HITACHI

YUTAMPO SERIES

Service Manual

Indoor unit

YUTAMPO

TAW-(190/270)RHC

Outdoor unit

RAW-35RHC



HITACHI

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1.1 General information

1.1.1 General notes

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As a result, some of the images or data used to illustrate this document may not refer to specific models. No claims will be accepted based on the data, illustrations and descriptions included in this manual.

No type of modification must be made to the equipment without prior, written authorization from the manufacturer.

NOTE

This air to water heat pump has been designed for standard water heating for human beings. For use in other applications, please contact your Hitachi dealer or service contractor.

1.1.2 Introduction

Hitachi proudly announces the newest R32 complete range of Heat Pump Water Heater in its award-winning YUTAMPO range.

The YUTAMPO units produce domestic hot water like any electrical heater, oil or gas boiler, but they do so by transforming renewable energy from the outside air and storing it into a heat energy tank. Heat pump water heaters extract the free energy present in the air, which is enough to heat a water tank up to a comfortable temperature, even on the coldest winter day. Every kW of electricity used to power the heat pump can yield up to more than 5 kW of energy for heating; this provides savings of up to 80% on heating expenses compared to a traditional fossil fuel boiler.

The system is simple to control; its new user controller (PC-ARFTE) improves the acclaimed and successful design used with the existing LCD controller, and provides a great deal of new functions.

1.2 Applied symbols

During normal air conditioning system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid damage to the unit, the installation or the building or property.

Situations that pose a risk to the safety of those in the surrounding area or to the unit itself are clearly indicated in this manual.

A series of special symbols are used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

DANGER

- ***The text following this symbol contains information and instructions relating directly to your safety.***
- ***Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others.***

In the texts following the danger symbol you can also find information on safety procedures during unit installation.

CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety.*
- *Not taking these instructions into account could lead to minor injuries to you and others.*
- *Not taking these instructions into account could lead to unit damage.*

In the texts following the caution symbol you can also find information on safety procedures during unit installation.

NOTE

- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

1.3 Norms and Regulations

Following Regulation EU No. 517/2014 on Certain Fluorinated Greenhouse gases, it is mandatory to fill in the label attached to the unit with the total amount of refrigerant charged on the installation.

Do not vent R32 into the atmosphere: R32 is fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP) R32 = 675.

Tn of CO2 equivalent of fluorinated greenhouse gases contained is calculated by indicated GWP * Total Charge (in kg indicated in the product label and divided by 1000.

Appropriate refrigerant

The refrigerant used in each unit is identified on the specification label and manuals of the unit. Hitachi shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.

Consequences of charging non-specified refrigerant

It may cause mechanical failure, malfunction and other accidents. It may cause operational failure of protection and safety devices of air conditioners. It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.

In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.

Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.

End clients and costumers shall be informed that servicing is not approved, and the installer who charged the nonspecified refrigerant shall be asked to fix the unit.

Hitachi will accept no responsibility for units that have been charged with non-specified refrigerant once.

1.4 Product guide

1.4.1 Classification of the units

1.4.1.1 Outdoor unit

Unit type: Outdoor unit (Split air system)					
	Position-separating hyphen (fixed)				
		Compressor power			
			R32 refrigerant		
				Heat pump	
					Series
RAW	-	35	R	H	C

1.4.1.2 Indoor unit

Unit type: YUTAMPO					
	Position-separating hyphen (fixed)				
		Tank capacity: 190 / 270			
			R32 refrigerant		
				Heat pump	
					Series
TAW	-	(x)	R	H	C

1.4.2 Product guide

1.4.2.1 Outdoor unit

1~ 230V 50Hz	
Unit	Code
RAW-35RHC	60374825



1.4.2.2 Indoor unit

1~ 230V 50Hz	
Unit	Code
TAW-190RHC	70491001
TAW-270RHC	70491014



1.4.3 Accessory code list

◆ Control accessories

Accessory	Name	Code	Figure
ATW-HCD-01	H-LINK Adapter for Central Devices application (to work with ATW-(MBS/KNX/TAG)-02)	7E549943	
ATW-MBS-02	MODBUS gateway for YUTAKI / YUTAMPO units	7E549924	
ATW-KNX-02	KNX interface for YUTAKI / YUTAMPO units	7E549925	
ATW-TAG-02	Home automation gateway	70549926	
AHP-SMB-01	SmartBox (Hi-Box)	70549919	
NEW ATW-OFC-02	Optional Function Connector (Inputs and Outputs optional signals)	7E549956	
NEW ATW-CP-05	Active Anode (Cathodic Protection)	7E549954	

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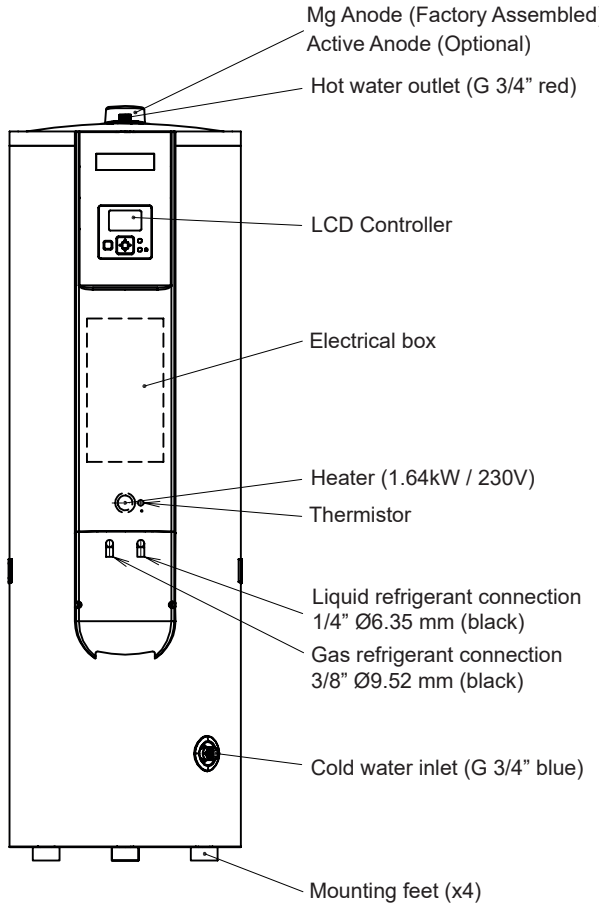
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2.1 Name of each part

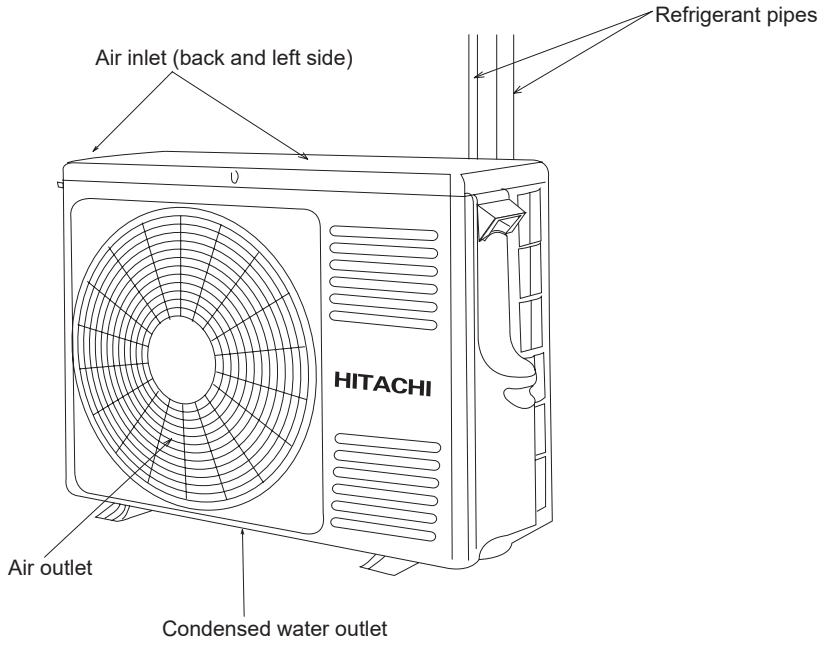
2.1.1 Tank unit TAW-(190-270)RHC



NOTE

- *• Mg-Anode should be changed yearly, it may loose its function for corrosive protection if exceeds the time frame.*
- *• It is recommended to replace the Mg-Anode every 1 year depending on water's quality.*
- *• Type number for Mg-Anode is E05269. Use this spare part reference to order it when replacement is needed.*

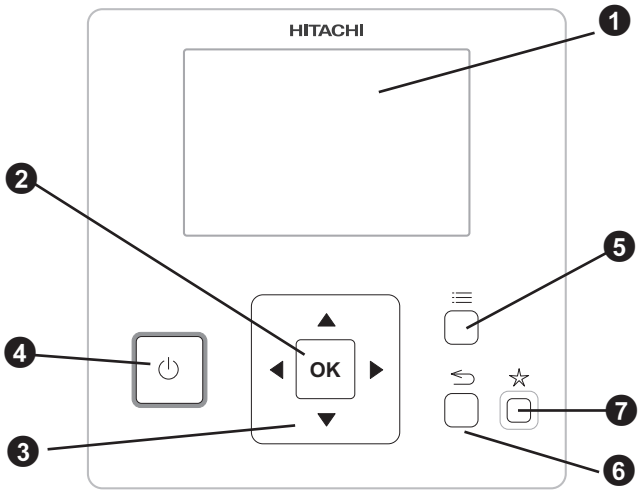
2.1.2 Outdoor unit RAW-35RHC



CAUTION

When heating operation, drain or defrosted water flows out from outdoor unit. Don't close drain outlet portion in chilly area so as not to freeze these.

2.2 Name and function of control panel



❶ LCD screen

❷ OK button

It is used to select the parameters to adjust and to confirm the selected values.

❸ Arrow key

It is used to navigate through the menus and screens.

❹ Run/Stop button

A new yellow light indication has been created on the Run/Stop button in case the YUTAMPO is in OFF state due to the timer. That helps to differenciate if the YUTAMPO is in OFF state due to the timer or manual stop (due to the Run/Stop button) avoiding any confusion about the reason for the stop.

- NO LIGHT: Manual OFF state
- RED: OFF state due to an alarm
- GREEN: ON state
- YELLOW: OFF state due to the timer

❺ Menu button

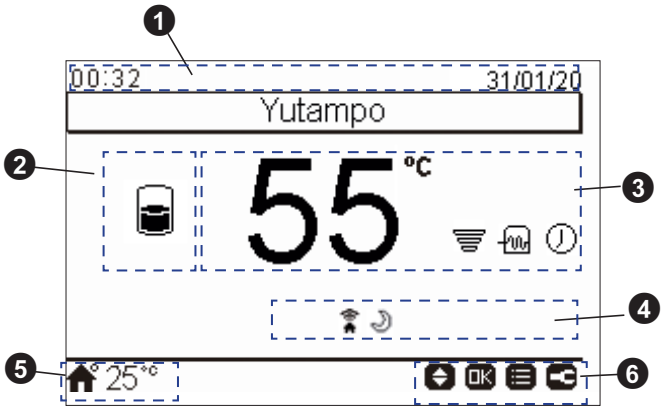
It is used to display the different configuration options of the controller.

❻ Return button

It is used to return to the previous screen.

❼ Favourite button

It is used as a shortcut to execute the preset favourite action (Timer, Night shift or DHW Boost) directly.



1 Time and date

2 State of DHW heating operation (OFF, Thermo ON/OFF)

3 DHW control

This part of the screen is used for the indication of the setting temperature for DHW and a throughput icon indicating the progress of DHW heating operation. It can also show icons indicating the operation of the auxiliary DHW electrical heater, the activation of timer programs and the operation of DHW boost, in case that these options are enabled.

The setting temperature can be modified using the arrow key when in this view.

The following quick actions are shown when pressing the OK button:

- Timer: Menu for the selection and configuration of simple timer and schedule timer
- Status: Display of information related to current operation conditions
- DHW Boost: Activation of the auxiliary DHW heater and Heat Pump (if operation is possible, to speed up DHW heating operation

4 Unit status icons

This part of the screen is used for the display of notification icons related to general status and operation conditions of the unit, including icons such as Central operation, Night shift or Compressor.

5 Outdoor temperature / Alarm indication

In normal operation, the outdoor air temperature is displayed next to the home-shaped icon.

In abnormal operation, the alarm icon is indicated together with the corresponding alarm code.

The outdoor air temperature displayed is blinking if the outdoor ambient temperature is out of its operating range (between -15°C and 37°C) and it required compressor to start. The YUTAMPO unit will force OFF state as a protective measure for the system.

6 Available buttons / Installer mode

This part of the screen is used to indicate the buttons of the unit controller which can be used at the moment.

When the Installer mode is enabled, its icon appears at the right end of this bar.

2.3 Preparing for operation

2.3.1 Filling up the tank

Follow the steps below when starting up the unit for the first time or when it has not been used for an extended period of time

1 Open the outlet water taps of the DHW, to expel all the air from inside the tank.
2 Turn on all the connected mixer taps (hot water side).
3 Open the inlet valve of the DHW tank in order to fill the tank. If there is a shut-down valve installed in the DHW tank outlet, open it to allow circulation through the DHW installation.
4 When water begins to flow from the outlet water taps of the DHW installation, close all these taps.
5 Turn off all the connected mixer taps.
6 Inspection
   - After filling the tank, check all pipe, heater and the tank for leakage.
   - Check operation of the pressure relief valve.
   - After heating water for the first time, check water leakage from the pipe, heater and the tank once more.

⚠ CAUTION

- *Fill up the tank completely before turning the power on. Turning the power when the tank is empty will overheat it and damage the unit.*
- *Check carefully for leaks in the water circuit, connections and circuit elements.*
- *Check that the water pressure in the circuit is lower than 7 bars.*
- *Fill the circuit with tap water. Water that conforms to the drinking water regulation in each country must be used. Do not use water from sources not subject to sanitary control like wells, rivers or lakes, since it may have a high content of impurities, salinity, lime, etc.*
- *To avoid deposits of scale on the heat exchangers surface it is mandatory to ensure a high water quality with low levels of CaCO3.*
- *The recommended standard water quality for the DHW circuit is shown in the table below.*

Item	DHW space	Tendency (1)	
	Water supply (2)	Corrosion	Deposit of scales
Electrical conductivity (mS/m) (25 °C)	100~2000	●	●
Chlorine Ion (mg Cl^-/l)	max 250	●	
Sulphate (mg/l)	max 250	●	
Combination of chloride and sulphate (mg/l)	max 300	●	●
Total Hardness (mg $CaCO_3$ /l)	60~150		●

NOTE

- *(1): The "●" mark in the table indicates that the concerned item is a factor increasing the tendency of each of the phenomena.*
- *(2): Water quality must comply with EU directive 98/83 EC.*

2.3.2 Turning on the power

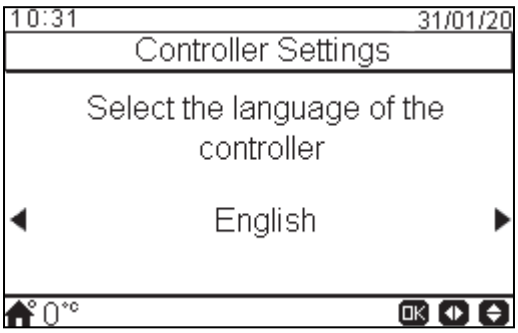
Turn on circuit breaker.

When the circuit breakers have been turned on, LCD panel of the tank unit will start to work.

2.4 Setting the language

After turning on the power, the LCD panel will show the controller settings screen.

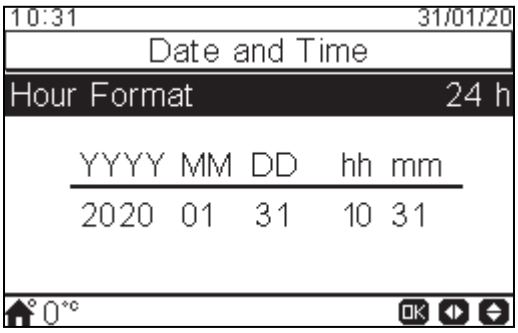
The YUTAMPO controller has 13 available languages.



Available languages
English
Español
Français
Italiano
Deutsch
Slovensko
Português
Dansk
Nederlands
Swedish
Suomi
Ελληνικά
Hrvatski

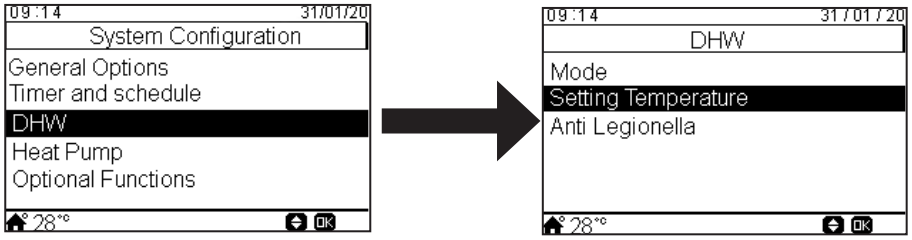
2.5 Setting the current time

After setting the language the LCD panel will show the date and time screen.



In this screen the date and time can be set in one of the available hour formats (12h (AM/PM) or 24h).

2.6 Setting hot water temperature



Hot water temperature can be set between 30 to 55°C (75 ºC when electric heater is enabled). Set the temperature depending on hot water volume that you require. The recommended temperature range is 45 to 55°C. (The factory default setting is 45ºC)
The operation mode will automatically change depending on the hot water setting temperature.

Hot water temperature	~ 55°C	55 ~ 75°C
Heat pump operation	ON (1) (3)	OFF
Electric heater operation	OFF/ON (2)	ON

- *(1): Heat pump may not operate depending on the condition of outdoor temperature and tank water temperature. Air temperature is below -15°C or above 37°C, the heat pump does not operate for the compressor protection.*
- *(2): Electric heater will operate in case that heating capacity of heat pump operation is not enough to heat up the water to setting temperature.*
- *(3): Air temperature is above 25°C, the heat pump start operate when tank temperature is below 42°C*

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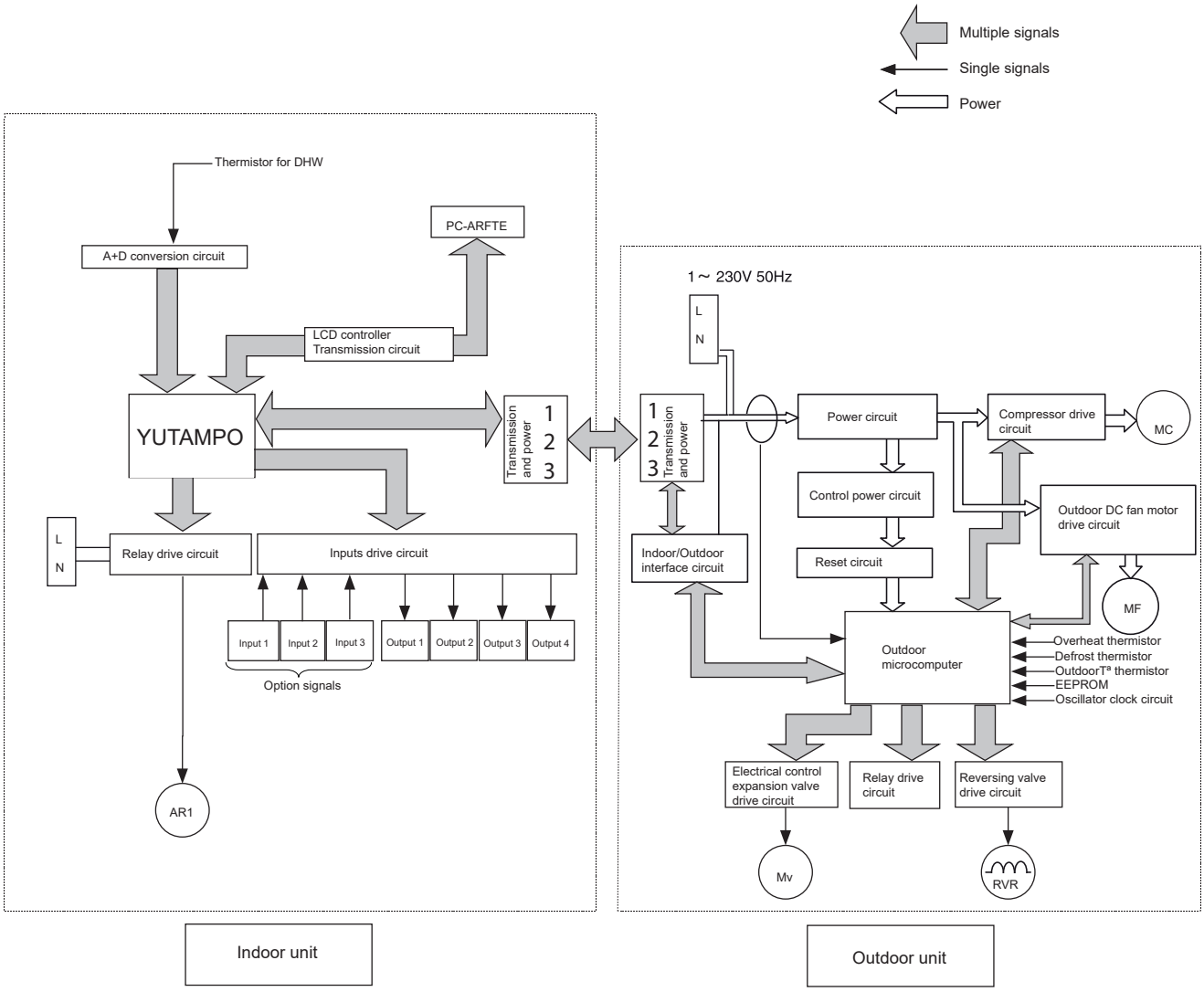
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3.1 System diagram



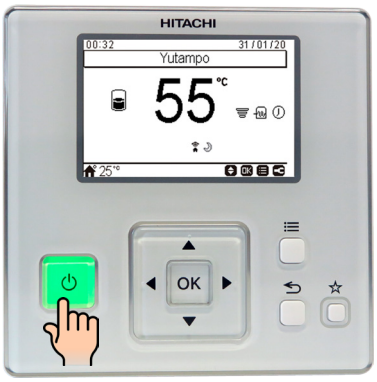
Symbol	Name
AR1	Electrical heater Domestic Hot Water tank output
Input 1~3	Optional inputs
Output 1~4	Optional outputs
RVR	4-way valve
Mv	Electric expansion valve
MC	Compressor motor
MF	Outdoor fan motor

3.2 Basic operation

The time required to reach the set water temperature depends on factors such as the temperature of water supply, the temperature inside the tank or the outdoor air temperature.

