DAIKIN

DAIKIN

Marine type
Container Refrigeration Unit

Service Manual

LXE10E100 or later
(DECOS Ⅲ e,f)

DAIKIN INDUSTRIES,LTD.

TR 08-03C

Please read the contents of this manual prior to operation of the unit.

This booklet will provide you with the minimum necessary information required to operate the Daikin refrigerated unit LXE10E100 or later equipped with the controller DECOSⅢe,f. It covers all of the unit's functions from basics such as the names of components, how to turn on the power supply, or change a setting temperature, to describing functions of product and maintenance service.

In addition, refer to the manuals listed below will be issued soon.

- ●Parts List
- ●Operation Manual of Personal Computer Software

The English text is the original instruction. Other languages are translations of the original instructions.

CONTENTS

SAFETY PRECAUTIONS
• Danger 4
• Warning 5
• Caution 6
1. INTRODUCTION 1-1
1.1 Operation range 1-1
1.2 Specification 1-1
1.3 Names of components 1-2
1.3.1 Outside 1-2
1.3.2 Inside 1-5
1.3.3 Control box 1-7
1.4 Set point of protection devices 1-10
1.5 Operating pressure and running current 1-11
1.6 Operating modes and control 1-15
1.6.1 Frozen operation 1-15
1.6.2 Chilled operation 1-17
1.6.3 Defrosting operation 1-19
1.6.4 Dehumidification control operation(optional) 1-22
1.6.5 Common control 1-23
2. ELECTRONIC CONTROLLER 2-1
2.1 Basic operation of electronic controller 2-1
2.1.1 Control panel 2-1
2.2 Operation procedure 2-4
2.2.1 Operation procedure flow chart 2-4
2.2.2 Mode operation procedure 2-7
1. Current (Operation state) indication mode 2-7
2. Operation setting mode 2-8
3. Battery mode 2-9
4. Mode operation 2-10
5. LED display light-OFF mode 2-11
6. Sensor indication mode 2-12
7. Temperature record scroll mode 2-15
8. Alarm record scroll mode 2-17
9. PTI record scroll mode 2-18
10. Optional function setting mode 2-19
11. Basic function setting mode 2-20
12. Optional condition setting mode 2-22
13. Input data mode 2-24
14. Controller software download mode 2-25
2.3 Alarm display and back-up function 2-26
2.3.1 Alarm list 2-26
2.3.2 Back-up operation at the time of control sensor (SS, RS) abnormality 2-27
2.3.3 Backup operation at the time of sensor abnormality 2-27
2.4 Back up Battery 2-29
2.4.1 Function 2-29
2.4.2 Checking the remaining battery voltage 2-29
2.4.3 Battery replacement (Rechargeable battery) 2-30
2.5 Information interchange with personal computer 2-31
2.5.1 Data logging 2-31
2.6 INSTALLATION OF SOFTWARE 2-32
2.6.1 INSTALLATION OF SOFTWARE OF LATEST VERSION (VERSION UPGRADE) 2-32
2.7 Pre-Trip Inspection 2-33
2.7.1 Manual inspection 2-34
2.7.2 Automatic PTI 2-36
2.7.2.1 Automatic PTI selection mode 2-36
2.7.2.2 Short PTI (S.PTI) 2-37
2.7.2.3 Alarm list during PTI (Pre-Trip Inspection) 2-38
2.7.2.4 Manual check (M.CHECK) 2-39
2.8 Chartless function 2-41
2.8.1 Chart indication function 2-41
2.8.2 P code (Pull down time indication) 2-43
2.8.3 Chartless code display function 2-44
2.8.3.1 List of chartless code 2-44
2.8.3.2 H-code 2-45
2.8.3.3 d-code 2-47
2.9 Communication modem 2-48
3. SERVICE AND MAINTENANCE 3-1
3.1 Maintenance service 3-1
3.1.1 Collection of refrigerant 3-1
3.1.2 Gauge manifold 3-1
3.1.3 Automatic pump down 3-3
3.1.4 Refrigerant recovery and charge 3-5
3.2 Main components and maintenance 3-8
3.2.1 Scroll compressor 3-8
3.2.2 Procedure of evaporator fan motor removing 3-12
3.2.3 Electronic expansion valve 3-14
3.2.4 Suction modulation valve 3-15
3.2.5 Drier 3-16
3.2.6 Solenoid valve 3-17
3.2.7 Discharge pressure regulating valve 3-18
3.2.8 Check valve 3-18
3.2.9 High-pressure switch (HPS) 3-19
3.2.10 High pressure transducer (HPT) 3-19
3.2.11 Low pressure transducer (LPT) 3-19
3.2.12 Fusible plug 3-20
3.2.13 Liquid/moisture indicator 3-21
3.2.14 Evacuation and dehydrating 3-22
3.3 Periodic Inspection Items 3-24
4. OPTIONAL DEVICES 4-1
4.1 Cold treatment transport 4-1
4.1.1 Setting the number of USDA sensor connetions 4-1
4.1.2 USDA sensor calibration 4-1
4.1.3 USDA report 4-1
4.1.4 Battery check and replacement 4-1
4.1.5 USDA sensor types and setting 4-2
4.2 Ventilator outlet opening detection (FA sensor) 4-3
4.3 Daikin Temperature Management System (optional) 4-6
4.4 Automatic Setpoint Change: ASC (optional) 4-8
4.5 Automatic Cold Treatment: ACT (Optional) 4-10

CONTENTS

5. TROUBLESHOOTING.....5-1
5.1 Refrigeration system and electrical system...5-1
5.2 Alarm codes on electronic controller.....5-13
5.3 Troubleshooting for automatic PTI (J-code)...5-16
5.4 Emergency operation.....5-18
5.4.1 Emergency operation of controller 5-18
5.4.2 Short circuit operation of controller.....5-19
5.4.3 Emergency operation of electronic expansion valve.....5-20
5.4.4 Emergency operation of suction modulation valve 5-21

6. APPENDIX.....6-1
6.1 Standard tightening torques for bolts 6-1
6.2 Standard tightening torque for flare nut.....6-1
6.3 Resistance of motor coil and solenoid valve coil...6-1
6.4 Temperature conversion table and temperature sensor (SS/RS/DSS/DRS/ECIS/ECOS/EIS/ EOS/ SGS/AMBS) characteristics table.....6-2
6.5 Temperature conversion table and temperature sensor (DCHS) characteristics table.....6-3
6.6 High and low pressure sensor characteristics table..6-4
6.7 HFC134a, temperature-vapor pressure characteristics table 6-5
6.8 Electric wiring pilot lamps and monitoring circuit (option).....6-6
6.9 Fuse protection table.....6-7
6.10 Schematic wiring diagram (LXE10E136F).....6-8
6.11 Stereoscopic wiring diagram (LXE10E136F) 6-9
6.12 Schematic wiring diagram (LXE10E136E) ...6-10
6.13 Stereoscopic wiring diagram (LXE10E136E) ...6-11

SAFETY PRECAUTIONS

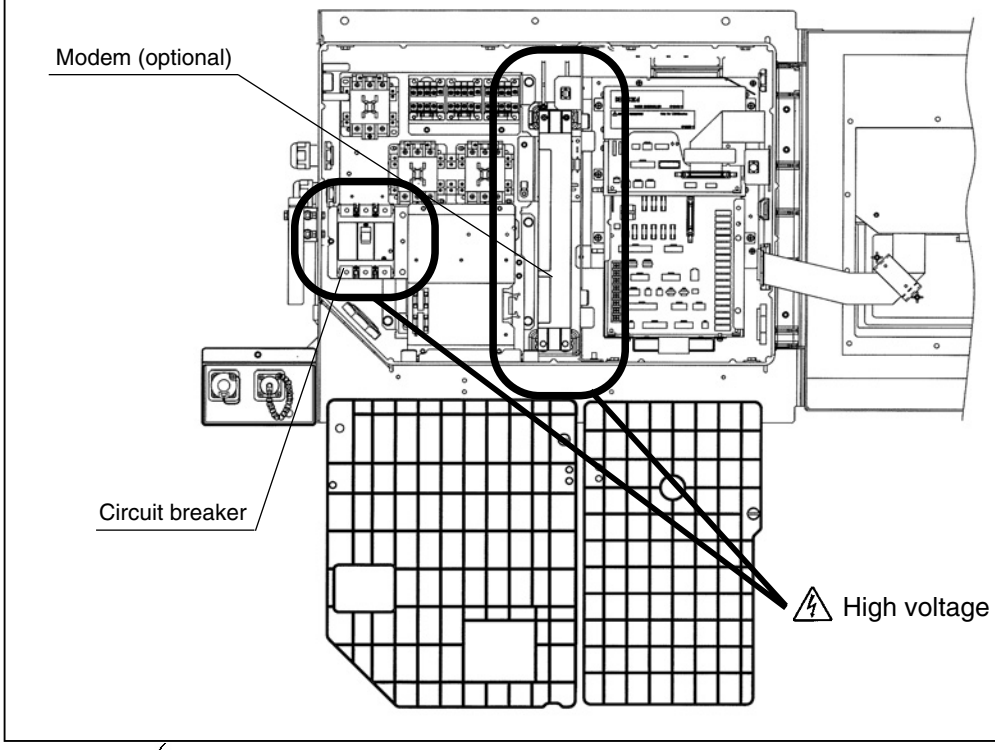
Always observe the following points before operating or inspecting a unit.

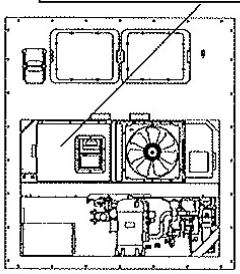
⚠ DANGER

Always shut off the main power supply of the facility before disconnecting the power plug.

Always turn off the main power supply of the facility before inspecting the interior of the control box.

※This is important because high voltage remains at the circuit breaker even though the circuit breaker in the control box is turned off.





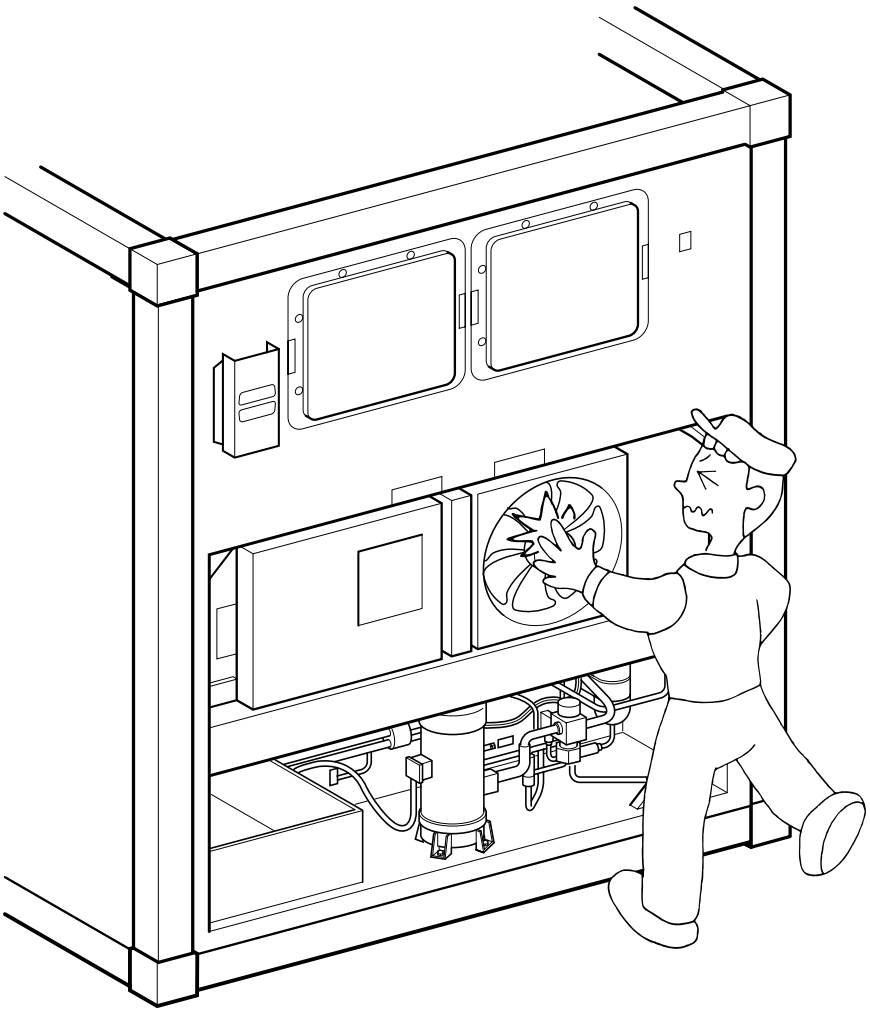
⚠ WARNING

Do not touch the condenser fan while power to the unit is ON.

Before removing the condenser fan cover, turn off the circuit breaker and disconnect the power plug.

During air-cooled operation : Condenser fan may start and stop automatically for the refrigerant high pressure control.

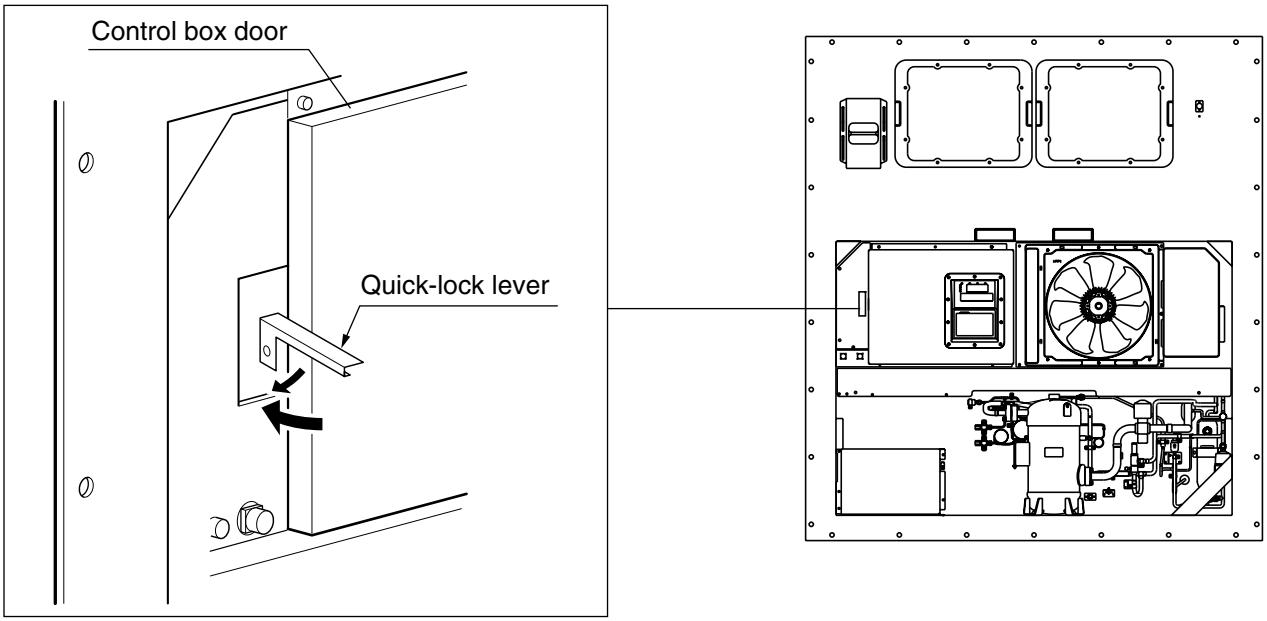
During water-cooled operation: Condenser fan may start and stop automatically for cooling of the control box.



⚠ CAUTION

Before starting the unit, run the generator.

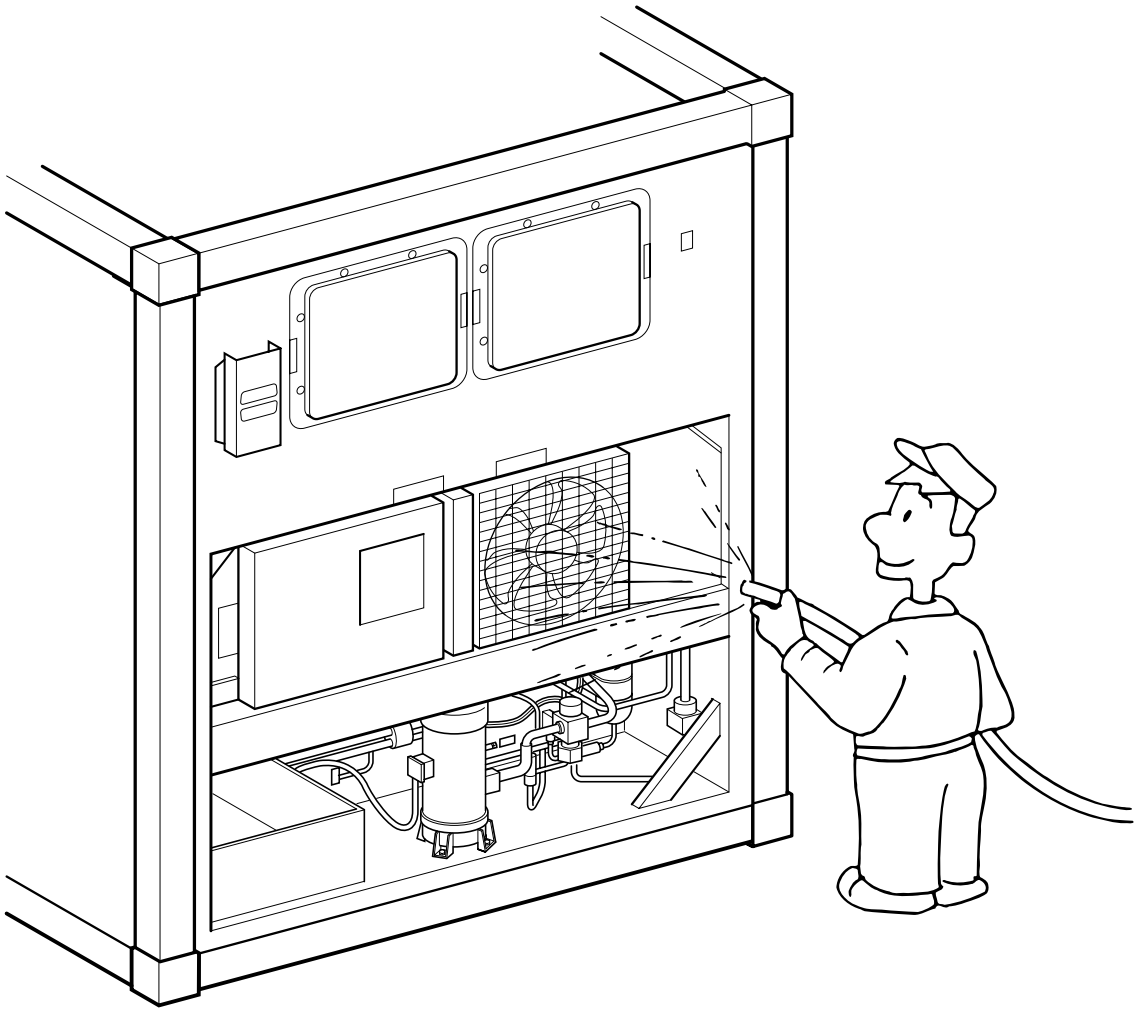
Securely close the control box cover.
Otherwise, it will allow water entry.



⚠ CAUTION

Wash the refrigeration unit with fresh water at PTI.

1. Carefully flush the external condenser with fresh water to remove the salt that sticks to it.

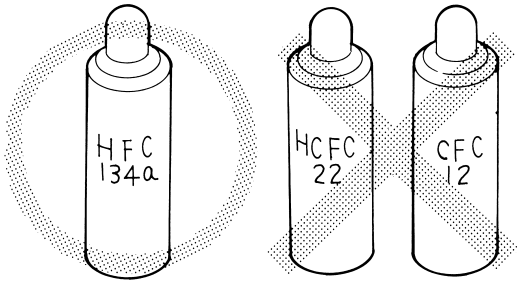


2. Corrosive gases generated from the cargo may corrode the copper pipes and aluminium fin of the internal evaporator. Therefore, wrap up the cargo properly to prevent such corrosion.
   Major corrosive gases include chlorine, ammonia, sulfuric acid, acetic acid, sulfur dioxide etc.

⚠ CAUTION

Refrigerant and refrigerant oil

Be sure to only charge the unit with refrigerant HFC 134a.
Never attempt to use any other refrigerant (CFC12, HCF22, etc) with the refrigeration unit.
If any other refrigerant not specified is charged, it may cause problems with the unit.

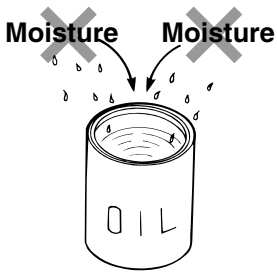


Use only Daikin specified refrigerant oil (IDEMITSU, Daphne Hermetic Oil FVC46D).
If any other refrigerating machine oil not specified is charged, it may cause problems with the unit.

DAPHNE
HERMETIC OIL
FVC46D

SUNISO
3GS-DI

Open the oil can, just before charging the oil, and use all the oil in the can once opened.
Do not leave the can open for 5 hours or longer to avoid moisture entry.
Using any refrigerant oil which has absorbed moisture may cause problems with the unit.



Use only exclusive tools for HFC134a. (gauge manifold, etc)
Do not use any tools for CFC12 or HCFC22.
Service ports with exclusive quick joints for HFC134a are provided in the refrigeration unit to avoid improper refrigerant or refrigerant oil from entering into the refrigeration circuit. (Refer to clause 3.1.2)
The charging hose and gauge port are not interchangeable with those of previous models using other refrigerants.

CLASS 1 PRODUCT SPECIFIED BY THE LAW CONCERNING THE RECOVERY AND DESTRUCTION OF FLUOROCARBONS OF FLUOROCARBONS

HFC IS USED FOR THIS PRODUCT AS A REFRIGERANT.

(1) EMISSION OF FLUOROCARBONS INTO THE ATOMOSPHERE WITHOUT PERMISSION IS PROHIBITED.
(2) RECOVERY OF FLUOROCARBONS IS MANDATORY WHEN SCRAPPING AND SERVICING THIS PRODUCT.
(3) THE KIND OF FLUOROCARBON AND ITS AMOUNT ARE STATED IN THE MANUFACTURER'S LABEL OR THE ADDITIONALLY CHARGED AMOUNT LABEL.

Important information regarding the refrigerant

This product contains greenhouse gases covered by Kyoto Protocol.
Do not discharge refrigirant into atmosphere.

Refrigerant type : R134a
GWP (1) value : 1430

(1) GWP=global warming potential

The refrigerant quantity is indicated on the unit name plate.

1. INTRODUCTION

1.1 Operation range

Use the units within the following range.

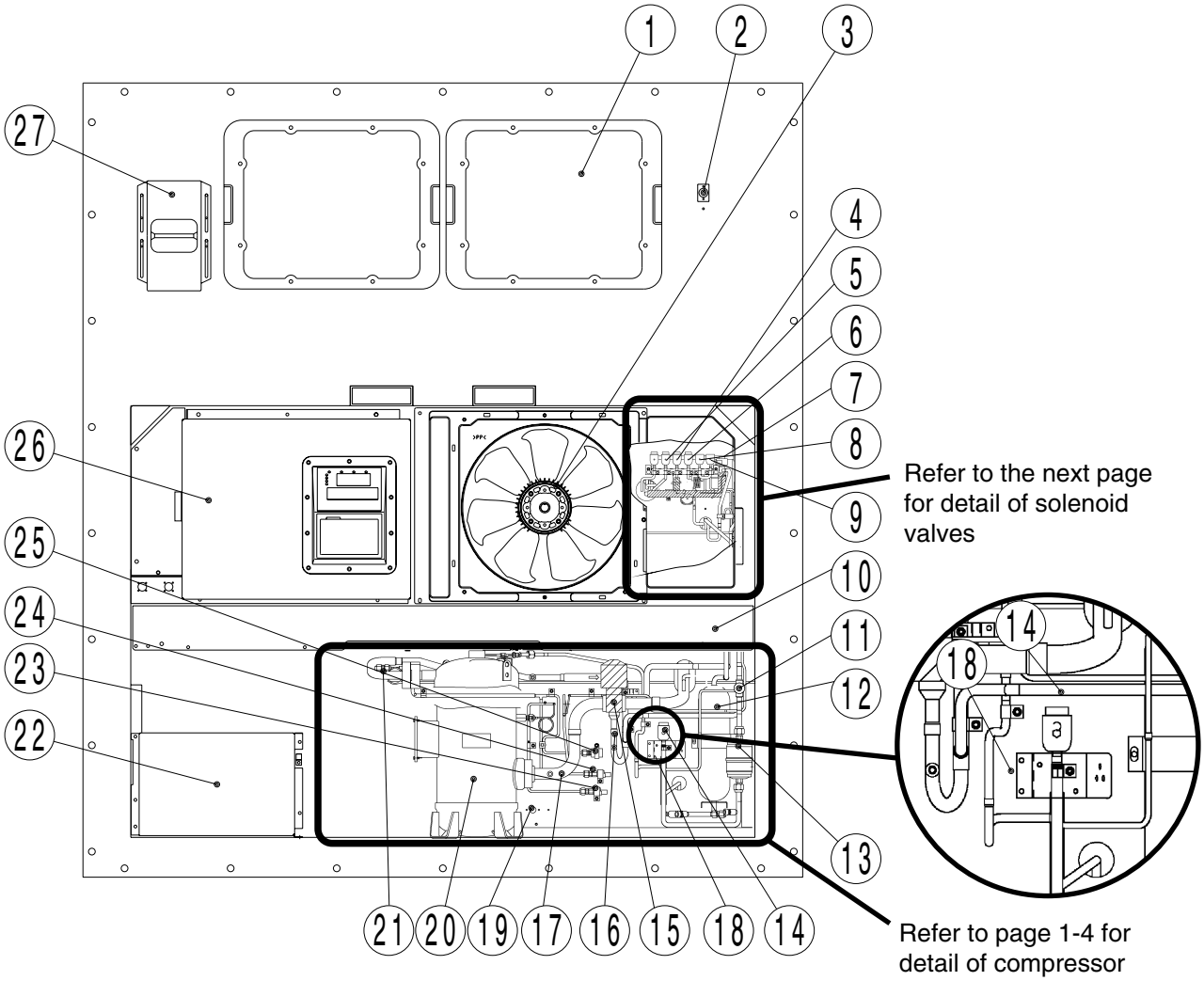
Item	Operation range
External temperature range	-30˚C to +50˚C (-22˚F to + 122˚F)
Internal temperature range	-30˚C to +30˚C (-22˚F to + 86˚F)
Voltage	50Hz: 380V/400V/415V, 60Hz: 440V/460V Voltage fluctuation rate should be within ±10%
Vibration and shock	Horizontal: 5G, Vertical: 2G

1.2 Specification

Item \ Model		LXE10E100F	LXE10E100 or later
Condenser cooling system		Air cooled type	
Controller		DECOSⅢf	DECOSⅢe
Power supply		AC 3-phase 380V/400V/415V 50Hz, 440V/460V 60Hz	
Compressor		Full hermetic scroll type (Output: 5.5kW)	
Evaporator		Cross fin coil type	
Air-cooled condenser		Cross fin coil type	
Evaporator fan		Propeller fan	
Evaporator fan motor		Three-phase squirrel-cage induction motor	
Condenser fan		Propeller fan	
Condenser fan motor		Three-phase squirrel-cage induction motor	
Defrosting	System	Hot-gas defrosting system	
	Initiation	Dual timer, on-demand defrost and manual switch	
	Termination	Detecting the temperature of evaporator outlet pipe and return air	
Refrigerant flow control		Electronic expansion valve	
Capacity control		Capacity control with hot gas bypass and suction modulating valve	
Protective devices /Safety devices		Circuit breaker, PT/CT board (for over current protection). Compressor thermal protector Condenser fan-motor thermal protector Evaporator fan-motor thermal protector High-pressure switch, Fusible plug, Fuse (Glass tube fuse)	
Refrigerant charged amount (R134a)		4.7 (kg)	4.7 or 5.2 (kg) For details, refer to the Name plate, unit performance
Refrigerant oil charged amount		IDEMITSU, Daphne hermetic oil FVC 46D : 3.4(ℓ)	
Weight		For details, refer to the Name plate, unit performance	

1.3 Names of components

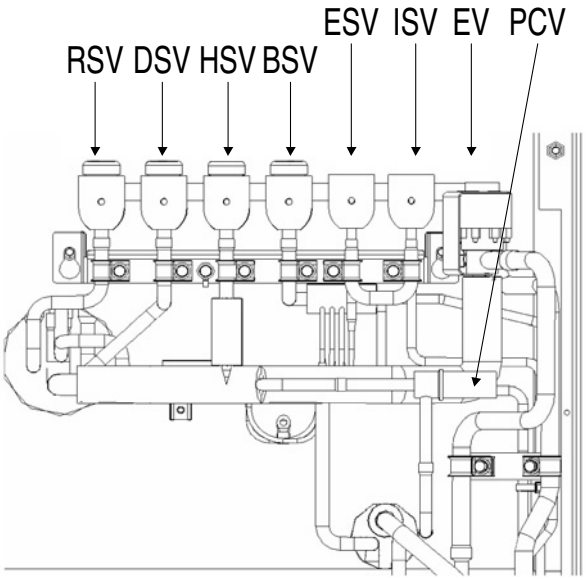
1.3.1 Outside



① Access panel
② Thermometer check port (Return air, optional)
※Thermometer check port is not fitted to some models.
③ Condenser fan motor (CFM)
④ Hot-gas solenoid valve (HSV)
⑤ Defrost solenoid valve (DSV)
⑥ Discharge gas by-pass solenoid valve (BSV)
⑦ Electronic expansion valve (EV)
⑧ Economizer solenoid valve (ESV)
⑨ Injection solenoid valve (ISV)
⑩ Air-cooled condenser
⑪ Liquid/moisture indicator
⑫ Liquid receiver
⑬ Dryer
⑭ Liquid solenoid valve (LSV)
⑮ Suction modulating valve (SMV)
⑯ Discharge pressure regulating valve (DPR)
⑰ Compressor suction pipe temperature sensor (SGS)
⑱ Ambient temperature sensor (AMBS)
⑲ Thermometer check port (Supply air)
⑳ Compressor (CM)
㉑ Discharge pipe temperature sensor (DCHS)
㉒ Storage space for power cable
㉓ Low pressure transducer (LPT)
㉔ High pressure transducer (HPT)
㉕ High pressure switch (HPS)
㉖ Control box
㉗ Ventilator

●LXE10E

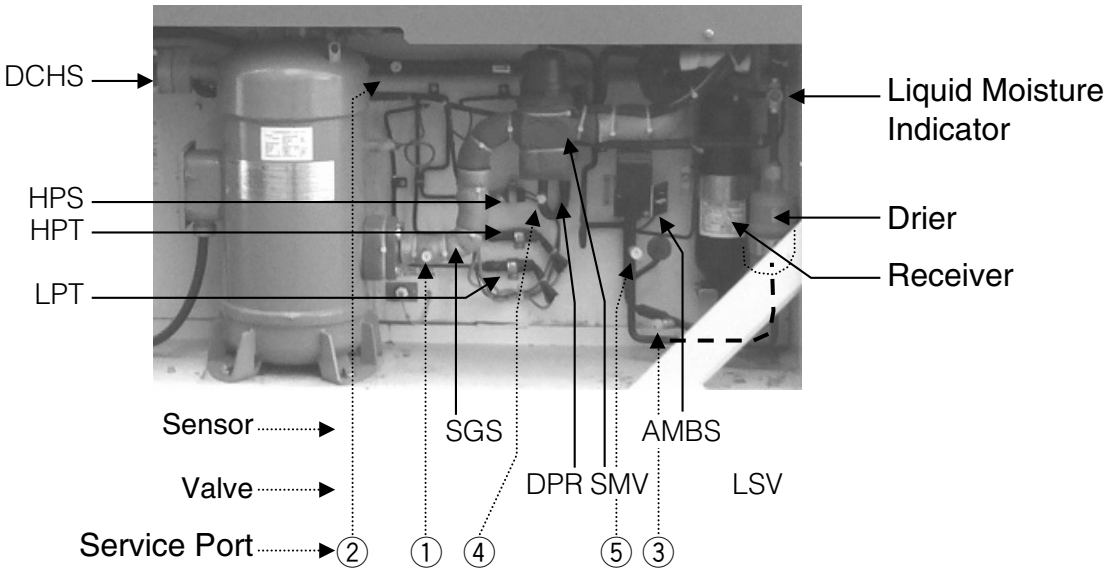
· Detail of solenoid valves



[Valve]
BSV :Discharge gas bypass Solenoid Valve
DSV :Defrost Solenoid Valve
DPR :Discharge Pressure Regulator Valve
EV :Electronic Expantion Valve
ESV :Economizer Solenoid Valve
HSV :Hot gas Solenoid Valve
ISV :Injection Solenoid Valve
LSV :Liquid solenoid valve (Refer picture felow)
PCV :Pressure Control Valve
RSV :Reheater Solenoid Valve (Optional)
for dehumidification control

Note: PCV is applicable from units with refrigerant charge 4.7kg.

· Detail of compressor and refrigerant control devices



[Sensor]
AMBS: Ambient temperature sensor
DCHS: Discharge Gas Temperature Sensor
DPR : Discharge Pressure Regulator Valve
HPS : High Pressure Switch
HPT : High Pressure transducer
LPT : Low pressure transducer
SGS : Compressor suction pipe temperature sensor
[Valve]
SMV : Suction modulating valve

[Service port]
① Low pressure
② High pressure
} For operation pressure check
③ Liquid pressure
④ High pressure
⑤ Liquid pressure
} Refrigerant recovery or vacuum dry
For Refrigerant charging
(For details, refer to page 3-5.)

Solenoid valve and activation

BSV : Discharge gas by-pass solenoid valve
BSV bypasses discharge gas to the suction side of the compressor to maintain low pressure at low outside temperatures.

DSV : Defrost solenoid valve
DSV supplies discharge gas (hot gas) from the compressor to the evaporator to defrost.

E V : Electronic expansion valve
EV controls the evaporator outlet superheat by using the temperature sensor at the evaporator outlet and inlet to control the refrigerant flow rate to the evaporator.
In case of EV coil abnormality or the controller malfunctions, the emergency magnet can be used to manually set the opening.

ESV : Economizer solenoid valve
By turning ON ESV, the economizer circuit is activated to make liquid refrigerant supercooled larger, which can increase cooling performance significantly. This function is activated during frozen operation. It is also activated when discharge pipe temperature abnormality is detected during a chilled operation at RS＜5°C.

HSV : Hot gas solenoid valve
HSV supplies hot gas to maintain the temperature inside during chilled operation at low outside temperature.

I S V : Injection solenoid valve
ISV is activated when the following cases occur:
1)When compressor discharge gas temperature is too high (for the protection of the compressor and lubricant)
2)When refrigerant flow rate is too low during defrosting operation. The defrosting time can be shortened with appropriate amount of refrigerant.

LSV : Liquid solenoid valve
LSV closes for pump down operation and during the automatic pumping-down and defrosting operations.

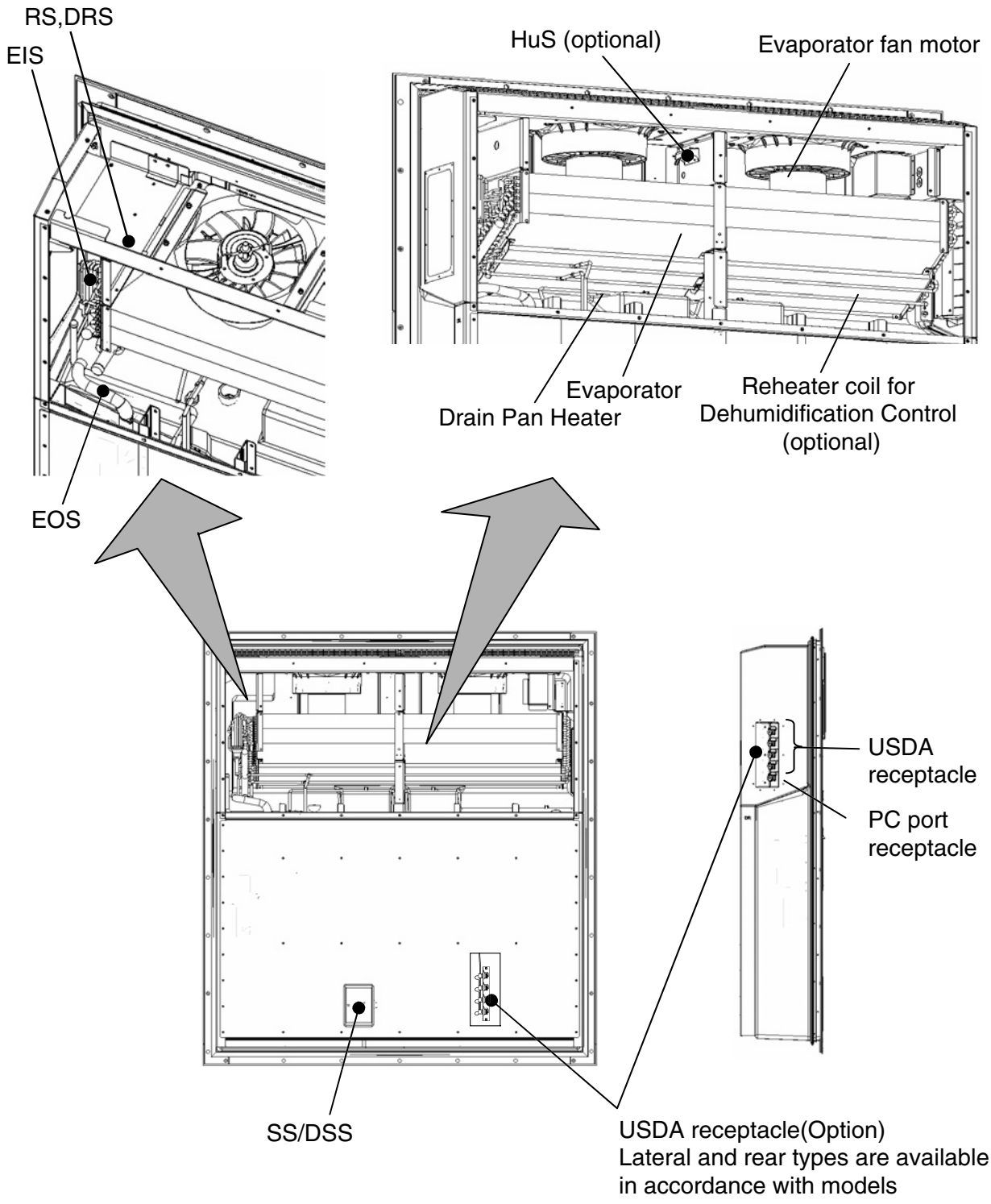
PCV : PCV relieve the refrigerant to low pressure side when the pressure becomes abnormally high.

RSV : Reheater solenoid valve (to control dehumidification)
RSV is activated during dehumidification operation to supply discharge gas (hot gas) from the compressor to the reheater coil.

SMV : Suction modulating valve
SMV automatically adjusts its opening to control the refrigerant flow rate by using the supply air temperature sensor SS during chilled operation.
The valve is fully open during pull-down or frozen operation. In case of SMV coil abnormality or the controller malfunctions, the emergency magnet can be used to fix the opening in full

1.3.2 Inside

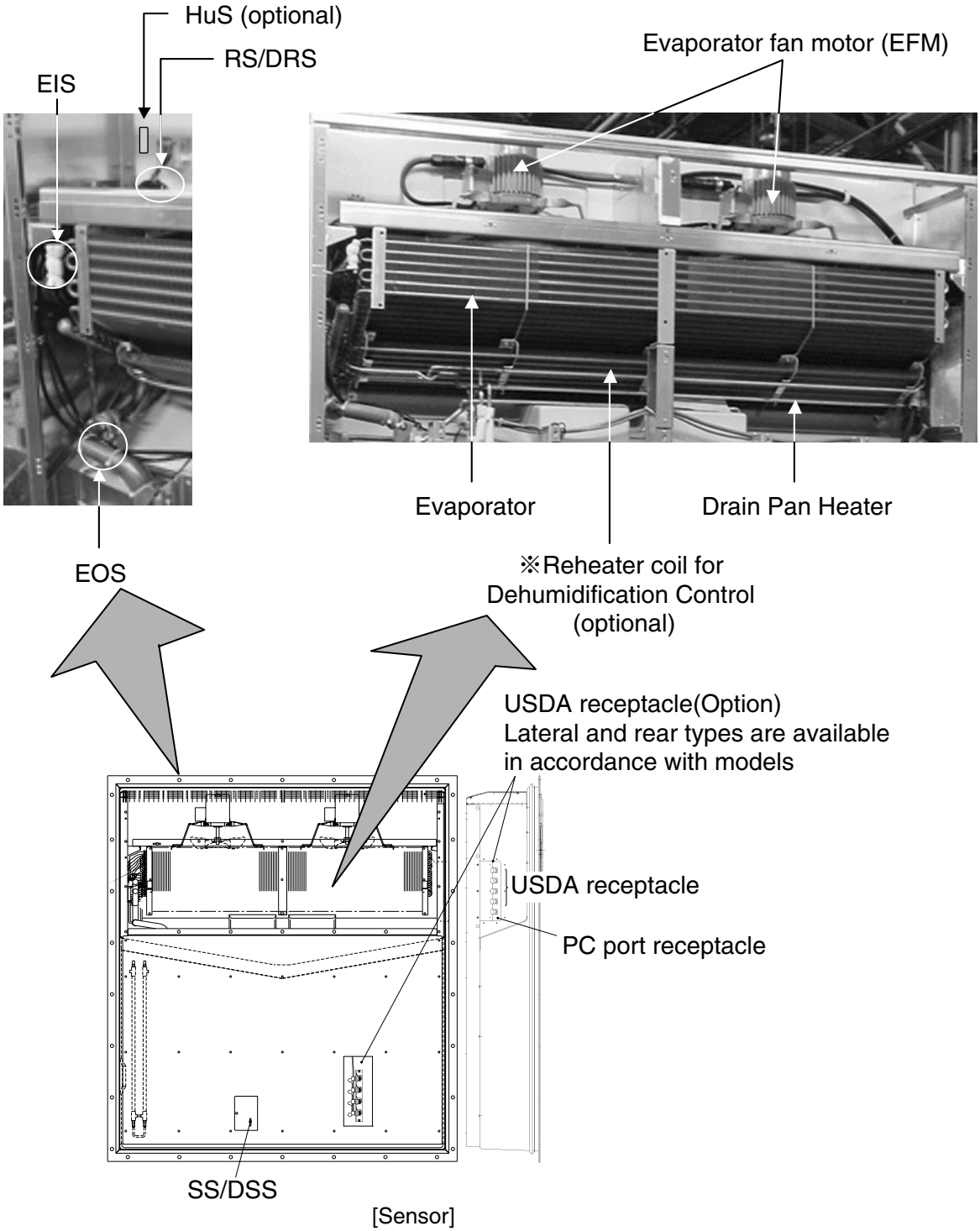
●LXE10E100F



[Sensor]

DRS:Return Air Temperature Sensor for Datacorder
DSS:Supply Air Temperature Sensor for Datacorder
EIS :Evaporator Inlet Temperature Sensor
EOS:Evaporator Outlet Temperature Sensor
HuS :Humidity Sensor (Optional)
RS :Return Air Temperature Sensor
SS :Supply Air Temperature Sensor

●LXE10E100 or later

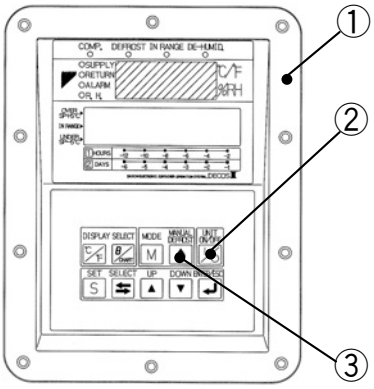


[Sensor]

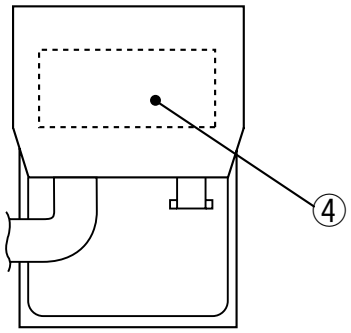
DRS:Return Air Temperature Sensor for Datacorder
DSS:Supply Air Temperature Sensor for Datacorder
EIS :Evaporator Inlet Temperature Sensor
EOS:Evaporator Outlet Temperature Sensor
HuS :Humidity Sensor (Optional)
RS :Return Air Temperature Sensor
SS :Supply Air Temperature Sensor

1.3.3 Control box

●Operation panel
(Outside of the control box)

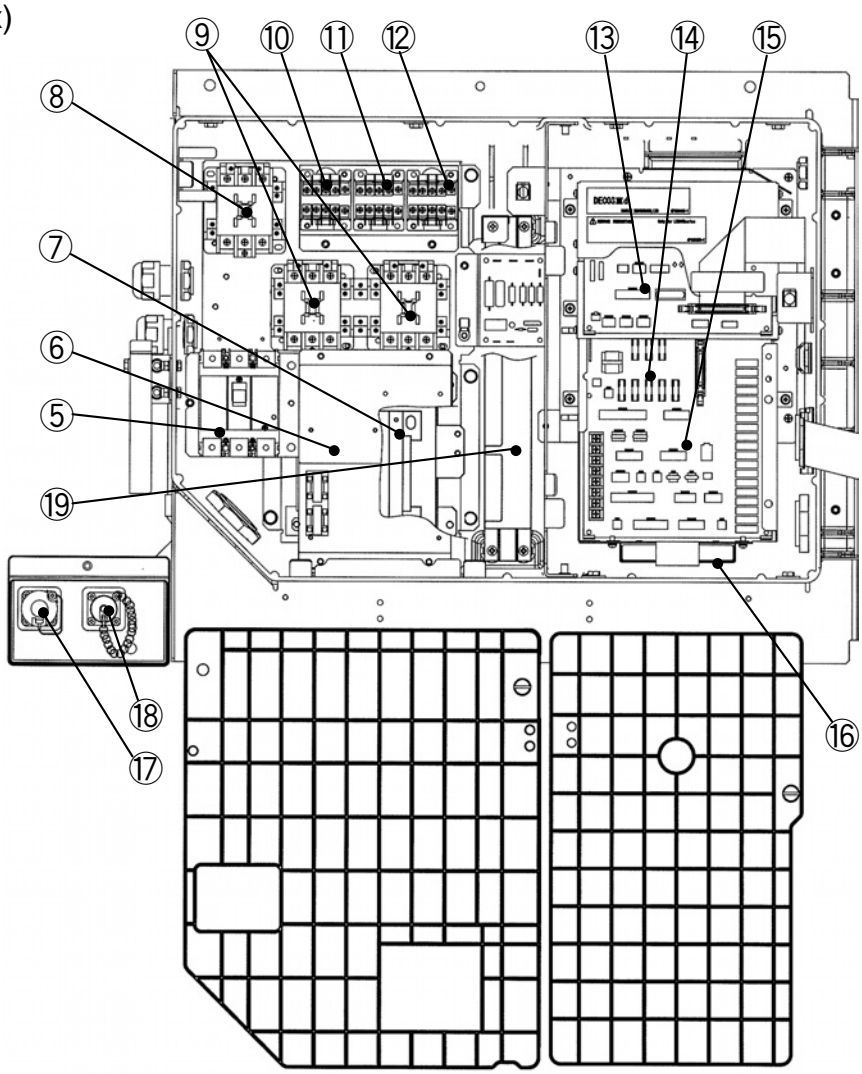


Front



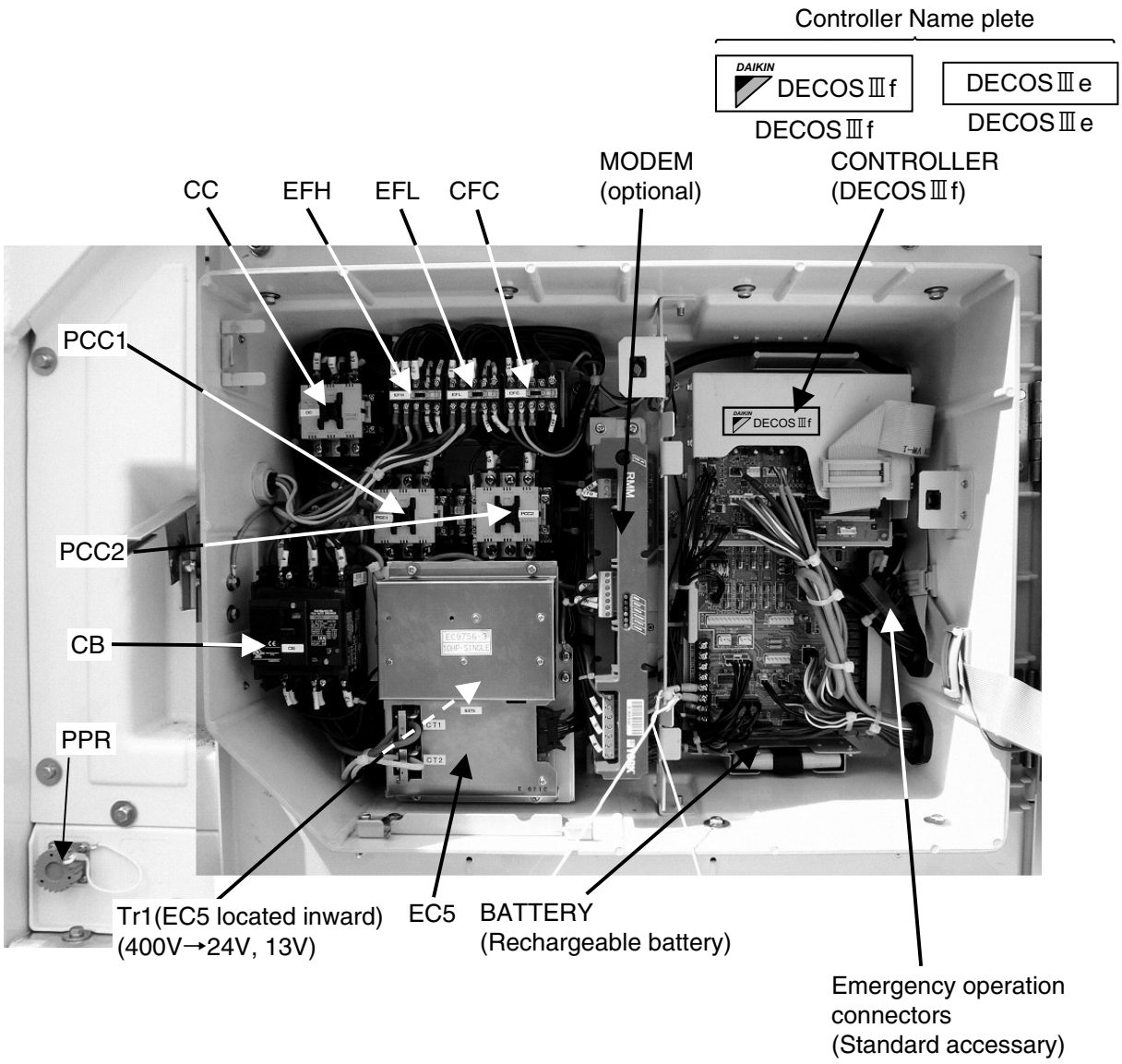
Rear

●Inside of the control box



① Controller operation panel
② UNIT ON/OFF key
③ MANUAL DEFROST key
④ Display board
⑤ Circuit breaker (CB)
⑥ PT/CT board (EC5)
⑦ Transformer for control circuit (Tr1)
⑧ Magnetic contactor for compressor (CC)
⑨ Phase correction contactor (PCC1, PCC2)
⑩ Magnetic contactor for high speed evaporator fan (EFH)
⑪ Magnetic contactor for low speed evaporator fan (EFL)
⑫ Magnetic contactor condenser fan (CFC)
⑬ Controller CPU board (EC1)
⑭ Fuse (Fu1-4, 6-9)
⑮ Controller I/O board (EC2)
⑯ Battery (BATTERY)
⑰ PC Port Receptacle (PPR)
⑱ Remote monitoring receptacle (RM, optional)
⑲ Modem (RCD, optional)

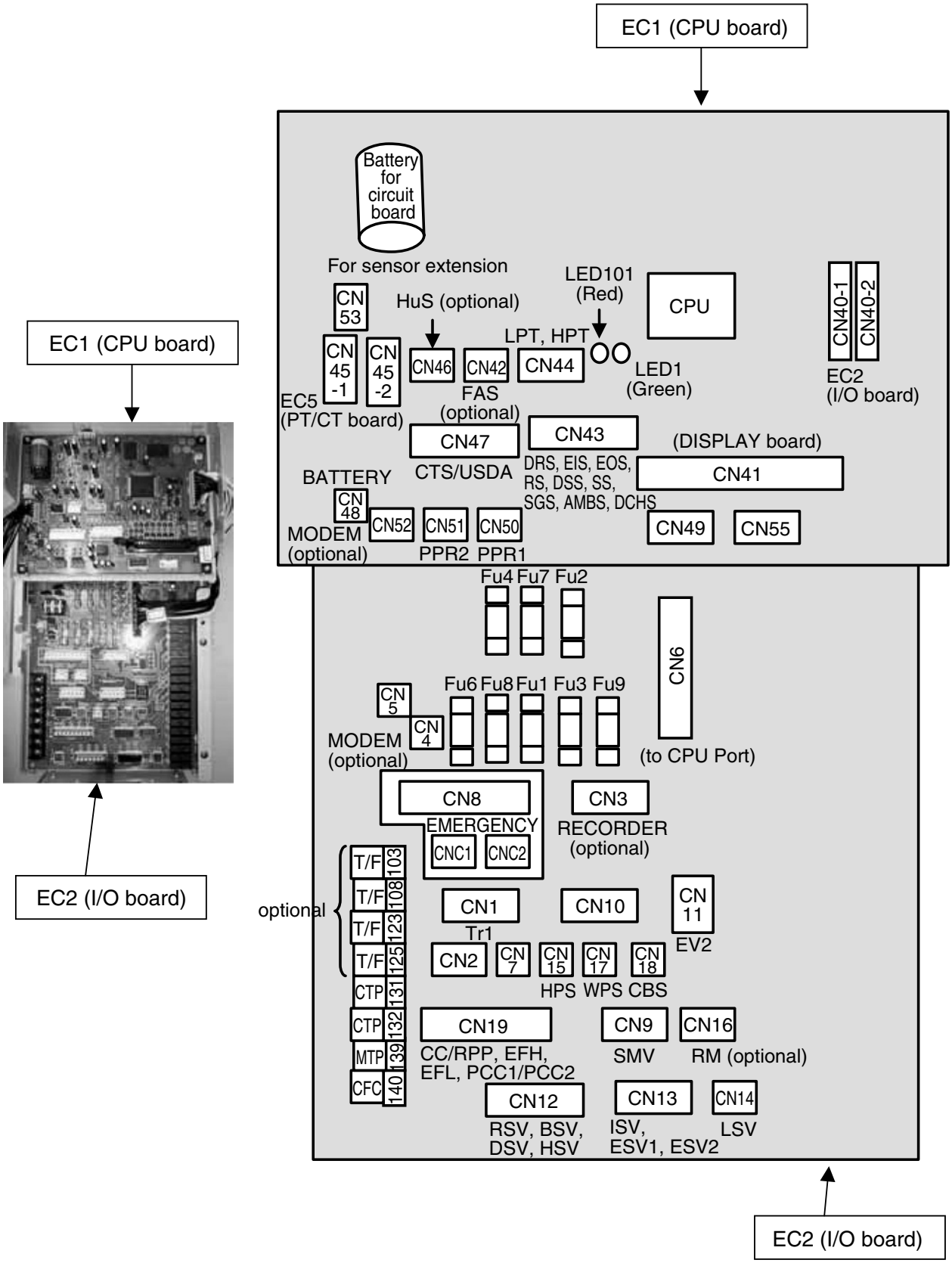
· Control box Inside detail



[Control Box]

BATTERY	:Back-up Battery
CB	:Circuit Breaker
CC	:Magnetic Contactor, Compressor
EC5	:PT/CT Board
EFH	:Magnetic Contactor, Evaporator Fan Motor, High Speed
EFL	:Magnetic Contactor, Evaporator Fan Motor, Low Speed
PCC1	:Phace Correction Contactor 1
PCC2	:Phace Correction Contactor 2
Tr1	:Transformer

· Control box Inside detail



1.4 Set point of protection devices

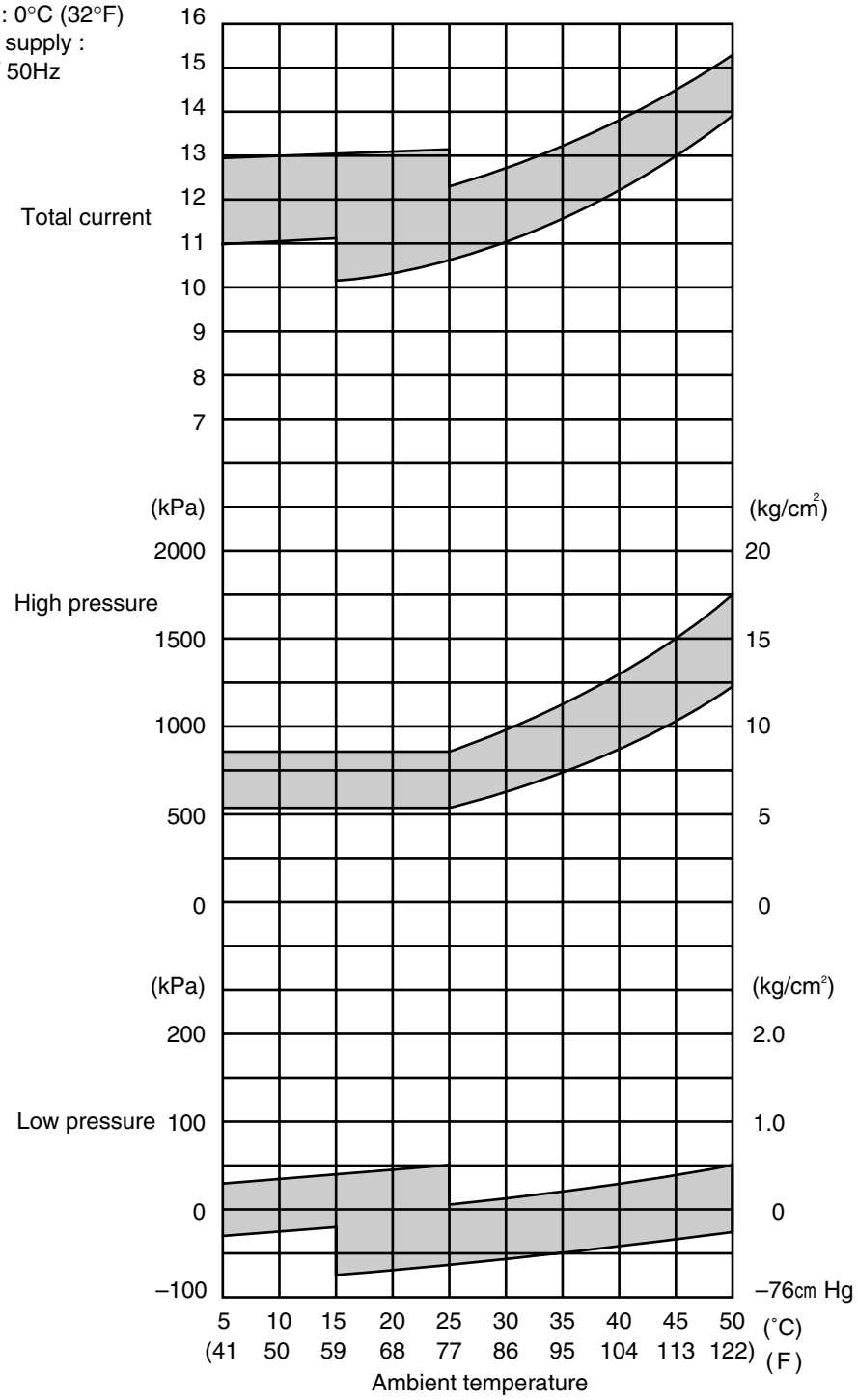
	Device name		Actuation	Set point	Detection method	Symbol
Pressure switch	High-pressure switch		OFF ON	2400kPa (24.47kg/cm²) 1900kPa (19.37kg/cm²)	High-pressure switch	HPS
Electronic controller	High-pressure control for Condenser fan		OFF ON	800kPa (8.2kg/cm²) 1000kPa (10.2kg/cm²) ※1	High-pressure transducer	HPT
	Discharge gas temperature protection set point	Pull down LPT>50kpa	OFF	135˚C (275°F) Reset in 3 minutes	Discharge gas temperature sensor	DCHS
		LPT≦50kpa	OFF	123˚C (262°F) Reset in 3 minutes		
	Overcurrent protection set point		OFF	26.0A Reset in 3 minutes	PT/CT board	CT2
Current	Circuit breaker		OFF	30A		CB
	Fuse		–	10A ※2		Fu
Motor	Evaporator fan motor thermal protector LXE10E100F		OFF ON	145˚C ± 5˚C (293°F ± 9°F) 94˚C ± 15˚C (201°F ± 27°F)		
	Evaporator fan motor thermal protector LXE10E100E or earlier		OFF ON	150˚C ± 5˚C (302°F ± 9°F) 95˚C ± 15˚C (203°F ± 27°F)		
	Condenser fan motor thermal protector		OFF ON	135˚C ± 5˚C (275°F ± 9°F) 86˚C ± 15˚C (186.8°F ± 27°F)		MTP
	Compressor motor thermal protector		OFF ON	140˚C ± 5˚C (284°F ± 9°F) 118˚C ± 11˚C (244.4°F ± 19.8°F)		CTP
–	Fusible plug		–	95～100˚C		

※1 When dehumidification is ON in dehumidification mode, the setting figure may change between 900~2100kPa automatically (Refer to "High Pressure Control" Page 1-24)

※2 Refer to "Fuse Protection table" in section 6.9.

