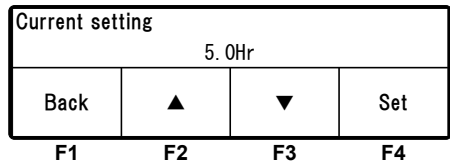


3 Press “F4 (Select)” switch.

⇒ Current setting of “Defrost interval timer” is displayed.



4 Press “F2 (▲)” or “F3 (▼)” switch to select a setting time.



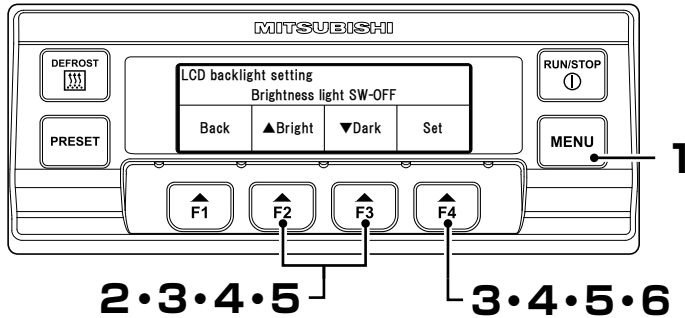
NOTE

- The defrosting can be set at OFF, or at every 1 hour in the range of from 1.0 hours to 12 hours.

5 Press “F4 (Set)” switch.

⇒ The setting completes, and the display returns to the screen of Step 2, “Main menu”.

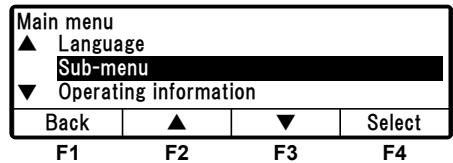
Setting LCD backlight



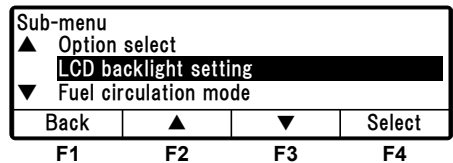
1 Press “MENU” switch.

⇒ The display changes to “Main menu” screen.

2 Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Sub-menu” screen (Right figure).

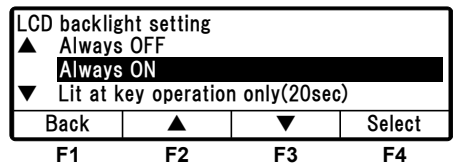


3 Press “F4 (Select)” switch to change to “Sub-menu” screen. Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “LCD backlight setting” screen (Right figure).



4 Press “F4 (Select)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch to select the following LCD backlight setting.



[Lit at key operation only(20sec)] : Lights for 20 seconds only when any switch is pressed.

[Always OFF] : Always turning off the light.

[Always ON] : Always lighting.

4 Initial setting

5 Press “F4 (Select)” switch.
【Lit at key operation only(20sec)】

⇒ Step 6

LCD backlight setting			
Lit at key operation only(20sec)			
Back			Set
F1	F2	F3	F4

【Always OFF】

⇒ Step 6

LCD backlight setting			
Always OFF			
Back			Set
F1	F2	F3	F4

【Always ON】

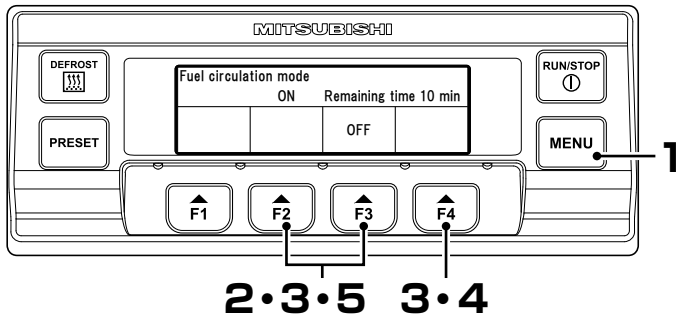
⇒ Adjust the brightness of the LCD backlight for Always ON by pressing “F2 (▲Bright)” or “F3 (▼Dark)” switch. ⇒ Step 6

LCD backlight setting			
Brightness of always ON			
Back	▲Bright	▼Dark	Set
F1	F2	F3	F4

6 Press “F4 (Set)” switch.

⇒ The setting completes, and the display returns to “Sub-menu” screen of Step 3.

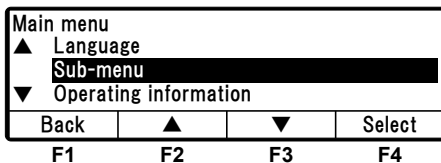
Fuel circulation mode setting



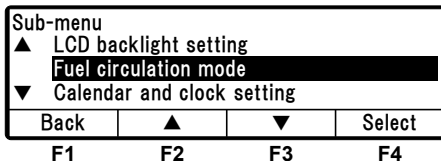
1 Press “MENU” switch.

⇒ The display changes to “Main menu” screen.

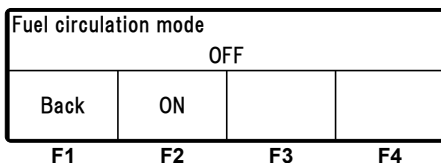
2 Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Sub-menu” screen (Right figure).



3 Press “F4 (Select)” switch to change to “Sub-menu” screen. Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Fuel circulation mode” screen (Right figure).

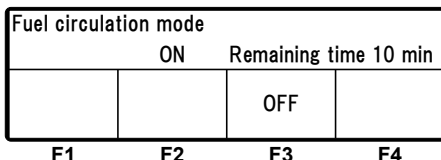


4 Press “F4 (Select)” switch to change to “Fuel circulation mode” screen (Right figure).



5 Press “F2 (ON)” switch.

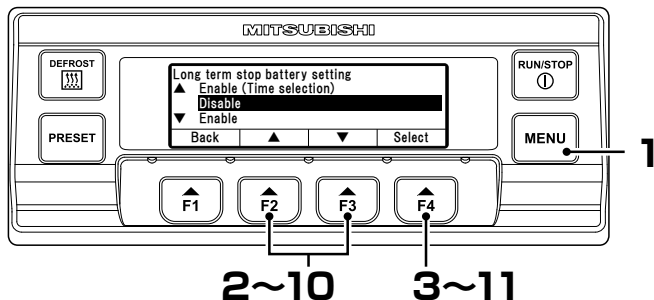
⇒ The remaining time (in minute) is displayed. Fuel circulation is completed 10 minutes later and the display returns to the normal display screen. To interrupt the fuel circulation, press “F3 (OFF)” switch to return to “Fuel circulation mode” screen of Step 4.



NOTE

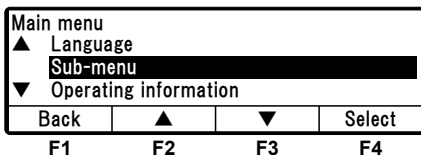
- If fuel is used up, air may intrude in the fuel system such as the fuel hose, etc, so that the engine may become unable to start. In such occasion, purge air in the fuel circulation mode before starting engine.

Setting Long term stop battery

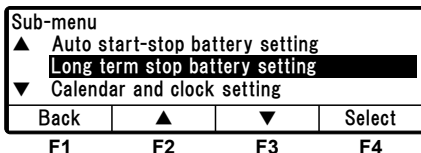


1 Press “MENU” switch.
⇒ The display changes to “Main menu” screen.

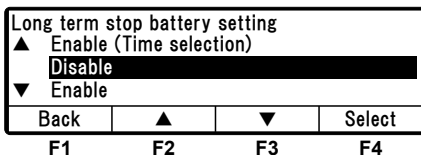
2 Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Sub-menu” screen (Right figure).



3 Press “F4 (Select)” switch to change to “Sub-menu” screen. Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Long term stop battery setting” screen (Right figure).



4 Press “F4 (Select)” switch.
⇒ Press “F2 (▲)” or “F3 (▼)” switch to select the long term stop battery setting.



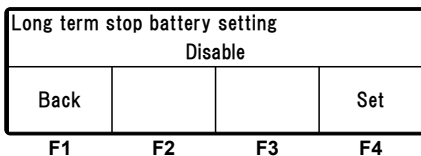
[Disable] : Disable long term stop battery.

[Enable] : Enable long term stop battery (check interval and voltage).

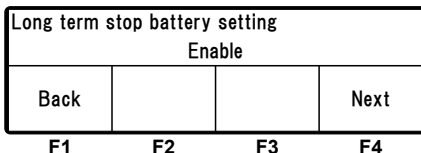
[Enable(Time selection)] : In addition to the above, time selection.

5 Press “F4 (Select)” switch.

[Disable]
⇒ Step 11




[Enable]
⇒ Step 9



【Enable(Time selection)】

- ⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Hour) of start of Long term stop battery setting start.

 **Notice**

- Time is displayed in the 24-hour scale. If it is “7 PM”, set as “19:00”.

Long term stop battery setting			
10:00 - 16:00			
Back	▲	▼	Next
F1	F2	F3	F4

6 Press “F4 (Next)” switch.

- ⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Minute) of start of Long term stop battery setting.

Long term stop battery setting			
10:30 - 16:00			
Back	▲	▼	Next
F1	F2	F3	F4

7 Press “F4 (Next)” switch.

- ⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Hour) of end of Long term stop battery setting.