If the electric heater is enabled, it is automatically set to auxiliary operation in case that heating up the water would take more than eight hours due to low water and outdoor air temperatures.

Press the ⏻ button. The indicator will light (green) and operation starts.



3.2.1 Operating procedures

Heating operation starts when water temperature is lower than the values set for the beginning of operation of the heat pump, the electrical heater, or both, as shown in the following sections.

The icon will appear during heating operation (Thermo-ON).

NOTE

- *The defrost icon appears during defrosting.*
- *Defrosting will be performed about once an hour when frost forms on the heat exchanger of the outdoor unit, for 3-7 minutes each time.*

The heating operation stops when the water temperature reaches the hot water temperature setting.

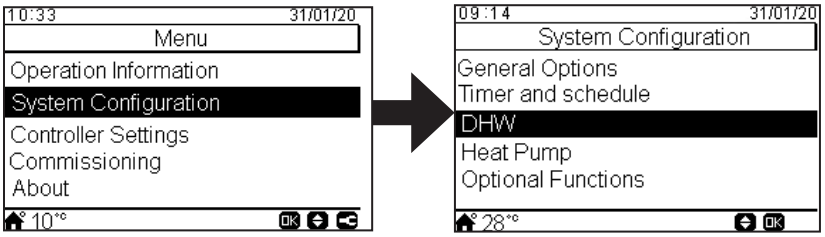
The icon will appear when DHW is ready (Thermo-OFF).

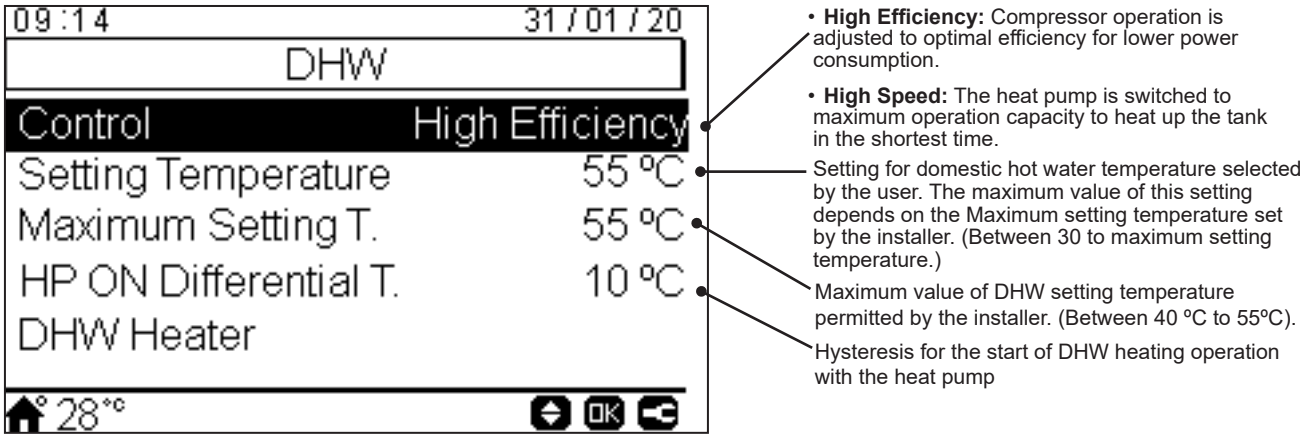
3.2.2 Stopping

Press the ⏻ button to stop heating operation and the indicator goes off.

3.3 Standard Operation without Electrical Heater

DHW heating operation starts when the temperature of the water in the tank is low enough to start up the heat pump. DHW is always heated up with the heat pump.



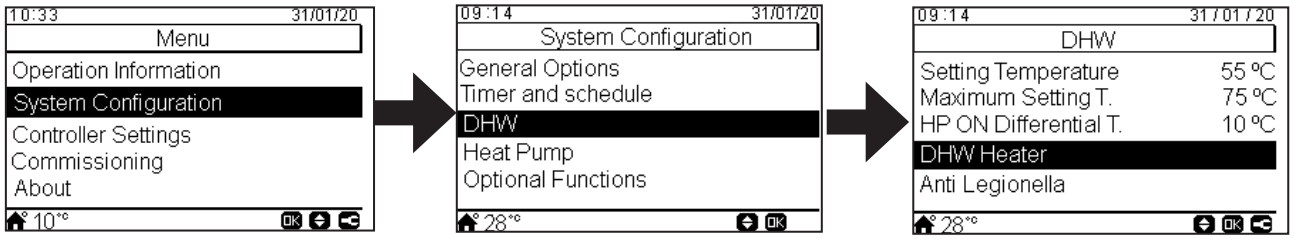


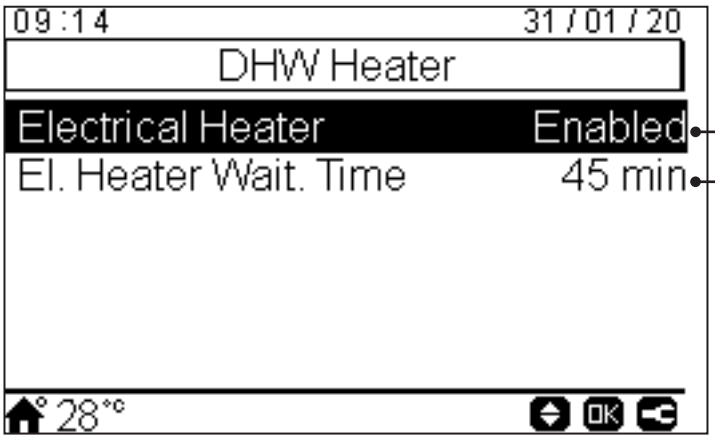
3.4 DHW Heater function

The DHW tank is fitted with a backup electrical heater. This electrical heater is disabled by factory settings and setting cannot increase more than 55 ºC.

In case of setting higher than 55ºC or anti-legionella function, electrical heater must be enabled.

It is possible to define a waiting time for the activation of the electrical heater of the DHW tank. After this time, heater will be switched ON in order to support Heat Pump to heat the tank.



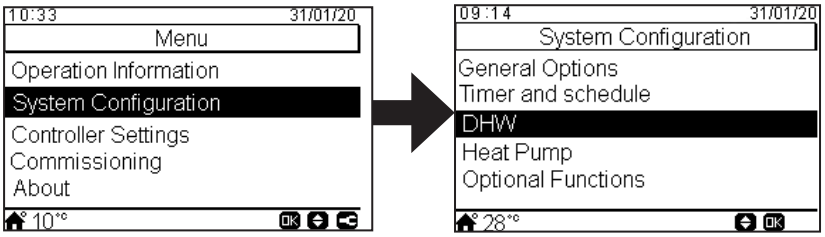


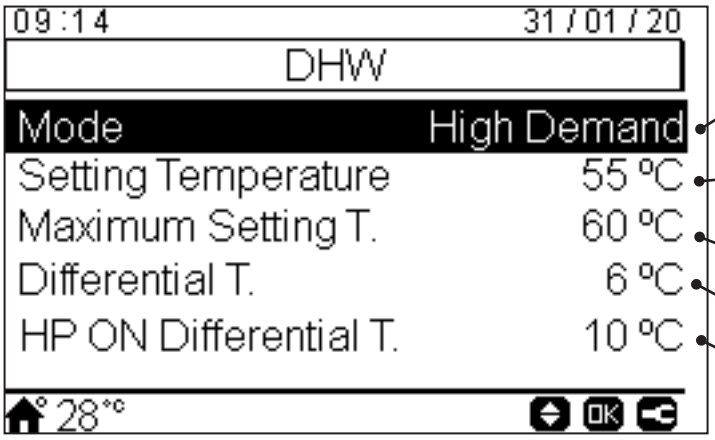
Status of electrical heater operation (enabled/ disabled)

Waiting time for the beginning of electrical heater operation since compressor start-up (High speed mode only)

In case of OFF, waiting time of Electrical heater is not considered and heater will be switched ON with Heat Pump

3.4.1 High Demand Mode





High Demand: DHW heating operation starts if the differential is larger than differential temperature. DHW can be heated up using the heater, the heat pump or a combination of both.

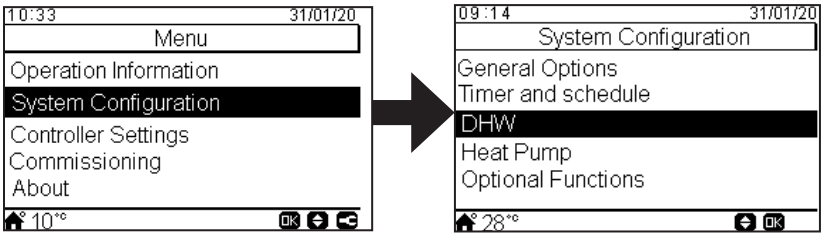
Setting for domestic hot water temperature selected by the user. The maximum value of this setting depends on the Maximum Setting T set by the installer. (Between 30 to Maximum Setting T.)

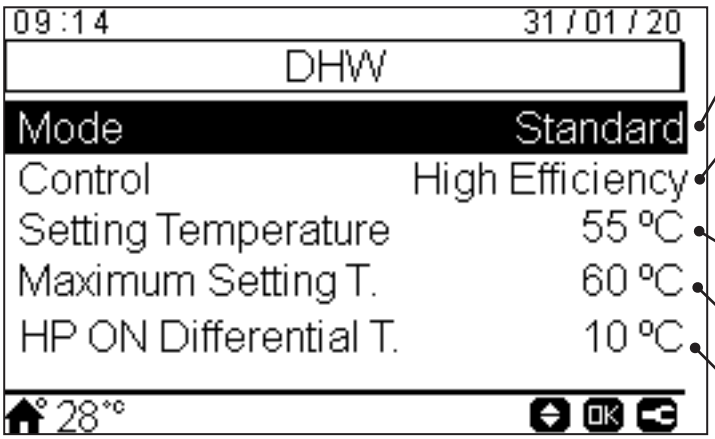
Maximum value of DHW setting temperature permitted by the installer. (Between 40 ºC to 55ºC or 75ºC when “Electric Heater” is enabled.)

Hysteresis of heater operation in High Demand mode.

Hysteresis for the start of DHW heating operation with the heat pump

3.4.2 Standard mode





DHW heating operation starts when the temperature of the water in the tank is low enough to start up the heat pump. DHW is heated up with the heat pump or the electrical heater (if the water setting temperature is up to 55ºC).

- **High Efficiency:** Compressor operation is adjusted to optimal efficiency for lower power consumption. If the water setting temperature is up to 55 ºC, the electrical heater starts when heat pump stops.
- **High Speed:** The heat pump is switched to maximum operation capacity to heat up the tank in the shortest time. If the water setting temperature is up to 55 ºC, the electrical heater starts when heat pump stops.

If the setting temperature has not been reached for a specific period of time **(EH waiting time)**, the electric heater starts to achieve this temperature.

Setting for domestic hot water temperature selected by the user. The maximum value of this setting depends on the Maximum Setting temperature set by the installer. (Between 30 to Maximum Setting temperature.)

Maximum value of DHW setting temperature permitted by the installer. (Between 40 ºC to 55ºC or 75ºC when “Electrical Heater” is enabled.)

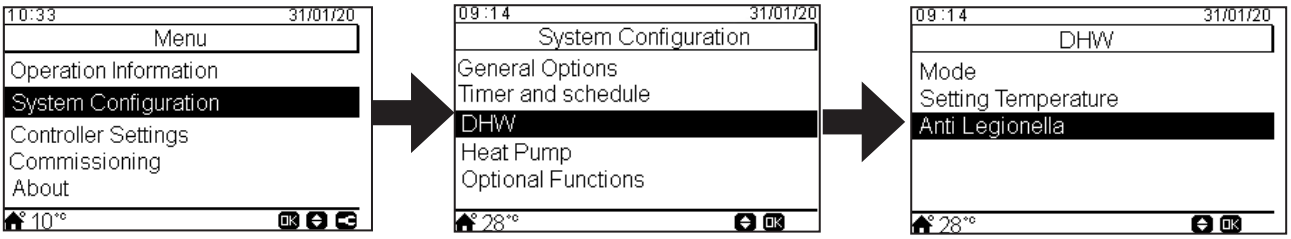
Hysteresis for the start of DHW heating operation with the heat pump

3.5 Anti Legionella function

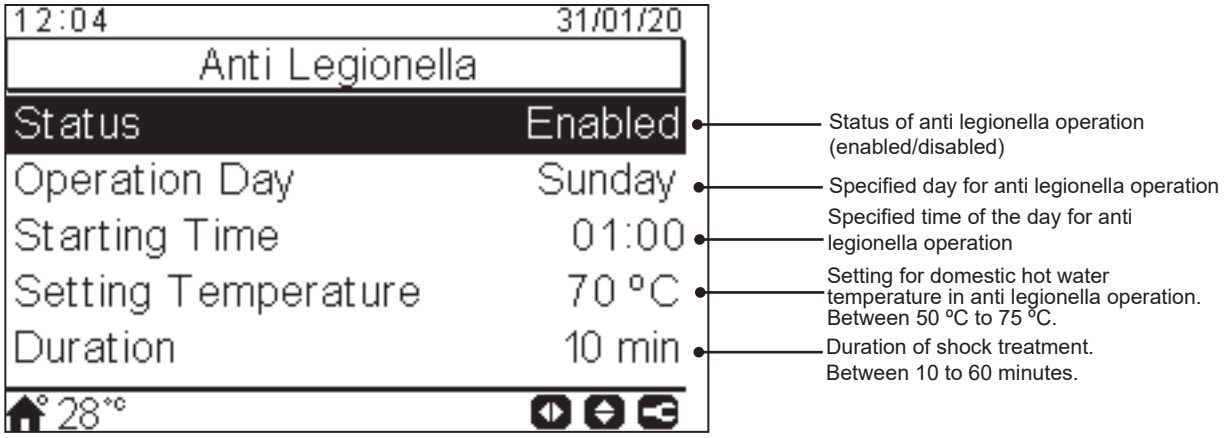
When anti legionella mode is set, the unit will raise the selected temperature of the tank (between 50 to 75°C) once a week to sterilize the water.

Anti legionella mode uses the electrical heater.

The ANTI LEG icon appears on the main screen.



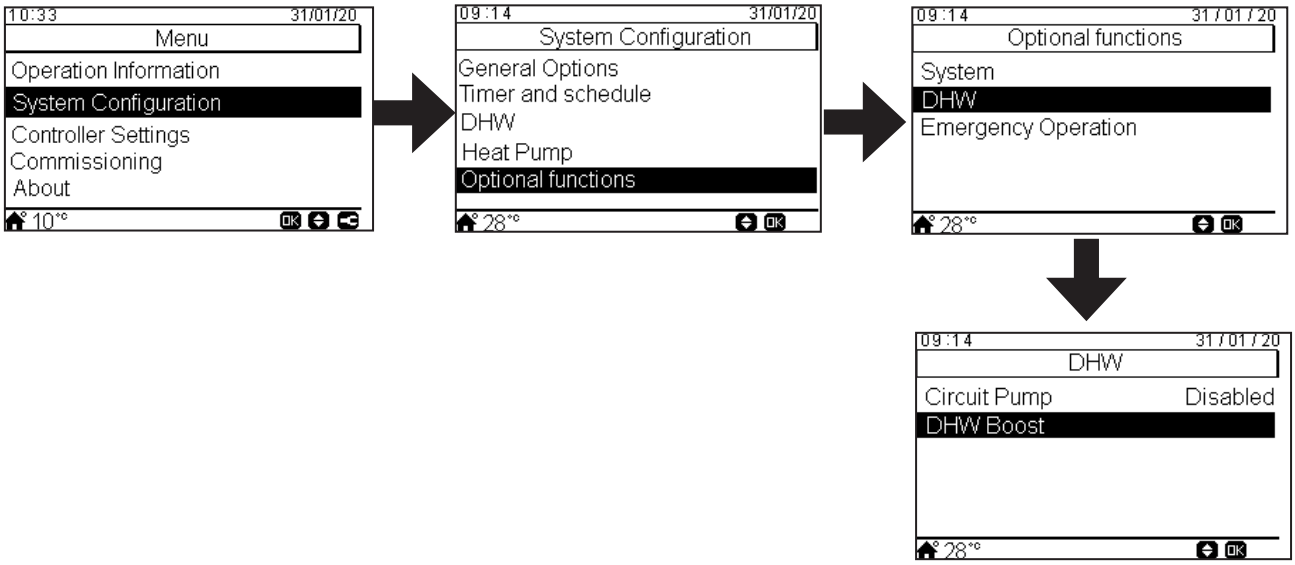
It is possible to configure the following parameters:

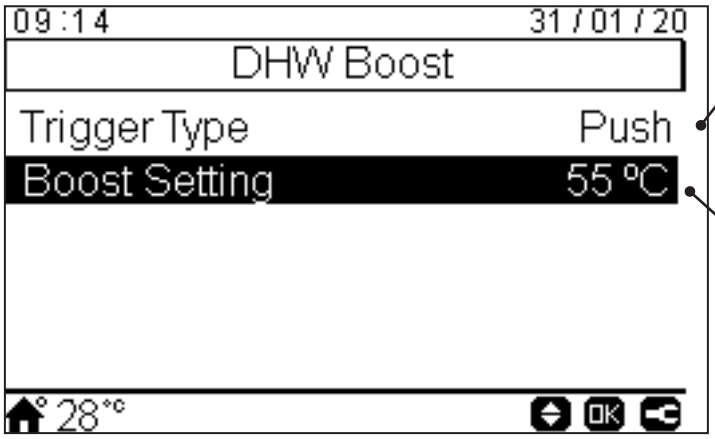


3.6 Boost function

It is possible to manually force a one-time heating of the DHW tank up to the temperature set as DHW Boost temperature. This feature is useful to cover exceptional demand of DHW.

The icon appears on the main screen.





Status of activation of DHW Boost:

- **Push:** DHW Boost is triggered by pushing the quick action button (Favourite button) on the LCD controller.
- **Open (NC):** DHW Boost is triggered by an external input relay which is normally closed (NC).
- **Closed (NO):** DHW Boost is triggered by an external input relay which is normally opened (NO)

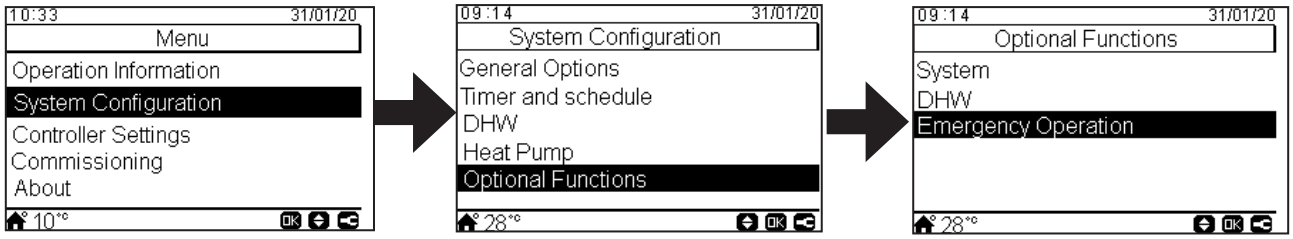
Setting for domestic hot water temperature in boost operation. The maximum value of this setting depends on the Maximum Setting temperature set by the installer.

NOTE

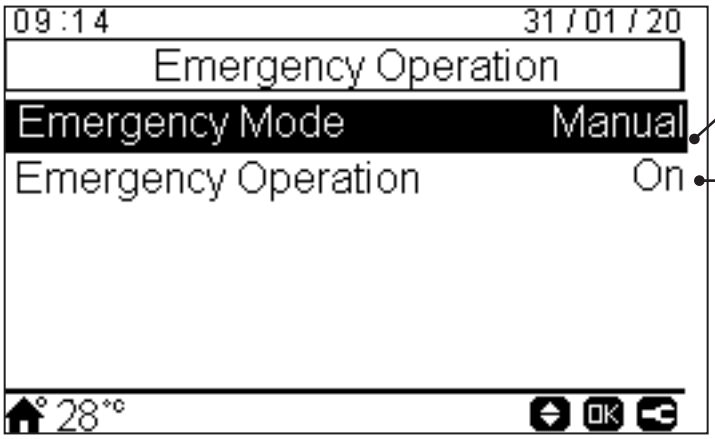
The boost function is not available during anti legionella mode.

3.7 Emergency function

It is possible to switch to emergency operation by means of the electrical heater, in case of malfunction of the outdoor unit.



If emergency mode is set up as manual, the user shall switch ON the electrical heater on the emergency operation option.



- **Manual:** The electrical heater is switched ON manually by the user
- **Automatic:** The electrical heater is switched ON automatically in case of malfunction of the outdoor unit.

