



DAIKIN

Marine type

Container Refrigeration Unit

Service Manual

Optional Functions

Model

LXE10D-A8

LXE10D-A9

LXE10D-A11

DAIKIN INDUSTRIES, LTD.

TR98-02A

This manual describes only the items different from those of the standard machine.

For the items not described in this manual, refer to the following document.

Service Guide, Services

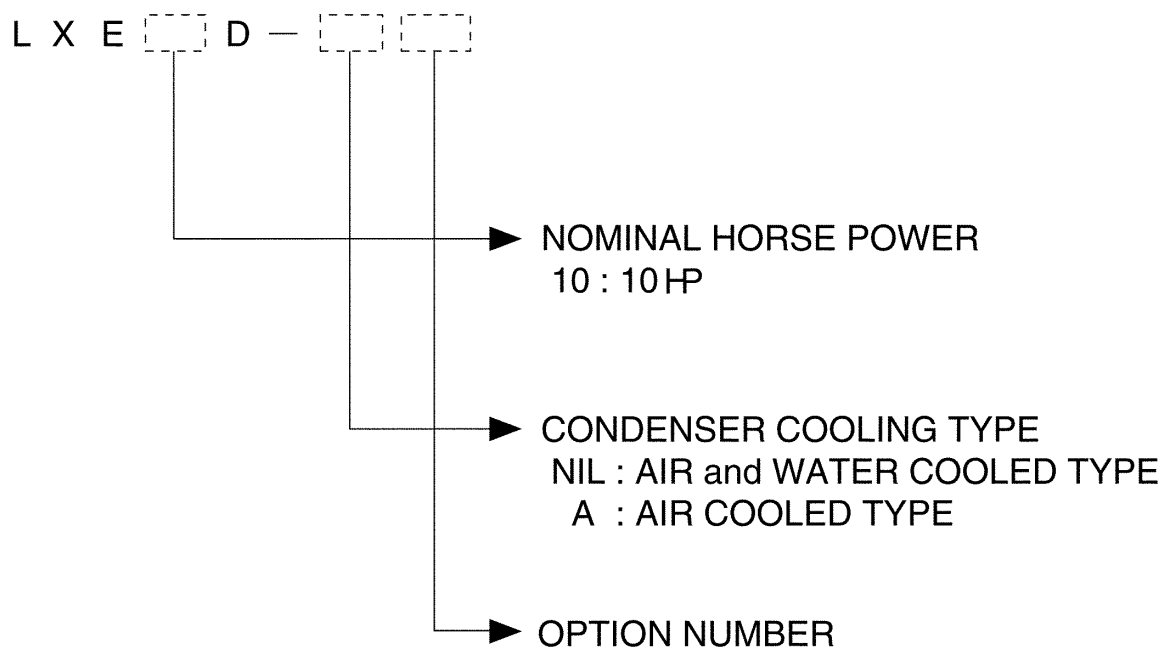
Service Manual (Operation)

Parts List

Operation Manual of Personal Computer Software

Compressor Dismantling and Assembly Manual

Denomination of Model Name



Note) "R" GIVEN AFTER OPTION NUMBER STANDS FOR "REVISION"
AND IT IS GIVEN FOR THE UNIT WHICH IS SPECIALLY
MODIFIED.

Covered Models

This Service Guide describes only the items different from those of the standard machine regarding the features and operation of LXE10D-A8, LXE10D-A9, and LXE10D-A11.

Name of models	LXE10D-A8	LXE10D-A9	LXE10D-A11
Major features	Dehumidifying function	—	Highly gas-tight
Cooling system of condenser	Specifically used for air cooling system		
Reheat coil	Provided	Not provided	Not provided
Wing bolt for control box cover	2 pcs.	2 pcs.	1 pc.
Wing bolt for ventilator	2 pcs.	2 pcs.	5 pcs.

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SAFETY PRECAUTIONS

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

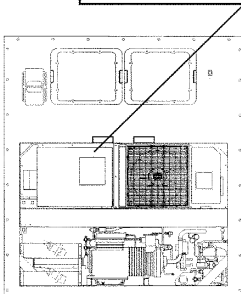
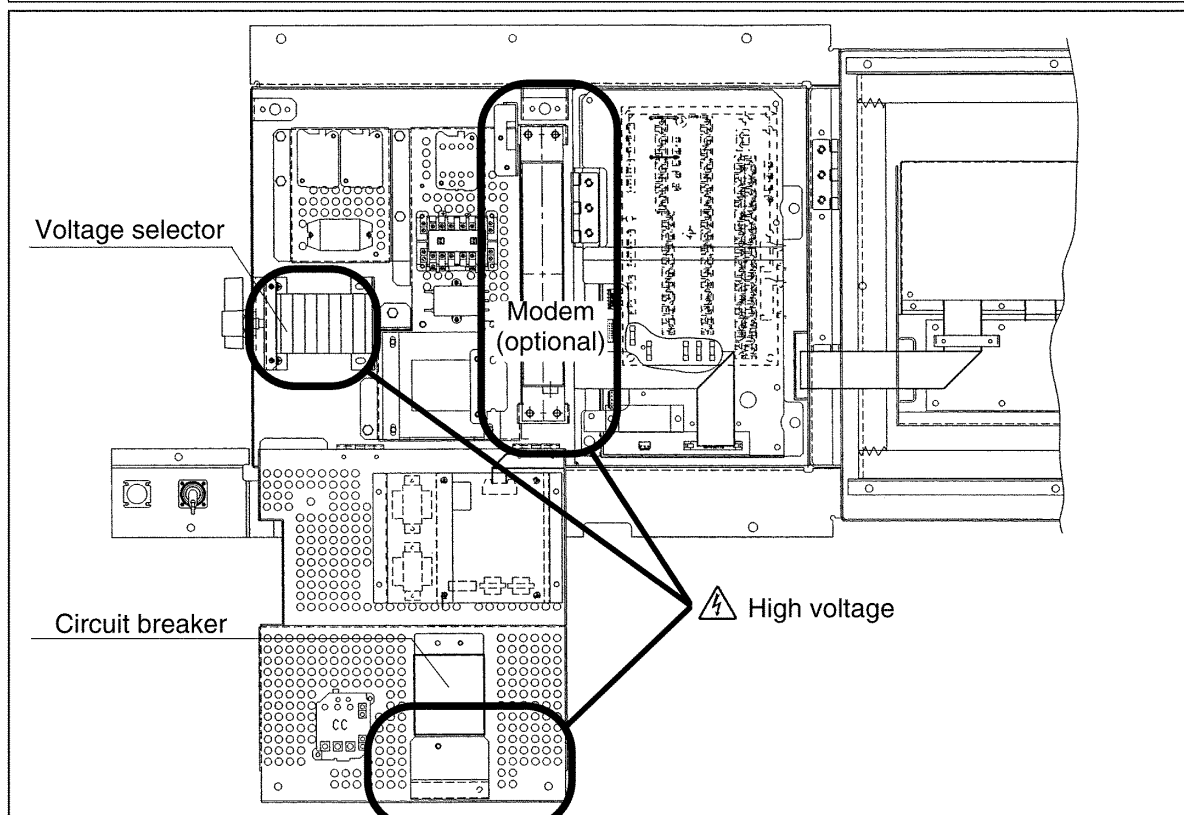
DANGER

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



Be sure to unplug the power cord before inspecting the inside of control box.

* Because the high voltage remains at the voltage selector, the circuit breaker and the optionally provided modem even though the circuit breaker in the control box is turned off.