Long term stop battery setting			
10:30 - 17:00			
Back	▲	▼	Next
F1	F2	F3	F4

8 Press “F4 (Next)” switch.

- ⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Minute) of end of Long term stop battery setting.

Long term stop battery setting			
10:30 - 17:30			
Back	▲	▼	Next
F1	F2	F3	F4

9 Press “F4 (Next)” switch.


- ⇒ Press “F2 (▲)” or “F3 (▼)” switch, and set check interval of Long term stop battery Setting.
(Setting option)
60, 30, 15min (Default: 60min)

Long term stop battery setting			
Check interval Every 60 min			
Back	▲	▼	Next
F1	F2	F3	F4

10 Press “F4 (Next)” switch.

- ⇒ Press “F2 (▲)” or “F3 (▼)” switch, and set voltage of battery charging operation during unit stop.
(Setting option)
12.0~12.5V (Default: 12.2V)

Long term stop battery setting			
12.2V			
Back	▲	▼	Set
F1	F2	F3	F4

 **NOTE**

- Each press on “F2” switch increases the value by 0.1 while the value decreases by 0.1 at each press on “F3” switch.

11 Press “F4 (Set)” switch.

- ⇒ The setting completes, and the display returns to “Sub-menu” screen of Step 3.

5 Operation

WARNING



Do not operate the refrigeration unit in the place where there is a risk of combustible gas leakage.

- Otherwise, it may cause a fire.

Do not touch the electric devices such as power plug etc. with wet hands.

- Otherwise, it may cause an electric shock.



Operate the refrigeration unit with commercial power supply when operating it indoor. The place must be well ventilated when operating it with engine drive.

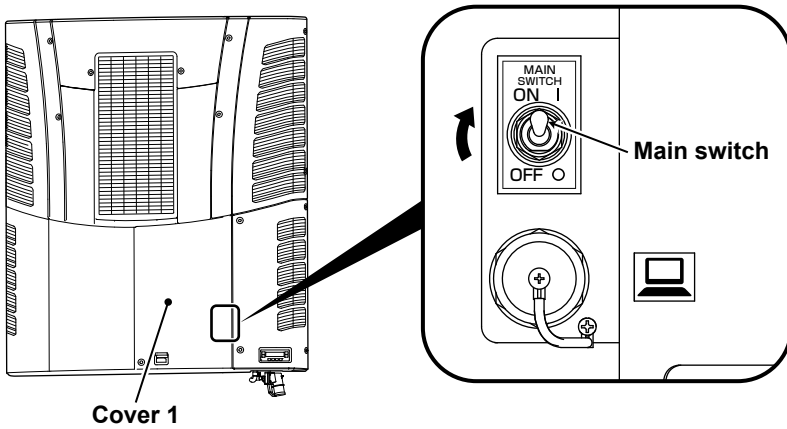
- Otherwise, collection of exhaust gases indoors may lead to difficulty in breathing.



NOTE

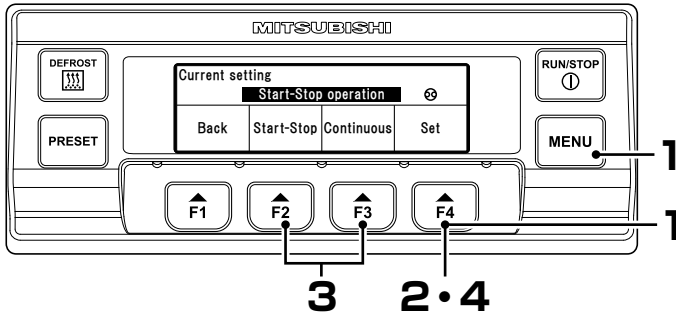
- Be sure to carry out the self diagnosis operation (PTI operation) before the operation.

Power on



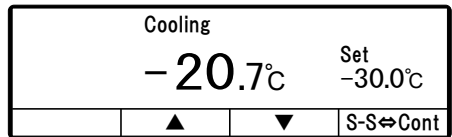
- 1 Open the cover 1. (☞ Refer to page 62.)
- 2 Set the "Main switch" to "ON" side.
- 3 Close the cover 1. (☞ Refer to page 63.)

Selecting the operation pattern



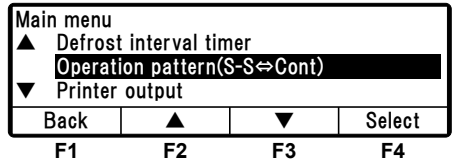
- 1** On the normal display screen (Right figure), press “F4 (S-S⇔Cont)” switch.

⇒ The display changed to the mode screen of Step 2 below.

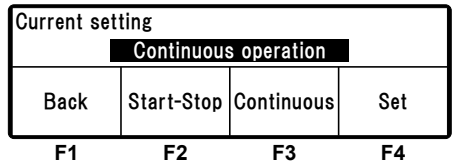


- 1** Press “MENU” switch.

⇒ The display changes to “Main menu” screen.

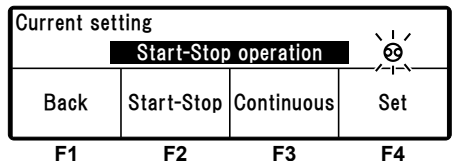


- 2** Press “F4 (Select)” switch to change to “Operation pattern selection” screen (Right figure).




- 3** Press “F2 (Start-Stop)” or “F3 (Continuous)” switch to select the automatic Start/Stop operation or the continuous operation.

⇒ Start/Stop display lights when the Start/Stop operation is set.



- 4** Press “F4 (Set)” switch.

⇒ The setting completes, and the display returns to the normal display screen.

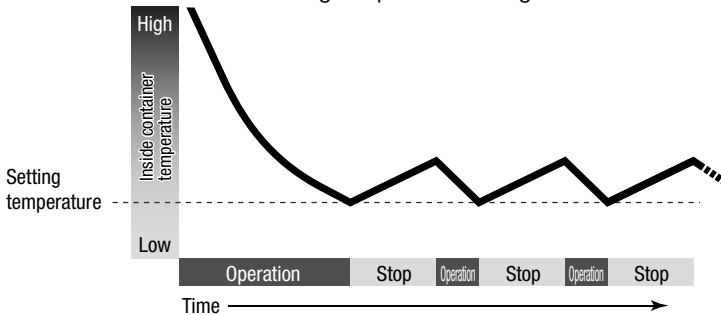
 **NOTE**

● What is the automatic start/stop operation?

Temperature inside container is maintained within a range of set point temperature by turning engine ON & OFF during engine drive and magnetic contactor ON & OFF during commercial power supply drive. This is also called as “Thermostat ON” and “Thermostat OFF” mode. Automatic start/stop operation consumes less fuel (electricity) than the continuous operation but has a relatively large fluctuation of the inside container temperature. This pattern of operation is suitable for cargos with a larger allowance in the control temperature.

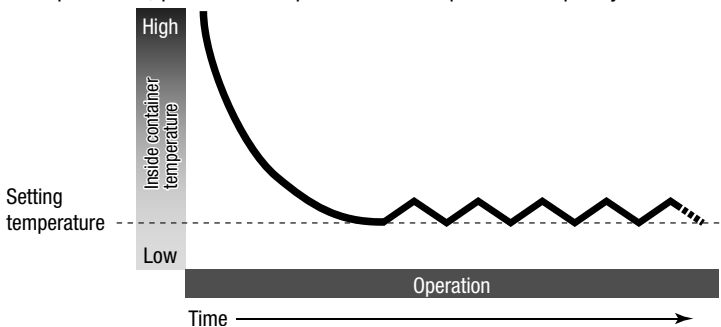
* Thermostat OFF: The action that the engine (generator) stops automatically after inside container temperature reached to the setting temperature.
(As the controller is active, it re-starts automatically.)

Thermostat ON: The action that the operation re-starts automatically when the inside container temperature comes off the designated range of the setting temperature during thermostat OFF.

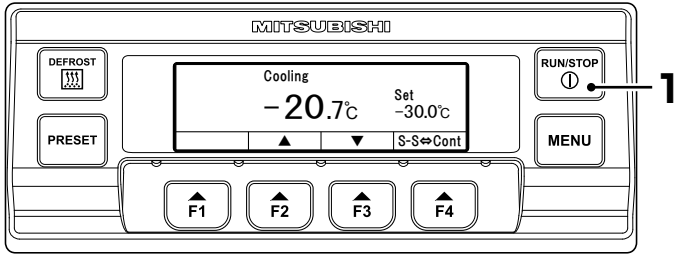


● What is the continuous operation?

The refrigeration unit operates without turning off the engine or magnetic contactor. Since this operation can maintain the inside container temperature very close to the setting temperature, it is suitable for cases such as chilled transportation, pharma transport which require strict quality control.



Starting the operation



WARNING



Start the operation after making sure that all covers for the refrigeration unit are closed.

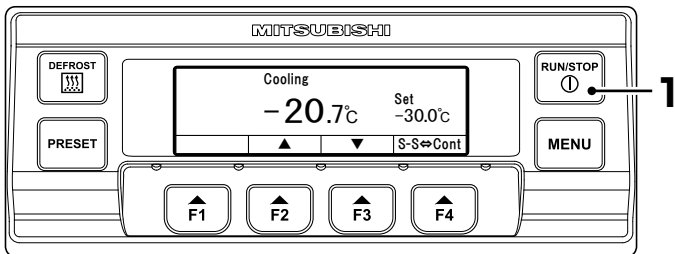
- It may cause accidents if the operation is started with the covers opened.