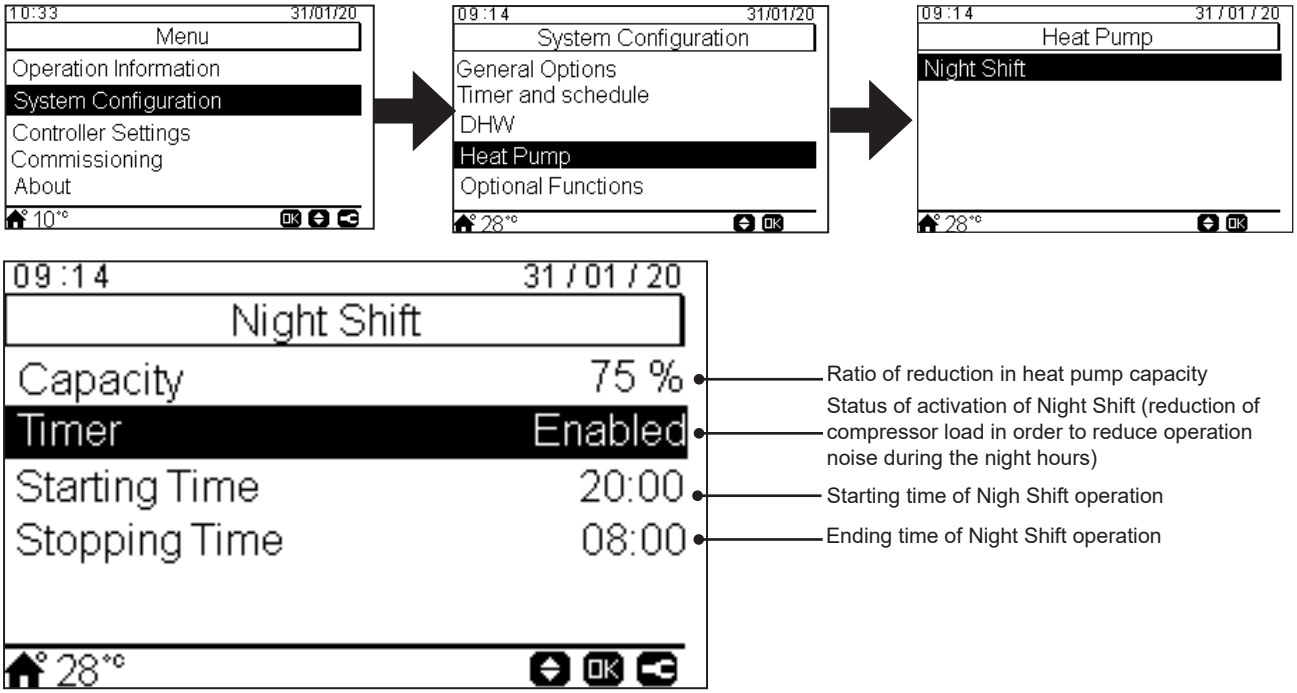
In case of manually operation, Emergency operation of Electrical Heater must be switched by ON/OFF function:

- **ON:** Heater switched ON
- **OFF:** Heater switched OFF

3.8 Night Shift Function

It is possible to reduce the compressor load with the intention of decrease the noise during the night time. When Night Shift function is active, the capacity of the YUTAMPO unit is reduced to the percentage defined in the menu and Night Shift icon is displayed in the general notifications zone of the LCD controller.

Night shift is disabled by default. Timer enabled activates the function. Once timer is enabled the function is activated and it is possible to adjust the period of time that the function is operating at the lower capacity set.



Night shift can be configured from the LCD controller to be launched from the Favourite button. Then, Favourite button works like an ON/OFF button:

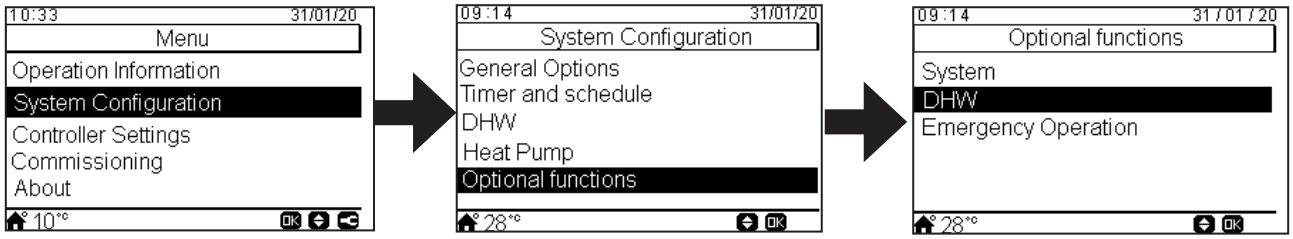
- When Night shift timer is enabled at the Night shift menu, Favourite button lets start or stop the night shift function before the specified time. The night shift cycle ends when the timer arrives to the stopping time. The timer cycle starts again the next day.
- When Night shift timer is not enabled at the Night shift menu, Favourite button starts or stops the Night shift function like an ON/OFF switch. When Favourite button launches Night shift function, this works until Favourite button is pressed again.

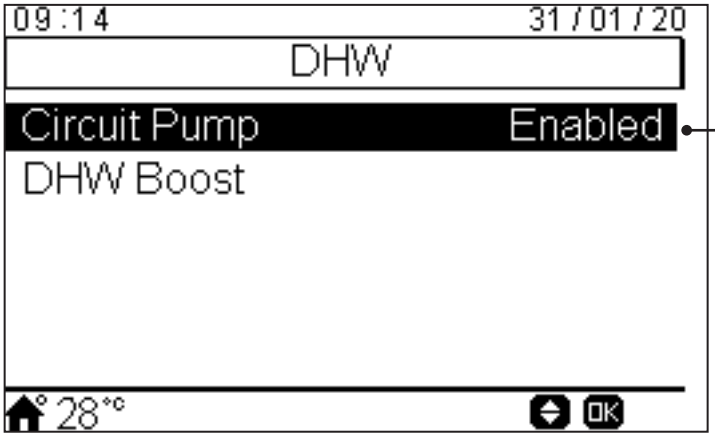
NOTE

- *During Night shift mode, the capacity given by the Outdoor unit is reduced according to the percentage defined by user. This function, however, may drive to an uncomfortable situation.*
- *This function is available for Heating, Cooling and DHW applications.*
- *In case of defrost and compressor protection operation, this function is not applicable.*
- *Protection of the Indoor unit can override this function.*
- *Protection of the Outdoor unit can override this function.*

3.9 Circuit Pump - DHW Recirculation function

YUTAMPO has an output for a DHW water pump re-circulation option. By using this output, user can heat all the water inside DHW piping system. This output can also be used with Anti-Legionella and timer function.



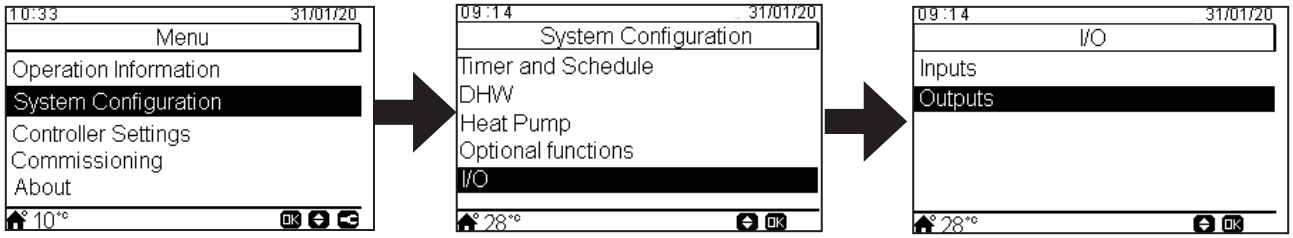


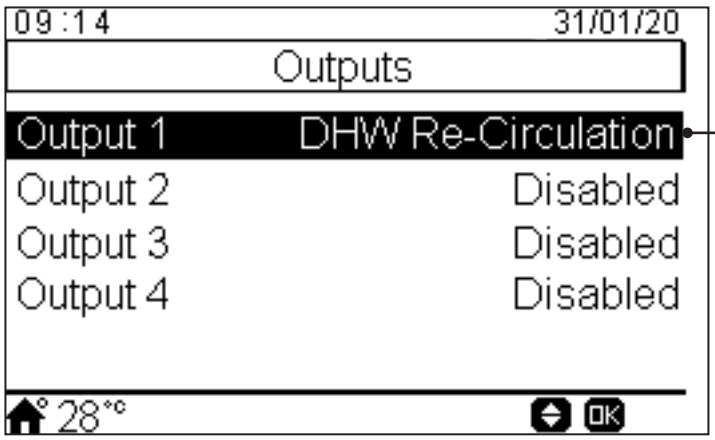
Status of activation of the water pump for the re-circulation of the hot water from the DHW tank by means of the heat pump.

This function can be used together with functions:

- Disabled, output is not used.
- Enabled, the output is enabled when DHW heat operation (HP or Heater) is enabled.
- Anti-Legionella, output must be enabled when DHW for legionella operation (HP or Heater) is enabled.
- Timer, timer canbe programmed in order to start or stop the water recirculation.

This output must be also configured from the I/O menu:

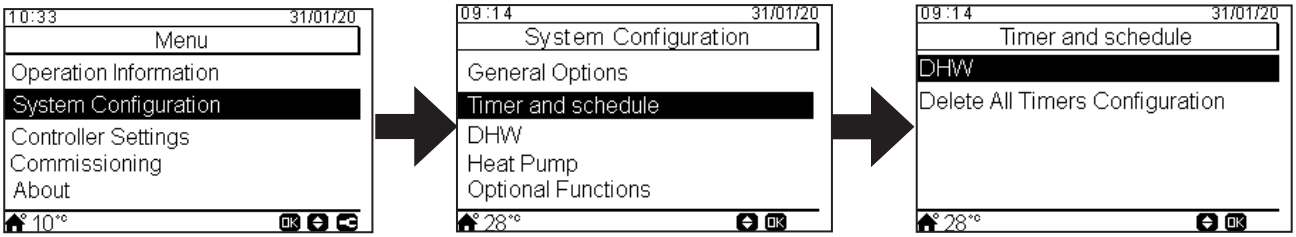




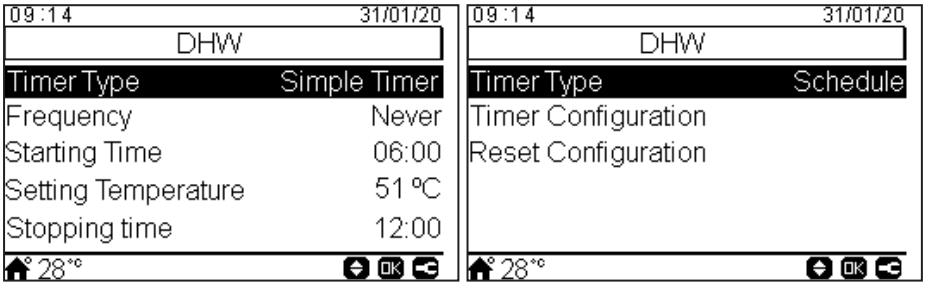
Output when the re-circulation pump for the DHW tank is enabled.

3.10 Timers function

The LCD controller must be set to the correct date and time before using the timer function.



The timer function allows the selection of **simple** and **scheduled** timers, as shown in the figures below:



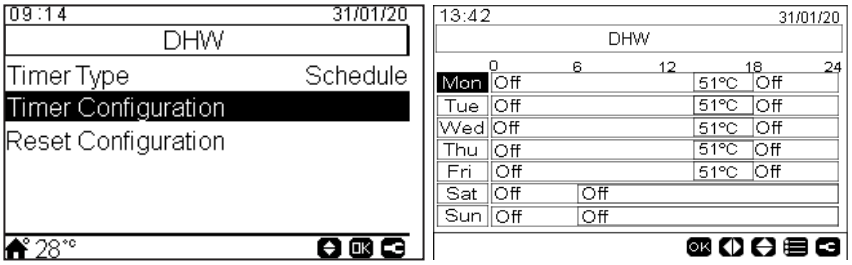
3.10.1 Setting of Simple timer

The following parameters can be adjusted:

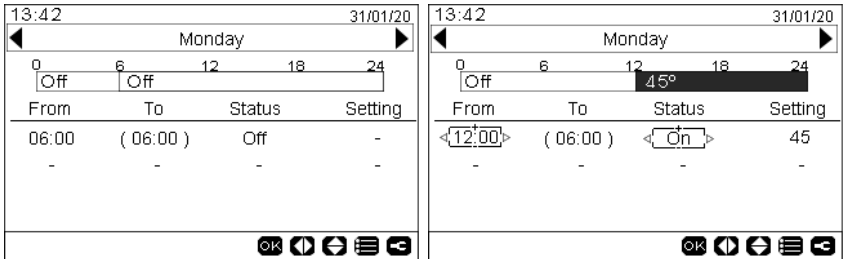
- Frequency (Never / Once / Everyday / Weekend / Work day)
- Starting Time: From 00:00 to 24:00
- Setting Temperature: From 30 ºC to 75 ºC
- Stopping time: From 00:00 to 24:00

3.10.2 Setting of Schedule timer

Pressing the OK key with “Timer Configuration” being selected displays the detailed schedule screen. The active schedule timers are shown in a weekly calendar.



Up to five timer events can be defined for each weekday, and these can be used for turning the DHW heating operation on or off, or to change the setting temperature for the DHW tank. Pressing the OK key with one of the weekdays being selected in the weekly calendar screen displays the detailed schedule for the weekday. The following parameters can be adjusted for each program within the day:

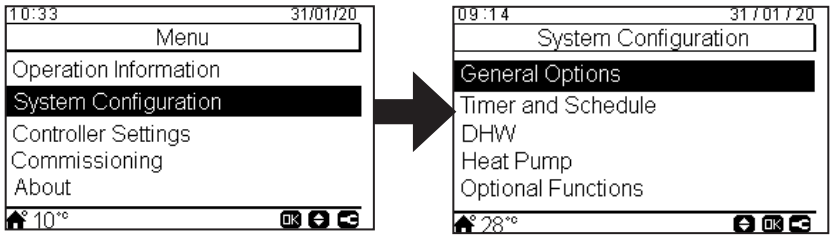


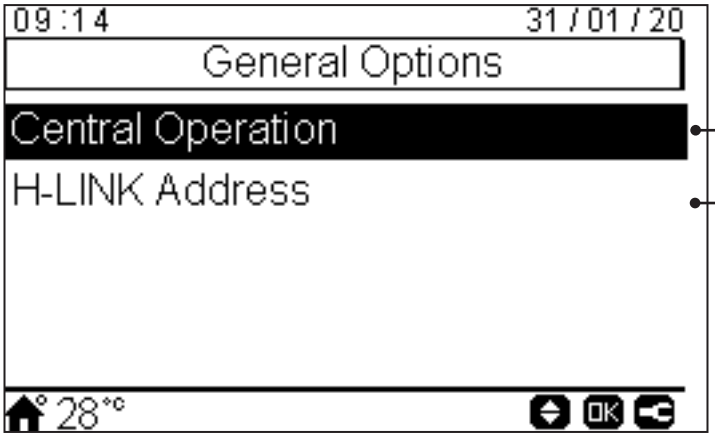
- From: Starting time (the selected Status remains valid until the time shown between brackets in the “To” column)
- Status: (On / Off)
- Setting: Setting temperature for the DHW tank (From 30 ºC to 75 ºC)

Pressing the “Menu” button during the edition of the timer events for a given weekday displays a menu to copy the daily pattern to other weekdays or to suppress the selected timer event.

3.11 Central Operation functions

In case that the YUTAMPO unit is connected to a central operation device (KNX,Modbus, etc.) it is necessary to configure the control type (local or full) and the H-LINK Address for the refrigerant cycle and the indoor unit.





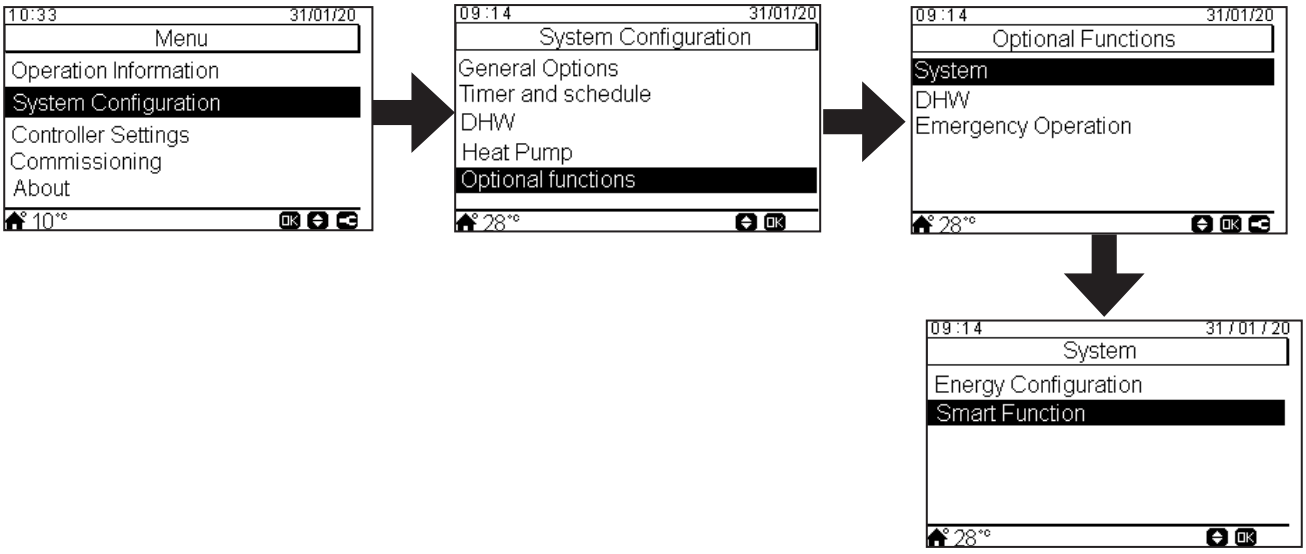
In case that the YUTAMPO unit is connected a central operation device (KNX,Modbus, etc.)

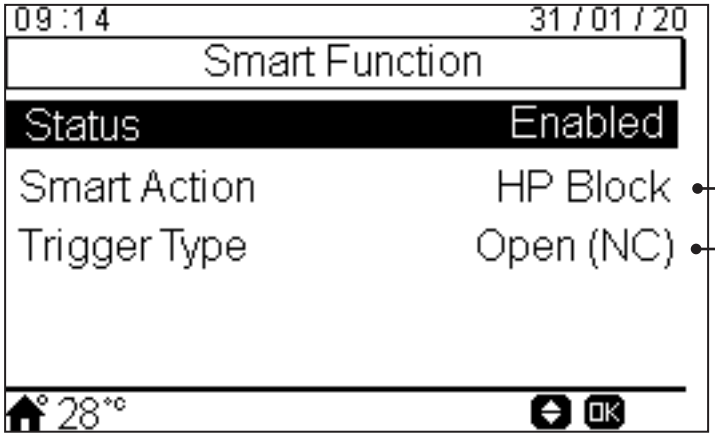
- **Local:** Central orders are disabled
- **Full:** Central orders are enabled

H-LINK communication addresses must be assigned in case that the YUTAMPO unit is connected to a central operation device (Default values: 0:0)

3.12 Smart function

This function can be used to block or limit the heat pump or increase demand due to electricity availability.



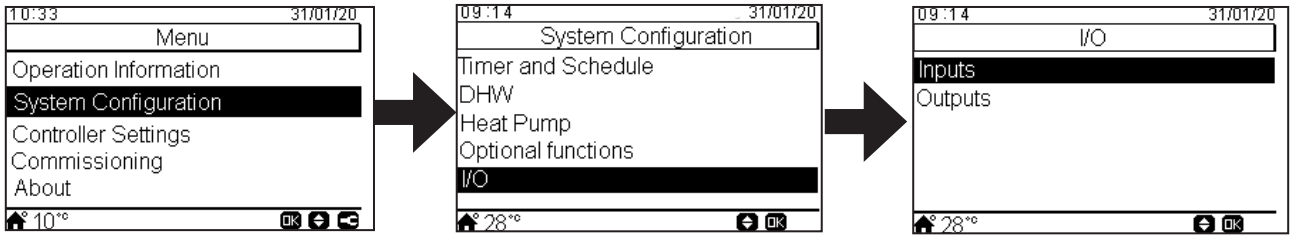


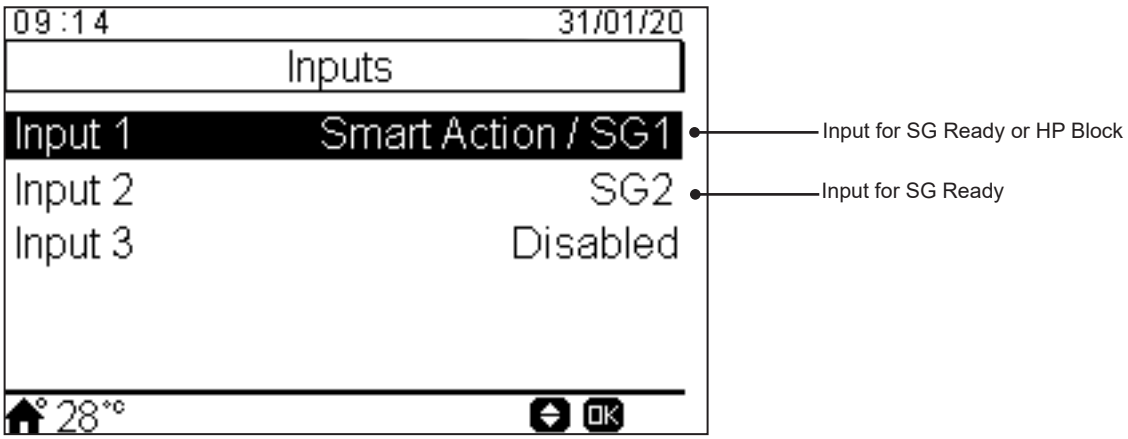
- **HP Block:** Heat Pump is forbidden in any condition.
- **SG Ready:** Smart Grid Ready operation.

Type of trigger for HP Block:

- **Closed:** Action when input is closed.
- **Open:** Action when input is open.