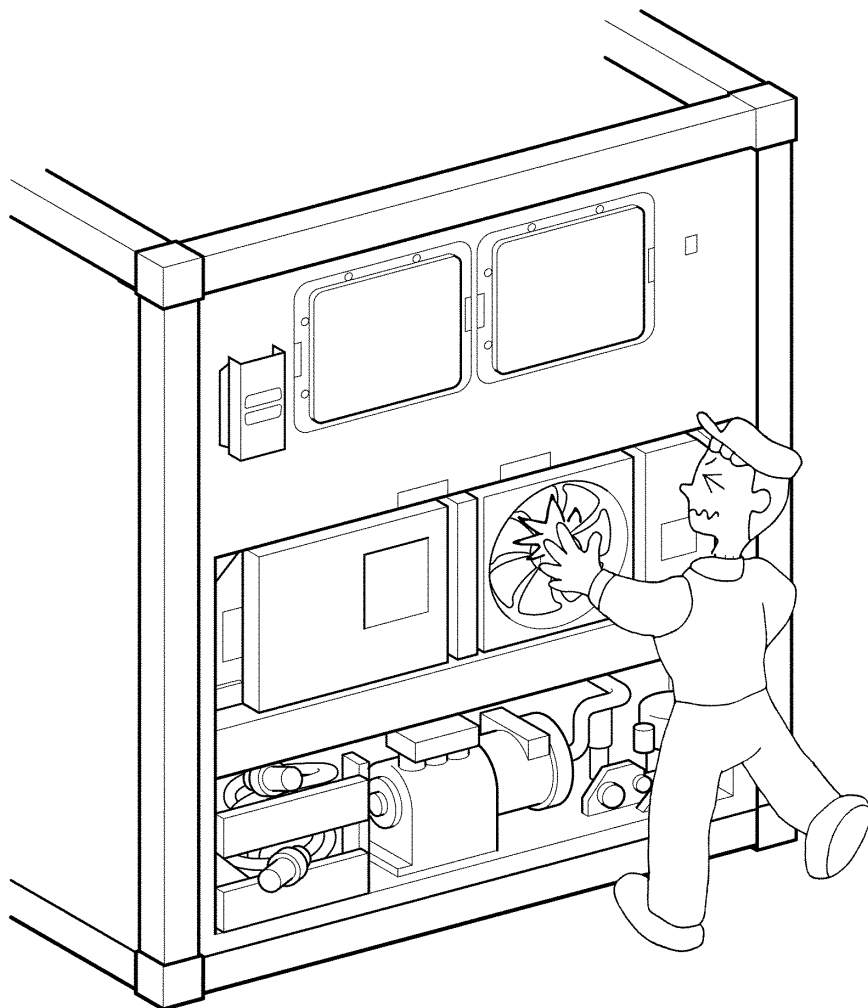
 **WARNING**

Do not touch the condenser fan during electricity being applied.

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



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

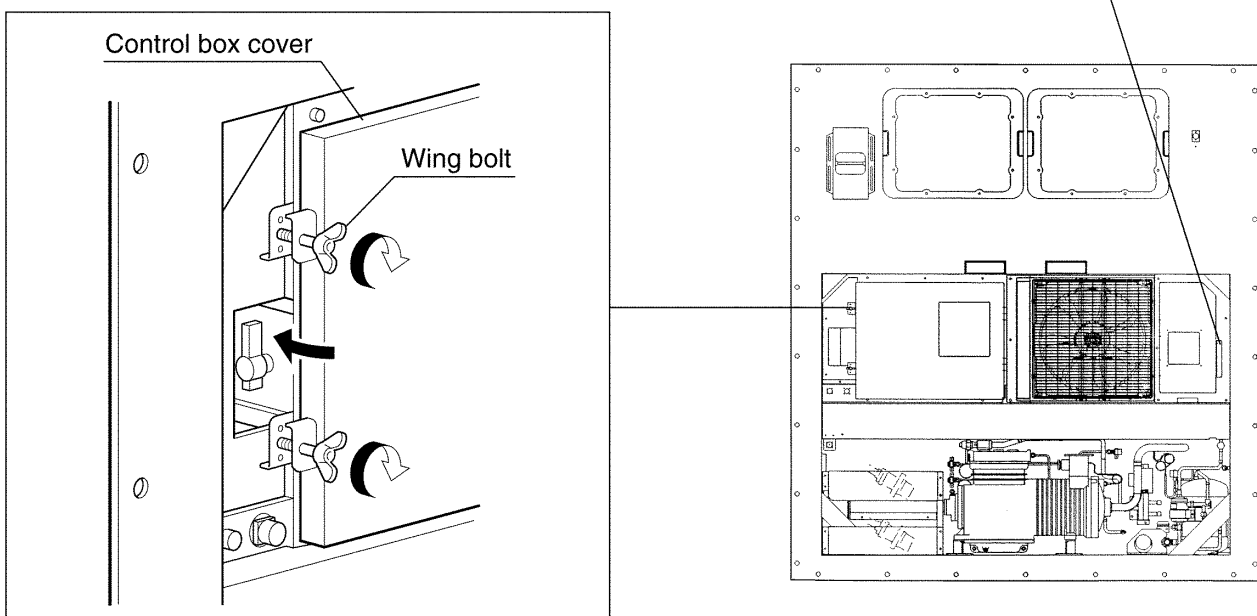
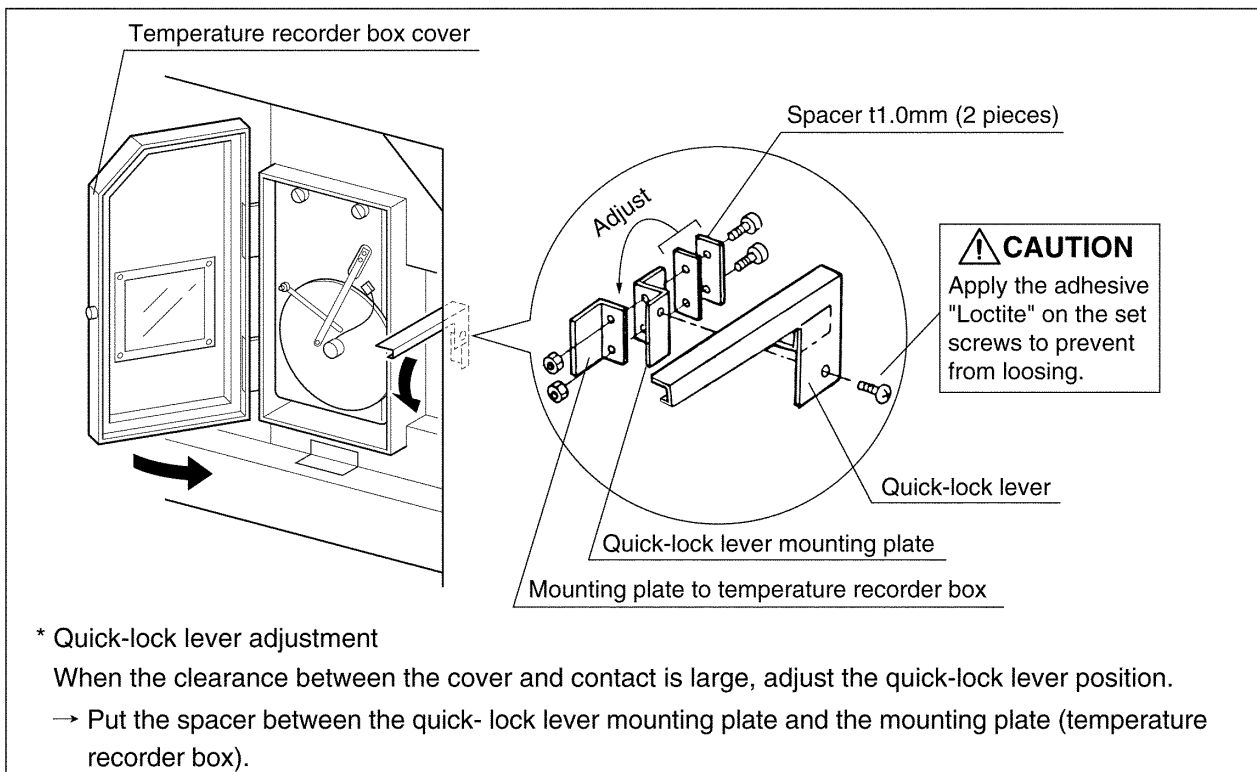


CAUTION

Before starting the unit, connect the power plug and run the generator.

Securely close the control box cover and the temperature recorder box cover (optional).