**1 Press “RUN/STOP” switch.
(The refrigeration unit is turned “ON”.)**

⇒ LCD indicates the inside compartment temperature and the setting temperature.

When the unit is connected to the commercial power supply, LCD indicates the display for commercial power supply.

Stopping the operation



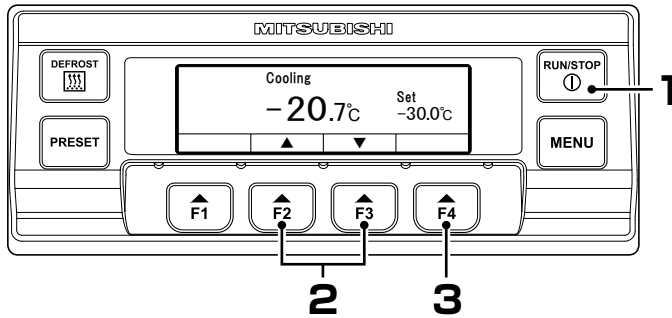
**1 Press “RUN/STOP” switch.
(The refrigeration unit is turned “OFF”.)**



NOTE

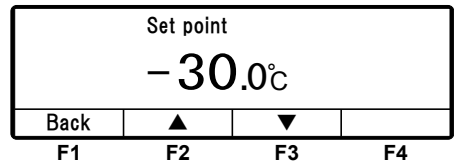
- If commercial power supply is connected while unit is operating with engine drive, unit will come to stop and buzzer sounds. Error display shows “Operation on Hold”.

Setting the temperature



1 Start the operation of refrigeration unit. (☞ Page 43)

2 Press “F2 (▲)” or “F3 (▼)” switch, and set a temperature.

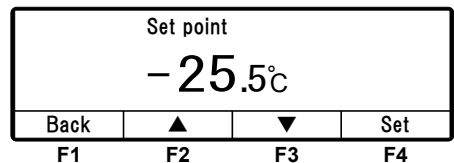


NOTE

- Each push on “F2” switch increases the value by 0.5 while the value decreases by 0.5 at each push on “F3” switch. If the switch is held down, the value changes continuously.

3 Press “F4 (Set)” switch.

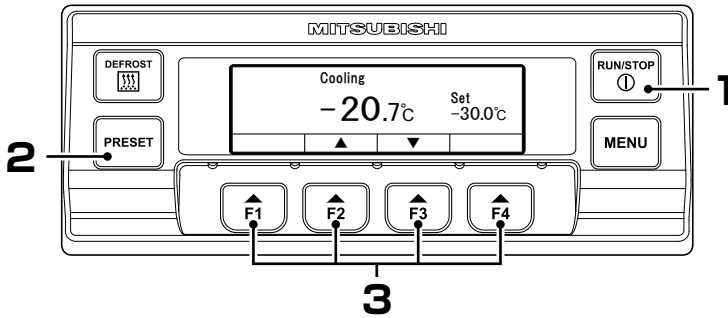
⇒ The setting completes, and the display returns to the normal display screen.



NOTE

- The “Preset” function is provided, with which it can be selected from 4 setting temperatures which have already been registered. (Next page)

Setting the preset operation pattern, defrost interval and set point



1 Start the refrigeration unit. (☞ Page 43)

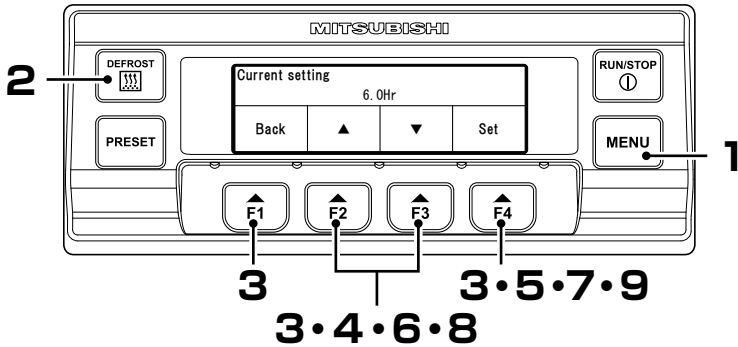
2 Press the “PRESET” switch.

⇒ The display changes to the preset setting screen. Right figure shows the setting values at the shipping from factory.

Start-stop Def 6.0Hr	Start-stop Def 6.0Hr	Start-stop Def 6.0Hr	Start-stop Def 6.0Hr
Set temp. -18.0°C	Set temp. -5.0°C	Set temp. 5.0°C	Set temp. 20.0°C
F1	F2	F3	F4

3 Press “F1 (~ F4)” switch.

⇒ Desired preset operation pattern, defrost interval and temperature are set, and the display returns to the normal display screen.



Changing the registered preset operation pattern, defrost interval and set point

1 Press the “MENU” switch when the refrigeration unit is stopped.

⇒ The controller becomes activated and the display changes to the "Normal display screen".

2 Press the “PRESET” switch.

Start-stop Def 6.0Hr Set temp. -18.0°C	Start-stop Def 6.0Hr Set temp. -5.0°C	Start-stop Def 6.0Hr Set temp. 5.0°C	Start-stop Def 6.0Hr Set temp. 20.0°C
F1	F2	F3	F4

3 Hold down “F1 (~ F4)” switch for 3 seconds.

⇒ Registered preset of “Operation pattern setting” is displayed.

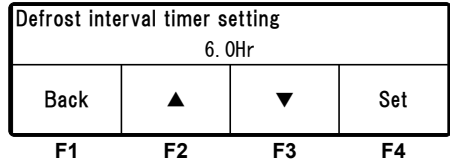
Operation pattern setting			
Start-Stop operation			
Back	Start-Stop	Continuous	Set
F1	F2	F3	F4

4 Press “F2 (Start-Stop)” or “F3 (Continuous)” switch to select the automatic Start-Stop operation or the Continuous operation (Right figure).

Operation pattern setting			
Continuous operation			
Back	Start-Stop	Continuous	Set
F1	F2	F3	F4

5 Press “F4 (Set)” switch.

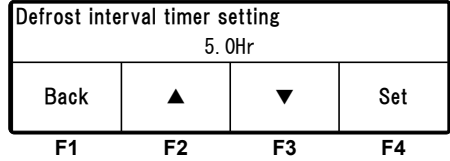
⇒ Registered preset of “Defrost interval timer” is displayed.



6 Press “F2 (▲)” or “F3 (▼)” switch to select a setting time.

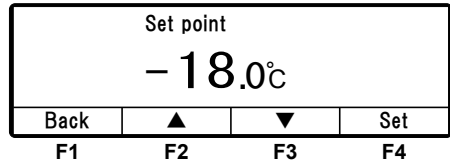
 **NOTE**

- The defrosting can be set at OFF, or at every 1 hour in the range of from 1.0 hours to 12 hours.

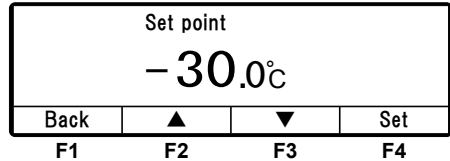



7 Press “F4 (Set)” switch.

⇒ Registered preset of “Set point” is displayed.



8 Press “F2 (▲)” or “F3 (▼)” switch, and set a temperature.



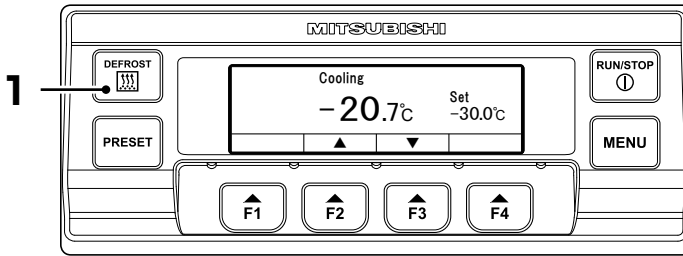
 **NOTE**

- Each push on “F2” switch increases the value by 0.5 while the value decreases by 0.5 at each push on “F3” switch. If the switch is held down, the value changes continuously.

9 Press “F4 (Set)” switch.

⇒ The setting completes, and the display returns to the normal display screen.

Manual defrost operation



Starting the manual defrost operation

- 1 Press the “DEFROST” switch once during cooling operation.

⇒ The defrost operation starts.



NOTE

- The defrost operation may not start when the inside container temperature is higher.

Ending the manual defrost operation

If the defrost operation completes, it returns to the cooling operation.

If it is necessary to interrupt the defrost operation and to return to the cooling operation, press the “DEFROST” switch once more.

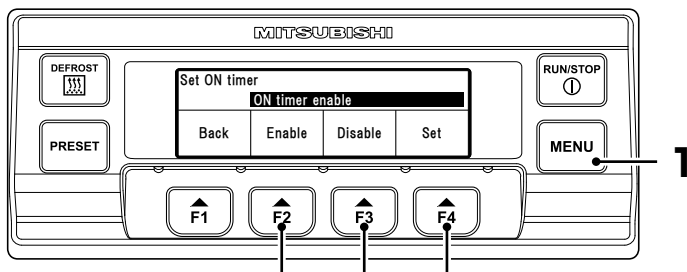
If the “RUN/STOP” switch is turned “OFF”, it interrupts the defrost operation and stops the operation of refrigeration unit.