1.5 Operating pressure and running current

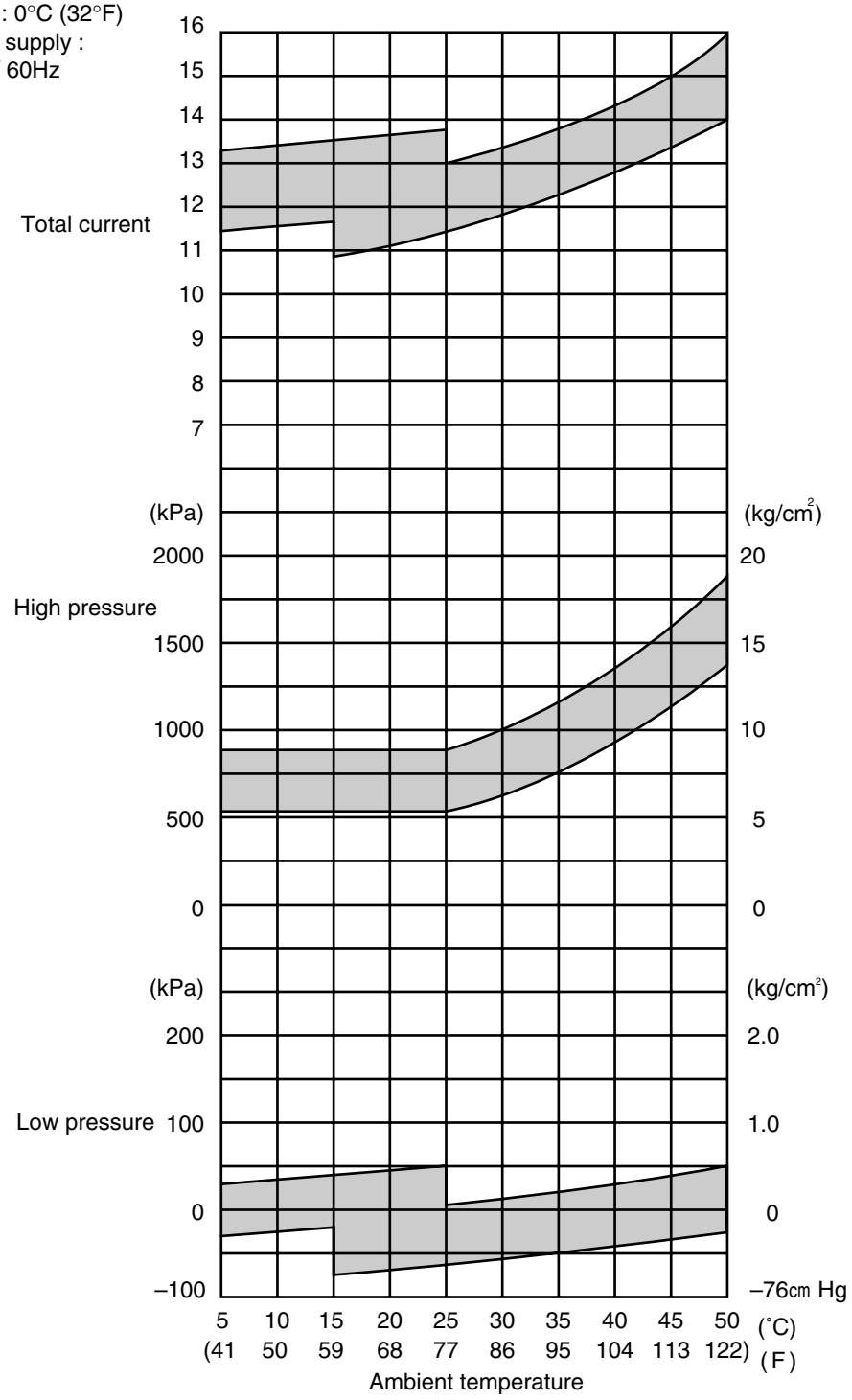
●Chilled mode
Inside : 0°C (32°F)
Power supply :
415V / 50Hz



●Fan motor current

Item	Current A
Condenser fan motor running current	1.4 (415VAC)
Evaporator fan motor running current (2 motors)	3.2 (415VAC) Hi speed

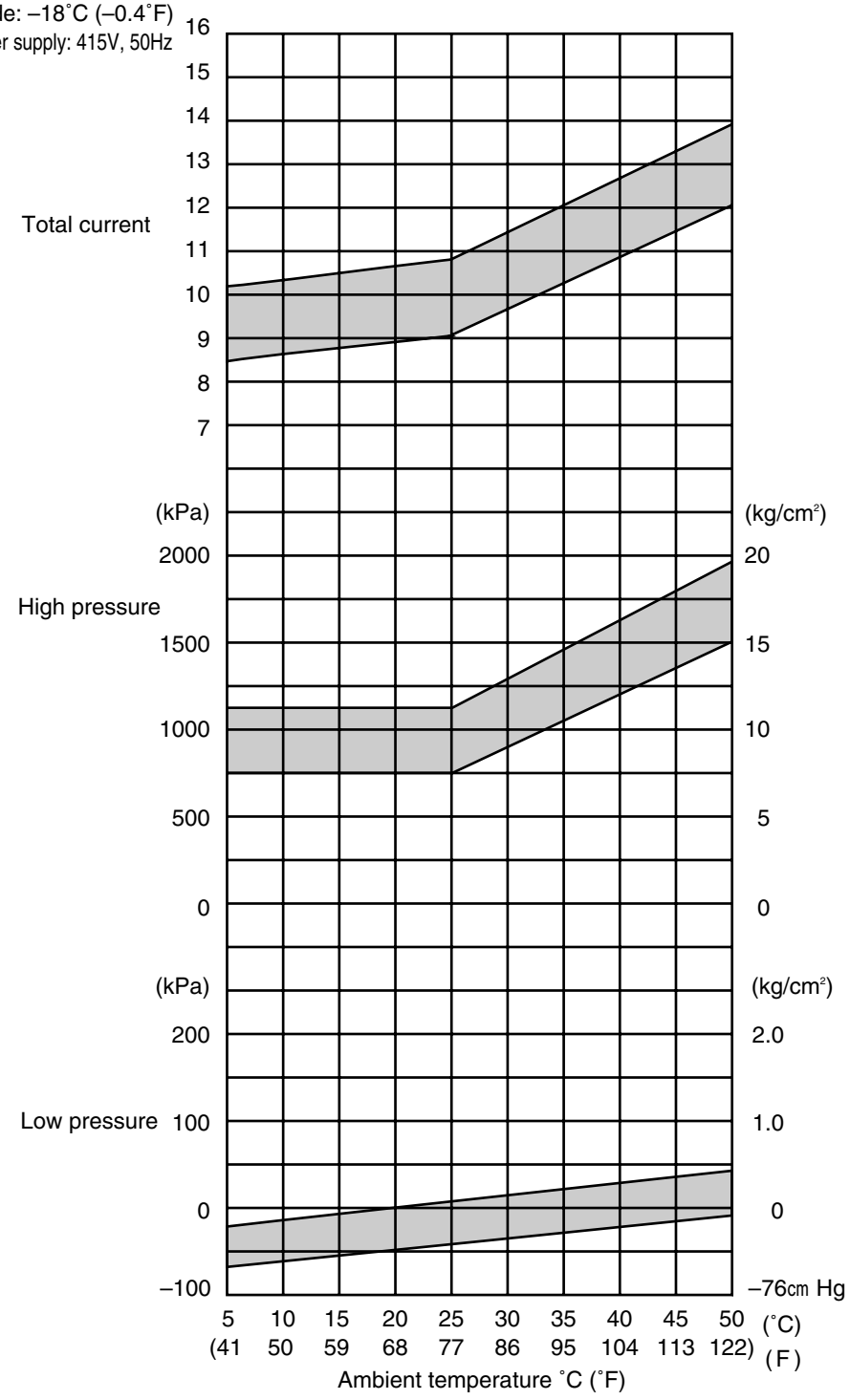
●Chilled mode
Inside : 0°C (32°F)
Power supply :
400V / 60Hz



●Fan motor current

Item	Current A
Condenser fan motor running current	1.4 (400VAC)
Evaporator fan motor running current (2 motors)	3.2 (400VAC) Hi speed

●Frozen mode
Inside: –18˚C (–0.4˚F)
Power supply: 415V, 50Hz



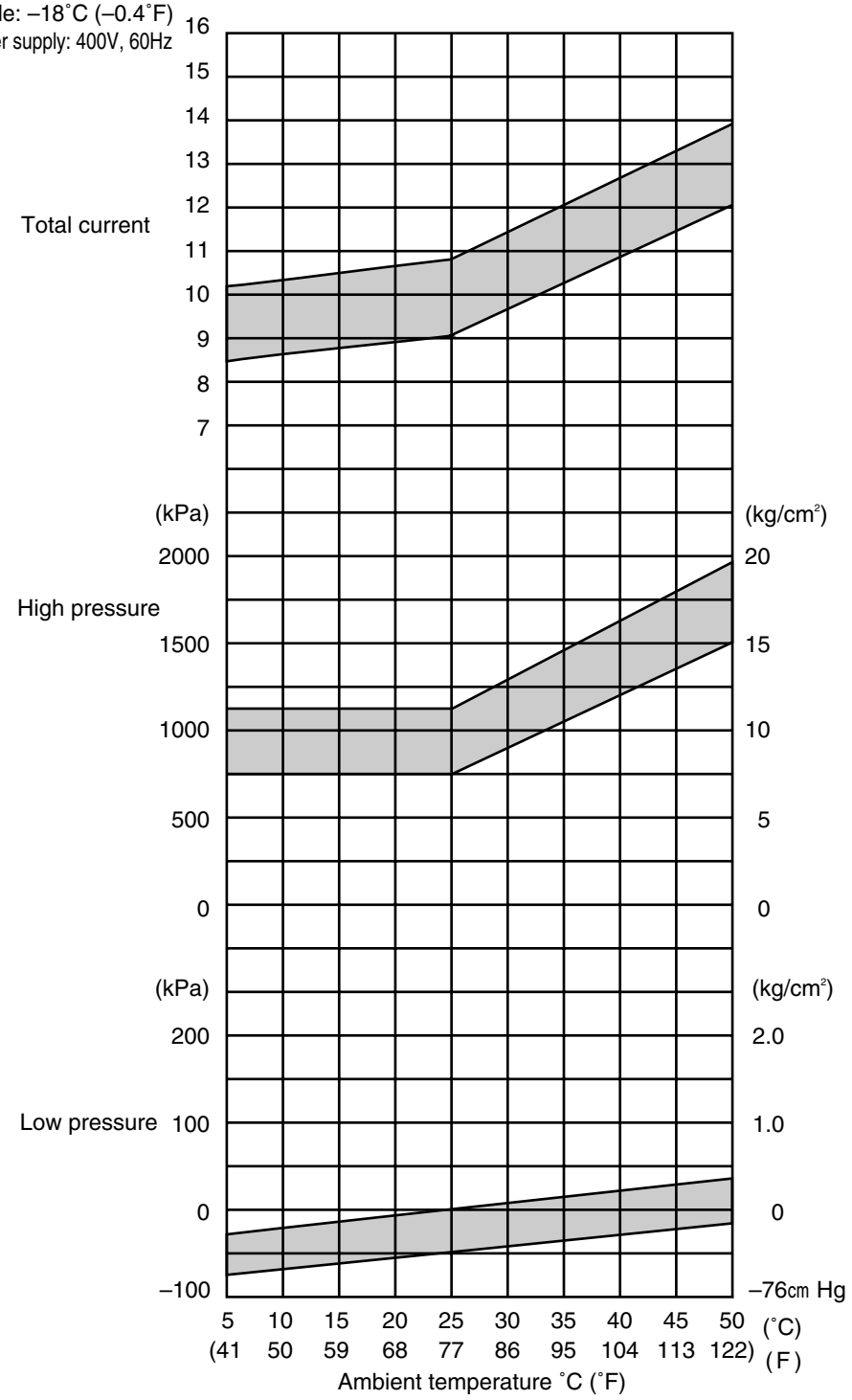
●Fan motor current

Item	Current A
Condenser fan motor running current	1.4 (415VAC)
Evaporator fan motor running current (2 motors)	0.9 (415VAC) Low speed

●Frozen mode

Inside: –18˚C (–0.4˚F)

Power supply: 400V, 60Hz



●Fan motor current

Item	Current A
Condenser fan motor running current	1.4 (400VAC)
Evaporator fan motor running current (2 motors)	0.9 (400VAC) Low speed

1.6 Operation modes and control

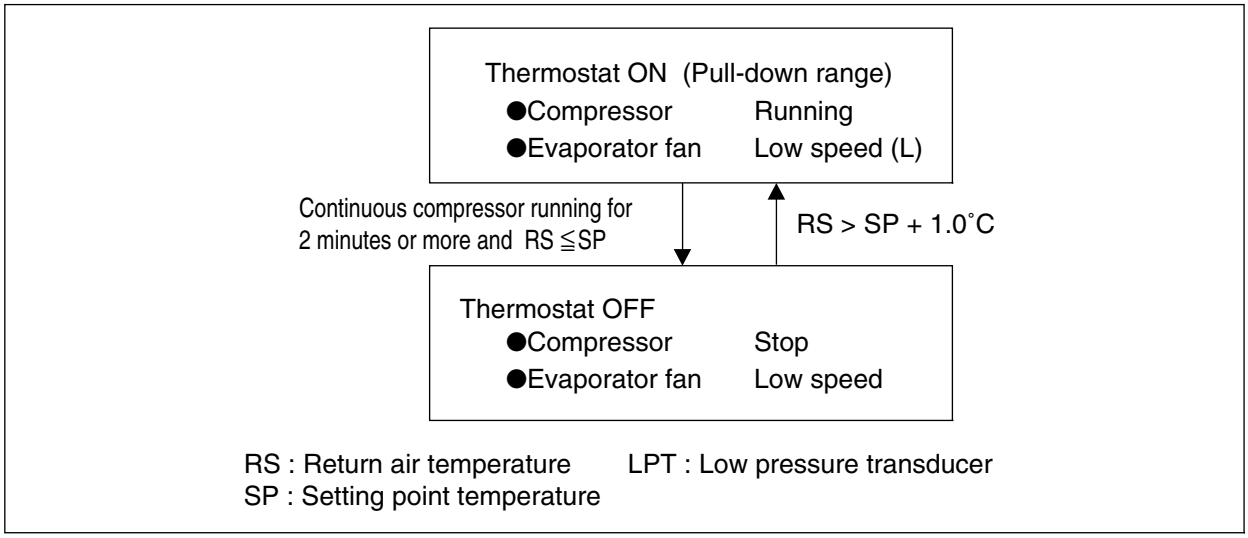
Two types of operation modes are available. chilled mode and frozen mode.

※For details, refer to clause 1.6.1 to 1.6.4

Operation mode	Setting temperature	Control sensor	Inside fan	Operation description
Chilled mode	–9.9˚C to +30.0˚C (–14.1˚F to +86.0˚F)	Supply air temperature sensor	High speed	Capacity control operation with suction modulating valve and hot-gas bypass control
Frozen mode	–30.0˚C to –10.0˚C (–22.0˚F to +14.0˚F)	Return air temperature sensor	Low speed	Compressor ON/OFF control
Defrosting operation	-	-	OFF	Hot-gas defrosting with refrigerant quantity control

1.6.1 Frozen operation

Control state transition and common control



Operation of magnetic contactor and solenoid valve

Component name			Thermostat ON	Thermostat OFF
Magnetic contactor	Compressor	CC	ON	OFF
	Evaporator fan. High speed	EFH	OFF	OFF
	Evaporator fan. Low speed	EFL	ON	ON
	Condenser fan	CF	ON / OFF ※1	OFF
Solenoid valve	Liquid solenoid valve	LSV	ON	OFF
	Economizer solenoid valve	ESV	ON	OFF
	Injection solenoid valve	ISV	ON / OFF ※2	OFF
	Hot-gas solenoid valve	HSV	OFF	OFF
	Defrost solenoid valve	DSV	OFF	OFF
	Discharge gas by-pass solenoid valve	BSV	OFF	OFF
	Reheat solenoid valve	RSV	OFF	OFF
Suction modulating valve		SMV	328pls (100%)	
Electronic expansion valve		EV	21~420pls (5~100%)	

Note) ※1: High pressure control (Refer to Page 1-24)
※2: Injection control (Refer to Page 1-25)

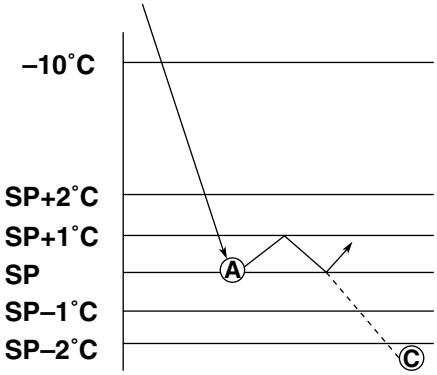
(1) Set point temperature and control sensor

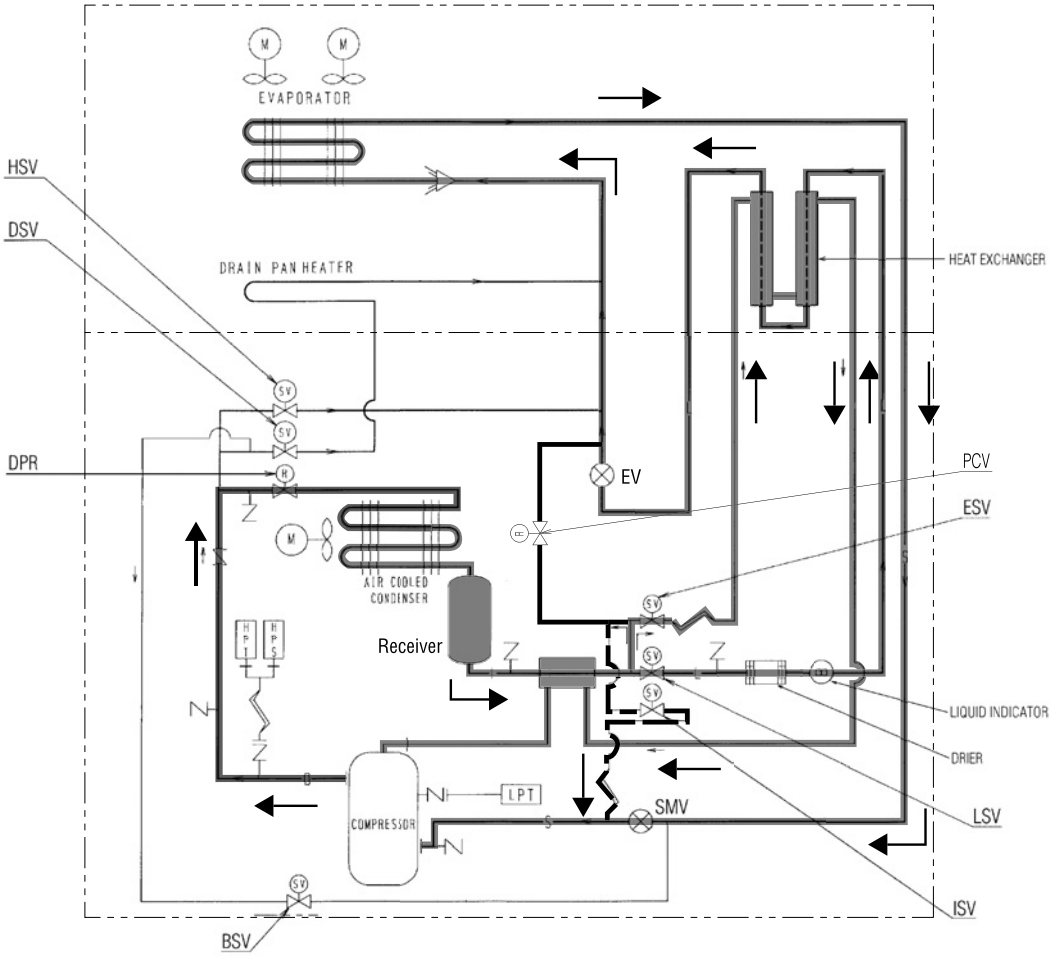
When the set point temperature (referred to as SP hereafter) is –10.0˚C(+14.0˚F) or lower, the compressor is operated ON and OFF, in response to return air temperature.

(2) Control

①When the control temperature reaches SP (point A), the compressor and condenser fan are turned off.

②When the control temperature exceeds SP+1.0˚C, the compressor, liquid solenoid valve and condenser fan are turned on. However, the compressor runs for at least 2 minutes every time once it is turned on. Even if the control temperature reaches SP or lower (point C) within 2 minutes after the compressor is turned on, the compressor, condenser fan and liquid solenoid valve are not turned off. (2 minutes compressor forced operation)

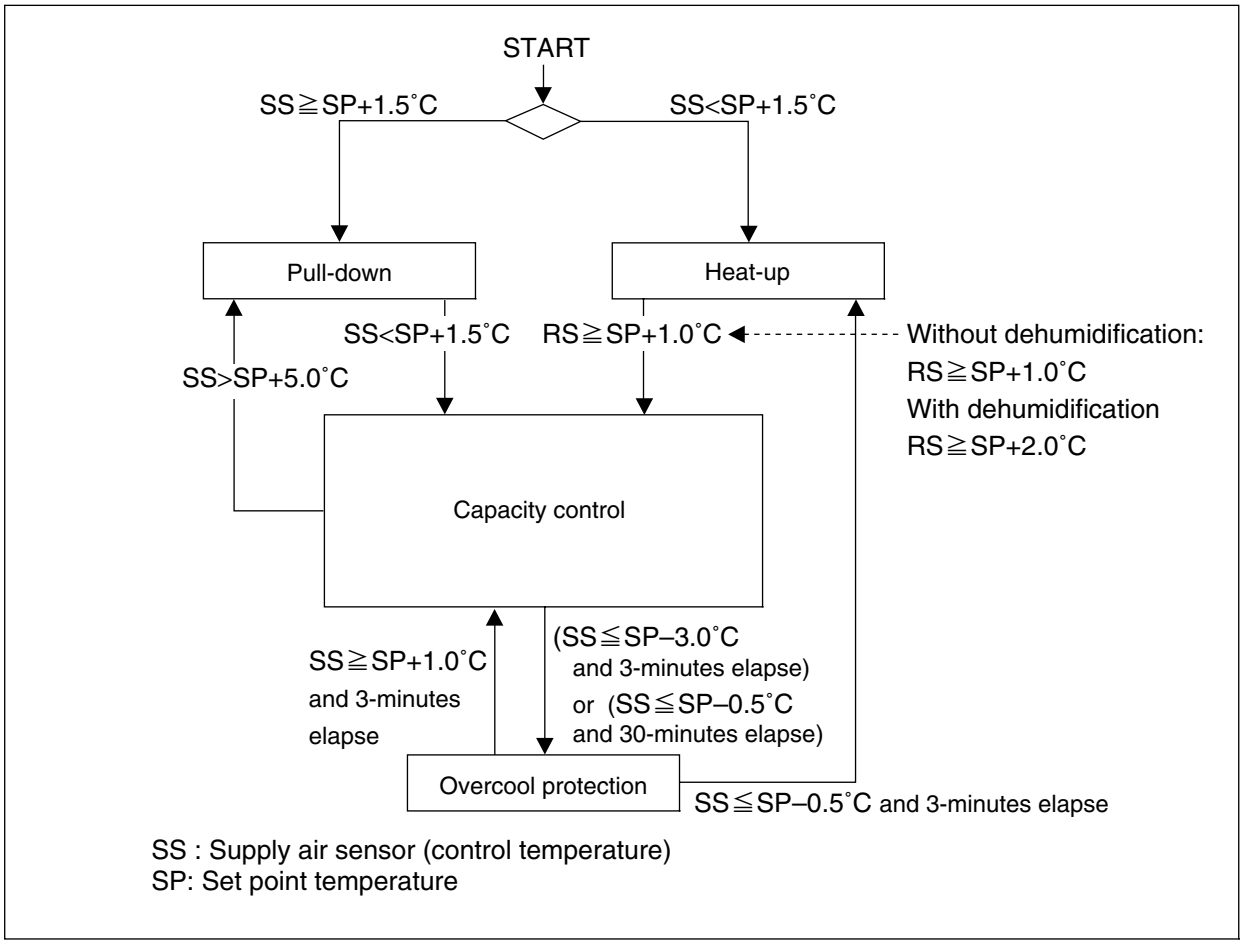




BSV :Discharge gas Bypass Solenoid Valve
DPR :Discharge pressure regulator
DSV :Defrost Solenoid Valve
ESV :Economizer Solenoid Valve
EV :Electronic Expansion Valve
HPS :High Pressure Switch
HPT :High Pressure Transducer
HSV :Hot Gas Solenoid Valve
ISV :Injection Solenoid Valve
LPT :Low Pressure Transducer
LSV :Liquid Solenoid Valve
PCV :Pressure Control Valve
SMV :Suction Modulation Valve

1.6.2 Chilled operation

Control state transition and common control



Operation of magnetic contactor and solenoid valve

Component name			Pull-down	Capacity control	Heat-up	Overcool protection
Magnetic contactor	Compressor	CC	ON	ON	ON	OFF
	Evaporator fan. High speed	EFH	ON	ON	ON	ON
	Evaporator fan. Low speed	EFL	OFF	OFF	OFF	OFF
	Condenser fan	CF	ON / OFF※1	ON	ON / OFF※4	OFF
Solenoid valve	Liquid solenoid valve	LSV	ON	ON	OFF	OFF
	Economizer solenoid valve	ESV	ON	OFF	OFF	OFF
	Injection solenoid valve	ISV	ON / OFF※2	ON / OFF※5	ON / OFF※3	OFF
	Hot-gas solenoid valve	HSV	OFF	ON / OFF※5	ON	OFF
	Defrost solenoid valve	DSV	OFF	ON / OFF※5	ON	OFF
	Discharge gas by-pass solenoid valve	BSV	OFF	ON / OFF※5	OFF	OFF
	Reheat solenoid valve	RSV	OFF	OFF	OFF	OFF
Suction modulating valve		SMV	328pls (100%)	10~328pls (3~100%)	328pls (100%)	328pls (100%)
Electronic expansion valve		EV	21~420pls (5~100%)	48~420pls (11~100%)	0pls (0%)	189pls (45%)

Note) ※1: High pressure control (P.1-24) ※4: Release control (P.1-26)
※2: Injection control (P.1-25) ※5: Capacity control and hot gas by-pass (P.1-26)
※3: Charge control (P.1-26)

(1) Set point temperature and control sensor

If the set point temperature is –9.9˚C (–14.1˚F) or higher, the suction modulating valve is controlled by the supply air temperature to adjust the freezing capacity.

(2) Control

(a) Pull-down operation

Pull-down operation is carried out with fully opened suction modulating valve when the control temperature (SS) is higher than the set point temperature by 1.5˚C or more (point ①).

(b) Capacity control operation

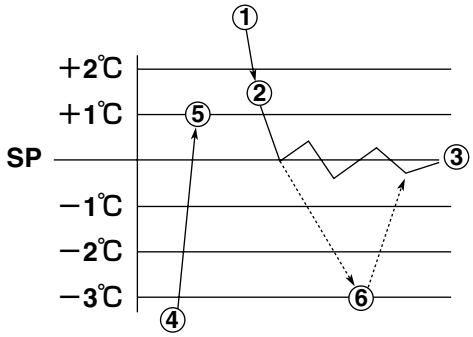
When the control temperature reaches the point ②, the suction modulating valve is activated to conduct the capacity control operation. After rising and dropping, the control temperature remains stable at the point ③. During the capacity control operation, hot gas by-pass (HSV, DSV, BSV) and liquid injection (ISV) are used in order to maintain the optimum operation condition of the refrigerant system.

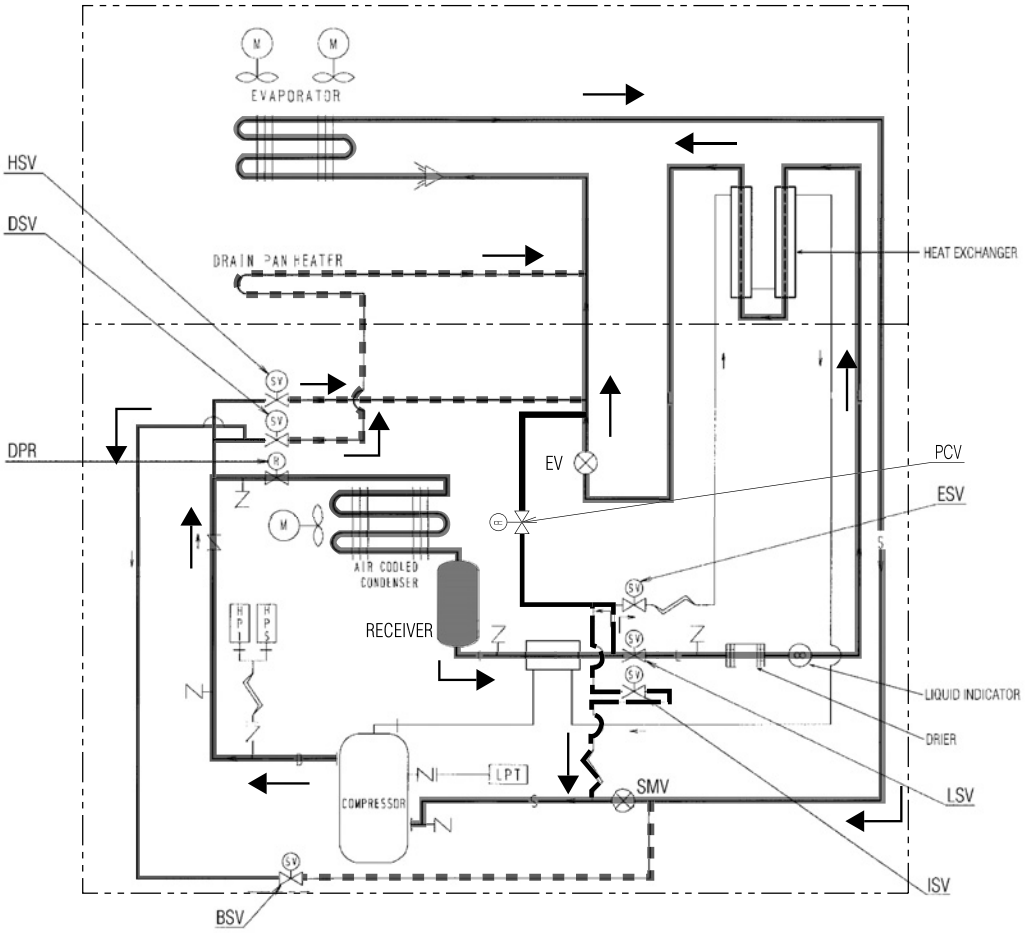
(c) Heat-up operation

When the control temperature (SS) is lower than the set point temperature by +1.5˚C(point ④), heat-up operation using hot gas is conducted. This heat-up operation raises the control temperature to the set point temperature + 1.0˚C(point ⑤). It rises up to set point temperature +2.0˚C during dehumidification operation.

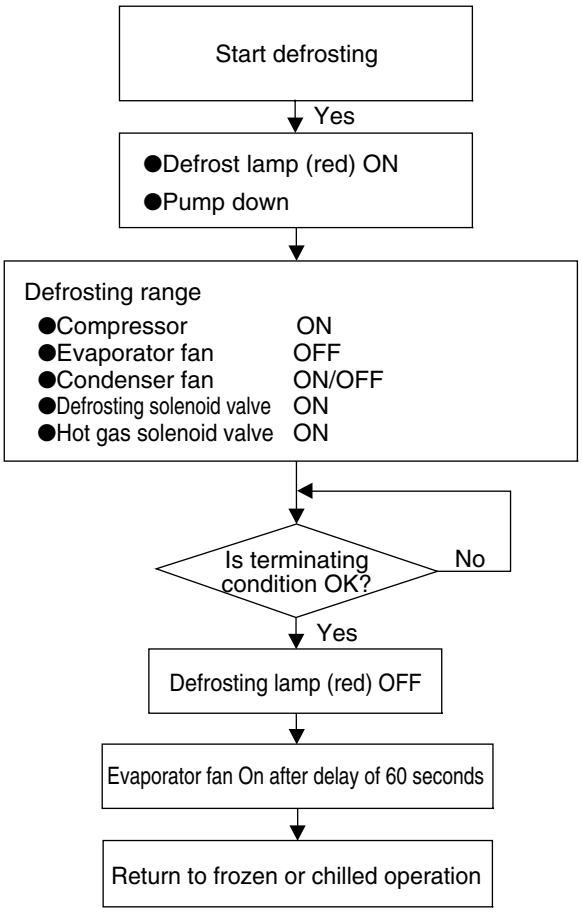
(d) Overcool protection operation

Although the unit's operation is in a stable state, if the control temperature lowers below set point temp by –3.0˚C (point ⑥), the compressor stops and only the evaporator fan continues to operate.





1.6.3 Defrosting operation



Operation of magnetic contactor and solenoid valve

Component name			Pump down	Defrosting
Magnetic contactor	Compressor	CC	ON	ON
	Evaporator fan. High speed	EFH	OFF	OFF
	Evaporator fan. Low speed	EFL		
	Condenser fan	CF	ON	ON/OFF ※2
Solenoid valve	Liquid solenoid valve	LSV	OFF	OFF
	Economizer solenoid valve	ESV	ON	OFF
	Injection solenoid valve	ISV	OFF	ON/OFF ※1
	Hot-gas solenoid valve	HSV	OFF	ON
	Defrost solenoid valve	DSV	OFF	ON
	Discharge gas by-pass solenoid valve	BSV	OFF	OFF
	Reheat solenoid valve	RSV	OFF	ON/OFF ※3
	Suction modulating valve	SMV	328pls (100%)	328pls (100%)
	Electronic expansion valve	EV	48~420pls (11~100%)	0pls (0%)

Note) ※1: Charging control (P.1-26)
※2: Release control (P.1-26)
※3: RSV:ON EOS>15˚C

Defrosting operation

(1) Defrosting system

A hot-gas defrost system is adopted in the units; i.e. the high temperature and high pressure refrigerant (hot gas) from the compressor is sent to the evaporator and drain pan for defrosting. Since the evaporator is heated directly by the hot gas (refrigerant), defrosting can be performed efficiently.

(2) Defrosting initiation

Defrosting initiation		Functions and timer setting
Pull down	Short timer	4 hours *1
	Automatic frost detection	Executed when the suction air temperature does not drop by 0.2˚C or more per hour during frozen operation *2
In-range	Defrosting interval	3 hours, 6 hours, 9 hours, 12 hours, 24 hours
		99 “On-demand defrosting” *3
Out-range	Out-range timer	30 minutes Executed 30 minutes after the control temperature rises out of the in-range
Manual defrosting (manual)		Executed by MSD key

*1. 6 hours when the control temperature is –20.0˚C or below
*2. Not executed when the control temperature is –20.0˚C below
*3. On-demand defrosting setting
If "99" is set, the on-demand defrosting is carried out.
The on-demand defrosting is executed during the frozen operation, and judging frost condition on the evaporator automatically and putting defrosting into operation where appropriate.

(3) Defrosting initiation conditions

Timer count	Initiation conditions for defrosting
Short timer Defrosting interval (frozen) Out-range timer Manual defrosting	EOS≦20.0˚C
Defrosting interval (chilled)	EIS<5.0˚C&EOS≦20.0˚C

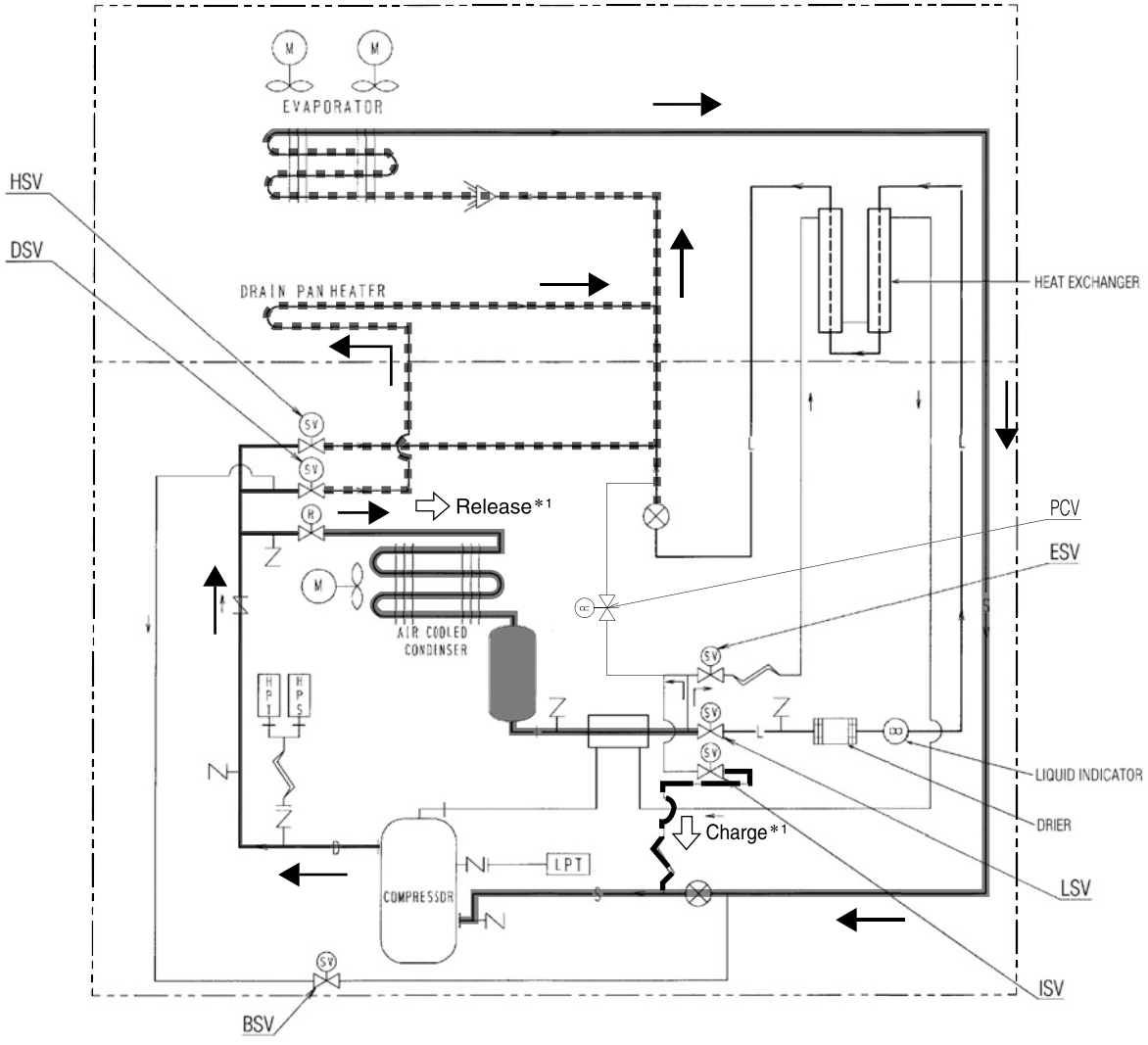
Note 1: If the initiation conditions for defrosting are not satisfied during timer counting or the manual defrosting operation, the defrosting operation is not executed based on the judgment that no frost is detected.

Note 2: In the case of the unit equipped with a reheat coil for dehumidification control (optional) (REHEAT setting "ON"), when dHU setting is "OFF", defrosting operation is executed regardless of the temperature for the initiation conditions.

(4) Defrosting termination conditions

Defrosting time	Defrosting termination conditions	
Within 45 minutes	EOS≧20.0˚C	
More than 45 minutes	Defrosting interval (frozen)	EOS≧30.0˚C
	Short timer Defrosting interval (chilled) Out-range timer Manual defrosting	EOS≧30.0˚C &RS/DRS≧15.0˚C
100 minutes	Shutdown (100 minutes for the backup timer)	

Note 1
Defrosting operation is terminated when a protection device is activated.



Note 2
＊1 : "Charge" and "Release" control during defrosting operation

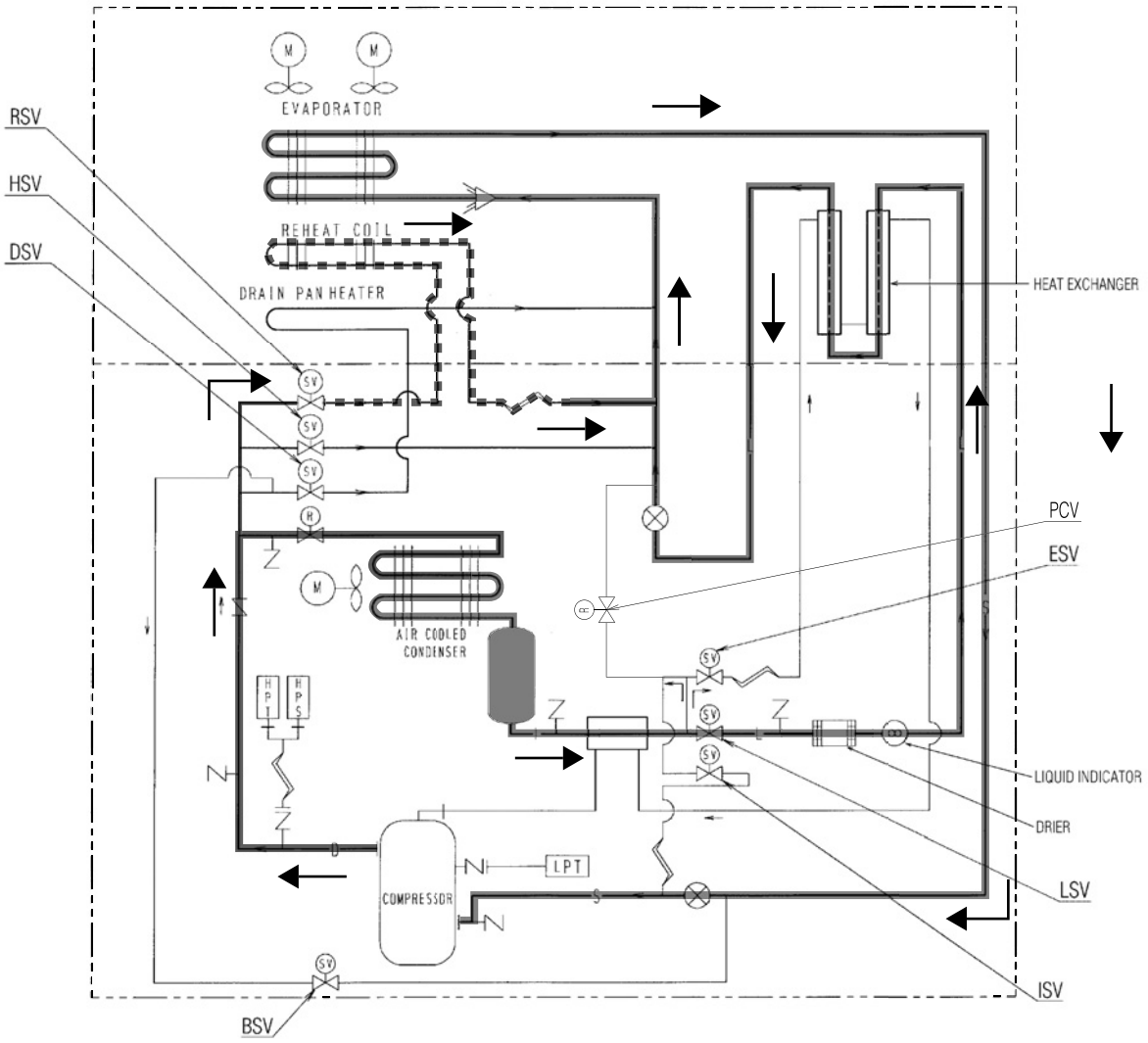
1.6.4 Dehumidification control operation (optional)

Dehumidification control, like the defrosting operation, uses high temperature refrigerant (hot gas) from the compressor. It is executed by flowing the hot gas to the reheat coil mounted to the bottom of the evaporator. This control is optional, available for the unit equipped with a reheat coil only.

1. To execute dehumidification control, setting the dehumidification control dHU to "ON" or "ON-A" is necessary. "ON" for the unit equipped with humidity sensor, "ON-A" for the unit without it. For setting procedures, refer to 2.2.2 (4. Mode operation)
2. Humidity setting range: 60 to 95%RH (when dHU is set to "ON"). For setting procedures, refer to 2.2.2 (2. Operation setting mode).
3. When dHU is set to "ON" or "ON-A", the "DEHUMID" lamp at the top of the control panel lights up.

Dehumidification control		dHU setting	DEHUMID lamp
When dehumidification control is executed	ON: for the unit equipped with humidity sensor	ON	ON*1
	ON-A: for the unit without humidity sensor	ON-A	ON*1
When dehumidification is not executed		OFF	OFF

*1 When the DEHUMID lamp does not light up
Set ON for the reheat coil installation "ON/OFF setting". For the setting procedures, refer to 2.2.2 (11. Basic function setting mode).



1.6.5 Common control

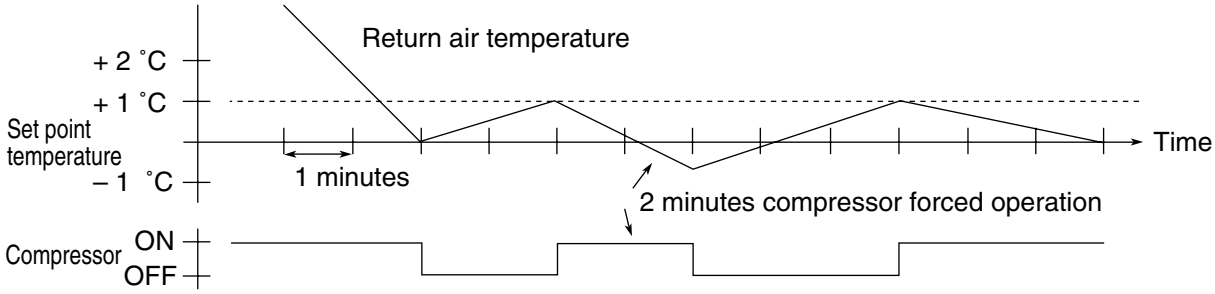
The following are controlled in different operation modes. (For the details, refer to the following pages.)

	Control name	Control content	Operation mode			
			Frozen	Chilled	Dehumidification	Defrost
A	Compressor ON/OFF control	The compressor is operated on and off to adjust the inside temperature.	✓			
B	Starting control	· At the start of the operation with low ambient temperature, an oil temperature raising control is executed. · When a protection device activates at the operation start, a high pressure/current control is executed.	✓	✓	✓	
C	Evaporator fan speed control	The evaporator fan is switched to the high or low speed according to the set point temperature.	✓	✓	✓	
D	Superheat control	In order to keep the superheat of the evaporator optimum, the opening of the electronic expansion valve is controlled.	✓			
E	High-pressure control	In order to keep the high pressure optimum, the opening of the electronic expansion valve is controlled.	✓	✓	✓	
F	Injection	In order to prevent the refrigerant oil from deteriorating, the injection solenoid valve control or electronic expansion valve control is carried out.	✓	✓	✓	
G	In-range control	When the control temperature is within SP ±2˚C, the in-range lamp is turned on.	✓	✓	✓	
H	In-range masking control	After defrosting initiation, the in-range lamp is kept on for 90 minutes.	✓	✓	✓	✓
I	Capacity control	It conducts capacity control during chilled operation.		✓	✓	
J	Charging and releasing control	The heating capacity of defrosting and heating operation are controlled.		✓	✓	✓
K	Pump down control	The liquid refrigerant is collected into the liquid receiver (or water cooled condenser).	✓	✓	✓	✓
L	Economizer control	The economizer circuit is controlled to enhance cooling capacity.	✓	✓	✓	
M	Reheat coil control	The reheat solenoid valve (RSV) is controlled to carry out dehumidification.			✓	

Common control

A : **Compressor ON/OFF control**

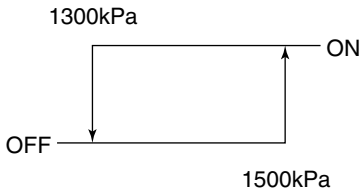
When the control temperature reaches the set temperature or lower, the compressor is stopped.
When the control temperature rises and becomes higher than the [set point temperature +1.0˚C], the compressor runs again.
When the compressor starts running, it is forcibly run for 2 minutes. (2 minutes compressor forced operation) in order to prevent the compressor from deterioration due to shortage of lubricant.



B : **Starting control**

○ Control when protective device activated
When the high pressure rapidly rises on starting or when the starting current is overcurrent, the compressor automatically stops to suppress high pressure and starting current.

○ Temperature control of refrigerant oil
When ambient temperature is low, the temperature of refrigerant oil for compressor is also low and the viscosity of the oil may be high.
On starting the unit, by-pass discharge gas to suction side of the compressor by opening the solenoid valve (BSV) to raise the oil temperature rapidly ensuring a stable feed of oil.
In order to control the oil temperature of refrigerating unit or in the event the high pressure is low, operate the compressor with the condenser fan stopped. If the high pressure reaches 1500 kPa or more, the fan will restart to operate.
The temperature control for refrigerant oil should be executed not with power ON/OFF in normal operation but with power ON under low ambient temperature.



An oil temperature raising control can be executed when all of the following conditions are met.

- The time turning power supply ON
- Ambient temperature ≦ 10˚C
- (Discharge gas temperature – ambient temperature) ≦ 4˚C

C : **Evaporator fan speed control**

The speed of the evaporator fan is switched in accordance with operation modes. A stop time of 10 sec. is provided to switch the high speed to low speed and vice versa.

Chilled mode : High speed
Frozen mode : Low speed

D : **Superheat control**

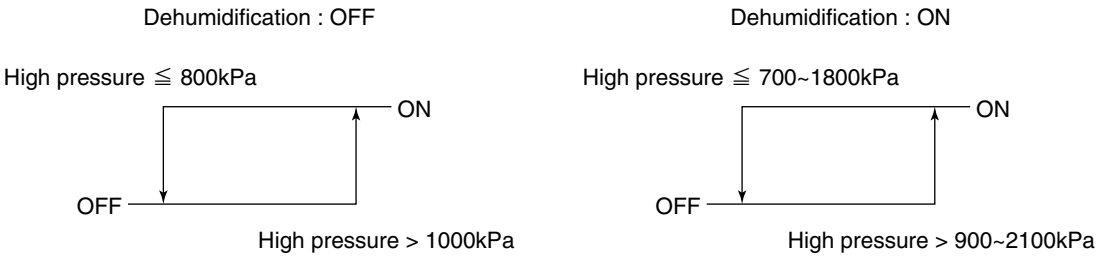
The evaporator superheat is adjusted to be optimum by controlling the opening of the electronic expansion valve based on the evaporator inlet and outlet refrigerant temperature and the compressor suction gas temperature.

E : **High-pressure control**

- By electronic expansion valve

When the ambient temperature is high during the air-cooled operation, the condensing pressure (high pressure) will increase, and the high pressure switch may be activated.
In order to prevent this situation, the high pressure is controlled to be 2350kPa or lower by adjusting the opening of the electronic expansion valve.

• By condenser fan control
When the ambient temperature is low during the air-cooled operation, the condenser pressure (high pressure) will decrease. Accordingly, the low pressure will decrease.
In order to prevent this situation, when the high pressure becomes set point or lower, the condenser fan stops to prevent the high pressure from excess dropping.
When the high pressure becomes set point or higher the condensor fan will restart.
This control varies upon dehumidification setting.



F : **Injection control**

In order to decrease the discharge gas temperature, liquid refrigerant is injected into the suction pipe.

• During normal compressor operation
The injection solenoid valve will be turned on or off to control the discharge gas temperature lower than set point.
The control is conducted properly by using detected discharge gas temperature and inside temperature.

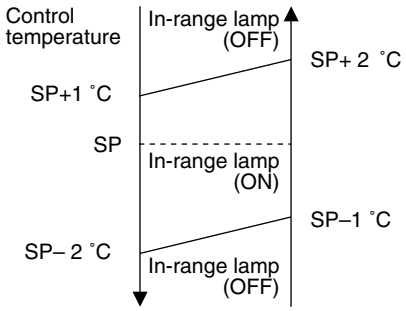
Discharge gas temperature (DCHS) set value

	Frozen, chilled (pull-down)			Chilled, capacity control
	AMBS<40˚C		AMBS>40˚C	
	RS≦0˚C	RS>0˚C		
ISV_ON	DCHS>120˚C	DCHS>125˚C	Turned ON/OFF depending on AMBS and RS	DCHS>113˚C
ISV_OFF	DCHS<110˚C	DCHS<118˚C		DCHS<108˚C

• Defrosting / Heat-up operation
Control the injection ON/OFF with charge control. For details, see the section of "charge control" on page 1-26.

G : **In-range control**

When the control temperature is close to the setting value (SP), the in-range lamp on the display panel is lit to clearly indicate whether the inside temperature is controlling normally.



H : **In-range masking control**

If the inside temperature is within the in-range when defrosting is started, the in-range lamp will be kept turned on forcibly for certain period as below regardless of the inside temperature thereafter.
This will avoid misunderstanding that there is a problem as the control temperature temporarily rises during defrosting.

Setpoint ≧ –20.0˚C	100 minutes
Setpoint ≦ –20.1˚C	130 minutes

I : **Capacity control**

In the chilled mode operation, adjusting cooling capacity makes the supply air temperature stable at the set point temperature (SP).

The capacity control is executed by adjusting the opening of suction modulating valve (SMV) between 3 to 100 %.

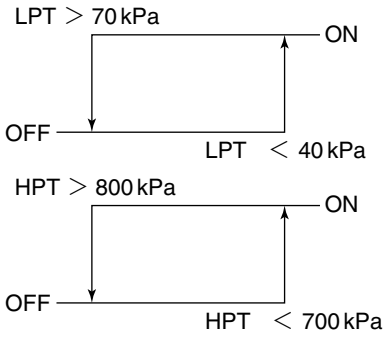
J : **Charge and release control**

Charge control or release control is executed to maintain the heating capacity optimum in defrosting and heating operation.

- Charge control

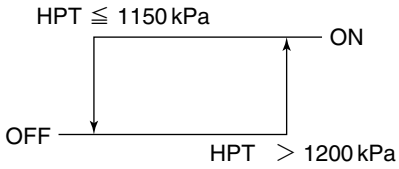
①The LPT controls the suction pressure by using the ISV (Injection Solenoid Valve) to inject liquid refrigerant into the suction pipe.

②The HPT controls the discharge pressure by using the ISV (Injection Solenoid Valve) to inject liquid refrigerant into the suction pipe.



- Release control

The discharge pressure (HPT) is detected and the condenser fan (CFM) is turned on, then, the refrigerant is released into the condenser.



K : **Pump down control**

When Defrost operation or Heating is activated, the Liquid Solenoid Valve (LSV) closes first to carry out Pump Down operation to collect the refrigerant in the receiver. The pump-down operation is stopped when the low pressure becomes 0kPa or less.

L : **Economizer control**

This unit using an economizer circuit combining the intermediate injection into the scroll compressor with the refrigerant heat exchanger. By turning ON the economizer solenoid valve (ESV), the economizer circuit is activated to keep a large sub cooling performance of liquid refrigerant and significantly increase the cooling performance.

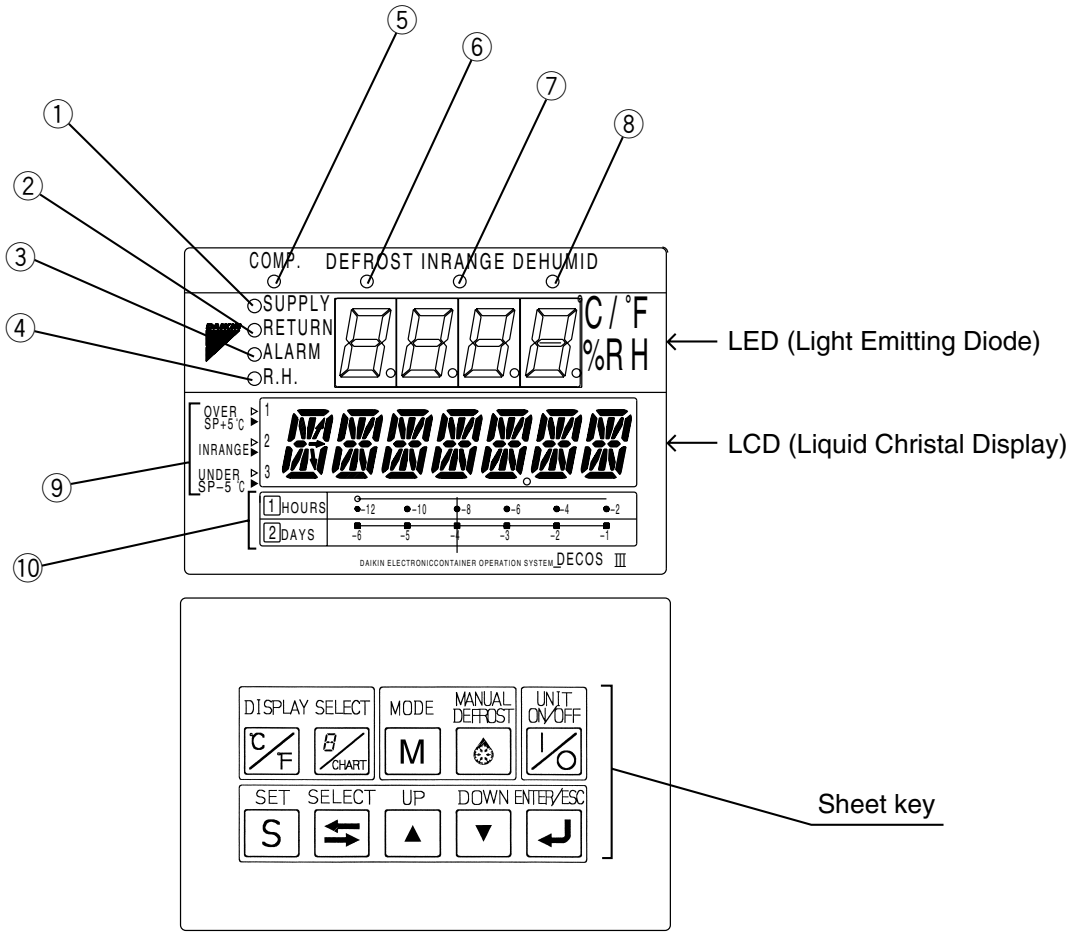
- The economizer control is operated only while the pull-down operation is in progress.

2. ELECTRONIC CONTROLLER

2.1 Basic operation of electronic controller

2.1.1 Control panel

Name and function of each component



① SUPPLY LED (Lights when "supply air temperature" is indicated.)
② RETURN LED (Lights when "return air temperature" is indicated.)
③ ALARM LED (Blinks when alarm is generated.)
④ R.H.LED (Lights when "relative humidity" is indicated.)
⑤ COMP.LED (Lights when the compressor is running.)
⑥ DEFROST LED (Lights when the unit is under the defrosting operation.)
⑦ IN RANGE LED (Lights when the control temperature is in range.)
⑧ DE-HUMID.LED (Lights when the controller is the dehumidification control. (optional)
⑨ Temperature base (Used for the graphic chart indication on the LCD.)
⑩ Time base (Used for the graphic chart indication on the LCD.)

Function of operation key

●UNIT ON/OFF key

To start or to stop the unit operation.
The controller has a memory function.
If the power supply is cut off suddenly while the unit is on, and the power supply is then turned on again, the unit automatically starts the operation without pressing this key again. If the power supply is cut off while the unit is off, the unit does not start the operation unless this key is pressed.

●MODE key

To carry out the following control
① Generator set (=Power corsumption control)
② Automatic pump down
③ Dehumidification set

●SET key

When the power supply is ON:
① Change operation mode from the CURRENT INDICATION MODE to the OPERATION SETTING MODE.
② Select the item to be set in the operation setting mode.

When the power supply is OFF:
① To change operation modes from the POWER OFF MODE to the BATTERY OPERATION MODE.

●SELECT key

This is not normally used in the basic operation procedure.
(This is mainly used in the maintenance procedure.)

●UP key

To select the item to be set in the selected mode.

●DOWN key

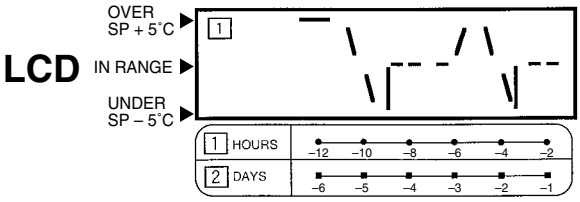
To select the item to be set in the selected mode.

●ENTER/ESCAPE key

To determine the setting values or displayed contents in the selected mode.

CHART key (DISPLAY SELECT key)

If CHARTLESS Function is "ON", this key is effective.
To display logged temperature data in a simple graphic chart on the LCD, press this key when the display reads "set point temperature" or other data. When this is pressed once again, the display returns to "set point temperature" or other data again.



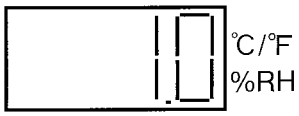
① Indicates the temperature data required to be converted into "˚F" on the LED or the LCD.

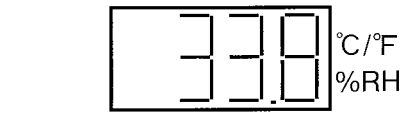
② Press the ℃/℉ key, then the temperature data displayed in "˚C" is converted into "˚F" for one minute.

※ If any other key is pressed during the "˚F" indication, the display switches to "˚C".