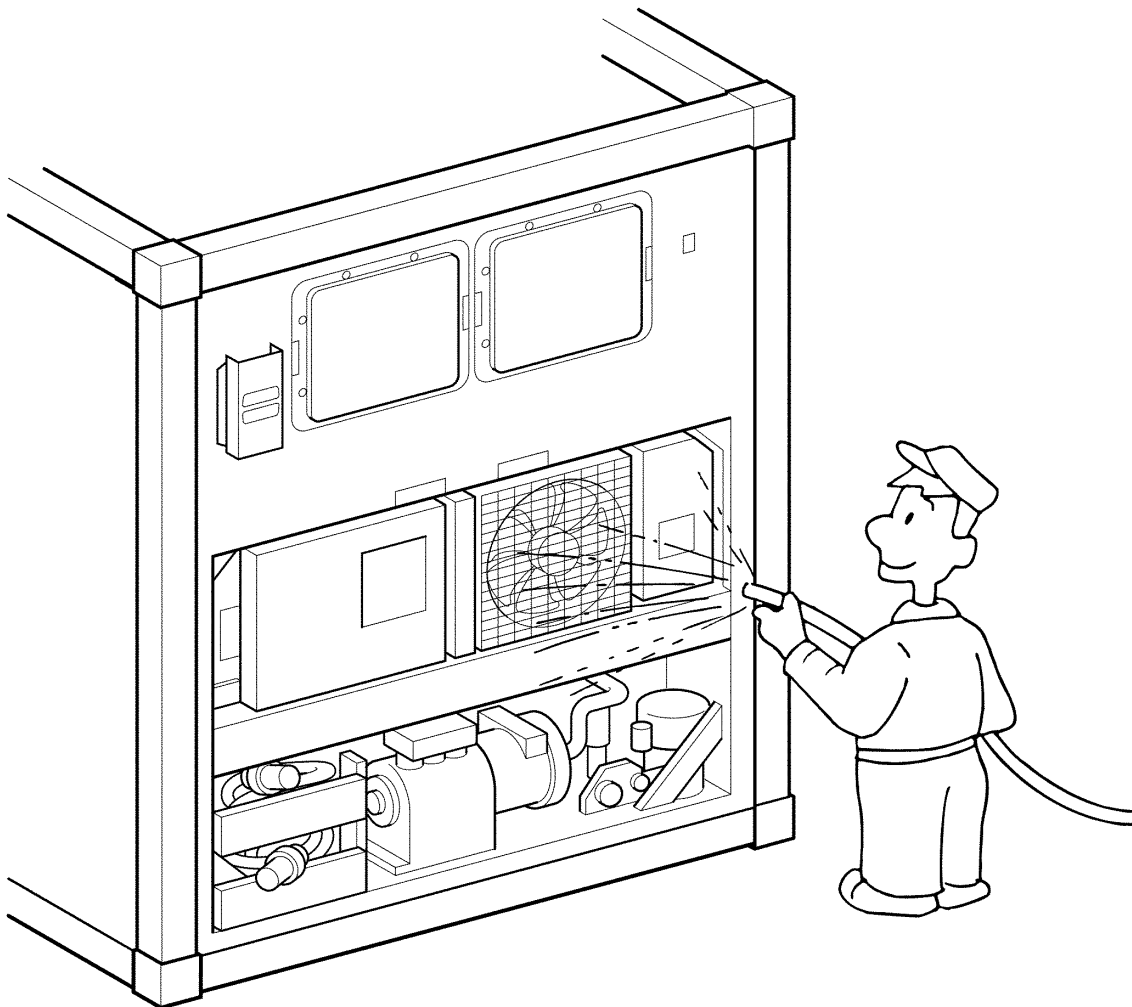
Otherwise, it will cause water ingress.



(Note) For LXE10D-A11, only one wing bolt is provided.

⚠ CAUTION

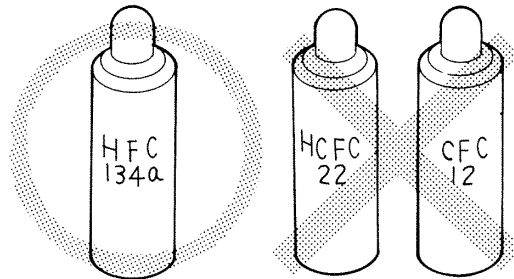
**Wash the refrigeration unit with fresh water before PTI.
Carefully flush the air-cooled condenser by fresh water since
much salt sticks to it.**



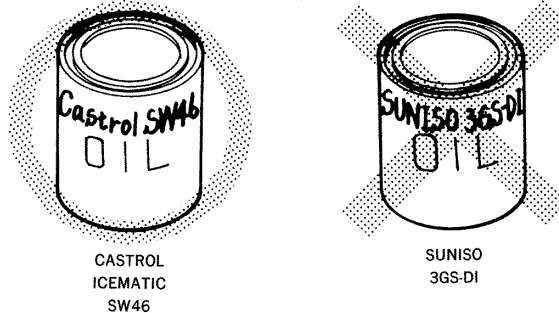
CAUTION

Refrigerant and refrigerating machine oil

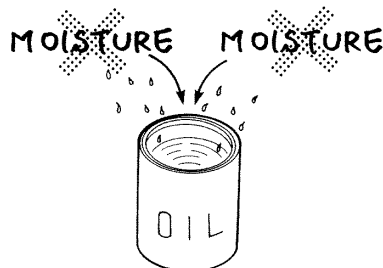
Charge only refrigerant HFC 134a to the unit.
Never attempt to use any other refrigerant (CFC12, HCFC22, etc) on the refrigeration unit.
If any other refrigerant not specified is charged, it may cause the troubles to the unit.



Use only Daikin specified oil (Castrol Icematic SW46) when replacing the refrigerating machine oil.
If any other refrigerating machine oil not specified is charged, it may cause the troubles to the unit.



Open the oil can, just before charging the oil, and use all the oil whose can is opened once.
Do not leave the opened can as it is for 5 hours or longer to avoid moisture ingress.
If any refrigerating machine oil which absorbs much moisture is used, it may cause the troubles to the unit.



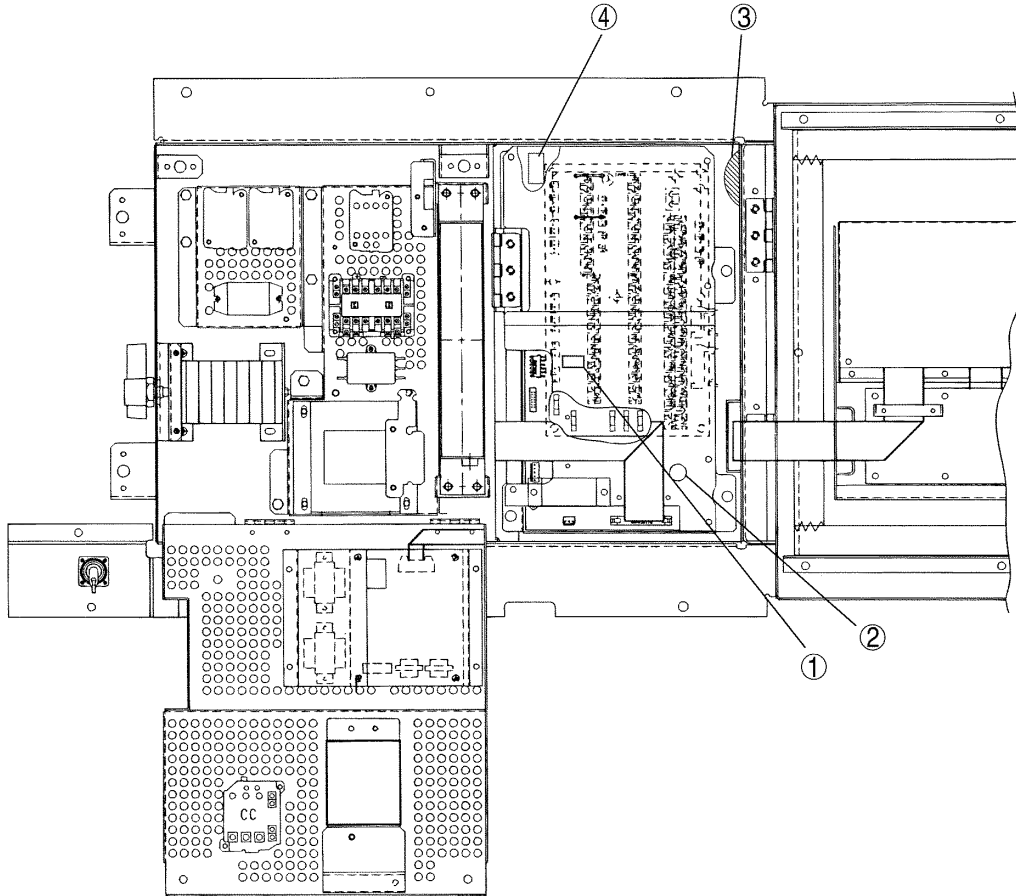
Use only exclusive tools for HFC134a.(gauge manifold, charging cylinder, etc)
Do not use any tools for CFC12 or HCFC22.
Service ports with quick joints for exclusive use of HFC134a are provided in the refrigeration unit to avoid refrigerant and refrigerating machine oil of a different kind entering into the refrigeration circuit. (Refer to section 7.2)
The charging hose and service port are not interchangeable with those of previous model(s).

1. DATA OF REFRIGERATION UNIT

1.1 Main specifications

Model		LXE10D-A8	LXE10D-A9 LXE10D-A11
Item			
Condenser cooling system	Air-cooled type		
Controller	DECOS III b		
Power supply	AC 3-phase	50Hz : 380V/400V/415V 60Hz : 440V/460V	
	(Optional) Dual voltage	AC 3-phase	200V class 50Hz : 200V 60Hz : 200V/220V/230V 400V class 50Hz : 380V/400V/415V 60Hz : 440V/460V
Compressor	Semi-hermetic type (Output: 5.5kW)		
Evaporator	Cross fin coil type		
Air-cooled condenser	Cross fin coil type		
Water-cooled condenser	Receiver		
Reheat coil (reheat heater)	Cross fin coil type	Not provided	
Fan	Direct motor driven type propeller fan		
Fan motor	Three-phase squirrel-cage induction motor		
Defrosting	System	Hot-gas defrosting system	
	Initiation	Dual timer or manual switch	
	Termination	Evaporator outlet pipe temperature measured by a defrosting termination detecting thermostat.	
Refrigerant flow control	Electronic expansion valve		
Capacity control	Hot gas bypass control with modulating control valve		
Protective safe devices	Circuit breaker, PT/CT board (for over current protection). compressor thermal protector, fan-motor thermal protector, high-pressure switch, fusible safety plug, fuse (10A) × 5		
Refrigerant (charged amount)	R134a: 4.8 (kg)/10.6 (lbs)	R134a : 4.4kg/9.7 (lbs)	
Refrigeration oil (charged amount)	CASTROL ICEMATIC SW46: 3.6 (ℓ)		
Unit weight	Approx. 650 (kg)/1433 (lbs) (Weight is different in accordance with units.)		