NOTE

- The manual defrost operation can be made also during the thermostat OFF stop.
- Unit will not enter manual defrost mode when “Defrost” switch is pressed while unit is not operating.

Setting the ON timer

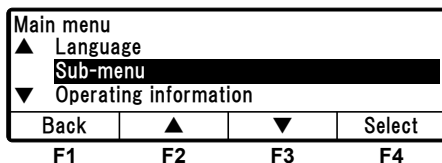


2 • **3** • **4** • **5** • **6** • **7** • **8** **3** • **4** • **5** • **6** • **7** • **8** • **9**

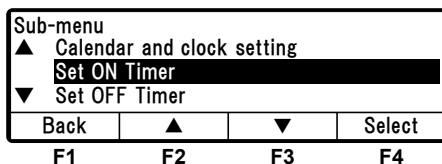
1 Press "MENU" switch.

⇒ The display changes to "Main menu" screen.

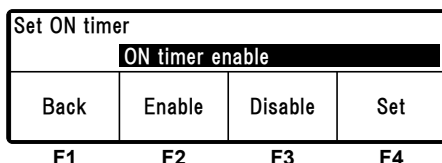
2 Press "F2 (▲)" or "F3 (▼)" switch till the display changes to "Sub-menu" screen (Right figure).



3 Press "F4 (Select)" switch to change to "Sub-menu" screen. Press "F2 (▲)" or "F3 (▼)" switch till the display changes to "Set ON Timer" screen (Right figure).



4 Press "F4 (Select)" switch to change to "ON timer enable" mode (Right figure).

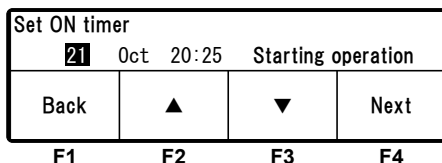


⇒ If Enable is selected by pressing "F2 (Enable)" switch, go to Step 5.

⇒ When Disable has been selected by pressing "F3 (Disable)" switch, if "F4 (Set)" switch is pressed, the display returns to the screen of Step 3.

5 Press "F4 (Set)" switch.

⇒ Press "F2 (▲)" or "F3 (▼)" switch, and set the time (Date) of Set ON timer.



6 Press “F4 (Next)” switch.


⇒ Press “F2 (▲)” or “F3 (▼)” switch, and set the time (Month) of Set ON timer.

Set ON timer			
22	Oct	20:25	Starting operation
Back	▲	▼	Next
F1	F2	F3	F4

7 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Hour) of Set ON timer.

Set ON timer			
22	Oct	23:25	Starting operation
Back	▲	▼	Next
F1	F2	F3	F4

 **NOTE**

- Time is displayed in the 24-hour scale. If it is “7 PM”, set as “19:00”.


8 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Minute) of Set ON timer.

Set ON timer			
22	Oct	23:30	Starting operation
Back	▲	▼	Set
F1	F2	F3	F4

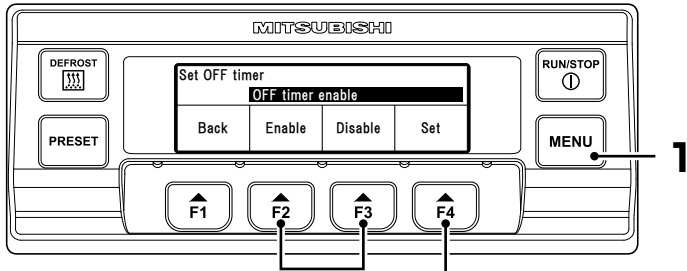
9 Press “F4 (Set)” switch.

⇒ The setting completes, and the display returns to the screen of Step 3, “Sub-menu”.

 **NOTE**

- Take note that the refrigeration unit starts the operation automatically at the setting time when the ON timer is set.

Setting the OFF timer



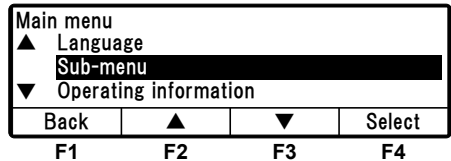
2 • 3 • 4 • 5 • 6 • 7 • 8

3 • 4 • 5 • 6 • 7 • 8 • 9

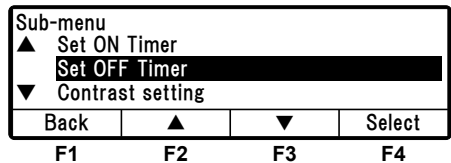
1 Press “MENU” switch.

⇒ The display change to “Main menu” screen.

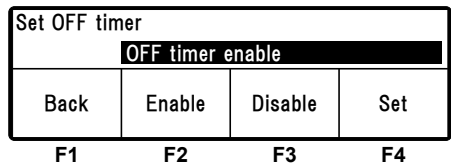
2 Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Sub-menu” screen (Right figure).



3 Press “F4 (Select)” switch to change to “Sub-menu” screen. Press “F2 (▲)” or “F3 (▼)” switch till the display changes to “Set OFF Timer” screen (Right figure).



4 Press “F4 (Select)” switch to change to “Set OFF timer” mode (Right figure).

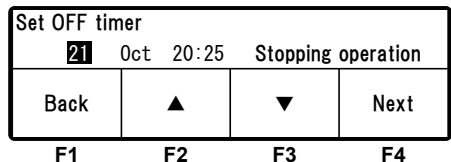


⇒ If Enable is selected by pressing “F2 (Enable)” switch, go to Step 5.

⇒ When Disable has been selected by pressing “F3 (Disable)” switch, if “F4 (Set)” switch is pressed, the display returns to the screen of Step 3.

5 Press “F4 (Set)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch, and set the time (Date) of Set OFF timer.



6 Press “F4 (Next)” switch.


⇒ Press “F2 (▲)” or “F3 (▼)” switch, and set the time (Month) of Set OFF timer.

Set OFF timer			
22	Oct	20:25	Stopping operation
Back	▲	▼	Next
F1	F2	F3	F4

7 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Hour) of Set OFF timer.

Set OFF timer			
22	Oct	23:25	Stopping operation
Back	▲	▼	Next
F1	F2	F3	F4

 **NOTE**

- Time is displayed in the 24-hpur scale. If it is “7 PM”, set as “19:00”.


8 Press “F4 (Next)” switch.

⇒ Press “F2 (▲)” or “F3 (▼)” switch, and adjust the time (Minute) of Set OFF timer.

Set OFF timer			
22	Oct	23:30	Stopping operation
Back	▲	▼	Set
F1	F2	F3	F4

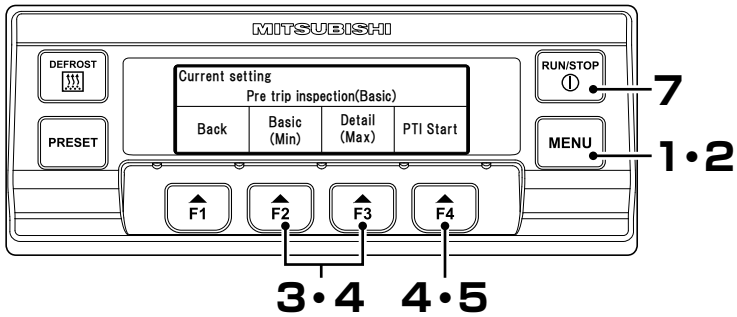
9 Press “F4 (Set)” switch.

⇒ The setting completes, and the display returns to the screen of Step 3, “Sub-menu”.

 **NOTE**

- Take note that the refrigeration unit stops the operation automatically at the setting time when the OFF timer is set.

Self diagnosis operation (PTI operation)



NOTE

- Perform the self diagnosis operation without fail before the operation.
- The inspection of the commercial power supply is skipped when the power supply is not connected.

Starting the operation

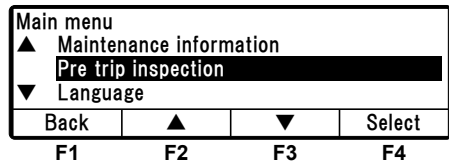
- 1 Press the “MENU” switch when the refrigeration unit is stopped.**
⇒ The controller becomes activated and the display changes to the "Normal display screen".

NOTE

- Go to the procedure 2 while the refrigeration unit is operating.

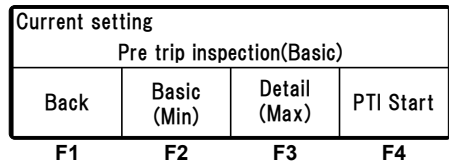
- 2 Press the “MENU” switch.**
⇒ The display changes to the "Main menu".

- 3 Press “F2 (▲)” or “F3 (▼)” switch till “Pre trip inspection” screen display.**




- 4 Press “F4 (Select)” switch to change to “PTI selection” mode (Right figure).**

⇒ Press “F2 [Basic (Main)]” or “F3 [Detail (Main)]” switch to select the pre trip inspection.