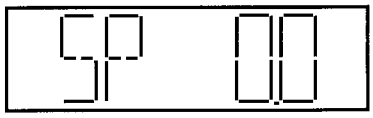
「℃」display **「°F」display**

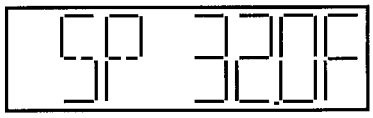
LED





LCD





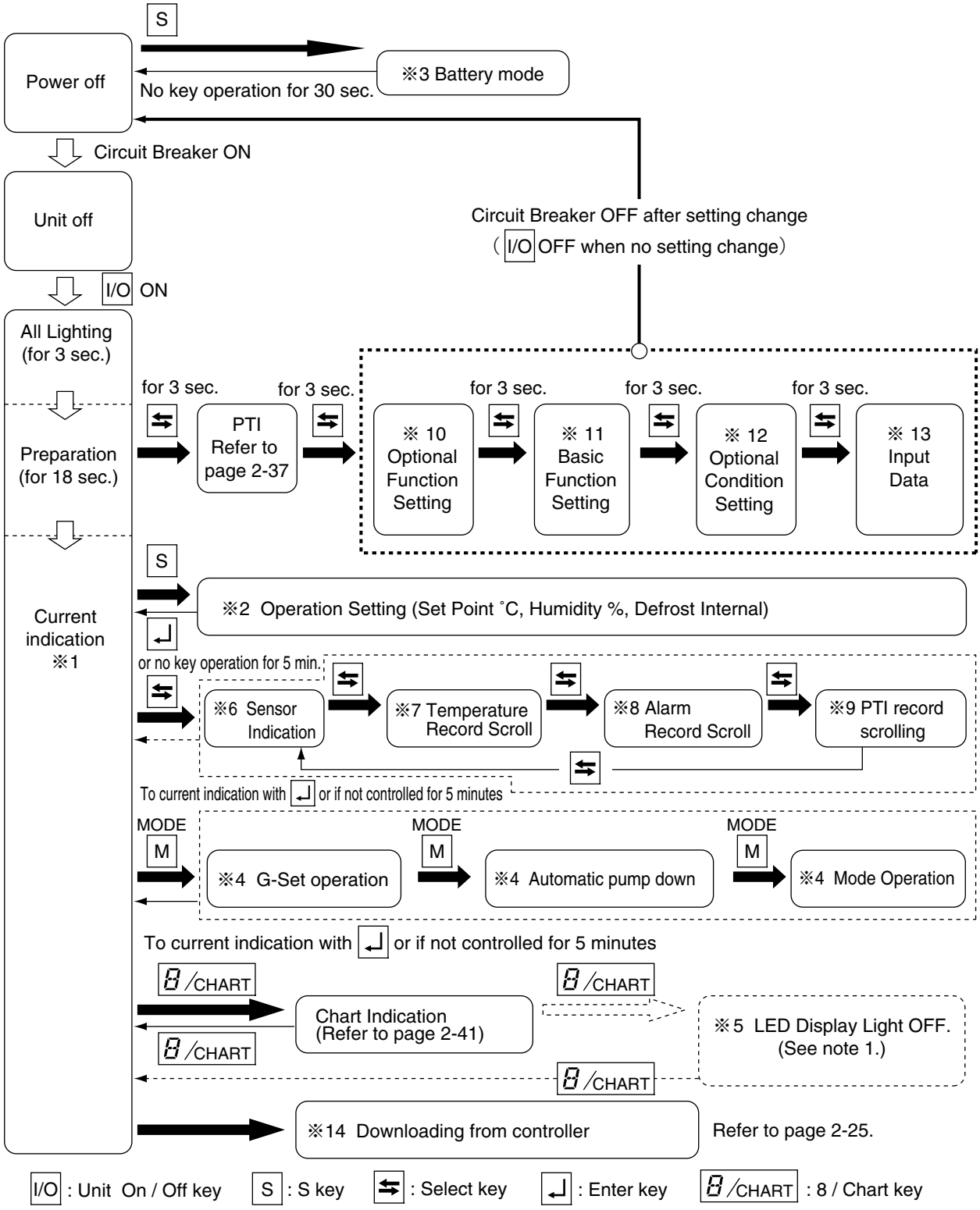
Manual defrost operation

①Press the MANUAL DEFROST key.

②Select "ON" indicated on the LED display using the △ key or the ▽ key, and press the ↵ key to determine the setting, then the defrost operation starts.

2.2 Operation procedure

2.2.1 Operation procedure flow chart



Note 1. ※5 activates when the "dISP" in ※11 is set to "ON" in controller initial setting in page 2-21.

※1. Current indication mode (indication of operation conditions) Indicates the unit operation conditions.	●Supply air temperature (SS) ●Return air temperature (RS) ●Defrost interval ●Alarm ●Setting point humidity and humidity (optional)	Page 2-7
※2. Operation setting mode Settings for cargo transportation	●Temperature settings ●Defrost interval settings ●Humidity settings (optional)	Page 2-8
※3. Battery mode (settings for operation conditions by using the battery) Setting can be executed when commercial power supply is not available.	●Temperature settings ●Humidity settings ●Defrost interval settings ●Unit ON/OFF setting	Page 2-9
※4. Mode operation ① G-Set operation : The maximum power consumption can be set in case of operation by generator. ② Automatic pump down : The pump down can be executed automatically. ③ Mode Operation : Dehumidification mode can be set. (optional)		Page 2-10
※5. LED display off mode LED display section on the controller can be turned off.	●LED lights off	Page 2-11
※6. Sensor indication mode Sensor values can be indicated. ●High pressure (HPT) ●Low pressure (LPT) ●Total current (CT1) ●Compressor current (CT2) ●Voltage (PT1) ●Ambient temperature (AMBS) ●Evaporator inlet temperature (EIS) ●Evaporator outlet temperature (EOS)	●Discharge gas temperature (DCHS) ●Suction gas temperature (SGS) ●Modulating valve opening (SMV) ●Electronic expansion valve opening (EV) ●Supply air temperature (SS) ●Return air temperature (RS) ●Pulp temperature (USDA #1, #2, #3) ●Cargo temperature (CTS) ●Data recorder supply air temperature (DSS) ●Data recorder return air temperature (DRS) [optional]	Page 2-12
※7. Temperature record scroll mode Temperature record of the control sensor can be indicated in order (scroll indication) from the latest data.	●Chilled mode: Supply air temperature ●Frozen mode: Return air temperature (up to 7 days)	Page 2-15

※8. Alarm record scroll mode		
Alarm record can be indicated in order (scroll indication) from the latest data.	●Alarm indication (up to 7 days)	Page 2-17

※9. PTI record scroll mode	
Last 3 PTI results can be displayed.	Page 2-18

※10. Optional function mode		
Set the optional functions if the controller is replaced.	●USDA sensor available/not available setting ●Dehumidification control on/off setting	Page 2-19

※11. Basic function setting mode		
Set the basic functions if the controller is replaced. ●Controller type ●Compressor unload ●Reheat coil	●Logging interval ●Data recorder sensor on/off ●Power supply ●Compressor horse power ●Indication (LED section) light off function on/off	Page 2-20 Page 2-21

※12. Optional condition setting mode			
●Chartless function setting (d code, H code) ●Type of USDA sensor ●°C/°F set	●H001 ●H002 ●H003 ●H004 ●H005 ●H006	●d1-- ●d2-- ●d3-- ●d-1- ●d-2-	Page 2-22 Page 2-23

※13. Input data mode		
Set the container ID and the controller time.	●Container I.D. (No.) ●Controller time	Page 2-24 Page 2-25

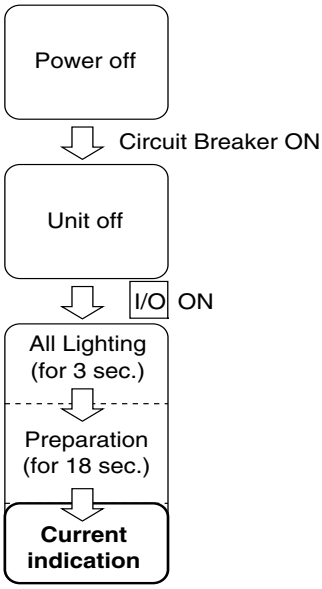
Personal computer and controller

※14. Controller software download mode	
Data logged in a personal computer and controller is exchangable. For the details, refer to the "Operation manual for personal computer software".	Page 2-25

2.2.2 Mode operation procedure

1. CURRENT (Operation state) INDICATION MODE

Supply air temperature (SS), return air temperature (RS), defrosting interval, currently existing alarms, set point humidity, and humidity are indicated.



Turn on the circuit breaker and the UNIT ON/OFF key after turning the power supply on, then the display panel switches to the CURRENT INDICATION MODE. (Key operation in the CURRENT INDICATION MODE is possible after approx. 21 seconds from turning on the UNIT ON/OFF key.)

In the CURRENT INDICATION MODE, supply air temperature, return air temperature, defrosting interval, current alarm and current humidity (optional) are shown.

Select an item using the △ or ▽ key. The value of the selected item is indicated on the LED lamp, LED display and LCD display.

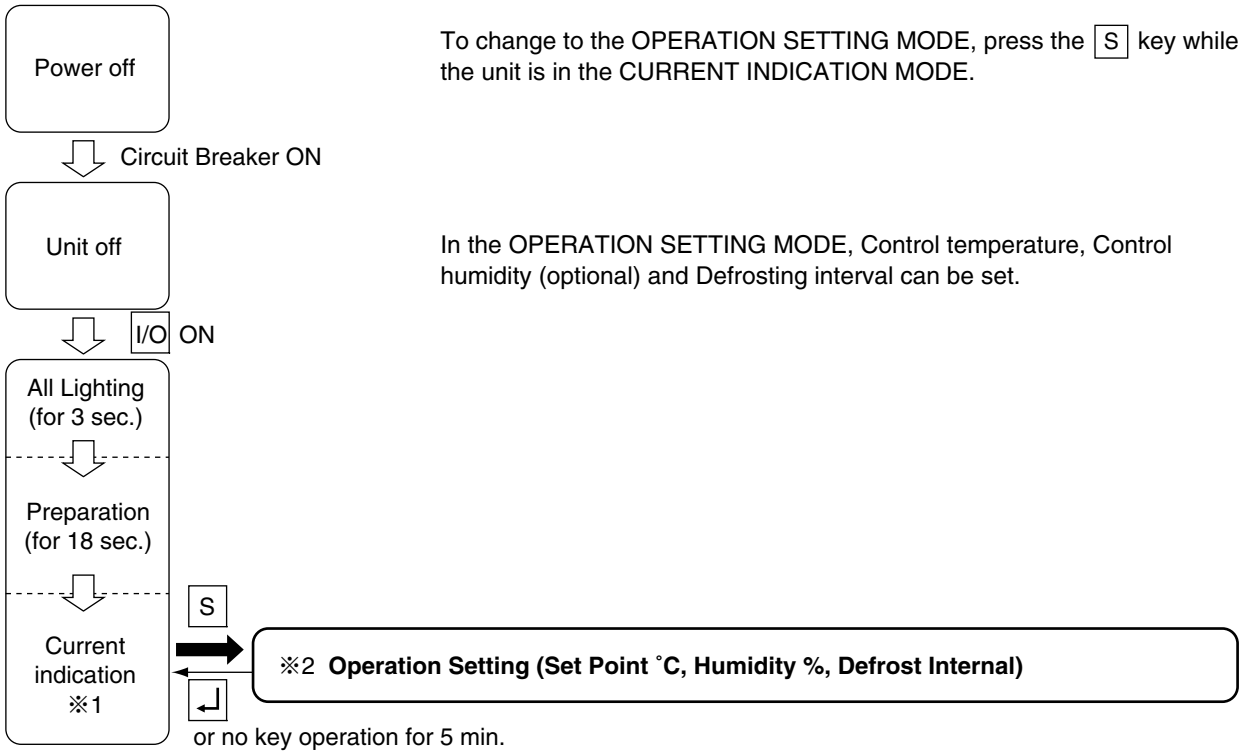
Indication item	LED lamp to be lit on	LED display	LCD display
SUPPLY AIR TEMPERATURE (SS)	SUPPLY	Supply air temperature	Set point temperature
RETURN AIR TEMPERATURE (RS)	RETURN	Return air temperature	Set point temperature
DEFROSTING INTERVAL (Def)	Chilled mode: SUPPLY Frozen mode: RETURN	Chilled mode: SUPPLY air temperature Frozen mode: RETURN air temperature	Current defrosting interval setting
ALARM (Note 1)	ALARM	All the detected alarms codes or ("Good" if there is no detected alarm)	The total number of detected alarms
HUMIDITY (optional, Note 2) (RH)	R.H.	Value of humidity sensor	Set point humidity

Note 1) ●Each pressing of the down key, scrolls through the detected alarm codes in sequence when two or more alarm codes are displayed.
After indicating the last alarm, display goes to the next item.
The numerator of the LCD display stands for the current alarm, while the denominator stands for the number of alarm codes existing.

Note 2) ●The value of the humidity sensor is displayed only when the "Dehumidification Control on/off Setting" is set to "ON", otherwise this item is skipped and the next item is shown.

2. OPERATION SETTING MODE

Control temperature, defrosting interval, and control humidity (optional) can be set.



To change to the OPERATION SETTING MODE, press the S key while the unit is in the CURRENT INDICATION MODE.

In the OPERATION SETTING MODE, Control temperature, Control humidity (optional) and Defrosting interval can be set.

Select an item using the S key. The value of the selected item is indicated on the LED and LCD display.

Item	LED display	LED display	Setting method
CURRENT INDICATION MODE	–	–	–
CONTROL TEMPERATURE SETTING	Current setting temperature Note 2)	"SET-SPC" or "SET-SPF"	Change the value using the △ key or ▽ key. Press the ↵ key to confirm the setting. Setting temperature range; –30 to 30˚C.
CONTROL HUMIDITY SETTING (optional Note 1)	Current setting humidity	"SET-SHU"	Change the value using the △ key or ▽ key. Press the ↵ key to confirm the setting. Setting humidity range: 60 to 95%RH
DEFROST INTERVAL SETTING	Current defrosting interval	"SET-dEF"	Select a defrost interval 99, 24h, 12h, 9h, 6h, or 3h using △ key or ▽ key. Press the ↵ key to confirm the setting. "On demand defrosting" is conducted when "99" has been selected. (See page 1-20.)

S key or no key operation for 5 minutes

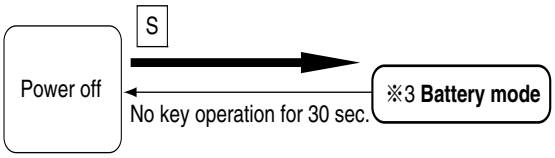
Note 1) ●When the humidity control is not set, this indication does not appear.

Note 2) ●In case temperature is set in ˚C setting temperature can be set at interval of 0.1 ˚C.
In case temperature is set in ˚F, setting temperature should be the value converted into ˚F based on ˚C and rounded off the two decimal places.

3. BATTERY MODE

When commercial power is not available, the following functions are available by using the built-in wake up battery.

- Indication of inside supply air temperature (SS) and return air temperature (RS)
- Setting for control temperature, control humidity and defrost interval



To change to the BATTERY MODE, press the [S] key while the unit is in the POWER OFF STATUS.

In the BATTERY MODE, return air temperature/supply air temperature can be indicated. Control temperature, Control humidity (optional), Defrosting interval and Unit ON/OFF key can be set.

Select an item using the [S] key. The value of the selected item is indicated on the LCD screen.
When no key operation is performed for 30 seconds in the BATTERY MODE, the battery mode turns off automatically off.

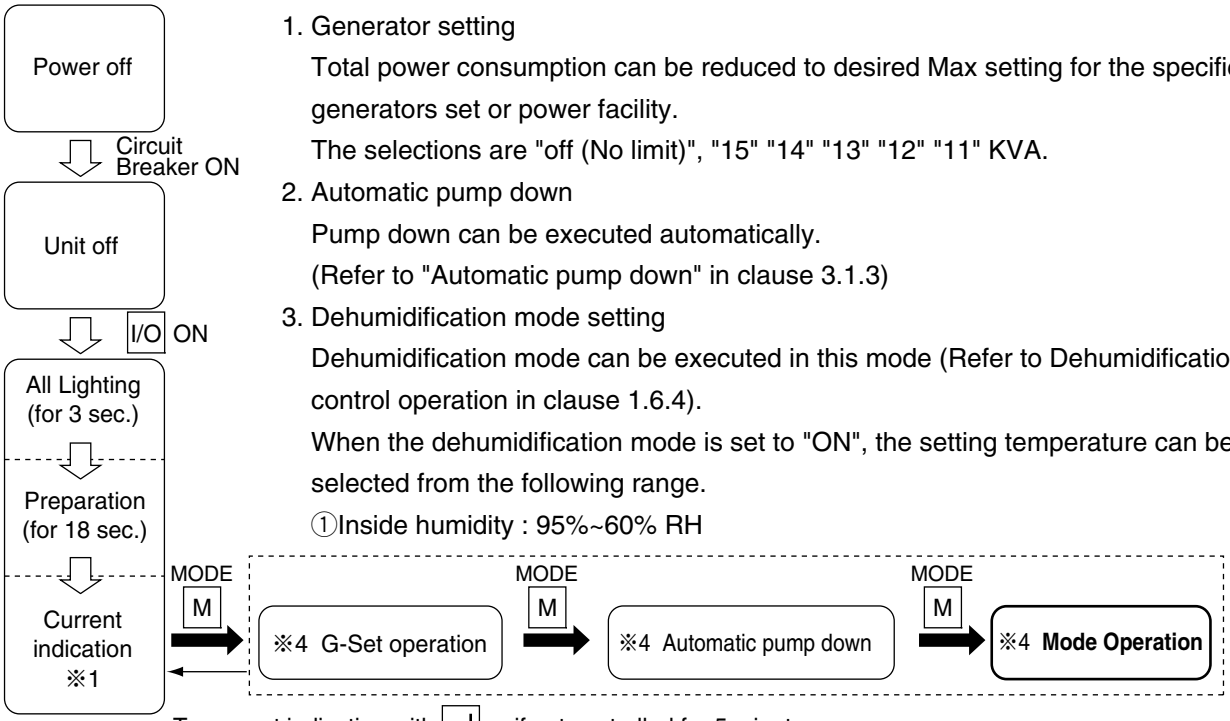
Indications or setting items	LED screen	LCD screen	Setting method
Power OFF	–	–	–
[S] Suction air temperature indication (RS)	(Unlit)	RS C	–
[S] Discharge air temperature indication (SS)	(Unlit)	SS C	–
[S] Ventilation amount indication (FA)	(Unlit)	FA	If FA SEN is set to "L" or "H"
[S] USDA1, USDA2 and USDA3 (CTS) indication (Optional)	(Unlit)	Set to "3" "1US" "2US" "3USDA3" Set to "4" or "AU" "1USDA1" "2USDA2" "3USDA3" or "CS"	If USDA is set to "3" or "4", or "AU"
[S] Low pressure indication (LPT)	(Unlit)	LPT	–
[S] High pressure indication (HPT)	(Unlit)	HPT	–
[S] F. PTI record indication	(Unlit)	F	–
[S] S. PTI record indication	(Unlit)	S	–
[S] C. PTI Chilled record indication	(Unlit)	FC	–
[S] C. PTI Frozen record indication	(Unlit)	FF	–
[S] Battery (BAT)	(Unlit)	bAT V	–
[S] Software version (SOFT)	(Unlit)	VER	–
[S] Control temperature setting (SP)	(Unlit)	SP C	Change the setting temperature using the [△] key and [▽] key and confirm the value using the [↵] key. Temperature setting range: –30 to +30˚C
[S] Control humidity setting (RH) (Optional)	(Unlit)	SHU	Change the setting humidity using the [△] key and [▽] key and confirm the value using the [↵] key. Humidity setting range: 60 to 95%RH
[S] Defrosting (Def) interval setting	(Unlit)	dEF H	Select a defrosting interval from among 99, 24h, 12h, 9h, 6h and 3h using the [△] key and [▽] key and confirm the value using the [↵] key. The on-demand defrosting operation is carried out if "99" is selected.
[S] Unit ON/OFF setting	(Unlit)	"UNIT ON" or "UNIT OFF"	Select "UNIT ON" or "UNIT OFF" using the [△] key and [▽] key and confirm the value using the [↵] key.

No operation for 30 seconds

4. MODE OPERATION

Press the MODE [M] key in current indication mode to go to MODE operation.

In mode operation, the following settings/operations are available.



1. Generator setting
   Total power consumption can be reduced to desired Max setting for the specific generators set or power facility.
   The selections are "off (No limit)", "15" "14" "13" "12" "11" KVA.
2. Automatic pump down
   Pump down can be executed automatically.
   (Refer to "Automatic pump down" in clause 3.1.3)
3. Dehumidification mode setting
   Dehumidification mode can be executed in this mode (Refer to Dehumidification control operation in clause 1.6.4).
   When the dehumidification mode is set to "ON", the setting temperature can be selected from the following range.
   ①Inside humidity : 95%~60% RH

Setting item	LED panel	LCD panel	Setting method
Current indication mode	–	–	–
G-set operation Note 1)	Power consumption upper limit setting Setting values OFF, 11, 12, 13, 14, 15 unit: kVA	G-SET	Select the power consumption upper limit setting by using △ or ▽ key, and press the ↵ key to confirm the setting.
Automatic pump down operation	ON, OFF	P down	Select "ON" by using △ key and ▽ key, and press the ↵ key to confirm the setting.
Dehumidification	ON, ON-A, OFF	dHu	Select desired setting by △ or ▽ key, then press ↵ key.
Humidity set	95% RH~60%RH	SET-SHU	Select desired setting by △ key or ▽ key, then press ↵ key to confirm.

MODE [M] between each item; (OFF) MODE [M] / (ON) MODE [M] from Dehumidification to Humidity set.

Note 1) In case of the G set operation, G-Set is also turned OFF automatically when the power is turned OFF.

5. LED display LIGHT-OFF MODE

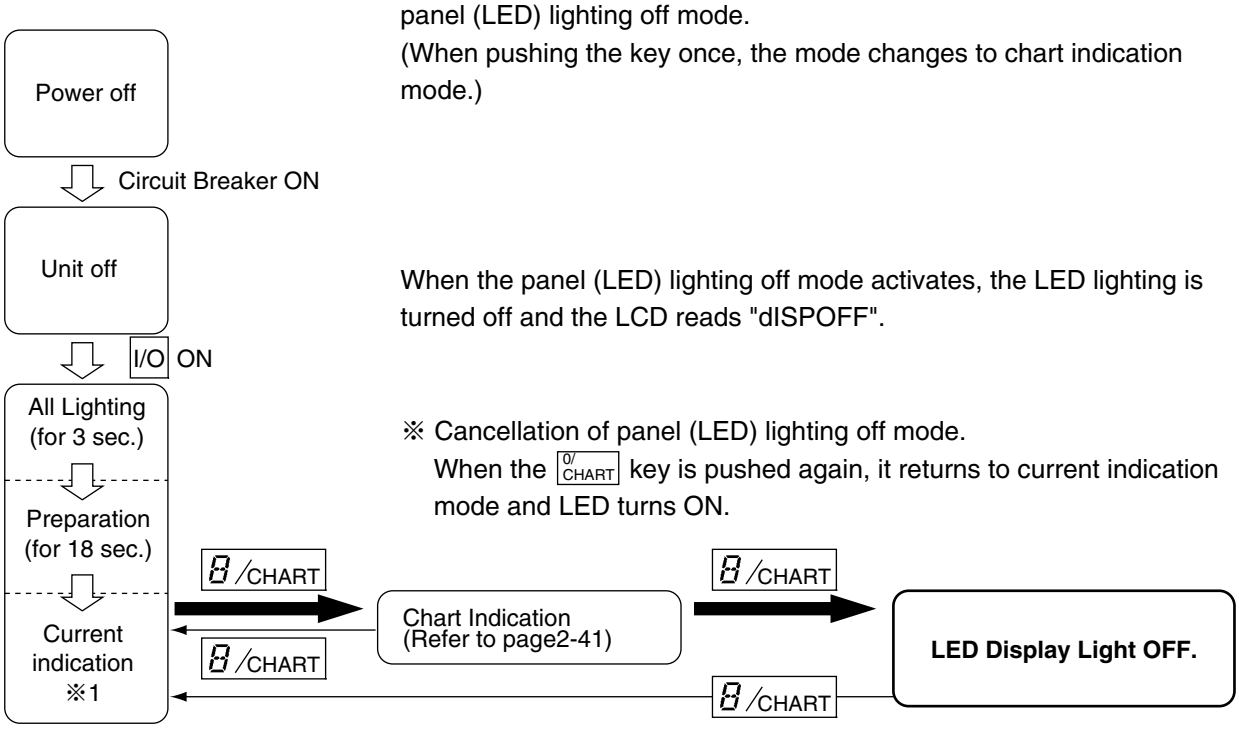
The controller LED display is turned off with this mode.

※ Activation of the panel (LED) lighting off mode.

To activate the panel (LED) lighting off mode, set the LED lighting off function "dISP" in "11. Basic function setting mode" to ON. Refer to page 2-21.

<Operation procedure>

Push the 0/CHART key twice during current indication mode to switch to the panel (LED) lighting off mode.
(When pushing the key once, the mode changes to chart indication mode.)



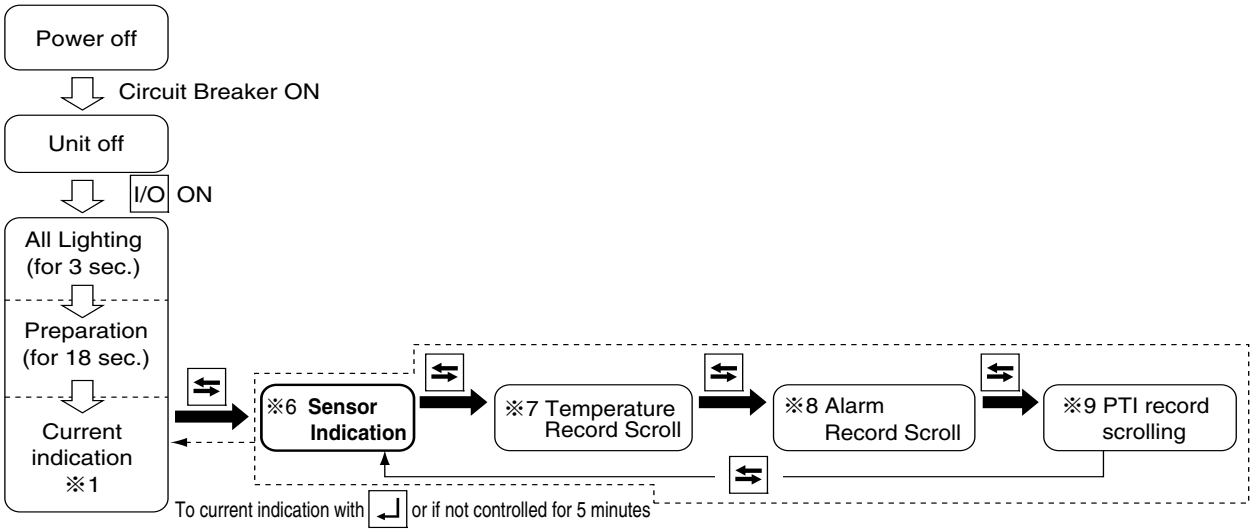
When the panel (LED) lighting off mode activates, the LED lighting is turned off and the LCD reads "dISPOFF".

※ Cancellation of panel (LED) lighting off mode.
When the 0/CHART key is pushed again, it returns to current indication mode and LED turns ON.

6. SENSOR INDICATION MODE

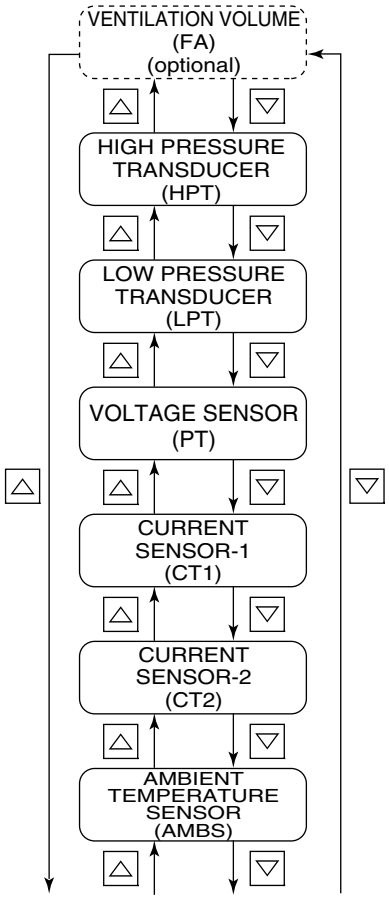
Each sensor value and the opening of the suction modulating valve (SMV) and the electronic expansion valve (EV) can be checked. The following items are shown.
High pressure (HPT), low pressure (LPT), voltage (PT1), total current (CT1), compressor current (CT2), ambient temperature (AMBS), evaporator inlet temperature (EIS), evaporator outlet temperature (EOS), discharge gas temperature (DCHS), suction gas temperature (SGS), suction modulating valve opening, electronic expansion valve opening, supply air temperature (SS) (during PTI only), return air temperature (RS) (during PTI only), pulp temperature (USDA#1, UADA#2, USDA#3) (optional), cargo temperature (CTS) (optional), supply air temperature for data recorder (DSS), return air temperature for data recorder (DRS).

<Mode selection procedure>



<Operation procedure>

Whenever the △ or ▽ key is pressed, the display changes.



LED: The ventilation volume is displayed.
LCD: The value of the ventilation volume is displayed.
Displayed as "FA "

LED: The control temperature is displayed.
LCD: The value of high pressure transducer is displayed.
The display reads: "HPT ".
(In kPa.)

LED: The control temperature is displayed.
LCD: The value of the low pressure transducer is displayed.
The display reads: "LPT ".
(In kPa.)

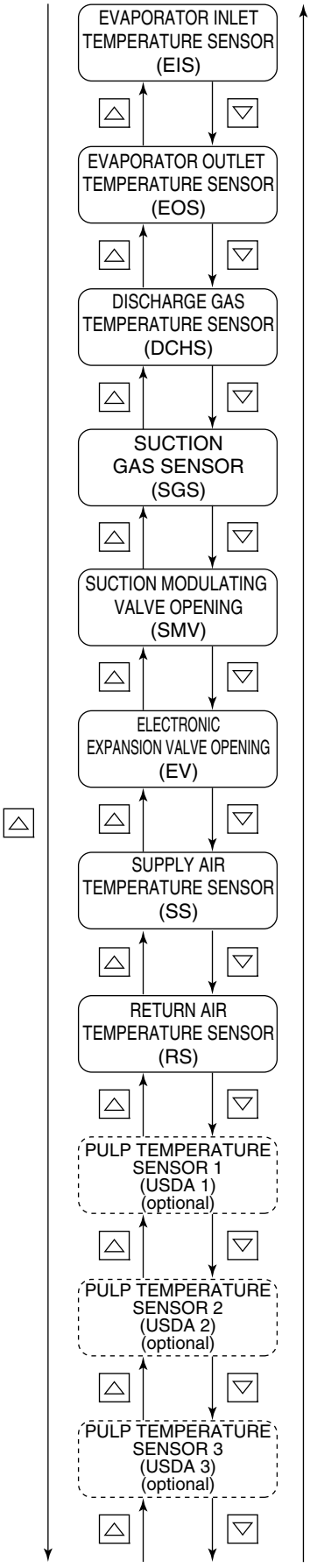
LED: The control temperature is displayed.
LCD: The value of voltage is displayed.
The display reads: "①PT V".
(In Volts.)

LED: The control temperature is displayed.
LCD: The value of total running current is displayed.
The display reads: "①CT A".
(In Ampere.)

LED: The control temperature is displayed.
LCD: The compressor running current is displayed.
The display reads: "②CT A".
(In Ampere.)

LED: The control temperature is displayed.
LCD: The ambient temperature is displayed.
The display reads: "Ab C".
(In ˚C or ˚F.)

6. SENSOR INDICATION MODE (Continued from the previous page)



LED: The control temperature is displayed.
LCD: The evaporator inlet temperature is displayed.
The display reads: "EI C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The evaporator outlet temperature is displayed.
The display reads: "EO C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The discharge gas temperature is displayed.
The display reads: "dC C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The suction gas temperature is displayed.
The display reads: "SG C".
(In ˚C or ˚F.)

LED: The control opening is displayed.
LCD: The suction modulating valve opening is displayed.
The display reads: "SMV ".
(In % : 0 to 100%)

LED: The control opening is displayed.
LCD: The electronic expansion valve opening is displayed.
The display reads: "EV ".
(In % : 0 to 100%)

(Displayed only during PTI)
LED: The PTI selection and the step No. are displayed.
LCD: The supply air temperature is displayed.
The display reads: "SS C".
(In ˚C or ˚F.)

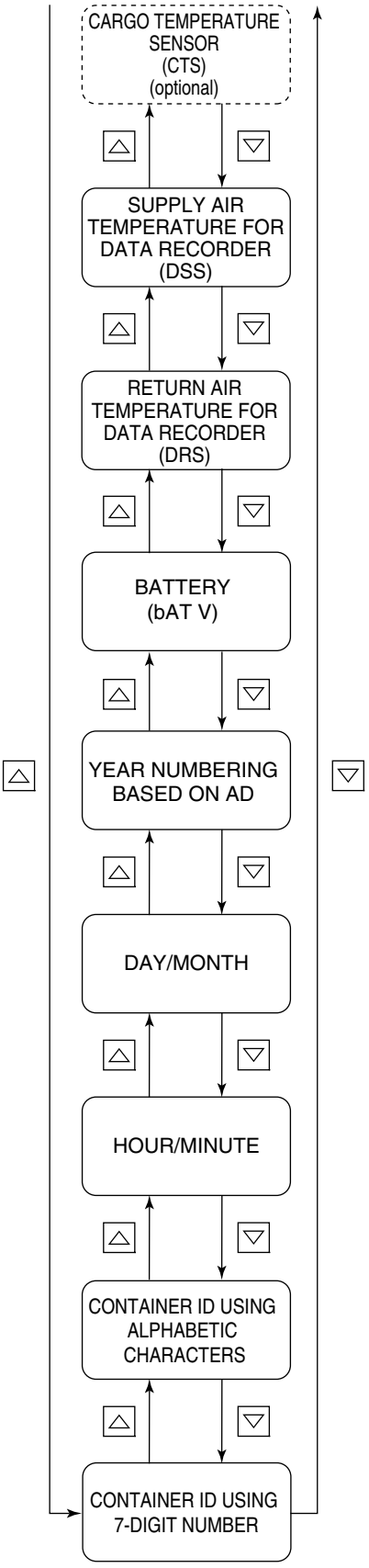
(Displayed only during PTI)
LED: The PTI selection and the step No. are displayed.
LCD: The return air temperature is displayed.
The display reads: "RS C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The pulp temperature is displayed.
The display reads: "1US C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The pulp temperature is displayed.
The display reads: "2US C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The pulp temperature is displayed.
The display reads: "3US C".
(In ˚C or ˚F.)

6. SENSOR INDICATION MODE (Continued from the previous page)



LED: The control temperature is displayed.
LCD: The pulp temperature is displayed.
The display reads: "CS C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The return air temperature for data recorder is displayed.
The display reads: "dS C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The supply air temperature for data recorder is displayed.
The display reads: "dR C".
(In ˚C or ˚F.)

LED: The control temperature is displayed.
LCD: The remaining voltage is displayed.
This is displayed as "bAT V"
(The unit is V.)

(Not displayed during PTI)
LED: The year based on AD system is displayed.
LCD: The year is displayed.
This is displayed as "YEAR".

(Not displayed during PTI)
LED: Day/Month is displayed.
LCD: The day and month are displayed.
This is displayed as "dAY/MON".

(Not displayed during PTI)
LED: Hour/Minute is displayed.
LCD: The time is displayed.
This is displayed as "TIME".

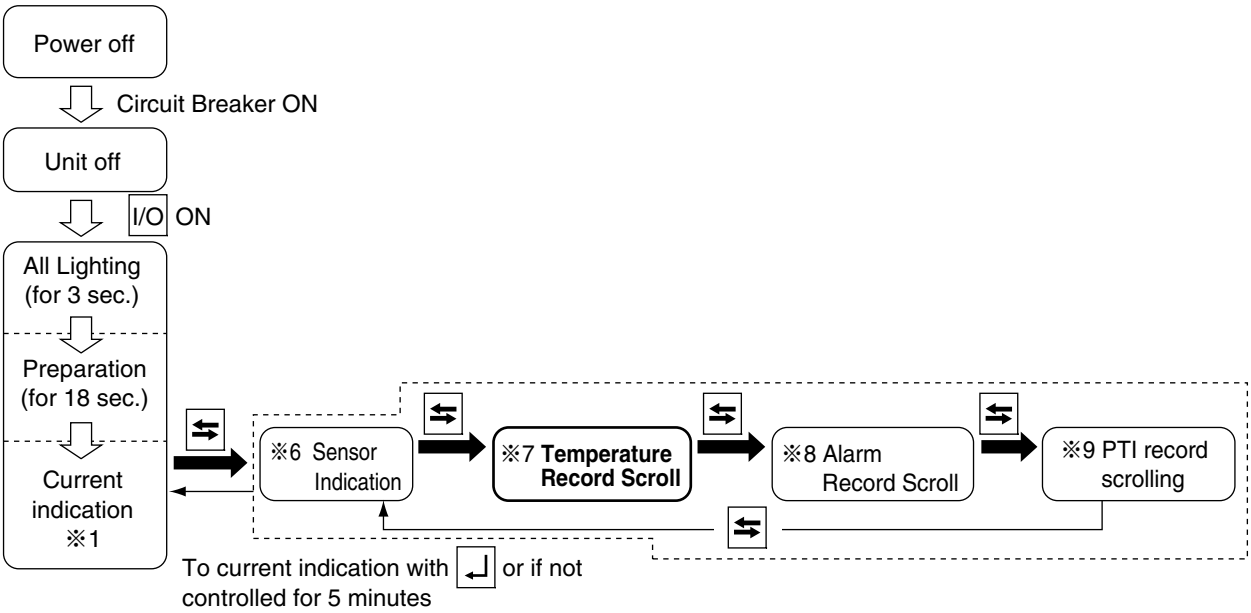
(Not displayed during PTI)
LED: I.d.-C is displayed.
LCD: The ID is displayed using alphabetic characters.
This is displayed as "****".
(ex. dilu)

(Not displayed during PTI)
LED: I.d.-N is displayed.
LCD: The ID is displayed using 7-digit number.
This is displayed as "*******".
(ex. 1234567)

7. TEMPERATURE RECORD SCROLL MODE

The records of the control sensor are displayed successively (one record per second) starting from the latest data. (A maximum of 7 days)

<Mode selection procedure>



<Operation procedure>

The LED indicates the control temperature, and the LCD displays the data/time and the data record temperature in turn. (In frozen mode, the return air temperature is the controlled temperature, and in chilled mode, the supply air temperature is the control temperature.)

Press the △ key or ▽ key to pause the successive display of records. After the pause, the successive (scrolling) display will be resumed if no key operation is done for 10 seconds.
Keep the ▽ key pressed for 3 seconds to view the data again from the beginning.

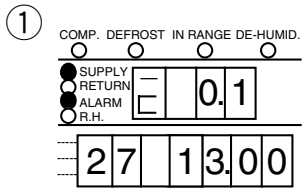
To restore the current indication mode, press the ↵ key.
If key operation is not performed within 5 minutes, the current indication mode is resumed.

● Example of TEMPERATURE RECORD SCROLL INDICATION MODE

※ It is assumed that the control temperature is the supply air temperature (SS) and the logging interval is 1 hour, and the current date and time are June 27, 2008, 14:00.

⚠ CAUTION

The displayed temperature is not the current instantaneous value but an average taken in a specific logging interval. Therefore, the printed control temperature on the trip report (instantaneous value) printed with the aid of personal computer may differ from the sensor data of the chartless function.
This is not an error.

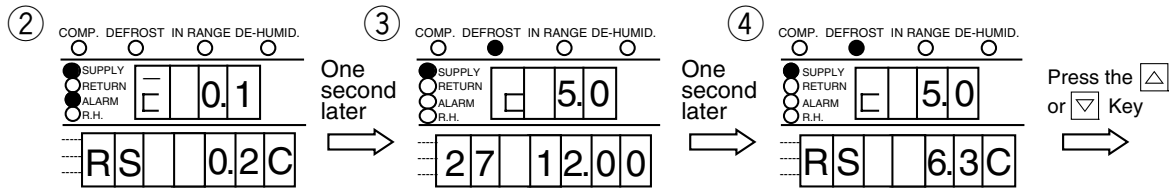


Example:
Operation data at 1:00 pm, June 27, 2008
SS= −0.1 ˚C
SUPPLY LED lights on.
ALARM LED lights on (when alarms exist).

One second later

To restart, press and hold the ▽ key for 3 seconds.

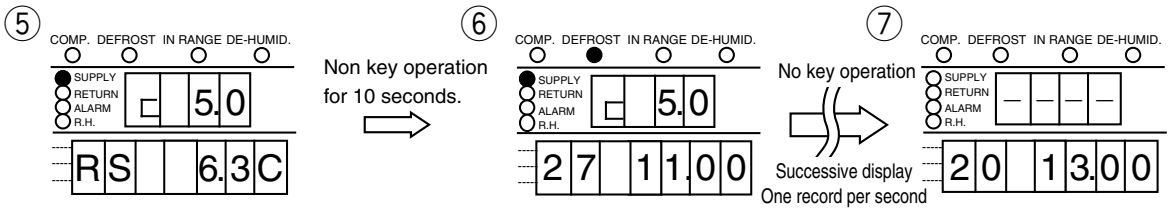
※To go back to the current indication mode, press the ↵ key.
※If key operation is not performed within 5 minutes, the current indication mode screen is resumed.



An example.
p.m. 1:00 June 27, 2008
RS= 0. 2 ˚C
SS= −0.1 ˚C
SUPPLY LED lights on.
ALARM LED lights on
(when alarms exist).

p.m.12:00 June
27, 2008
SS= 5.0 ˚C
DEFROST LED lights on.
(during defrosting)

p.m.12:00 June
27, 2008
SS= 5.0 ˚C
RS= 6.3 ˚C
DEFROST LED lights on.
(during defrosting)



Stop on the data of
p.m. 12:00 June 27, 2008

Example: The successive display is resumed at every 1-hour logging intervals from the data stopped at 12:00 p.m., June 27, 2008.

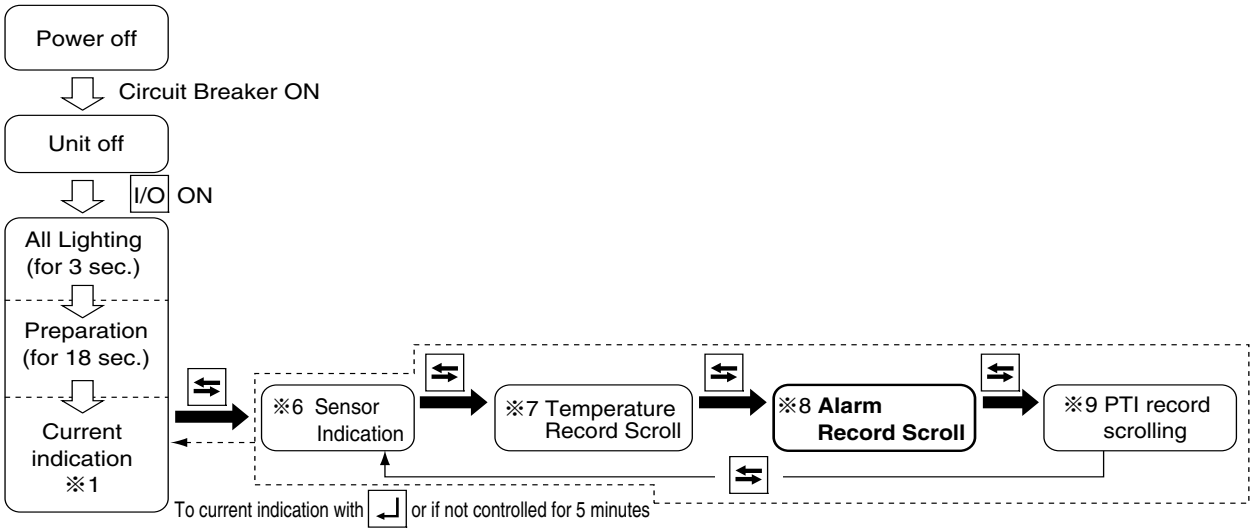
After completion of indication of the oldest data (Final indication)

Note: "⊏" on the leftmost of the LED shows that the indication is of the temperature record scroll indication mode.

8. ALARM RECORD SCROLL MODE

The records of alarms are displayed successively (one record per second) starting from the latest one. (Alarms for a maximum of 7 days)

<Mode selection procedure>



<Operation procedure>

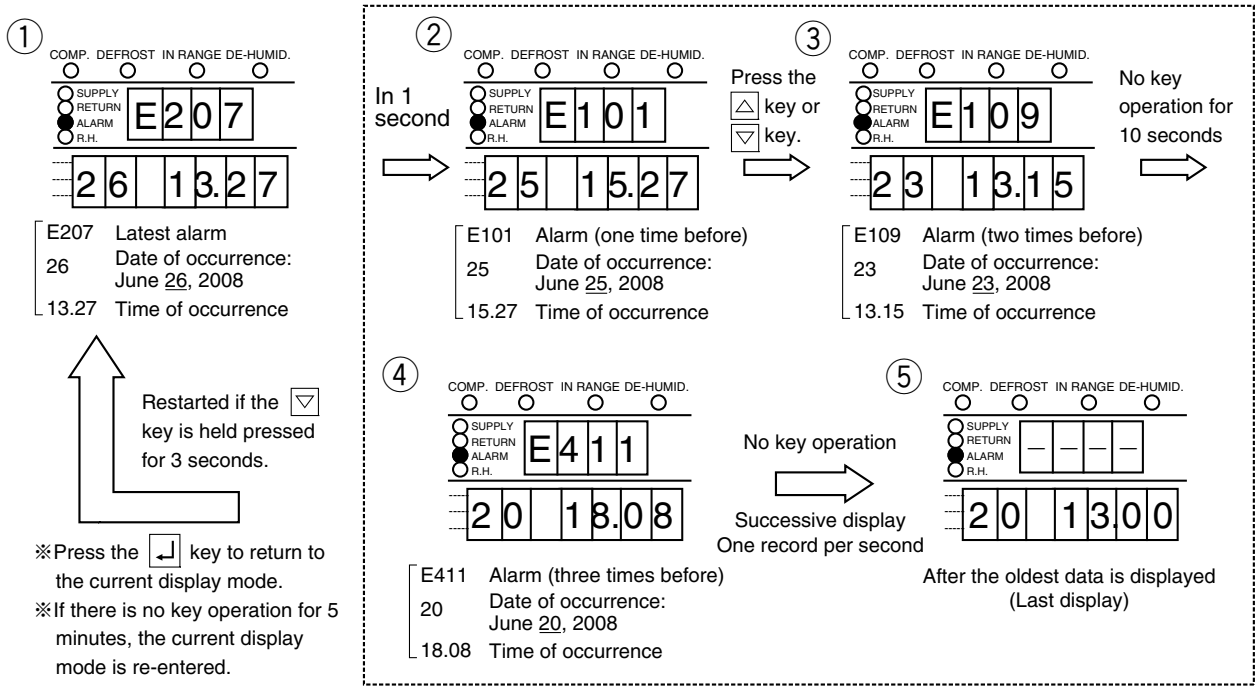
The alarm codes are displayed in the LED, and the alarm occurrence time and date are displayed in the LCD.

Press the △ key or ▽ key to pause the successive display of records. After the pause, the successive (scrolling) display will resume if there is no key operation for 10 seconds.
Keep the ▽ key pressed for 3 seconds to view the data again from the beginning.

Press the ↵ key to return to the current display mode screen.
If there is no key operation for 5 minutes, the current display mode screen reappears.

●Example of alarm record scroll mode display

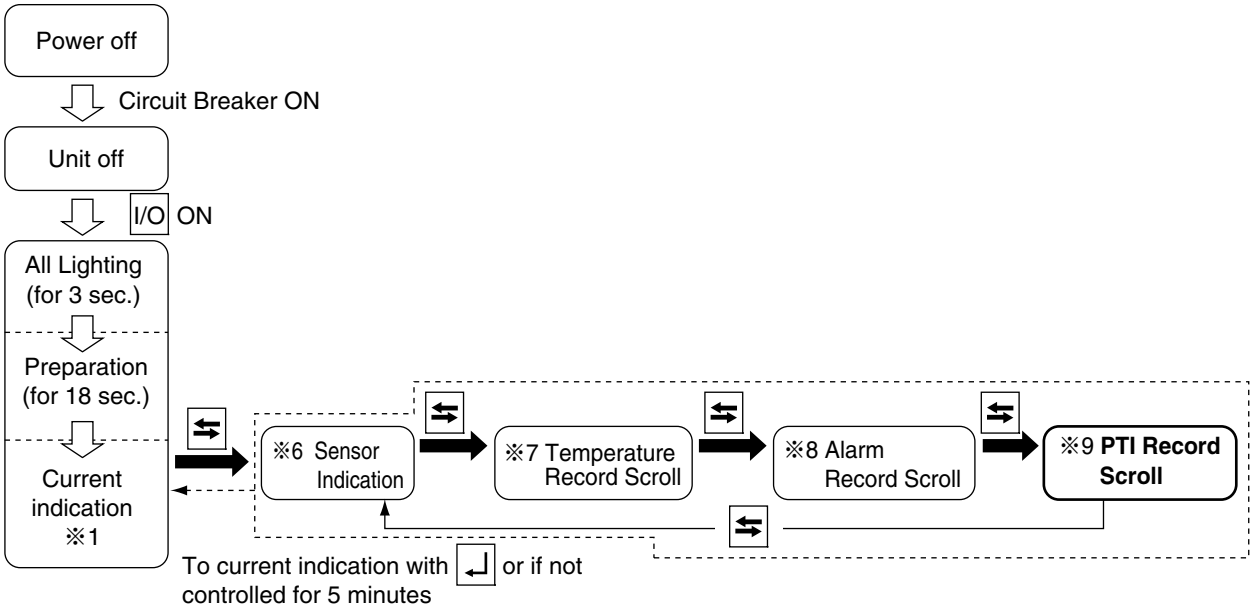
※The example below is based on the presumption that the current time is around 14:00, June 27,



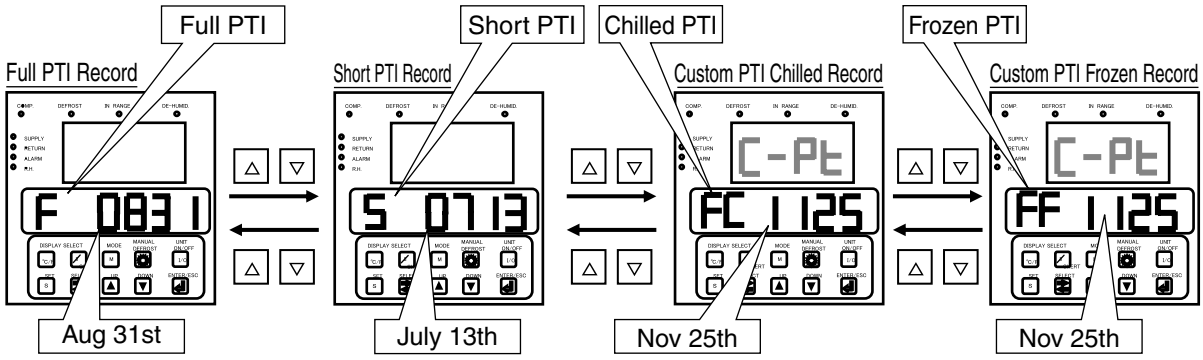
9. PTI RECORD SCROLL MODE

The record is shown in sequence (scroll) starting with the latest data.

<Mode selection procedure>



The controller displays "time and date" and "FULL PTI, SHORT PTI, or CUSTOM PTI" as shown below.

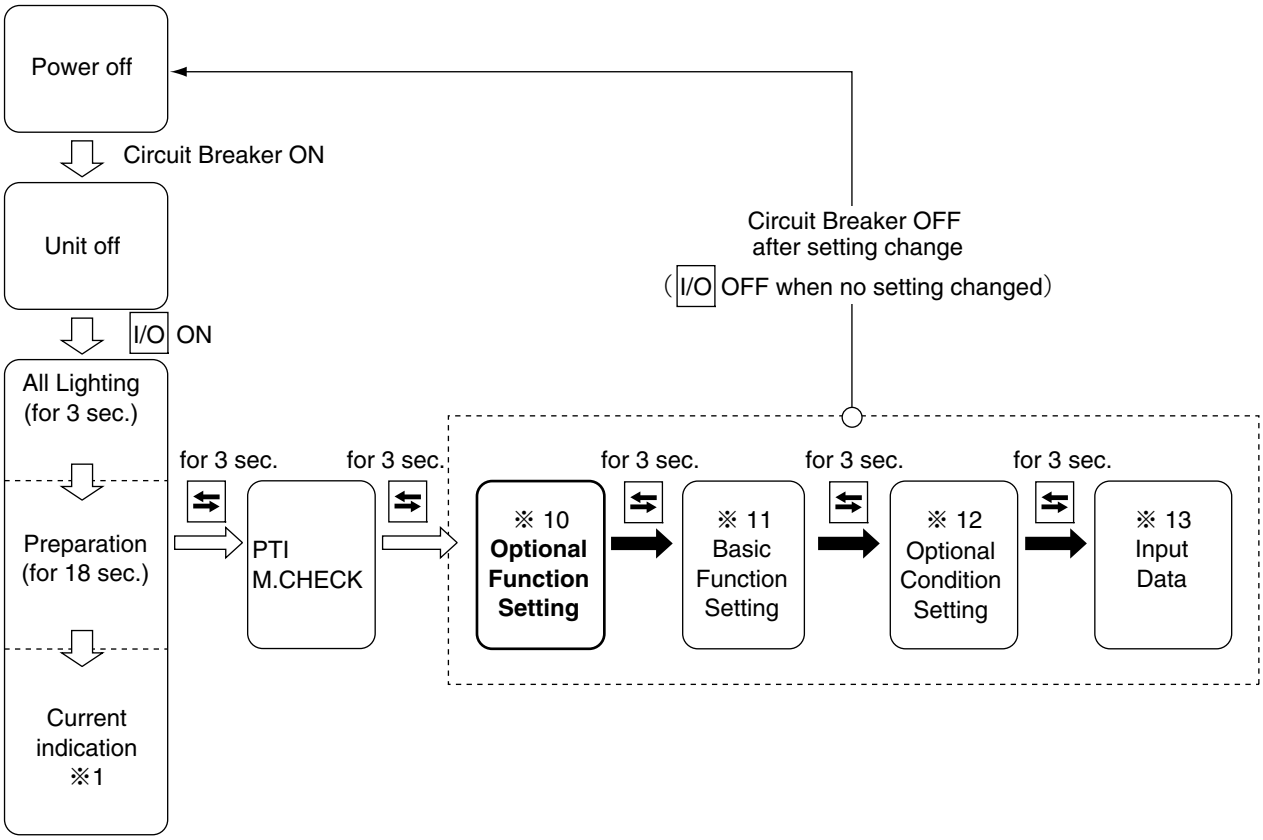


Indicated as below in LCD display when there is no PTI data (applicable for scroll mode and battery mode).

F-PTI : F ---- S-PTI : S ---- FC-PTI : FC --- FF-PTI : FF ---

10. OPTIONAL FUNCTION SETTING MODE

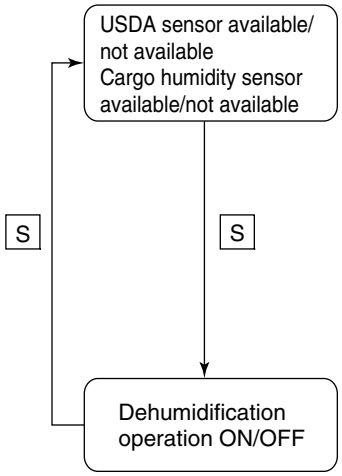
<Key operation to enter/exit>



<Key operation in this mode>

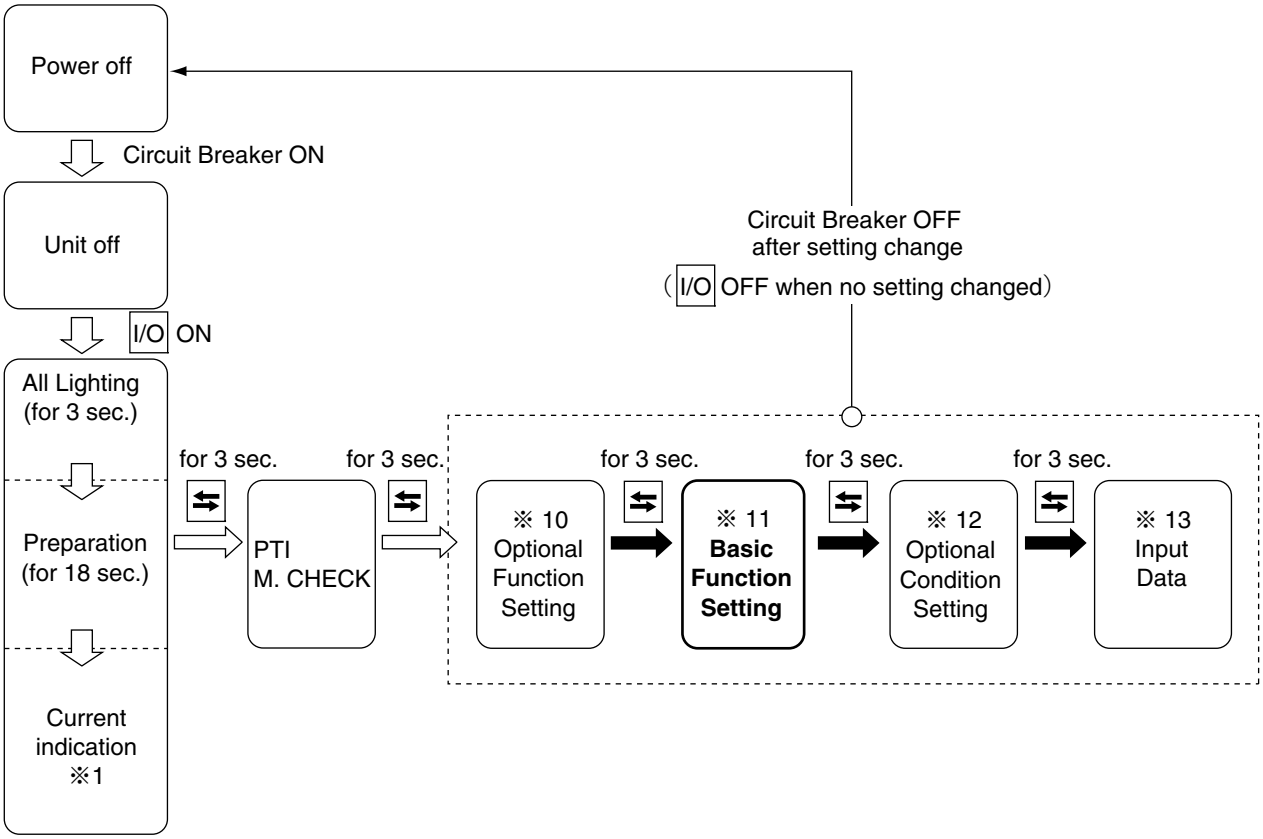
Whenever the S key is pressed, the display changes.

To confirm the setting, turn the power breaker OFF after the setting.

Indications or setting items	LED screen	LCD screen	Setting method
	OFF: USDA sensor not available 3 : 3 USDA sensors 4 : 3 USDA sensors and 1 cargo temperature sensor Au : To measure the temperature inside or cargo temperature for the purposes other than cold treatment transport, USDA sensor can record the temperatures ranging from −38℃ to +40℃. Don't use it for cold treatment transport because it does not meet the USDA standards.	USdA	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: "3" is set automatically if 2 USDA sensors are connected.
	ON : Dehumidification operation with dehumidification sensor installed ON-A: Dehumidification operation without dehumidification sensor OFF : No dehumidification operation Note : Check if the dehumidification coil available or not available in 2.3.2 (11. Basic function setting mode)	dHU	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: The dehumidification can be turned ON and OFF during the mode operation described in 2.2.2 (4. MODE OPERATION)

11. BASIC FUNCTION SETTING MODE

<Key operation to enter/exit>



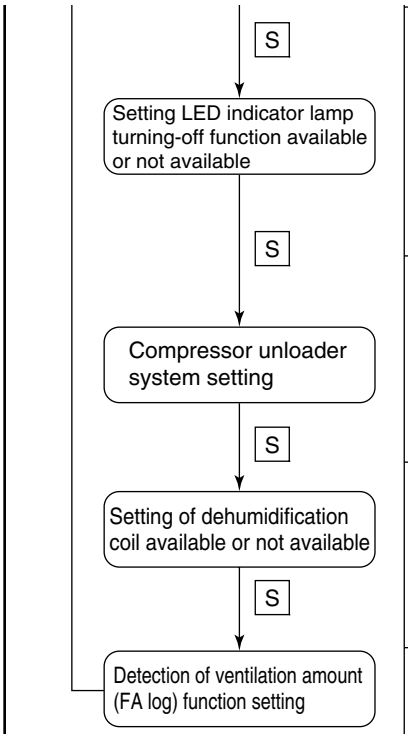
<Key operation in this mode>

Whenever the S key is pressed, the display changes.

To confirm the setting, turn the power breaker OFF after the setting.

Indications or setting items	LED screen	LCD screen	Setting method
Controller setting	A: DECOS-Ⅲa d: DECOS-Ⅲd b: DECOS-Ⅲb e: DECOS-Ⅲe c: DECOS-Ⅲc f: DECOS-Ⅲf	dECOS-3	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.
S Logging interval setting	15, 30, 60 and 120 (The unit is minute)	LOG INT	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.
S Data recorder sensor available or not available setting	ON : Data recorder sensor available OFF: Data recorder sensor not available	REC SEN	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.
S Power supply setting	Sing : In case of normal power supply dUAL: If the DUAL power supply (Optional) is available	OC-SET	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.
S Horsepower setting	5 : If the compressor corresponds to 5 horsepower (Only some units of Decos Ⅲa) 10: If the compressor corresponds to 10 horsepower	HP	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.