1.2 Name of each part of control box



- ① Personal computer receptacle
- ② Service monitor lamp (flashing when it is normal, and lit or extinguished when it is abnormal)
- ③ Spare fuse (Kept in a vinyl bag) ... LXE10D-A8/A9
- ④ Spare fuse (kept in a holder) ... LXE10D-A11

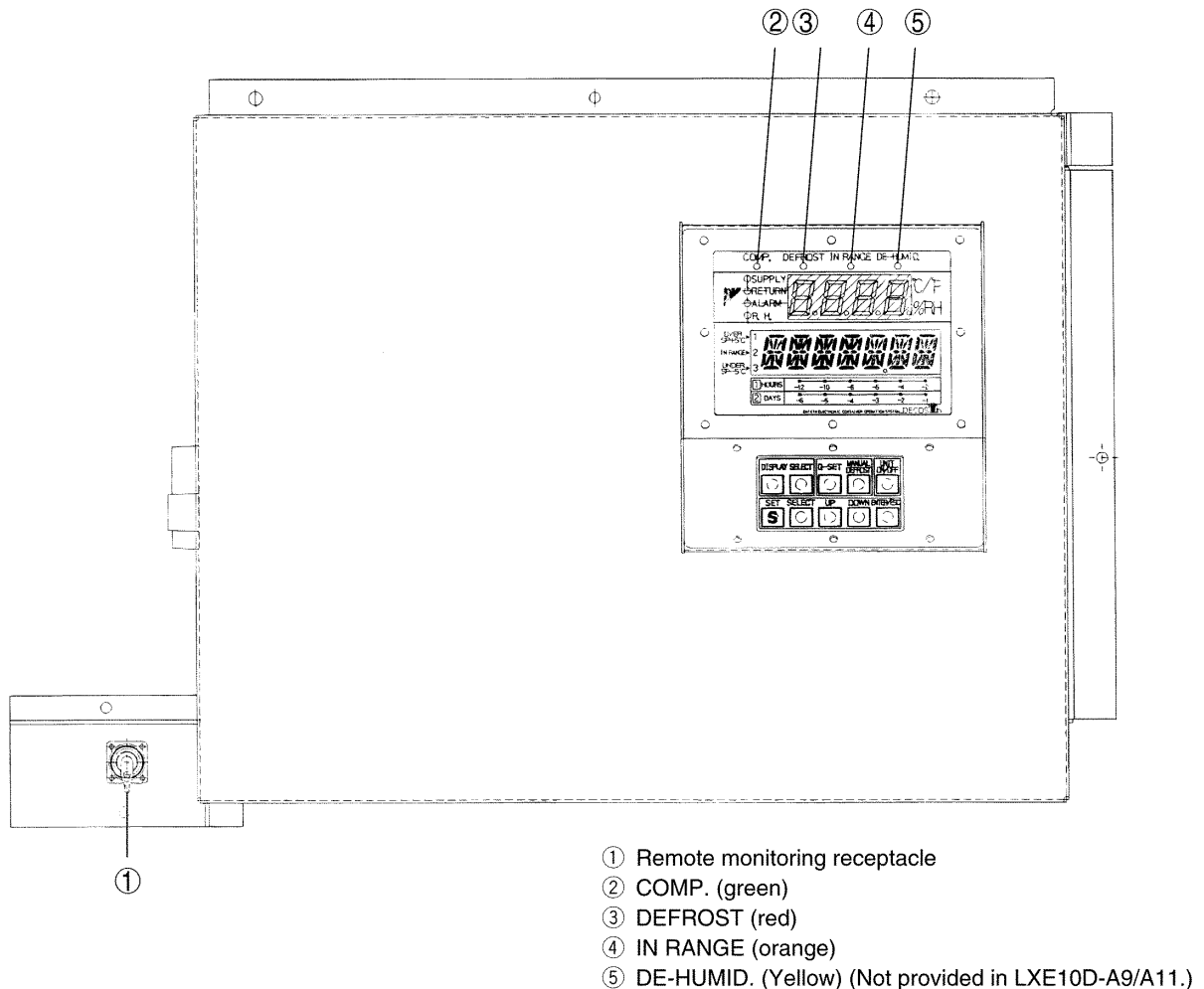
1.3 Pilot lamps and monitoring circuit

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

Pilot lamp to be lit on	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 range (within 2°C (3.6°F) of the set point temperature).
※ DE-HUMID.	Yellow	The controller is set to the dehumidification control operation.(optional)

The remote monitoring receptacle for the pilot lamp is also equipped. The connections are shown below.

※ Not provided in LXE10D-A9/A11.



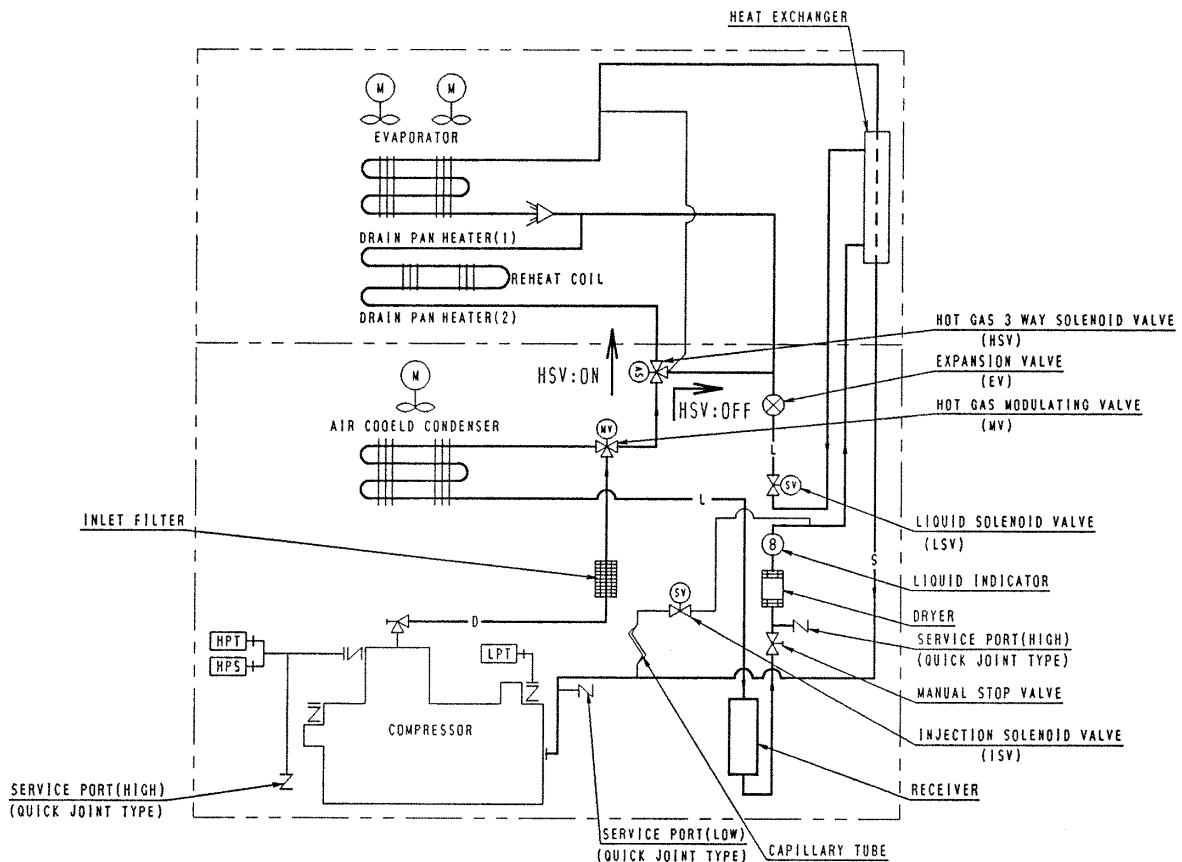
2. DEHUMIDIFICATION OPERATION (ONLY APPLIED TO LXE10D-A8)

This paragraph explains the dehumidification control.