After selecting the Smart Function (HP Block or SG Ready) it is necessary to select the appropriate input on the I/O menu:





3.12.1 SG Ready Function

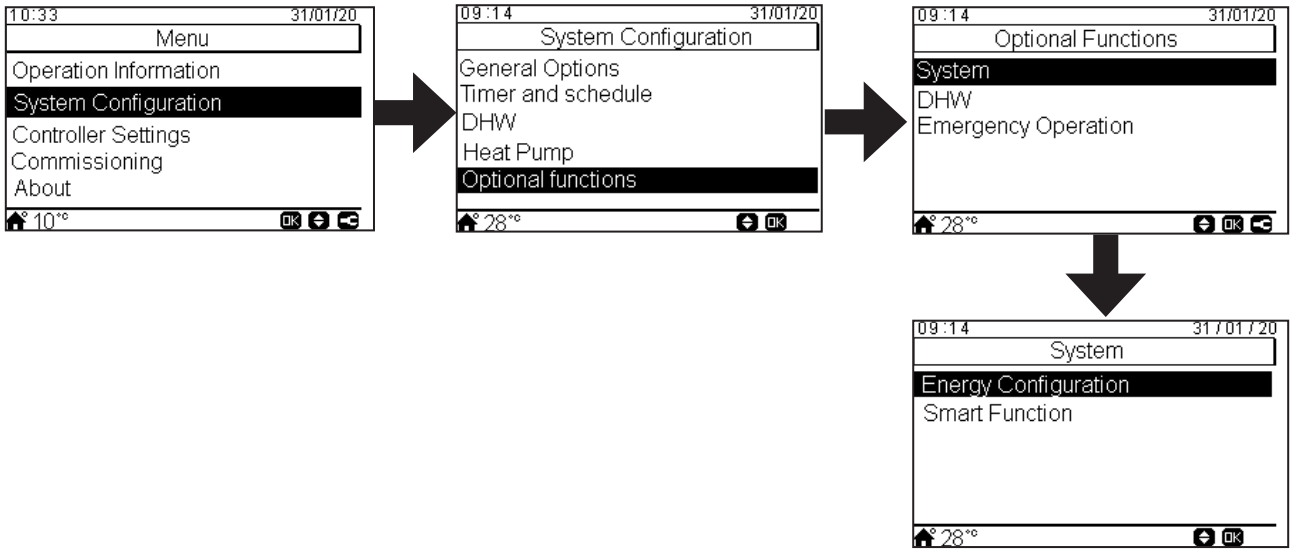
The SG Ready is awarded to the heat pump series, to control technology by integrating the individual heat pump. Allows in a smart grid by using two digital inputs establishing an unidirectional connection and allowed for four different operation modes:

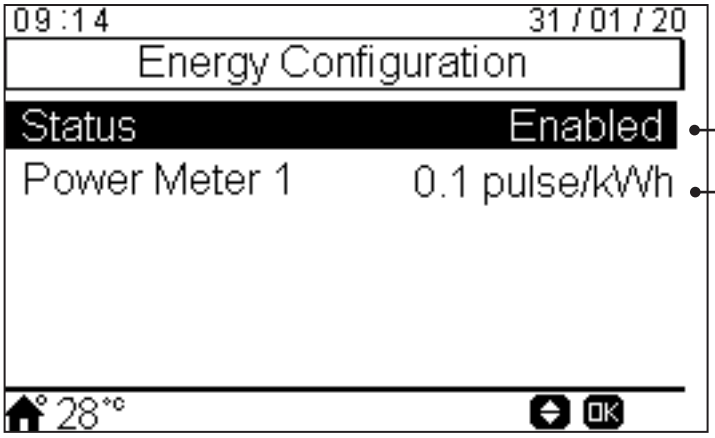
SG Input 1	SG Input 2	Action	Description
Open	Open	Standard HP mode	SG is not activated.
Close	Open	External blocking mode	Heat Pump is forbidden when signal is active
Open	Close	Low price mode	Increase DHWT Temperature setting by + 7ºC
Close	Close	Overcapacity mode	Tdhws (Setting temperature) =Tdhwmax (Maximum water temperature)

3.13 Energy configuration function

This optional function allows measuring the real power consumption. It can be done by outdoor unit estimation, or connecting an external power meter.

The number of pulses of the power meter is a variable that must be set through the unit controller.



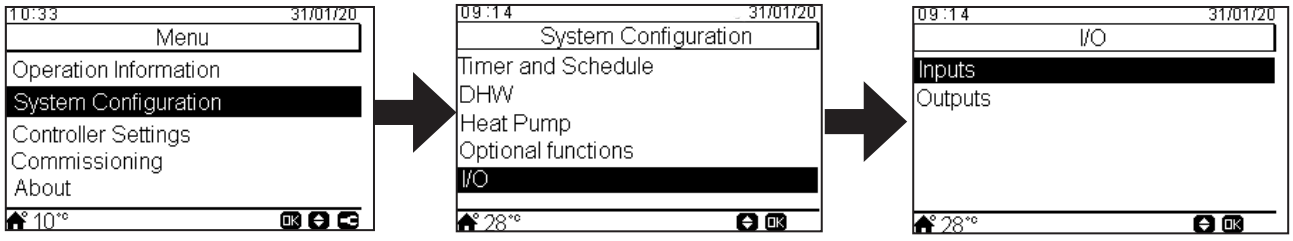


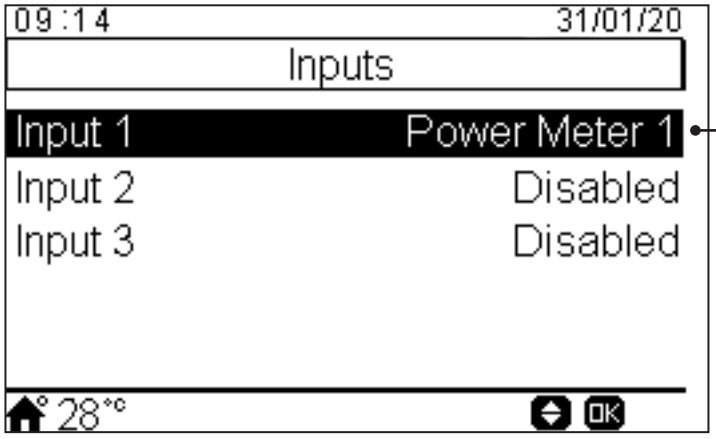
Status of the power meter data control

Number of pulses per kWh of the power meter. This parameter must be adjusted when connecting an external power meter.

Range: 0.1/1/10/100/1000 pulse / kWh

After enabling the energy configuration it is necessary to select the appropriate input on the I/O menu:

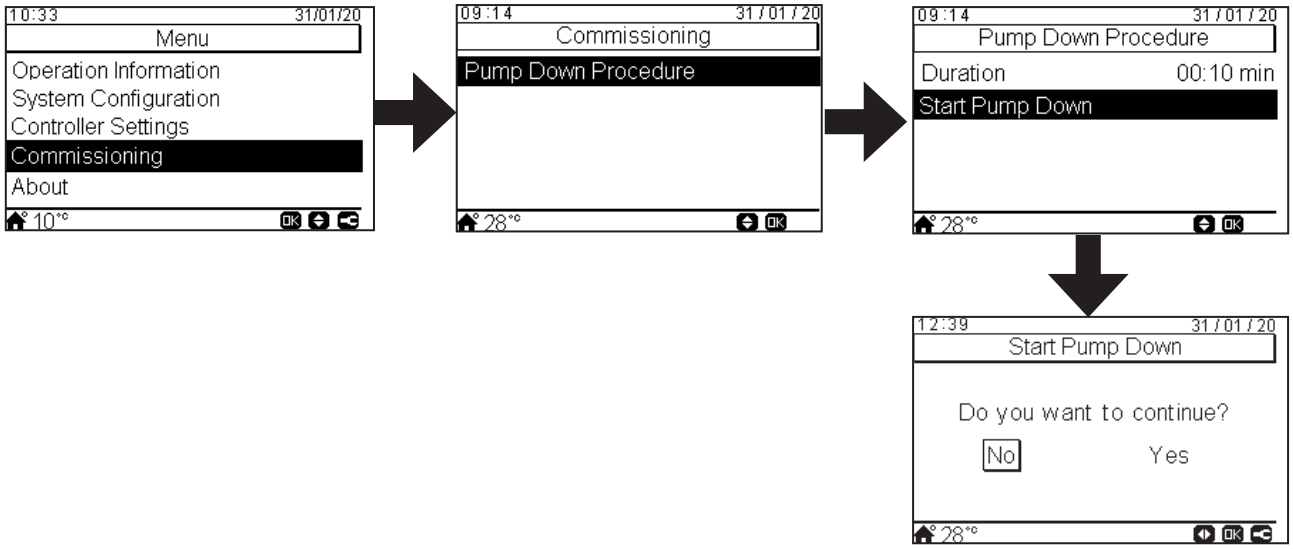


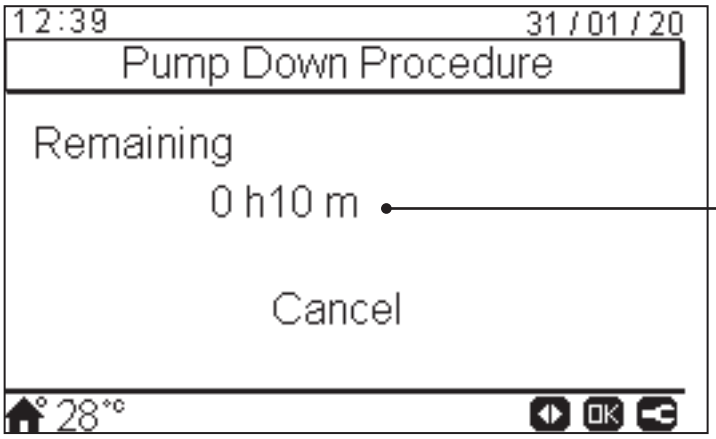


Input used as kW/h pulse count for the monitoring of energy data

3.14 Pump down procedure function

In case of replacing refrigerant parts, it is possible to collect the refrigerant to the outdoor unit by pump down procedure.



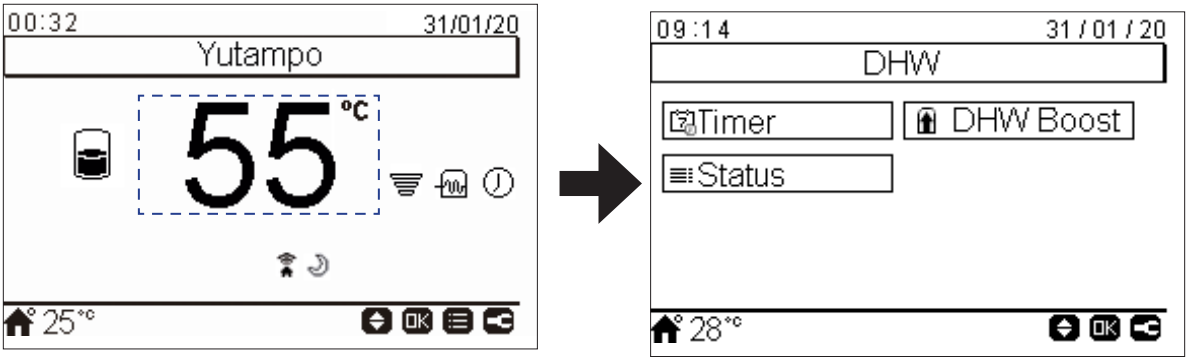


Configured time for the pump down procedure

⚠ CAUTION

After collecting the refrigerant through the pump down procedure function it's necessary to take the voltage out of the system so that the 4-way valve does not remain in cooling mode.

3.15 Quick action function



The following quick actions are shown when pressing the OK button at the setting temperature:

- **Timer:** Menu for the selection and configuration of simple timer and schedule timer
- **Status:** Display of information related to current operation conditions
- **DHW Boost:** Activation of the auxiliary DHW heater and Heat Pump (if operation is possible, to speed up DHW heating operation

3.16 Inputs and outputs

3.16.1 Inputs

The system allows to set three inputs depending on the operations and preferences of the installation. The input functions are available when using the ATW-OFC-02 accessory.

- **Smart Act / SG 1:** This function is used to block or limit the power consumption of the heat pump when restrictions in power supply must be observed.
- **SG 2:** When using a Smart Grid Ready application, this input is used as a digital input 2, allowing four different operating modes.
- **DHW Boost:** Manual request for immediate DHW heating operation.
- **Power Meter 1:** Input used as kW/h pulse count for the monitoring of energy data.
- **Forced OFF:** Forced OFF operation of the unit. The remote control switch can still be used, but it will show an indication that operation is forbidden.

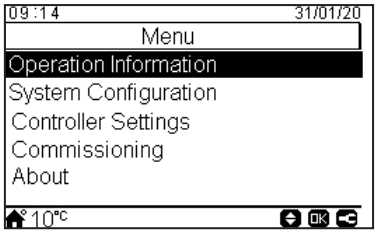
3.16.2 Outputs

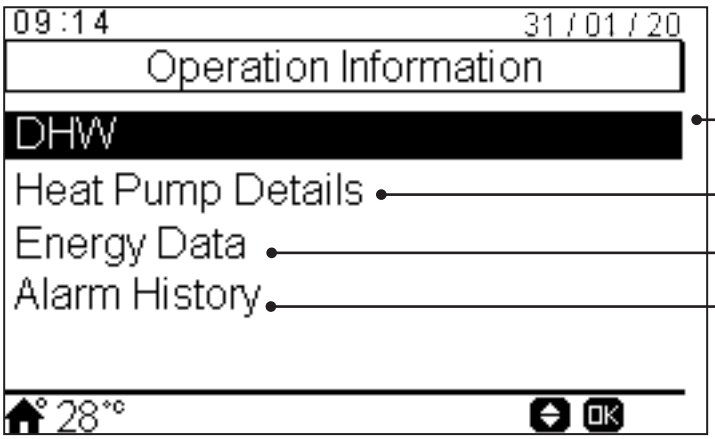
There are four available outputs to set. There are conditions of setting depending on the installation. The output functions are available when using the ATW-OFC-02 accessory.

- **Alarm:** Output when an “Alarm Code” is received from the indoor or outdoor units.
- **Operation:** Output when the tank is in DHW heating operation.
- **Defrost:** Output when the operation state of the outdoor unit is defrosting.
- **DHW Re-circulation:** Output when the re-circulation pump for the DHW tank is enabled.

3.17 Operation information

In operation information menu it is possible to find the most important setting parameters of the system besides the information of the operation conditions.





Detailed information about DHW:
- Operation
- Current temperature
- Setting Temperature
- Electrical Heater Status
- Electrical Heater Operation
- Legionella Status
- Legionella Operation

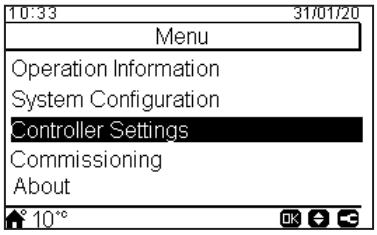
Detailed information about Heat Pump:
- Outdoor Ambient Temperature
- Discharge Gas Temperature
- Evaporation Gas Temperature
- Inverter operation frequency
- Defrosting
- Unit Capacity
- Unit Type

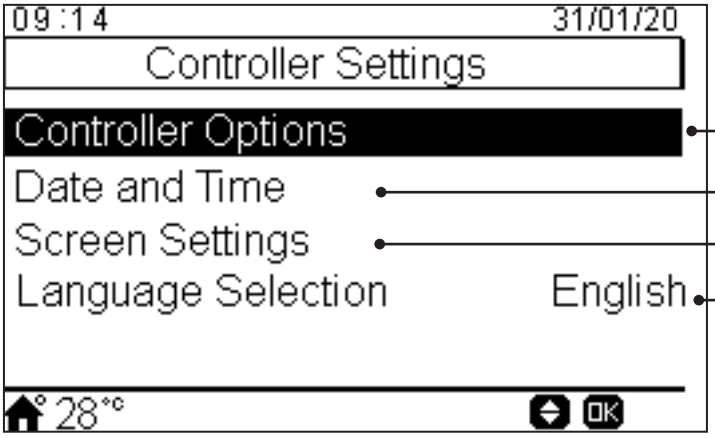
Detailed information about Energy Data:
- Input Power (Total / month by month)

Shows a list of the alarm history of the system

3.18 Controller Settings

Under the controller settings menu it is possible to adjust the several parameters:





To set the desired function for the Favourite Action button.

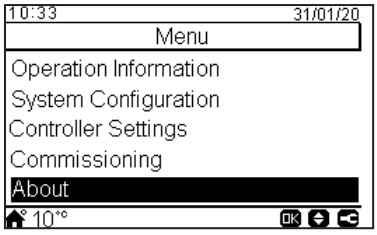
Date and time adjustments and European summer time set.

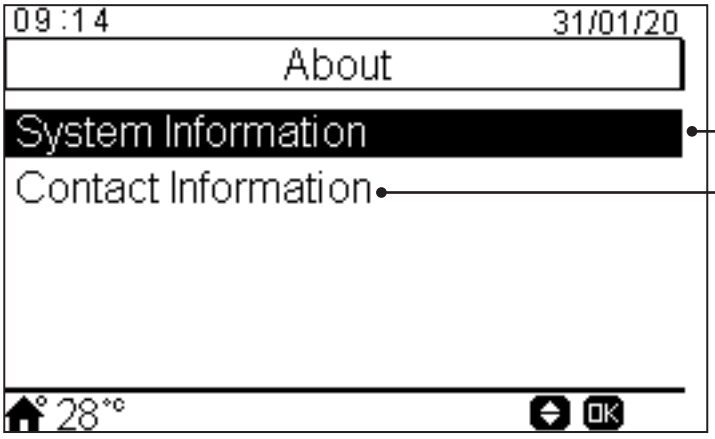
Screen brightness, backlight time, contrast and ON led bright.

Selection of the unit controller language.

3.19 About

In this section of the LCD controller it is possible to find the following information:





Unit type, unit capacity, controller firmware, indoor PCB firmware and language package.

It is possible and recommendable to fill this information providing a contact phone to the user.

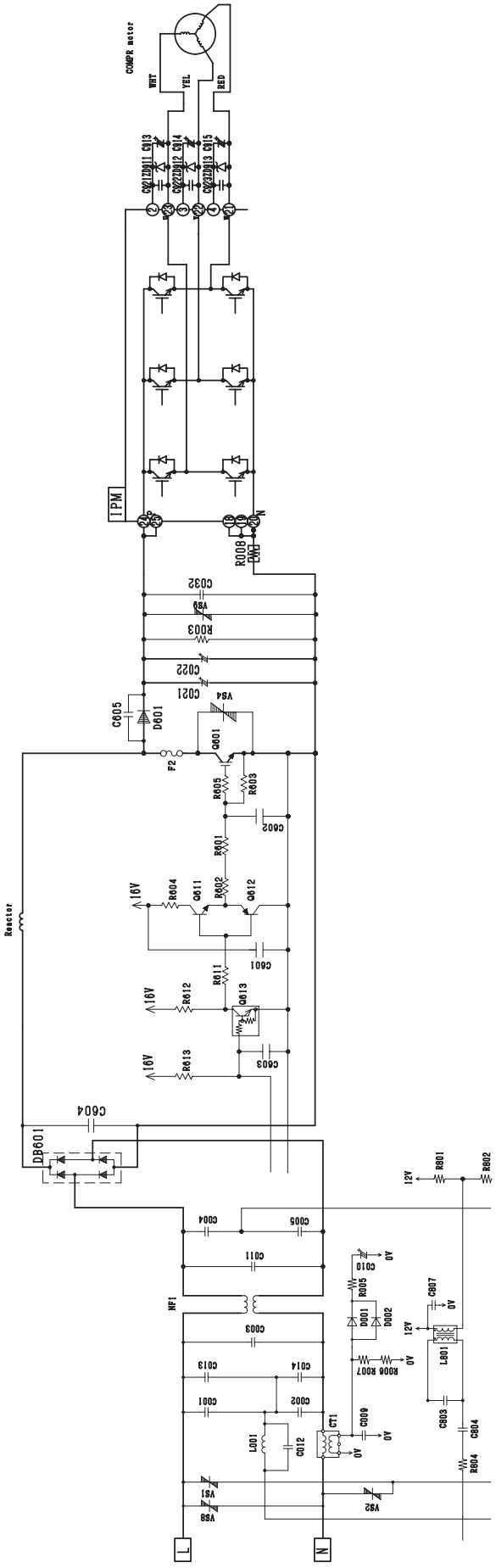
4. Electrical checks of main parts

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4.1 Outdoor unit

4.1.1 Power circuit



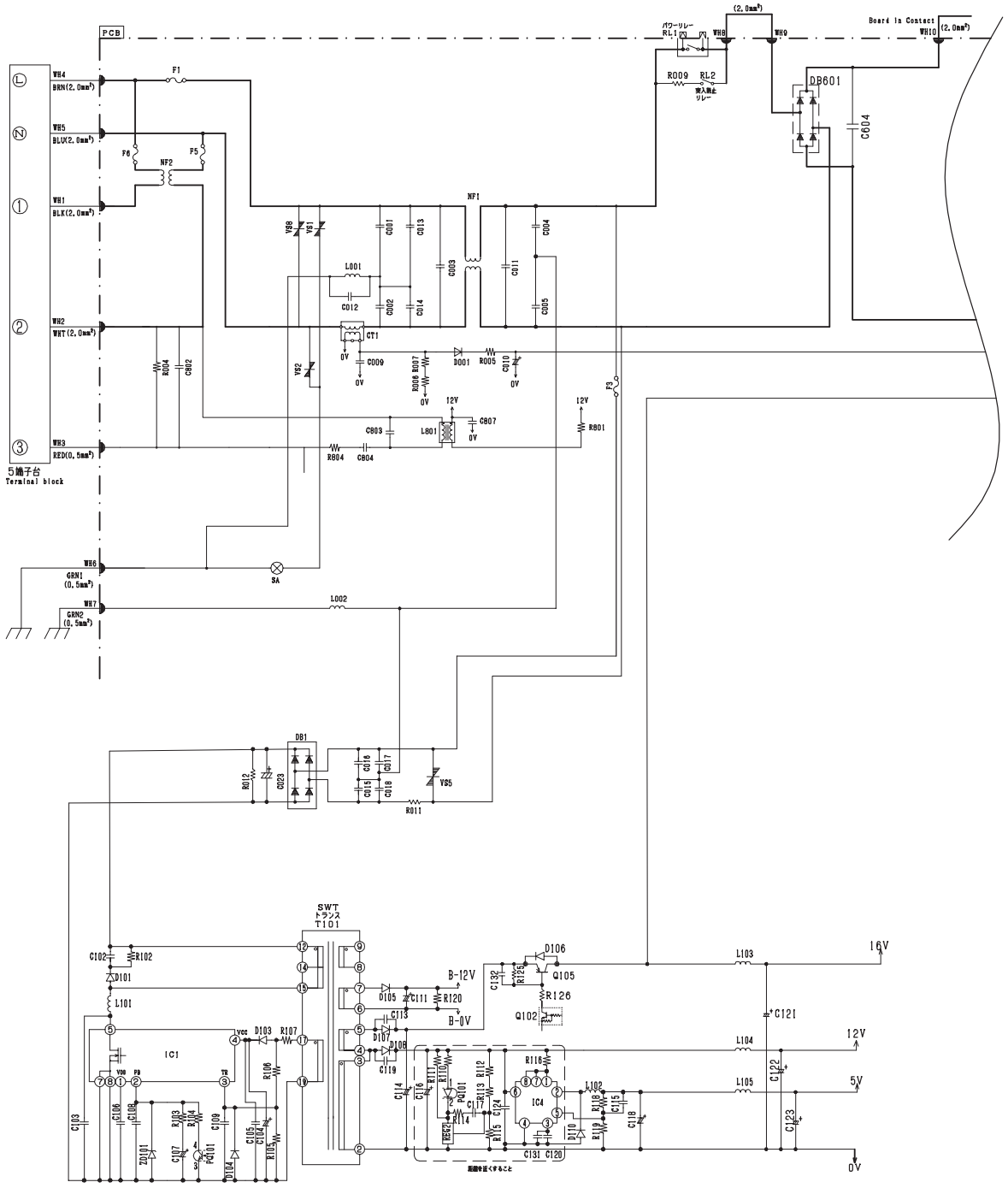
This circuit full-waves rectifies 230 VAC applied between terminals L and N and boosts it to a required voltage with the IPM to create a DC voltage.