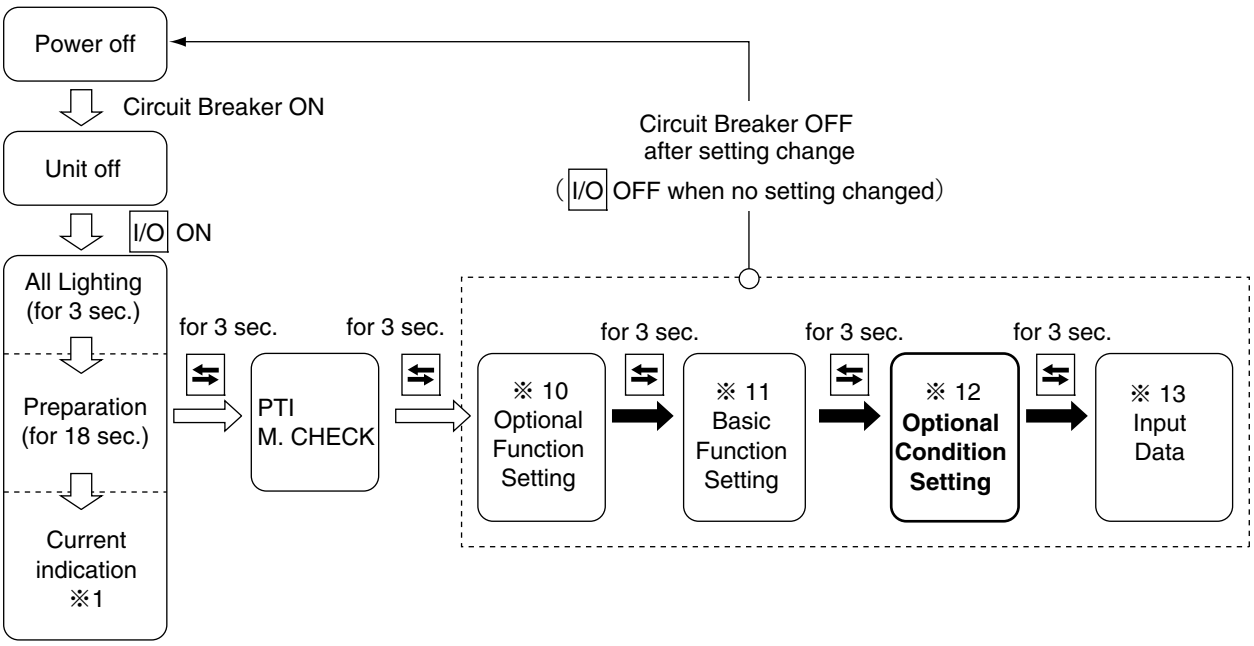
11. BASIC FUNCTION SETTING MODE (Continued from the previous page)



ON : Turning-on function available OFF: Turning-off function not available	diSP	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: If turned "ON", the LED display becomes unlit by pressing the 0/ CHART key twice.
33 : Unloader system available 100: Unloader system not available	COMP	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: "33" is applicable only for LXE10D.
ON : Dehumidification coil available OFF: Dehumidification coil not available Note: For the unit equipped with reheat coil, be sure to select ON.	REHEAT	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.
OFF: Detection function not available H : Detection function available at the upper ventilator L : Detection function available at the lower ventilator	FA SEN	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.

12. OPTIONAL CONDITION SETTING MODE

<Key operation to enter/exit>



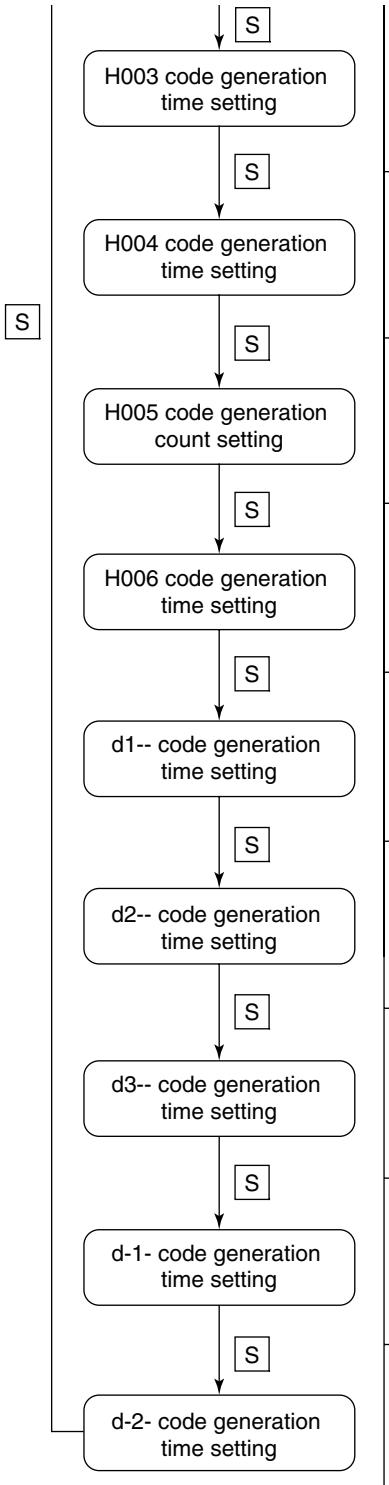
<Key operation in this mode>

Whenever the S key is pressed, the indication changes.

To confirm setting, turn the power breaker OFF after the setting.

Indications or setting items	LED screen	LCD screen	Setting method
Temperature & pressure display unit setting	C: Temperature unit = ˚C, Pressure unit = kPa, F: Temperature unit = ˚F, Pressure unit = PSI	dEG C/F	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection.
S → Chartless code (H code & D code) Display setting	ON : H code and D code are displayed. OFF: H code and D code are not displayed.	CHARTLS	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3 for details about H & d codes.
S → USDA sensor type setting	1: ST9702-1 sensor 2: NTC type probe sensor	USDA1/2	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: For details, refer to section 4.1.
S → H001 code generation temperature setting	The temperature at which the H001 code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is ˚C.)	H001	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.2.
S → H002 code generation time setting	The time at which the H002 code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour)	H002	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.2

12. OPTIONAL CONDITION SETTING MODE (Continued from the previous page)

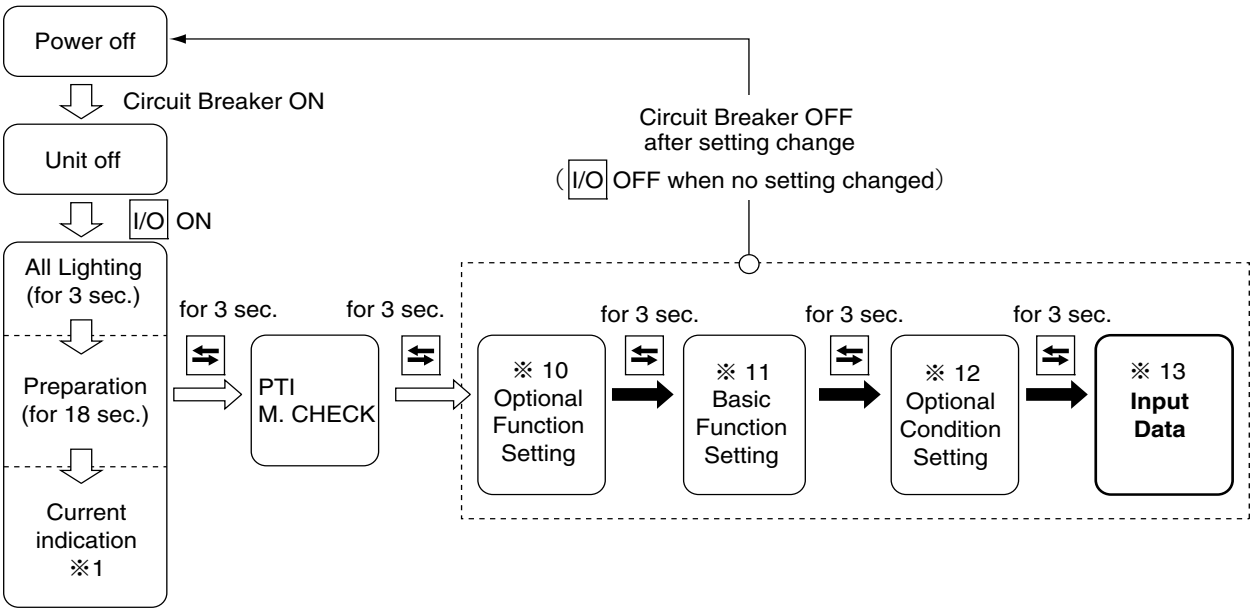


The time at which the H003 code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour.)	H003	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.2.
The temperature at which the H004 code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is ˚C.)	H004	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.2.
The number of times of defrosting operations which generate the H005 is set. 1, 2, 3, 4, 5, 10 (The unit is number of times.)	H005	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.2.
The time at which the H006 code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is number of times.)	H006	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.2.
The time at which the d1- code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour.)	d1--	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.3.
The time at which the d2- code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour.)	d2--	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.3.
The time at which the d3- code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour.)	d3--	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.3.
The time at which the d-1- code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour.)	d-1-	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.3.
The time at which the d-2- code is generated is set. 1, 2, 3, 4, 5, 10 (The unit is hour.)	d-2-	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection. Note: Refer to section 2.8.3.3.

13. INPUT DATA MODE

Each of the following item data can be input.
Container I.D. (No.) input and controller and controller time

<Key operation to enter/exit>



<Key operation in this mode>

Whenever the S key is pressed, the indication changes.
To confirm the setting, turn OFF the circuit breaker.

Indications or setting items	LED screen	LCD screen	Setting method
Input the container I.D. (No.)		SET I.d	Press the ↵ key to go to the lower screen.
	I.d.- C: To the screen in which the shipping company name is input I.d.- n : To the screen in which the number is input	XXXX (4 alphabetical characters)	Make selection by pressing the △ key and ▽ key. Press the ↵ key to go to each input screen.
	<Input of shipping company name> I.d.-C	XXXX (4 alphabetical characters) The characters being selected blink. First, the leftmost character starts to blink.	Change the blinking character using the △ key and ▽ key. If the ↵ key is pressed, the blinking character moves to the right. If the ↵ key is pressed while the rightmost character is lit, the input is confirmed and the number input screen appears.
S S	<Input of numbers> I.d.-n	XXXXXXX (7 numbers) The characters being selected blink. First, the leftmost character starts to blink	Change the blinking number using the △ key and ▽ key. If the ↵ key is pressed, the blinking number moves to the right. If the ↵ key is pressed while the rightmost number is lit, the input is confirmed. Note: If the number is incorrect, the input cannot be confirmed and the screen in which the shipping company name appears.

13. INPUT DATA MODE (Continued from the previous page)

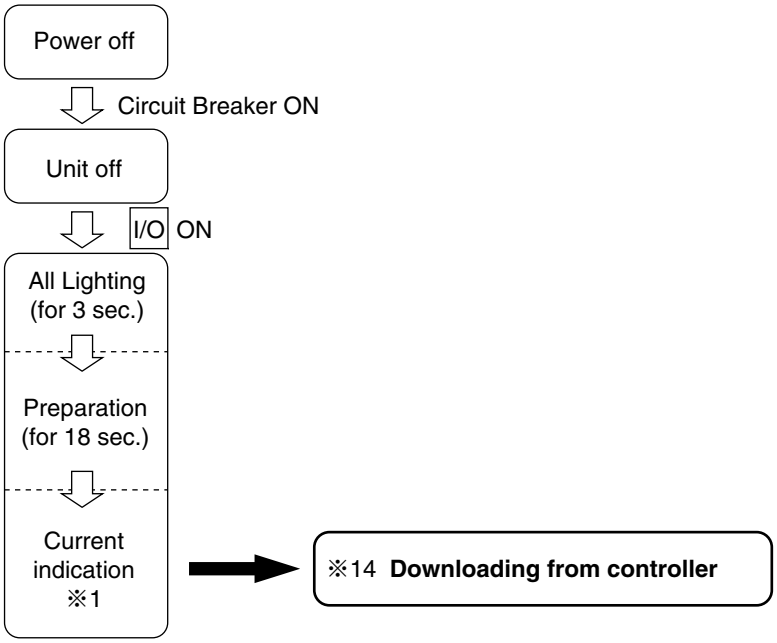
Controller time input

——	SET TIME	Press the ↵ key to go to the subsequent "Year" setting screen.
20XX (The A.D. year currently set)	YEAR	The value can be increased or decreased by using the △ key and ▽ key. Press the ↵ key to confirm the selection and go to the subsequent "Month" setting screen.
XX (The month currently set)	MONTH	The value can be increased or decreased by using the △ key and ▽ key. Press the ↵ key to confirm the selection and go to the subsequent "Day" setting screen.
XX (The day currently set)	dAY	Make the setting in the same manner as described above. Confirm the selection to go to the subsequent "Hour" setting screen.
XX (The hour currently set)	HOUR	Make the setting in the same manner as described above. Confirm the selection to go to the subsequent "Minute" setting screen.
XX (The minute currently set)	MINUTE	Make the setting in the same manner as described above.

14. CONTROLLER SOFTWARE DOWNLOAD MODE

The data on personal computer and a controller are interchanged in this mode.
For details, see the Operation Manual for Personal computer software.
Downloading is possible even in "3. BATTTERY MODE". page 2-9.

<Key operation to enter/exit>



2.3 Alarm display and back-up function

2.3.1 Alarm list

Alarm grouping	Alarm code	Alarm content	Action with alarm
Permanent stop	F101	The high-pressure switch (HPS) contact is open	The whole unit stops
		When the high-pressure switch (HPS) is faulty before the compressor starts to operate	
		The fuse (Fu1) is blown	
		Faulty controller	
	F109	The low pressure becomes –90KPa or less within 2 seconds after the compressor starts to operate	The whole unit stops
	F111	Communication error between the CPU board and the IO board	Restarts after a 3-minute standby
	F301	Temperature setting request	The whole unit stops
	F401 F403	Supply air temperature sensor SS fault Return air temperature sensor RS fault	The whole unit stops
	F603	The suction modulating valve (SMV) activation fault	The whole unit stops
		The default setting for the controller model is wrong	
	F701	The power supply voltage error is detected within 2 seconds after the power is turned on (more than 535V, less than 300V)	The whole unit stops
	F705	S phase is open phase	The whole unit stops
	F803	If any of the following conditions is applicable 1) E107 is generated twice due to EV opening error 2) 2 evaporator fans are judged as abnormal (refer to E205) 3) Welding of the magnetic switch of the compressor 4) Failures are present in any 2 of the HPT sensor, LPT sensor, DCHS sensor	The whole unit stops
Display alone or restortable alarm	E101	The high-pressure switch (HPS) is activated during normal operation	Restarts after a 3-minute standby
	E103	Operating current of the compressor is high (electronic type OC)	Restarts after a 3-minute standby
	E105	Operating current of the compressor is high (microcomputer type OC)	Restarts after a 3-minute standby
	E107	The discharge gas temperature is excessively high	Restarts after a 3-minute standby
		Refrigerant shortage is detected (EV opening large)	
		F803 is displayed when E107 occurs twice because of EV opening abnormality	
	E109	The low pressure remains at –90KPa or less for 2 seconds during normal operation	Restarts after a 3-minute standby
		The low pressure remains more than 400KPa for 5 minutes	
	E201	Pump down is not completed within 120 seconds	Only abnormal indication
	E203	Overcooling prevention (control sensor <=SP-3.0) continues for 3 minutes in the chilled mode	Restarts after a 3-minute standby
	E205	The evaporator fan motor stops	Only abnormal indication
	E207	Defrosting is not completed within 100 minutes	Only abnormal indication
	E303	Humidity setting request / dHU is set to ON when REHEAT set to OFF.	Only abnormal indication
	E305	Defrosting timer setting request	Only abnormal indication
	E307	Calendar setting request	Only abnormal indication
	E311	Trip start setting request	Only abnormal indication
	E315	Failure in the PT/CT board	Restarts after a 3-minute standby
	E401	Supply air temperature sensor (SS) fault	Backup operation
	E402	Data recorder supply air temperature sensor (DSS) fault	Backup operation
	E403	Return air temperature sensor (RS) fault	Backup operation
	E404	Data recorder return air temperature sensor (DRS) fault	Backup operation
	E405	Discharge gas temperature sensor (DCHS) fault	Only abnormal indication
	E406	Suction gas temperature sensor (SGS) fault	Backup operation
	E407	Evaporator inlet pipe temperature sensor (EIS) fault	Backup operation
	E409	Evaporator outlet pipe temperature sensor (EOS) fault	Backup operation
	E411	Ambient temperature sensor (AMBS) fault	Only abnormal indication
	E413	Low pressure sensor (LPT) fault	Backup operation
	E415	High pressure sensor (HPT) fault	Backup operation
	E425	Pulp temperature sensor (USDA1) fault	Only abnormal indication
	E427	Pulp temperature sensor (USDA2) fault	Only abnormal indication
	E429	Pulp temperature sensor (USDA3) fault	Only abnormal indication
	E431	Humidity sensor (HuS) fault	Only abnormal indication
	E433	Cargo temperature sensor (CTS) fault	Only abnormal indication
	E417	Voltage sensor (PT1) fault	Only abnormal indication
	E421	Current sensor (CT1) fault	Only abnormal indication
	E423	Current sensor (CT2) fault	Restarts after a 3-minute standby
	E603	Suction modulating valve (SMV) wiring fault, drive circuit fault or controller setting error	Backup operation
	E607	Faulty contact point of manual defrost key (sheet key)	Only abnormal indication
	E707	Instantaneous voltage failure shutdown Power supply voltage failure shutdown during operation (more than 535V, less than 300V)	Restarts after a 3-minute standby
	E801	Flat battery of the CPU board	Only abnormal indication
	E805	Ventilation opening detection failure The default setting failure for the controller and FA SEN	Only abnormal indication
	E807	The ventilator is openned during frozen operation	Only abnormal indication

Code	Description	Abnormal LED	
		Operation	AUTO PTI
FXXX	Serious trouble such as the temperature inside out of in-range or the unit stoppage.	○	○
EXXX	Not dangerous situation with the temperature inside within in-range. Backup operation is executed in most cases.	●	○
HXXX	Information code: When the temperature inside is out of in-range (alternative to the temperature recorder)	●	
DXXX	Information code: When the temperature inside is out of in-range (alternative to the temperature recorder)	●	
JXXX	Displayed in J code when judged as abnormal by AUTO PTI		○
PXXX	The unit is in the pull down process. "XXX" indicates the pull down time	○	

○LED on ●LED off

2.3.2 Backup operation at the time of control sensor (SS, RS) abnormality

Control sensor	Alarm at the time of control sensor abnormality	Operation at each control mode		Backup at the time of control sensor abnormality	
		Chilled	Frozen	First stage	Second stage
SS	E401	Backup	Normal operation continued	DSS	RS-2.0˚C
RS	E403	Normal operation continued	Backup	DRS	SS+5.0˚C

SS : Supply air temperature sensor
RS : Return air temperature sensor
DSS : Supply air temperature for data recorder
DRS : Return air temperature sensor for data recorder

2.3.3 Backup operation at the time of sensor abnormality

Abnormal sensor		Mode	Backup operation method
AMBS	Ambient temperature air sensor	All modes	Only abnormal indication (Operation continued)
DCHS	Discharge gas temperature sensor	Chilled	Only abnormal indication (Operation continued)
		Frozen Defrosting	Only abnormal indication (Operation continued)
EIS	Evaporator inlet sensor	Chilled	Only abnormal indication (Operation continued)
		Frozen	See the next page
		Defrosting	Only abnormal indication (Operation continued)
EOS	Evaporator outlet sensor	Chilled	Only abnormal indication (Operation continued)
		Frozen	See the next page
		Defrosting	Defrosting initiation: permission given at any time Defrosting termination: terminating when the timer has reached 100 minutes or EIS has exceeded 90˚C or RS has exceeded the set temperature
SGS	Suction gas temperature sensor	Chilled	Only abnormal indication (Operation continued)
		Frozen	See the next page
		Defrosting	Only abnormal indication (Operation continued)
HPT	High pressure sensor	Chilled, Frozen	Only abnormal indication (Operation continued)
		Defrosting	Charge: Only abnormal indication (Operation continued) Release: Executed by LPT
LPT	Low pressure sensor	Chilled, Frozen	Only abnormal indication (Operation continued)
		Defrosting	Charge: Executed by HPT Pump down: No pump down (Operation continued)

●Back-up for temperature sensors (EIS, EOS, SGS) at frozen mode (superheat control)

No.	Evaporator inlet sensor EIS	Evaporator outlet sensor EOS	Compressor suction gas sensor SGS	Back-up operation
1	Normal	Normal	Normal	superheat control
2	Normal	Normal	Abnormal	superheat control
3	Normal	Abnormal	Normal	Liquid refrigerant back prevention to compressor by EIS and SGS
4	Normal	Abnormal	Abnormal	Expansion valve fixed opening rate control
5	Abnormal	Normal	Normal	Liquid refrigerant back prevention to compressor by EOS and SGS
6	Abnormal	Normal	Abnormal	Expansion valve fixed opening rate control
7	Abnormal	Abnormal	Normal	Expansion valve fixed opening rate control
8	Abnormal	Abnormal	Abnormal	Expansion valve fixed opening rate control

2.4 Back Up Battery

2.4.1 Function

When commercial power supply is not available, backup battery can be used as power supply to display and set the following items.
Refer to 2.2.2 (3. Battery mode).

1) Display function
   - Return air temperature indication (RS)
   - Supply air temperature indication (SS)
   - Ventilation amount indication (FA)
   - USDA & CTS temperature indication
   - High pressure indication (HPT)
   - Low pressure indication (LPT)
   - Full-PTI record indication
   - Short-PTI operation day record indication
   - Chilled-PTI operation day record indication
   - Frozen-PTI operation day record indication
   - Remaining battery voltage indication (BAT)

2) Setting function
   - Control temperature setting (SP)
   - Control humidity setting (RH)
   - Defrosting interval setting (Def)

2.4.2 Checking the remaining battery voltage

1) Checking the remaining battery voltage

The remaining battery voltage can be checked during operation in accordance with 2.2.2 (6. Sensor indication mode).

When the unit does not run or commercial power supply is not available, the remaining battery voltage can be checked in accordance with 2.2.2 (3. Battery mode).

The remaining voltage
7.6V or more: The battery has been charged.
7.5V or less : The battery may have deteriorated. It is recommendable to replace the battery.
7.1V or less : The battery has deteriorated. The battery must be replaced.

●Things to keep in mind when checking the remaining voltage

Make sure that the unit has run for 14 hours at least or commercial power supply has recharged for 14 hours at least with the circuit breaker ON (the unit OFF) before checking the remaining voltage.
Recharging for 14 hours at least is a must.

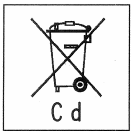
Note 1: Because of the battery property, accurate remaining voltage cannot be obtained if not fully charged.
Note 2: The remaining voltage during recharging, under the recharger's influence, is indicated (blinking) higher than it should be.

2) Rechargeable battery

The battery life is approximately 2 years. In the event of using the battery for 2 years or more, data logging etc. may not be executed when the power is turned off even if the LCD screen indicates that the remaining voltage is 7.6V or more.

3) The remaining voltage for dry batteries can be checked, but replace the new ones before a voyage as needed basis such as refrigerated transport (USDA). Don’t judge by the remaining voltage.

2.4.3 Handling used batteries



This symbol is added to the rechargeable battery attached to the unit.
This means that the batteries shall not be mixed with unsorted Household waste.
If a chemical symbol is printed beneath the symbol, this chemical symbol means that the battery contains a heavy metal above a certain concentration. Possible chemical symbols are Cadmium Cd:lead(>0,002%)
Waste batteries must be treated at a specialized treatment facility. By ensuring waste batteries are disposed off correctly, you will help to prevent potential negative consequences for the environment and human health.

In addition, the used batteries, please send to our certified stores or the satellite parts centers as follows.

Please send batteries replaced in EU member nations to the following address.

DAIKIN REFRIGERATION OFFICE
FASCINATIO BOULEVARD 562 CAPELLE
A/D IJSSEL NETHERLANDS 2909 VA
TEL: +31-(0)10-286-2090
FAX: +31-(0)10-286-2099

2.5 Information interchange with personal computer

The electronic controller DECOS Ⅲe,f has a internal memory function to record the set point temperature, inside temperature, operation mode, occurrence alarm and the report of automatic PTI during transportation in addition to the normal operation control.
Also users can retrieve the logging data and operations condition of the unit and save the information on a personal computer through the serial communication port (personal computer receptacle) provided on the controller front panel. The retrieved data is useful to analyze any problems that occurred during transportation and to prepare various kinds of reports.
Moreover, users can up-load the information such as the container No., cargo name, destination and other information from their personal computer to the controller.
Refer to the Operation Manual for Personal Computer Software for detail.

2.5.1 Data logging

The data logging function is to store operation data which is generated during navigation.
There are seven kinds of logging data.
For Trip data, its logging interval can be selected from 15, 30, 60 (default) and 120 minutes.
※Controller has Max. 2 years capacity at 60 min log interval.

	Type	Logging data
1	ID data	● Setting temperature ● Container ID ● Setting ventilation amount ● Setting humidity
2	Trip data	● Operation date (year, month, day) ● Outside air temperature ● Operation time ● Setting humidity (Optional) ● Setting temperature ● Humidity (Optional) ● Supply air temperature for data recorder ● Operation mode ● Discharge air temperature for data recorder ● Supply air temperature ● Discharge air temperature
3	USDA (Optional)	● Pulp temperature sensor USDA #1 to #3 ● Year/month/day/time ● Logging interval of 1 hour
4	USDA+CTS (Optional)	● Pulp temperature sensor USDA #1 to #3 ● Cargo temperature sensor CTS ● Year/month/day/time ● Logging interval of 1 hour
5	Event	● Power ON/OFF ● Defrosting interval setting change ● Unit ON/OFF ● Defrosting IN/OUT ● Setting temperature change ● PTI startup and result ● G-set setting ● Setting humidity change ● Battery mode startup ● FA log (optional)
6	Alarm	● Alarm occurrence date (year/month/day) ● Alarm code
7	PTI	● SHORT PTI ● CHILLED PTI ● FULL PTI ● FROZEN PTI
8	Software version	● Version of the software installed in the controller
9	Controller serial number	Serial number of the controller

Logged data can be retrieved with the aid of personal computer software.
Refer to the Operation Manual for Personal Computer Software for detail.

2.6 INSTALLATION OF SOFTWARE

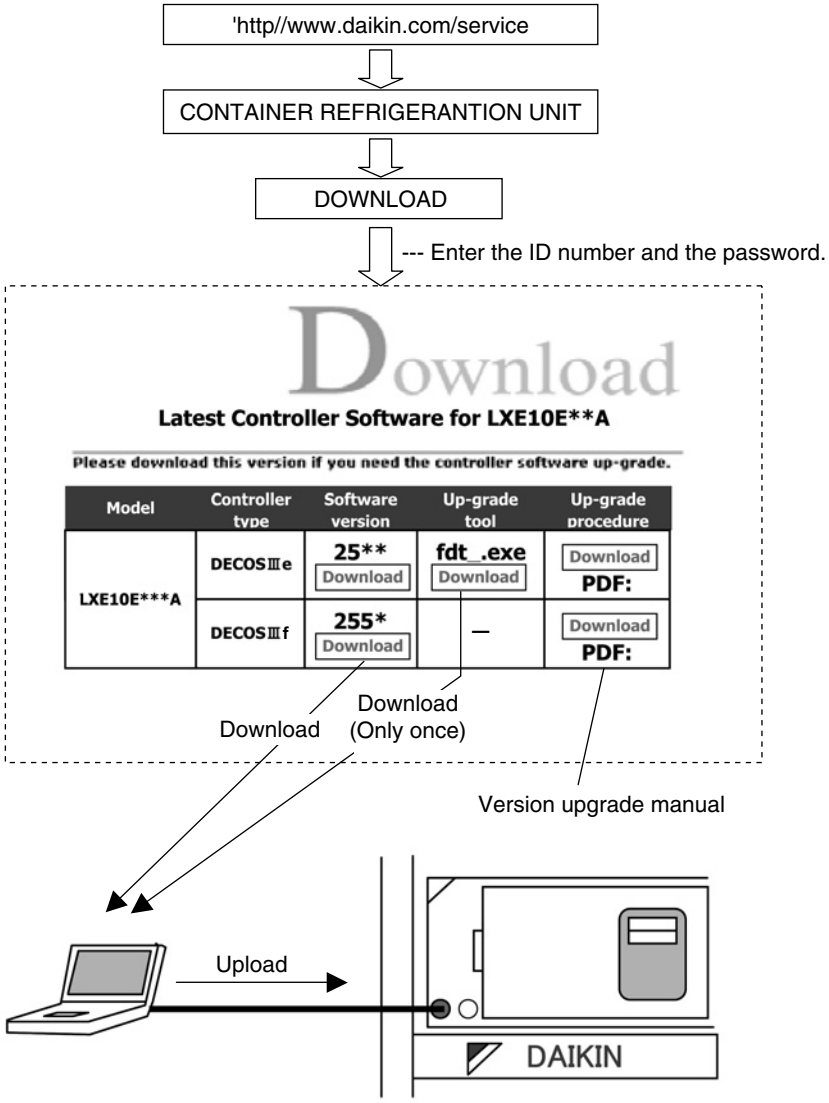
2.6.1 INSTALLATION OF SOFTWARE OF LATEST VERSION (VERSION UPGRADE)

●Items required

1. Personal computer (with Windows 2000 or Windows XP installed)
2. Communication cable
3. Tool for software version upgrade (DECOS Ⅲe only) (fdt_4_00_2.exe)
4. Software for controller DECOS Ⅲe,f

After the replacement with the spare parts controller, the software needs to be upgraded. Download the software of the latest version and the tool for version upgrade (only once) from the DAIKIN HOME PAGE by following the procedure shown below.

Note: The unit is operated by using the software already installed in the controller. However, ensure that the software is upgraded to implement optimal operation.



CAUTION

Never turn the power OFF or disconnect the battery connector while the software version upgrade is in progress. Otherwise, the software version upgrade will fail.
In such a case, retry the software version upgrade.

2.7 Pre-trip inspection

● Perform a pre-trip inspection of each component and take remedial actions if necessary so that the unit will operate normally. The following is the items necessary for a pre-trip inspection, but those surrounded with a frame can receive an automatic PTI

(1) Appearance inspection of unit

① Physical damage
② Casing insulation through penetration
③ Drain hose (dust and clogging)
④ Power cable and plug damage
⑤ Condition of refrigerant piping fasteners.
⑥ Condition of each sensor installation
⑦ Loose mounting sections
- Bolts and nuts ----- Casing frame, compressor, fan motor and control box
- Cable glands ----- Control box

⑧ Conditions of control box cover packing (water-proof)
⑨ Magnetic contactor contact point for burning out.

(2) Inspection before unit operation

① Refrigerant leakage inspection

② Power voltage inspection (Automatic PTI range)

(3) Operation inspection of safety device and control equipment

① Safety device	HPS	----- Measurement of the actuating pressure by stopping the condenser fan motor.
② Control equipment	Solenoid valve	----- Inspection of operation (open and close) and leakage
	EFM	----- Speed switchover and rotating direction
	EV, SMV	----- Inspection of operation (open and close) and leakage

(4) Operation in each mode

① Pull-down →	0˚C		Pull-down time, voltage and current
② Chilled control	0˚C	Electronic temperature recorder calibration	Return, supply air temperature differential, voltage and current
③ Defrosting			Defrosting time
④ Pull-down →	–18˚C		Pull-down time, evaporator fan motor speed switchover
⑤ Frozen control	–18˚C	Electronic temperature recorder calibration	(Temperature differential and rotating direction) ON/OFF, voltage and current

Remaining frost inspection

(5) PTI report preparation

● Consumables

① Rechargeable battery: 2 years
② Humidity sensor: Inspect every year. Replace when appropriate.
③ Refrigerant: Inspect at the time of PTI. Replace if an abnormality (malfunction caused by moisture entering, etc.) is detected.
④ Power plug: Inspect during PTI. Replace if an abnormality is detected.
⑤ Power cable: Inspect during PTI. Replace if an abnormality is detected.

2.7.1 Manual inspection

Some items subject to a manual inspection are listed below

	No.	Inspection item	Inspection content	PTI
General structure	1	Inspection for physical damage		✓
	2	Loose mounting bolts	1) Casing frame	✓
			2) Compressor	✓
			3) Condenser fan motor	✓
			4) Evaporator fan motor	✓
			5) Control box	✓
			6) Access panel	✓
	3	Condition of panels, hinges and lock		✓
	4	Drain pan and drain hose cleaning		✓
	5	Control box inspection	Cover packing inspection and replacement	✓
	6	Sealing condition of holes through casing frame	Air leakage and clearance	✓
Refrigerant system	1	Refrigerant leakage		✓
	2	Refrigerant	Inspection of moisture in the refrigerant, and refrigerant charged amount	✓
	3	Inspection of high pressure switch operational pressure		✓
	4	Operation and leakage of solenoid valve	1) Liquid solenoid valve	✓
			2) Economizer solenoid valve	✓
			3) Injection solenoid valve	✓
			4) Hot gas solenoid valve	✓
			5) Defrosting solenoid valve	✓
			6) Discharge gas by-pass solenoid valve	✓
	5	Operation and leakage of suction modulating valve		✓
	6	Operation and leakage of electronic expansion valve		✓
	7	Function inspection and replacement of liquid moisture indicator		✓
	8	Condition of fasteners on the refrigerant pipes and gauge pipes		✓
	9	Condenser coil cleaning	Water-cleaning	✓

	No.	Inspection item	Inspection content	PTI
Electrical system	1	Damage of power cable and plug		✓
	2	Inspection of condition of internal wiring		✓
	3	Terminal looseness inspection and retightening if necessary	1) Magnetic switch	✓
			2) Electronic controller terminal block	✓
			3) Terminal block	✓
	4	Condition of monitoring receptacle cap		✓
	5	Condition of personal computer receptacle cap		✓
	6	Fuse conditions	Burned out or not	✓
	7	Inspection of magnetic switch contact	Contact point inspection	✓
	8	Electric insulation check	1) Power cable and plug	✓
			2) Compressor	✓
			3) Condenser fan motor	✓
			4) Evaporator fan motor	✓
	9	Starting procedure inspection		✓
	10	Thermosensor	1) Installation condition of sensor	✓
			2) Indication error inspection and replacement	✓
	11	PT/CT (voltage and current) indication error inspection		✓
	12	Pressure sensor indication error inspection		✓
	13	Electronic controller	Check of wake-up battery	✓
	14	Evaporator fan motor	1) Speed switchover	✓
			2) Rotation direction	✓
	15	Condenser fan motor	Rotating direction	✓
	16	Evaporator fan	Deformation and damage inspection	✓
	17	Condenser fan	Deformation and damage inspection	✓
Others	1	Check for abnormal noise and vibration during operation		✓
	2	Temperature control function	1) 0˚C operation	✓
			2) –18˚C operation	✓
	3	Defrosting function		✓
	4	Unit water-cleaning		✓

2.7.2 Automatic PTI

●Automatic PTI enable conditions

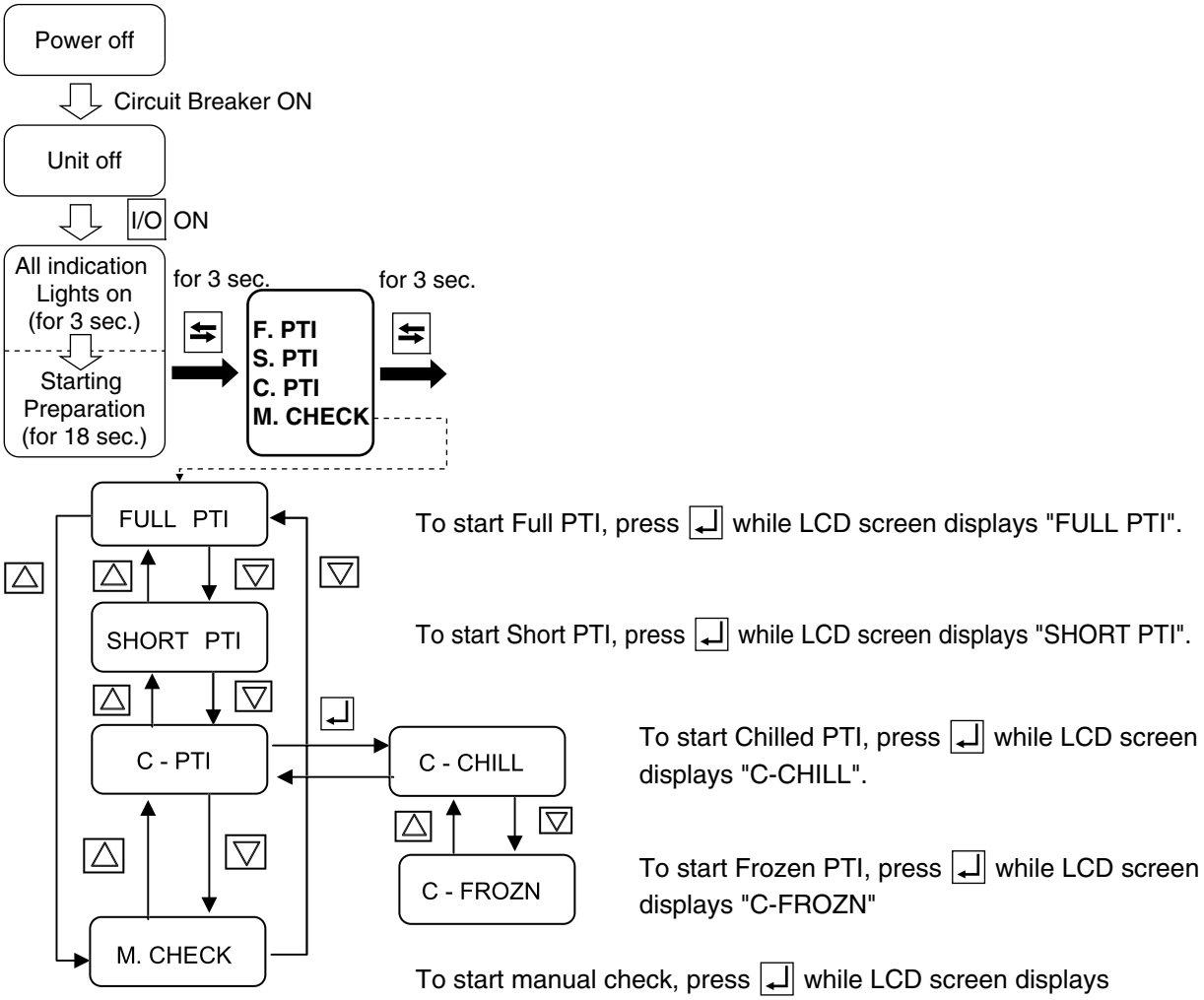
43˚C≧ambient temperature≧–10.0˚C

An accurate result of the PTI may not be provided if the ambient temperature is above 43˚C or below –10˚C. Alarm J501 will be indicated except for Short PTI

●Automatic PTI includes Short PTI, Full PTI, Custom PTI (Chilled PTI, and Frozen PTI)

PTI		Content
Short PTI		Performed in order to find parts abnormalities. PTI continues even if abnormalities are found during PTI. But it terminates as soon as the compressor failure or the evaporator fan lock is detected.
Full PTI		Short PTI, Chilled PTI and Frozen PTI are performed. It terminates as soon as abnormalities are found after the completion of Short PTI
Custom PTI	Chilled PTI	Short PTI and Chilled PTI are performed. It terminates as soon as abnormalities are found after the completion of Short PTI
	Frozen PTI	Short PTI and Frozen PTI are performed. It terminates as soon as abnormalities are found after the completion of Short PTI

2.7.2.1 Automatic PTI selection mode



To start Full PTI, press ↵ while LCD screen displays "FULL PTI".

To start Short PTI, press ↵ while LCD screen displays "SHORT PTI".

To start Chilled PTI, press ↵ while LCD screen displays "C-CHILL".

To start Frozen PTI, press ↵ while LCD screen displays "C-FROZN"

To start manual check, press ↵ while LCD screen displays "M.CHECK" For details, refer to 2.7.2.4

2.7.2.2 Short PTI (S.PTI)

● Step display and content

Step	Content	Short PTI	Full PTI	Custom PTI	
				Chilled	Frozen
P00	Basic data record (container No., date, time, compressor integrated run-hour, ambient tempera ture)	✓	✓	✓	✓
P02	Alarm check on all sensors	✓	✓	✓	✓
P04	Power conditions (voltage and frequency) check	✓	✓	✓	✓
P05	Compressor start running check	✓	✓	✓	✓
P06	Actuating pressure check at OFF and ON of High pressure switch (HPS)	✓	✓	✓	✓
P08	Pump-down check	✓	✓	✓	✓
P10	Solenoid valve leakage check •Liquid solenoid valve (LSV) •Injection solenoid valve (ISV) •Hot gas solenoid valve (HSV) •Defrost solenoid valve (DSV) •Discharge gas by-pass (BSV) •Economizer solenoid valve (ESV)	✓	✓	✓	✓
P12	Supply and return air sensor (SS and RS) accuracy check	✓	✓	✓	✓
P14	Pressure sensor (HPT and LPT) accuracy check	✓	✓	✓	✓
P16	Evaporator fan high and low-speed operation check	✓	✓	✓	✓
P18	Start up	✓	✓	✓	✓
P20	Economizer solenoid valve (ESV) opening or closing check ※1 ※2	✓	✓	✓	✓
P22	Discharge gas by-pass solenoid valve (BSV) opening or closing check ※2	✓	✓	✓	✓
P24	Defrost solenoid valve (DSV) opening or closing check	✓	✓	✓	✓
P26	Standard pull-down operation	✓	✓	✓	✓
P28	Suction modulating valve (SMV) operation check, SGS sensor check	✓	✓	✓	✓
P29	Electronic expansion valve (EV) operation check	✓	✓	✓	✓
P30	Injection solenoid valve (ISV) opening or closing check ※2	✓	✓	✓	✓
P32	Hot-gas solenoid valve (HSV) and Reheat coil solenoid valve (RSV -optional) opening or closing check	✓	✓	✓	✓
P50	Check on pull-down to 0˚C		✓	✓	
P60	Check on controllability of chilled mode operation.		✓	✓	
P70	Check on defrosting		✓	✓	✓
P80	Check on pull-down from 0˚C through –18˚C		✓		✓
P90	Check on controllability of frozen mode operation		✓		✓

※1 If the ambient temp is –10˚C or lower, the function check of the solenoid valve cannot be preformed correctly, short circuit the terminals 121 and 102 on the terminal board, and check the operation of the solenoid valve.

※2 If the difference between ambient temperature and return air temperature is 15˚C or higher, these steps will be skipped.

※3 Step No. are indicated in LED display.

Example: Step No.10	Short PTI	Full PTI	Custom PTI Frozen PTI	Custom PTI Chilled PTI
	SP 10	FP 10	FrP10	ChP10

2.7.2.3 Alarm list during PTI (Pre-Trip Inspection)

The alarm during automatic PTI are concerned with PTI inspection items in addition to those during normal operation.

The alarms at automatic PTI are indicated in J ※※※., being separated from those during normal operation.

There are some alarms which are not displayed on the control panel, however, they can be checked referring to the PTI report.

Check NO. (LED display)	Check content	Alarm Indication (LED display)	Alarm content	Remarks
P00	Basic data	No indication	Check basic-data	
P02	All sensor	Same as normal operation	Check basic-data	
P04	Power supply	No indication	Check basic-data	
P05	Starting	J051	Compressor malfunction	
P06	HPS	J061	Abnormal OFF value	
	〃	J062	Not recovered (Not reset)	
	〃	J064	High pressure does not rise.	
	〃	J065	High pressure does not drop.	
P08	Pump-down	J081	Long pump-down	
P10	Liquid solenoid valve	J101	Valve leakage	
P12	RS, SS accuracy	J121	Sensor deterioration	
P14	HPT, LPT accuracy	J141	Sensor deterioration	
P16	Evaporator fan motor	J161	Evaporator fan motor malfunction	
P20	Economizer solenoid valve	J201	Economizer solenoid valve malfunction	
P22	Discharge gas by-pass solenoid valve	J221	Discharge gas by-pass solenoid valve malfunction	
P24	Defrost solenoid valve	J241	Defrost solenoid valve malfunction	
P26	Operation	No indication	Judged with P28	
P28	Suction modulating valve	J281	Suction modulating valve does not activate	
P29	Electronic expansion valve	J291	Long pump-down	
P30	Injection solenoid valve	J301	Injection solenoid valve malfunction	
P32	Hot-gas solenoid valve	J321	Hot-gas solenoid valve malfunction	
	Reheat coil solenoid valve	J322	Reheat coil solenoid valve malfunction	
P50	Pull-down cooling capacity	J501	Out of ambient temperature conditions	Press the select key for 3 seconds to restart when alarms are displayed in J code
P50	0˚C pull-down check	J502	Long pull-down time	
P60	0˚C holding check	No indication		
P70	Defrosting	J701	Out of starting conditions	
		J702	Long defrosting time	
P80	Pull-down cooling capacity	J801	Long pull-down time	
P90	–18˚C control	No indication		

Refer to section 5.3 for more information.

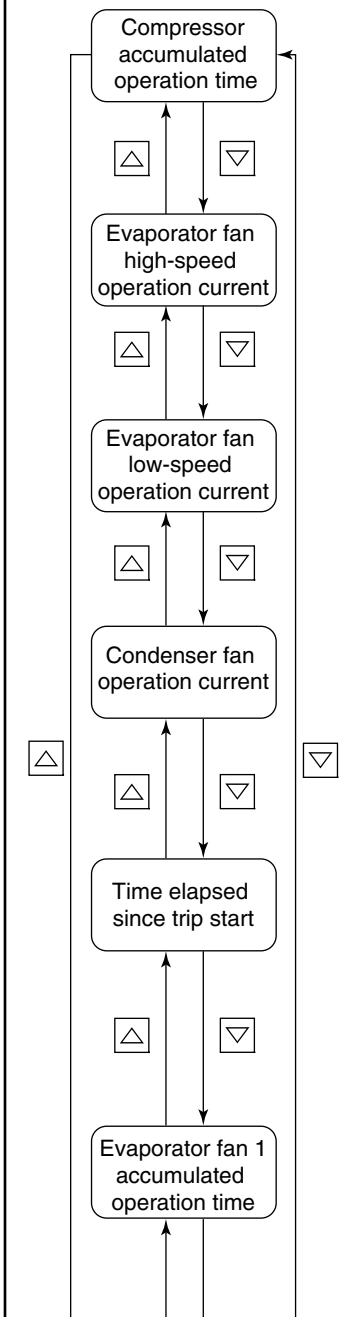
2.7.2.4 Manual check (M.CHECK)

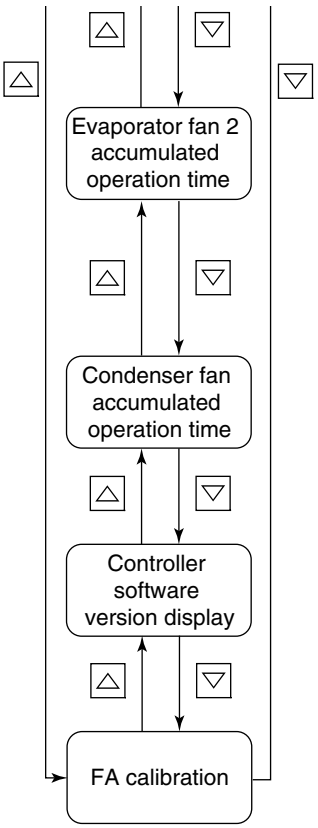
In M. CHECK, each functional component is inspected. However, unlike in S.PTI and F.PTI, there is no alarm indication etc.

<Inspection items>

Compressor operation time, evaporator fan high-speed operation current, evaporator fan low-speed operation current, condenser fan operation current, battery lifespan (number of years or months), horsepower indication, time elapsed since starting the trip, operation time of evaporator fans 1 & 2, operation time of the condenser fan, and software version

<Control method>

Setting items	LED screen	LCD screen	Setting method and description
	Accumulated operation time of the compressor	CC ×10H	Press the ↵ key to display the number in the LED meaning the accumulated operation time of the compressor. Operation time = Number in LED × 10 [hours] Keep the ↵ key pressed for 3 seconds to reset the accumulated operation time to 0.
	Evaporator fan operation current at high speed	EFH A	Press the ↵ key to operate the evaporator fan at high speed, and the operation current of the fan is indicated in the LED. The unit is A.
	Evaporator fan operation current at high speed	EFL A	Press the ↵ key to operate the evaporator fan at low speed, and the operation current of the fan is indicated in the LED. The unit is A.
	Evaporator fan operation current	CF A	Press the ↵ key to operate the condenser fan, and the operation current of the fan is indicated in the LED. The unit is A.
	Time elapsed since starting the trip	TS H	Press the ↵ key to show the time elapsed since starting the trip. The unit is [hour]. Keep the ↵ key pressed for 3 seconds to start the trip with the time elapsed reset to 0 [hour].
	Accumulated operation time of evaporator fan 1	EF1 ×10H	Press the ↵ key to show the accumulated operation time of evaporator fan 1 in the LED. Operation time = Number in LED × 10 [hours] Keep the ↵ key pressed for 3 seconds to reset the accumulated operation time to 0. Evaporator fan 1 is located on the right viewed from the inside.



Accumulated operation time of evaporation fan 2	EF2 ×10H	Press the ↵ key to display the accumulated operation time of evaporator fan 2 in the LED. Operation time = Number in LED × 10 [hours] Keep the ↵ key pressed for 3 seconds to reset the accumulated operation time to 0. Evaporator fan 2 is located on the left viewed from the inside.
Accumulated operation time of the condenser fan	CF ×10H	Press the ↵ key to display the accumulated operation time of the condenser fan in the LED. Operation time = Number in LED × 10 [hours] Keep the ↵ key pressed for 3 seconds to reset the accumulated operation time to 0.
Software version	SOFTVER	Press the ↵ key to display the software version in the LED.
Ventilation amount (FA)	FA CAL	Ventilation amount(FA) is indicated in LED when pressing ↵. If ventilation amount is indicated despite the ventilator exit totally closed, press ↵ for 3 seconds to calibrate to ventilation amount zero.

2.8 Chartless function

The controller provides the temperature recorder function.

In the case of recorder-equipped units, checking for the temperature on the chart recorder will provide ease of monitoring the state of the trip.

Since recent controllers are available for long and accurate temperature recording, non-recorder-equipped units have been increasingly used. In this case, in place of the recorder, the following three "Chartless functions" are available.

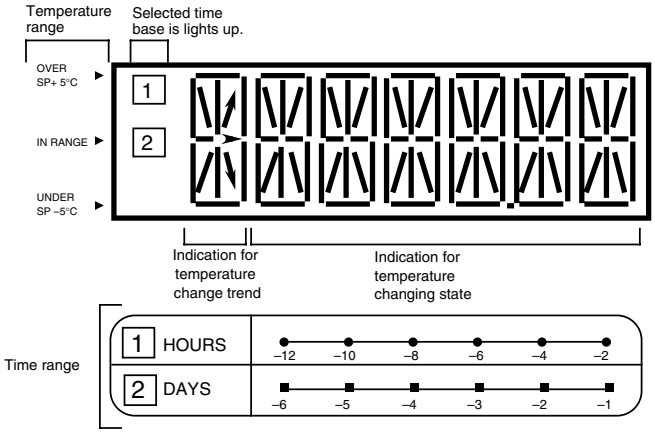
- Chart Indication Function
- Pull Down Time Indication Function
- Chartless Code display Function

2.8.1 Chart indication function

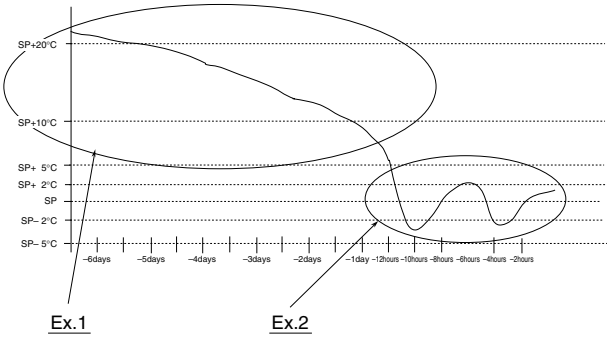
The temperature record data is indicated in a graphic chart on the LCD panel in the chart indication mode.

- The displayed log period is selected from 12 hours (1 HOURS on the time base) or 6 days (2 DAYS on the time base).
- The displayed intervals are 2 hours for 12 hours log (1 HOURS) and one day for 6 days log (2 DAYS).
- The indication of the data during the defrosting is flickered, and the indication of the other chart data is lit on.

● LCD panel

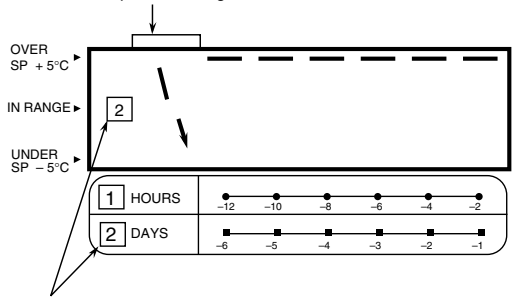


● Example of chart indication



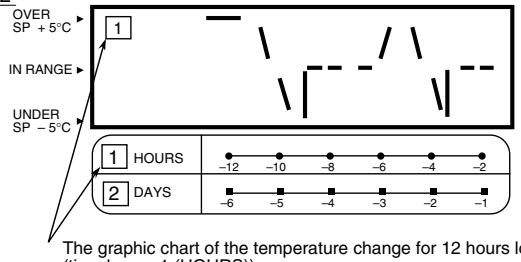
Ex.1

The arrow indicates the temperature change trend when all segments are in the same temperature range.



The graphic chart of the temperature change for 6 day log (time base : 2 (DAYS))

Ex.2

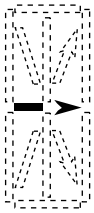


The graphic chart of the temperature change for 12 hours log (time base : 1 (HOURS))

●Displaying temperature change trend:

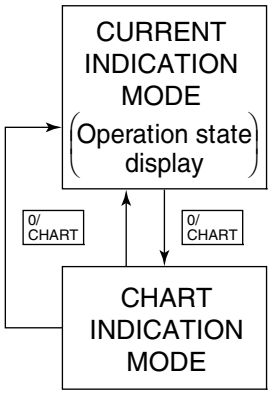
・The temperature change trend is shown in the leftmost LCD.

・However, this display is shown only when all segments are in the same temperature range.

Trend indication	Condition
Temperature rise trend 	(The latest data on the chart − the oldest data on the chart) > ※ set point of H001 (ALARM indication setting)
Temperature stable tendency 	(The latest data on the chart − the oldest data on the chart) < set point of H001 or (the oldest data on the chart − The latest data on the chart) < set point of H001
Temperature fall tendency 	(the oldest data on the chart − The latest data on the chart) > set point of H001

※The trend display varies depending on the setting of H001.
For details about the setting of H001, refer to page 2-22~23, "OPTIONAL CONDITION SETTING MODE."

< Operation procedure >



To shift to the chart indication mode, press the 0/CHART key while the unit is in the current indication mode.

In the chart indication mode, the LCD displays a simple graphic chart.
The ordinate at the left side of LCD screen for temperature base and the abscissa at the bottom of LCD for time base are indicated.
The No. indicated at the time base is the same as the No. on the left most of the LCD, which indicates the simple graphic chart is of 12 hours log or 6 days log indication.
Select the base to be uses using the △ or ▽ key.

When the 0/CHART key is pressed, the unit goes back to the current indication mode.

2.8.2 P code (Pull down time indication)

The control temperature and pull-down time are indicated alternately during pull-down operation.
When the pull-down is completed, the P code will be deleted.
P001: Lasts the pull-down for 1 hour.
P002: 2 hours passed since pull-down started.

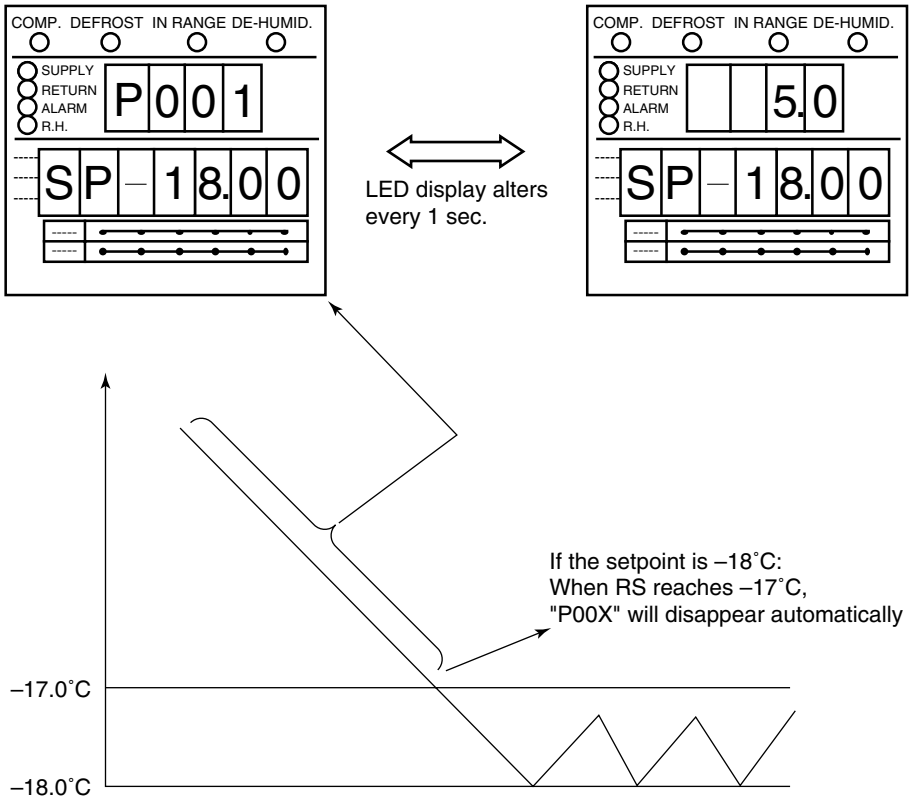


Figure1

2.8.3 Chartless code display function

The chartless code represents the coded inside air temperature.
Select "ON" of the chartless code setting to indicate the code on the LED.
For the chartless code setting, refer to the "OPTIONAL CONDITION SETTING MODE" on the page 2-22～2-23.

- P code: Indicates the pull-down time.
- H code: Indicates the abnormal temperature records.
- d code: Indicates the operation history.

2.8.3.1 List of chartless code

C: chilled mode, F: Frozen mode

	Code	Description	Operation mode	Figure
Abnormal temperature record	H001	The alarm is displayed when the control temperature does not decrease by (3˚C) or more for every 4 hours during pull-down operation.	C, F	2
	H002	The alarm is displayed when the total out-of- in-range reaches (2 hours). (Count is not performed during defrosting.)	C, F	3
	H003	The alarm is displayed when the integrated time of state "below SP-1˚C" reaches (2 hours).	C	4
	H004	The alarm is displayed when the integrated time of state "below SP-2˚C" reaches (2 hours).	C	4
	H005	The alarm is displayed when the control air temperature is Out-of -In-Range and defrosting was performed successively (three times) while the control air temperature does not return to in-range.	C, F	5
	H006	The alarm is displayed when the integrated time of difference 2 ˚C or more between control sensor data and record sensor data reaches to (one hour) or more.	C, F	6
Opreration history	d3XX	When the total time above set point +3˚C reaches (1 hour), [XX = 01] will be displayed.	C, F	7
	d2XX	When the total time above set point +2˚C reaches (1 hour), [XX = 01] will be displayed.	C, F	7
	d1XX	When the total time above set point +1˚C reaches (1 hour), [XX = 01] will be displayed.	C, F	7
	d–1X	When the total time below set point –1˚C reaches (1 hour), [XX = 01] will be displayed.	C, F	7
	d–2X	When the total time below set point –2˚C reaches (1 hour), [2X = 21] will be displayed.	C, F	7
	PXXX	XXX: When the total pull-down time reaches one hour, an indication XXX=001 appears.	C, F	1

Note 1) The (encircled) setting can be changed. The setting in the [box] varies according to the (encircled) setting.

Note 2) To delete the H code or d code, press the ↵ key for 3 seconds during the relevant code indicated.

Note 3) H code and d code are deleted when the power supply is turned off for 3 days.

2.8.3.2 H-code

H001 =The alarm is displayed when the control temperature does not decrease by (3˚C) or more every 4 hours during pull-down operation.

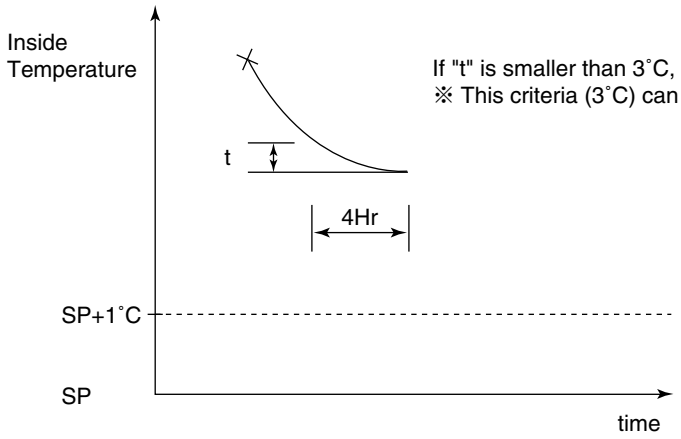


Figure2

H002 =The alarm is displayed when the total time out of "in-range" reaches 2 hours. (Counting is not performed during defrosting).