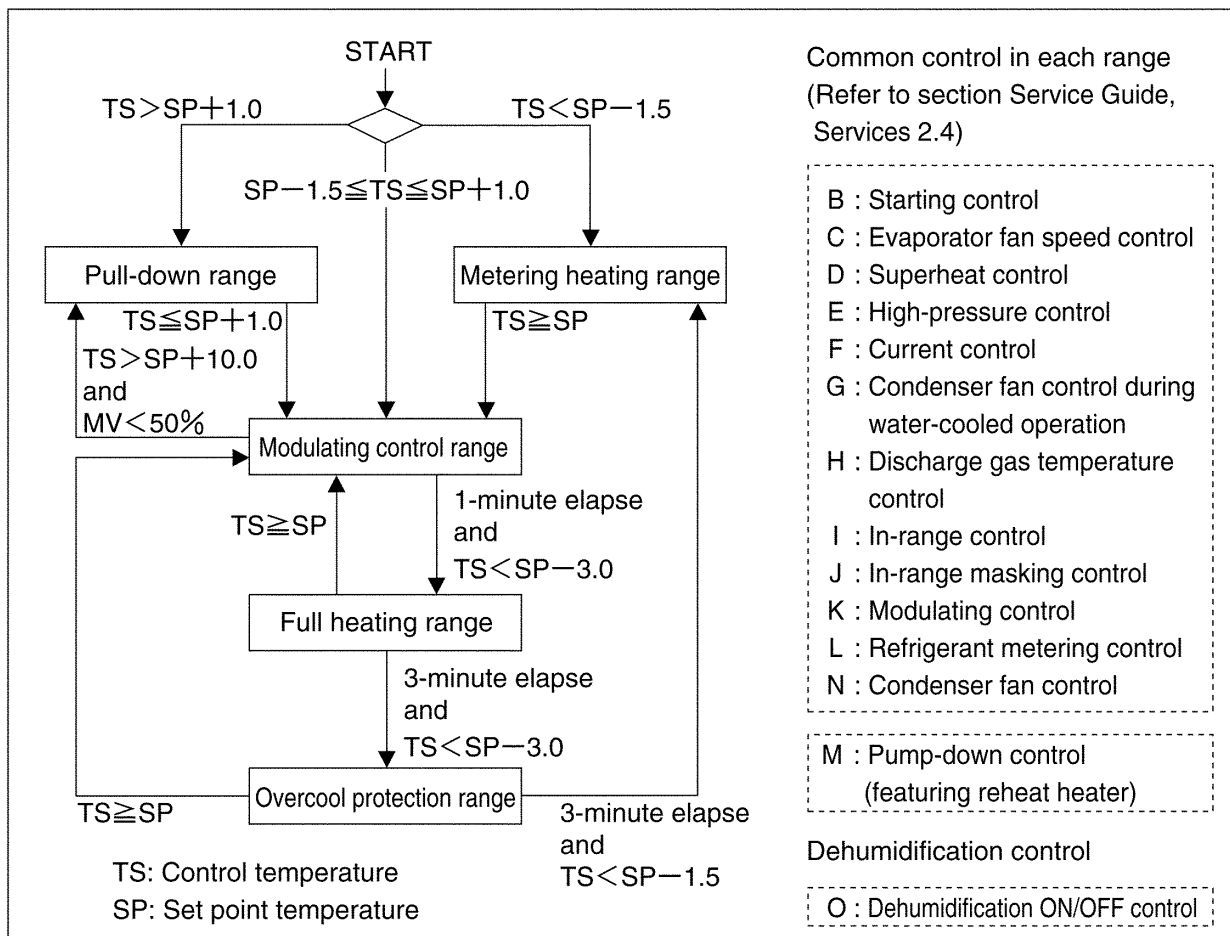
For the other humidity control, refer to the Service Guide, Services.

LXE10D-A8 features the dehumidification function. The display panel on the controller allows switch over of dehumidification control setting.

Dehumidification control setting	Dehumidification control
OFF	Not executed
ON	<ul style="list-style-type: none"> The opening degree of expansion valve is controlled so that the power consumption becomes 13.5 kW when the hot-gas 3-way solenoid valve is turned on under the "chilled" operation mode. The dehumidification control is turned on and off by turning on and off the hot-gas 3-way solenoid valve.



● Control state transition and common control



● Operation of magnetic contactor and electronic solenoid valve

Component name			Pull-down	Modulating control	Full heating	Overcool protection	Metering heating	
Magnetic contactor	Compressor	CC	○	○	○	×	○	
	Evaporator fan High speed	EFH	○	○	○	○	○	
	Evaporator fan Low speed	EFL	×	×	×	×	×	
	Condenser fan	CF	△	△	△	×	△	
Solenoid valve	Liquid solenoid valve	LSV	○	○	○	×	×	
	Injection solenoid valve	ISV	△	△	×	×	△	
	Hot-gas 3-way solenoid valve	HSV	×	△	×	×	○	
Opening, modulating valve			MV	0%	0.1~99.9%	100%	0%	100%
Electronic expansion valve			EV	400~2000 pulse	350~2000 pulse	500 pulse	500 pulse	500 pulse

Note) ○ : Energized × : Deenergized △ : Depending on the control conditions

Dehumidification control

	Name of control	Description of control	Operation modes			
			Frozen	Chilled	Partially frozen	Defrost
O	Dehumidification ON/OFF control	The humidity in the refrigeration unit is controlled by turning on and off the hot-gas 3-way solenoid valve.		○*		

※ Only under the proportional control

O: Dehumidification ON/OFF control

- The dehumidification turning ON/OFF operation is controlled by turning on and off the hot-gas 3-way solenoid valve only under the proportional control of "chilled" operation mode.
- When the 3-way solenoid valve is turned on, hot gas flows in the reheat coil (reheat heater) and drain pan heater.

Then, when discharged air passing through the evaporator is fed through the reheat coil (reheat heater), the discharged air will be reheated, resulting in drop of its relative humidity and dehumidification of the refrigeration unit.

Conditions under which the hot-gas 3-way solenoid valve is turned on

- Humidity in the refrigeration unit > 75%RH and within the proportional control range

Conditions under which the hot-gas 3-way solenoid valve is turned on and then turned off

- Humidity in the refrigeration unit ≤ 60%RH
- Outside the proportional control range

Notes:

- If the relative humidity in the refrigeration unit is between 60% RH and 75% RH within the proportional control range, the hot-gas 3-way solenoid valve is turned on.
- Although the conditions under which the hot-gas 3-way solenoid valve is turned on are satisfied, the hot-gas 3-way solenoid valve is forcedly kept turned off for 3 minutes after the start-up of the unit, termination of defrosting, and measurement heating. Then, after 3 minutes has passed and the opening degree of proportional control valve (MV) has decreased to 75% or lower, the solenoid valve will be turned on.
- The opening degree of hot-gas 3-way solenoid valve (refrigerant circulation rate) is controlled so that the power consumption becomes 13.5 kW, resulting in the maximum dehumidification performances.

M: Pump down control

Before metering heating or defrost mode, the refrigerant in the refrigeration circuit is liquidized and pumped down in the water-cooled condenser (or receiver) by closing the liquid solenoid valve (LSV) and the modulating valve (MV). When the low pressure reaches -55kPa or lower, the pump down is terminated and it turns to the metering heating or defrost mode.

When the reheat heater is provided

The special pump-down control is executed so that the refrigerant stagnant in the reheat heater can be securely recovered into the refrigerant reservoir.

When the pump-down control is executed, the opening degree of proportional control valve is changed to 80%, 60%, 40%, 20%, 0%, then again 80% circularly. Under this control, the opening degree is kept at each level for 12 seconds. Then, when the low pressure has dropped below 55 kPa, the refrigerant recovery operation will be terminated.

3. DEFROSTING INTERVAL

Unlike the standard machine, LXE10D-A8/A9/A11 control the switch over of long timer and short timer so that they can be switched over according to the time elapsed from the start-up of the unit.

1) Starting of defrosting

	Within 72 hours from start-up of the unit	After 72 hours from start-up of the unit
Starting of defrosting	Defrosting is started by the signal from the timer set to a shorter time between the long timer (4 hours) and short timer.	Defrosting is started by the signal from the long timer.

2) Setting of defrosting interval (long timer)

Name of models	Dehumidification control Note: "dHu" setting	Setting of defrosting interval	Defrosting interval setting screen
LXE10D-A8	ON	Fixed When SP 5.6°C: 6 hours SP < 5.6°C: 3.5 hours	Not displayed
	OFF	Variable Can be selected from 3, 6, 9, 12, and 24 hours.	Displayed
LXE10D-A9 LXE10D-A11		Variable Can be selected from 3, 6, 9, 12, and 24 hours.	Displayed

Note: Refer to the "4.2 Dehumidification control setting."