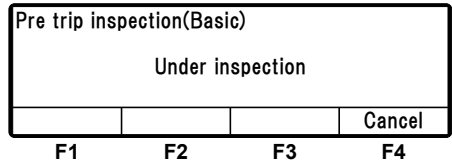
- [Basic (Min)] Basic self diagnosis operation**
[Detail (Max)] Detail self diagnosis operation
 (With the cooling and defrost operations)

 **NOTE**

- Self diagnosis operation takes approx. 5 minutes for "Basic (Min)" or 2.5 hours (It may take a little longer depending on the setting temperature and the outdoor air temperature.) for "Detail (Max)" from start to end.

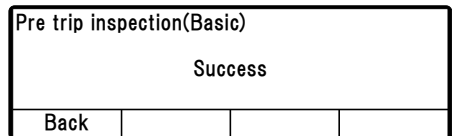
5 Press the "F4 (PTI Start)" switch.

- ⇒ If the "F4 (PTI Start)" switch is pressed during operation, the refrigeration unit stops temporarily.
- ⇒ To interrupt PTI operation, press "F4 (Cancel)" switch.
- ⇒ When the diagnosis is completed, the engine stops and the result of diagnosis will be displayed.



Finishing the operation when no defects are detected

6 When no abnormal condition has been detected, "Success" is displayed.



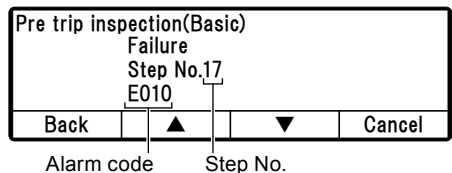
7 Press the "RUN/STOP" switch to turn it "OFF".

- ⇒ The controller will stop.

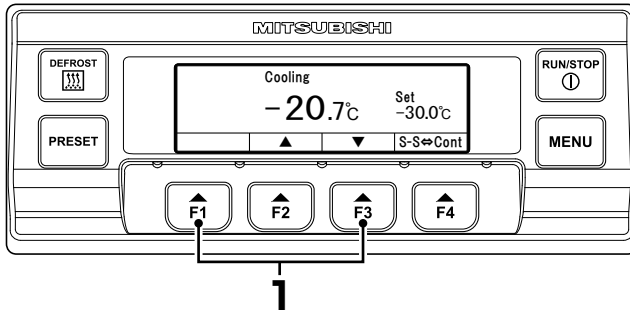
Perform the same procedures when stopping the PTI operation during the inspection.

When abnormal conditions are detected

"Failure", "Step No." and the error code corresponding to the abnormal condition are displayed. When multiple abnormalities occur, display contents are switched and displayed every 2 seconds. Check the alarm code (👉 Refer to pages from 75 to 78) and perform proper treatment or contact your nearest dealer.



Setting the key lock/unlock

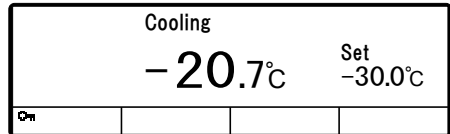


NOTE

- Key lock setting disables switch operation except for the "RUN/STOP" switch.

Setting the key lock

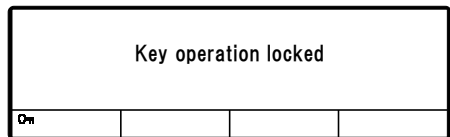
1 Hold down "F1" and "F3" switch for 3 seconds during the refrigeration unit operation or "Normal display screen".

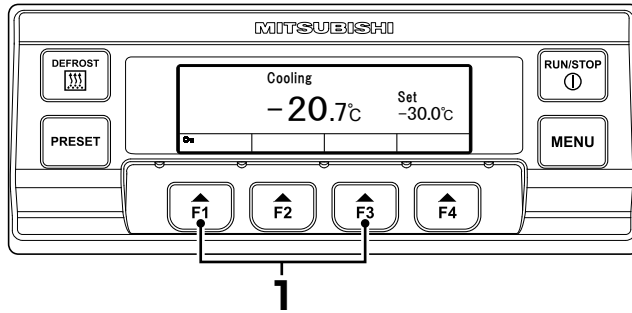



Key lock screen

⇒ The setting completes, and the key mark is displayed (Upper right figure, call "key lock screen").

⇒ If you press any switch other than "RUN/STOP" switch while the key is locked, the "key operation locked" is displayed (Lower right figure).





 **NOTE**

- This section describes when “key unlock setting at restart” is OFF.
- If “key unlock setting at restart” is ON, the key lock is released when the refrigeration unit stops. (→ page 26)

Setting the key unlock

- 1 Hold down “F1” and “F3” switch for 3 seconds during the refrigeration unit operation or “key lock screen”.
 - ⇒ The setting completes, and the display returns to the normal display screen.

6 Loading

Preparation before loading

- 1** Cargos must be cooled down or heated up to the designated temperature with other refrigeration device in advance.
- 2** Clean inside of the container.
- 3** Perform the inspection of the refrigeration unit and the body*.
(☞ Refer to page 60.)
* Check with the body manufacturer for the items to be inspected.
- 4** Set the right temperature for transportation of the cargo and cool down or heat up inside of the container to the setting temperature.
(☞ Refer to page 44.)



NOTE

- The temperature inside of the closed container may reach 60°C under a blazing sun. Loading in such a container causes damages or deterioration of the quality. Be sure to cool down inside of the container to the setting temperature before loading.
- When it is hardly cooled down, contact your nearest dealer before loading.

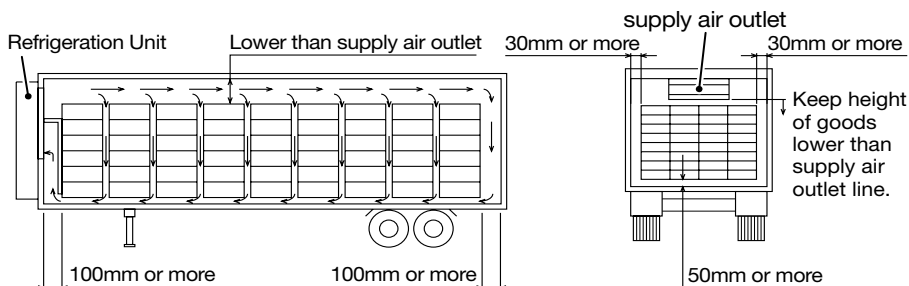
Loading and unloading

Loading procedure

1 Stop the cooling operation. (☞ Refer to page 43.)

2 Load the cargos in the container.

Leave a space between the cargo and inner wall of the container as shown in the following figure in order to circulate airflow.



3 Keep the top layer of the cargo as flat as possible.

⚠ CAUTION



Waterproof the cargos if they need to be.

- Otherwise, it may deteriorate quality of the cargos due to the spattering water from defrosting.

4 When loading the cargos which need to be protected from water, cover the cargos in the vicinity of evaporator outlet with waterproof sheet.

5 After completing loading, start the operation of the refrigeration unit. (☞ Refer to page 43.)

Unloading

1 Stop the cooling operation. (👉 Refer to page 43.)

2 Unload the cargos.



NOTE

- Frost forms and accumulates on the evaporator coil while the refrigeration unit is operated during loading or unloading.
 - Since the inside container temperature rises (or falls during cold winter) while the door is kept opened, load or unload as quickly as possible.
 - A curtain helps to prevent ambient air from entering or inside air from escaping during loading or unloading.
-

7 Inspection

Precautions for inspection

Always carry out the following inspections before the operation to prevent any damages of the refrigeration unit before happening.

WARNING



Do not perform the inspection in the place where the combustible gas leakage may happen.

- Otherwise, leaked gas may catch fire when in contact with hot components of refrigeration unit.



Do not modify or remove the protective device mounted to the cover.

- It may cause injury if the refrigeration unit is operated with the cover opened.



Be sure to perform daily and periodic inspections.

- Otherwise, it may cause troubles of the refrigeration unit or accidents.

The area must be well ventilated when performing the inspection indoors.

- Otherwise, collection of exhaust gases indoors may lead to difficulty in breathing.

 **CAUTION**



Use 3-phase AC400V 50Hz for power supply.

- It may cause damage of the refrigeration unit or a fire if any other power supply was used.

Watch your step when climbing up on the trailer for opening and closing the cover or inspection.

- If you step off, you may fall down and get injured.

When leakage of the refrigerant is detected, contact your nearest dealer immediately.

- Otherwise, it may cause blindness or frostbite.
-

 **CAUTION**



When inspecting unit, stop the unit and wait until the engine has cooled down.

- High temperature parts such as engine exhaust pipe, compressor, refrigerant high pressure piping, etc may cause burns.




Set the "Main switch" to "OFF" to stop the refrigeration unit and remove the battery terminal and plug for power cord during the inspection and cleaning.

- Otherwise, it may cause injury or an electric shock due to unexpected start.
-

Opening of the covers

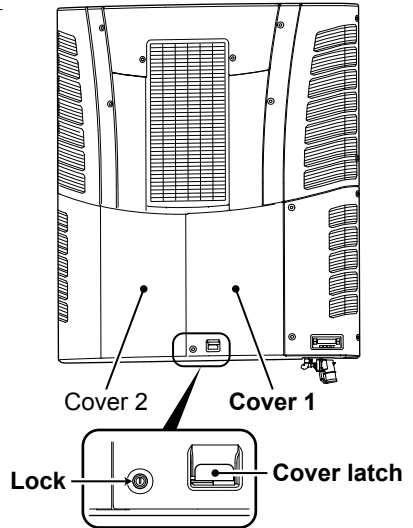
The covers can be opened without using tools when performing the inspection.