The voltage become 300-330 V when the compressor is operated.

◆ Main parts

Name	Description
Intelligence power module (IPM)	A module that constitute by an inverter part. In case of intelligence power module malfunction or connection failure immediately after compressor starts, its may stop due to error of abnormal low speed, switching failure, Ip stop and others.
Diode stack (DB601)	These rectify the 230 VAC from terminal L and N to a DC power supply. If diode stack (DB601) are faulty, DC voltage may not be generated and the compressor may not operate at all. Also be aware that the 15A fuse might have blown.
Smoothing capacitors (C021-C022, 375 µF, 420 V)	This smoothes (averages) the voltage rectified by the diode stack.
IGBT to improve efficiency (Q601)	It will improve the efficiency during compressor load become heavy when current flow through the chopper period of Q601.

4.1.2 Power circuit (low voltage)



The 230V AC voltage is rectified to DC voltage (B-12V,16V,12V,5V) pass through switching control IC (ICI), switching transformer.

- (1) B-12V Power supply for electrical expansion valve.
- (2) 16V Power supply for IPM driver circuit of compressor and fan motor, IGBT action.
- (3) 12V Power supply for 4 way valve relay, power relay, inrush current relay,motor current amplification.
- (4) 5V Power supply for microcomputer, peripheral circuits.

◆ Main parts

Name	Description
C001,C002,C003,C004,C005,C011,C013,C014, NF1	These absorb electrical noise generated during operation of compressor and also absorb external noise entering from power line to protect electronic parts.
Surge absorber, varistor 1,2,5,8	These absorbs external power surge.
IC4	DC/DC convertor IC (DC12V -> DC5V)

4.1.3 PCB for power circuit

Voltage specification of power circuit as shown in below table.

Output	Spec	Main load	Measuring point	Example of possible failure mode
5 V 0/P	5 $^{\pm 0.4}$ V	Micon, Thermistor	Tester ⊕: L105 (JUMPER) Tester ⊖: D110 (EARTH)	Outdoor not operate, no blinking indication
12 V 0/P	12 $^{\pm 0.5}$ V	Micon, IC2, 3, 4 Relay circuit	Tester ⊕: L104 (JUMPER) Tester ⊖: D110 (EARTH)	Outdoor not operate, no blinking indication
16 V 0/P	15.5 $^{+1.5}_{-1.0}$ V	IPM for Compressor IPM for DC fan	Tester ⊕: L103 (JUMPER) Tester ⊖: D110 (EARTH)	Stop: LD301 3, 4 or 12 times blinking
B-12 V 0/P	13 $^{+2.5}_{-1.0}$ V	Expansion valve	Tester ⊕: R120 (B-12 V) Tester ⊖: R120 (B-0 V)	Stop: LD301 5 times blinking

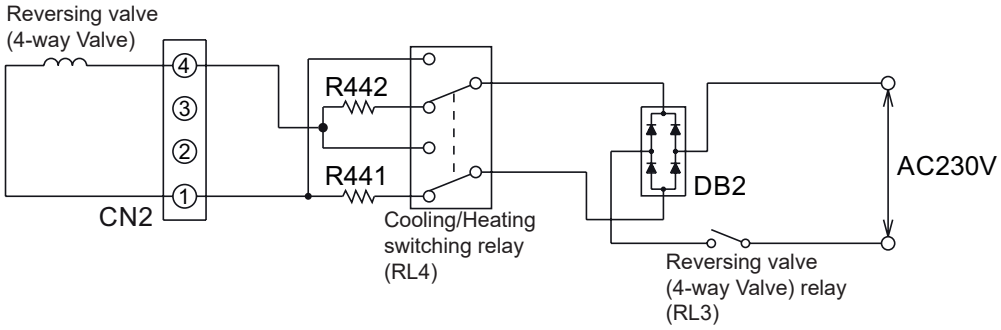
Power circuit for PCB can consider normal if the result is satisfied with above specification.

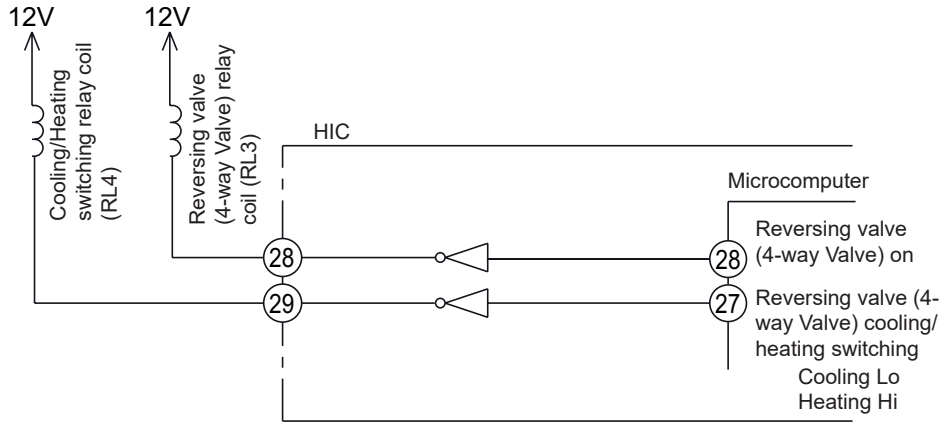
4.1.4 Reversing valve control circuit

This control is used to control de ON/OFF state of the relay and the coil, both of the reversing valve.

The ON/OFF state of the relay depends on the operation mode, as shown in the following table.

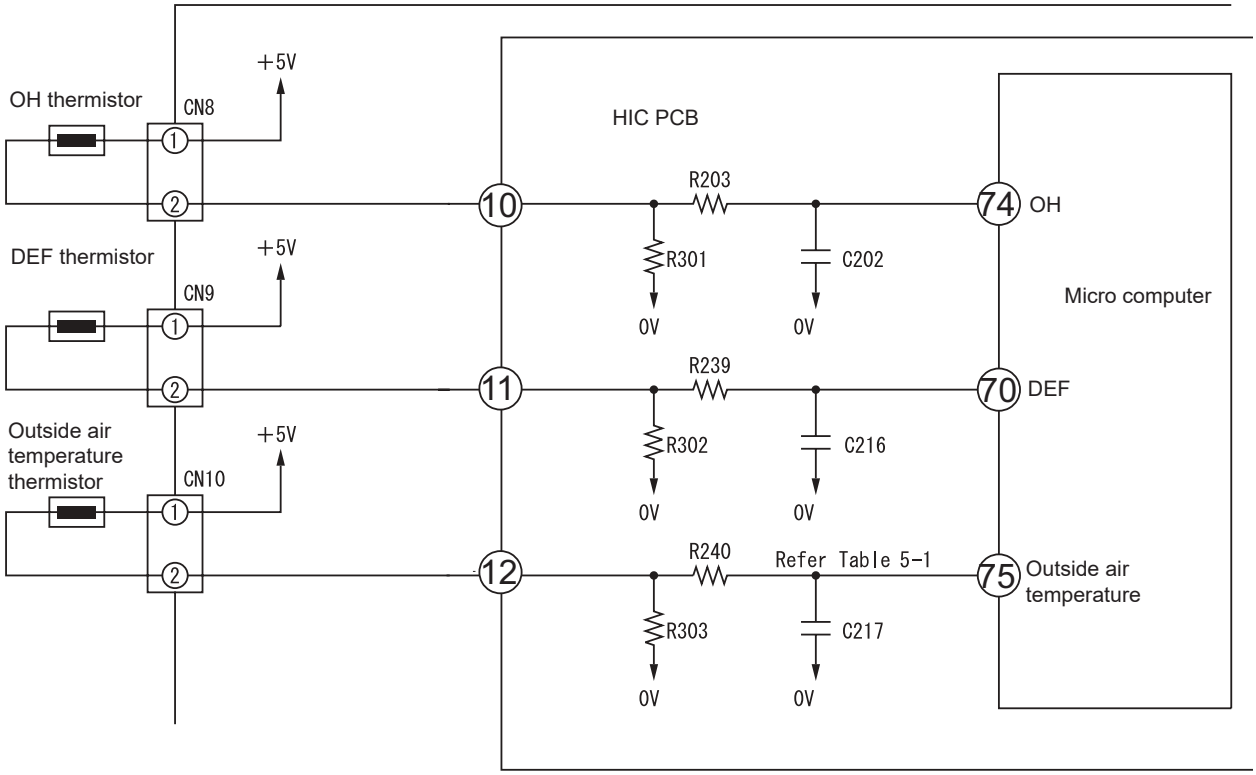
If the reversing valve is not powered or the conditions do not correspond to the appropriate ones for the operation mode, it could indicate failure of the control circuit of the reversing valve.





Operation mode		Cooling operation (including forced cooling operation)	(Reference) Heating operation
Tester and CN2 terminal connection point		⊕ terminal of tester to CN2 pin ④ ⊖ terminal of tester to CN2 pin ①	⊕ terminal of tester to CN2 pin ① ⊖ terminal of tester to CN2 pin ④
Types of testers	Analog tester	The tester indicates about 80 VDC and returns to 0 V, and indicates about 80 VDC again.	The tester indicates about 160 VDC and returns to 0 V, and indicates about 160 VDC again.
	Digital tester	The tester indicates a large value for an instant and returns to 0 V, and indicates a large value again.	The tester indicates a large value for an instant and returns to 0 V, and indicates a large value again.

4.1.5 Temperature detection circuit



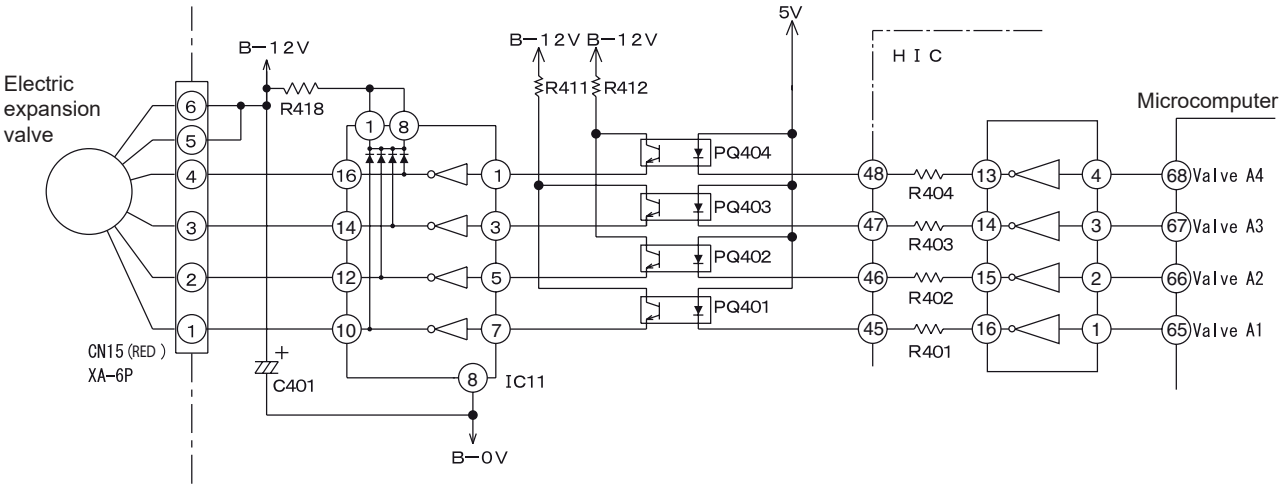
- OH thermistor circuit detect the temperature at the surface of compressor head, DEF thermistor circuit detect the defrosting operation temperature (evaporation temperature).
- A thermistor is a negative resistor element which has characteristics that the higher (lower) the temperature, the lower (higher) the resistance.
- When the compressor is heated, the resistance of the OH thermistor becomes low and ⊕ 5V is divided by OH thermistor and R301 and the voltage at pin 74 of microcomputer.
- Compare the voltage at microcomputer pin 74 and setting value stored inside. If the value exceed the set value, microcomputer will judge that the compressor is overheated and stop the operation.
- When frost is formed on the outdoor heat exchanger, the temperature at the exchanger drops abruptly. Therefore the resistance of the DEF thermistor becomes high and the voltage at pin 70 of micro computer drops. If this voltage becomes lower than the set value stored inside, microcomputer will enter the defrost control.
- During defrost operation, the microcomputer will transfer the defrosting condition command to indoor unit via SD0 pin of interface of IF transmission output.
- The microcomputer read the outdoor temperature by outside air thermistor and transfer it to the indoor unit, thus controlling the compressor rotation speed according to the set value in the EEPROM of indoor unit and switching the operation mode (outdoor fan on/off etc.) to DRY mode.
- Below table show the typical values of outdoor temperature in relation to the voltage.

Outside Air Temperature (°C)	-10	0	10	20	30	40
Voltage at both side of R303 (V)	1.19	1.69	2.23	2.75	3.22	3.62

NOTE

- *When the thermistor is open, open condition or disconnect, microcomputer pin 70-74-75 are approx. 0V;*
- *When thermistor is shorted, they are approx. 5V and LD301 will blink 7 times.*
- *However, an error is detected when only the OH thermistor is shorted and will enter blinking mode after 12 minutes start the compressor operation.*

4.1.6 Electric expansion valve circuit



The electric expansion valve is driven by DC12V. Power is supplied to 1 or 2 phases of 4-phase winding to switch magnetic pole of winding in order to control the opening degree.

Relationship between power switching direction of phase and open/close direction is shown below. When power is supplied, voltages at pins 4 to 1 of CN15 are about 0.9V and 12V when no power is supplied.

When power is reset, initial operation is performed for 10 or 20 seconds. During initial operation, measure all voltages at pin 4 to 1 of CN15 by using a multimeter. If there is any pin with voltage that has not changed from 0.9V or 12V, expansion valve or micro computer is broken.

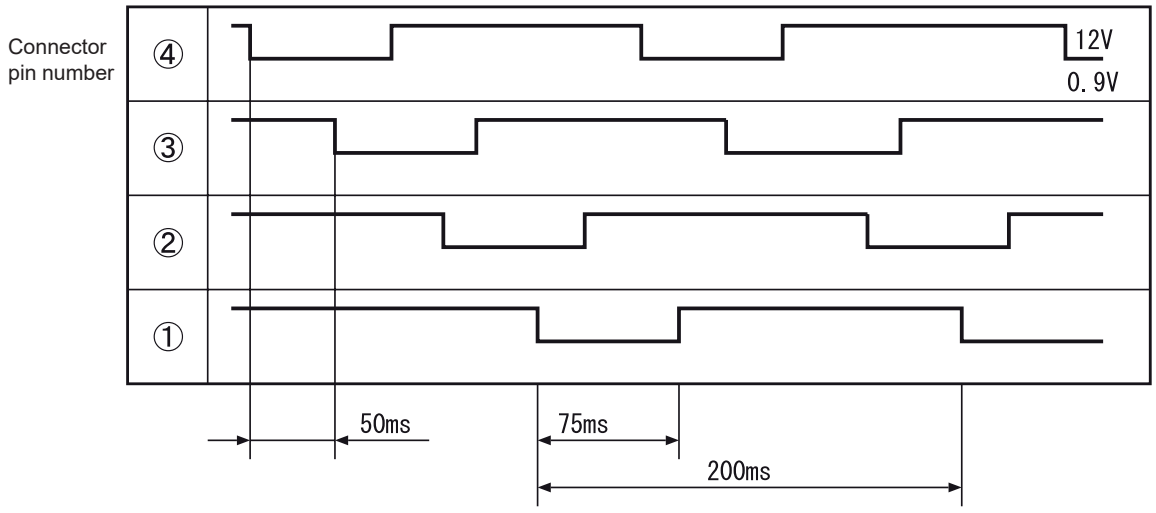
Figure below shows logic waveform when expansion valve is operating.

CN15 pin number	Wire	Drive status							
		1	2	3	4	5	6	7	8
①	WHT	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
②	YEL	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
③	ORG	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
④	BLU	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Operation mode

1→2→3→4→5→6→7→8 Valve close

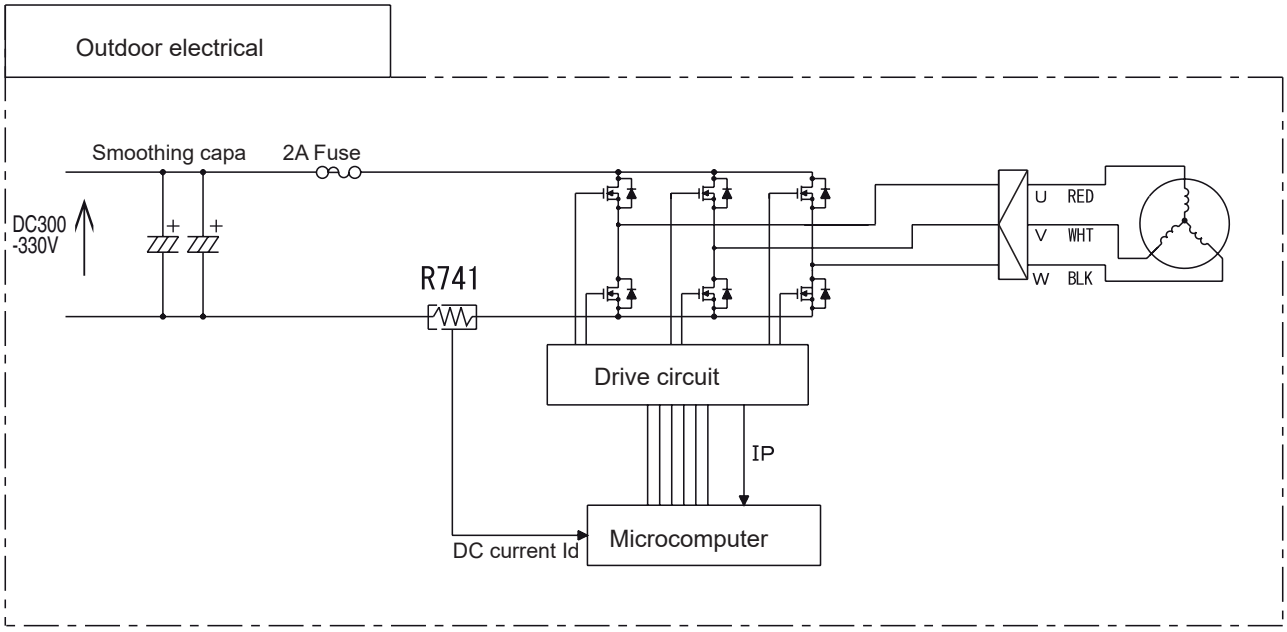
8→7→6→5→4→3→2→1 Valve open



With expansion valve control, opening degree is adjusted to stabilize target temperature by detecting compressor head temperature. The period of control is about once per 20 seconds and output a few pulse.

4.1.7 DC fan motor control circuit

This model is built with DC fan motor control circuit inside outdoor electrical unit.



This DC fan motor is control by outdoor microcomputer that follow the operating instruction received from indoor microcomputer. The DC current that flow from R741 will presume actual operation speed and control the rotation to follow the operating instruction. Based on this DC current it will detect a over current and other fan motor failure.

◆ Fan motor speed controller during starting

Due to the interference of strong wind etc., operation movement is changed based on fan direction and rotation speed as shown below during starting of operation.

In addition, the fair wind is define as wind that blow to outside direction using Mouth Ring part.

- At strong and contrary wind: The rotational speed is not controlled as to protect the equipment and fan will rotate reversely depend on the wind. Automatically start when wind condition become weak.
- At contrary wind: The rotational speed is controlled in fair wind direction after it slowly reduce the speed and finally stop.
- At fair wind: The rotational speed is controlled as it is.
- At strong fair wind: The rotational speed is not controlled as to protect the equipment and fan will rotate in the normal direction depend on the wind. Automatically start when wind condition become weak.

◆ Fan motor speed controller during unit operating

There is a case where fan rpm is reducing during rotating caused by interference of strong wind.

If this condition continue in long period, fan will stop rotating. (LD301 : 11 times blinking) The unit will restart according to control as per during start (1).

◆ Method of confirming self diagnosis LD301 lamp: 12 times blinking.

If the unit stop and LD301 on the PCB blinking 12 times (fan lock stop is detected), follow below steps to confirm it.