3) Short timer when the set time is under -20°C

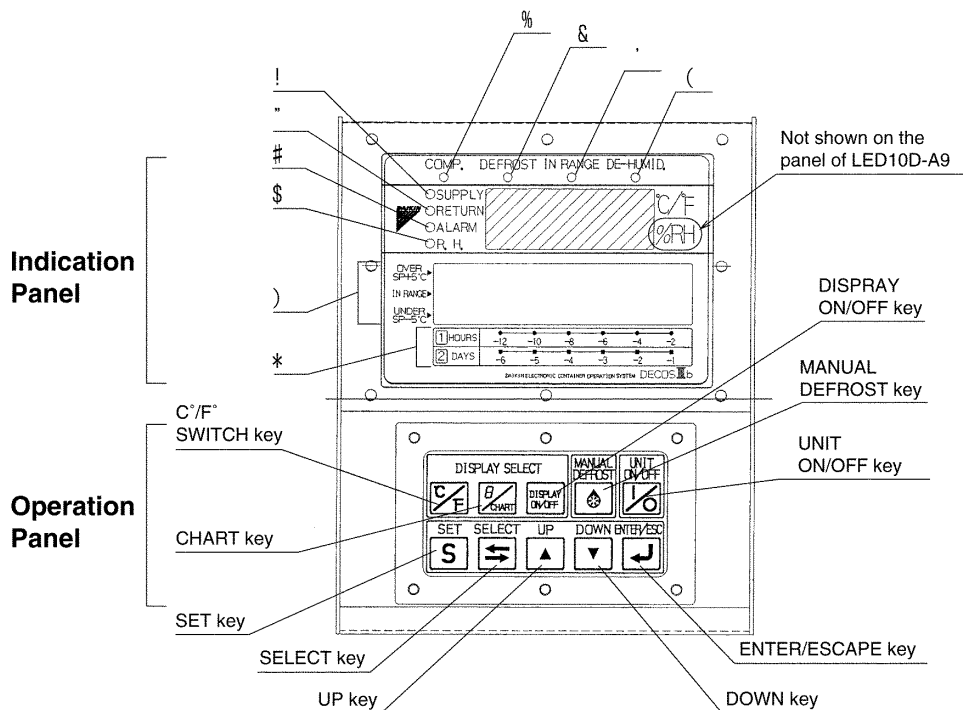
Name of models	Short timer
LXE10D-A8	6 hr
LXE10D-A9	
LXE10D-A11	12hr

Note, however, that the long timer set value should have priority when the long timer is set to a shorter level than the specified above.

4. ELECTRONIC CONTROLLER

4.1 Control panel

Name and function of each component



- ① SUPPLY LED (This is lit on while the LED display indicates "supply air temperature".)
 - ② RETURN LED (This is lit on while the LED display indicates "return air temperature".)
 - ③ ALARM LED (This is lit on and off when alarms happen.)
 - ※ ④ R.H. LED (This is lit on while the LED display indicates current "relative humidity".)
 - ⑤ COMP. LED (This is lit on while the compressor is running.)
 - ⑥ DEFROST LED (This is lit on while the unit is under the defrosting operation.)
 - ⑦ IN RANGE LED (This is lit on while the control temperature is in range.)
 - ※ ⑧ DE-HUMID. LED (This is lit on while the controller is under the dehumidification control operation.)
 - ⑨ Temperature base (This is used for the graphic chart indicated on the LCD display.)
 - ⑩ Time base (This is used for the graphic chart indicated on the LCD display.)
- ※ Not provided in LXE10D-A9/A11.

Function of operation key



● Display ON/OFF key

Pressing this key alternately turns on and off the LED of controller.

The indication "dISPoFF" appears on the LCD while the LED is turned off.

If you set the unit ON/OFF key to the OFF position while the LED is turned on, the LED turning-off function will be reset.

Note: Under the chart display mode and scroll display mode, the display ON/OFF key is disabled.

4.2 Dehumidification control setting (Only LXE10D-A8)

CAUTION

When using LXE10D-A9/A11, be sure to set the dehumidification control parameter "dHu" to "off." Otherwise, the error code "E431" will appear.

LXE10D-A8 features the dehumidification function. Therefore, it is necessary to set whether the dehumidification control is to be executed or not according to the cargo to be transferred. You can set whether the dehumidification control is to be executed or not by operating the display panel of controller (DECOSIIIb).

1) Description of setting

Whether the dehumidification control is to be executed or not is switched over according to the setting of dehumidification control parameter "dHu" under the optional function setting mode.

Dehumidification control	Setting of dehumidification control "dHu"	DE-HUMID LED	7-segment LCD
To execute	on	Lighted	"A" is displayed.
Not to execute	off	Extinguished	"A" is not displayed.

CAUTION

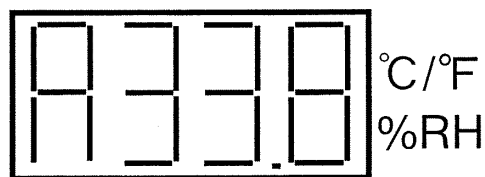
When the cargo does not need dehumidification control, be sure to set the dehumidification control parameter "dHu" to "off."

CAUTION

The reheat heater operation is not interlocked with the status of DE-HUMID LED.

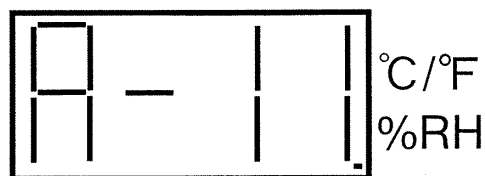
(Example of LED indication under dehumidification control)

Example: Sensor temperature: 33.8°C









However, when the sensor temperature is -10°C or lower or exceeds 100.0°C and its indication needs four digit places, the place of decimal point will be moved by one digit so that the temperature can be displayed. The fractions below the decimal point is rounded off in the indication.

Example: Sensor temperature: -11.1°C

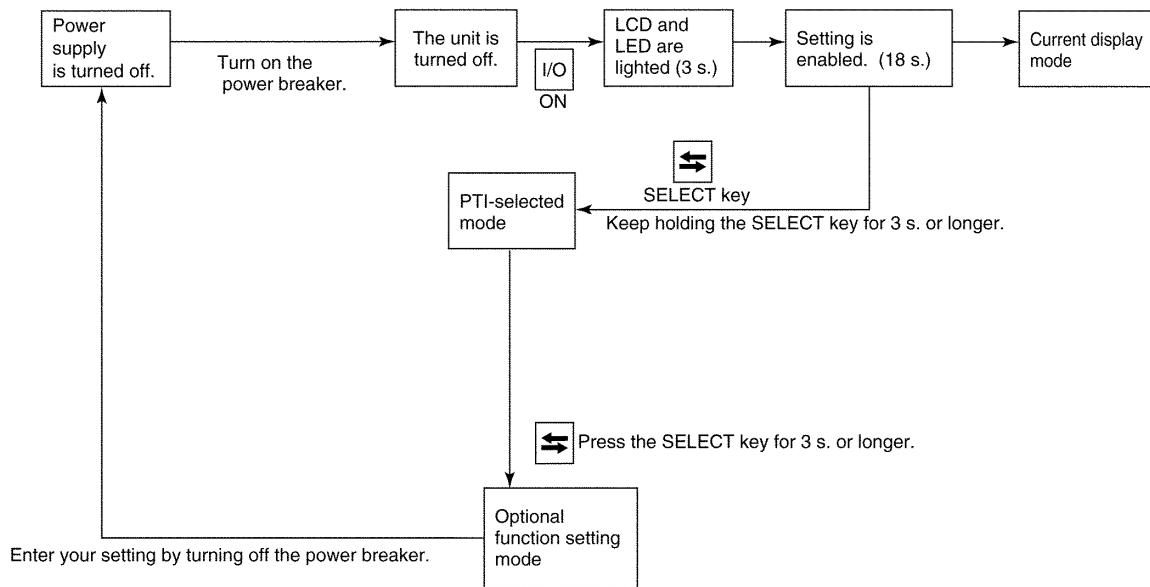


2) Panel operation

- ① If the power supply is turned on, turn off the unit switch.
- ② Turn on the power supply of the unit. In 3 seconds, the LCD and LED will light. Then, within 18 seconds, keep holding the  key for 3 seconds to select the optional function setting mode.
- ③ Then, the PTI-selected mode will be displayed on the LCD. If you keep holding the  key for further 3 seconds or longer, the optional function setting mode will be selected.
- ④ Press the  key once to display the indication "dHu" on the LCD. (For details, refer to the flow of change of optional function setting mode on the back side.)
- ⑤ Press the  or  key to select "on (executing control)" or "off (not executing control)".
- ⑥ Press the  key to enter your selection.
- ⑦ Turn off the power breaker. (Be sure to turn it off after changing setting of a parameter.)