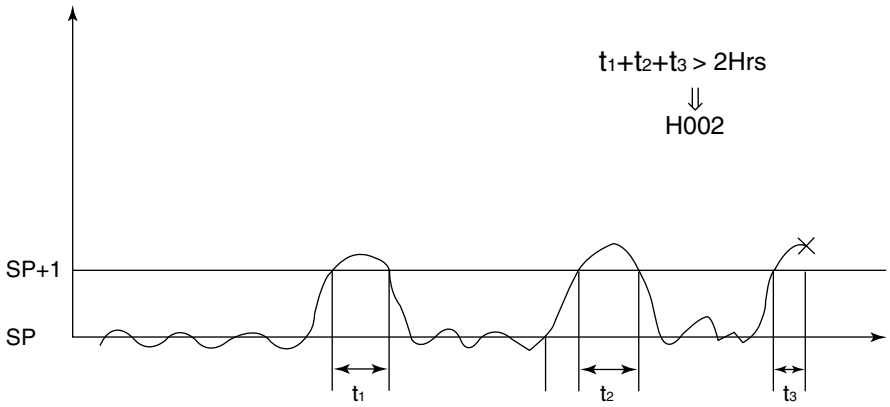


Figure3

H003 =The alarm will be displayed when the total time below setpoint –1˚C reaches 2 hours.

H004 =The alarm will be displayed when the total time below setpoint –2˚C reaches 2 hours.

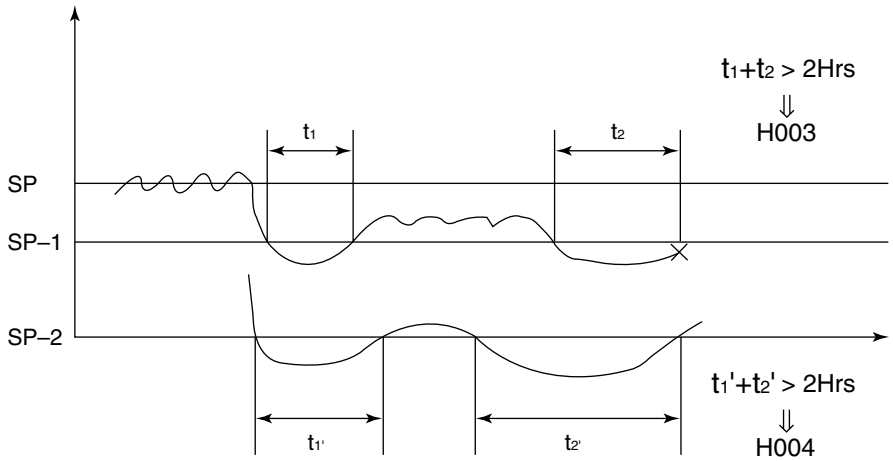


Figure4

H005 =The alarm is displayed when the control air temperature is out of "in-range" and defrosting was performed three times while the control air temperature does not return to in-range.

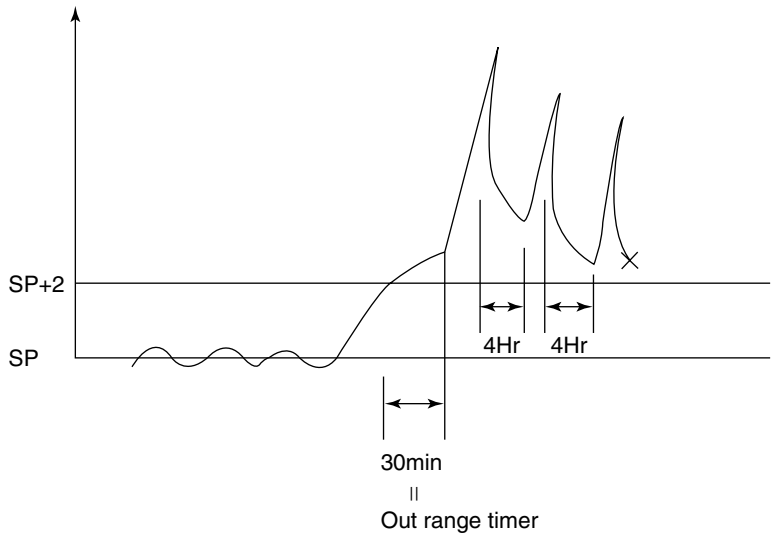
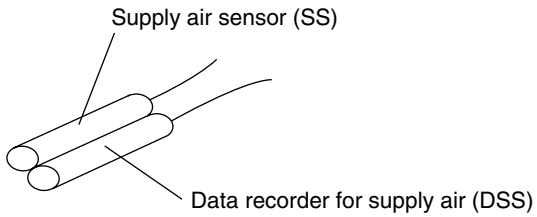


Figure5

H006 =Alarm is displayed when the temperature difference between the control sensor and record sensor is 2˚C for 1 hour, or more.



|DSS–SS| > 2˚C→ H006

Figure6

2.8.3.3 d-code:

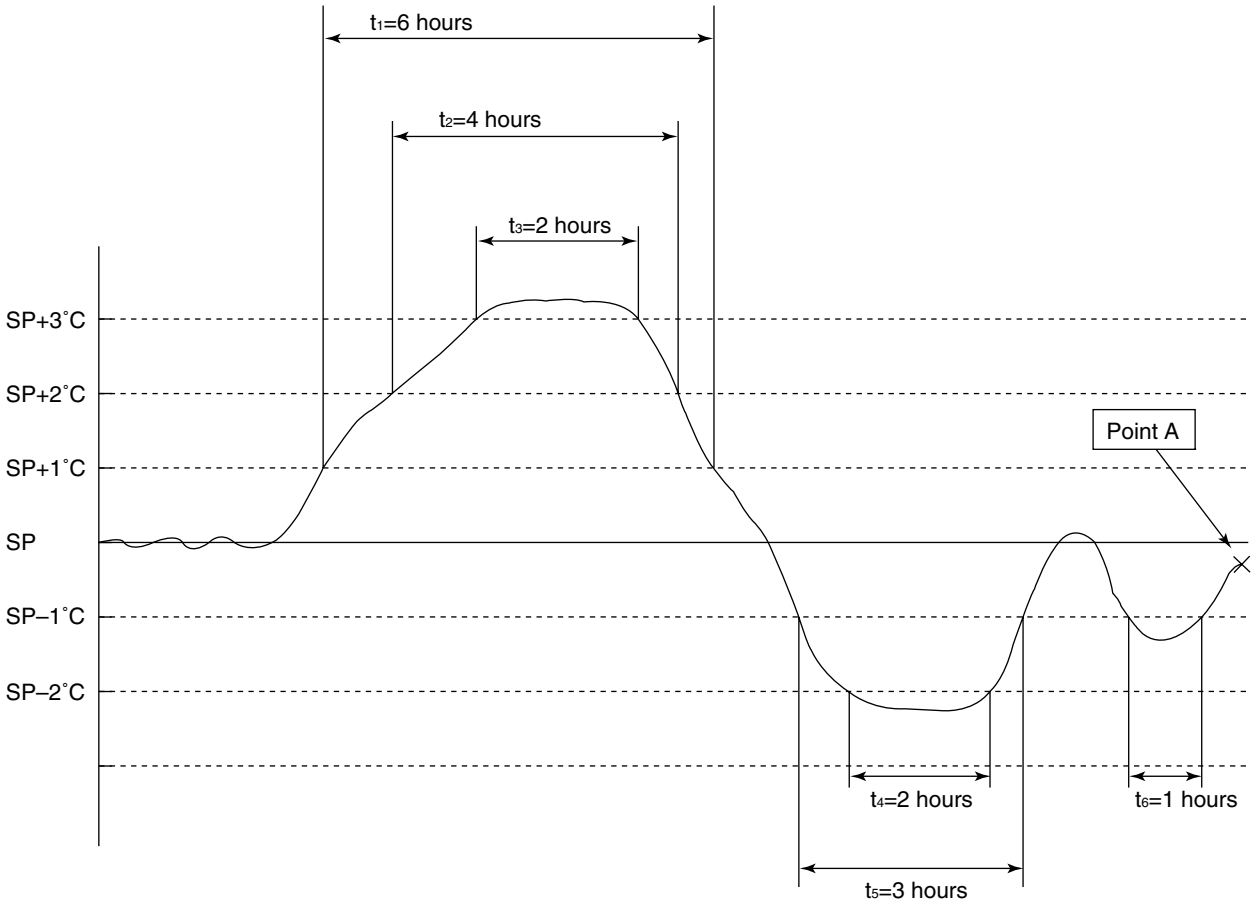
The d-code shows the current operation state of the unit.

Example d101:

- This code "d101" will be displayed when the total time above set point +1˚C reaches 1 hour. The code "d102" will then be displayed when the total time above set point +1˚C reaches 2 hours.

Example d-21:

- This code "d-21" will be displayed when the total time below set point –2˚C reaches 1 hour. The code "d-22" will then be displayed when the total time below set point –2˚C reaches 2 hours.



Example : If inside temperature was recorded above graph, controller shows the following "d code" when user check the code at "point A"

d106 (above setpoint +1˚C for 6 hours)
d204 (above setpoint +2˚C for 4 hours)
d302 (above setpoint +3˚C for 2 hours)
d-22 (below setpoint –2˚C for 2 hours)
d-13 (below setpoint –1˚C for 3 hours)
d-11 (below setpoint –1˚C for 1 hour)

Figure7

2.9 Communication modem

DECOS Ⅲ e,f controller has function to transmit operation data through power line, if slave modem is provided in control box.

The slave modem shall be complied with ISO10368. The following items can be monitored and/or commanded via master modem: (*1)

	Item	Description	
1	Inquiries (Remote monitoring)	● Inside temperature and humidity ● Set point temperature ● Defrosting interval ● Container No. ● Logger header information ● Alarm ● Operation mode	● Sensor data ● Trip data ● Alarm data
2	Commands (Remote control)	● Set point temperature changing ● Defrosting interval changing ● Manual defrosting initiation	● Container No. changing ● Unit ON/OFF changing ● Header information changing

(*1) According to the relationship among slave modem, Master modem and controller, items which can monitor and/or command are different. Please contact DAIKIN sales office if you have a specific item to monitor/command.

3. SERVICE AND MAINTENANCE

3.1 Maintenance service

3.1.1 Collection of refrigerant

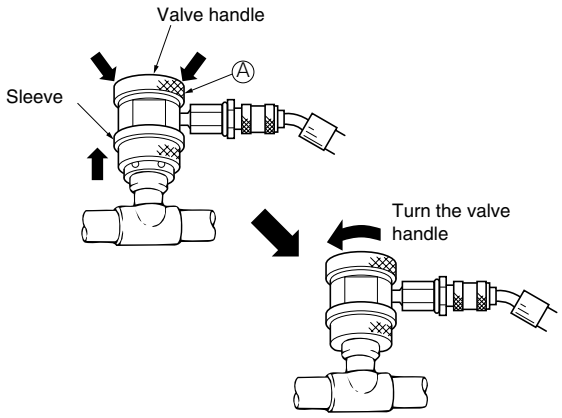
①When releasing the refrigerant from the refrigerant system, be sure to use a refrigerant recovery unit to protect the ozone layer around the earth from depletion.

②Observe strictly all the environmental laws relating with to the country where the repair service is conducted.

3.1.2 Gauge manifold

(1) Attaching the gauge manifold

Turn the valve handle of coupler counterclockwise (the push pin is pulled up). Slide the sleeve upward, and press it against the service port. Then, securely push the valve handle (section A) until a click sound is heard. After the coupler is inserted into the service port, release the sleeve. The coupler is fixed so that it is not detached from the service port.
Next, turn the valve handle clockwise. Lower the push pin, and open the check valve at the service port.

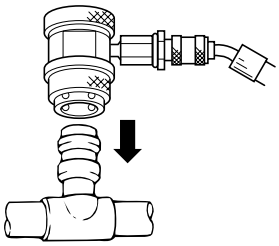


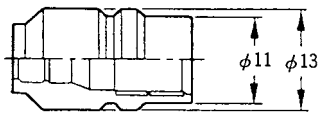
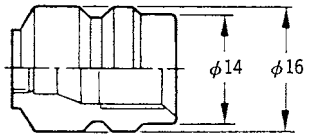
Note: Do not fully turn the valve handle clockwise. Otherwise, the push pin may be broken.

⚠ CAUTION

1. Use the pressure indicating function of the controller to check the working pressure as much as possible instead of using the gauge manifold in order to prevent foreign particles or moisture from mixing into the refrigerant system.
2. Do not use any pressure gauge, gauge manifold, charge hose and charging cylinder that has been used for CFC12 in order to prevent refrigerant or refrigerant oil of a different kind from mixing.
   Use the exclusive tools for HFC 134a.
3. The service port of quick joint type is provided to make improved handling.

※Quick joint system

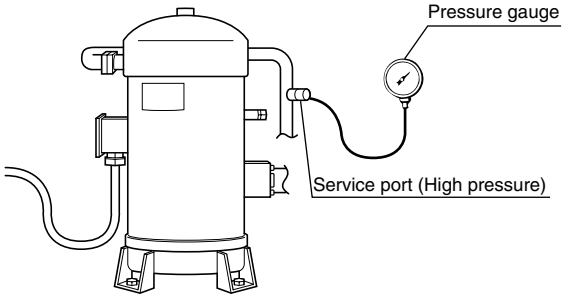


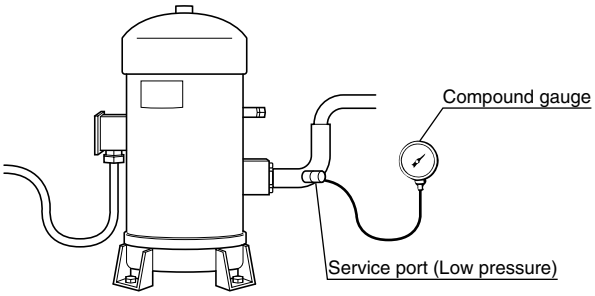
	HFC134a (SAE quick joints)
Low pressure side	
High pressure side	

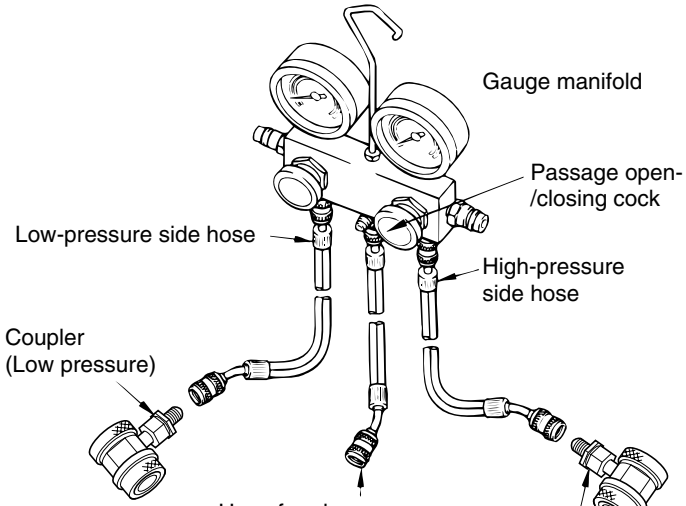
Be sure to use the gauge manifold with the quick joints shown above.

●Location of service ports on high pressure and low pressure sides

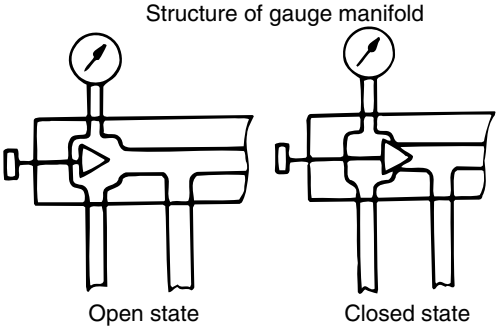
Service ports on high pressure and low pressure sides are located as shown below.







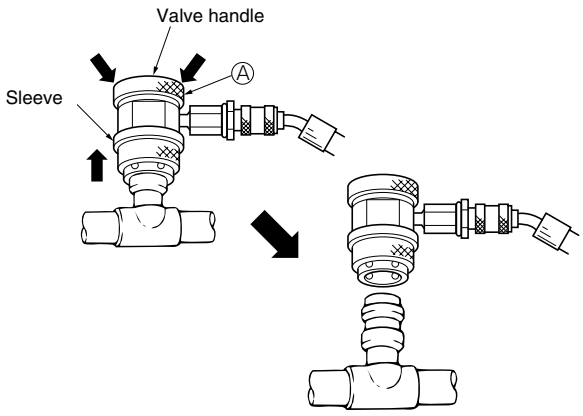
Structure of gauge manifold



Open and closed states of gauge manifold

(2) Removal of gauge manifold

Turn the valve handle of coupler counterclockwise (the push pin is pulled up). Slide the sleeve upward while fixing the valve handle (section A) to disconnect the quick joint from the service port.



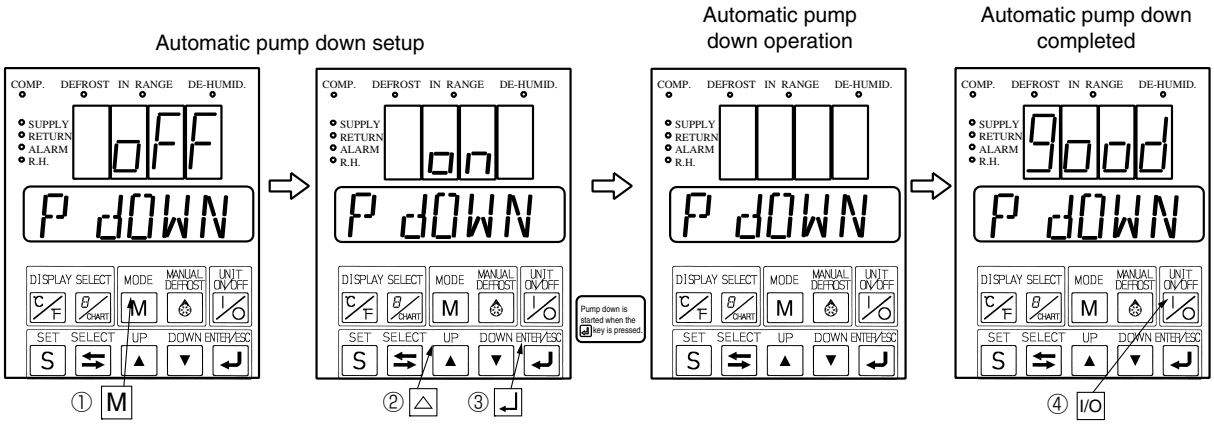
⚠ CAUTION

Be sure to attach the cap to the service port after the removal of the manifold.

3.1.3 Automatic pump down

An automatic pump down system is applied to the unit to prevent the unit from extra decrease of low pressure due to pump down operation or burning of scroll compressor due to a closed stop valve.

(1) Access to automatic pump down operation mode



① Press the "M" key twice while the unit is running (press it once during the dehumidification control setup). Then, the unit enters the pump down mode.

② Alter the display from "OFF" to "ON" with the "△" key.

③ Fix the display with the enter key.

④ Turn the Switch OFF.

⑤ Deactivate the circuit breaker.

- The unit is stopped when pumpdown is finished.
- When abnormal finish error occurs, E201 (faulty pump down) is displayed.

(2) Use of automatic pumpdown

[1] Replacement of dryer

※After the automatic pumpdown operation is completed, pressure in the pipe in and out of the dryer is slightly higher than the atmospheric pressure.
Thus, although no ambient air will enter into the piping, even when the dryer is replaced, replace it quickly in a short period. (For details, see clause 3.2.5)

※Therefore, the system inside does not need to be dried with vacuum after the dryer is replaced.

[2] Recovering refrigerant

※Before recovering refrigerant, execute the automatic pump down operation.
(As for the details, see (2) of clause 3.1.4)

[3] Charging refrigerant (third step)

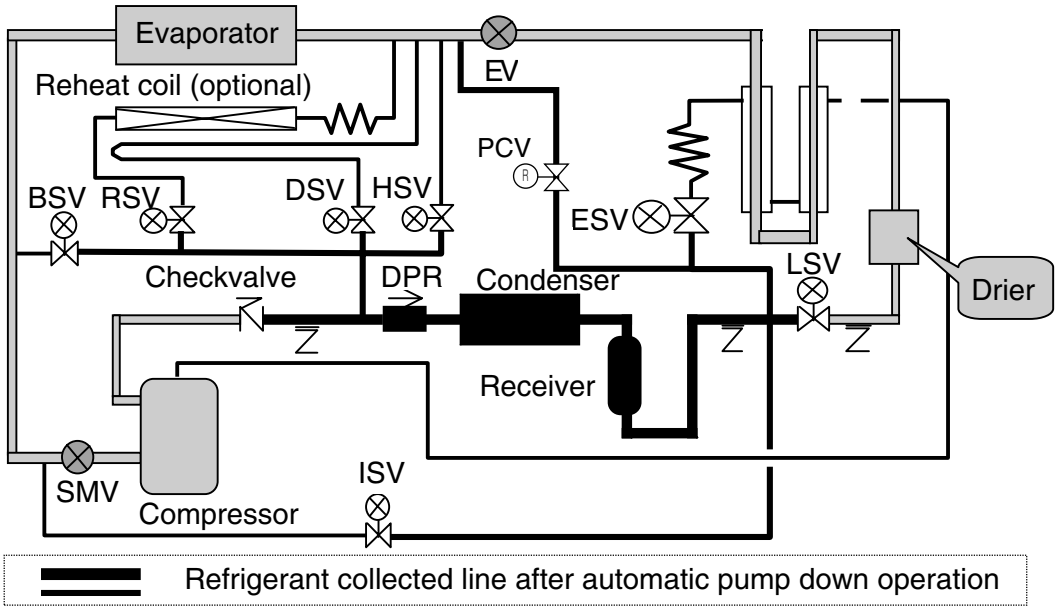
※ If the ambient temperature is low, and the refrigerant cannot be charged to the specified amount because of pressure balance, execute the automatic pump down operation. (As for the details, see (3) of clause 3.1.4)

(2) Automatic pump down operation

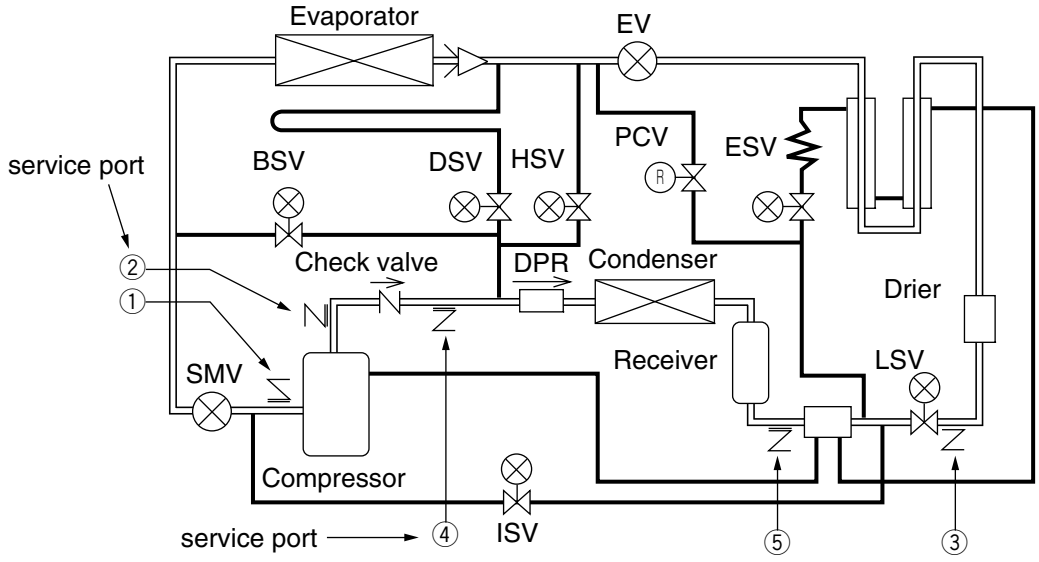
Once the automatic pump down is started, all of the service works from refrigerant collection into the receiver, to the equalizing in suction piping system, can be executed automatically.
When "Good" is displayed, service works such as replacing the dryer, etc. can be conducted without any other operation.

Step	①	②	③	④	⑤
	[Preperation] Turn on Automatic pump down. ⇩ Normal operation for 30 minute ※1	[Pump down] ※2 Pump down start ⇩ Compressor stop at LP≦−55kPa	[Pump down] ※2 Compressor stop for 20 seconds.	[Pressure equalizing] All stop for 40 seconds. ⇩ Prevention of air mixing (vacuum) in the system	[Termination] EV full close ⇩ Termination "GOOD"
COMP	ON	ON	OFF	OFF	OFF
EFM	High speed	High speed	High speed	OFF	OFF
CFM	ON	ON	ON	OFF	OFF
LSV	ON				
ESV		ON			
ISV				ON (2nd) ※3	
HSV				ON (1st) ※3	
DSV					
BSV					
RSV					
SMV	328pls(100%)	328pls(100%)	328pls(100%)	328pls(100%)	328pls(100%)
EV	77pls(18%)	146pls(34%)	146pls(34%)	146pls(34%)	0pls(fullclose)

※1. If HPT exceeds 1700 kPA, no operation is executed for thirty seconds.
※2. The pumpdown operation described in② ⇒ ③shown in the table above is repeated depending on the status 20 seconds after the compressor is stopped (three times, maximally).
※3. If LPT exceeds 0 kPa 40 seconds after the unit is stopped completely, next operation of shifting from "HSV ON" to "ISV ON" is not executed.



3.1.4 Refrigerant Recovery and Charge

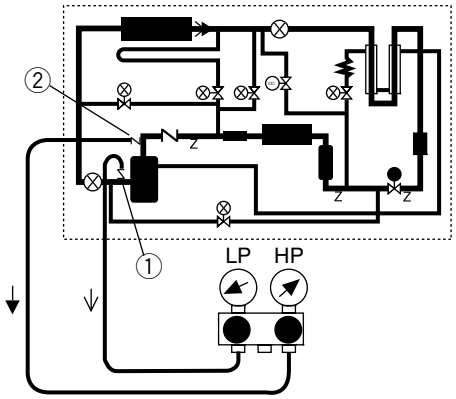


Service work		Service port	Remarks
Pressure Check	High pressure	②	
	Low pressure	①	
Refrigerant charge (R134a) <LXE10E100F> 4.7 kg <LXE10E100E or previous models> 4.7 kg or 5.2 kg For details, refer to the model name plate.	[1] Refrigerant Recovery	⑤	Recover refrigerant from port ⑤ after operating Automatic Pump-Down first.
		④ & ⑤	Recover completely the refrigerant left in the unit port ④ & ⑤.
	[2] Vacuum & Dehydration	④ & ⑤	After recovering, vacuum from port ④ & ⑤. ※The connection at port ④ is same size at ① for low pressure.
	[3] Liquid charging	⑤→③※	After vacuuming, charge liquid refrigerant from ⑤ first and them from ③.
			If not reached to the specified amount 5.2 kg, go to next below.
		③※	1. Operate Automatic Pump-Down first and stop it using ON/OFF switch after the compressor stops during the Auto pump down operation. 2. Charge liquid refrigerant from port ③.

Note)※ Charging liquid refrigerant from ① causes malfunction of the compressor.

(1) Operation Pressure Check

Check high pressure from the service port ② on the compressor discharge. Check low pressure from the service port ① on the compressor suction.



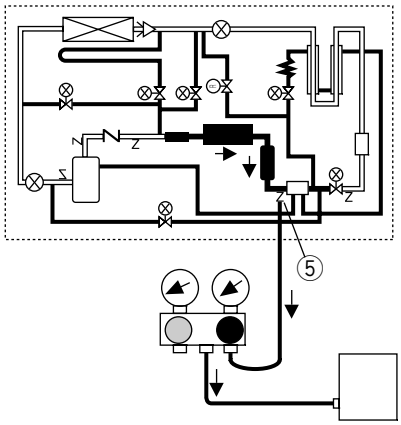
(2) Recovery non-condensable gas

If the air or other non-condensable gases are present in the refrigeration system, they will gather in the condenser and the pressure inside the condenser will rise significantly and the thermal conductivity of the condensing surface will be decreased, resulting in deterioration of refrigeration performance. Therefore, it is very important to eliminate the non-condensable gases.
If the discharge pressure is abnormally high and the pressure is not normalized, check whether the air or other non-condensable gases are present by following the procedure below.

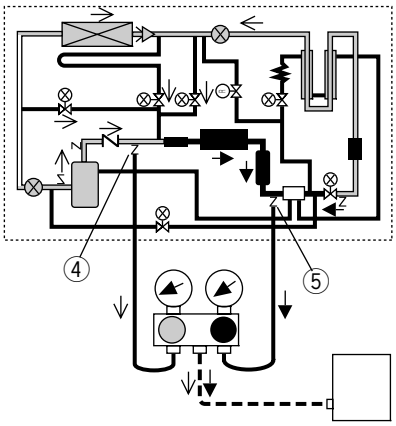
●After carrying out the automatic pump-down operation to collect the coolant in the liquid receiver, stop the unit once. Operate the condenser fan in accordance with the condenser fan check procedure included in the manual check procedure, and wait until the cooling air inlet and outlet temperatures become equal. Non-condensable gases are present if there is any difference between the saturation pressure and the condensation pressure corresponding to the temperature of the cooling air.

(3) Refrigerant Recovery

①Operate Automatic Pump Dpwn.
②Recover refrigerant from port ⑤.



③Recover completely refrigerant left in the unit from ports ④ & ⑤.



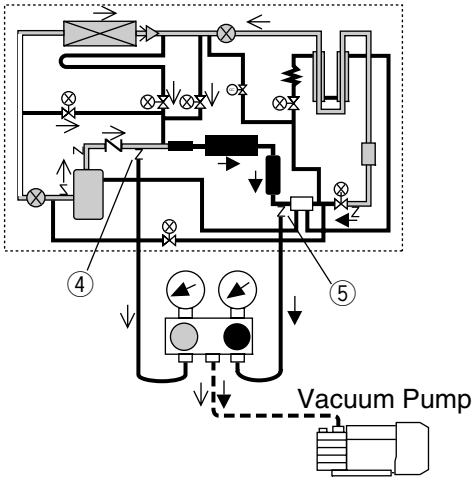
(4) Vacuum-dehydrating, and refrigerant / charging

If all the refrigerant has leaked out and air is intermixed in the refrigeration circuit, remove the cause of trouble and carry out vacuum-dehydrating. Then charge the specified amount of refrigerant.
[Required tools]

1. Refrigerant cylinder (content of 20kg) equipped with joint for HFC134a
2. Gauge manifold with quick joints
3. Weighing scale (up to 50kg)
4. Vacuum pump

(a) Vacuum dehydrating

After recovering the refrigerant, replace the filter drier and connect the vacuum pump to the service ports ④ and ⑤ at the liquid receiver outlet piping and discharge pressure regulating valve inlet, and then vacuum up to 76cmHg. Disconnect the vacuum pump, holding the refrigerant circuit in the vacuum state. However, if air enters in the refrigerant circuit, vacuum up the circuit to 76cmHg and then vacuum the circuit for another 2 hours or more.



(b) Cylinder weight recording

Place a refrigerant cylinder on the weighing scale, and record the weight of the cylinder.

(c) Charging of liquid refrigerant

1.After vacuum & dehydration, charge the liquid refrigerant from port ⑤. (Aprrox. 50% of the specified amount will be charged.)

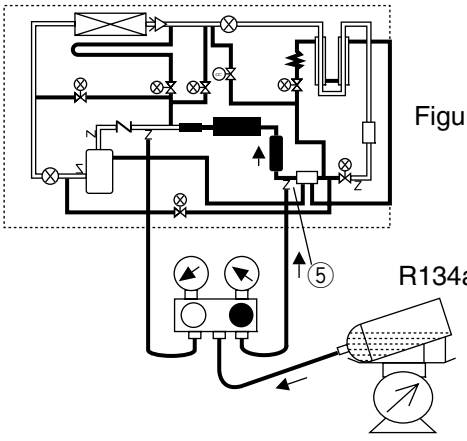


Figure 1

2.Replace the manifold gauge hose to port ③ and add the liquid refrigerant. Then if it reached to the specified amount close the cock of the refrigerent cylinder.

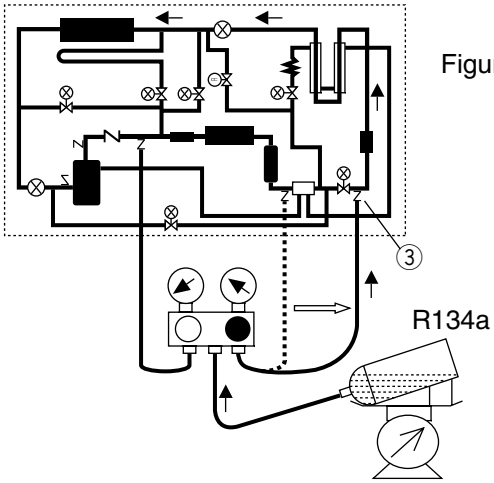


Figure 2

If it is not reached to the specified amount due to the pressure valance, close the cock of the ref. cylinder and go to next 3 & 4.

3.Operate Automatic Pump Down first. When the compressor stops during the operation, end the Auto. P. D. operation using Unit ON/OFF switch.

4.Open the cock of the ref. cylinder and add the liquid refrigerant from port ③. Then if it reached to the specified amount close the cock of the ref. cylinder.

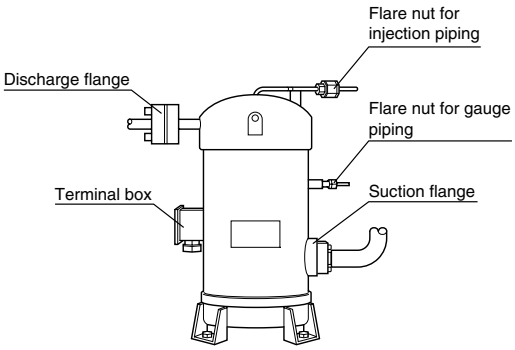
⚠ CAUTION

Carry out the operation check after the replacing and charging of refrigerant, then replace the drier.

3.2 Main components and maintenance

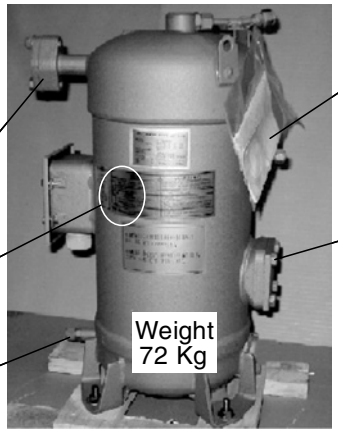
3.2.1 Scroll compressor

The compressor is of a hermetic scroll type with the built-in motor so that there are less places where refrigerant may leak. No refrigerant oil is required when the unit is new because it has been charged before delivery.



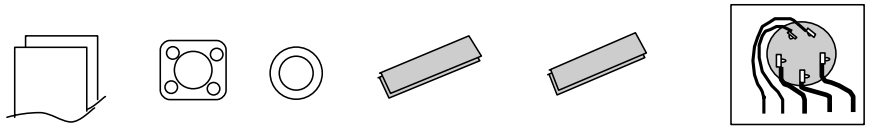
(1) Preparation of spare parts compressor

[Model JT224D-NYR]
* Precharged refrigerant oil DAPHNE FVC46D * 2.9L
* Precharged non-moistured nytrogen gas



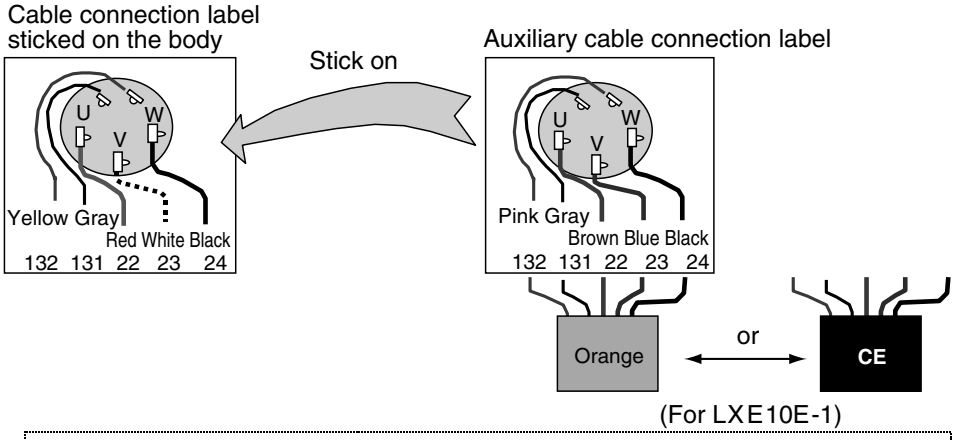
[Auxiliary parts]

Instruction card	Gasket, Suction	Gasket, Discharge	Packing tape for suction flange	Insulation tape for suction flange	Cable connection abel for LXE10E-1
2 pcs	1 pcs	1 pcs	1 pcs	1 pcs	1 pcs



(See Note 1)

Note 1. Stick the auxiliary cable connection label onto the label sticked on the compressor body. This is only for LXE10E-1.



(For LXE10E-1)

Note 2. Don't drop the precharged refrigerant oil out after removing the blind flanges.

CAUTION

The preparation of refrigerant oil is not required.
The compressor has been charged with the oil.

(2) Removal of compressor

Recover refrigerant

1. Recover the refrigerant from service port ④ on discharge line and ⑤ at receiver/water cooled condenser outlet. (Refer to the clause 3.1.4 Refrigerant Recovery and charge)
2. Close the discharge and suction side stop valves on the compressor.

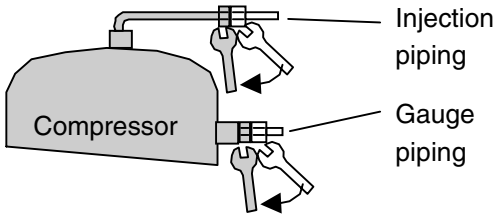
Disconnect cables and mounting bolts

3. Switch off the power.
4. Open the terminal box cover and disconnect the cables.
5. Remove the mounting bolts.

Disconnect pipings

6. Remove the flare nuts for the injection piping on the compressor head and gauge piping on the body.

Attention !
Use double wrenches when the flare nuts are removed.



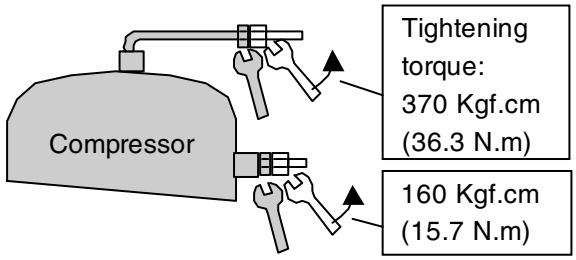
7. Remove the insulation tape fixed on suction flange and discharge flange.
8. Remove the bolts for suction and discharge flange.

(3) Installation of compressor

Connect pipings and fix mounting bolts

1. Before connecting pipings, insert and screw in the mounting bolts slightly.
2. Tighten the flare nuts for the injection piping and gauge piping on the body.

Attention !
Use double wrenches when the flare nuts are tightened.



3. Fix the suction and discharge flanges using with the auxiliary gaskets and the bolts.
4. Tighten the mounting bolts.

Tightening torque
257 Kgf.cm (25.2 N.m)

435 Kgf.cm (42.7 N.m)

Connect cables

5. Connect the cables to the terminals.

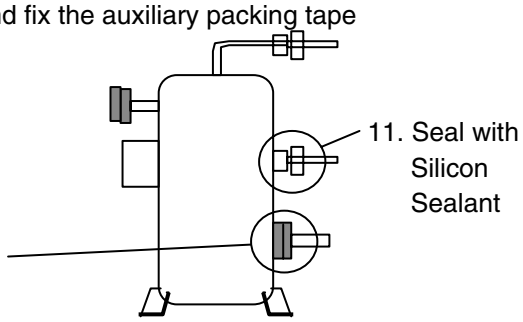
Attention !	Pay attention to the cable connection. Incorrect wiring may run the compressor in wrong direction and may cause burn out.

Charge refrigerant

6. Open the discharge and suction side stop valves.
7. Vacuum and dehyadrate from service port ④ and ⑤.
8. Then charge the refrigerant from service port ⑤ and ③.
   (Refer to the clause 3.1.4 Refrigerant Recovery and charge)
9. Check gas leakage especially at sunction/discharge flanges and flare nuts for injection piping/gauge piping.

10. Fix the auxiliary insulation tape and fix the auxiliary packing tape using clamp band to the sunction flanges.

11. Seal with silicon sealant around the flare nut for gauge piping.



⚠ CAUTION

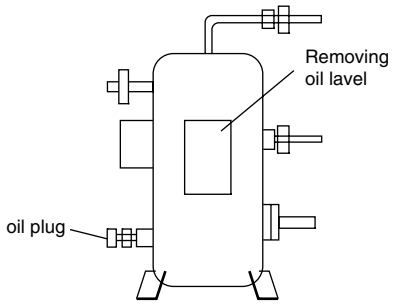
The preparation of refrigerant oil is not required.
The compressor has been charge with the oil.

⚠ CAUTION

The unit does not have suction stop valve. Be sure to adhere packing tape at suction piping section to prevent moisture from entering.

(4) Removal of excess refrigerant oil after compressor replacement

The oil plug and "Removing oil label" are fitted on the spare parts compressor.



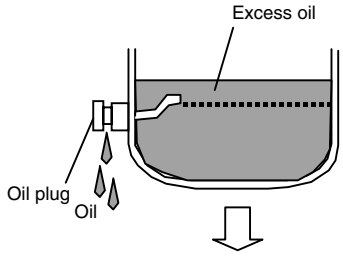
○ When the compressor is replaced to spare parts compressor, remove the excess refrigerant oil in the following procedure.

Preparation

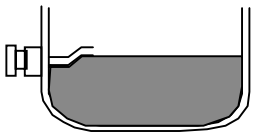
1. First check again whether the discharge/suction side stop valves are opened and the cable connection at terminal is correct.
2. Connect manifold to the discharge and suction ports.
3. Operate the unit for about 5 minutes.Stop the unit.

Return the oil to the compressor

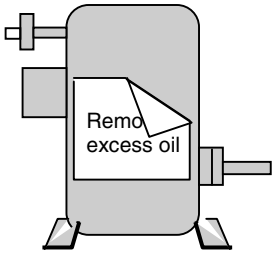
4. Operate the S-PTI (Short PTI) and stop at step of "P10".
   (1) Set the ON/OFF switch to ON.
   (2) Push and hold the [⇄] key for 3 seconds to enter PTI selection mode.
   (3) Selecting the "S-PTI" mode using the [△] [▽] key and pushing the [↵] key activates the short PTI.
   (4) When "P10" is displayed on the LED, stop the unit.
5. Bypass gas from high pressure side to low pressure side of gauge manifold, adjust the low pressure to 0kPa or more.
6. Loosen the oil drain plug and remove the excess oil.



7. Close the oil plug when no more oil comes out.



8. Take off "Removing oil label" sticked on compressor body.



REMOVING EXCESS COMPRESSOR OIL IS NOT COMPLETED.

REMOVE EXCESS COMPRESSOR OIL. THEN TAKE OFF THIS LABEL

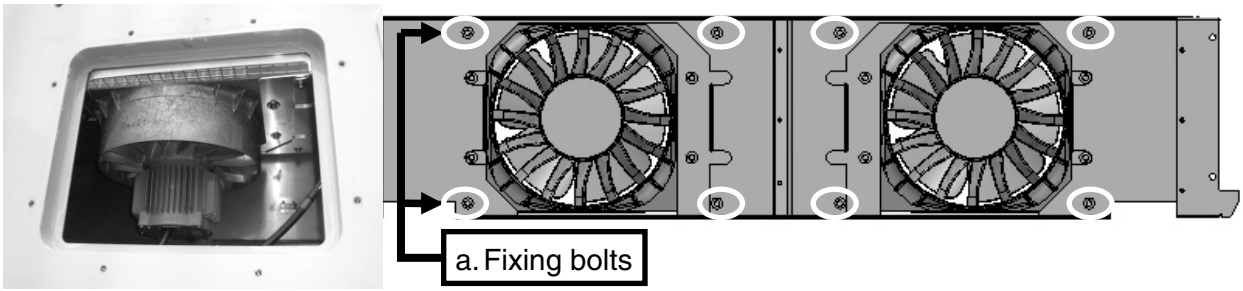
<Function of step P06 & P08 before P10>
Operate the steps of "P06" and "P08" which are displayed on the LCD.
P06/HPS check:
When the high pressure rises, the circuration rate of refrigerant increaces and the oil is expected to return to the compresor.
P08/Pump down check:
The refrigerant contained in the compressor oil is evaporated and separated from the oil.

3.2.2 Procedure of evaporator fan motor removing

●LXE10E100F

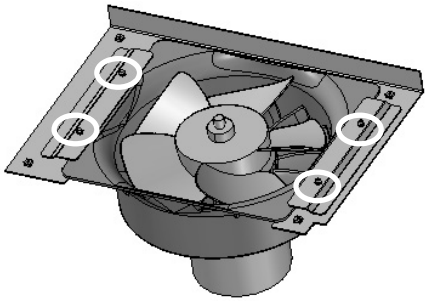
(1) Removing

a. Remove access panel and disconnect 4 pcs fixing bolts (M6) from fan mounting plate.

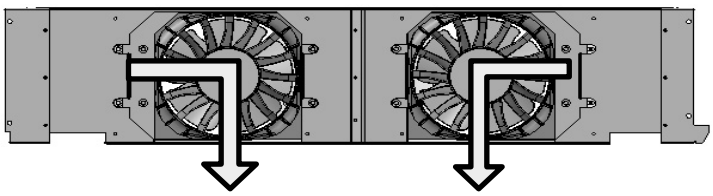


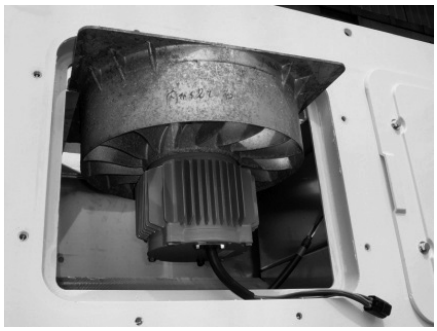
b. Loosen 4 pcs bolts (M8) from fan blade fixing metal.

c. Disconnect power supply connector on fan motor

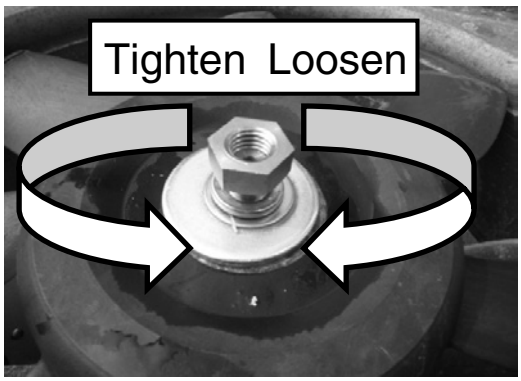


d. Slide fan mounting plate following arrow direction and remove fan assembly toward front side.





e. Remove fan mounting plate and replace fan motor.
(The screw of fan fixing nut (M14) is reverse direction.)

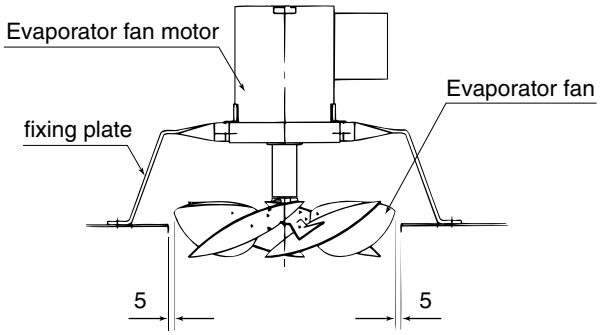


(2) Installation

f. Re-stall fan in a reverse way of removing.

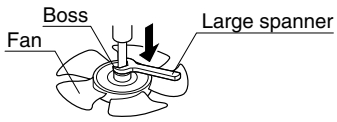
●LXE10E100E or earlier

(1) Replacing evaporator fan



Loosen the two sets of screws on the boss portion of the fan, and pull the fan downward out.

※ If the boss is stuck to the motor shaft, use a large spanner as shown below.



(2) Replacing evaporator fan motor

① After removing the fan at procedue (1), disconnect the fool proof wire connection.
② Remove the motor mounting bolts. (Do not remove the motor mounting base.)
③ After replacing the motor, connect the wiring with fool proof wire connection.
④ Install the fan.
⑤ After replacement, make sure that the fan is not in contact with the fan guide. (To check, rotate the fan by hand.)

⚠ CAUTION

Apply the locking agent on the screws of the fan to prevent from loosening. Otherwise, fan may drop from the motor.

3.2.3 Electronic expansion valve

● Model Coil : HCM-MD12DM-1
Body : HCM-BD35DM-1

This unit adopts an electronic expansion valve. The electronic expansion valve controls the optimum refrigerant flow rate automatically, using the temperature sensor at the evaporator inlet and outlet pipes.

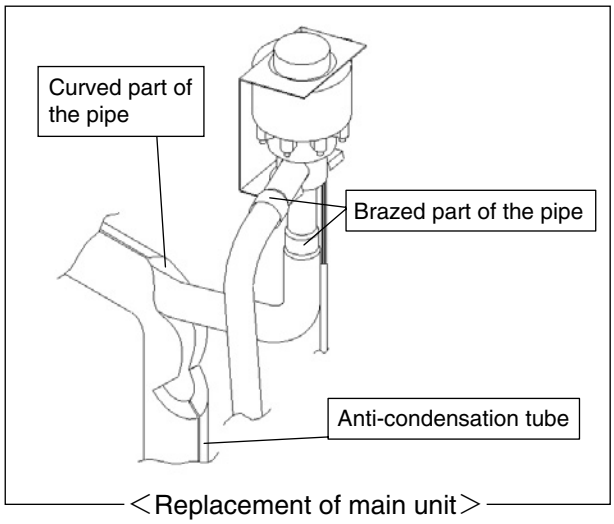
In case of emergency including controller malfunction, refer to the chapter of troubleshooting, section 5.4, Emergency operation.

(1) Replacing the coil

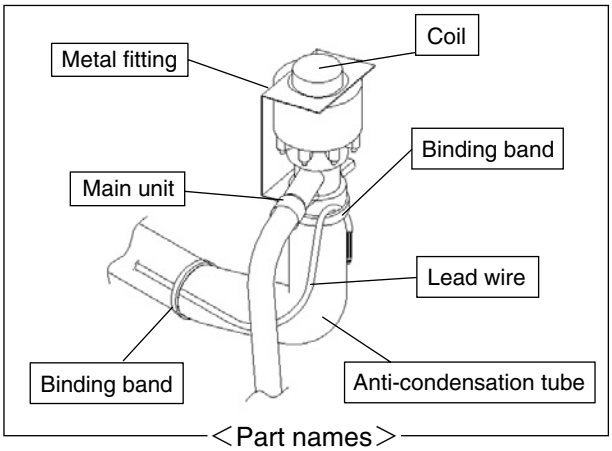
① Remove the binding band fixing the coil lead wire.
② Disconnect the connector of the coil.
③ Remove the metal fitting and the coil.
④ Replace the old coil with a new one.
⑤ Attach the coil and the metal fitting.
⑥ Mount the connector of the coil.
⑦ Fix the coil lead wire with a binding band.

(2) Replacing the body

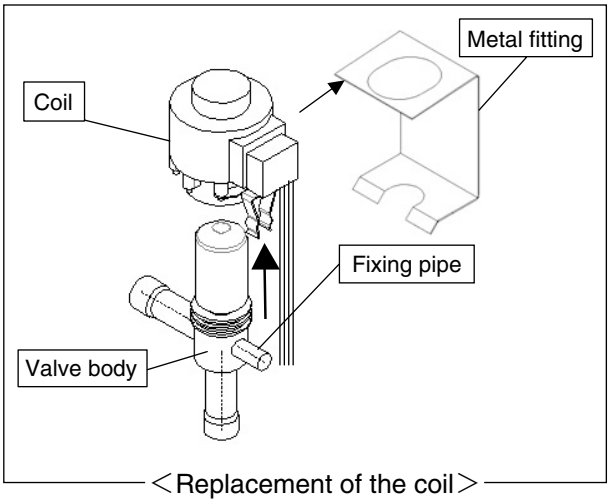
① Remove the binding band fixing the coil lead wire.
② Detach the anti-condensation tube until the curved part of the pipe.
③ Remove the metal fitting and the coil.
④ Remove the brazed part of the pipe.
⑤ Insert the new valve body in the pipe.
→Braze the new valve body while cooling it with a wet cloth.
Maximum body temperature : 120˚C (248˚F) or less
⑥ Mount the coil and the metal fitting.
⑦ Mount the anti-condensation tube.
⑧ Fix the coil lead wire with a binding band.



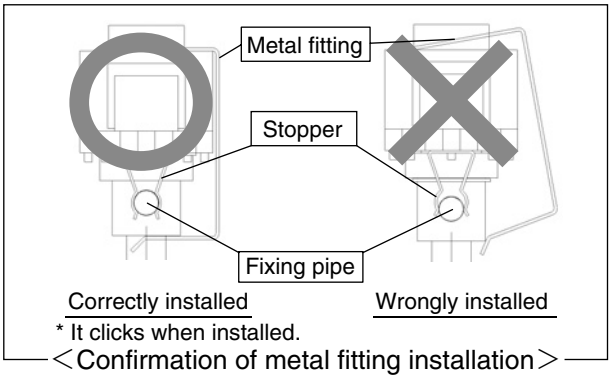
＜Replacement of main unit＞



＜Part names＞



＜Replacement of the coil＞



＜Confirmation of metal fitting installation＞

Attention (When installing the coil and the metal fitting)

●Securely attach the coil stopper to the valve body fixing pipe.
→If wrongly attached, the expansion valve may function abnormally, damaging the compressor.

●Take care not to allow the metal fitting damage or pinch the lead wire.
→Malfunction of the expansion valve may arise.

3.2.4 Suction modulation valve

The flow rate of suction gas is controlled between 10 to 328pls (3 to 100%) by a stepping motor in order to conduct capacity control operation.

1. Replacing the coil

● Coil removing procedure

(1) Disconnect the SMV lead wire connector ① from the inside of control box.

(2) Cut the binding band ③ at the upper rubber cover ① and lower rubber cover ②, then remove the rubber cover ①.

(3) Cut the tie wrap ⑤ located above the coil ④, then remove it.

(4) Remove the coil ④ and the lower cover assembly ②.

● Reinstalling of coil

(1) Mount the lower rubber cover assembly ② and the coil ④.

Note) Engage the dimple ⑧ of coil bracket ⑦ with the dimple (protrusion) ⑨ of coil ④, and adjust the angle as shown in the Fig. D.
Since the angle adjustment is important for control of suction modulating value, carry out the adjusting accurately.

(2) Fix the coil ④ and coil bracket ⑦ with the tie wrap ⑤ so that the coil ④ and the position of the dimple of coil bracket ⑦ should not be displaced.

Note) Ensure that the tie wrap is not tilted.

(3) Arrange the lead wires as shown in the Fig. A and Fig. D and fix them with the binding band so that the slack of lead wires should be prevented.

(4) Replace the upper rubber cover ①.

Note) Set the engaging section of upper cover to fit with the rim of lower rubber cover ⑩.

(5) Place the binding band ③ to fit the upper and lower covers

Note) Fix the lead wire carefully so that water does not enter into its protecting tube ⑪. (Fix lead wire with binding band.)

(6) Connect the connector of lead wire ① to the inside of control box.

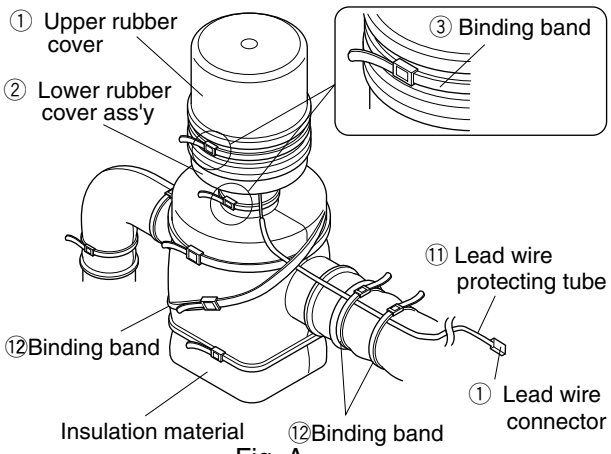


Fig. A

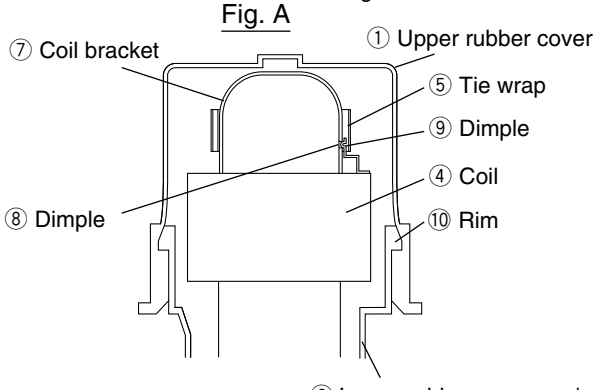


Fig. B

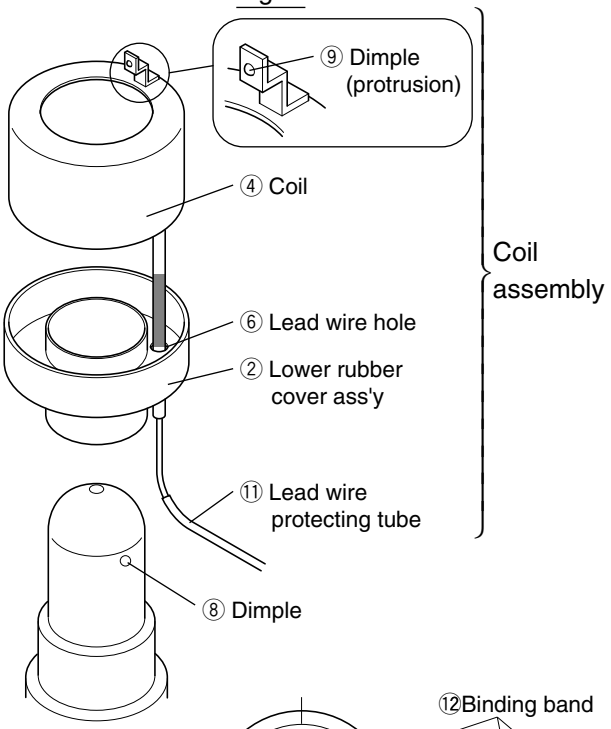


Fig. C

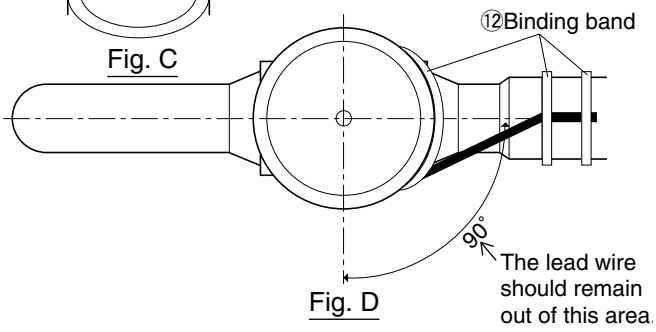
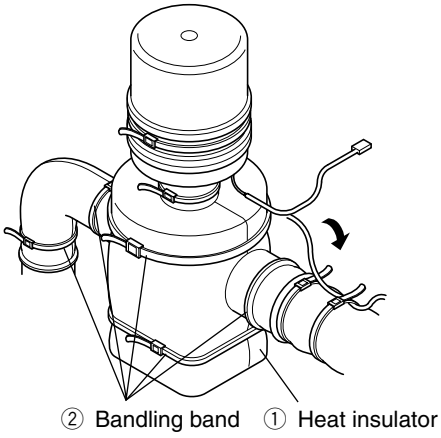
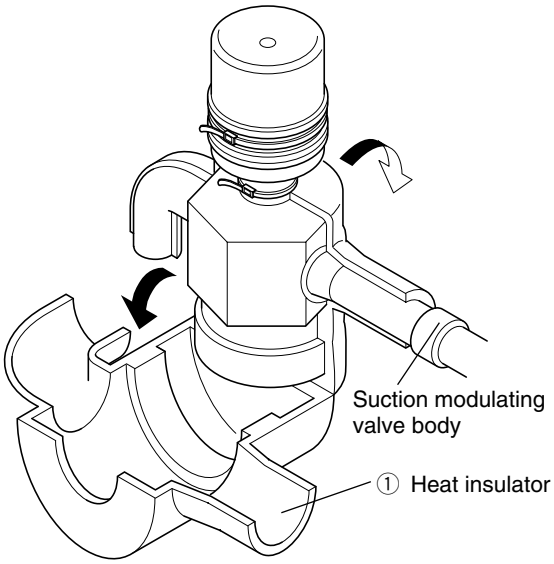


Fig. D

2. Replacement of body

(1) Remove the coil. Refer to the section 1. "Replacing the coil" for removing procedure.
(2) Remove the heat insulator ① for the SMV after cut the binding band ②.
(3) Heat up the brazed joint on the piping of SMV body to disconnect the pipe at brazed section.
(4) Assemble piping of the SMV body, and conduct brazing while keeping the temperature of lower body of SMV below 120˚C (248˚F) by covering the body with wet cloth.
Note) When brazing, to keep the temperature of body, including value body, coil, lead wire, etc. below 120˚C by supplying water.
In this work, be sure to prevent water from entering into the lead wire protection tube.
(5) Install the heat insulator ① and fasten it with bandling band ②.
(6) Install the coil. Refer to the section 1. "Replacing the coil" for removing procedure on the previous page.