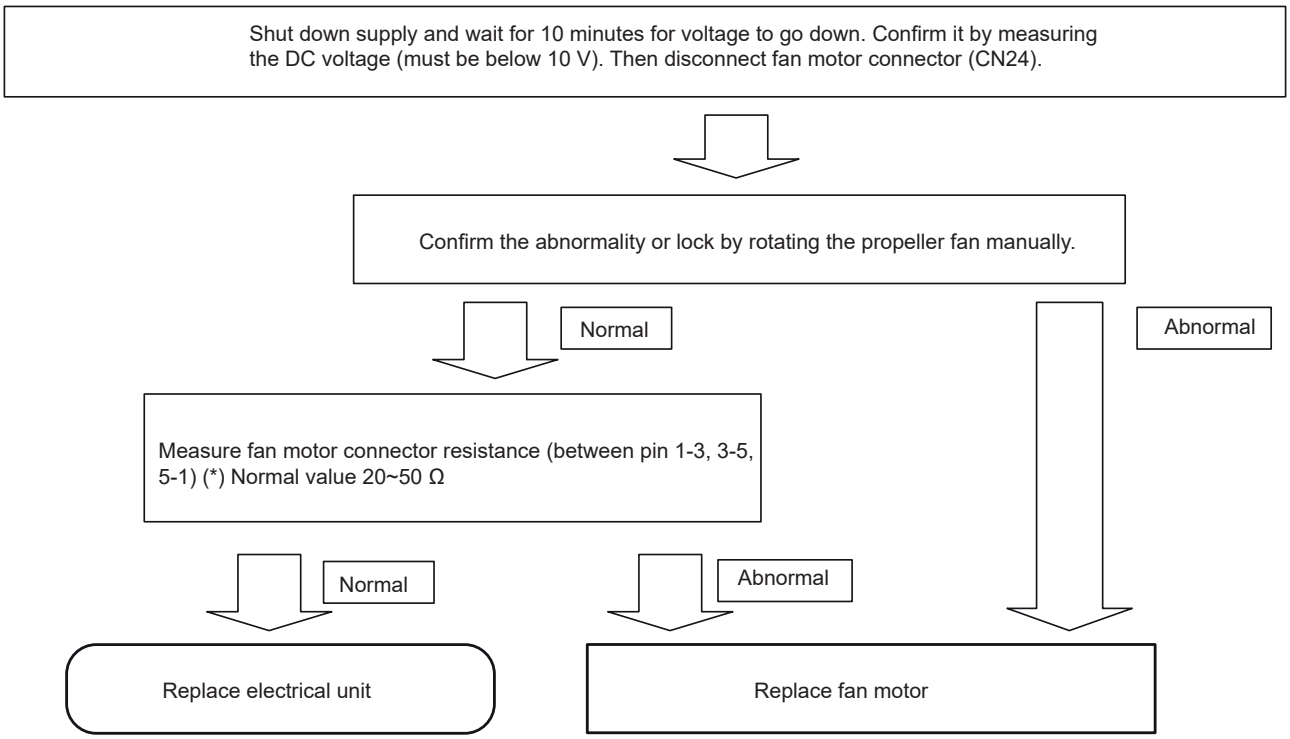
1 Fan lock stop is detected when something has disturb the fan rotation by inserting material into propeller fan or ice has growing inside outdoor unit caused by snow. Remove it if found something is blocking the fan.

2 Confirmed that CN24 connector is securely inserted. Fan lock stop is detected also when connector is not properly inserted. Please securely insert if found any disconnection.

3 Fan lock stop also can be detected where strong wind blown surrounding the unit. Please confirm after restart the unit. (It may take few minutes to operate the compressor). It is not a malfunction of electrical unit or fan motor if the unit run continuously after restart the unit.

4 Check fan motor condition as below procedure.

Checking Fan Motor procedure



Reconnect again fan motor connector (CN24).

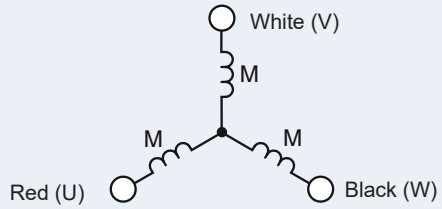
NOTE

(*) Please confirm above checking procedure if found 2A fuse blown. If fan motor is broken, replace both electrical unit and fan motor.

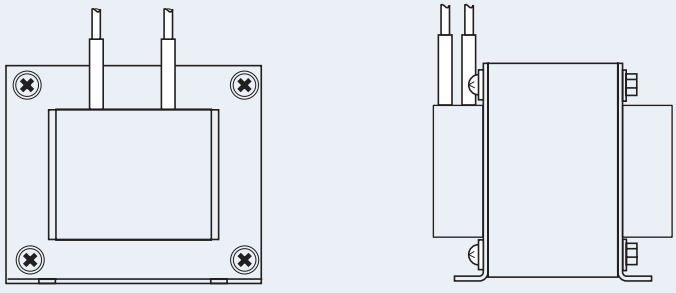
CAUTION

- *Beware of electric shock due to high voltage when conducting an operation check.*
- *Power supply for DC fan motor and compressor is common (DC300~330V).*

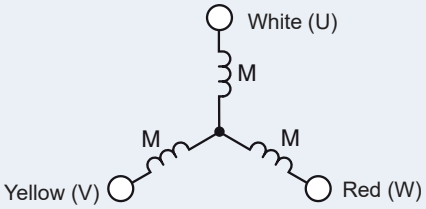
4.1.8 Fan motor

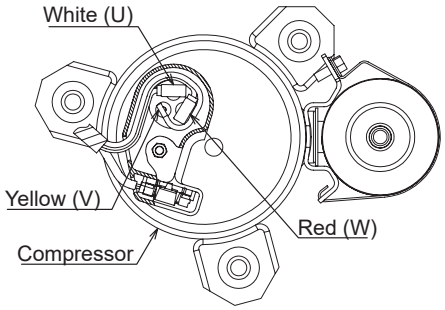
Power source	DC: 120 - 380 V
Output	47 W
Connection	

4.1.9 Reactor

Rating	15 (mH) 250 mΩ MAX (20 ºC)
	

4.1.10 Compressor motor

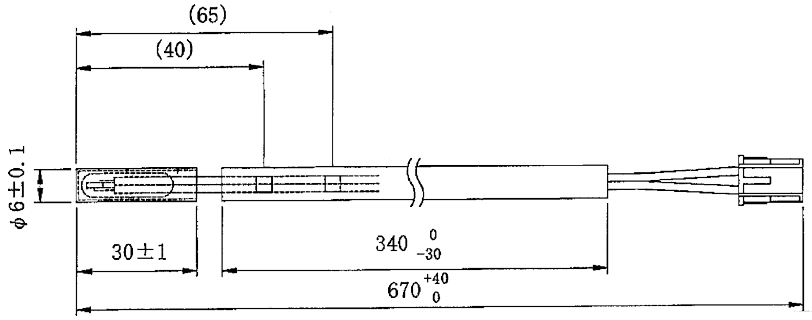
Compressor type	ASD102SKQA6JK6
Power source	220 - 350 V
Output	840 W
Connection	
Resistance value	2 M= 2.167

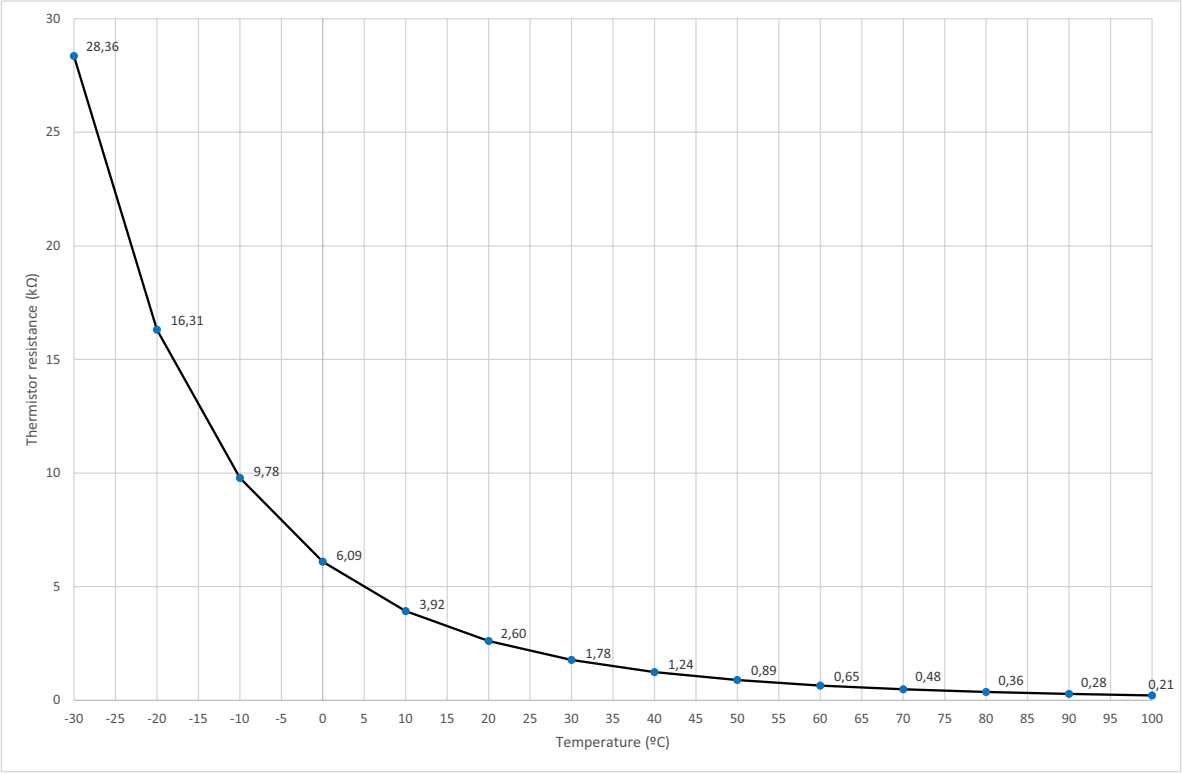


⚠ CAUTION

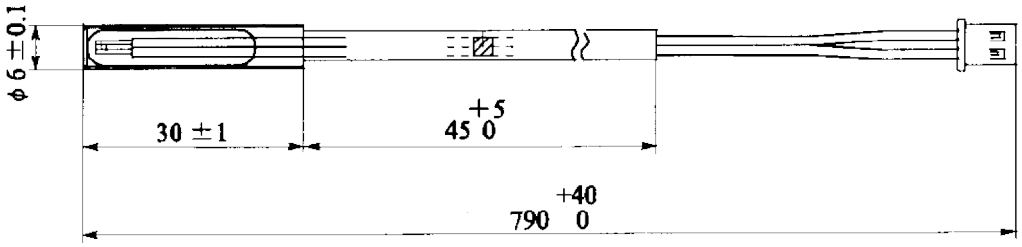
When the refrigerating cycle has been operated for a long time with the capillary tubes clogged or crushed or with too little refrigerant, check the colour of the refrigerating machine oil inside the compressor. If the colour has been changed conspicuously, replace the compressor.

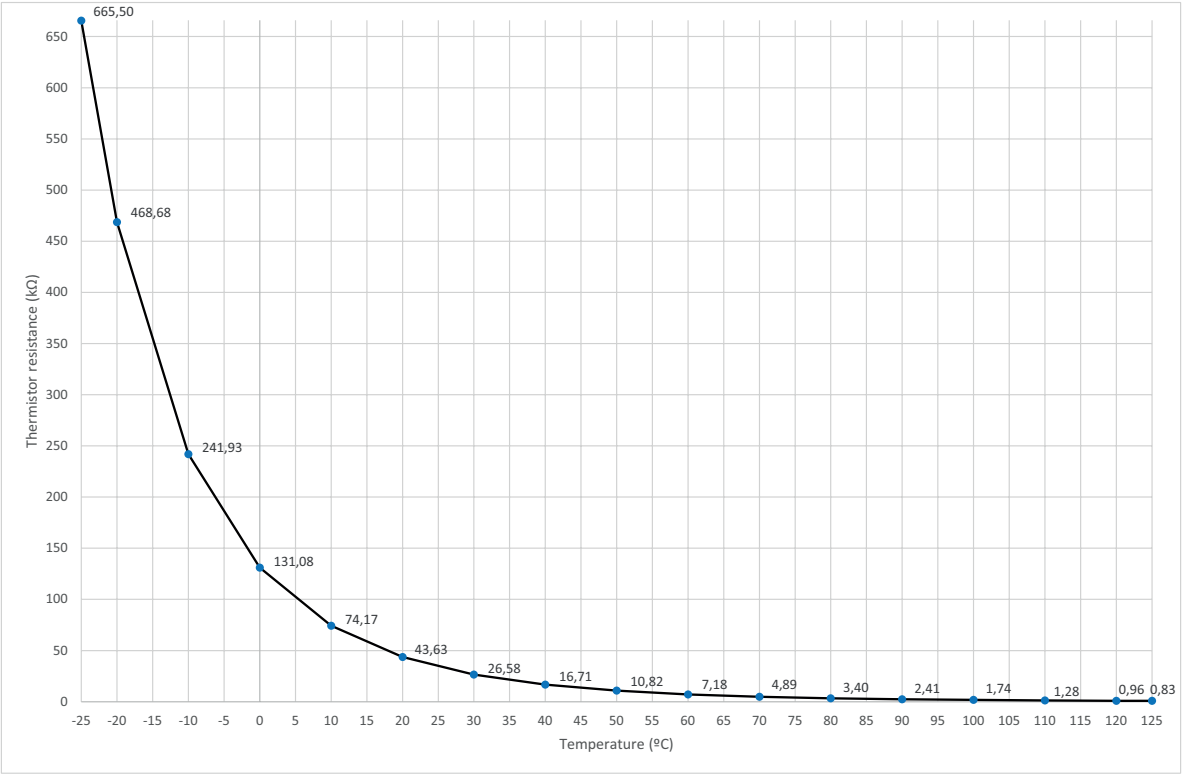
4.1.11 Thermistor for outside air temperature (Ta)



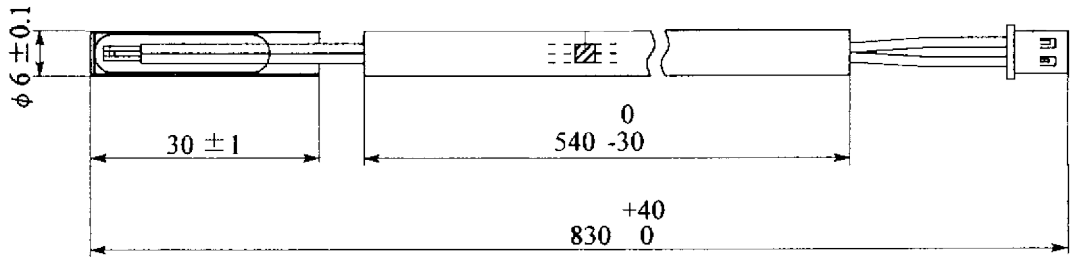


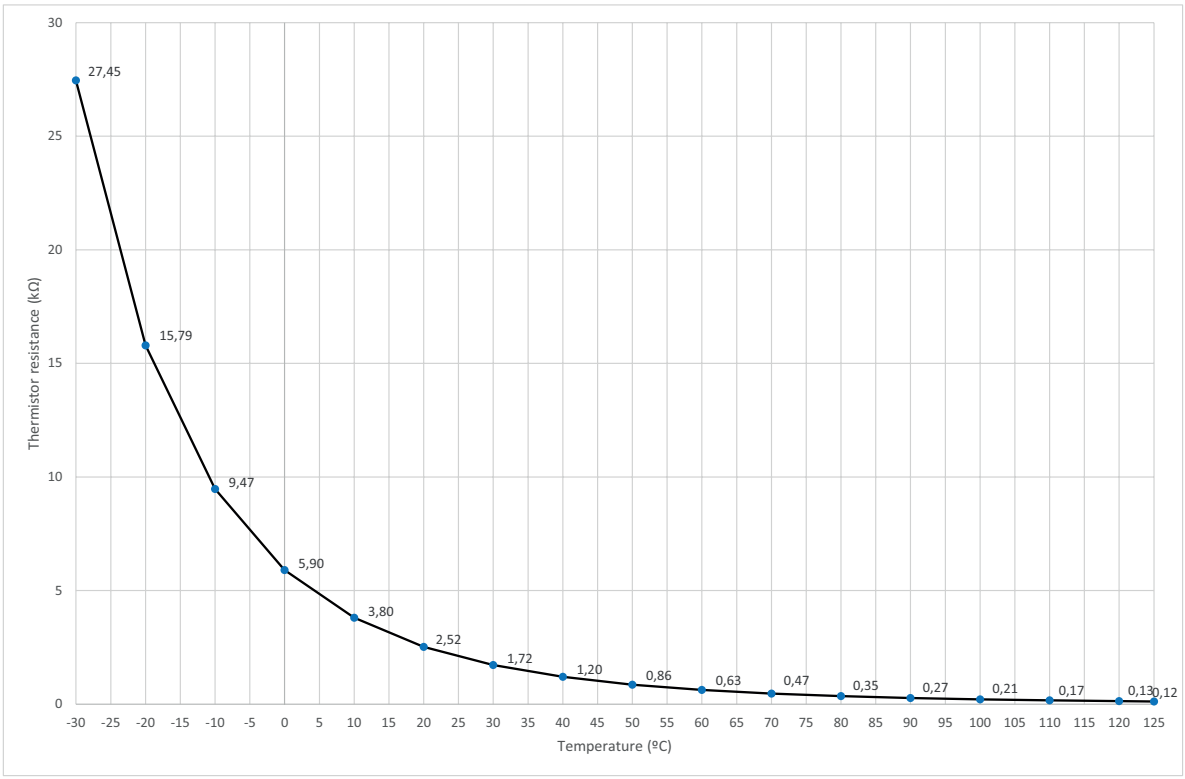
4.1.12 Thermistor for overheat temperature (Td)





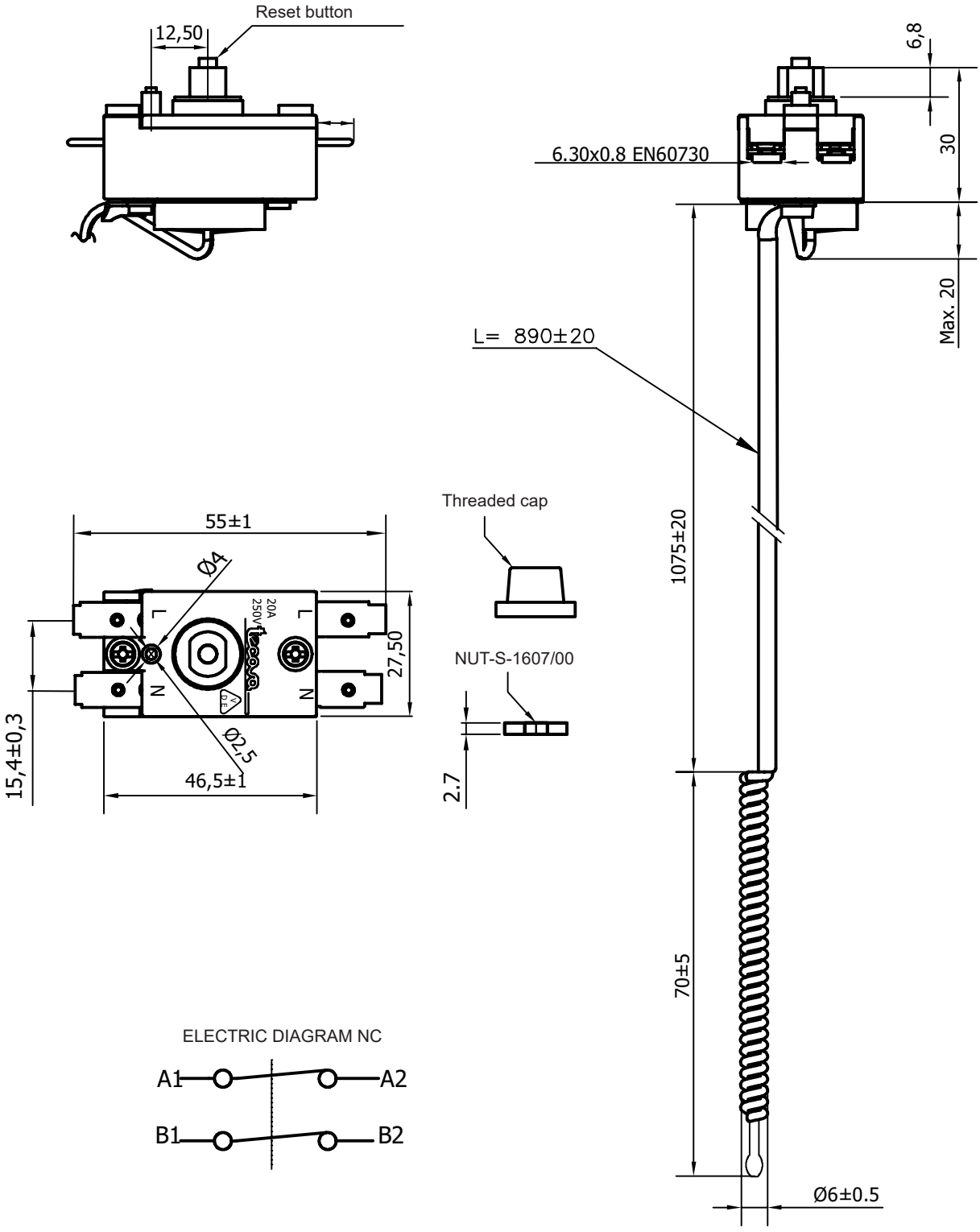
4.1.13 Thermistor for defrost (HEX) temperature (Te)