- When you operate the unit under the "frozen" mode by mistake while the parameter for dehumidification control is set to "on":

Operation modes	DE-HUMID LED	7-segment LCD	Dehumidification control	Long timer
Partial frozen	Lighted	"A" is displayed.	Not to execute	<ul style="list-style-type: none"> • The setting screen of long timer is not displayed. • After the setting of parameter "dHu" is switched over from off to on, the timer (set to one of 3, 6, 9, 12, and 24 hours) starts and signals the unit to start defrosting after the set time passed.
Frozen	Lighted	"A" is displayed.	Not to execute	



CAUTION

If you turn off only the unit switch after changing setting of a parameter without turning off the power breaker:

- **The controller cannot recognize the setting parameter change. Therefore, when you turn on the unit switch next, the previous setting will be automatically restored after the LCD and LED has lighted.**
- **After changing setting of a parameter, be sure to turn off the power breaker.**

3) Optional function setting mode

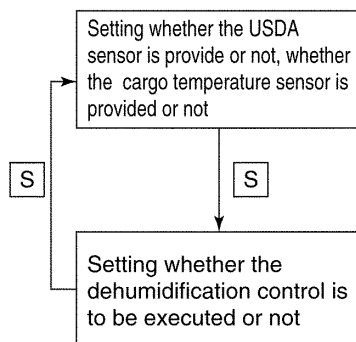
You can confirm the following basic information.

Setting on whether the USDA sensor is provided or not, whether the cargo temperature sensor is provided or not, dehumidification control is to be executed or not




Before starting operation, set whether the dehumidification control is to be executed or not.

Each time you press the **S** key, the setting will be switched over.

To enter your selection, turn off the power breaker once.

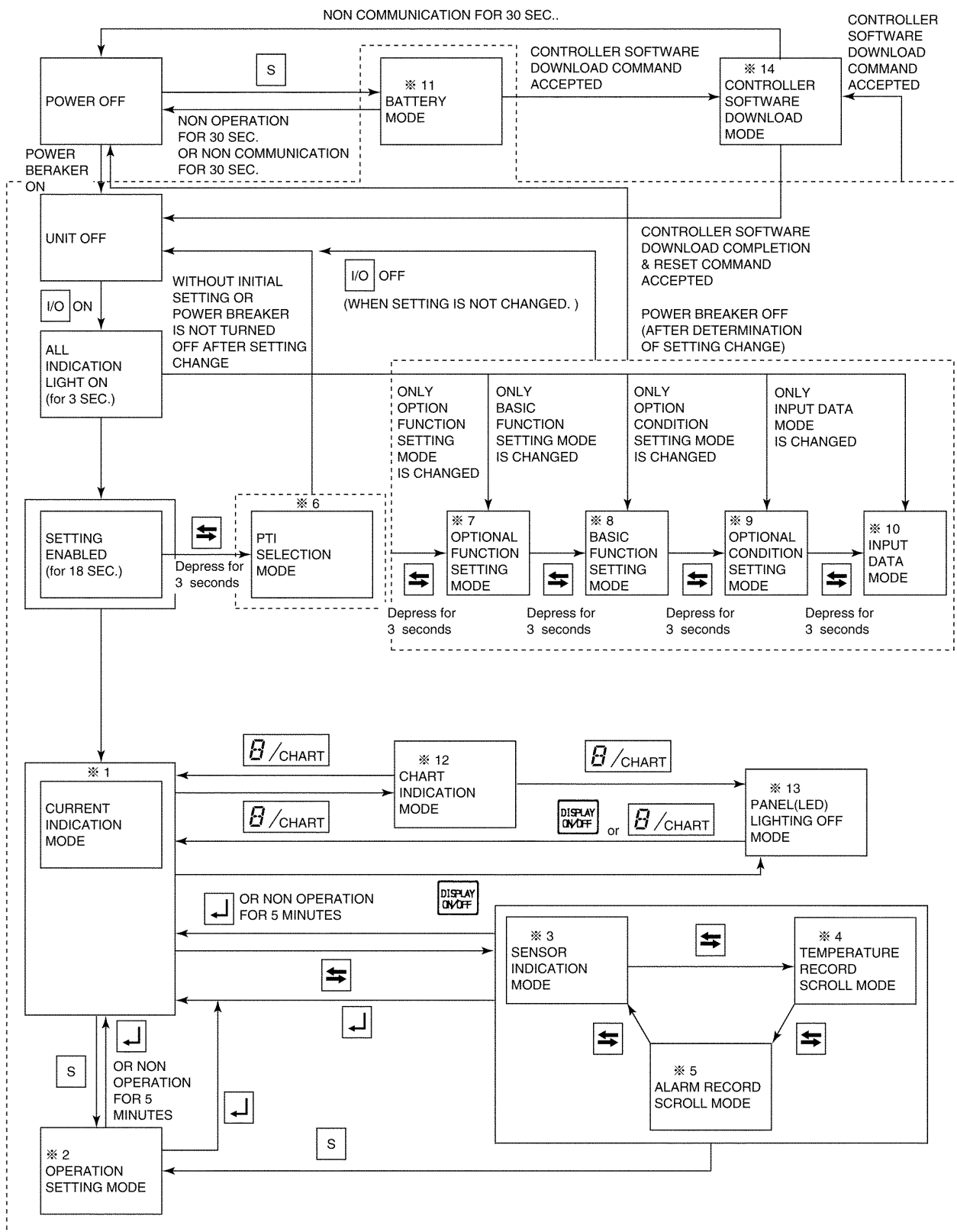


When the LCD screen shows "USdA", the LED screen shows "OFF."

To select whether the dehumidification control is to be executed or not, select "on (executing)" or "off (not executing)" on the LED screen while the LCD screen shows "dHu". Each time you press the  or  switch, the indications "on (executing)" and "OFF (not executing)" can be alternately switched over. To enter your selection, press the  key.

4.3 Indication mode flow chart

[INDICATION FLOW CHART]



- ※1 **CURRENT INDICATION MODE**.....Supply air temp. (SS), return air temp. (RS), defrosting interval, currently existing alarms, and set point temperature/humidity are indicated.
- ※2 **OPERATION SETTING MODE**.....Control temperature, defrosting interval, and control humidity (optional) can be set.
- ※3 **SENSOR INDICATION MODE**.....The following sensor values are 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, electronic expansion valve opening, supply air temperature (SS) (during PTI only), return air temperature (RS) (During PTI only), pulp temperature (USDA#1, USDA#2, USDA#3) (optional), cargo temperature (CTS) (optional), Data recorder supply sensor (DSS) (optional) and data recorder return sensor (DRS) (optional).
- ※4 **TEMPERATURE RECORD SCROLL MODE**.....Control sensor records are indicated successively (scrolled), beginning with the latest one.
- ※5 **ALARM RECORD SCROLL MODE**.....Alarm records are indicated successively (scrolled), beginning with the latest one.
- ※6 **PTI SELECTION MODE**.....Full PTI (F.PTI), Short PTI (S.PTI), manual check (M.CHECK) test modes can be selected.
- ※7 **OPTIONAL FUNCTION SETTING MODE**.....USDA sensor ON/OFF, dehumidification control ON/OFF, and cargo temperature sensor ON/OFF can be set.
- ※8 **BASIC FUNCTION SETTING MODE**.....Controller, logging interval, data recorder sensor ON/OFF, power input, horse power, panel (LED) lighting off function ON/OFF can be set.
- ※9 **OPTIONAL CONDITION SETTING MODE**.....D code, H code alarm indication, USDA sensor and conditions of alarms (H001, H002, H003, H004, H005, H006, d1--, d2--, d3--, d-1- and d-2-) can be set.
- ※10 **INPUT DATA MODE**.....Container I.D. (No.), and controller time can be input.
- ※11 **BATTERY MODE**.....This mode enables operation when power is not available.
- ※12 **CHART INDICATION MODE**.....Temperature record data can be indicated in graph on the LCD.
- ※13 **PANEL (LED) LIGHTING OFF MODE**.....Controller LED display panel can be turned the light off.
- ※14 **CONTROLLER SOFTWARE DOWNLOAD MODE**.....Data logged in a personal computer and a controller is exchangeable.

(NOTE) After setting was changed on ※7, ※8, ※9, and ※10 modes, be sure to turn OFF the power breaker for confirmation of the setting.

●For the operation procedures under each display mode, refer to the Service Guide, Services.