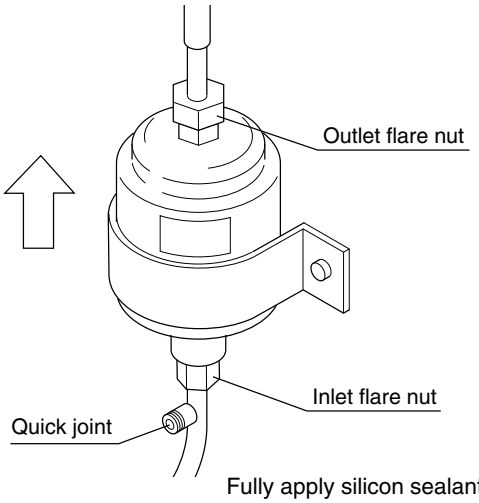


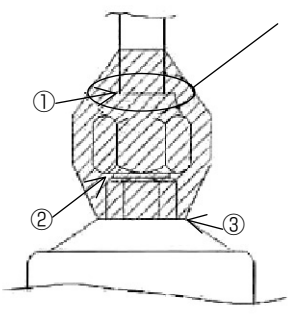
3.2.5 Drier

The drier automatically absorbs moisture in the refrigerant while it is circulated. It also commonly works as a filter to remove dust in the refrigerant. Replace the drier if it does not absorb moisture, is blocked, or if the system has been opened to the atmosphere. When installing the new drier, follow the arrow and do not make any mistake about the installation direction of the drier

(1) Replacement procedure

① Conduct **the automatic pump down** to collect the refrigerant in the liquid receiver. Refer to page 3-3 and 3-4 for the automatic pump down.
② Then, quickly replace the drier with a new one after loosening the flare nuts on the inlet and outlet side of the drier.
③ After completing of the replacement of the drier, be sure to conduct refrigerant leakage test to confirm that no refrigerant leakage is occuring.
④ Check on the green colour of the liquid / moisture indictor after system operation has started.
⑤ Apply silicon sealant to the drier body including the flare nuts on the inlet and outlet sides





Fully apply silicon sealant to the drier body including the flare nuts on the inlet and outlet sides

When put under low temperature and pressure by some operation conditions, ① and ② might have the threads damaged by frozen dew drops.

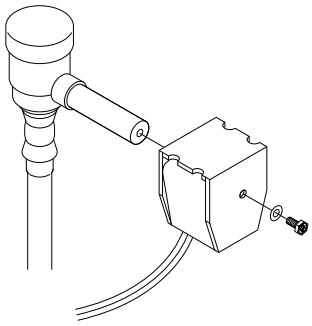
③ may become rusty as a result of coating peel-off at work using a spanner

3.2.6 Solenoid valve

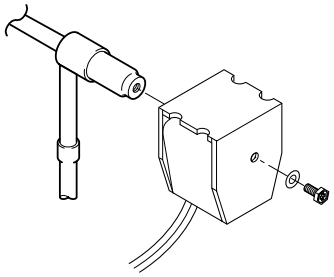
Two kinds of solenoid valves are employed for the unit.

Coil is common and replacement procedure is also almost the same for all types of valves.

Valve name	Symbol	Valve type	Type of coil
Economizer Solenoid valve.	ESV	NEV-202DXF	NEV-MOAB507C
Injection Solenoid valve.	ISV		
Liquid Solenoid valve.	LSV	VPV-803DQ	
Discharge gas by-pass Solenoid valve.	BSV		
Defrosting Solenoid valve.	DSV		
Hot gas Solenoid valve.	HSV		
Reheat Solenoid valve. (optional)	RSV		



VPV-803DQ
Fig. 1



NEV-202DXF
Fig. 2

(1) Replacing the coil

① Remove the lead wire connector from the inside of the control box, and cut and recover the binding band which fastens the lead wire.

② Remove the hexagonal head bolt on the top of the coil to pull the coil out.

③ Replace the coil with a new one and restore the hexagonal head bolt, the binding band and connector on the original position.
When reassembling the coil, the tightening torque should be 1.2 N·m (12.2 kg·cm).

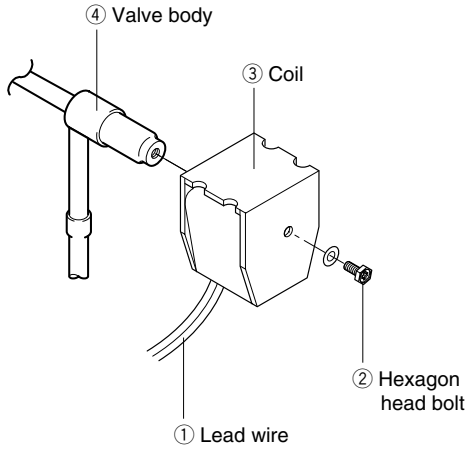
(2) Replacement of valve body

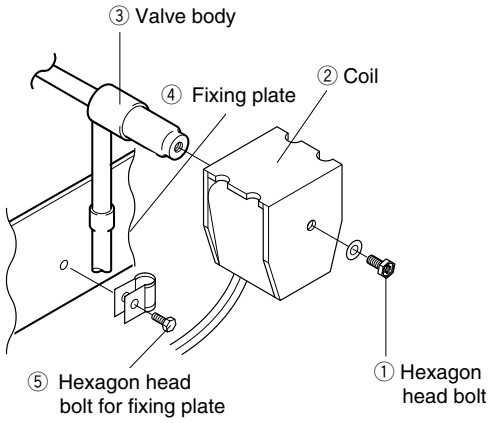
① Remove the hexagonal head bolt on the top of the coil to pull the coil out.

② Remove the hexagonal head bolt of the fixing plate, and cut the two pipes at the side of the valve body.
Disconnect the remaining pipes at the brazed joint sections.

③ Insert the new valve body into the pipe and conduct brazing while keeping the temperature of the valve body below 120 ˚C (248 ˚F) by cooling.

④ Install the coil and restore the hexagonal head bolt of the fixing plate and the connector into their original position.





3.2.7 Discharge pressure regulating valve

● Model KVR15

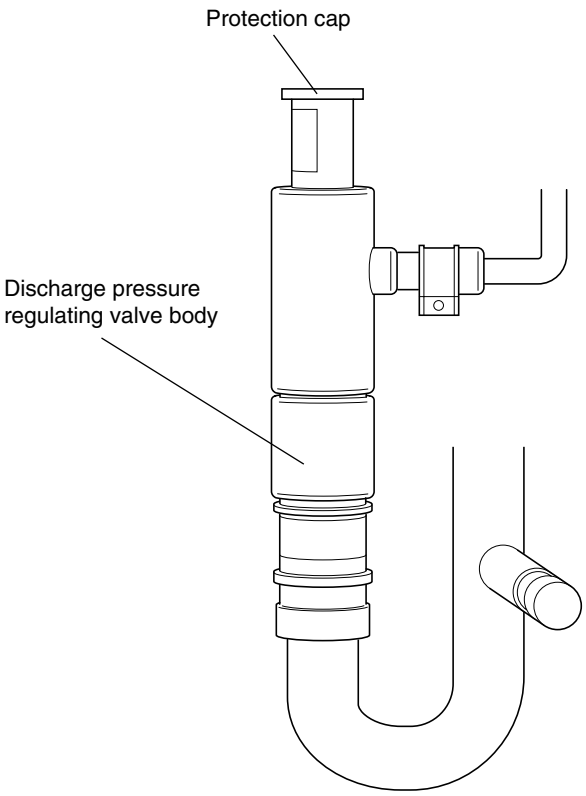
(1) Replacing the valve

① Remove the protection cap to conduct brazing for the valve body.
Be sure not to turn the regulating screw inside the valve, since the pressure has been adjusted to 690 kPa (7.0 kg/cm²).

② When brazing, it is required to cool the valve body in order to keep the temperature of valve body below 140 ˚C by covering the body with wet cloth or the like.

③ After brazing work, set and tighten the protection cap.
The tightening torque should be 8 to 10 N·m.
Apply lock-tight, etc. on the screw section to avoid loosening of the cap.

④ After replacement, carry out refrigerant leakage check, and make sure there are no leaks.



3.2.8 Check valve

● Model LCV(B)5

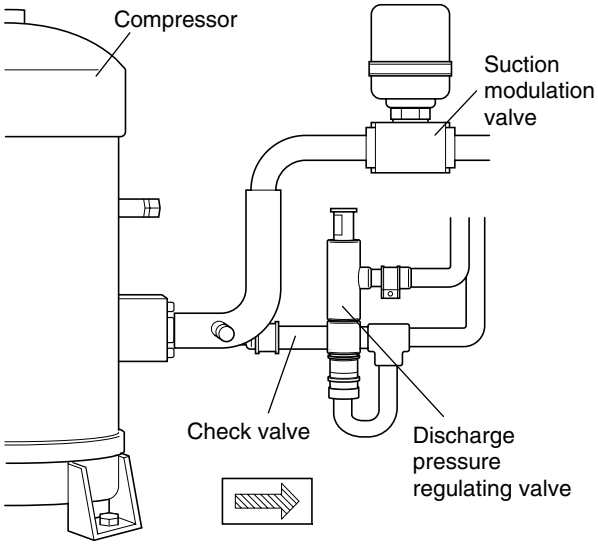
(1) Replacement procedure

① Remove the pipe clamp which fixes the check valve, then heat up the valve to disconnect the brazed joint.

② Install the new check valve taking care to install it in the correct direction, which is the same direction as the arrow shown in the label.

③ Conduct brazing while cool the center part of valve with a wet cloth to keep the temperature of the valve body below 120 ˚C (248˚ F)

④ After replacing the valve, carry out refrigerant leakage check, and make sure that there are no leaks.



3.2.9 High-pressure switch (HPS)

● Model ACB-KB15

● Set point OFF : 2400kPa (24.47kg/cm²)
ON : 1900kPa (19.37kg/cm²)

When the refrigeration pressure of the unit rises abnormally, the compressor stops for safety. The HPS will be activated when the pressure exceeds the set point, as a result of trouble with the condenser fan.

(1) Replacement procedure

① Disconnect the lead wire from the control box.

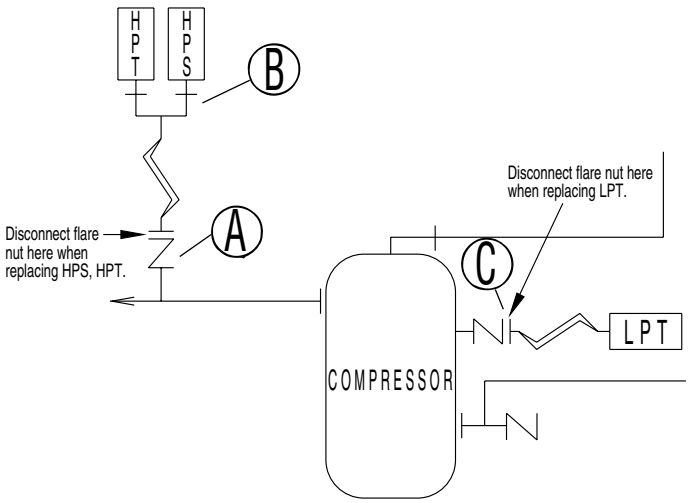
② In order to prevent refrigerant from flowing out, disconnect the high-pressure gauge piping from the gauge joint (with check valve) Ⓐ on the compressor side.

③ Remove the flare nut Ⓑ and mounting screws of HPS on the casing at the left side of the compressor.

④ Replace the HPS. After tightening the flare nut Ⓑ, tighten the flare nut Ⓐ.

⑤ After tightening Ⓐ, slightly loosen the flare nut Ⓑ, remove air, and retighten Ⓑ.

⑥ After replacing, carry out the refrigerant leakage check, and make sure that there are no leaks.



3.2.10 High pressure transducer (HPT)

Model		NSK
Transducer type		NSK-BC030F
Identification color	Transducer	Red & Brown body
	Connector	Nothing

The HPT is located in the refrigerant circuit. The operating high pressure value is displayed on the controller indication panel.

(1) Replacement procedure

The replacement procedure is the same as that for the low pressure transducer. Make sure that the fixing position and the cable connection is correct.

3.2.11 Low pressure transducer (LPT)

Model		NSK
Transducer type		NSK-BC010F
Identification color	Transducer	Black body
	Connector	Nothing

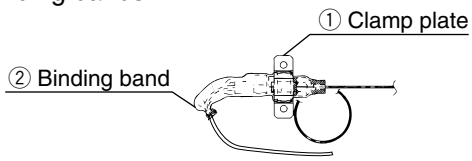
The LPT is located in the refrigerant circuit. The operating low pressure value is displayed on the controller indication panel.

(1) Replacing the transducer

① Disconnect the lead wire from the control box.

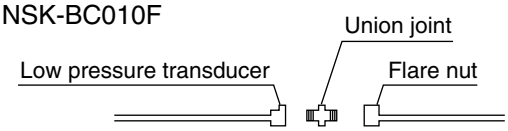
② In order to prevent refrigerant from flowing out, disconnect the low-pressure transducer piping from the gauge joint (with check valve) Ⓒ on the compressor side.

③ Remove two screws on the clamp plate fixing low pressure transducer in place, and cut the binding bands.

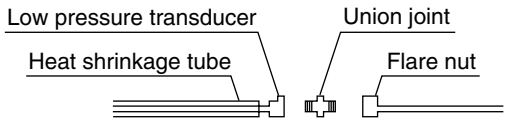


④ Remove the heat shrinkage tube, and disconnect the connector from the low pressure transducer.

● NSK-BC010F



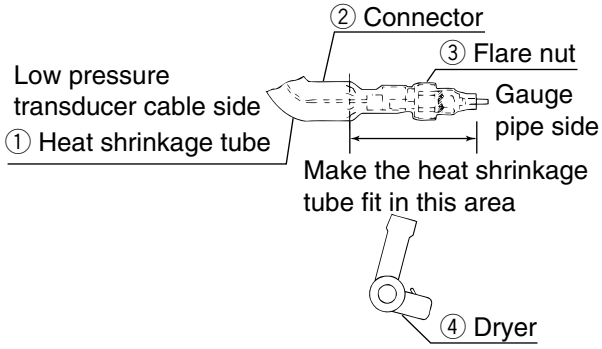
⑤ Insert the pressure transducer cable through the heat shrinkage tube, and connect the union joint and connector to the new low pressure transducer. If paint on the low pressure transducer is peeled off, apply clear lacquer.



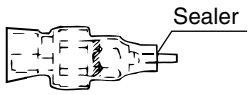
⚠ CAUTION

Do not expose the low pressure transducer to hot air of a dryer for excess time.
Otherwise, the transducer may be damaged.

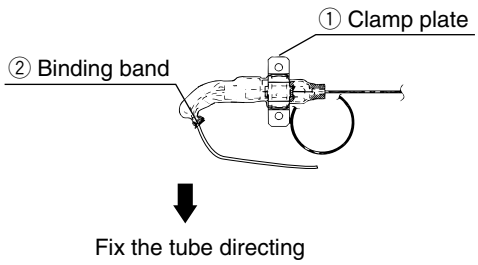
⑥ Apply the heat shrinkage tube in the following position, then shrink it with hot air of a dryer.



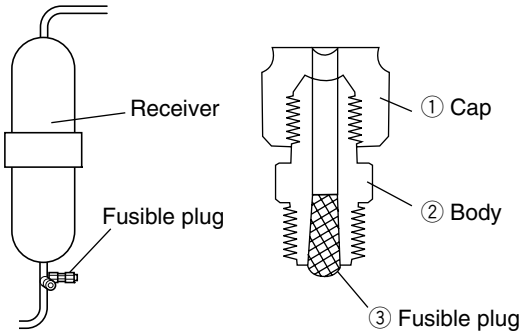
⑦ Apply sealer between the heat shrinkage tube and the flare nut. (Sealer :KE4898)



⑧ Fix the low pressure transducer with the clamp plate, and fix the cable with the binding band.
Fix the shrinkage tube end of the cable side downward for prevention of water entering into the tube.



3.2.12 Fusible plug

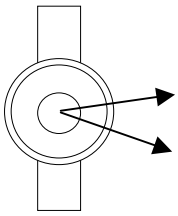


● Replacement of fusible plug
If pressure rises abnormally in the refrigeration circuit, the fusible plug is automatically activated, so, thoroughly check the possible causes if the fusible plug melts.
If the fusible plug is activated, the fusible alloy ① melts and refrigerant blow out (Melting point: 95˚C ~100˚C).
For replacement, ①-③ shall be replaced.

3.2.13 Liquid / Moisture indicator

Liquid/Moisture Indicator permits checking of the refrigerant flow rate and moisture content in the refrigerant.

(1) Moisture indicator



Color	Judgement
Green	Dry
Yellow	Wet (Contains excessive moisture)

ATTENTION 1

Replace refrigerant

(2) Judgement for refrigerant flow rate (normal, shortage or overcharge)

Operation		Judgement	
Frozen operation	RS<approx. 0˚C  Full	Normal	Refrigerant charge is normal if the indicator is full of liquid when RS is under approx. 0˚C
	RS<approx 0˚C  Flashing	Shortage	Refrigerant charge is short if the indicator shows flashing of refrigerant when RS is under approx 0˚C
	RS>approx 0˚C  Flashing	Normal in most cases	Refrigerant charge is normal with flashing in the indicator in most cases, when RS is above approx 0˚C
Chilled operation	 Flashing	Normal in most cases	Refrigerant charge is normal with flashing in the indicator in most cases, during chilled operation with capacity control.

ATTENTION 2

As flashing here does not mean gas shortage, do not charge with additional refrigerant.

Possibly caused by overcharging

⚠ CAUTION

If the amount of refrigerant is excessive or insufficient, completely recover all refrigerant and charge with a correct amount of refrigerant.

Additionally charging refrigerant exceeding the specified amount may cause a failure of the compressor.

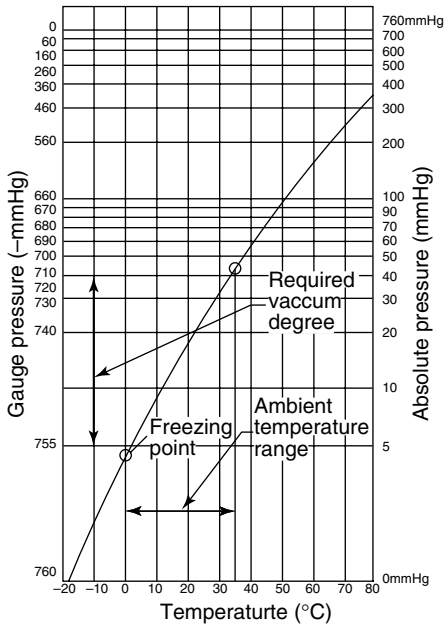
3.2.14 Evacuation and dehydrating

After repairing the refrigerant system, vacuum-dehydrate the system before charging the refrigerant.

Vacuum-dehydrating is the process to make the circuit dry by purging the moisture (liquid) in the circuit to outside in state of vapor (gas) using the vacuum pump.

As the pressure lowers below normal atmosphere (760mmHg), the boiling point of water rapidly drops. If the boiling point drops beyond the atmospheric temperature, water will be vaporized.

Example: If the atmospheric temperature is 7.2 ˚C (45 ˚F), vacuum-dehydrating will be impossible unless the vacuum degree is lower than –752mmHg. For vacuum-dehydrating, it is important to select and maintain the vacuum pump.



(1) Vacuum pump selection

Select a vacuum pump considering the following two points.

①Select a vacuum pump whose vacuum achievability is excellent.
(A vacuum degree of –755mmHg or lower can be achieved.)

②The displacement must be relatively large (approx. 40 ℓ /min. or more).
Before vacuum-dehydrating work, be sure to confirm that the pump achieves the vacuum degree of –755mmHg or lower by using the vacuum gauge.

Boiling point of water (˚C)	Atmospheric pressure(mmHg)	Vacuum degree(mmHg)
40	55	–705
30	36	–724
26.7	25	–735
24.4	23	–737
22.2	20	–740
20.6	18	–742
17.8	15	–745
15.0	13	–747
11.7	10	–750
7.2	8	–752
0	5	–755

(Reference) Kinds of vacuum pumps and achievable vacuum degree

Type	Achievable vacuum degree Displacement	Application	
		For vacuum-dehydrating	For air exhausting
Oil rotary type (oil-necessary type)	–759.98mmHg 100 ℓ /min.	Applicable	Applicable
Oilless rotary type (oil-unnecessary type)	–750mmHg 50 ℓ /min.	Inapplicable	Inapplicable
	–759.98mmHg 40 ℓ /min.	Applicable	Applicable

Take care that this type is often used as the most convenient type.

With the pump of an oil rotary type, it is important to replace the oil and check the achievability every 1 to 2 months.

(2) Vacuum-dehydrating method

There are two method of vacuum-dehydrating of normal vacuum-dehydrating and special vacuum-dehydrating. In general, the normal vacuum-dehydrating is applied. If any moisture has entered the circuit, apply the special vacuum-dehydrating method.

[normal vacuum-dehydrating]

①Vacuum-dehydrating(first time)

Connect the gauge manifold to the service ports of the liquid line and the outlet of discharge pressure regulator. Run the vacuum pump for 2 hours or longer. (The achievable vacuum degree must be –755 mmHg or lower)

If a pressure of –755mmHg or lower can not be achieved even after pump operation of 2 hours, moisture or leakage may exist in the system. In this case, run the pump another hour or more.

If a pressure of –755mmHg or lower can not be achieved even after operation of 3 hours or more, check for leakage.

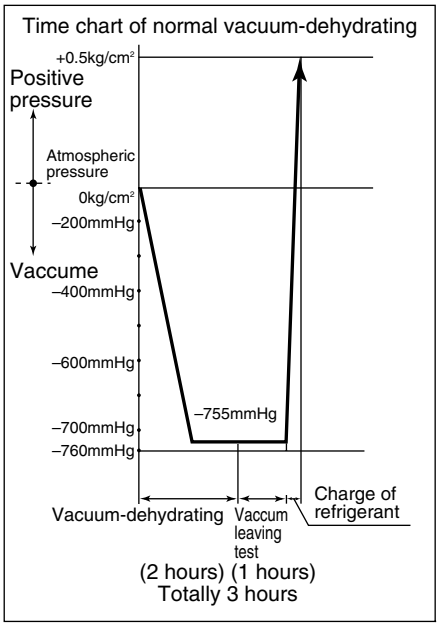
Note: Evacuate the system from the service ports ④ of both liquid and outlet of the check valve ⑤, because the system is blocked on the way since the liquid solenoid valve is provided on the way of the system.

② Vacuum holding test

Hold the system at a pressure of –755mmHg or lower for 1 hour or longer, and confirm that the vacuum reading does not rise on the vacuum gauge. If it rises, moisture or leakage may exist in the system. However, take care not to leak air from the gauge manifold. If air enters, it is recommended to use the cupper tube directly instead of gauge manifold.

③ Charging of refrigerant

After the vacuum-holding test, make the circuit vacuous again for approx. 10 minutes. Then, charge the specified amount of refrigerant through the service port on the liquid line using the charging cylinder.



[Special vacuum-dehydrating]

This method is that the vacuum-breaking process with nitrogen gas is integrated one time or more in the same way as the normal vacuum-dehydrating process.

①Vacuum-dehydrating (first time)

..... 2 hours

②Vacuum-breaking (first time)

Nitrogen gas is pressurized to 0.5kg/cm² from the service port on suction pipe. Since nitrogen gas breaks the vacuum, the effect of the vacuum-dehydrating is enhanced. However, if there is much moisture, it can not be removed by this method. Therefore, do not allow water entry or produce water during the refrigerant piping work.

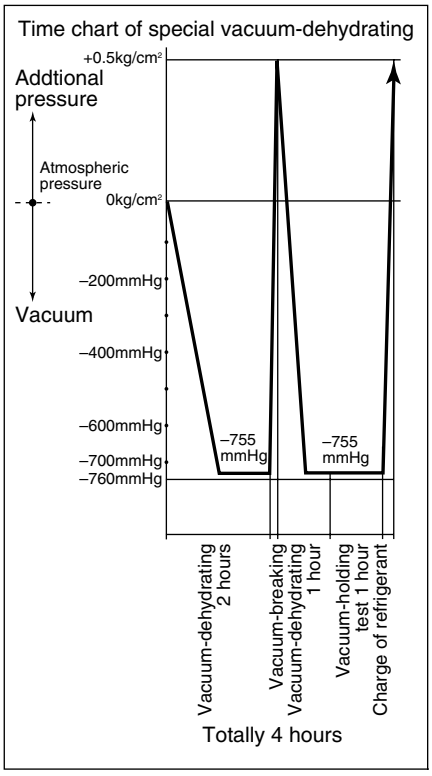
③Vacuum-dehydrating (second time)

Run the vacuum pump one hour or longer. (The achievable vacuum must be –755mmHg or lower.)

If pressure of –755mmHg or lower can not be achieved even after vacuuming of 2 hours, repeat step ②vacuum-breaking and ③vacuum-dehydrating.

④Vacuum holding test ..... 1 hour
⑤Additional charge of refrigerant
} Same as normal vacuum-dehydrating

Note: Make sure to use nitrogen gas for vacuum-breaking. (If any oxygen gas is used, it may explode.)



(1mmHg=0.0013kg/cm²=0.133Kpa)

3.3 Periodic Inspection Items

Always to operate the unit normally, conduct periodic inspections of each part in addition to pre-operation ones and make adjustments or repairs where necessary.
The following table shows an example of the inspection plan.

	No.	Inspection item	Inspection content	2nd year	4th year	8th year
general structure	1	Inspection for physical damage		✓	✓	✓
	2	Loose mounting bolts		✓	✓	✓
	3	Condition of panels, hinge and lock		✓	✓	✓
	4	Control box inspection	1) Cover packing inspection and replacement	✓	✓	✓
			2) Loose cable gland	✓	✓	✓
			3) Internal cleaning	✓	✓	✓
	5	Sealing condition of holes through casing frame	Air leakage and clearance	✓	✓	✓
	6	Packing inspection and replacement	Ventilator cover packing	✓	✓	✓
	7	Painted area recondition	1) Compressor	✓	✓	✓
			2) Water-cooled condenser/liquid receiver	✓	✓	✓
			3) Solenoid valve (coil cap)	✓	✓	✓
			4) Casing frame		✓	✓
	8	Repainting	1) Compressor			✓
			2) Water-cooled condenser/liquid receiver			✓
			3) Condenser fan motor			✓
			4) Condenser fan			✓
Refrigerant system	1	Refrigerant leakage		✓	✓	✓
	2	Compressor	Water entering to compressor terminal	✓	✓	✓
	3	Dryer	Visual check	✓	✓	✓
	4	Function inspection and replacement of liquid moisture indicator				✓
	5	Condition of fasteners on the refrigerant pipes and gauge pipes		✓	✓	✓
	6	Condition of thermal insulation of refrigerant pipe		✓	✓	✓
	7	Evaporator coil cleaning (BY water)		✓	✓	✓
	8	Condenser coil cleaning	1) Water-cleaning	✓	✓	✓
			2) Steam-cleaning (after pumping down the refrigerant)		✓	✓
	9	Water-cooled condenser inspection	1) Water-leakage inspection	✓	✓	✓
			2) Operation of water pressure switch	✓	✓	✓

	No.	Inspection item	Inspection content	2nd year	4th year	8th year
Electrical system	1	Damage of power cable and plug		✓	✓	✓
	2	Inspection of condition of internal wiring		✓	✓	✓
	3	Terminal looseness inspection and retightening if necessary	1) Magnetic switch	✓	✓	✓
			2) Electronic controller terminal block	✓	✓	✓
			3) Terminal block	✓	✓	✓
	4	Condition of monitoring receptacle cap		✓	✓	✓
	5	Condition of personal computer receptacle cap		✓	✓	✓
	6	Fuse conditions	Burned out or not	✓	✓	✓
	7	Magnetic switch contact point inspection and replacement	1) Contact point inspection	✓	✓	
			2) Replace the contact on compressor contactor			✓
			3) Replace the contact on compressor fan motor			✓
			4) Replace the contact on evaporator fan motor			✓
	8	Electric insulation check	1) Power cable and plug	✓	✓	✓
			2) Compressor	✓	✓	✓
			3) Condenser fan motor	✓	✓	✓
			4) Evaporator fan motor	✓	✓	✓
	9	Thermo sensor	1) Installation condition of sensors	✓	✓	✓
			2) Inspection of sensor and sensor lead for damage	✓	✓	✓
			3) Indication error inspection and replacement	✓	✓	✓
	10	PT/CT (voltage and current) indication error inspection		✓	✓	✓
	11	Pressure sensor indication error inspection		✓	✓	✓
	12	Electronic controller	LCD panel replacement		✓	✓
	13	Evaporator fan motor	Inspection of bearing		✓	✓
	14	Condenser fan motor	Inspection of bearing		✓	✓
	15	Evaporator fan	Deformation and damage inspection	✓	✓	✓
	16	Condenser fan	Deformation and damage inspection	✓	✓	✓

4. OPTIONAL DEVICES

The following optional devices are available for some models. For other optional devices, refer to the "Optional function" manual and parts list.

4.1 Cold Treatment Transport

Models equipped with USDA sensor and receptacle (optional for both) can perform cold treatment transport.

4.1.1 Setting the number of USDA sensor connections

It is necessary to set the number of USDA sensor connections prior to cold treatment transport. The setting procedures are described below

Setting the number of USDA sensor connections

The number of USDA sensor connections can be 3 or 4. Set "3" or "4" in accordance with the number of the connections based on the cold treatment transport standards (USDA). If there is no USDA transportation, set "OFF"

Setting the number of USDA sensor connections

USDA setting "OFF", "3", "4"	Number of connections
OFF	When there is no USDA transportation
3	3
4	4

Note 1: For the setting procedures of the number of USDA sensor connections, refer to 2.2.2 (10. Optional function setting mode)

4.1.2 USDA sensor calibration

USDA sensors must be calibrated for each transportation. Connect the PC with installed DCCS software and operate according to procedures. Select "USDA SENSOR CALIBRATION" when the number of USDA sensor connections is 3 and select "4 PULP SENSOR CALIBRATION" if the number of them is 4. For details, refer to DCCS operation manual

Checking USDA sensor type setting

If a hugely different calibration value is obtained at calibration, it is possible that USDA sensor model setting is incorrect. USDA sensor type includes "ST9702-1" type and "NTC" type. Refer to 4.1.5 in USDA sensor. Make sure that USDA1/2 is set to "1" for "ST9702-1" type and "2" for the "NTC" type.

If the setting is wrong, correct it.

USDA sensor model setting

USDA1/2 setting to "1" or "2"	Sensor type Probe type
1	ST9702-1
2	NTC

Note 1: To set USDA1/2 to "1" or "2", refer to 2.2.2 (10. Optional function setting mode)

Note 2: Setting error does not allow the controller to recognize the sensor property and correct data cannot be recorded. Be sure to connect correctly

4.1.3 USDA report

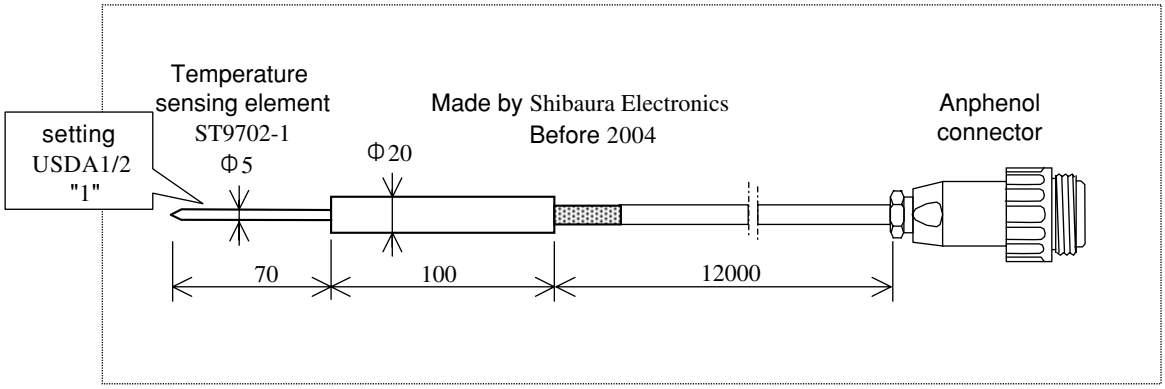
Temperature record data during cold treatment transport can be prepared in the format in conformity with USDA standards which is downloadable from the PC that installed DCCS software. Select "USDA TREATMENT REPORT" when the number of USDA sensor connections is 3 and select "4 PULP SENSORS TREATMENT REPORT" when the number of them is 4. For details, refer to DCCS operation manual

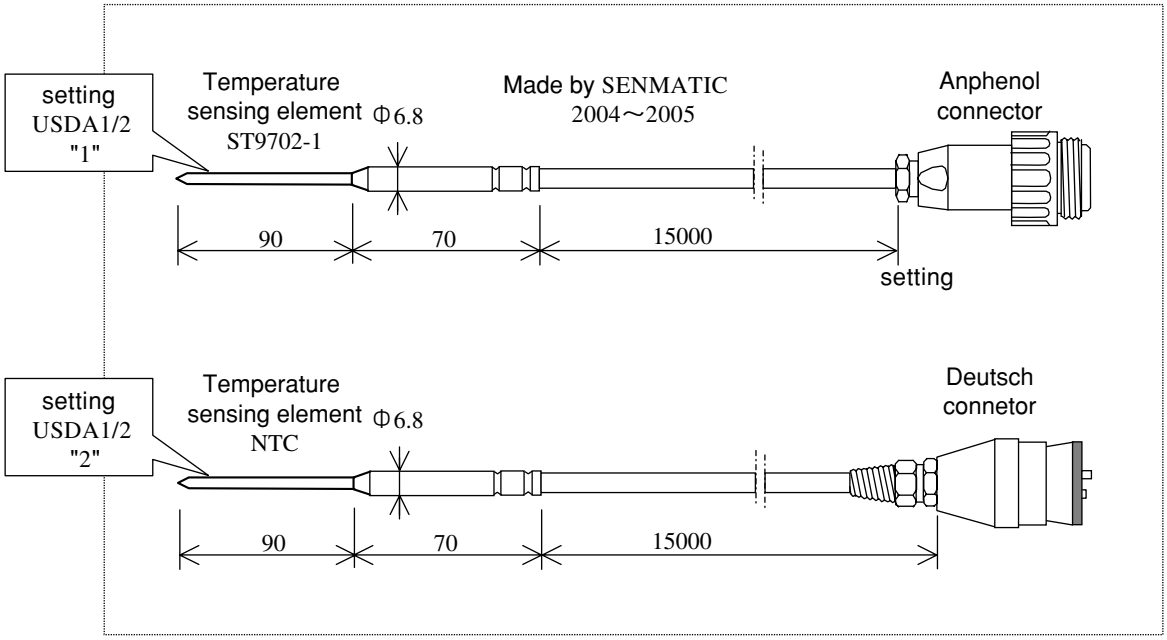
4.1.4 Battery check and replacement

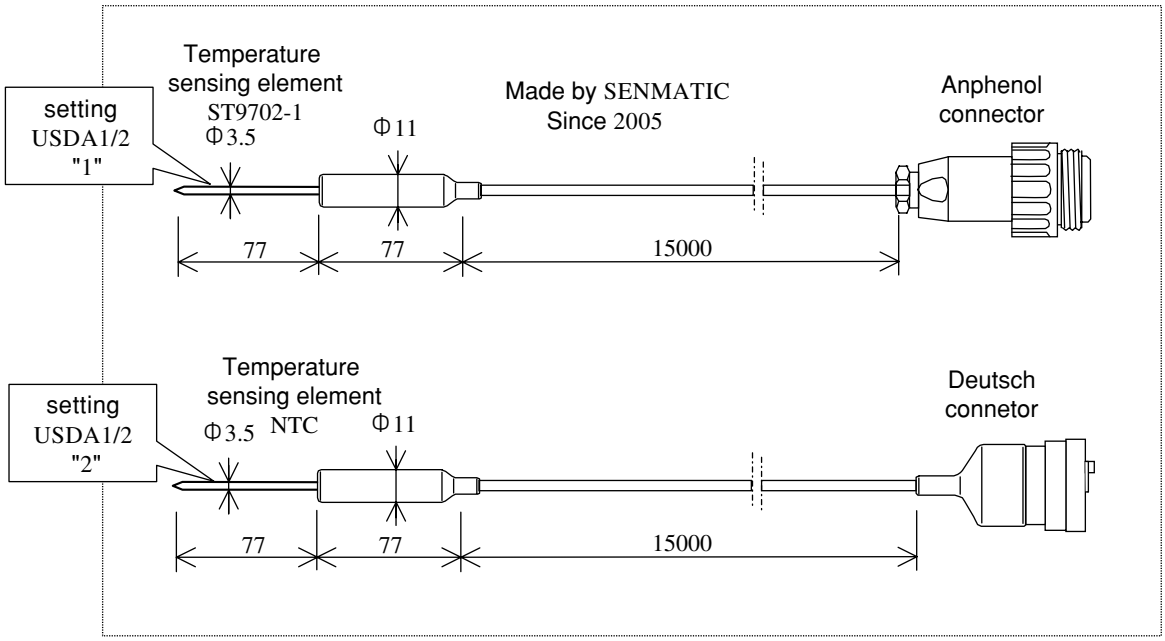
Temperature data must be recorded for 72 hours after the power is turned off. Be sure to check the backup batteries for the controller prior to voyages.

Rechargeable batteries：Check the remaining battery voltage mentioned in 2.4 section.

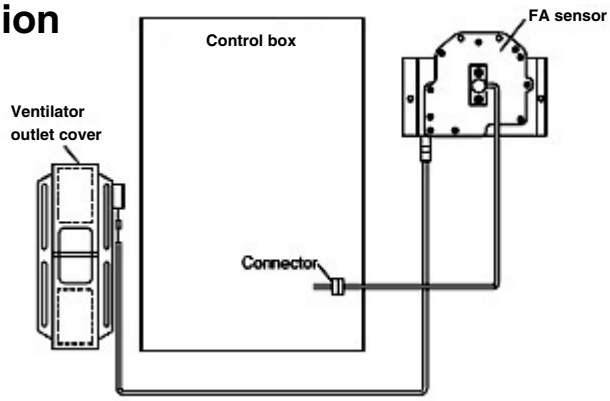
4.1.5 USDA sensor types and setting







4.2 Ventilator outlet opening detection (FA sensor)

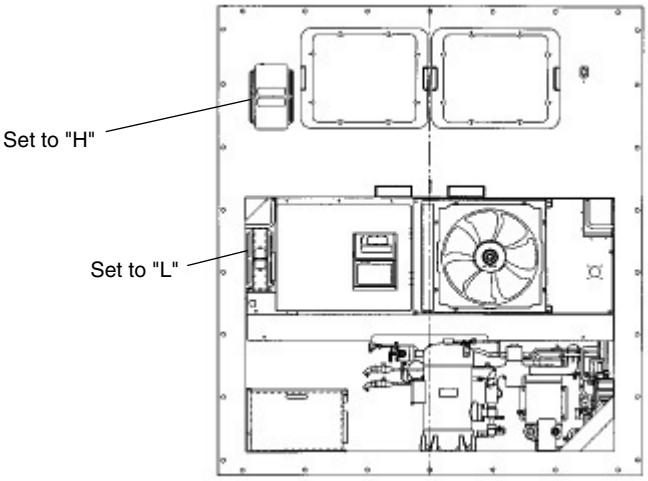


●Type: 5ZZ2157

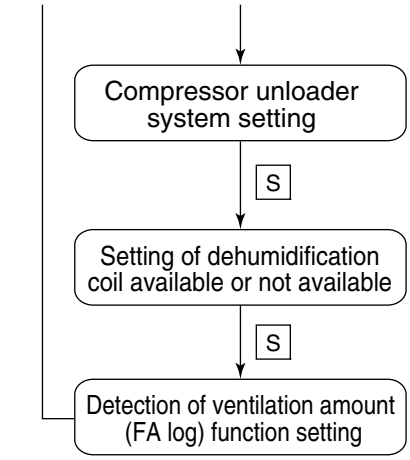
Consisting of the body (wire reel and position meter) and the wire. The top of the wire is connected to the ventilator outlet cover so that the ventilator outlet opening can be detected.

Setting method

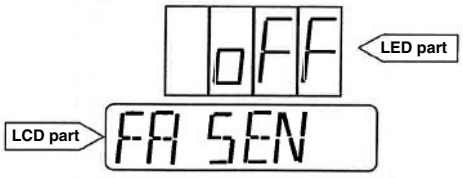
To validate the ventilator outlet opening detection function, it is necessary to configure the settings in accordance with the installation positions of the ventilator outlet in the "basic function setting mode" mentioned below



11. Basic function setting mode



LED screen	LCD screen	Setting method
OFF : Detection function not available H : Detection function available at the upper ventilator opening L : Detection function available at the lower ventilator opening	FA SEN	Make selection using the △ key and ▽ key. Press the ↵ key to confirm the selection



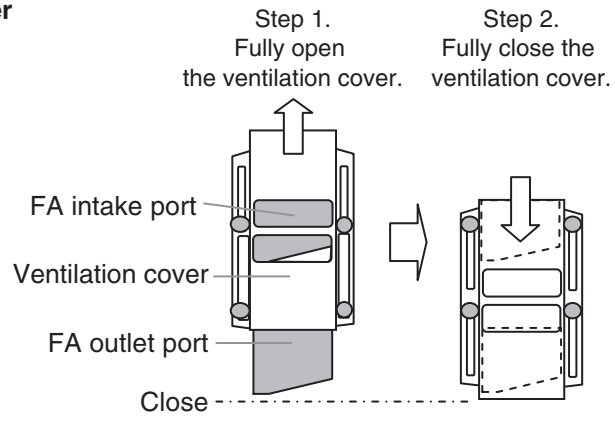
* Applicable models: LXE10E G Type (DECOS III G) and earlier
* The calibration method for the FA sensor varies depending on the model.

FA sensor calibration (zero point adjustment) method

When setting the ventilation amount (FA amount), calibrate the position of the ventilator outlet cover and the FA sensor (zero point adjustment) in advance in accordance with the steps below.

1. Positioning the ventilator outlet cover

Position the ventilator outlet cover in accordance with the two steps (fully open ⇒ fully close) given at right.



2. Calibrating the FA sensor

After the positionng of the ventilator outlet cover has been completed, carry out the FA sensor calibration.

Refer to "FA calibration" in the manual check selection mode (P. 2-40, 2.7.2.4 M.CHECK) for details of the calibration operation.

Ventilation amount (FA amount) setting method

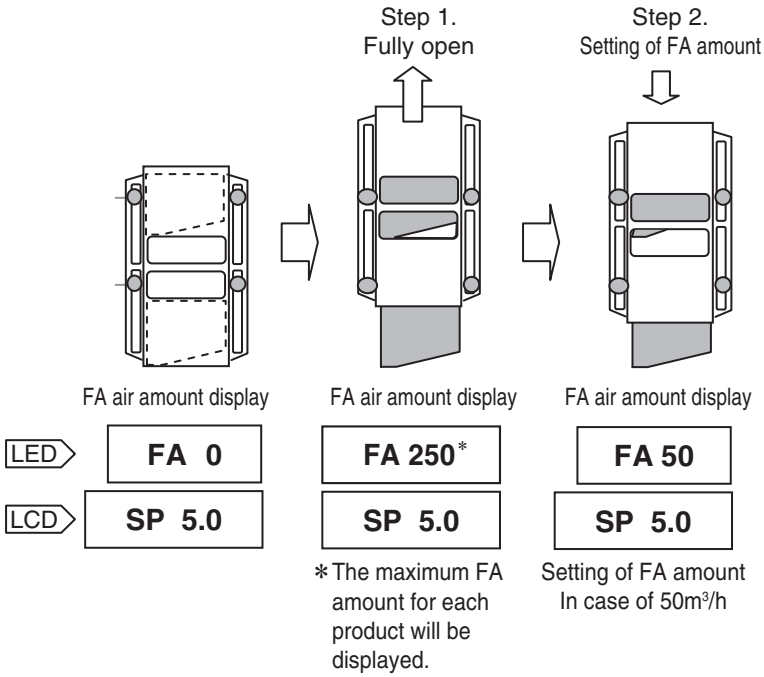
Step 1: Fully open the ventilator outlet cover.

Step 2: Move the cover downward until the FA amount which is displayed on the LED reaches the setting value.

Tighten the four wing bolts to secure the cover.

If the cover is moved upward in step 2, repeat the procedure starting from step 1.

Display the FA amount on the LCD in accordance with the method given in 6. SENSOR INDICATION MODE (P.2-12) or 3. BATTERY MODE (P.2-9).



Function description

1. Ventilation amount log function

Ventilation amount data can be provided to the controller as event log

2. Data logging details

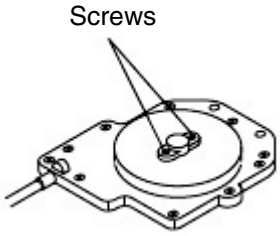
- Ventilation amount (FA) converted from the ventilator outlet opening degree (indicated in m^3/h)
- Time, data, month, year for data logging

3. Log timing

- When the unit starts to run
- Once a day (12:00 am)
- When the ventilation outlet opening changes

Replacement method

① Remove the lead wire (connector connection) in the control box
② Remove the screws that fixate the ventilator outlet cover to the top of the wire
③ Remove the screws fixating the body to the casing and replace the whole sensor including the wire
＊ Be sure to replace the whole sensor including the wire
④ After replacing, seal with silicon sealant around the screwss fixing the position meter in the sensor body



4.3 Daikin Temperature Management System (optional)

DTMS function

This is the temperature control function to cut down power consumption. To conserve energy, this system controls the compressor's ON-OFF switching, High-Low switching for the evaporator fan speed while maintaining the existing temperature control

Control details

		DTMS
Chilled mode	Operating range	-9.9℃≦SP≦-2.6℃, -1.0℃≦SP≦+30.0℃*2
	Temperature control range	Same as normal chilled operations*2 (SP-0.5℃≦SS≦SP+0.5℃)
	Compressor	ON-OFF operation*3
	Condenser fan motor	OFF when the compressor is OFF
	Evaporator fan motor	High-Low switching operation*3
Frozen mode*1	Operating range	Whole frozen range (-10.0℃≧SP≧-30.0℃)
	Temperature control range	Same as normal frozen operations (SP≦RS≦SP+1.0℃)
	Compressor	ON-OFF operation
	Condenser fan motor	OFF when the compressor is OFF
	Evaporator fan motor	High-Low switching

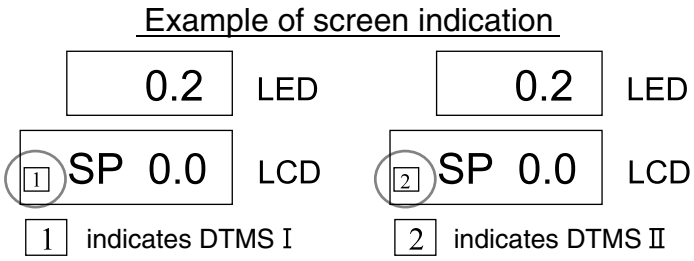
*1 Energy-saving control applicable to the frozen mode in DTMS Ⅱ

*2 Operating range for DTMS Ⅰ : -1.0℃≦SP≦+30.0℃

*3 The unit operation is different from normal operation under DTMS operation. But it is not abnormal. Under nomal operation (without DTMS), the compressor is always ON and the evaporator fan motor is always High

Special instruction for DTMS function

1) "1" or "2" is displayed in LCD screen during DTMS operations



2) Operation control

DTMS is not activated for the following cases even if DTMS is set to ON (dFLt)

1) During dehumidification operations
2) When USDA is set to ON
3) During pull down operations
4) During defrosting operations
5) During heating operations
6) Out of in-range
7) During automatic PTI
8) During high-load operations (chilled mode only)
   · When there is a huge gap between SS and RS
   · When the compressor's ON-OFF switching cycle becomes short
9) When protection devices are activated

3) Cancellation of DTMS operation

When DTMS function is unnecessary for some transportation, cancel the operation in accordance with the procedures described in the next page. But DTMS function is automatically switched to ON (dFLt) at the completion of the PTI mentioned below

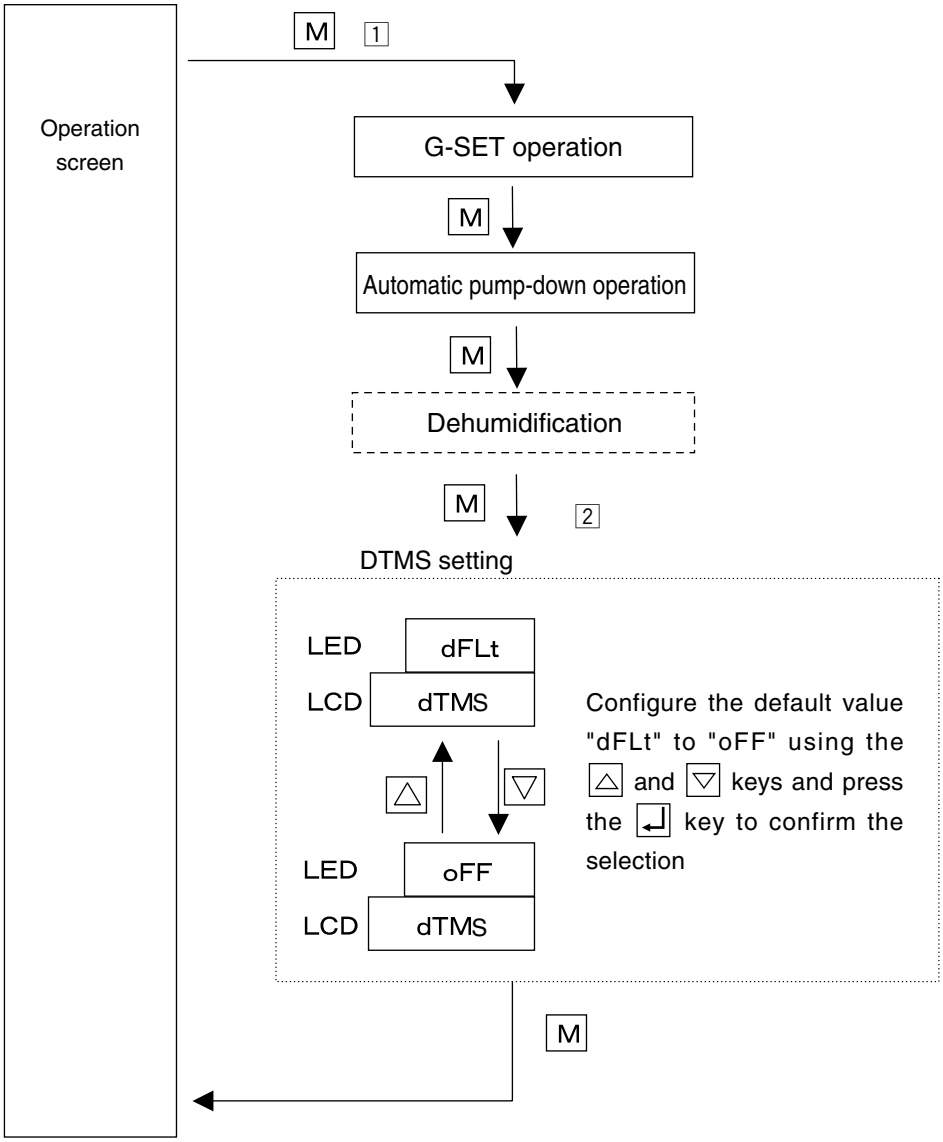
1) When F-PTI is completed 2) When Chilled PTI is completed 3) When Frozen PTI is completed

Setting method for DTMS operation cancellation

1 Press and hold the M key until the DTMS setting screen is displayed

2 When the DTMS setting screen is displayed, select "oFF" using the △ and ▽ keys and press the ↵ key to confirm the selection

3 Press the M key to go back to the normal operation screen

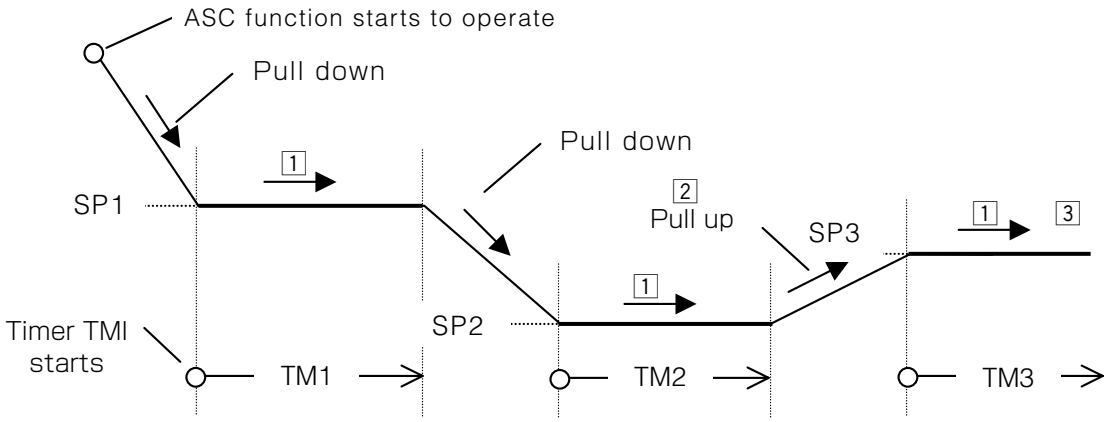


4.4 Automatic Setpoint Change: ASC (optional)

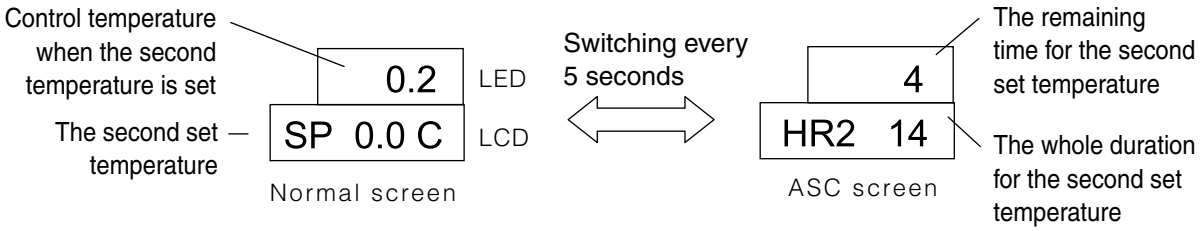
ASC function

It is necessary to change the set temperature over time for some types of cargoes. ASC function can specify the set temperature and its duration

For example, as shown below, ASC function allows the set temperatures to change automatically by specifying in advance the first set temperature (SP1) and its duration (TM1), the second set temperature (SP2) and its duration (TM2), the third set temperature (SP3) and its duration (TM3) amid the pull down and the pull up operations. For some types of cargoes, dehumidification control settings are configured as well.



1 ASC screen and the normal screen switch to each other every 5 seconds during the in-range control
In the following example, the second set temperature SP2 (0.0℃) and its duration TM2 (14Hr)



2 The temperature inside is raised gradually (0.5℃/Hr) to prevent rapid temperature rise during the pull up operation

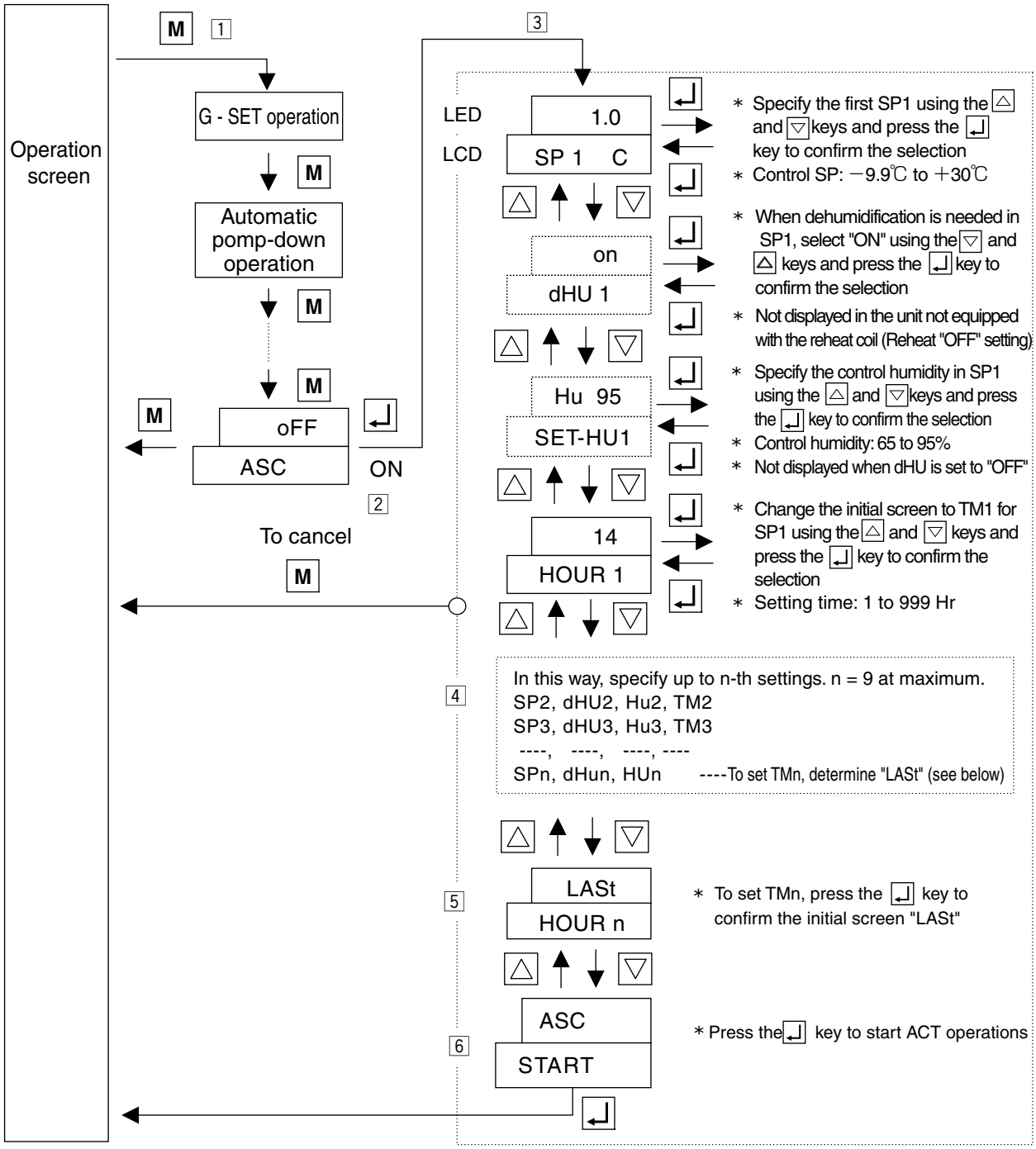
3 Up to 9 patterns are available for setting temperatures (up to 8 for setting time). There is no duration limit for the last set temperature

Special instruction for ASC operation

1) It is impossible to change the set temperature and the set duration during ASC operation.
To change the settings, configure ASC settings to "OFF" and "ON" again.
2) When the power is turned off (unit off) during ASC operation, ASC operation restarts at next power-on
3) The following items are recorded as event log
ASC "ON"/ "OFF", SP1, TM1, dHU1 "ON"/ "OFF", RH1, SP2 ----, SP3 ---
4) The last set temperature is displayed on the modem. The settings cannot be changed via the modem
5) Cancellation of ASC operation
①When configuring ASC to "OFF" ②When F-PTI is completed ③When Custom PTI (Chilled & Frozen) is completed

Setting ASC function

1. When the unit is running, press and hold the M key until the ACS setting screen is displayed
2. When the ACS setting screen is displayed, select "ON" using the △ and ▽ keys and press ↵ key to confirm the selection
3. Specifying the set temperature (SP1 for first item) ⇒ moving to the next item using the ▽ key ⇒ dehumidification control (dHU1) on/off setting ⇒ control humidity HU 1% setting ⇒ TM1 (Hr) setting
4. Specifying SP2, SP3.....SPn. n=9 at maximum
5. To determine TMn for the last SPn, press the ↵ key to determine the initial screen "LASt"
6. To start ASC operations, press the ↵ key in ASC START screen



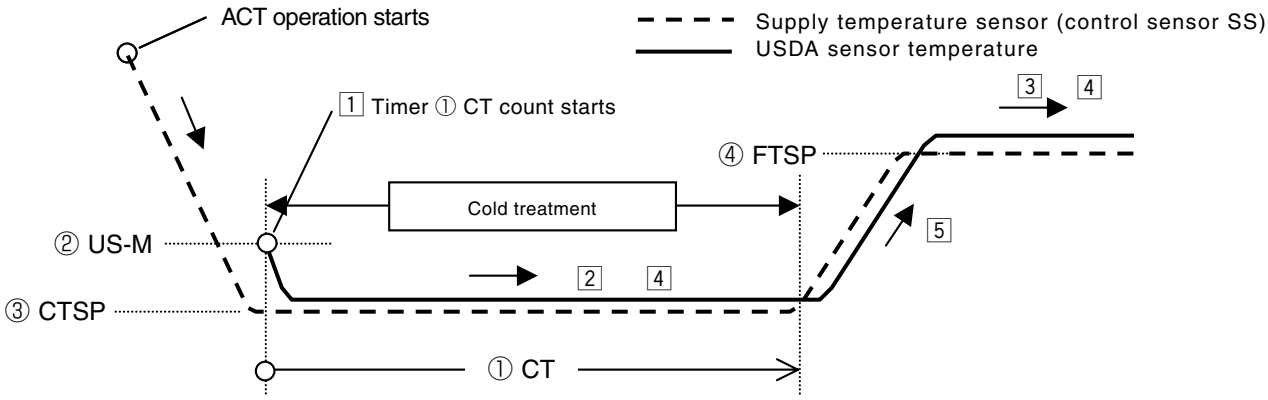
4.5 Automatic Cold Treatment: ACT (Optional)

ACT function

When cold treatment is completed during USDA transport (when the standard period has passed with the standard pulp temperature kept equal to or less than the base temperature), ACT function switches the temperature to the preset temperature automatically to continue the operation

To activate ATC, the following 4 items must be set

①	Cold treatment period (day)	----CT
②	Maximum pulp temperature (℃)	----US-M
③	Set temperature during cold treatment (℃)	----CTSP
④	Set temperature after cold treatment is completed (℃)	----FTSP



1 When all USDA sensor temperature has fallen to equal to or cold treatment pulp temperature (US-M), the timer for cold treatment period (CT day) starts to count.