 **NOTE**

- Open the cover 1 at first.

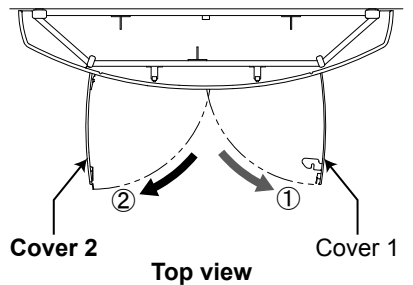
Cover 1

- 1 Open the lock located left the "Cover latch".
- 2 Pull the "Cover latch".
⇒ The lock is released and the cover 1 opens a little.
- 3 Open the cover 1 by hand.



Cover 2

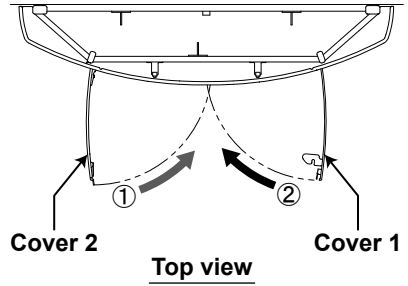
- 1 Open the cover 2 by hand.



Closing the cover

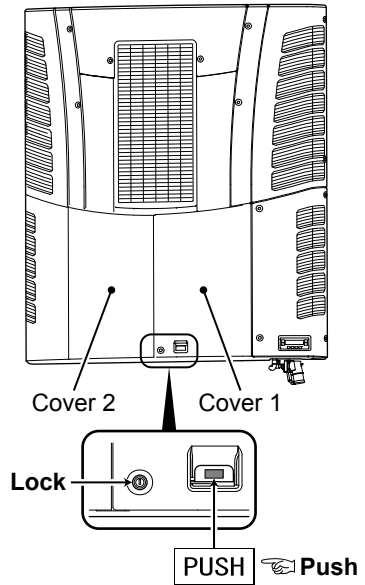
When closing the covers, close the cover 2 first and then cover 1 which has protective device for a safety purpose.

- 1 Close the cover 2.
- 2 Close the cover 1.
- 3 Press the metal latch at **PUSH** mark to secure the covers.
- 4 Lock the cover 1 using key.



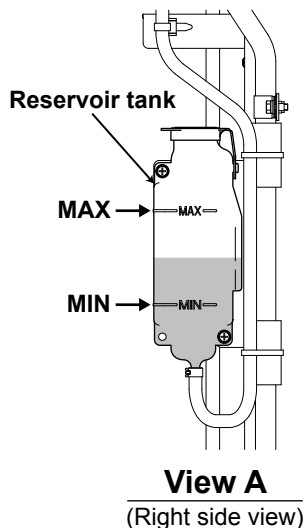
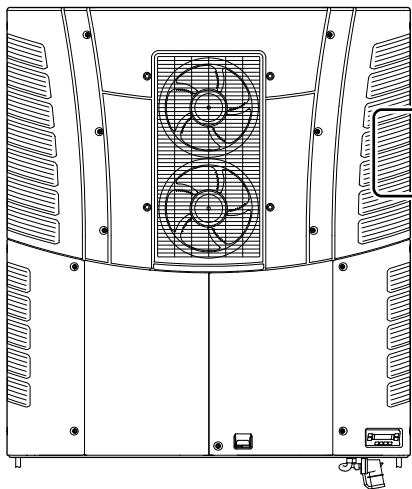
 **NOTE**

- If the covers are not pushed enough to lock, it may open while the vehicle is moving. Lock the covers securely.



Daily inspection

Inspection of the cooling water quantity



CAUTION



Do not perform inspection of the cooling water or refill it immediately after the engine stopped.

- High temperature steam may blow out and it may cause heat injury.

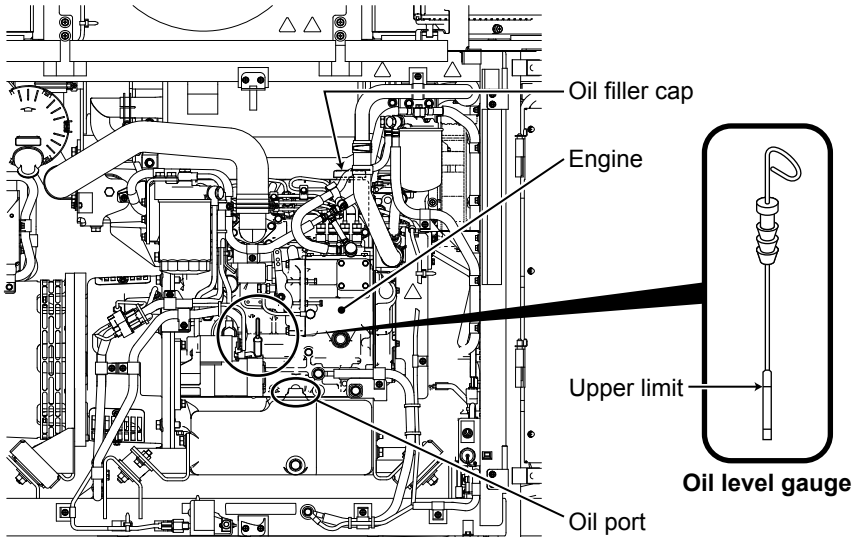


Use the designated antifreeze coolant.

- Otherwise, it may cause troubles.

- 1 Check that the fluid level is between "MAX" and "MIN" in the reservoir tank.
- 2 When the fluid level is lower than "MIN", refill the designated antifreeze coolant to the level of "MAX". (Contact your nearest dealer)
(👉 Refer to page 71 for the designated antifreeze coolant.)

Inspection of engine oil quantity



CAUTION



Do not perform inspection of the engine oil or refill it immediately after the engine stopped.

- Since the engine oil becomes very hot, it may cause heat injury.

Do not refill the engine oil excessively.

- Engine may not be stopped due to abnormal combustion of the oil, or white smoke or oil may come up from the exhaust pipe.




Use the designated engine oil.

- Otherwise, it may cause troubles.

Surely wipe off spilled engine oil during refilling.

- If the oil is heated up, it may cause a fire.

- 1 Check if the fluid level of engine oil is in the vicinity of the upper limit of the oil level gauge.
- 2 When the quantity of engine oil is not enough, supply the designated engine oil from the oil port to the level not to exceed the upper limit.
[👉 Refer to page 71 for the designated engine oil.]

 **NOTE**

- When the error code "E075" is displayed during the refrigeration unit operation, it is the time to change engine oil. Please contact your nearest dealer and request them to change the oil and the oil filter. Reset "Engine oil inspection/Hr" after changing them. (Refer to page 31.)

Inspection of engine fuel quantity

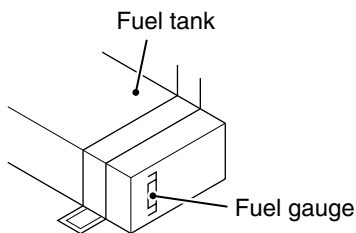
CAUTION




Use the designated engine fuel.

- Otherwise, it may cause damage of the engine.

- 1 Always check the fuel quantity with the fuel level gauge to avoid running short of fuel during transportation.
- 2 If there is not enough fuel left in the tank, refuel it.
[👉 Refer to page 71 for designated fuel.]



 **NOTE**

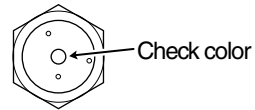
- Stop the operation with the "RUN/STOP switch" when refueling.

Inspection of leakage and wiring condition

- 1 Check if there is no leakage of cooling water, engine oil or engine fuel from the tanks, pipes or connecting parts.
- 2 Check if there is no damage on the wire connected to the battery.
- 3 If any abnormal conditions are detected, contact your nearest dealer.

Inspection with the sight glass

- 1 Run the refrigeration unit for 10 minutes.



- 2 Confirm if the check color appears in green.

 **ADVICE**

- If the check color appears in yellow, contact your nearest dealer.
-

When operating the refrigeration unit with low inside container temperature continuously for a long period

When operating the refrigeration unit continuously for a long period at 10°C or lower, ice adheres to the drain pan and so on. Stop the unit operation once or twice a week, and keep the door open to return the inside temperature to normal so that the ice in the drain pan is melted.

Periodic inspection

Please ask your nearest dealer to perform periodic inspection to ensure to use the refrigeration unit in the best condition all the time.

Periodic inspection consists of the following items.

1. Weekly inspection
2. Inspection at every 1500 hours
3. Inspection at every 3000 hours
4. Inspection at every 4500 hours

Check the contents of inspection with the check sheet submitted after the periodic inspection.