CAUTION



Since the humidity setting is fixed to 70%RH, the setting is not displayed under the operation setting mode and battery mode. Only the humidity in the refrigeration unit is displayed by the LED. (In case of LXE10D-A8)

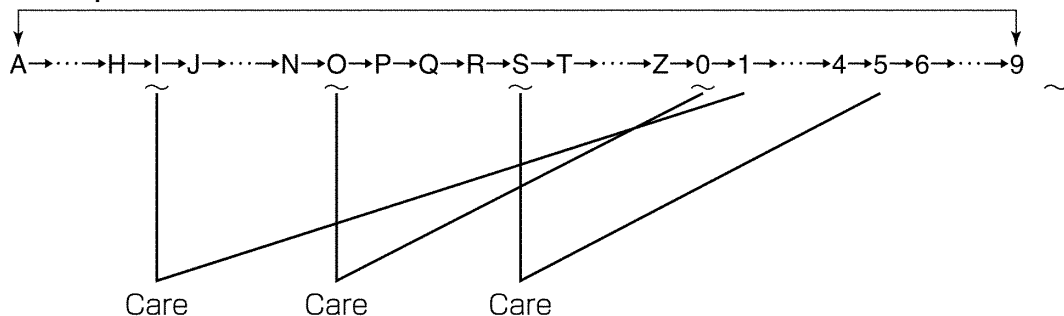
⚠ CAUTION

When inputting the container I.D. (No.) under the input data mode, take care not to enter any of the following pairs of an alphabet and a numeral.

- The alphabet "O" and numeral "0" are displayed in the same manner on the LCD screen. Do not input them inversely. → 
- The alphabet "S" and numeral "5" are displayed in the same manner on the LCD screen. Do not input them inversely. → 
- The alphabet "I" and numeral "1" are displayed in a similar manner on the LCD screen. Do not input them inversely.



To change the alphabet or numeral currently displayed, press the  or  key. The displayed character is changed in the following sequence.



4.4 Backup against humidity sensor errors

When the dehumidification parameter "dHu" is set to "off", the normal control is executed. Therefore, the unit continues ordinary operation regardless whether any of the following equipment is normal or not.

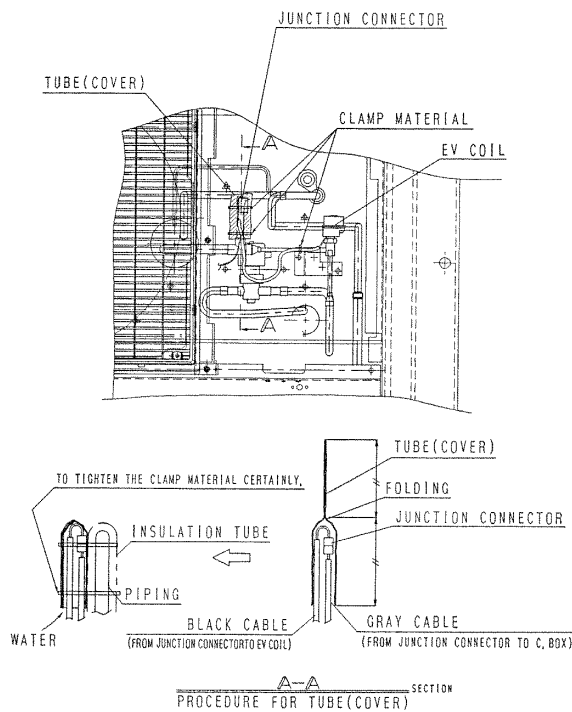
Error sensors	Modes	Description of backup			
		altems	Description of control		
Humidity sensor	HuS	C	Reheat heater (reheat coil)	ON	Within the proportional control range, the hot-gas 3-way solenoid valve is forcedly turned on.
				OFF	Outside the proportional control range, the hot-gas 3-way solenoid valve is forcedly turned off.
	PF,F, DF	Ordinary operation. However, the pump-down control is executed in the standard manner.			
Overheat preventing thermocouple	EHT	All modes	Operation continues.		

C : Chilled, PE : Partially frozen, F : Frozen, DF : Defrost

5. MAIN EQUIPMENT AND ITS MAINTENANCE

5.1 Electronic expansion valve

This unit has employed a relay connector for the lead wire of expansion valve coil. Removing the relay connector facilitates replacement of the coil. Since the relay connector is not of the moistureproof specifications, treat the relay connector to make it moistureproof by the following procedures.



CAUTION

After replacing the coil, seal the lock nut that fastens the main unit and coil using the proper sealant.

5.2 Humidity sensor

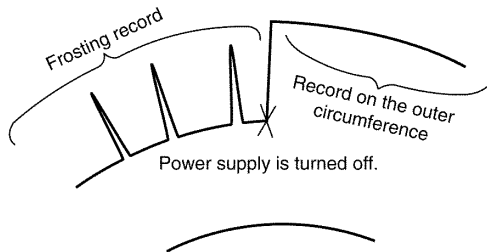
CAUTION

We recommend you to replace the humidity sensor every about three years.

6. ELECTRONIC TEMPERATURE RECORDER

- Temperature record with power supply turned off

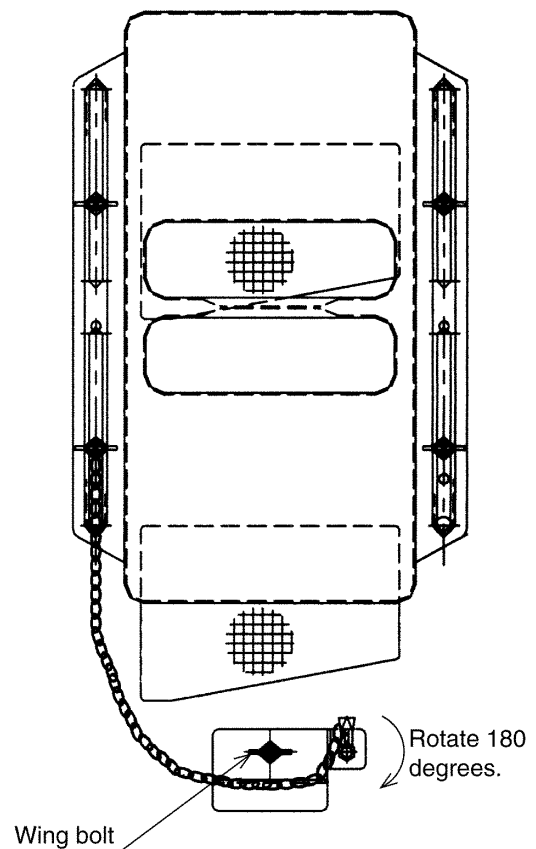
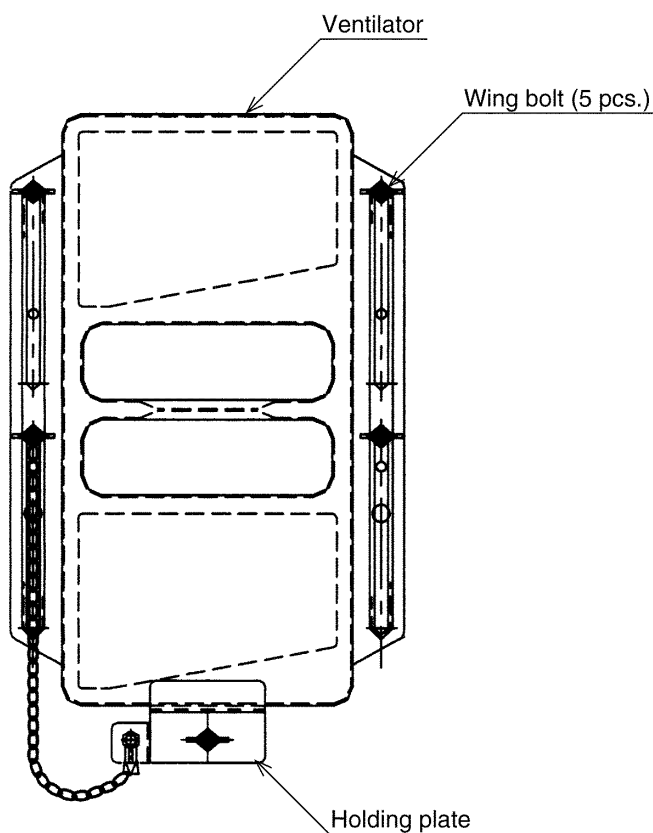
When the power supply is turned off, the pen will move to the outer circumference of recording sheet simultaneously.



7. VENTILATOR (LXE10D-A11 ONLY)

When opening/closing the ventilator, be careful of the following notes

- When fully closing the ventilator
 - ① Be sure to fix the bottom of the ventilator with the holding plate as shown in the figure below.
 - ② Securely tighten the wing bolts (5 pcs.).



When fully closing

- When opening the ventilator
 - ① Rotate the holding plate 180 degrees as shown in the figure above.

If the ventilator is opened without rotating the holding plate, the holding plate is cooled by cold air to form dewdrops.
 - ② Even when the holding plate is not used, be sure to fix the holding plate with a wing bolt.

When fully opening

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