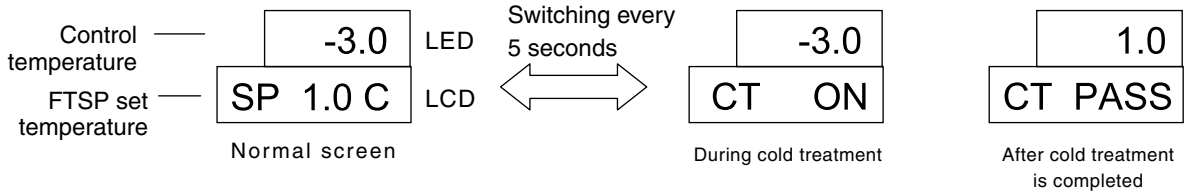
2 When the temperature exceeds US-M during cold treatment, which results in data logged, CT counting is cancelled. When the temperature falls to equal to or below US-M again, counting restarts to recount cold treatment days (CT day).

3 After cold treatment is completed, the operation starts at FTSP setting temperature.

4 CTSP and FTSP can be changed during ACT operations (CT day and US-M cannot be changed)

5 The temperature inside is raised gradually (0.1℃ per hour) to prevent rapid temperature rise

● ACT screen and the normal screen switch to each other every 5 seconds during ACT operations



Special instruction for ACT function

1) Cancellation of ASC operation

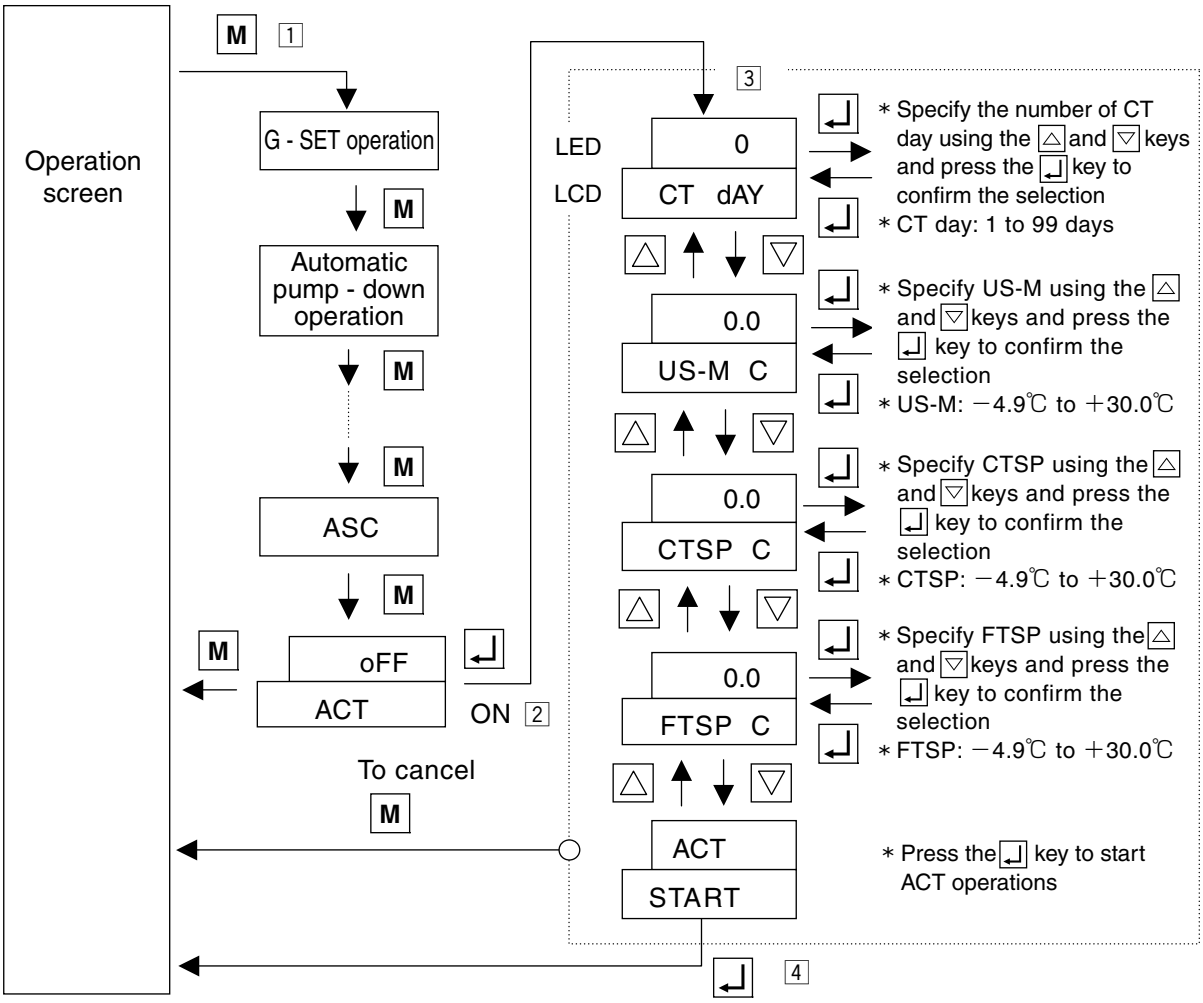
1) When ASC is set to "OFF" 2) When F-PTI is completed 3) When Chilled PTI is completed 4) When Frozen PTI is completed

2) Power off (unit off) during ACT operation and operations when restarting

Stop time	ACT operation when restarting
Less than 1 hour	ACT operation continues
1 hour or more to less than 48 hours	CT counting is reset and ACT operation continues
48 hours or more to less than 72 hours	ACT operation cancelled (can run at set temperture FTSP)
72 hours or more	ACT operation cancelled

Setting of ACT function

1 With the unit running, press and hold the M key until the ACT setting screen is displayed
2 When the ACT setting screen is displayed, change "OFF" to "ON" using the △ and ▽ keys and press the ↵ key to determine the selection
3 Specifying the number of CT day for first item ⇒ moving to the next items using the ▽ key ⇒ configuring US-M, CTSP, and FTSP in order.
4 To start ACT operations, press the ↵ key in ACT START screen

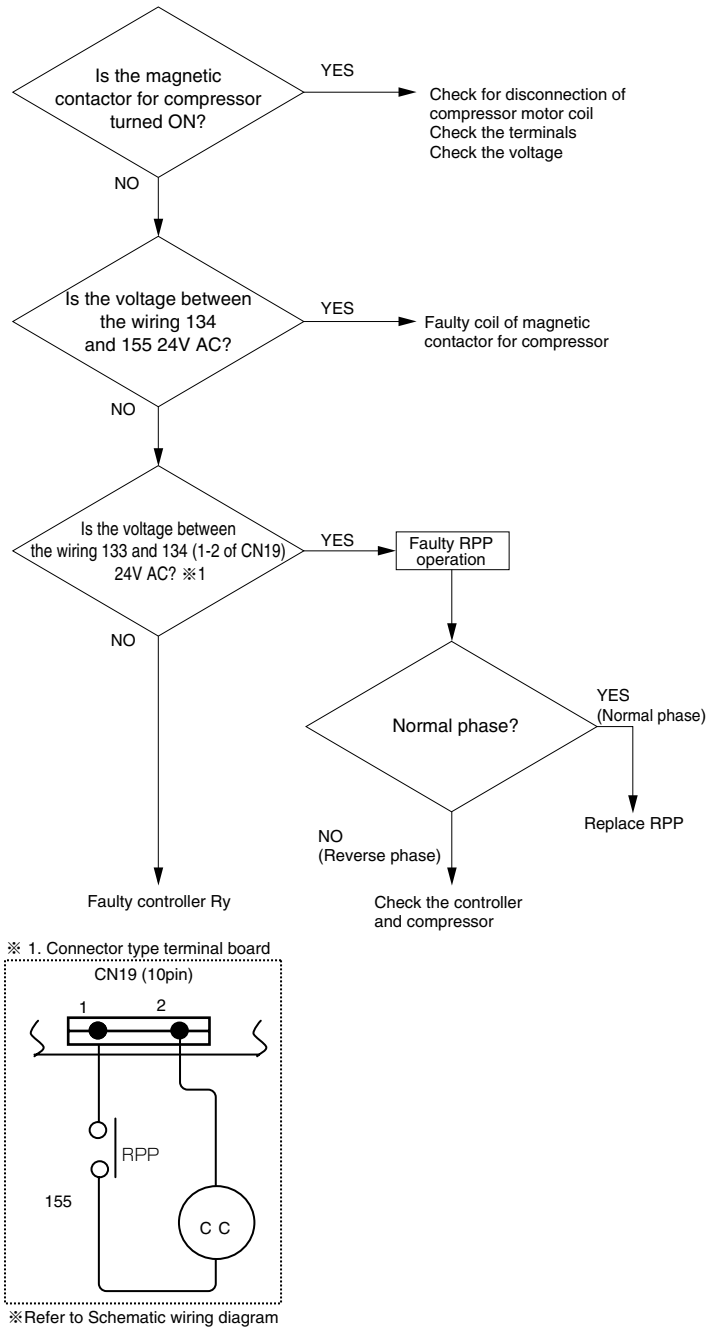


5. TROUBLESHOOTING

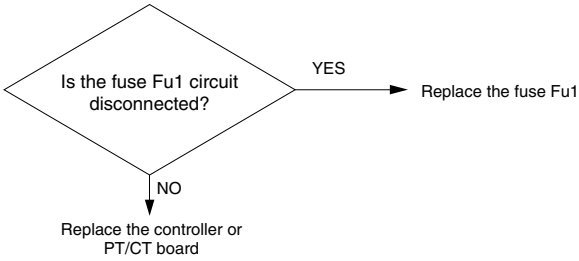
5.1 Refrigeration system and electrical system

If the unit does not work properly, refer to the following table to find causes of trouble and provide appropriate measures.

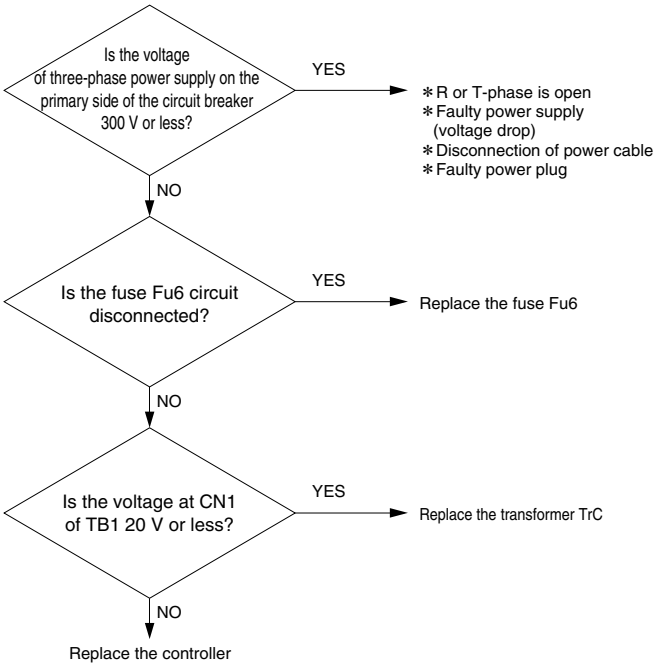
Symptom		Cause	Checkpoint	Remedy
Unit does not operate	A. Neither evaporator fan, condenser fan nor compressor runs.	Faulty power supply	Voltage on primary side of circuit breaker It should be within the voltage range shown in page 1-1.	Check the power supply Check the power supply plug Check for disconnection of cable
		Failure in running of condenser fan	Ensure that the condenser fan is stopped while high pressure is under control. (Increase the high pressure compulsorily, and make sure that the condenser fan stops when the HPT is 1000 kPa or more.)	The unit is normal if the condenser fan is stopped while the HPT is 1000 kPa or more
			Megger check on secondary side of magnetic contactor (Evaporator fan motor, condenser fan motor, compressor)	Replace faulty device
		Controller	Unit switch ON/OFF check	Turn the switch ON
			Alarm presence (F code)	See the instructions for alarm code of electronic controller in section 5.2
		Secondary side of power supply transformer	Check for disconnection of Fu1 (fuse) Check for malfunction in object models shown in section 6.9	Replace the Fu Replace faulty device
			Check for disconnection on secondary side of transformer (Tr) Connector type terminal board: Check of 24V between lead wires 101 and 104	Replace the transformer
	B. Evaporator fan runs, but condenser fan and compressor do not run.	Not malfunction (thermo-OFF status)	Display of controller (ALARM display)	See the alarm code when ALARM is issued
	C. Evaporator fan and compressor run,but condenser fan does not run.	Not malfunction (high pressure control)	Check of operation of HPT (E101) by controller display	Refer section 6.2
		External factor	Visual check for foreign matters caught in and deformation (including relevant parts such as controllers)	Remove foreign matters
	D. Condenser fan and compressor run, but evaporator fan does not run.	Faulty electrical system of evaporator fan · CTP activation · Motor burnt out (disconnection) · Disconnected coil of magnetic contactor	Controller display E205 (Faulty 1 unit of EFM) E803 (Faulty 2 units of EFM) ↓ · Motor coil resistance · Ensure that the magnetic contactor is turned ON · Voltage on secondary side of magnetic contactor (three-phase)	· Replace the fan motor · Replace the magnetic contactor
		External factor	Visual check for foreign matters caught in and deformation (including relevant parts such as controllers)	Remove foreign matters
	E. Compressor runs, but evaporator fan and condenser fan do not run.	Not malfunction (defrost)	Check the lighting status of LED (red) of DEF on control panel	

Symptom		Cause	Checkpoint	Remedy
I Unit does not operate	F. Evaporator fan and condenser fan run, but compressor does not run (throbs)	· Faulty power supply of compressor system · Burnt-out of compressor motor (disconnection) · Faulty connection of terminal board of compressor (disconnection, entering of water) Disconnection of magnetic contactor coil Faulty controller (Ry) Faulty RPP (reverse phase protector)		
		Stopped if the main power supply voltage drops and compressor stops with E103 or E105 error.	All the three phases should be AC 300 V or higher	

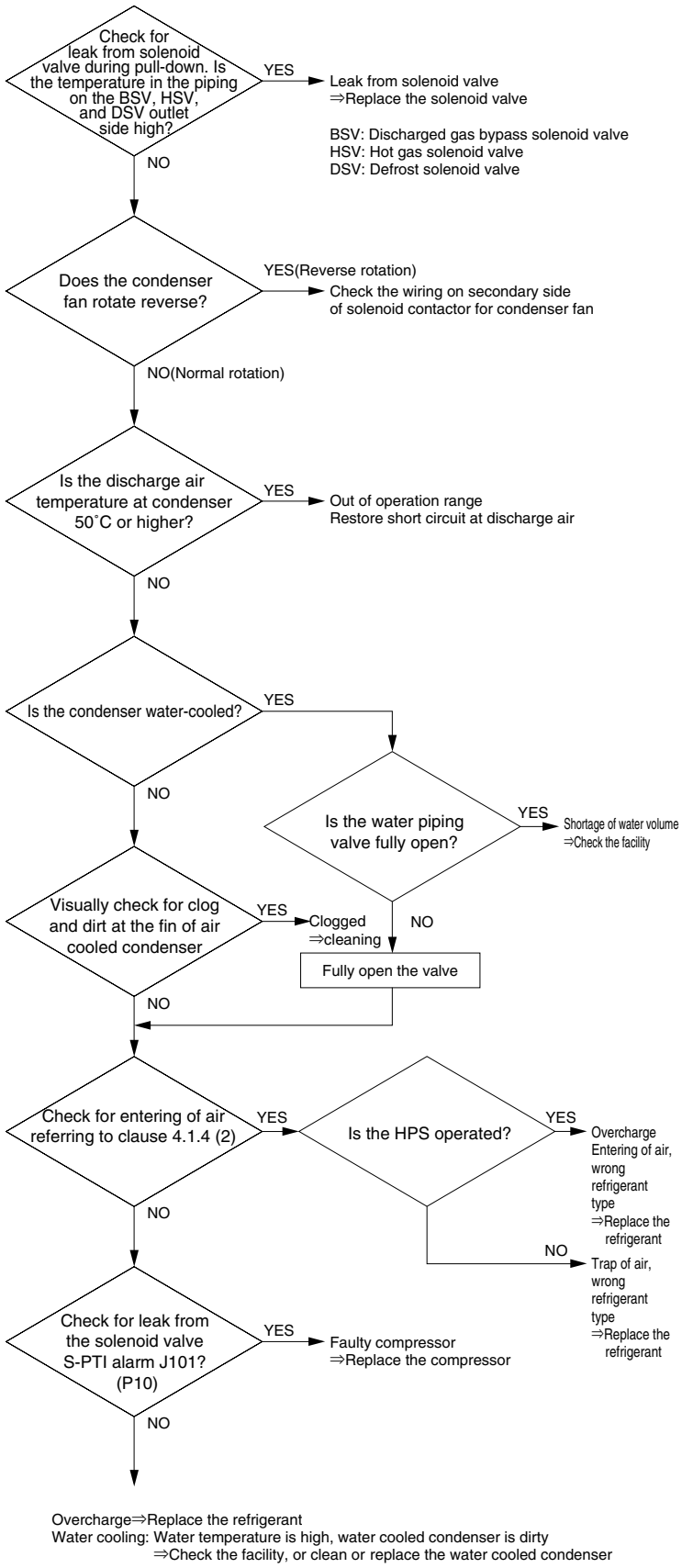
<table>
<tr><th colspan="2">Symptom</th><th>Cause</th><th>Checkpoint</th><th>Remedy</th></tr>
<tr><td rowspan="2">I Unit does not operate</td><td>The compressor does not operate</td><td>Disconnection of fuse Fu1 circuit

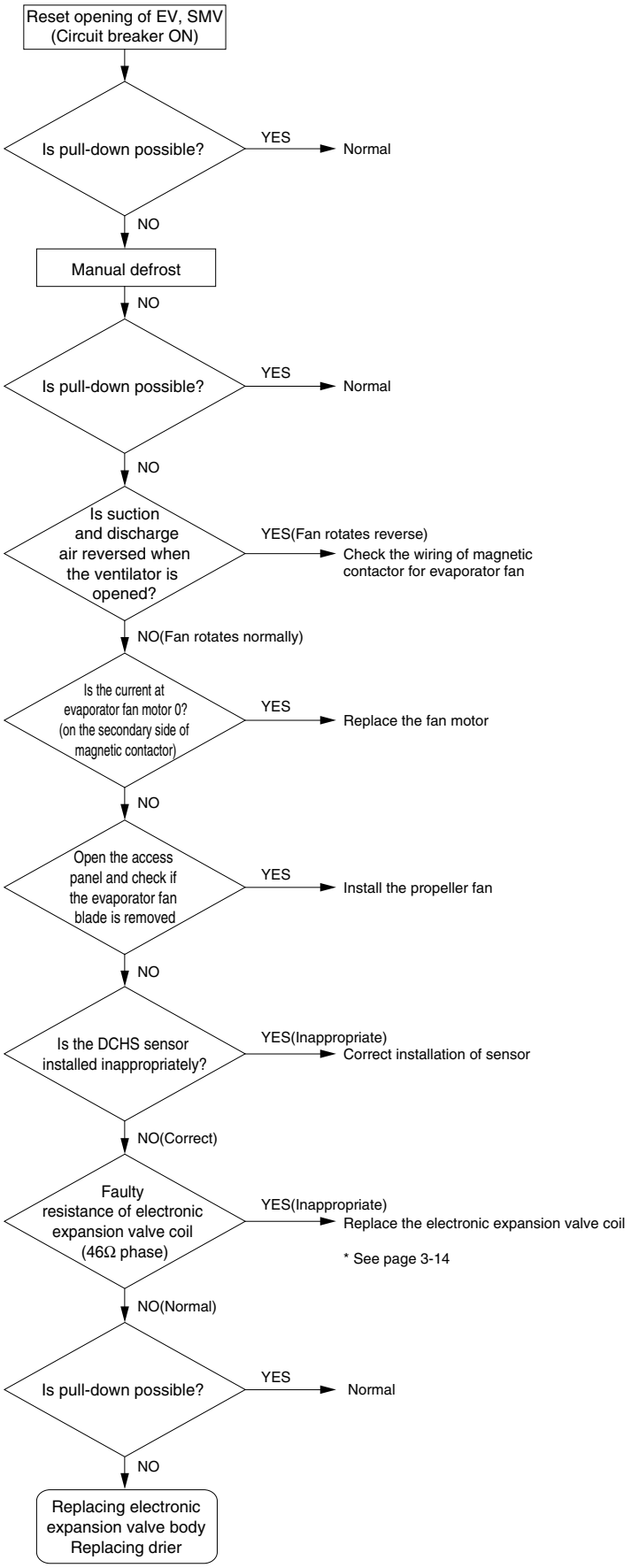
Faulty controller
Faulty PT/CT board</td><td> 
</td><td></td></tr>
<tr><td>Power supply of the controller cannot be turned on</td><td>· R or T-phase is open
· Faulty power supply (voltage drop)
· Disconnection of power cable

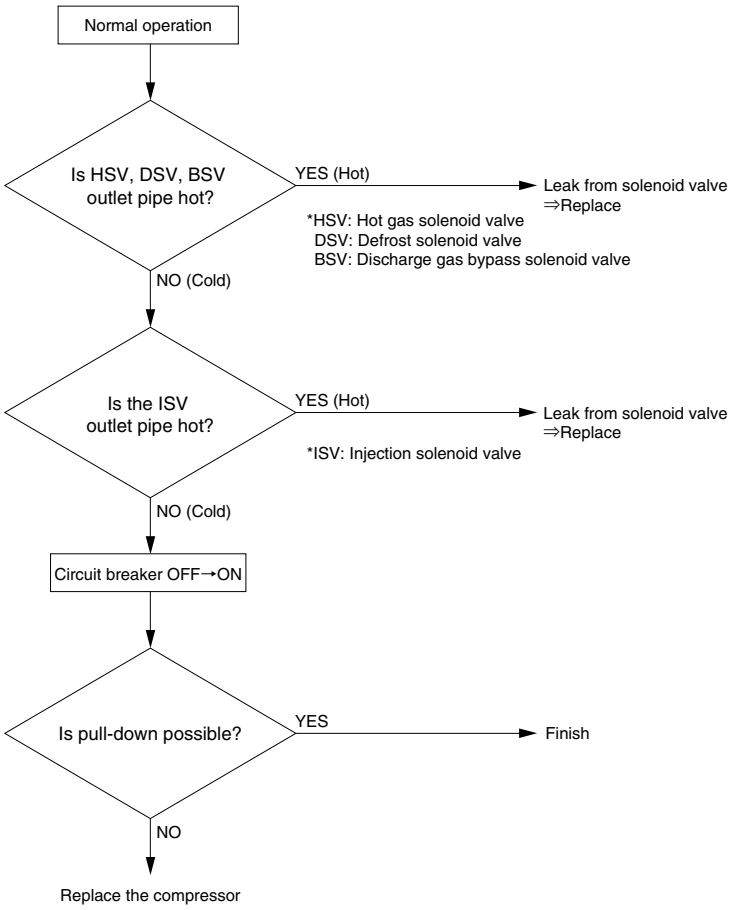
Faulty power plug
Disconnection of fuse Fu6 circuit

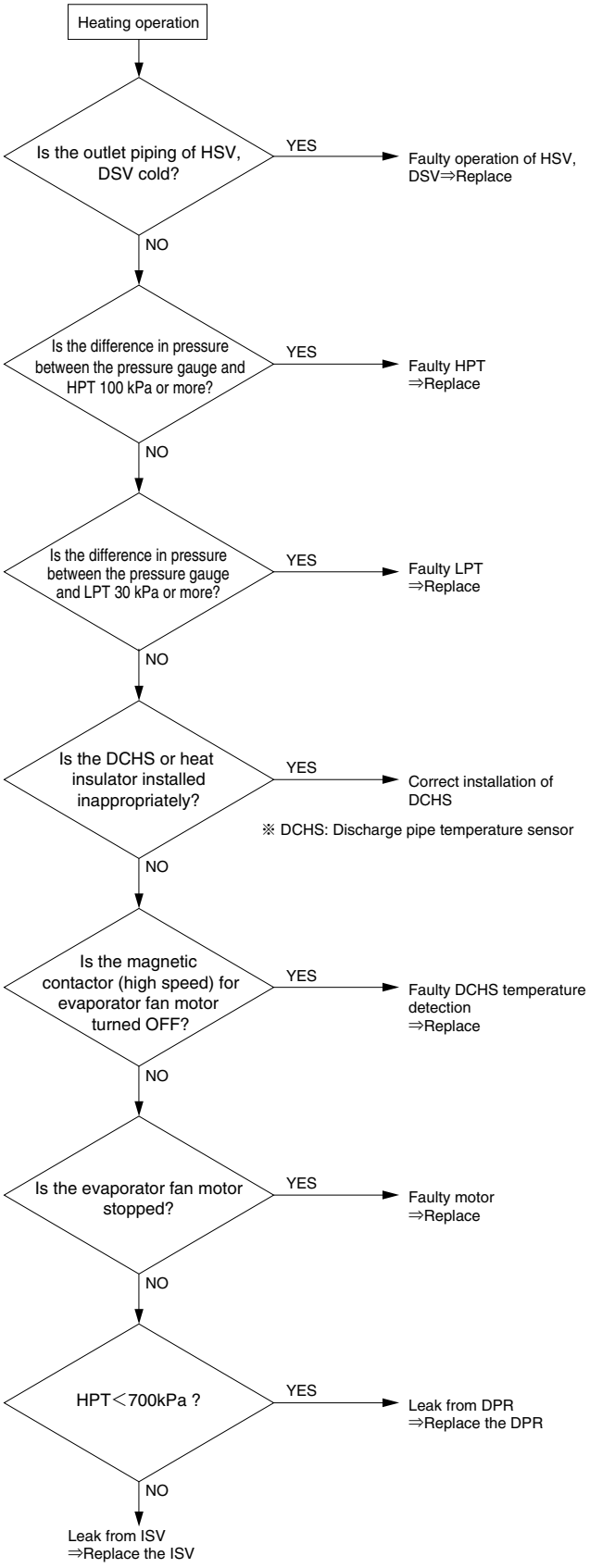
Faulty transformer</td><td> 
</td><td></td></tr>
<tr><td rowspan="3">II Unit operates but soon stops</td><td>A. Unit operates but soon stops (full stop)</td><td>Refer the Alarm list (page 3-26)</td><td>———</td><td>———</td></tr>
<tr><td>B. Evaporator fan runs, but condenser fan and compressor stop soon.</td><td>Thermo OFF (normal)</td><td>———</td><td>———</td></tr>
<tr><td>C. Compressor runs, but condenser fan and evaporator fan stop.</td><td>Defrost (normal)</td><td>———</td><td>———</td></tr>
</table>

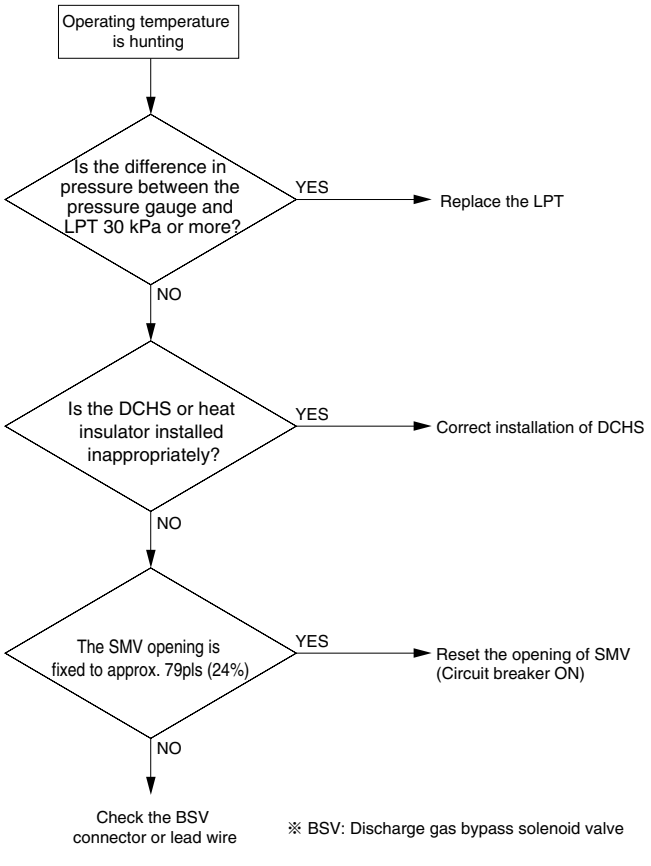
	Symptom	Cause	Checkpoint	Remedy
Ⅲ Inside temperature does not drop	Indicator flashes when the RS is 0˚C or less during frozen operation	Refrigerant shortage Blocked pipe (parts) (including solenoid valves) Trap of air in refrigerant system	Gas leak check	YES → Gas leaks⇒Repare the gas leaking portion NO ↓
	The high pressure is excessively high	Faulty discharge pressure control valve DPR	Is the difference in pressure between the ports ② and ⑤ 1000 kPa or more?	YES → Clogged section between the ports ② and ⑤ or DRP operation is faulty⇒Replace the DPR NO ↓
	The low pressure is excessively low	Faulty liquid solenoid valve LSV	Is the difference in pressure between the ports ⑤ and ③ 100 kPa or more?	YES → Blocked section between the ports ⑤ and ③ or blocked LSV⇒Replace the LSV NO ↓
		Blocked dryer	Is the difference in temperature of the pipe in front of and that back of dryer filter 5˚C or more?	YES → Check for clog in a dryer⇒Replace the dryer NO ↓
	The low pressure is excessively high	Entering of air	Check for entering of air referring to clause 4.1.4 (2)	YES → Air is entering⇒Replace refrigerant Note: Recover refrigerant when replacing it NO ↓
	Frosted compressor body or suction pipe	Faulty high pressure transducer HPT	Is the difference in pressure between the pressure gauge and HPT 100 kPa or more?	YES → Faulty HPT⇒Replace the HPT NO ↓
				Gas shortage⇒Replace the refrigerant

	Symptom	Cause	Checkpoint	Remedy
Ⅲ Inside temperature does not drop	The high pressure is excessively high	Solenoid valve internal leak Reverse rotation of condenser fan · Ambient temperature is high · Short circuit · Is the condenser water-cooled? · Low water level · Water temperature is high Clogged heat exchanger of condenser · Entering air · Overcharge · Wrong refrigerant type Compressor internal leak		

Symptom	Cause	Checkpoint	Remedy
Ⅲ Inside temperature does not drop The low pressure is excessively low	· Faulty opening of electronic expansion valve (EV) · Faulty opening of suction modulating valve (SMV) · Low air volume (frosted evaporator) Low air volume (reverse rotation of evaporator fan) Low air volume (stop of evaporator fan) Low air volume (drop of propeller fan) Displacement of discharge pipe temperature sensor DCHS (detection of humidity) Faulty electronic expansion valve coil Entering of water in refrigerant system Water choke		

Symptom	Cause	Checkpoint	Remedy
Ⅲ Inside temperature does not drop The low pressure is excessively high	Solenoid valve internal leak(BSV, DSV, HSV) Solenoid valve internal leak(ISV) Faulty compression by compressor		

Symptom	Cause	Checkpoint	Remedy
Ⅳ Inside temperature does not rise (during heating operation) The high pressure is excessively low The discharge gas temperature is low The low pressure is excessively high	Faulty operation of valve (HSV or DSV) Faulty operation of high pressure transducer HPT (charging is impossible) Faulty operation of low pressure transducer LPT (charging is impossible) Displacement of HPT, DCHS (Stop of evaporator fan) Stop of evaporator fan Reduced heating air volume (stop or drop of evaporator fan) Pressure leak to condenser due to leak from discharge pressure control valve (DPR) Leak from ISV⇒ Charge control is unavailable		

Symptom	Cause	Checkpoint	Remedy
V Control is unstable (during chilled proportional control operation)	The control temperature is unstable		

Faulty low pressure transducer LPT

Faulty discharge pipe temperature sensor DCHS

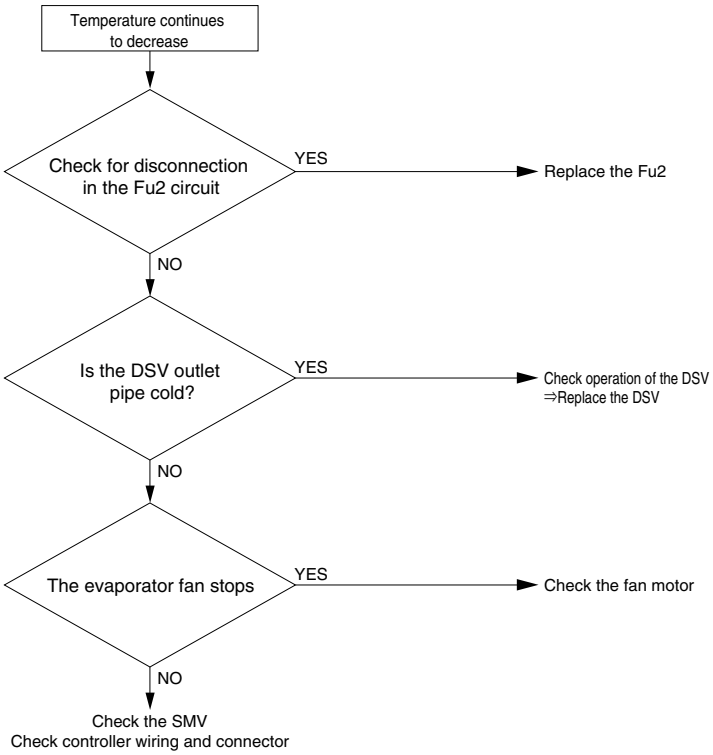
Faulty opening of suction modulating valve SMV

Faulty contact of solenoid valve (BSV)

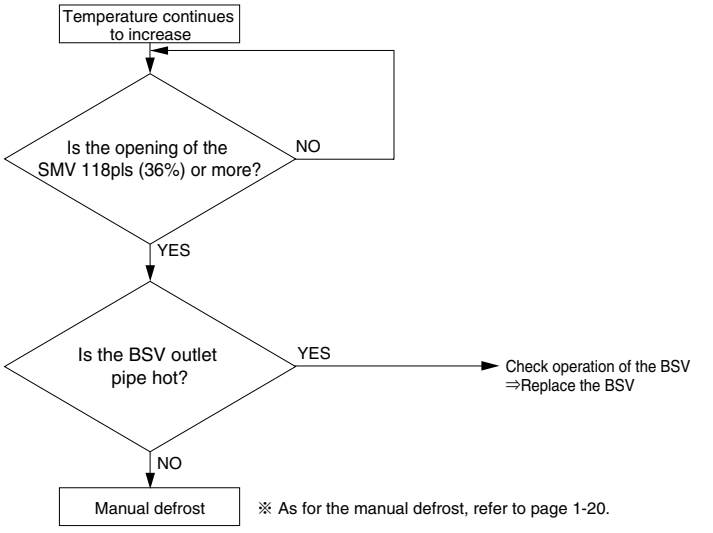
<table>
<tr><th colspan="2">Symptom</th><th>Cause</th><th>Checkpoint</th><th>Remedy</th></tr>
<tr><td rowspan="2">Ⅴ Control is unstable (during chilled proportional control operation)</td><td>Temperature continues to decrease</td><td>Disconnection of fuse (Fu2) circuit

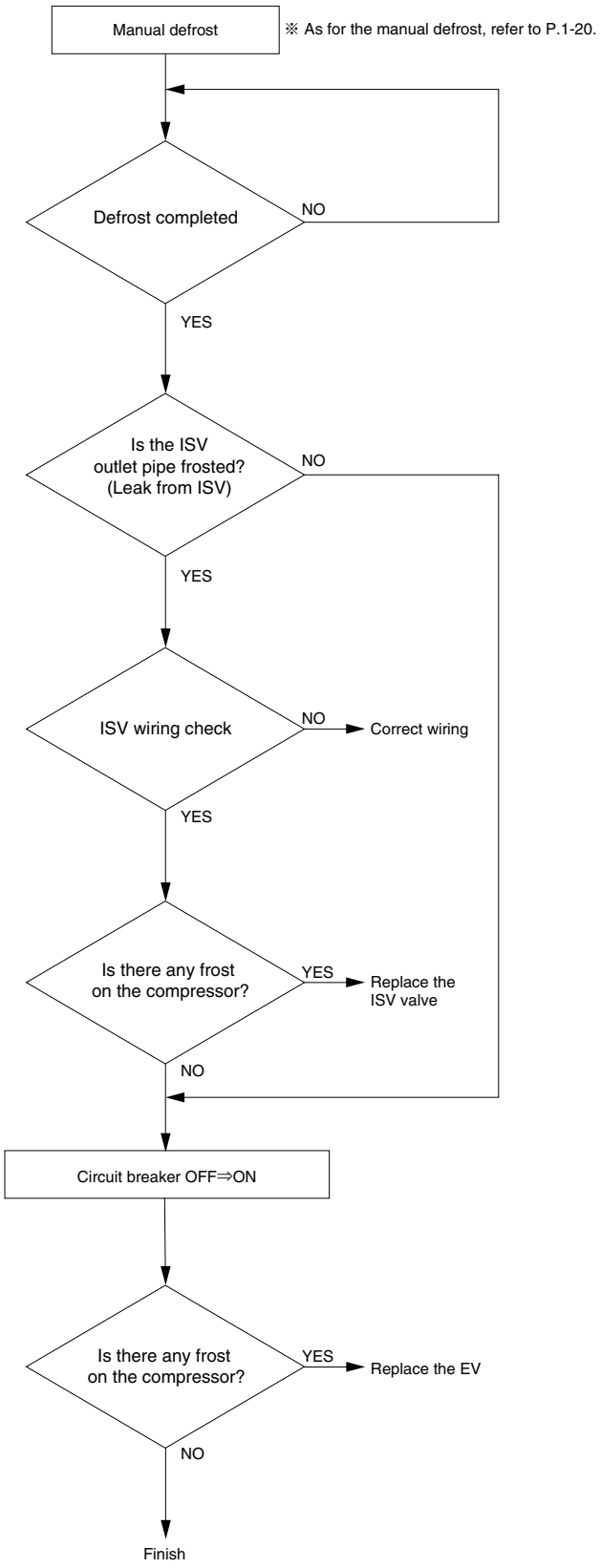
Faulty operation of defrost solenoid valve DSV

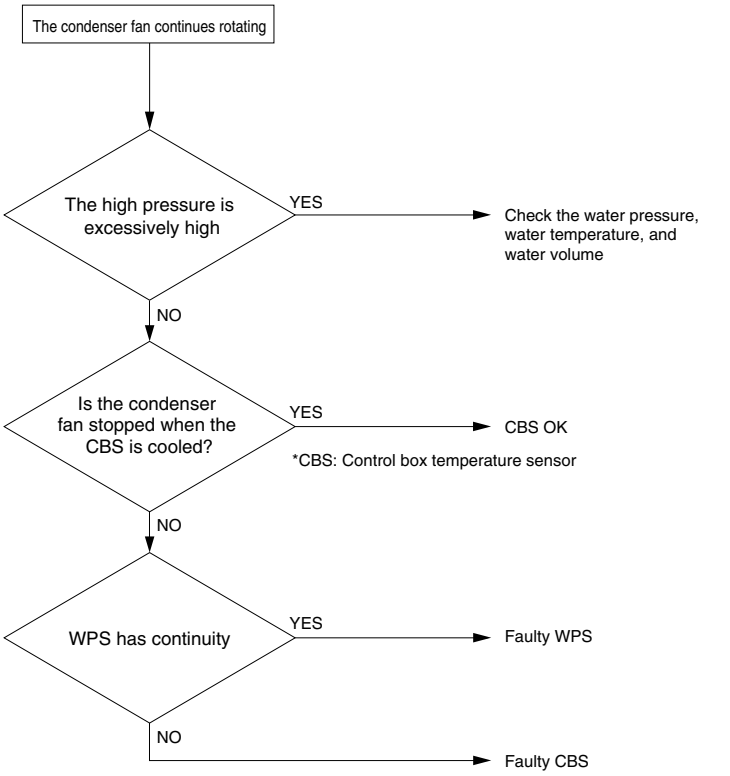
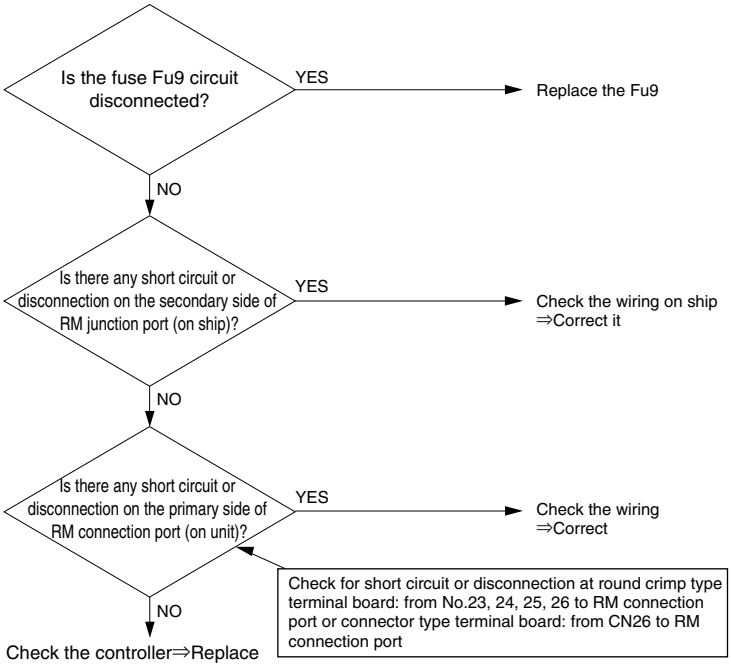
Stop of evaporator fan

Faulty operation of suction modulating valve SMV</td><td colspan="2"> 
</td></tr>
<tr><td>Temperature continues to increase</td><td>Excessive frost on evaporator

Opened discharge gas bypass solenoid valve BSV (dusts caught in)

Excessive frost on evaporator</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="4">Ⅵ Abnormal noise or vibration</td><td rowspan="2">Abnormal noise</td><td>Malfunction of compressor inside</td><td>Auditory check</td><td>Replace</td></tr>
<tr><td>Fan motor of evaporator, condenser
・Worn bearing</td><td>Auditory check</td><td>Replace the unit</td></tr>
<tr><td></td><td>・Interference with fan guide</td><td>Auditory check
Visual check</td><td>Replace the faulty parts</td></tr>
<tr><td>Abnormal vibration</td><td>Compressor, fan motor
・Loosen bolt</td><td>Auditory check
Visual check</td><td>Tighten bolts</td></tr>
<tr><td></td><td>Piping
・Removed or loosen cramp</td><td>Auditory check
Visual check</td><td>Correct the cramp</td></tr>
</table>

	Symptom	Cause	Checkpoint	Remedy
Ⅶ Abnormal frosting on compressor	Abnormal frosting on compressor · Frosting on terminal cover · Frosting on compressor head	Dusts caught in injection solenoid valve ISV Faulty operation of electronic expansion valve (EV)		

	Symptom	Cause	Checkpoint	Remedy
Ⅷ Does not perform water cooled operation	The air cooling evaporator fan continues rotating	Water pressure switch WPS will not operate ・Water pressure is low ・Water temperature is excessively high ・Water flow rate is low Temperature in the control box is high Water pressure switch WPS is short-circuited		
Ⅸ Others	The remote monitoring RM is not output.	Disconnection of Fu9 Short-circuit of RM circuit ・Faulty controller Short-circ of RM ・circuit on ship		

5.2 Alarm codes on electronic controller

If any alarm occurs, search its cause and repair it referring to the following table.

Be sure to check the connectors in the electronic controller as the poor contact of them may cause the controller alarm codes.

Alarm code	Content	Possible cause/checkpoint
F101	The high-pressure switch (HPS) contact is open	HPS circuit check · Broken lead wire · Faulty contact · Blown fuse Fu1
	If HPS is activated before the compressor starts to operate when the power is turned on. Or, if the compressor fails to start to operate 5 times during the starting control.	Condenser fan motor operation check
		Discharge piping refrigerant circuit check · Discharge stop valve · Discharge filter · Discharge check valve · Discharge pressure regulating valve
	The fuse Fu1 is blown	Fuse Fu1 circuit check
	Faulty controller	Faulty controller
F109	LPT becomes lower than -90KPA within 2 seconds after the compressor starts to operate.	Refrigerant circuit check · Suction stop valve · SMV (Suction modularing valve) · EV (Electronic expansion valve) · LSV (Liquid solenoid valve) · Dryer · Clogged EV, LSV inlet filter
		Low pressure transducer LPT circuit check · Fu3, LPT fault, broken lead wire, short circuit
		Shortage of refrigerant
		Faulty controller
F111	A communication error in the CPU and I/O board	Controller fault · CPU board fault (EC1) · I/O board fault (EC2)
F301	Temperature setting request	Set temperature has not been set up yet (Set up the temperature when the controller is replaced)
		Faulty controller (CPU board fault)
F401 F403	Supply air temperature sensor SS fault Return air temperature sensor RS fault	Faulty SS and RS · Broken or short-circuited lead wire · Faulty wiring (disconnection of connector) · Faulty sensor
		Faulty sensor (faulty CPU PCB)
F603	Wrong controller model setting	Decos Ⅲ "c" or "d" for LXE10E Decos Ⅲ "b" for LXE10D
	If the suction modulating valve (SMV) does not fully close even when instructed so.	Faulty SMV body · Broken coil
		Faulty driving circuit · Disconnection of connector · Blown Fu7, 4 · Faulty PCB for suction modulating valve (EC6)
F701	Power supply voltage error If 270V<PT1<300V or PT1<535V within 2 seconds after the power is turned on. If the phase sequence (positive and negative) is unknown.	Abnormal power supply voltage · 535V or higher, 300V or lower
		Faulty voltage detection · Faulty PT of PC/CT board (other than disconnection and short-circuit) · Faulty contact of connector · S phase is open phase
F705	S phase is open phase	Abnormal power supply voltage · S phase is open phase · Faulty contact of power supply facility
		Faulty power supply equipment · Faulty contact of power plug · Faulty contact of power cable · Faulty PT/CT board (EC5)
F803	If any of the following conditions is applicable 1) E107 is generated twice due to EV opening error. 2) Considered that both of the 2 evaporator fans are stopped 3) Improper welding of the magnetic switch of the compressor 4) Failures are present in any 2 of the HPT sensor, LPT sensor and DCHS sensor	Find the cause of the alarm for each of the issued alarm codes
E101	High-pressure switch (HPS) activates during operation	Troubleshooting → The inside temperature does not drop. → Refer to the item "The high pressure is excessively high."

Alarm code	Content	Possible cause/checkpoint
E103 (Electronic type OC)	Operating current of the compressor is high	Single phase operation due to faulty contact · Magnetic contactor for compressor · Compressor cable · Compressor terminal
		Malfunctioned equipment · Compressor lock · Actuation of thermal protector CTP for compressor · Faulty PT/CT board (EC5) · Faulty controller (CPU, I/O board)
		Wrong initial setup of PT/CT board (jumper wire) (Single or Dual power supply, 10HP or 5HP)
E105 (Micro-computer type OC)	Operating current of the compressor is high	Single phase operation due to incomplete contact · Magnetic contactor for compressor · Compressor cable · Compressor terminal
		Malfunctioned equipment · Compressor lock · Faulty CT of PT/CT board · Abnormal controller (CPU board)
		Wrong initial setting of controller (Single or Dual power supply, 10HP or 5HP)
E107	· The discharge gas temperature is excessively high · The EV opening error continues 5 minutes.	Clogged refrigerant system · Dryer · Filter
		Shortage of rafrigerant
		Malfunctioned equipment · Faulty operation of ISV · Clogged capillary at ESV outlet
E109	Low pressure becomes abnormal during operation.	Refer to the "Unit operates but soon stops" and "Low pressure is excessively low" in "6. Troubleshooting"
		Malfunctioned equipment · Faulty low pressure transducer LPT · Faulty controller (CPU board) · Blown fuse Fu3
E201	Pumpdown is not completed within 120 seconds	The solenoid valve cannot be closed (dusts caught in) · LSV (liquid solenoid valve) · HSV (hot gas solenoid valve) · DSV (defrost solenoid valve) · BSV (discharge gas bypass solenoid valve)
		Faulty operation of compressor
		Malfunctioned equipment · Controller · Low pressure transducer LPT
E203	Overcooling prevention (control sensor<=SP-3.0) continues for three minutes or longer in the chilled mode	Refer to the "Control is unstable" and "Temperature continues to decrease" in "6. Troubleshooting"
E205	The inside fan motor stops	Faulty operation of evaporator fan motor · Motor lock · Burned-out motor coil · Operation of thermal protector CTP for compressor · Disconnection on the secondary side of magnetic contactor for evaporator fan
		Faulty evaporator fan propeller · Propeller ice lock · Foreign matters caught in propeller
E207	Defrost cannot be completed within 90 minutes	Malfunctioned equipment · Faulty sensor (EOS, RS, HPT, LPT, DCHS) · Faulty controller · Faulty operation of HSV, DSV, ISV · Faulty operation of discharge pressure regulating valve
		Abnormal refrigerant system · Sfortage of refrigerant · Heavy frosting

Alarm	Content	Possible cause/checkpoint
E303	Humidity setting request	· Dehumidification dHU set to "ON" with humidity RH "%" unset · dHU is set to ON when REHEAT set to OFF. · Controller fault (CPU board fault)
E305 E307 E311	Defrosting timer setting request Calendar setting request Trip start setting request	· Faulty controller · Setting error
		Faulty operation · Wrong initial setting of controller
E315	A failure in the PT/CT board	Replacement of the PT/CT board requested · There is no input from the PT/CT board.
E401 E402 E403 E404 E405 E406 E407 E409 E411 E413 E415 E425 E427 E429 E431 E433	Supply air temperature sensor (SS) fault Data recorder supply air temperature sensor (DSS) fault Return air temperature sensor (RS) fault Data recorder return air temperature sensor (DRS) fault Discharge pipe temperature sensor (DCHS) fault Suction gas temperature sensor (SGS) fault Evaporator inlet pipe temperature sensor (EIS) fault Evaporator outlet pipe temperature sensor (EOS) fault Ambient temperature sensor (AMBS) fault Low pressure transducer (LPT) fault High pressure transducer (HPT) fault Pulp temperature sensor (USDA1) fault Pulp temperature sensor (USDA2) fault Pulp temperature sensor (USDA3) fault Humidity sensor (Hus) fault Carge temperature sensor (STS) fault	System malfunction · Faulty sensor · Faulty controller · Broken or short-circuited lead wire · Wrong wiring · Disconnection of connector
E417 E421 E423	Voltage sensor (PT1) fault Current sensor (CT1) fault Current sensor (CT2) fault	Malfunctioned equipment · Faulty sensor · Faulty controller · Broken or short-circuited lead wire · Wrong wiring · Disconnection of connector
E603	· SMV (MV) operation malfunction · EV connection malfunction	SMV operation malfunction · Faulty controller · Faulty SMV coil · Faulty PCB for SMV · Broken wire of harness (disconnection of connector)
		EV connection malfunction · EV wire or harness disconnection · EV connector disconnection
E607	Faulty contact point of manual defrost key (sheet key)	Faulty short-circuit of switch
		Faulty short-circuit of CPU
E707	Instantaneous voltage failure shutdown If 270V<PT1<300V or PT1>535V continues for 15 seconds during operation.	If commercial power supply is turned off for 40 to 300mm seconds or the voltage is 535V or higher or 300V or lower.
E801	Exhausted battery of the CPU board	Replacement of the battery requested · Exhausted battery of the CPU board
E805	A failure in the FA sensor	If the FA setting is other than "OFF", the FA sensor is abnormal.
E807	Opened ventilator	The ventilator is opened during frozen operation

5.3 Troubleshooting for automatic PTI (J-code)

Step	Content	Alarm code	Conclusion	Possible cause	Check method
P00	Basic data record	No indication	No judgment		
P02	Alarm check on all sensor	Same as normal operation	Same as normal operation	Same as normal operation	Same as normal operation
P04	Power supply check	No indication	Same as normal operation	Same as normal operation	Same as normal operation
P05	Compressor start running check	J051	Same as normal operation	Same as normal operation	Same as normal operation
P06	HPS check	J061	Abnormal OFF point	(1) HPS malfunction (2) High pressure transducer (HPT) malfunction (3) Gas leak from Gauge manifold (No unit malfunction)	(1) Check HPS (2) Compare to Gauge manifold (3) Remove Gauge manifold.
		J062	Not return		
		J064	High pressure does not rise.		
		J065	High pressure does not drop.		
P08	Pump down check	J081	Pump down requires too long time.	Blocked with contamination of liquid solenoid valve	Try again S-PTI
				Leakage of hot gas by-pass solenoid valve	Touch the outlet pipe of the solenoid valve.
				Leakage of defrosting solenoid valve	Touch the outlet pipe of the solenoid valve.
				Leakage of discharge gas by-pass solenoid valve	Touch the outlet pipe of the solenoid valve.
P10	Solenoid valve check	J101	Excessive leakage of solenoid valve	Liquid solenoid valve malfunction	Check Liquid solenoid valve
				Suction modulating valve malfunction	Check Suction modulating valve
				Injection valve malfunction	Check Injection valve
P12	RS, SS accuracy check	J121	Excessively large temperature difference between RS and DRS Excessively large temperature difference between SS and DSS	SS malfunction	Compare the SS with the DSS on the controller panel.
				RS malfunction	Compare the RS with the DS on the controller panel.
P14	HPT, LPT accuracy check	J141	Excessively large pressure difference between HPT and LPT	HPT malfunction	Compare the high pressure valve with the gauge manifold of HPT (on the controller panel).
				LPT malfunction	Compare the low pressure valve with the gauge manifold of LPT (on the controller panel)
P16	Evaporator fan Hi/Lo speed operation check	J161	Abnormal operation of evaporator fan speed	Evaporator fan and motor malfunction. Magnetic contactor (EFH/L) and wiring malfunction.	Check Evaporator fan and motor. Check magnetic contactor (EFH/L) and wiring.
P20	Check on economizer solenoid valve (ESV)	J201	ESV does not open.	ESV coil malfunction	Check on ESV coil, wiring and terminals.
				ESV malfunction	Check on capillary tube temperature on ESV outlet.

Step	Content	Alarm code	Conclusion	Possible cause	Check method
P22	Check on discharge gas by-pass solenoid valve (BSV)	J221	BSV does not open.	BSV coil malfunction	Check on BSV coil, wiring and terminals.
				BSV malfunction	Check on outlet piping temperature of BSV
P24	Check on defrosting solenoid valve (DSV)	J241	DSV does not open.	DSV coil failure	Check on DSV coil, wiring and terminals.
				DSV malfunction	Check on outlet piping temperature of DSV
P26	Standard Pull down operation	No indication			
P28	Check on suction modulating valve (SMV) (Open SMV to 3%)	J281	(LPT : decrease 20kPa)	SMV coil malfunction Faulty controller connection wiring	Refer to section 3.2.4. Check appearance. (Replace coil bracket) Check wiring and connector
P29	Electronic expansion valve check	J291	Pump down time is too long.	Electronic expansion valve wiring malfunction	Check knocking sound of the coil Disconnect and connect the connector of the coil.
				Electronic expansion valve coil burn out.	Check on knocking sound of coil.
				Leakage of hot gas by-pass solenoid valve	Touch the outlet pipe of the solenoid valve.
				Leakage of defrosting solenoid valve	Touch the outlet pipe of the solenoid valve.
				Leakage of discharge gas by-pass solenoid valve	Touch the outlet pipe of the solenoid valve.
P30	ISV opening or closing check	J301	ISV does not open.	ISV coil malfunction	Check on ISV coil, wiring and terminals.
				ISV malfunction	Check on capillary tube temperature on ISV outlet.
P32	HSV opening or closing check	J321	HSV does not open.	HSV coil malfunction	Check on HSV coil, wiring and terminals.
	RSV opening or closing check	J322	RSV does not open.	RSV coil malfunction	Check on outlet piping temperature of RSV
P50	Pull-down cooling capacity	J501	Out of ambient temperature condition	No unit malfunction Ambient temperature is lower than -10˚C Ambient temperature is higher than 43˚C	Check ambient temperature.
		J502	Pull down time is too long.	Same as normal operation ※	Same as normal operation ※
P60	0˚C control	No indication	No judgement		
P70	Defrosting operation check	J701	Out of starting condition. (EOS is 20˚C or more.)	Wrong installation of EOS.	Check the installation of EOS.
				Leakage of hot gas solenoid valve	Touch the outlet pipe of the solenoid valve.
		J702	Defrost time is too long.	Wrong installation of EOS.	Check the installation of EOS.
				EOS malfunction.	Check EOS.
P80	Pull-down cooling capacity	J801	Pull down time is too long.	Same as normal operation ※	Same as normal operation ※
P90	–18˚C control	No indication	No judgement		

Note :※"Same as normal operation" means that it is same as judgement, countermeasure and check method at normal operation. (Refer to from Page 5-1 to 5-17)

5.4 Emergency operation

5.4.1 Emergency operation of controller

In case of the controller malfunction, emergency operation can be executed by using emergency operation kit.

(1) Components to be prepared (emergency operation kit)

◯ Short-circuit connector ... Installed in front of the controller inside the control box

◯ Emergency magnet ... (Part No. 1896110)

(2) On-site work

The following works are required for emergency operation.

① Wiring change for short circuit operation

1) Wiring change for cutting off the power to CPU board

2) Wiring change for making the forced running of Compressor, Condenser Fan and Evaporator Fans.

* Install the short-circuit connector in front of the controller.

* For the details, refer to the clause 5.4.2 "Short Circuit Operation"

② Opening adjustment of electronic expansion valve

* The emergency magnet is used to adjust the opening.

* For the details, refer to the clause 5.4.3 "Opening Adjustment"

③ Suction Modulation Valve opening adjustment for full opening.

* Use Emergency Magnet for full the opening.

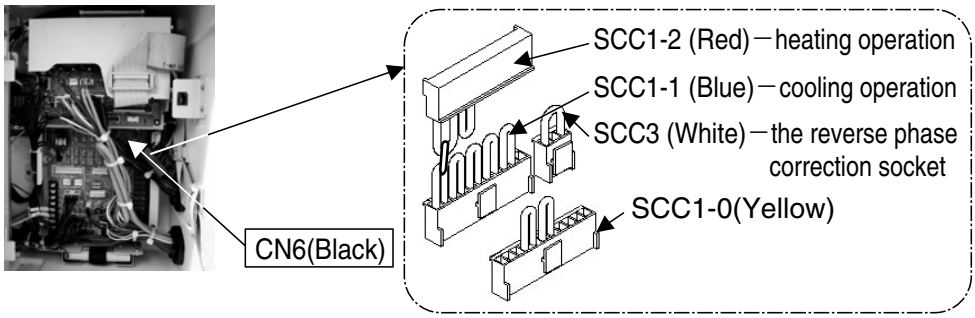
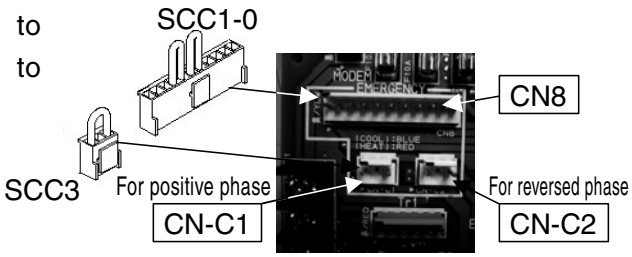
* For details, refer to "Adjustment in fully open condition" in section 5.4.4.

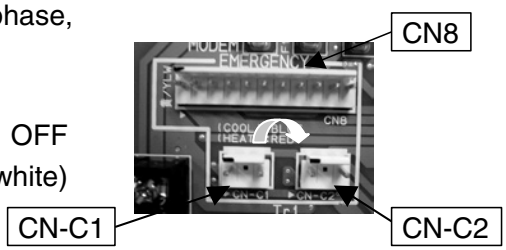
(3) Operating condition at emergency

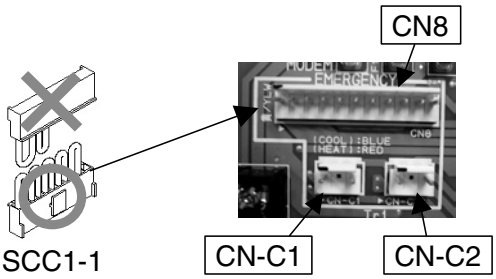
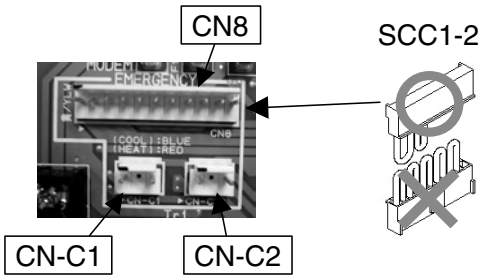
Temperature can not be controlled. Turn the circuit breaker on or off to maintain the target temperature.

Mode	Available function of protection devices	Operating condition of unit
Cooling operation	HPS : High pressure switch CTP : Compressor thermal protector	◯ Compressor runs continuously. ◯ Evaporator fan runs at low speed continuously. ◯ Condenser fan runs continuously. ◯ Electronic expansion valve operates with fixed opening. ◯ Suction modulating valve operates with full opening.
Heat operation	————————	◯ Compressor stops. ◯ Evaporator fan runs at high speed continuously. ◯ Condenser fan stops.