Periodic inspection check sheet

Customer				Customer's signature		
Refrigeration Unit	Model Serial No.	TFV150GA	, #/No.	BL	Delivery date	
	Operation time	H1:[], H2:[], H3:[]			Inspection date	
Vehicle	Registered No.				Inspection company	
	Model Serial No.				Inspector	
CATEGORY	OPERATION DETAILS				Inspection result	Remarks
DAILY CHECK						
CHECK	Check the amount of fuel in fuel tank					
CHECK	Check the unit for unusual noise or vibrations					
WEEKLY CHECK						
CHECK	Check the unit and hose clamps for engine coolant leakage					
CHECK	Check the unit and fuel hose clamps for fuel leakage					
CHECK	Check engine coolant level					
CHECK	Check engine oil level					
CHECK	Perform MIN. PTI					
AFTER FIRST 100HR						
REPLACE	Replace engine oil					
REPLACE	Replace engine oil filter					
EVERY 1500H MAINTENANCE						
CHECK	Check the status of battery					
CHECK	Check the refrigerant circuit for leakage					
CHECK	Check engine mount rubber for signs of damage / crack					
CHECK	Confirm that the Engine RPM within specification limit					
CHECK	Check unit mounting bolts					
CHECK	Perform MAX. PTI					
REPLACE	Change the fuel filter					
REPLACE	Change the engine oil filter					
REPLACE	Change the air-filter element					
REPLACE	Change the engine oil					
REPLACE	Change the fuel pump filter					

Customer				Customer's signature	
Refrigeration Unit	Model Serial No.	TFV150GA	, #/No.	BL	Delivery date
	Operation time	H1:[]	, H2:[]	, H3:[]	Inspection date
Vehicle	Registered No.				Inspection company
	Model Serial No.				Inspector
CATEGORY	OPERATION DETAILS			Inspection result	Remarks
EVERY 3000H MAINTENANCE					
CHECK	Check unit panels, latch etc. for any signs of damage				
CHECK	Check air hoses and fuel hoses for wear and cracks				
CHECK	Check engine water pump belt tension				
CHECK	Check the unit for exhaust gas leakage from exhaust pipe connection points				
CHECK	Check the drain hose discharge function				
CHECK	Check the fuel tank for condensate water				
CHECK	Confirm that generator output voltage is within specification limit				
CHECK	Check electrical box internal components for breakage				
CLEAN	Clean evaporator / condenser / radiator oils				
EVERY 4500H MAINTENANCE					
REPLACE	Change the engine coolant				
EVERY 9000H MAINTENANCE					
CHECK	Check engine coolant hose for wear and cracks				
CHECK	Check engine stop-hold solenoid				
REPLACE	Replace engine water pump belt				
REPLACE	Replace engine mount rubber				
REPLACE	Replace fuel pump				
REPLACE	Replace centrifugal clutch				
REPLACE	Perform engine overhaul				
AT 24000H OPERATION HOUR TIMING					
CHECK	Perform a full unit check (Maintenance of risky parts)				

Details of applicable oils and cooling water

		Kind / Name	Volume
Engine fuel		Diesel fuel (EN590) *1	-
Engine oil		Type API Class CE or higher 10W-30	13.5L (including engine oil filter)
Compressor oil		Diamond Freeze MA32R	1450cc
Cooling water	Antifreeze coolant *2	Fuso Diesel Long Life Coolant	6.35L (including reservoir)
	Water	Soft water with fewer impurities	

*1 At a cold region, use a type of fuel adapted to the cold weather. Otherwise, the fuel could freeze and, damage the engine.

*2 Use the antifreeze coolant with the following concentrations according to the lowest ambient temperature of the region.

Antifreeze coolant concentration (%wt)	30	35	40	45	50	55	60
Mixed antifreeze coolant quantity (L)	1.91	2.22	2.54	2.86	3.18	3.50	3.81
Lowest ambient temperature (°C)	-10	-15	-20	-25	-30	-35	-40

*Initial setting: Antifreeze coolant concentration: 50%wt




NOTE

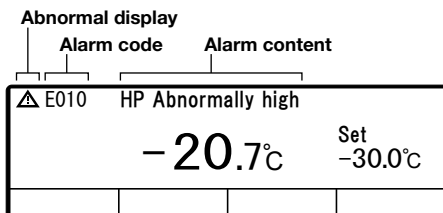
- Adjust antifreeze coolant concentration according to the expected lowest ambient temperature.
If it is not appropriate, the cooling water may be frozen and cause the damage of the radiator or engine.
- As the cooling water is an industrial waste, observe the applicable laws and regulations in your country to dispose it.

8 For emergency

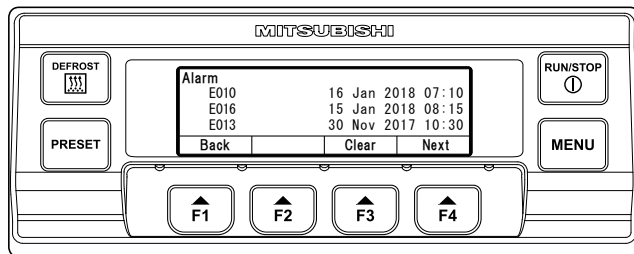
Alarm display

- If any error occurs, the abnormal display  lights or blinks on the LCD (the backlight lights or blinks).
- Check the alarm code displayed at the right-hand side of the abnormal display. (There are a few errors where alarm content is not displayed.)

When no error code is displayed at the LCD, change to the alarm display as described below, and check the alarm content.



Switching "Normal display" and "Alarm display"



Switching from "Normal display screen" to "Alarm display mode"

Press once each on the [MENU] switch, [F3(▼)] switch and [F4(Select)] switch. (The display returns to the "Normal display screen" 20 seconds later.)

Switching from "Alarm display mode" to "Normal display screen"

Press the [F1(Back)] switch 2 times on the extended display of "Alarm display mode". (The screen changes to "Normal display screen" in 20 seconds in case of 1 press.) or hold down [MENU] switch.

Countermeasures

Refer to "Alarm code table" for the contents of each error code and its countermeasure.

(☞ Refer to pages 75 to 78)

CAUTION



Abide by the instructions of this operation manual for the countermeasures of the errors.

- Otherwise, it may cause injury or an electric shock due to unexpected start.

When you contact your nearest dealer

When you contact your nearest dealer for the error occurred during operation of the refrigeration unit, give them the following information.

- Company name
- Customer's name
- Company telephone number
- Number of the plate
- Type of the refrigeration unit
- Present location of the vehicle
- Destination
- Kind of cargo
- Setting temperature
- Present inside container temperature
- Specific condition of trouble
- Alarm code displayed on the LCD.

Resuming operation after an emergency stop

If a remark "Automatic operation reset" is written in the column for the Unit condition in the list of alarm codes, the operation will resume as soon as required conditions are satisfied. If a remark "Unit operation stops" is written in the same column, start the operation in usual procedure after removing causes of the troubles.

Resuming operation after an emergency stop

- Press the [RUN/STOP] switch on the controller to stop the unit.
(Confirm that the LCD display is turned off.)
- Press the [RUN/STOP] switch once more to resume the operation of the unit.



CAUTION



If the unit stops by the same error immediately after the operation is resumed, stop the operation and contact your nearest dealer.

- Otherwise, it may cause serious damages or accidents.
-

List of alarm codes

Alarm Code	Trouble	Countermeasure	Alarm Display	Unit Condition
E006	Load drive circuit fuse is blown.	AC Fuse F2 has blown. Ask a dealer for inspection.	On	Unit stops.
E009	Commercial power supply is faulty.	Commercial power supply is interrupted or the power plug is not connected to the power socket. Check the power supply.	Blinking	Unit stops. (Automatic operation reset)
E010	High-pressure protection device tripped.	High-pressure switch has tripped. 1) Check if there is nothing restricting the movement of propeller fan. 2) Check to see if the condenser coil is fouled heavily. Ask a dealer for inspection.	On	Unit stops.
E013	Discharge gas temperature is abnormally high.	Refrigerant temperature at the compressor discharge side has reached the protective temperature. Consult a dealer.	Blinking	Unit stops. (Automatic operation reset)
E014	Insufficient refrigerant quantity	Refrigerant quantity is extremely low. Ask a dealer for inspection.	On	Unit stops.
E016	Low-pressure is abnormally low.	Refrigerant pressure at the compressor suction side has dropped to the protective pressure. Ask a dealer for inspection.	On	Unit stops.
E017	High-pressure sensor failed.	High-pressure sensor is not operating normally. Ask a dealer for inspection.	On	Unit stops.
E021	Engine cooling water temperature is abnormally high.	Engine water temperature switch has tripped. Inspect the water quantity in the reservoir tank and replenish if necessary. (Antifreeze coolant density 50%wt) Also inspect and clean the radiator (heat exchanger placed at right as seen facing the refrigeration unit). Ask a dealer for inspection.	On	Unit stops.
E023	Engine speed is abnormally low.	Engine speed is extremely low. Ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 10 times.)
E024	Engine starting failed.	Inspect the fuel tank to see if fuel is reserved. If fuel is reserved, inspect the battery.	On	Unit stops.
E027	Engine overrun.	Engine speed has increased far beyond the setting value. Ask a dealer for inspection.	On	Unit stops.
E030	Front cover is not closed.	Front cover is open or not closed completely. Close the cover completely.	Blinking	Unit stops. (Automatic operation reset)
E036	Abnormal overheating of centrifugal clutch.	High temperature switch (HTS) has tripped. Ask a dealer for inspection.	On	Unit stops.
E050	Inside container temperature sensor failed.	Inside container temperature sensor has blown or short-circuited. Ask a dealer for inspection.	Blinking	Unit operation continues.
E060	High-pressure switch failed.	High-pressure switch has failed. Ask a dealer for inspection.	Blinking	Unit stops. (Automatic operation reset)
E063	Discharge gas temperature sensor failed.	Discharge gas temperature sensor has blown or short-circuited. Ask a dealer for inspection.	Blinking	Unit operation continues.
E070	Engine oil pressure switch failed and engine oil pressure failed.	Engine oil pressure switch has failed. Ask a dealer for inspection.	On (Blinking)	Unit stops.(Operation continues partially.)