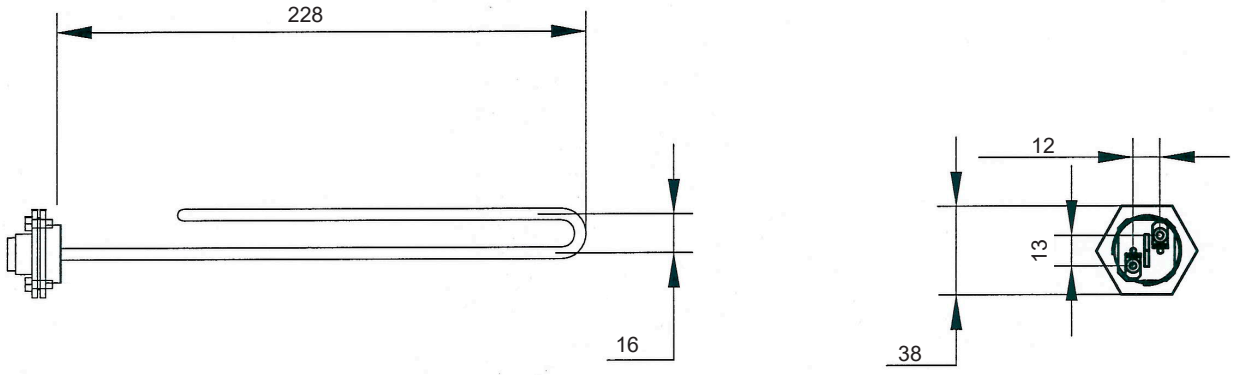
4.2 Indoor unit

4.2.1 Safety thermostat (water temperature safety device)



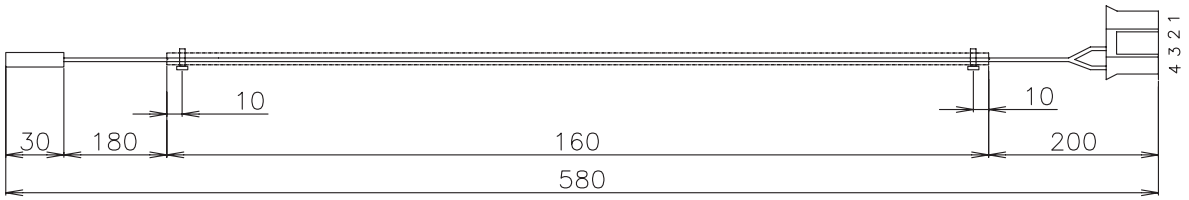
Disconnection temperature	90+/-5ºC
Rated current	20 A
RESET button	The appliance can not connect again until the bulb doesn't fall 50ºC at least

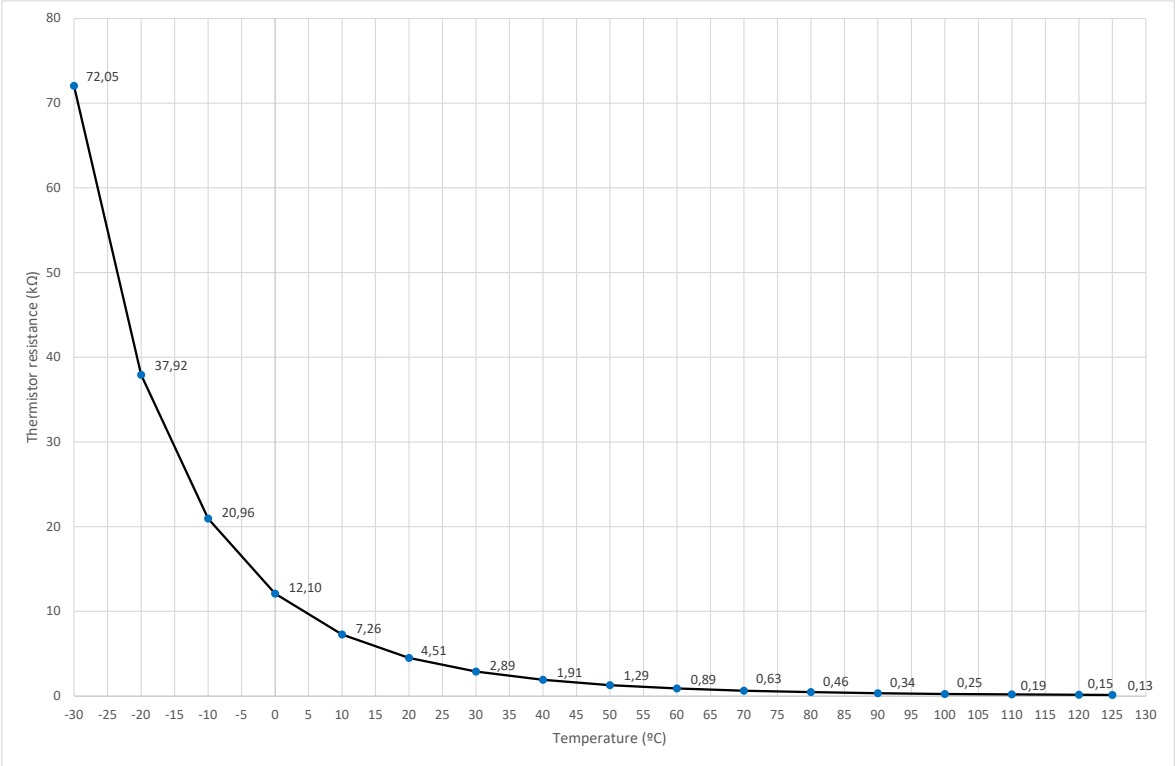
4.2.2 Electrical heater



Resistance value (Ω)	30~36 Ω
Capacity	1.64 kW
Power supply	1 ~ 230 V 50 Hz

4.2.3 DHW Thermistor





HITACHI

5. Servicing

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5.2.7 Replacing the Mg Anode rod 56

DANGER

- *Disconnect the units from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.*
- *Wait minimum 10 minutes or more from all power supplies have been turned OFF.*
- *When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components.*
- *In case of replacing Hydraulic parts, drain water from the unit its needed. Close Shutdown valves and open the drain valves (both field-supplied).*

CAUTION

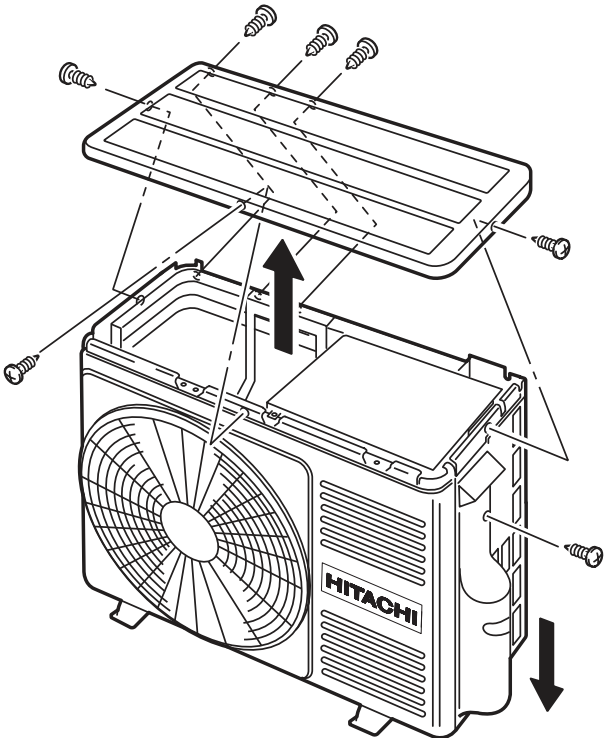
- *In case of replacing refrigerant parts, collect refrigerant to the outdoor unit by pump down procedure.*
- *Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing refrigerant parts, replace it quickly. If exposed for a long period, seal the liquid pipe and gas pipe.*
- *All refrigerant parts are connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections, if not, oil existing pipe inside may ignite.*
- *When performing brazing work, besides security gloves it is a must to wear convenient eye protection.*
- *In case of blocked or stacked parts, use appropriated tools and eventually lubricants to release them.*
- *In case of sharped edged parts, as covers, use security gloves to avoid getting injured.*
- *Take care with the LCD display of the unit controller while removing the frame.*
- *Pay attention of no falling off the service cover.*
- *Take care when removing service cover; the parts inside the unit could be hot.*
- *Before power on the unit, fill the DHW tank with water following the procedure described in section "Filling the DWH tank with water".*

5.1 Outdoor unit

5.1.1 Procedure for disassembly and reassembly the outdoor unit

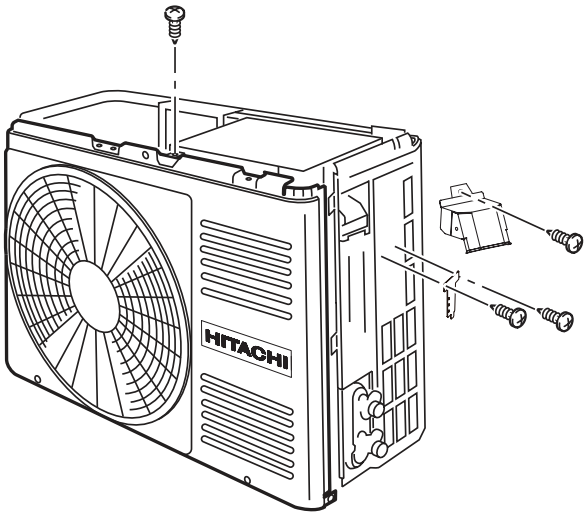
1 Remove the service valve cover lock screws and lower the cover to remove it.

2 Remove the top cover lock screw and raise the cover to remove it.



3 Remove the electrical box lock screw.

4 Remove the terminal cover lock screw.



5 Remove each connector and earth cable from the lead wire. Then,remove the electrical box .

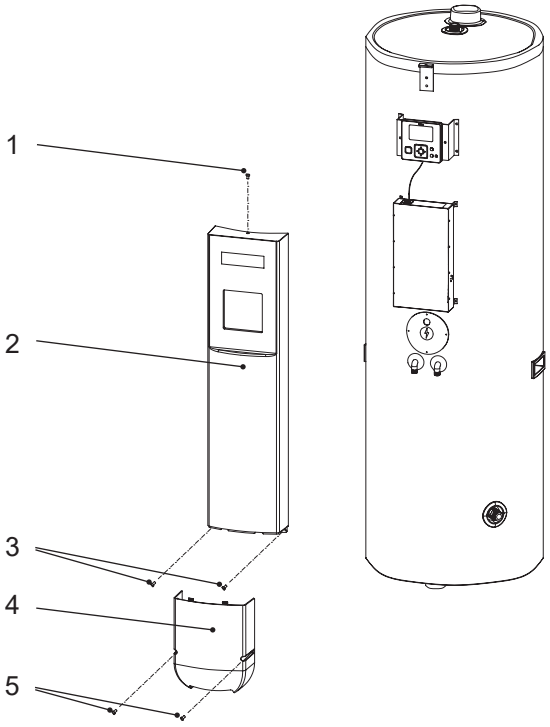
5.2 Indoor unit

5.2.1 Removing the service cover

1 Unscrew the 2 screws which are fixed to the lower front cover and remove it.

2 Unscrew the 2 screws on the bottom of the upper front cover.

3 Unscrew the screw on the top of the upper front cover and remove it.



⚠ CAUTION

- *Take care, do not damage the LCD when removing the service cover.*
- *Pay attention of no falling off the service cover.*
- *Take care when removing service cover; the parts inside the unit could be hot.*

NOTE

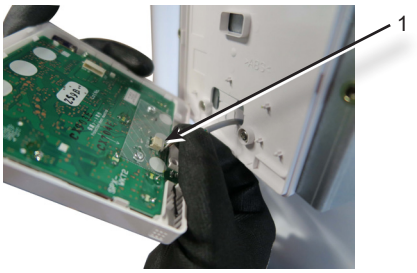
- *When reassembling, proceed in reverse way than disassembling.*
- *Please note that for the maintenance operations described below, it will be necessary to remove the maintenance cover as a first step.*

5.2.2 Replacement of the LCD Controller

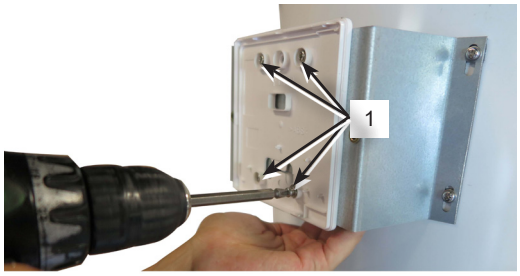
1 Insert the tip of a slotted screwdriver into the notches at the bottom of the holding bracket, push and turn the slotted screwdriver and then remove the holding bracket from the remote control switch.



2 Unplug the CN2 connector **-1-** from the LCD controller.



3 Remove the fixing screws (x4) **-1-** of the LCD controller to the tank.

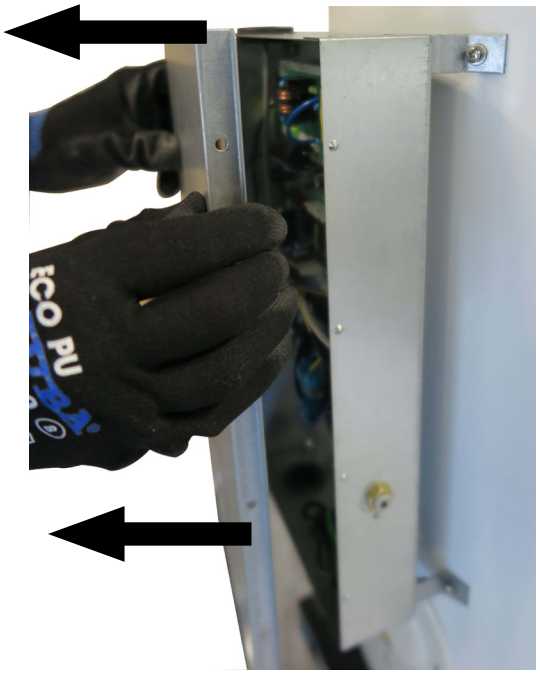


NOTE

When reassembling, proceed in reverse way than disassembling.

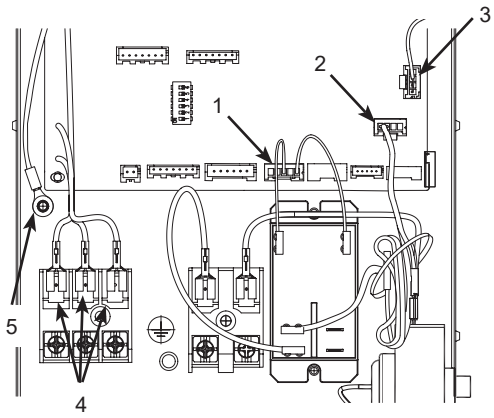
5.2.3 Replacement the PCB

1 Pull backwards to remove the ebox cover.

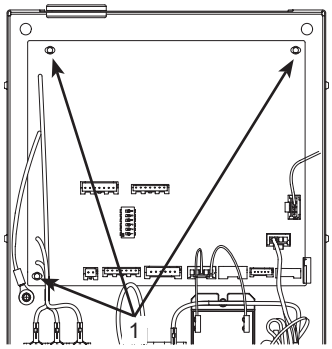


2 Unplug the following cables:

Id.	Description
1	CN15 Relay-AR
2	CN4 Thermistor
3	CN20 LCD Controller
4	TB1 Transmission wiring
5	Earth



3 Clamp the middle part of the spacers (x3) **-1-** with long-nose pliers and remove the PCB toward front side.



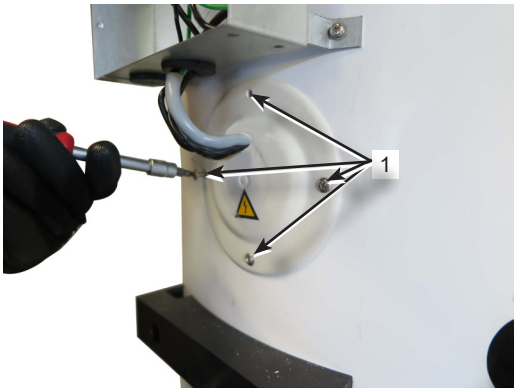
NOTE

When install new one, proceed in reverse way than disassembling.

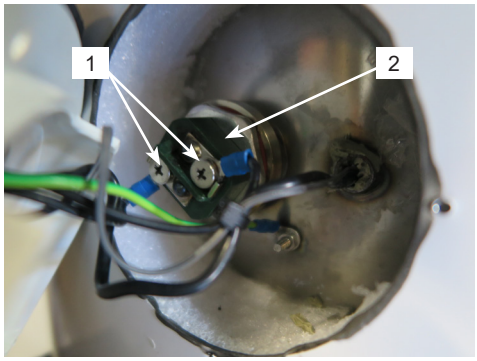
5.2.4 Replacement of the electrical heater

1 Drain the DHW tank as explained in section *"Draining of the DHW"*.

2 Remove the screws (x4) **-1-** of the heater cover.



3 Unscrew and disconnect the electric wires (N and L) **-1-** from the heater **-2-**.



4 Unscrew and remove the electric heater from the tank.



NOTE

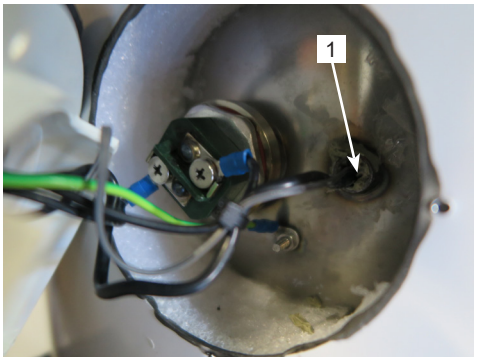
When install new one, proceed in reverse way than disassembling.

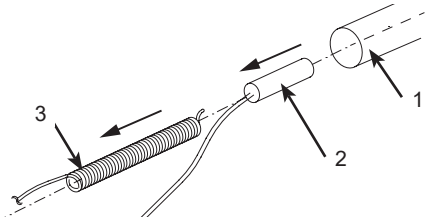
5.2.5 Replacement of the thermistor

1 Remove the screws (x4) of the heater cover and the heater cover.

2 Disconnect the thermistor from the PCB (CN4 connector).

3 Remove the thermostat bulb **-3-** and the thermistor **-2-** from the same sheath **-1-**.





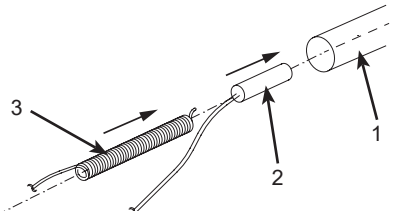
4 Install new one thermistor.

a. Insert the thermistor **-2-** through the hole of the heater cover.

b. Apply conductive silicon grease in the sheath **-1-** and thermistor **-2-** to guaranty the contact surface.

c. Insert the thermistor **-2-** inside the sheath.

d. Insert the thermostat bulb **-3-** inside the sheath **-1-**.



e. Connect the thermistor to the PCB (CN4 connector).

f. Mount the heater cover and fix it with the screws (x4).

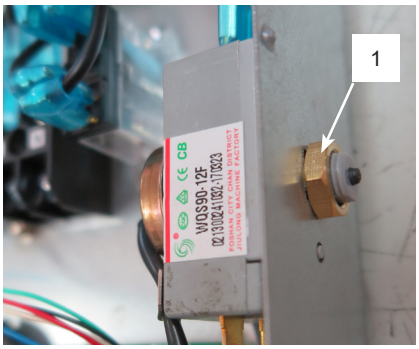
5

5.2.6 Replacement of the safety thermostat

The safety thermostat is used in case of water gets too hot.

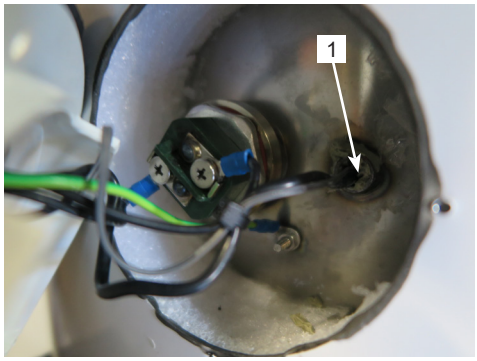
1 Open the ebox and disconnect all the terminals connected to the thermostat.

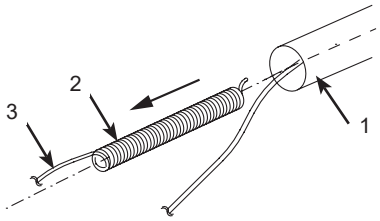
2 Remove the external nut **-1-** that fixes the thermostat to the electrical box.



3 Remove the screws (x4) of the heater cover and the heater cover.

4 Remove the thermostat bulb **-2-** and the capillary **-3-** from the sheath **-1-**.





5 Pass the thermostat bulb through the hole of the heater cover and remove the whole safety thermostat.

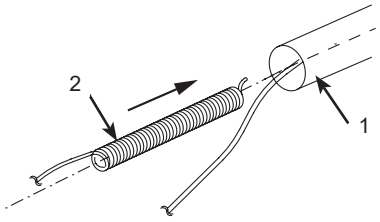


6 Install new one thermostat.

a. Insert the thermostat bulb and capillary through the hole of the heater cover.

a. Apply conductive silicon grease in the sheath **-1-** and thermostat bulb **-2-** to ensure the contact surface.

b. Insert the thermostat bulb **-2-** inside the sheath **-1-**.



c. Assembly the thermostat and fix it with the external nut.

d. Connect all the terminals to the thermostat in the same position as it was originally and close the ebox.

e. Mount the heater cover and fix it with the screws (x4).