5.4.2 Short circuit operation of controller

<table>
<tr><th></th><th>Cooling operation</th><th>Heating operation</th></tr>
<tr><td>Power OFF</td><td colspan="2">①Turn OFF the circuit breaker.</td></tr>
<tr><td>Preparation</td><td colspan="2">②Pull the connector (black) from CN6 on the I/O board.
③Remove the connectors attached to the controller, SCC1-0 (yellow), SCC1-1 (blue), SCC1-2 (red) and SCC3 (white).
 
</td></tr>
<tr><td>Confirmation of power supply reversed phase</td><td colspan="2">④Connect SCC1-0 (yellow) to CN-C1 and SCC3 (white) to CN-8, respectively.
 

⑤Turn ON the breaker.
If the power supply is in reversed phase, the condenser rotates inversely.
 

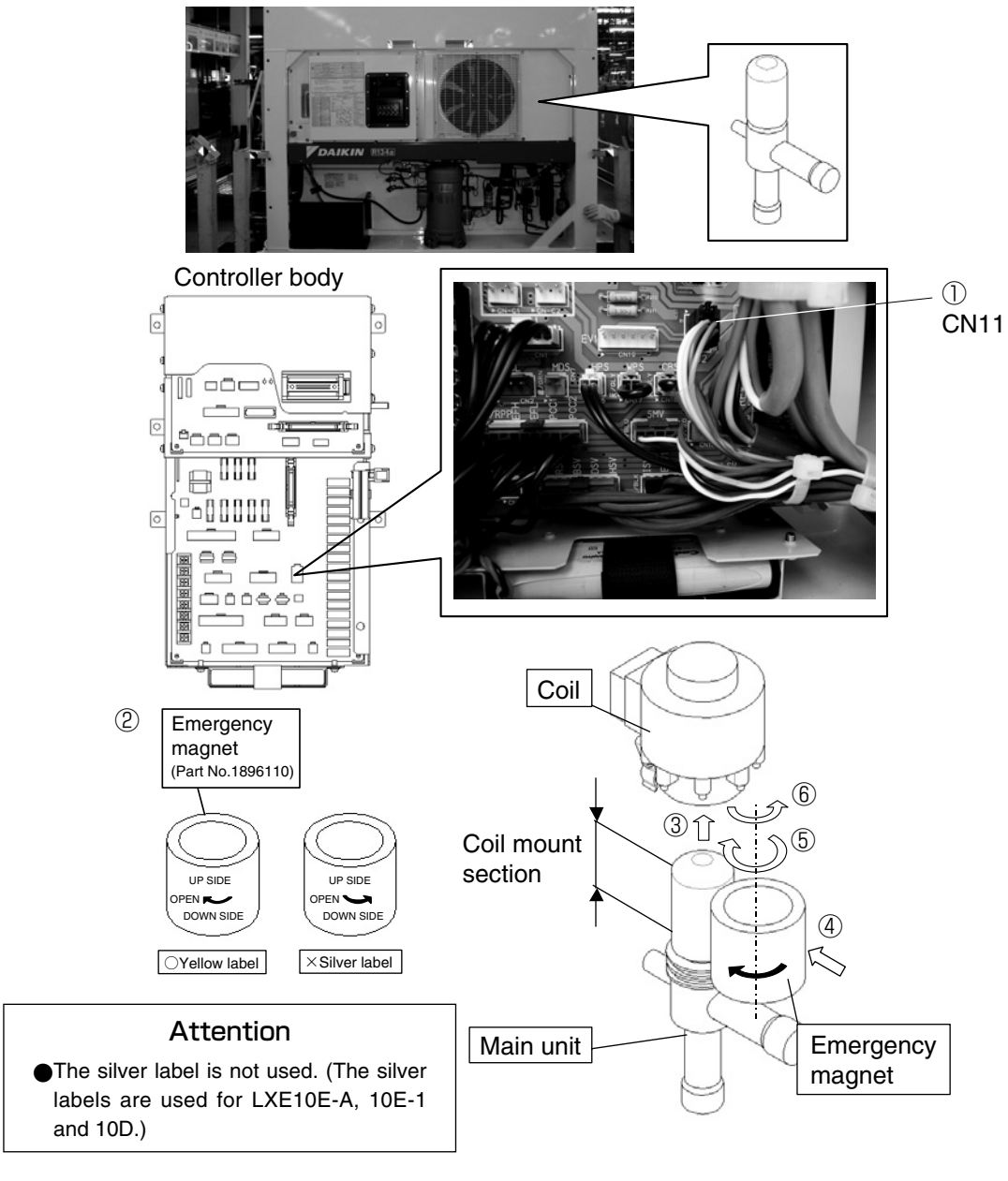
⑥In case of reversed phase, Turn OFF the breaker and connect SCC3 (white) from CN-C1 to CN-C2.</td></tr>
<tr><td>Forcible operation of compressor and condenser fan</td><td><Cooling Operation>
1.Turn OFF the breaker.
2.Pull SCC1-10 (yellow) from CN8 and connect SCC1-1 (blue) instead.
3.Turn ON the breaker.
 
</td><td><Heating Operation>
1.Turn OFF the breaker.
2.Pull SCC1-10 (yellow) from CN8 and connect SCC1-2 (red) instead.
3.Turn ON the breaker.
 
</td></tr>
<tr><td>Causion when turning the power off</td><td colspan="2">Carry out the power supply reversed phase check once again when running the unit again after having turned the power OFF.</td></tr>
</table>

5.4.3 Emergency operation of electronic expansion valve

If the controller does not work or the electronic expansion valve coil has failed, the emergency magnet can be used to fully open the electronic expansion valve.

①Disconnect the CN11 connector from the power supply I/O board of the controller to forcibly turn OFF the power supply to the electronic expansion valve.
②Prepare the emergency magnet.
③Remove the electronic expansion valve coil.
④Bring the emergency magnet into contact with the coil mount section of the electronic expansion valve body with indication "UP SIDE" located upward. (The emergency magnet is magnetically attracted to the coil mount section by the driving magnet located inside.)
⑤Turn the emergency magnet in the OPEN direction (clockwise) in the same place.
→Ensure that the valve is fully open. (There is a small click sound.)
⑥Turn 90˚ to 180˚ counterclockwise the emergency magnet in the same place.

To shorten the operation time, it is recommended that the opening be adjusted. However, slightly close the opening if there is a frost around the compressor due to the operation in wet conditions or the degree of superheat is small.



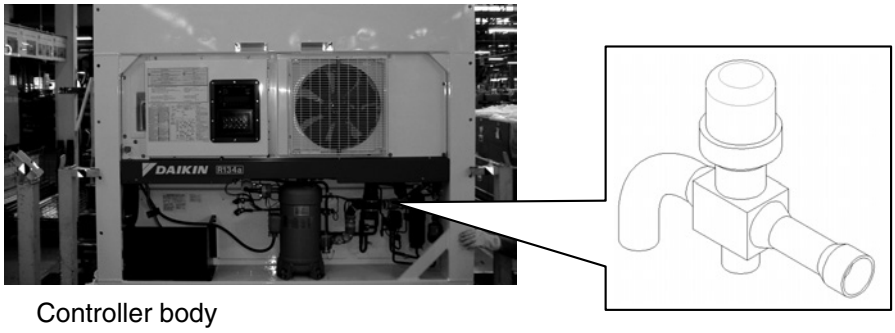
Attention

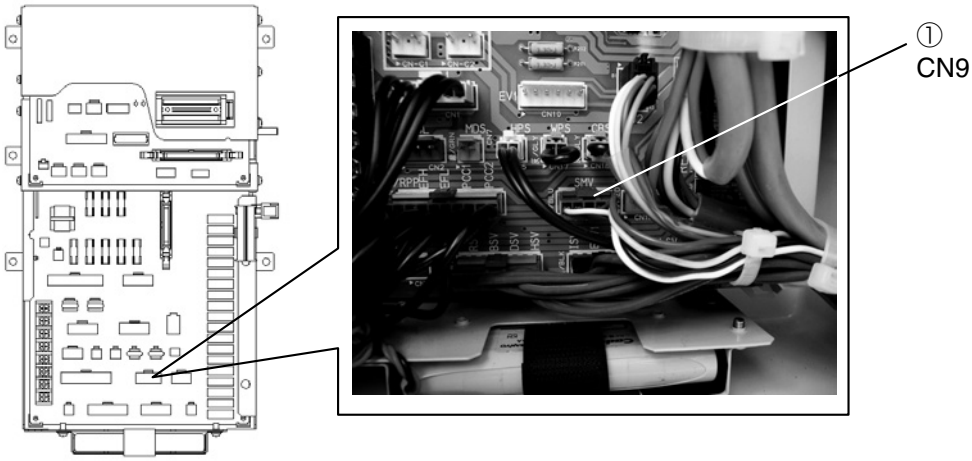
●The silver label is not used. (The silver labels are used for LXE10E-A, 10E-1 and 10D.)

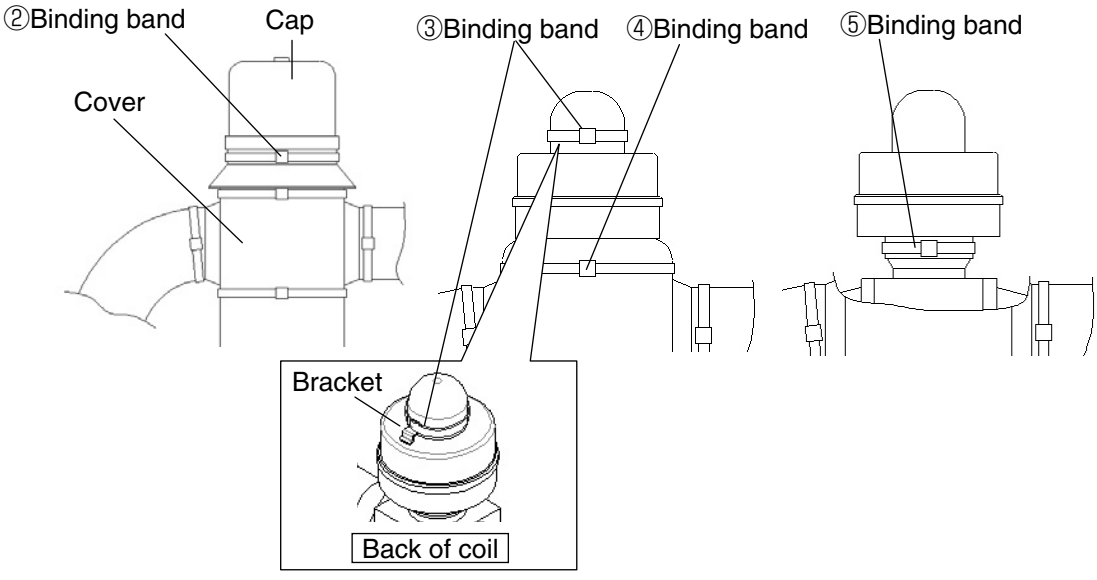
5.4.4 Emergency operation of suction modulation valve

If the controller does not work or the suction modulation valve coil has failed, the emergency magnet can be used to fully open the suction modulation valve.

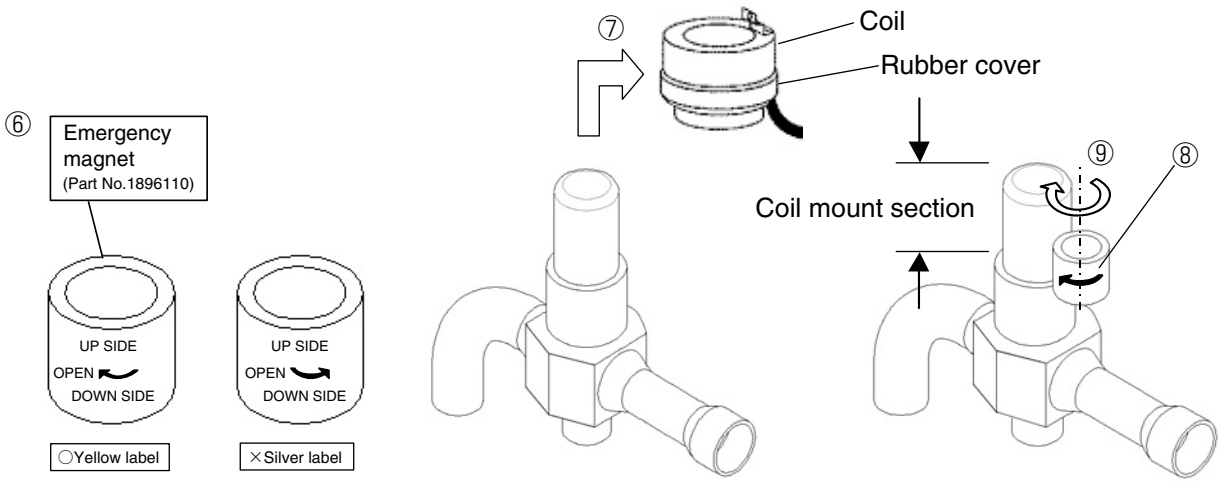
①Disconnect the CN9 connector from the power supply I/O board of the controller to forcibly turn OFF the power supply to the suction modulation valve.
②Remove the binding band of the suction modulation valve cap, and then remove the cap.
③Remove the binding band from the upper section of the suction modulation valve coil.
④Remove the binding band of the suction modulation valve cover to expose the lower section of the suction modulation valve coil.
⑤Remove the binding band from the lower section of the suction modulation valve coil.







⑥Prepare the emergency magnet.
⑦Remove the suction proportional coil. (Removed together with the coil's lower rubber cover)
⑧Bring the emergency magnet into contact with the coil mount section of the suction modulation valve with indication "UP SIDE" located upward. (The emergency magnet is magnetically attracted to the coil mount section by the driving magnet located inside.)
⑨Turn the emergency magnet in the OPEN direction (clockwise) in the same place.
→Ensure that the valve is fully open. (There is a small click sound.)



Attention

●The silver label is not used. (The silver labels are used for LXE10E-A, 10E-1 and 10D.)

6. APPENDIX

6.1 Standard tightening torques for bolts

	Bolt size	Main part	Tightening torque		
			N · m	kgf · cm	lbf · ft
Stainless steel	M4	Small parts	1.6	16	1.2
	M5	Solenoid valve,Mounting plate	3.0	30	2.3
	M6	Access panel	5.2	53	3.8
	M8	Evaporator fan motor Condenser fan motor Control box Service door	12.3	125	9.1
	M10	Evaporator fan motor mounting base Compressor suction flange Compressor discharge flange	25.2	257	18.6
	M12	Compressor	42.7	435	31.5

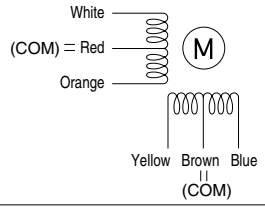
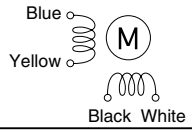
Note: Tolerance of tightening torque is within ±10%.

6.2 Standard tightening torque for flare nut

Pipe size		Main part	Tighten torque		
mm	in.		N · m	kgf · cm	lbf · ft
ϕ 6.4	2/8	Compressor pressure port	15.7	160	11.3
ϕ 9.5	3/8	–	36.3	370	26.8
ϕ 12.7	4/8	Dryer	54.9	500	40.5

Note: Tolerance of tightening torque is within ± 10%.

6.3 Resistance of motor coil and solenoid valve coil

Symbol	Parts name	Value of resistance Ω	Remarks
CM	Compressor motor coil	1.780Ω(@75˚C)	
CFM	Condenser fan motor coil	21.5Ω（20℃）	
EFMH	Evaporator fan motor coil (high speed)	23.0Ω±10%（20℃）	LXE10E100F
EFMH	Evaporator fan motor coil (high speed)	11.4Ω±10%（20℃）	LXE10E100E or earlier
EFML	Evaporator fan motor coil (low speed)	89.2Ω±10%（20℃）	LXE10E100F
EFML	Evaporator fan motor coil (low speed)	17.2Ω±10%（20℃）	LXE10E100E or earlier
LSV	Liquid solenoid valve coil	15.2Ω±10%（20℃）	
HSV	Hot gas solenoid valve coil		
DSV	Defrosting solenoid valve coil		
ISV	Injection solenoid valve coil		
ESV	Economizer solenoid valve coil		
BSV	Hot gas by-pass solenoid valve coil		
RSV	Reheater solenoid valve		
EV	Electronic expansion valve coil	White - Red : 46±3Ω Orange - Red : 46±3Ω Yellow - Brown : 46±3Ω Blue - Brown : 46±3Ω	
SMV	Suction modulation valve coil	Blue - Yellow : 113Ω(20℃) Orange - White : 113Ω(20℃)	

※The values of resistance are at room temperature excluding those of compressor.

6.4 Temperature conversion table and temperature sensor (SS/RS/DSS/DRS/ECIS/ECOS/EIS/EOS/SGS/AMBS) characteristics table

Temperature(°C)	Temperature(°F)	Resistance(kΩ)	Temperature(°C)	Temperature(°F)	Resistance(kΩ)
−40	−40	53.54	+1	+33	6.557
−39	−38	50.52	+2	+35	6.270
−38	−36	47.69	+3	+37	5.997
−37	−34	45.04	+4	+39	5.737
−36	−32	42.55	+5	+41	5.490
−35	−31	40.21	+6	+42	5.255
−34	−29	38.01	+7	+44	5.031
−33	−27	35.95	+8	+46	4.818
−32	−25	34.01	+9	+48	4.616
−31	−23	32.19	+10	+50	4.423
−30	−22	30.47	+11	+51	4.239
−29	−20	28.86	+12	+53	4.064
−28	−18	27.34	+13	+55	3.897
−27	−16	25.91	+14	+57	3.737
−26	−14	24.57	+15	+59	3.586
−25	−13	23.30	+16	+60	3.441
−24	−11	22.10	+17	+62	3.303
−23	−9	20.98	+18	+64	3.171
−22	−7	19.91	+19	+66	3.045
−21	−5	18.91	+20	+68	2.925
−20	−4	17.96	+21	+69	2.810
−19	−2	17.07	+22	+71	2.700
−18	−0	16.23	+23	+73	2.596
−17	+1	15.43	+24	+75	2.496
−16	+3	14.68	+25	+77	2.400
−15	+5	13.96	+26	+78	2.308
−14	+6	13.29	+27	+80	2.221
−13	+8	12.65	+28	+82	2.137
−12	+10	12.05	+29	+84	2.057
−11	+12	11.48	+30	+86	1.980
−10	+14	10.94	+31	+87	1.907
−9	+15	10.43	+32	+89	1.837
−8	+17	9.940	+33	+91	1.769
−7	+19	9.480	+34	+93	1.705
−6	+21	9.044	+35	+95	1.643
−5	+23	8.631	+36	+97	1.584
−4	+24	8.239	+37	+98	1.527
−3	+26	7.867	+38	+100	1.473
−2	+28	7.514	+39	+102	1.421
−1	+30	7.178	+40	+104	1.371
−0	+32	6.860	+41	+105	1.323
			+42	+107	1.277
			+43	+109	1.232
			+44	+111	1.190
			+45	+113	1.149
			+46	+114	1.110
			+47	+116	1.072
			+48	+118	1.036
			+49	+120	1.002
			+50	+122	0.968

6.5 Temperature conversion table and temperature sensor (DCHS) characteristics table

Temperature(°C)	Temperature(°F)	Resistance(kΩ)	Temperature(°C)	Temperature(°F)	Resistance(kΩ)
10	50	478.765	51	123	75.191
11	51	455.208	52	125	72.229
12	53	432.939	53	127	69.398
13	55	411.880	54	129	66.692
14	57	391.960	55	131	64.105
15	59	373.110	56	132	61.630
16	60	355.269	57	134	59.264
17	62	338.376	58	136	56.999
18	64	322.377	59	138	54.832
19	66	307.220	60	140	52.758
20	68	292.857	61	141	50.772
21	69	279.241	62	143	48.871
22	71	266.330	63	145	47.049
23	73	254.085	64	147	45.305
24	75	242.467	65	149	43.633
25	77	231.442	66	150	42.031
26	78	220.975	67	152	40.496
27	80	211.037	68	154	39.024
28	82	201.598	69	156	37.612
29	84	192.629	70	158	36.258
30	86	184.107	71	159	34.959
31	87	176.005	72	161	33.713
32	89	168.302	73	163	32.517
33	91	160.976	74	165	31.369
34	93	154.006	75	167	30.267
35	95	147.374	76	168	29.208
36	96	141.061	77	170	28.192
37	98	135.051	78	172	27.216
38	100	129.328	79	174	26.278
39	102	123.876	80	176	25.376
40	104	118.681	81	177	24.510
41	105	113.731	82	179	23.677
42	107	109.012	83	181	22.877
43	109	104.512	84	183	22.107
44	111	100.221	85	185	21.366
45	113	96.127	86	186	20.654
46	114	92.221	87	188	19.969
47	116	88.493	88	190	19.309
48	118	84.935	89	192	18.675
49	120	81.537	90	194	18.064
50	122	78.291			

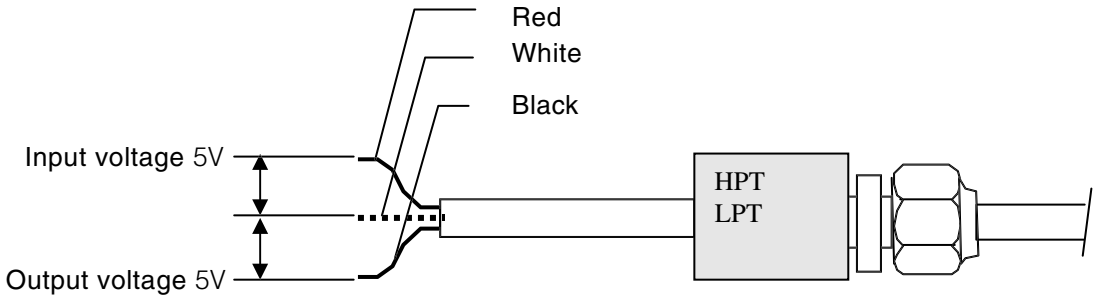
6.6 High and low pressure sensor characteristic table

For high pressure sensor

pressure (kPa·G)	out put (V)	pressure (kPa·G)	out put (V)
0	0.50	1100	1.62
100	0.60	1200	1.72
200	0.70	1300	1.83
300	0.81	1400	1.93
400	0.91	1500	2.03
500	1.01	1600	2.13
600	1.11	1700	2.23
700	1.21	1800	2.34
800	1.32	1900	2.44
900	1.42	2000	2.54
1000	1.52	2100	2.64

For low pressure sensor

pressure (kPa·G)	out put (V)	pressure (kPa·G)	out put (V)
−500	−1.03	300	1.42
−400	−0.72	400	1.72
−300	−0.42	500	2.03
−200	−0.11	600	2.34
−100	0.19	700	2.64
0	0.50	800	2.95
100	0.81	900	3.25
200	1.11	1000	3.56



6.7 HFC134a, temperature - vapor pressure characteristics table

Temperature		Vapor pressure			Temperature		Vapor pressure		
°C	°F	kPa	kg/cm²·G	PSIG	°C	°F	kPa	kg/cm²·G	PSIG
−40	−40	−49	−0.50	−7.1	20	68	470	4.79	68.1
−39	−38.7	−46	−0.47	−6.6	21	69.8	488	4.97	70.7
−38	−36.4	−44	−0.44	−6.3	22	71.6	507	5.16	73.5
−37	−34.6	−41	−0.41	−5.9	23	73.4	525	5.35	76.1
−36	−32.8	−37	−0.38	−5.3	24	75.2	544	5.55	78.8
−35	−31	−34	−0.34	−4.9	25	77	564	5.75	81.7
−34	−29.2	−31	−0.31	−4.4	26	78.8	584	5.95	84.6
−33	−27.4	−27	−0.27	−3.9	27	80.6	604	6.16	87.5
−32	−25.6	−24	−0.24	−3.4	28	82.4	625	6.37	90.6
−31	−23.8	−20	−0.20	−2.9	29	84.2	647	6.59	93.8
−30	−22	−16	−0.16	−2.3	30	86	668	6.81	96.8
−29	−20.2	−12	−0.12	−1.7	31	87.8	691	7.04	100.1
−28	−18.4	− 8	−0.07	−1.1	32	89.6	713	7.27	103.3
−27	−16.6	− 3	−0.03	−0.4	33	91.4	737	7.51	106.8
−26	−14.8	1	0.01	0.1	34	93.2	760	7.75	110.2
−25	−13	6	0.06	0.8	35	95	785	8.00	113.8
−24	−11.2	11	0.11	1.5	36	96.8	810	8.25	117.4
−23	− 9.4	16	0.16	2.3	37	98.6	835	8.51	121.0
−22	− 7.6	21	0.21	3.0	38	100.4	861	8.77	124.8
−21	− 5.8	27	0.27	3.9	39	102.2	887	9.04	128.6
−20	− 4	32	0.33	4.6	40	104	914	9.31	132.5
−19	− 2.2	38	0.39	5.5	41	105.8	941	9.59	136.4
−18	− 0.4	44	0.45	6.3	42	107.6	969	9.88	140.5
−17	1.4	51	0.51	7.3	43	109.4	998	10.17	144.7
−16	3.2	57	0.58	8.2	44	111.2	1027	10.47	148.9
−15	5	64	0.64	9.2	45	113	1057	10.77	153.2
−14	6.8	71	0.71	10.2	46	114.8	1087	11.08	157.6
−13	8.6	78	0.79	11.3	47	116.6	1118	11.39	162.1
−12	10.4	85	0.86	12.3	48	118.4	1149	11.72	166.6
−11	12.2	93	0.94	13.4	49	120.2	1182	12.04	171.3
−10	14	100	1.02	14.5	50	122	1214	12.38	176.0
− 9	15.8	108	1.10	15.6	51	123.8	1248	12.72	180.9
− 8	17.6	117	1.18	16.9	52	125.6	1281	13.06	185.7
− 7	19.4	125	1.27	18.1	53	127.4	1316	13.42	190.8
− 6	21.2	134	1.36	19.4	54	129.2	1351	13.77	195.8
− 5	23	143	1.45	20.7	55	131	1387	14.14	201.1
− 4	24.8	152	1.55	22.0	56	132.8	1424	14.51	206.4
− 3	26.6	162	1.65	23.4	57	134.6	1461	14.89	211.8
− 2	28.4	172	1.75	24.9	58	136.4	1499	15.28	217.3
− 1	30.2	182	1.85	26.3	59	138.2	1538	15.67	223.0
0	32	192	1.96	27.8	60	140	1577	16.07	228.6
1	33.8	203	2.07	29.4	61	141.8	1617	16.48	234.4
2	35.6	214	2.18	31.0	62	143.6	1658	16.90	240.4
3	37.4	225	2.29	32.6	63	145.4	1699	17.32	246.3
4	39.2	237	2.41	34.3	64	147.2	1741	17.75	252.4
5	41	249	2.53	36.1	65	149	1784	18.19	258.6
6	42.8	261	2.66	37.8	66	150.8	1828	18.63	265.0
7	44.6	274	2.79	39.7	67	152.6	1872	19.09	271.4
8	46.4	287	2.92	41.6	68	154.4	1918	19.55	278.1
9	48.2	300	3.06	43.5	69	156.2	1964	20.02	284.7
10	50	314	3.20	45.5	70	158	2010	20.50	291.4
11	51.8	328	3.34	47.5	71	159.8	2058	20.98	298.4
12	53.6	342	3.48	49.5	72	161.6	2107	21.48	305.5
13	55.4	357	3.63	51.7	73	163.4	2156	21.98	312.6
14	57.2	372	3.79	53.9	74	165.2	2206	22.49	319.8
15	59	387	3.95	56.1	75	167	2257	23.01	327.2
16	60.8	403	4.11	58.4	76	168.8	2309	23.54	334.8
17	62.6	419	4.27	60.7	77	170.6	2362	24.08	342.4
18	64.4	436	4.44	63.2	78	172.4	2415	24.62	350.1
19	66.2	453	4.62	65.6	79	174.2	2470	25.18	358.1
					80	176	2525	25.74	366.1

Conversion rate：1kgf/cm²·G=98.0665kPa

1kPa = 0.145PSIG

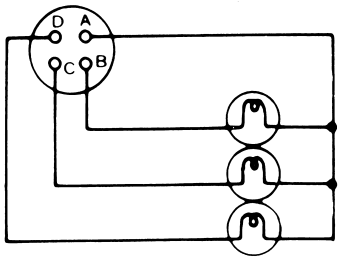
6.8 Electric wiring

pilot lamps and monitoring circuit (option)

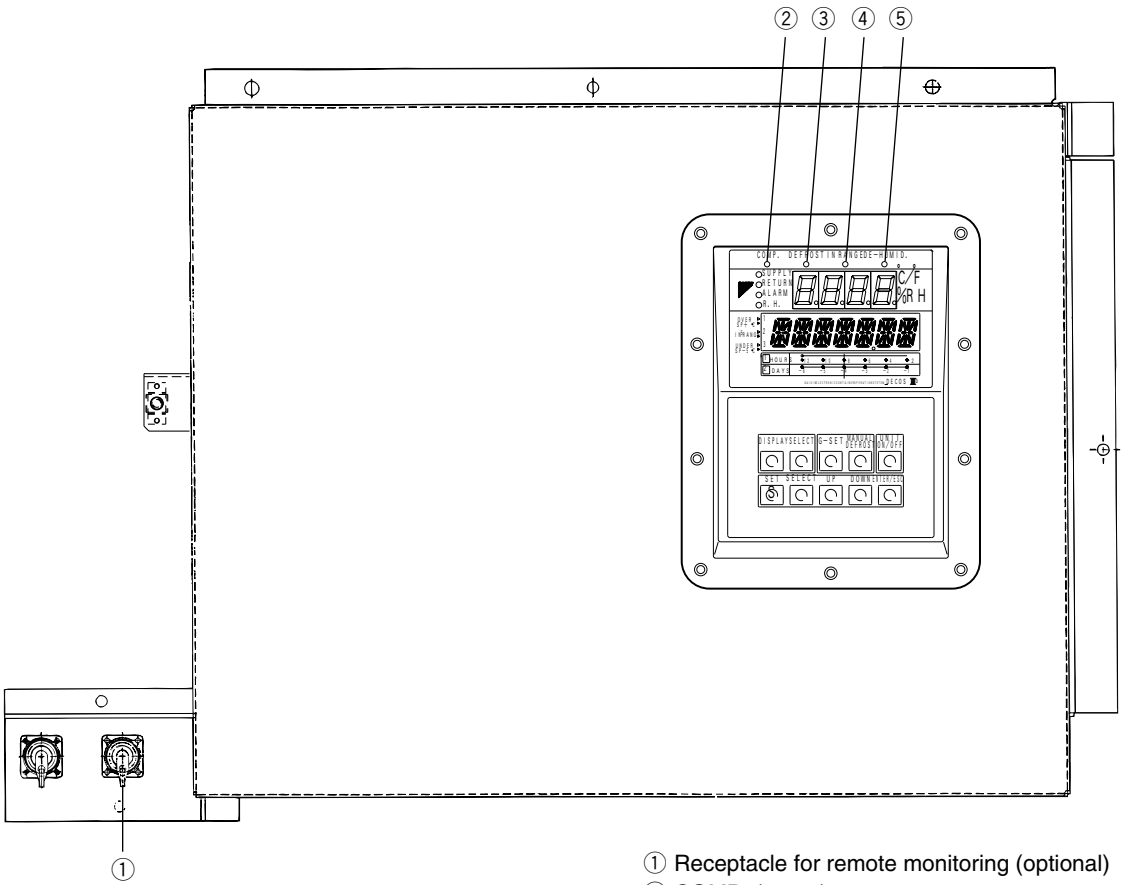
Four pilot lamps which indicate operating mode are mounted on the controller in the control box.

Pilot lamp	Color	Operating condition
COMP.	Green	The compressor is running
DEFROST	Red	The unit is under defrosting operation
IN RANGE	Orange	The inside temperature is within the proper range (within±2.0˚C (±3.6˚F) of the preset temperature).
DE-HUMID.	Yellow	The unit is set to the dehumidification control operation. (optional)

Also, the receptacle for remote monitoring of the indicator lamp can be optionally attached. The connection is as shown below.



A: Earth
B: Compressor (green)
C: Defrost (red)
D: In range (orange)

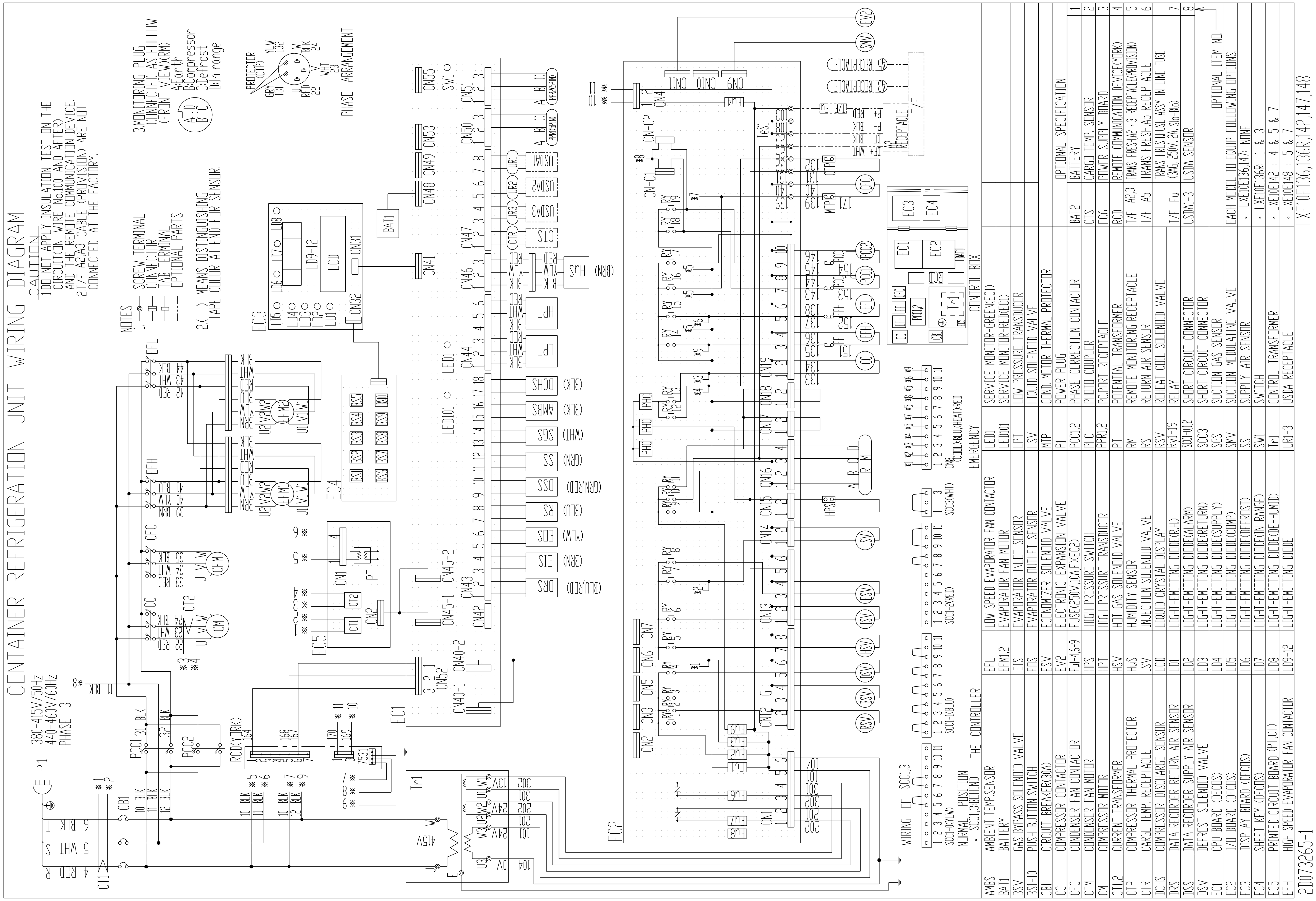


① Receptacle for remote monitoring (optional)
② COMP. (green)
③ DEFROST (red)
④ IN RANGE (orange)
⑤ DE-HUMID. (yellow)

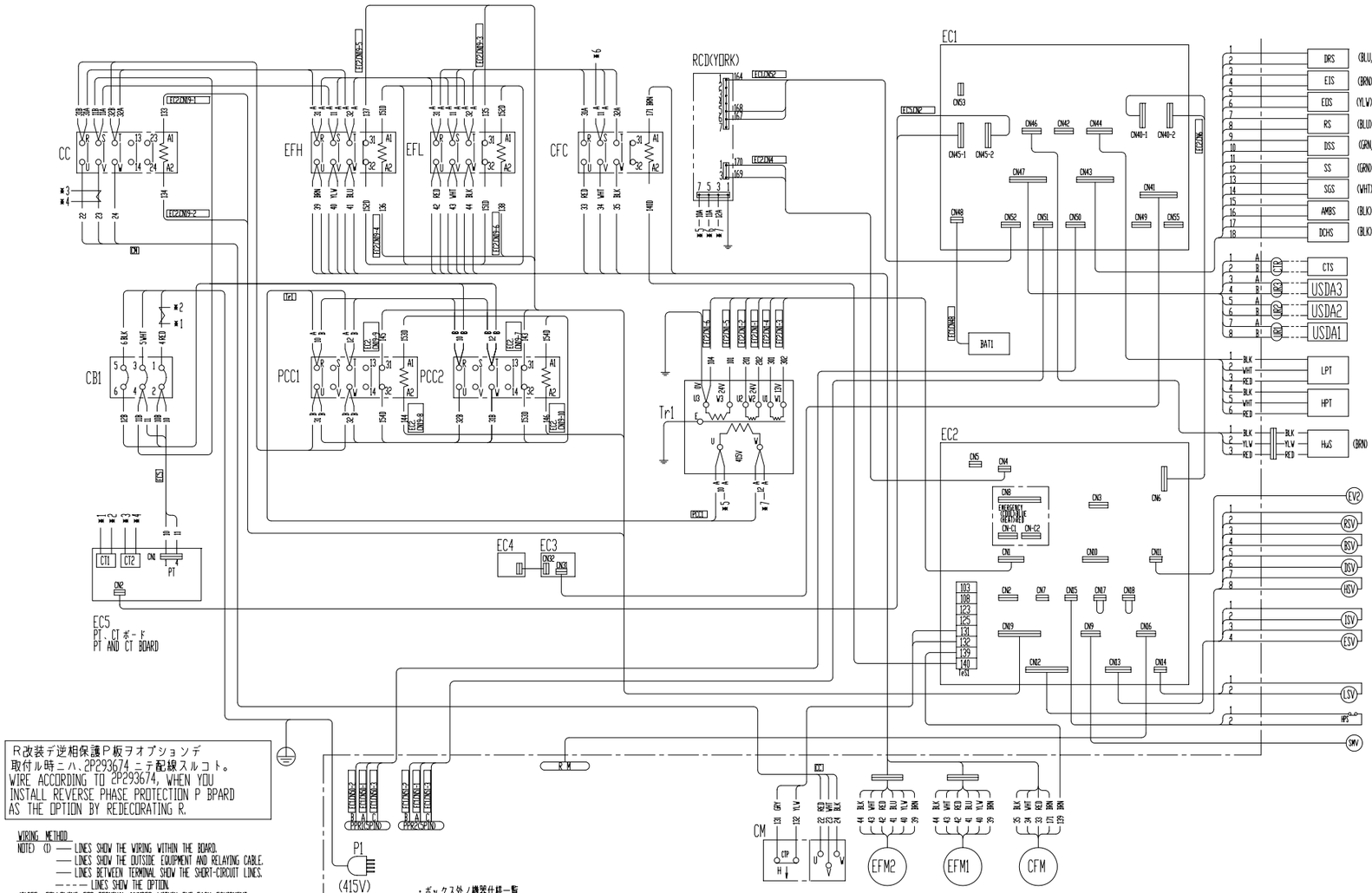
6.9 Fuse protection table

	Protection of:
Fuse 1 (250V, 10A)	• High pressure switch (HPS) • Compressor contactor (CC) • Evaporator fan contactor high speed (EFH) • Evaporator fan contactor low speed (EFL) • Condensor fan contactor (CFC) • Compressor terminal protector (CTP) • Phase correction contactor (PCC1, PCC2)
Fuse 2 (250V, 10A)	• Gas bypass solenoid valve (BSV) • Defrost solenoid valve (DSV) • Reheater solenoid valve (RSV) for dehumidification
Fuse 3 (250V, 10A)	• Hot gas solenoid valve (HSV) • Liquid solenoid valve (LSV) • Injection solenoid valve (ISV) • Economizer solenoid valve (ESV)
Fuse 4 (250V, 10A)	• Modem
Fuse 6 (250V, 10A)	• Recorder
Fuse 7 (250V, 10A)	• CPU board • Electronic expansion valve (EV) • Suction modulating valve (SMV) • LED display • LCD screen
Fuse 8 (250V, 10A)	• Spare
Fuse 9 (250V, 10A)	• Remote monitoring receptacle (RM)

6.10 Schematic wiring diagram (LXE10E136F)



6.11 Stereoscopic wiring diagram (LXE10E136F)



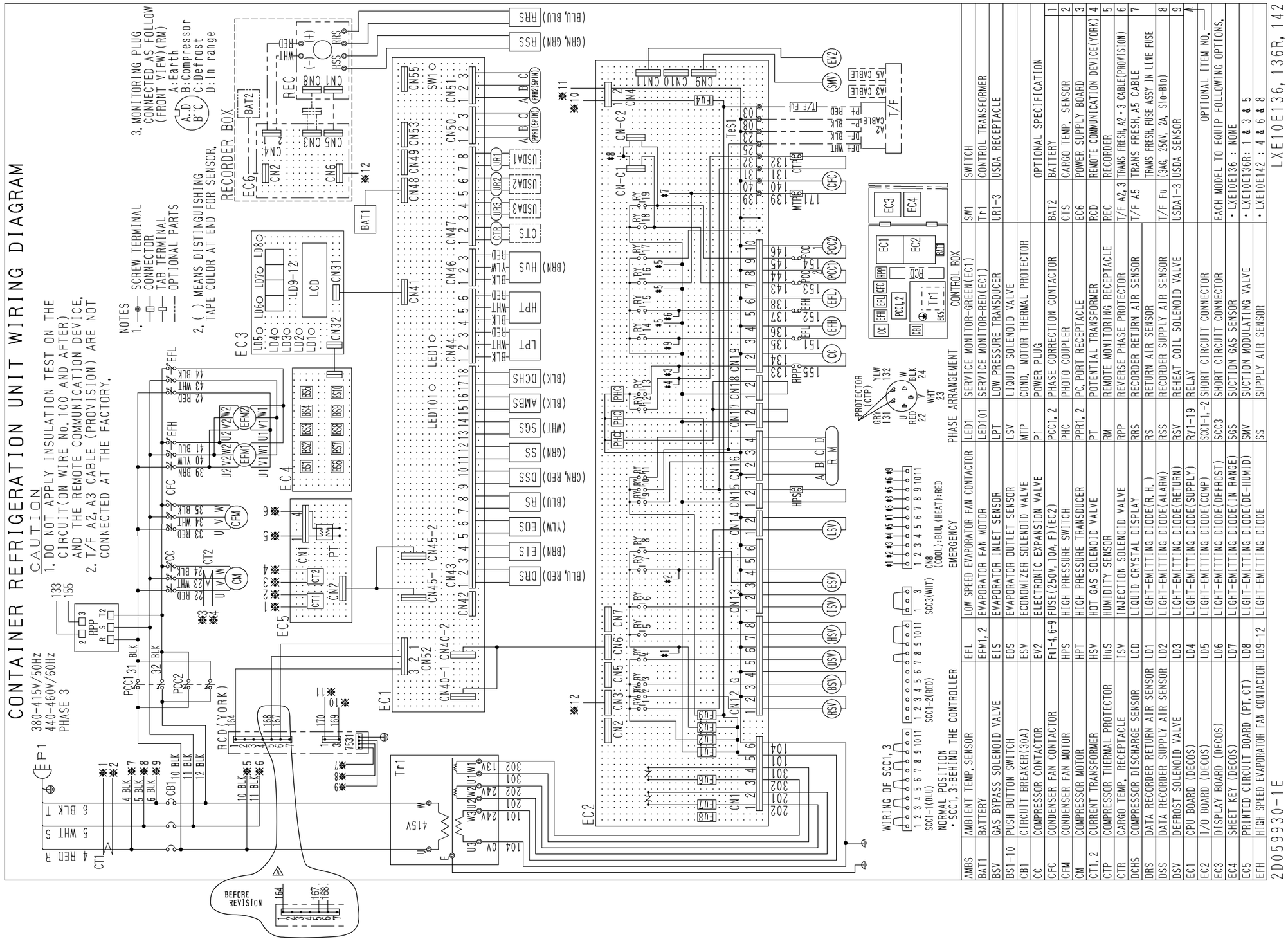
・ボックス外ノ機器仕様一覧

整理 NO	品名	機器仕様	器具番号	整理 NO	品名	機器仕様	器具番号	整理 NO	品名	機器仕様	器具番号
1	外気温度センサ		AMBS	14	電子膨張弁		EV2	27	サクションガスセンサ		SGS
2	ガスバイパス電磁弁		BSV	15	圧力開閉器（高圧）		HPS	28	吸入比例弁		SMV
3	電動機（庫外ファン）		CFM	16	高圧圧力センサ		HPT	29	吹出温度センサ		SS
4	電動機（圧縮機）		CM	17	ホットガス電磁弁		HSV	30	USDA レセプタクル		URI-3
5	カーゴ温度レセプタクル		CTR	18	湿度センサ		HuS	31			
6	吐出管温度センサ		DCHS	19	インジェクション電磁弁		ISV	32			
7	吸込温度センサ（チャートレス）		DRS	20	低圧圧力センサ		LPT	33			
8	吹出温度センサ（チャートレス）		DSS	21	液電磁弁		LSV	34			
9	デフロスト電磁弁		DSV	22	プラグ（400V 用）		P1	35			
10	電動機（庫内ファン）		EFM1 . 2	23	パソコンボートレセプタクル 1，2		PPR1,2	36			
11	熱交入口センサ		ETS	24	モニタリングレセプタクル		RM	37			
12	熱交出口センサ		EDS	25	吸込温度センサ		RS	38	カーゴ温度センサ	オプション部品	CTS
13	エコノマイザ電磁弁		ESV	26	レヒートコイルバイパス電磁弁		RSV	39	USDA センサ	オプション部品	USDA1-3

・PARTS LIST OF OUTSIDE EQUIPMENT

REF. NO	NAME	DEVICE SPEC	APPLIANCE NO	REF. NO	NAME	DEVICE SPEC	APPLIANCE NO	REF. NO	NAME	DEVICE SPEC	APPLIANCE NO
1	AMBIENT TEMP.SENSOR		AMBS	14	ELECTRONIC EXPANSION VALVE		EV2	27	SUCTION GAS SENSOR		SGS
2	GAS BYPASS SOLENOID VALVE		BSV	15	HIGH PRESSURE SWITCH		HPS	28	SUCTION MODULATING VALVE		SMV
3	CONDENSER FAN MOTOR		CFM	16	HIGH PRESSURE TRANSDUCER		HPT	29	SUPPLY AIR SENSOR		SS
4	COMPRESSOR MOTOR		CM	17	HOT GAS SOLENOID VALVE		HSV	30	USDA RECEPTACLE		URI-3
5	CARGO TEMP. RECEPTACLE		CTR	18	HUMIDITY SENSOR		HuS	31			
6	COMPRESSOR DISCHARGE SENSOR		DCHS	19	INJECTION SOLENOID VALVE		ISV	32			
7	DATA RECORDER RETURN AIR SENSOR		DRS	20	LOW PRESSURE TRANSDUCER		LPT	33			
8	DATA RECORDER SUPPLY AIR SENSOR		DSS	21	LIQUID SOLENOID VALVE		LSV	34			
9	DEFROST SOLENOID VALVE		DSV	22	POWER PLUG		P1	35			
10	EVAPORATOR FAN MOTOR		EFM1 . 2	23	PC.PORT RECEPTACLE1,2		PPR1,2	36			
11	EVAPORATOR INLET SENSOR		ETS	24	REMOTE MONITORING RECEPTACLE		RM	37			
12	EVAPORATOR OUTLET SENSOR		EDS	25	RETURN AIR SENSOR		RS	38	CARGO TEMP. SENSOR	OPTION PARTS	CTS
13	ECONOMIZER SOLENOID VALVE		ESV	26	REHEAT COIL SOLENOID VALVE		RSV	39	USDA SENSOR	OPTION PARTS	USDA1-3

6.12 Schematic wiring diagram (LXE10E136E)

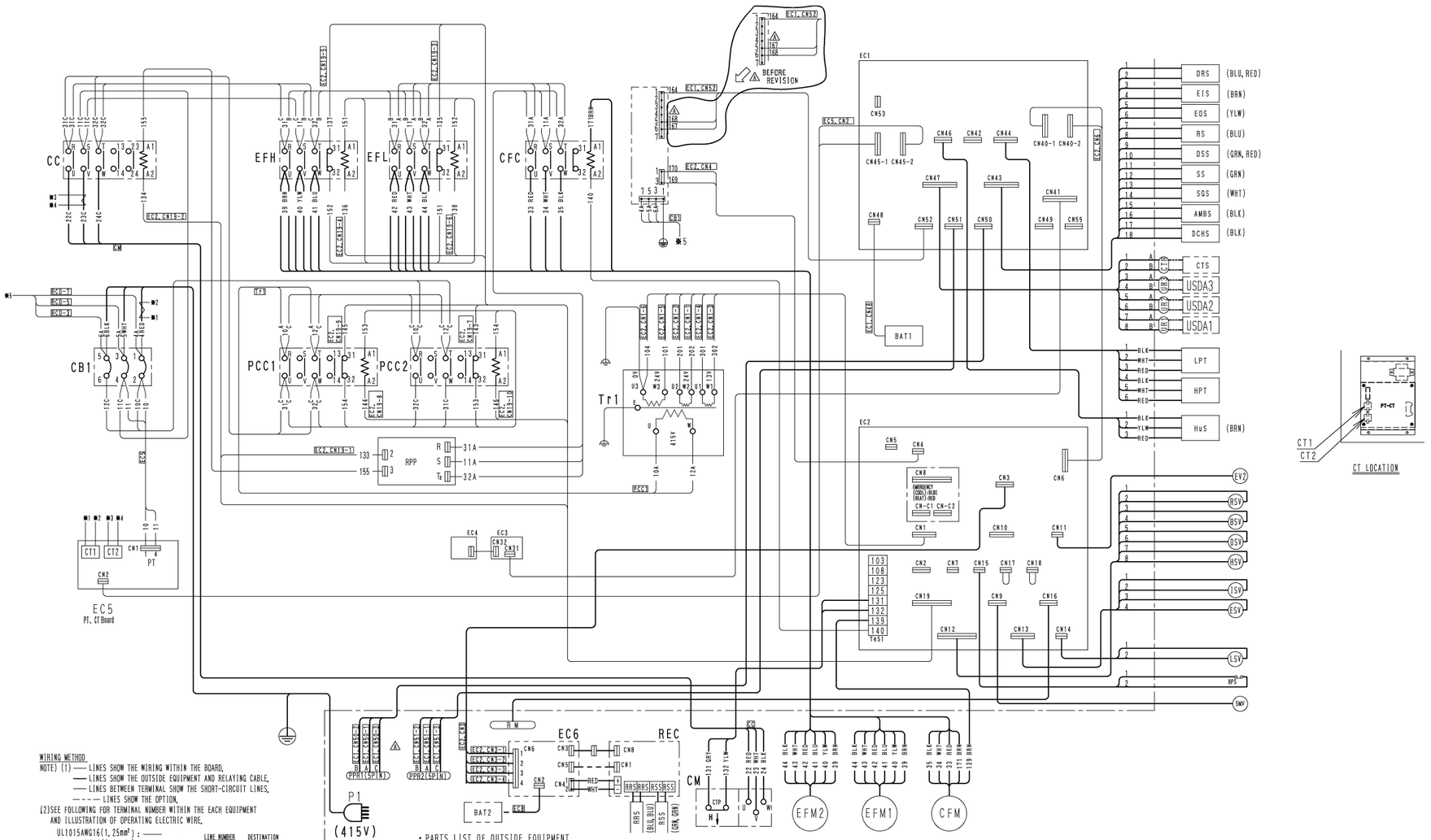


AMBS	AMBIENT TEMP. SENSOR	EFL	LOW SPEED EVAPORATOR FAN CONTACTOR	LED1
BAT1	BATTERY	EFM1, 2	EVAPORATOR FAN MOTOR	LED101
BSV	GAS BYPASS SOLENOID VALVE	EIS	EVAPORATOR INLET SENSOR	LPT
BS1-10	PUSH BUTTON SWITCH	EOS	EVAPORATOR OUTLET SENSOR	LSV
CB1	CIRCUIT BREAKER(30A)	ESV	ECONOMIZER SOLENOID VALVE	MTP
CC	COMPRESSOR CONTACTOR	EV2	ELECTRONIC EXPANSION VALVE	P1
CFC	CONDENSER FAN CONTACTOR	Fu1-4, 6-9	FUSE(250V, 10A, F)(EC2)	PCC1, 2
CFM	CONDENSER FAN MOTOR	HPS	HIGH PRESSURE SWITCH	PHC
CM	COMPRESSOR MOTOR	HPT	HIGH PRESSURE TRANSDUCER	PPR1, 2
CT1, 2	CURRENT TRANSFORMER	HSV	HOT GAS SOLENOID VALVE	PT
CTP	COMPRESSOR THERMAL PROTECTOR	HuS	HUMIDITY SENSOR	RM
CTR	CARGO TEMP. RECEPTACLE	ISV	INJECTION SOLENOID VALVE	RPP
DCHS	COMPRESSOR DISCHARGE SENSOR	LCD	LIQUID CRYSTAL DISPLAY	RRS
DRS	DATA RECORDER RETURN AIR SENSOR	LD1	LIGHT-EMITTING DIODE(R. H.)	RS
DSS	DATA RECORDER SUPPLY AIR SENSOR	LD2	LIGHT-EMITTING DIODE(ALARM)	RSS
DSV	DEFROST SOLENOID VALVE	LD3	LIGHT-EMITTING DIODE(RETURN)	RSV
EC1	CPU BOARD (DECOS)	LD4	LIGHT-EMITTING DIODE(SUPPLY)	RY1-19
EC2	I/O BOARD (DECOS)	LD5	LIGHT-EMITTING DIODE(COMP)	SCC1-1, -2
EC3	DISPLAY BOARD (DECOS)	LD6	LIGHT-EMITTING DIODE(DEFROST)	SCC3
EC4	SHEET KEY (DECOS)	LD7	LIGHT-EMITTING DIODE(IN RANGE)	SGS
EC5	PRINTED CIRCUIT BOARD (PT, CT)	LD8	LIGHT-EMITTING DIODE(DE-HUMID)	SMV
EFH	HIGH SPEED EVAPORATOR FAN CONTACTOR	LD9-12	LIGHT-EMITTING DIODE	SS

SW1	SWITCH		
Tr1	CONTROL TRANSFORMER		
UR1-3	USDA RECEPTACLE		
	OPTIONAL SPECIFICATION		
BAT2	BATTERY	1	
CTS	CARGO TEMP. SENSOR	2	
EC6	POWER SUPPLY BOARD	3	
RCD	REMOTE COMMUNICATION DEVICE(YORK)	4	
REC	RECORDER	5	
T/F A2, 3	TRANS FRESH, A2・3 CABLE(PROVISION)	6	
T/F A5	TRANS FRESH, A5 CABLE	7	
	TRANS FRESH, FUSE ASSY IN LINE FUSE		
T/F Fu	(3A6, 250V, 2A, S10-B10)	8	
USDA1-3	USDA SENSOR	9	
		A	
	OPTIONAL ITEM NO.		
EACH MODEL TO EQUIP FOLLOWING OPTIONS.			
• LXE10E136 : NONE			
• LXE10E136R: 1 & 3 & 5			
• LXE10E142 : 4 & 6 & 8			

LXE10E136, 136R, 142

6.13 Stereoscopic wiring diagram (LXE10E136E)



WIRING METHOD

NOTE) (1) —— LINES SHOW THE WIRING WITHIN THE BOARD.
— LINES SHOW THE OUTSIDE EQUIPMENT AND RELAYING CABLE.
— LINES BETWEEN TERMINAL SHOW THE SHORT-CIRCUIT LINES.
– – – – LINES SHOW THE OPTION.

(2)SEE FOLLOWING FOR TERMINAL NUMBER WITHIN THE EACH EQUIPMENT AND ILLUSTRATION OF OPERATING ELECTRIC WIRE.

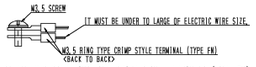
UL1015AWG16(1.25mm²) : ——
// AWG14(2.0mm²) : —A—
// AWG12(3.5mm²) : —B—
// AWG10(5.5mm²) : —C—

ex. 22C — LINE NUMBER, DESTINATION, ELECTRIC WIRE SIZE

(3)WIRING COLOR
BLK : BLACK、BLU : BLUE、GRY : GRAY
BRN : BROWN、RED : RED、YLW : YELLOW
WHT : WHITE、GRN : GREEN

(4)SEE TABLE FOR SEQUENCE FIGURE IN THIS DRAWING.

(5)UNLESS OTHERWISE SPECIFIED AT INSTRUCTION FOR C, BOX ASSY, IN THE RING TYPE CRIMP STYLE TERMINALS BOTH TIGHTEN CASE MUST AS BELOW, THEN, IN BOTH OF THE TERMINALS OF DIFFERENT ELECTRIC WIRE SIZE TIGHTEN CASE MUST BE UNDER TO LARGE OF ELECTRIC WIRE SIZE AS BELOW,



(6)THE M3.5 SLEEVE RECESSED RING TYPE CRIMP STYLE TERMINALS (TYPE FN) BOTH TIGHTEN POINTS OR THE M3.5 SLEEVE RECESSED RING TYPE CRIMP STYLE TERMINALS (TYPE FN) AND THE M4 SLEEVE RECESSED RING TYPE CRIMP STYLE TERMINALS (TYPE FN) BOTH TIGHTEN POINTS, THEY MUST BE TIGHTENING TORQUE 11.2~13.8kgf・cm(1.1~1.3N・m).

(7)WIRING MUST NOT CONTACT TO COIL OF Tr1.

(8)HIGH VOLTAGE WIRING AND LOW VOLTAGE WIRING DIVORCE IN 25mm AND OVER, PROVIDED CTP AND WTP IS EXCEPT.

(9)IF INTERNAL WIRING IS NOT SPECIFIED, SEE GAH010-Z.

(10)THE COLOR WITHIN ( ) SHOWS THE DISTINCTION COLOR.

・PARTS LIST OF OUTSIDE EQUIPMENT

REF. NO.	NAME	DEVICE SPEC	APPLIANCES NO.	REF. NO.	NAME	DEVICE SPEC	APPLIANCES NO.	REF. NO.	NAME	DEVICE SPEC	APPLIANCES NO.
1	AMBIENT TEMP. SENSOR		AMBS	14	ELECTRONIC EXPANSION VALVE		EV2	27	RECORDER SUPPLY AIR SENSOR		RSS
2	GAS BYPASS SOLENOID VALVE		BSV	15	HIGH PRESSURE SWITCH		HPS	28	REHEAT COIL SORENOID VALVE		RSV
3	CONDENSER FAN MOTOR		CFM	16	HIGH PRESSURE TRANSDUCER		HPT	29	SUCTION GAS SENSOR		SGS
4	COMPRESSOR MOTOR		CM	17	HOT GAS SOLENOID VALVE		HSV	30	SUCTION MODULATING VALVE		SMV
5	CARGO TEMP. RECEPTACLE		CTR	18	HUMIDITY SENSOR		HuS	31	SUPPLY AIR SENSOR		SS
6	COMPRESSOR DISCHARGE SENSOR		DCHS	19	INJECTION SOLENOID VALVE		ISV	32	USDA RECEPTACLE		UR1-3
7	DATA RECORDER RETURN AIR SENSOR		DRS	20	LOW PRESSURE TRANSDUCER		LPT	33			
8	DATA RECORDER SUPPLY AIR SENSOR		DSS	21	LIQUID SOLENOID VALVE		LSV	34	BATTERY	OPTION PARTS	BAT2
9	DEFROST SOLENOID VALVE		DSV	22	POWER PLUG		P1	35	CARGO TEMP. SENSOR	OPTION PARTS	CTS
10	EVAPORATOR FAN MOTOR		EFM1、2	23	PC. PORT RECEPTACLE1、2		PPR1、2	36	POWER SUPPLY BOARD	OPTION PARTS	EC6
11	EVAPORATOR INLET SENSOR		EIS	24	REMOTE MONITORING RECEPTACLE		RM	37	RECORDER	OPTION PARTS	REC
12	EVAPORATOR OUTLET SENSOR		EOS	25	RECORDER RETURN AIR SENSOR		RRS	38	USDA SENSOR	OPTION PARTS	USDA1-3
13	ECONOMIZER SOLENOID VALVE		ESV	26	RETURN AIR SENSOR		RS	39			

Revise C	by the application of DECOS Ⅲf controller	2011.7.1
Revise B	Correction and reviewing of manual	2010.3.31
Revise A	by Service manual news CM-7-8,7-9	2009.9.30

DAIKIN INDUSTRIES, LTD.

Head Office. Umeda Center Bldg., 4-12, Nakazaki-Nishi 2-chome, Kita-ku, Osaka, 530-8323 Japan.

Tel: 06-6373-4338

Fax: 06-6373-7297

Tokyo Office. JR Shinagawa East Bldg., 11F 18-1, Konan 2-chome, Minato-ku Tokyo, 108-0075 Japan.

Tel: 03-6716-0420

Fax: 03-6716-0230

TR08-03C

$5,00 (2011.8.00150)NK