Alarm Code	Trouble	Countermeasure	Alarm Display	Unit Condition
E087	Defrost termination sensor failed.	Defrost termination sensor (DTS) has failed. Ask a dealer for inspection.	Blinking	Unit operation continues.
E099	Controller communication error	Controller cannot communicate properly. Ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 10 times.)
E202	R phase is interrupted.	R phase of commercial 3-phase power supply is interrupted (current does not flow). Ask for inspection on electric equipment.	Blinking	Unit operation continues.
E204	DCS fuse break	Fuse F41, 42 or 43 has blown. Replace the fuse F41, 42 or 43 (10 A) in the DC electric box. Ask a dealer for inspection.	Blinking	Unit operation continues.
E206	T phase is interrupted.	T phase of commercial 3-phase power supply is interrupted (current does not flow). Ask for inspection on electric equipment.	Blinking	Unit operation continues.
E210	Pump down failure	Pump down error has been detected during self diagnosis operation (PTI operation).	On	Unit stops.
E221	Engine low speed is not adjusted properly.	Engine at the low speed operation runs off largely from the rated speed. Ask a dealer for adjustment.	Blinking	Unit operation continues.
E223	Engine stalls frequently.	Engine stalls frequently. Check to see if sufficient fuel is in the fuel tank. If fuel is sufficient, ask a dealer for inspection.	On	Unit stops.
E250	Evaporator outlet temperature sensor failed.	Evaporator outlet temperature sensor has blown or short-circuited. Ask a dealer for inspection.	On	Unit stops.
E252	Supply air temperature sensor failed.	Supply air temperature sensor has blown or short-circuited. Ask a dealer for inspection.	Blinking	Unit operation continues.
E256	Ambient temperature sensor failed.	Ambient temperature sensor has blown or short-circuited. Ask a dealer for inspection.	Blinking	Unit operation continues.
E265	Fluid bypass solenoid valve failed.	Fluid bypass solenoid valve (SV5) has failed. Ask a dealer for inspection.	Blinking	Unit operation continues.
E266	Electronic expansion valve failed.	Electronic expansion valve (EEV) has failed. Ask a dealer for inspection.	On	Unit stops
E268	Buzzer circuit failed.	External buzzer circuit has short-circuited. Ask a dealer for inspection.	Blinking	Unit operation continues.
E269	Stop solenoid circuit failed.	Stop solenoid circuit has short-circuited. Ask a dealer for inspection.	On	Unit stops.
E272	Pre-heater relay failed.	Pre-heater relay (ARPH) circuit has short-circuited. Ask a dealer for inspection.	On	Unit stops.
E274	Fuel pump failure	Fuel pump has failed. Ask a dealer for inspection.	On	Unit stops.
E280	Battery voltage dropped.	Battery voltage has dropped. Replace the battery if it is aged.	Blinking	Unit operation continues. (Operation stops if abnormal is detected during PTI.)
E282	Economizer solenoid valve failed	Economizer solenoid valve (SV8) has failed. Ask a dealer for inspection.	Blinking	Unit operation continues.

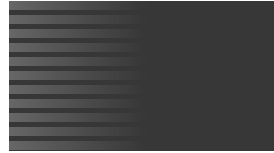
8 For emergency

Alarm Code	Trouble	Countermeasure	Alarm Display	Unit Condition
E301	Inverter overheat	Inverter heat sink temperature is upper 75°C. 1) Stop and restart the unit 2) In case E502 is displayed in parallel, that is the source of error. Ask a dealer for inspection.	On	Unit stops.
E302	Inverter overcurrent	Inverter current has reached the protective value. Stop and restart the unit	On	Unit stops.
E305	Inverter start failure	Inverter start up has failed. Stop and restart the unit. If the same alarm repeats, ask a dealer for inspection.	On	Unit stops.
E306	Abnormal Inverter stepped out	Inverter operation has stepped out. Ask a dealer for inspection.	On	Unit stops.
E501	One phase loss (Generator)	No electrical power supply from generator. Ask a dealer for inspection.	On	Unit stops.
E502	Abnormal ARRF relay circuit	Cooling fan motor relay has failed. Ask a dealer for inspection.	On	Unit stops.
E503	Abnormal MCCF circuit	Outside fan motor contactor has failed. Inspect outside fan motor contactor, connector and harness .	On	Unit stops.
E504	Abnormal MCEF circuit	Inside fan motor contactor has failed. Inspect Inside fan motor contactor, connector and harness.	On	Unit stops.
E602	Abnormal Heat sink temperature sensor	Inverter heat sink temperature sensor has failed. Ask a dealer for inspection.	Blinking	Unit operation continues.
E603	HTS-CF tripped	Outside fan motor temperature switch has tripped. Check blockage of air flow path. If the same alarm repeats, ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 3 times.)
E604	HTS-EF tripped	Outside fan motor temperature switch has tripped. Check blockage of air flow path. If the same alarm repeats, ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 3 times.)
E605	Abnormal AC-DC converter	AC/DC convertor has failed. Ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 3 times.)
E606	Abnormal commercial power supply (ARCPS) relay circuit	Power supply change contactor has failed. When 'Engine drive automatic switching backup function' is ON. Ask a dealer for inspection.	Blinking	Unit operation continues. (Engine drive)
		Power supply change relay has failed. When 'Engine drive automatic switching backup function' is OFF. Ask a dealer for inspection.	On	Unit stops.
E608	Current sensor failure	Current sensor has failed. Inspect harness and current sensor. Ask a dealer for inspection.	Blinking	Unit operation continues.
E609	AC-DC converter one phase loss	AC/DC converter detects 1 phase loss. Ask a dealer for inspection.	On	Unit stops.
E610	AC-DC converter two phase loss	AC/DC converter detects 2 phase loss. Ask a dealer for inspection.	On	Unit stops.

Alarm Code	Trouble	Countermeasure	Alarm Display	Unit Condition
E611	AC-DC converter overheat	AC/DC converter temperature has reached the protective value. Ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 3 times.)
E612	AC-DC converter voltage high	AC/DC converter voltage has reached the protective value. Ask a dealer for inspection.	On	Unit stops.
E613	AC-DC converter short-circuit	AC/DC converter output side harness has short-circuited. Ask a dealer for inspection.	On	Unit stops.
E614	AC-DC converter start failure	AC/DC converter start up has failed. Ask a dealer for inspection.	Blinking (lights after 10 sec)	Unit stops. (Automatic operation reset repeats up to 3 times.)
E702	Abnormal 4way valve	4way valve has failed. Ask a dealer for inspection.	On	Unit stops.
E801	Abnormal Engine water temperature (WTT) sensor	WTT sensor has failed. Inspect WTT sensor. 1) Check harness and connector for damage 2) If no issue found above, ask a dealer for inspection.	Blinking	Unit operation continues.
E991	Abnormal Communication (Main-Comm)	Communication between main board and communication board has failed. Ask a dealer for inspection.	ON	Unit stops.
E992	Communication failure (Comm-INV)	Communication between inverter board and communication board has failed. Ask a dealer for inspection.	On or Blinking	Unit stops. (Automatic operation reset repeats up to 4 times.)

9 Specification

Item		Type	TFV150GA		
Function		-	Cooling / Heating / Defrost		
Position		-	Flash mount		
Compressor		-	Electric drive (Engine generator and Commercial power)		
Operating modes		-	Automatic start/stop mode		
			Continuous operation mode		
Defrost method		-	Reverse cycle defrost		
			Start: Automatic, Manual		
			Stop: Automatic, Manual		
Ambient temperature		°C	-20 to +40		
Set point range		°C	-30 to +30		
Refrigerant charge volume		kg	R410A , 5.7		
Design pressure		MPa	High pressure side: 4.15		
			Low pressure side: 2.21		
AC Power supply	Voltage		AC-V	Generator power supply : 400 (Nominal) Commercial power supply : 400 ±10%	
	Frequency		Hz	Generator power supply : 50 (Nominal) Commercial power supply : 50 ±3%	
	Power		W	MAX 16000	
DC Power supply	Voltage		DC-V	Rated output 14.4±0.3	
	Power		W	Max 600	
Battery	Name		-	VARTA SILVER DYNAMIC	
	Voltage		V	12	
	Capacity@20hour rating		Ah	77	
	Weight		Kg	17.94	
Unit dimensions	Outside		L×H×W	2000 × 2216 × 430	
	Inside		mm	1680 × 1150 × 100	
Unit weight		kg	770		
Cooling capacity	Ambient temperature		°C	30	
	Engine Drive	Room temp. 0°C	W	14600	
		Room temp. -20°C		8080	
	Commercial power supply	Room temp. 0°C	W	14700	
Room temp. -20°C		8090			
Heating capacity	Ambient temperature		°C	-10	-20
	Engine Drive	Room temp. 12°C	W	17100	12000
	Commercial power supply	Room temp. 12°C	W	15900	12100



MITSUBISHI HEAVY INDUSTRIES THERMAL SYSTEMS, LTD.

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