5.2.7 Replacing the Mg Anode rod

1 Drain the DHW tank as explained in section *"Draining of the DHW"* in *"7. Maintenance notes"* chapter.

2 Remove the anode cover.



3 Loosen the anode rod with a M17 socket spanner.

4 Take out the anode rod from the tank and replace it if it is necessary.

6. Troubleshooting

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6.1 Outdoor unit

6.1.1 Discharge procedure and power shut off method for power circuit

DANGER

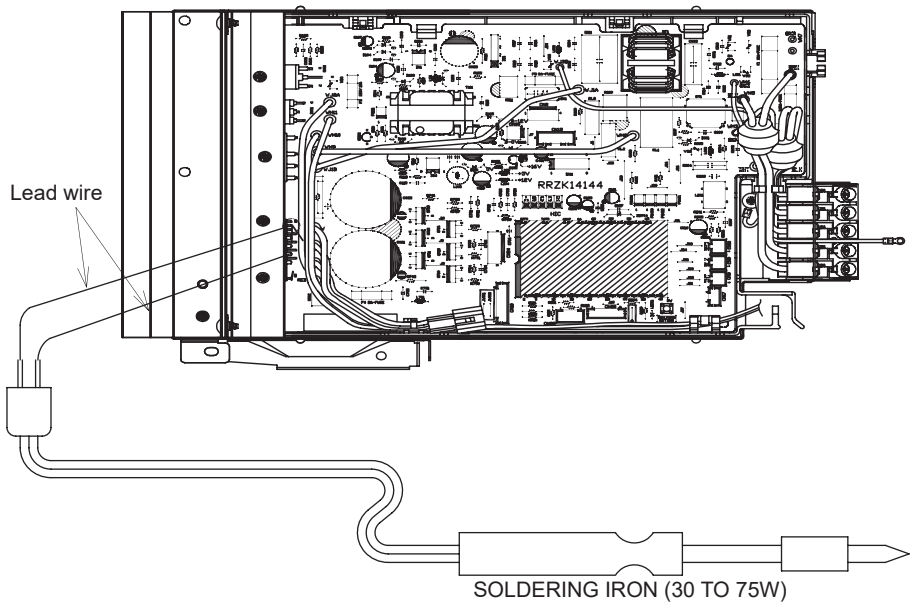
Voltage of about 350 V is charged between the terminal of smoothing capacitors.
During continuity check for each circuit part of the outdoor unit, be sure to discharge the smoothing capacitors.

◆ Discharge Procedure

1 Turn off the power.

2 After power is turned off, wait for 10 minutes or more. Then, remove electrical parts cover and apply soldering iron of 30 to 75 W for 15 seconds or more to IPM(24) and IPM (20) terminals on the main PCB as shown in the figure below, in order to discharge voltage in smoothing capacitor.

Do not use a soldering iron with transformer: Otherwise, thermal fuse inside transformer will be blown.

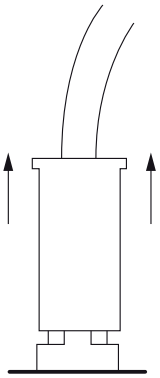


◆ Disconnection of tab terminal receptor

All receptors used to connect with tab terminal are built with lock mechanism. Please take note that by using a force to pull out the receptor without releasing the lock, can cause a damage.

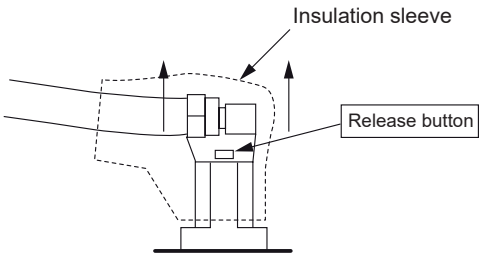
Furthermore, during connecting the receptor back make sure to securely insert until end.

Receptor type and procedure to releasing the lock



Vertical (with plastic casing)

Pull out by holding the plastic casing.



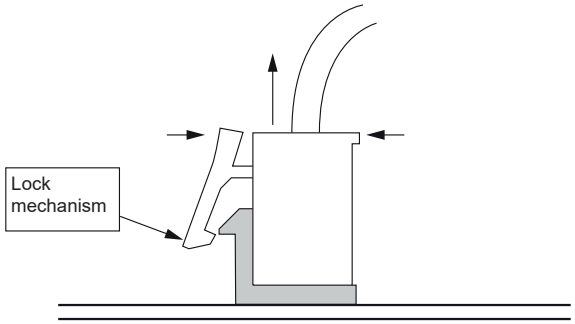
Horizontal (with a insulation sleeve)

Pull out from top of insulation sleeve while pushing the release button.

Disconnecting on board connector

On board connector with lock mechanism are widely used. Please take note that by using a force to pull out with out releasing the lock mechanism, can cause a damage.

Furthermore, during inserting back the connector make sure it surely done.



Release the lock with finger before disconnecting

Connector disconnection during discharge is prohibited

Disconnecting connector during discharge is extremely prohibited. Component on board and fan motor will damage. Proceed trouble shooting process after confirming smoothing capacitor of indoor & outdoor PCB has been discharged.

6.1.2 Troubleshooting support

Nº	Function	Description
1	Display on the outdoor unit side	• The failure mode detected on the outdoor unit side is displayed by blinking the “LD301”. Detecting a failure will stop the outdoor unit and keep blinking the LD301 until it is restarted. (The communication error will persist until the communication is reestablished.)
2	Self-diagnosis memory	• The failure modes detected on the indoor and outdoor unit sides are stored in the nonvolatile memory of the indoor unit and can be read later on. (The memory will remain even after power-off.) • Moreover, the normal self-diagnosis display function which rarely occurs will store and display failure modes that do not end up displaying the indoor unit lamp. (Any such mode may be unable to be stored if indoor or outdoor communications is in a failure.) • The product stores 5 last-stored failure modes. • There is a function for deleting memory. Once you clear the memory and run the product for several days, you can read the failure modes and check them, thereby detecting the less frequent failure phenomena. • Failure modes can be checked by both the blinking of the lamp of the outdoor unit and the display of the remote control liquid crystal display.

NOTE

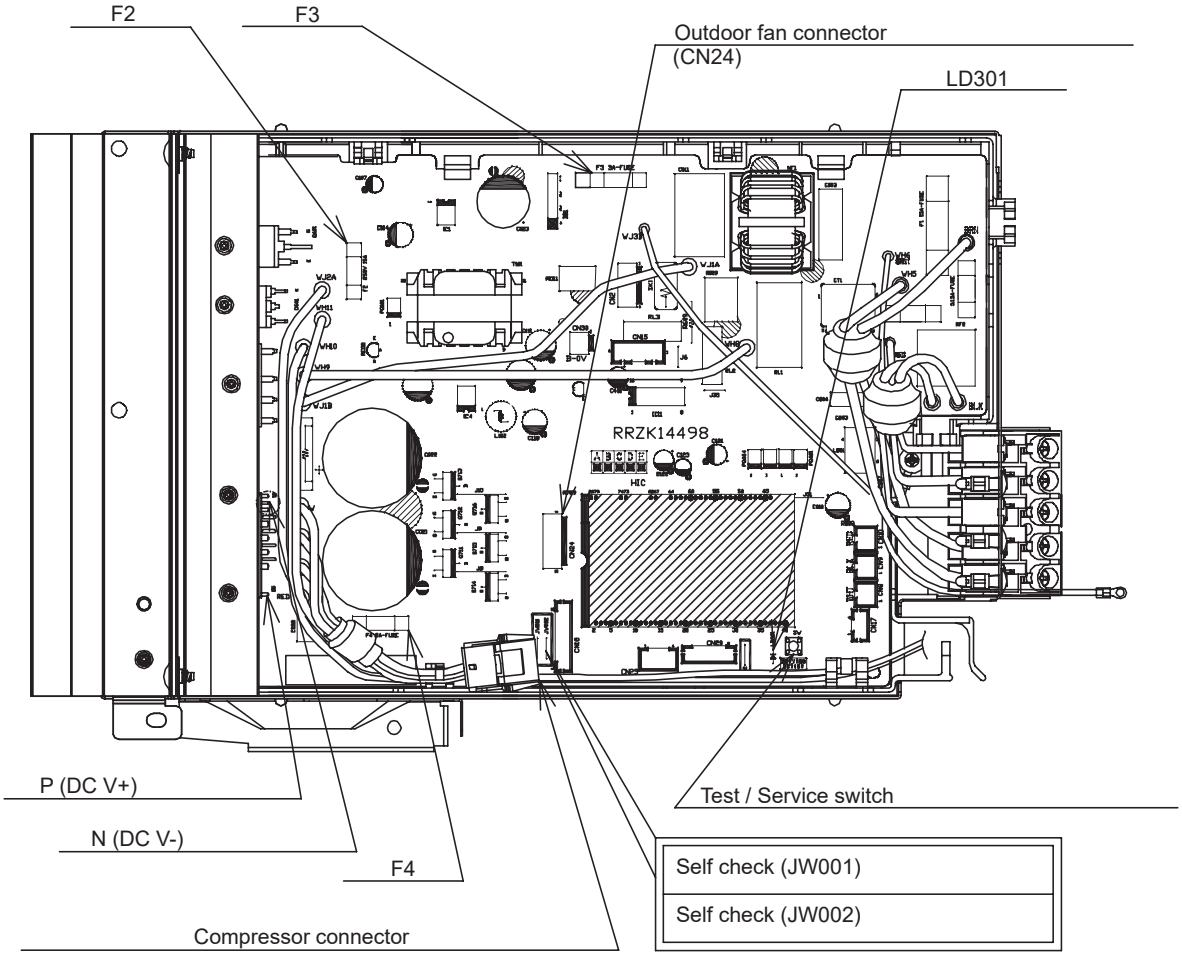
- *The “self-diagnosis function of the communication circuit” available in our conventional models is now incorporated as part of the normal self-diagnosis function.*
- *In the case of a failure in the communication circuit, you do not have to conduct a special operation and the operations can be automatically divided into 3 blinking operations and 12 blinking operations of the timer lamp.*

6.1.3 Self-diagnosis lighting mode

DANGER

- ***DC350V***
- ***CUT THE POWER SOURCE AND WAIT MORE THAN 10 MINUTES BEFORE SERVICE WORK.***

Confirm the DC Voltage at the measuring point shown in below figure must be less than 10V.



◆ Other check points

Diagnosis for reversing valve operation error:

- Check reversing valve wire connection either wire broken or not.
  - If it is OK check 3.15 A fuse.
  - If it is broken replace fuse or OU Controller.
- When display the communication error or the outdoor do not run at all.
  - Please check the continuity of the indoor - outdoor connecting cord (F cable).

During Stop

LD301	Self-Diagnosis Name
Light	Normal operation
2 sec lighting and 0.3 sec lights out repetition	Overload operation (normal operation)

◆ Outdoor fan motor check diagnosis method

1 Put the power off.

2 Remove the outdoor fan motor's connector from CN24.

3 Rotate the fan motor by hand and check whether the fan motor is locked or not.

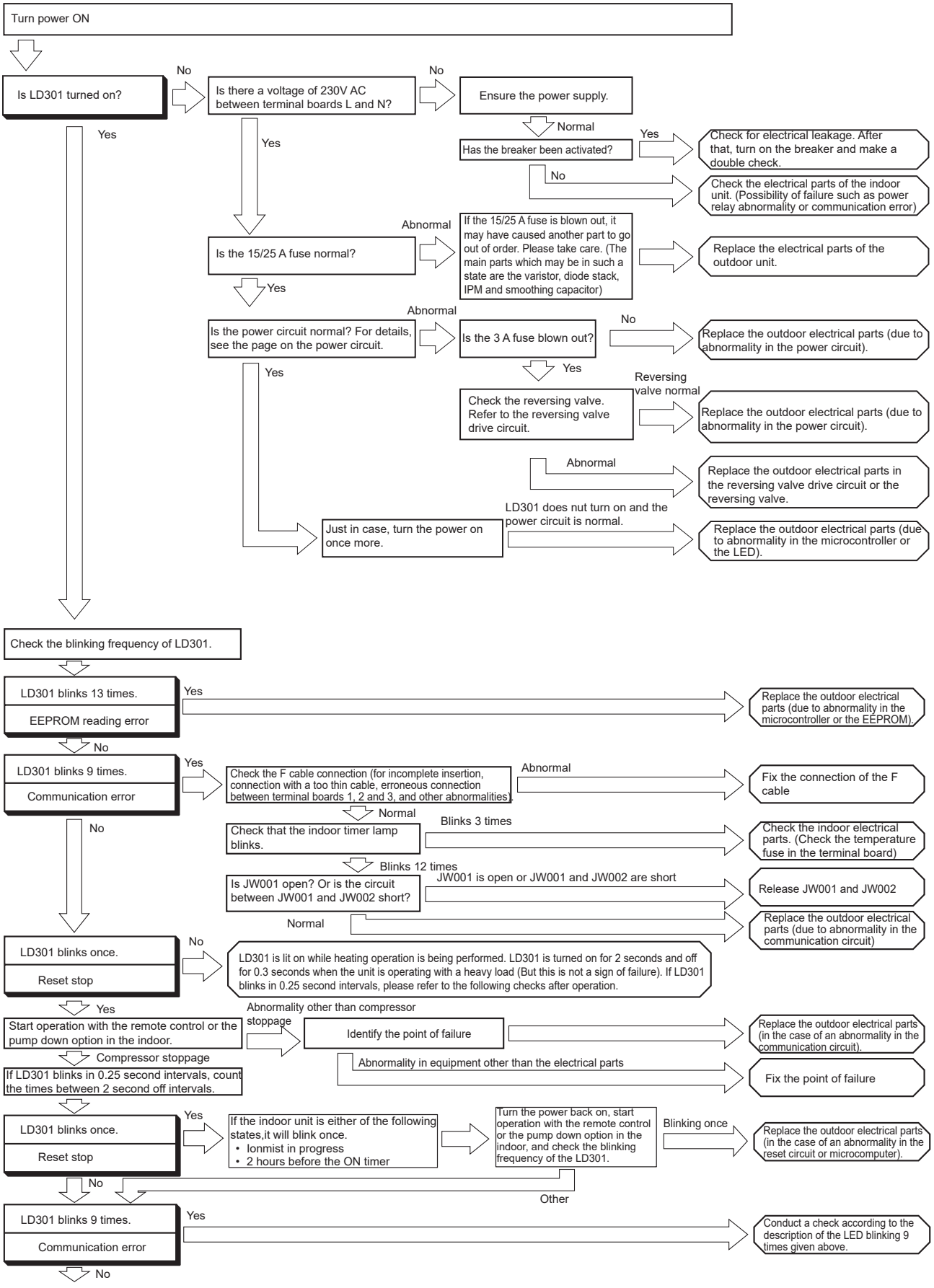
4 Measure the resistance between each terminal of the fan motor connector. Normal resistance between each terminal: 60 ~ 100 Ω

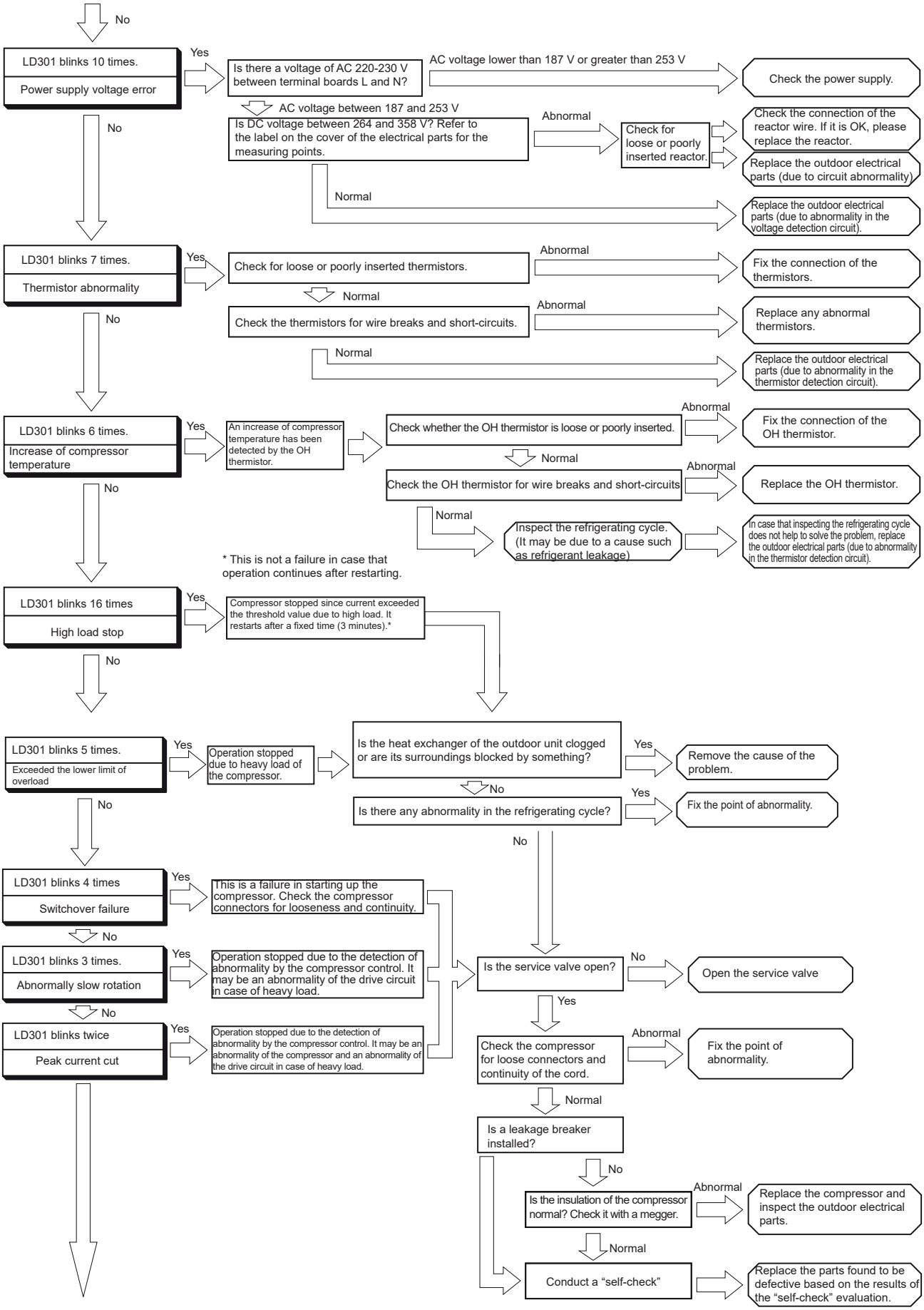
5 Insert the fan motor's connector.

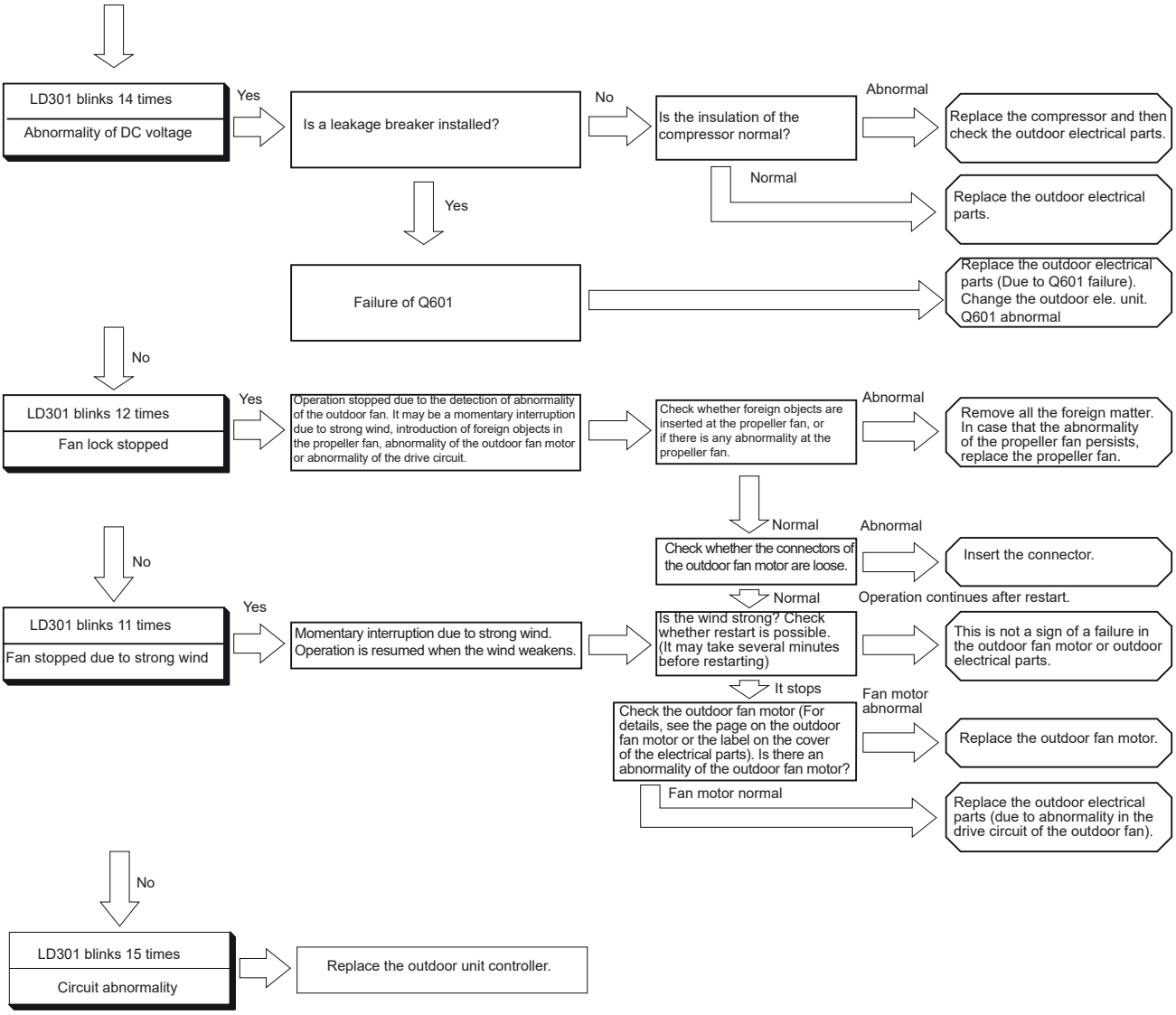
◆ During stop: Self-diagnosis blinking mode

LD301 (red) Blinking times	Self-diagnosis contents	Main check point	How to repair
OFF	Normal stop (Stopped by the indoor thermostat or due to main operation OFF)	1. No need to check	1. No malfunction
ONCE	Reset stop	1. Microprocessor was rebooted	1. Replace the outdoor unit controller.
2 times	Exceeded peak current	1. Failure of the outdoor unit controller 2. Abnormal compressor load	1. Replace the outdoor unit controller. 2. Check the compressor.
3 times	Abnormally low rotation speed	1. Failure of the outdoor unit controller 2. Abnormal compressor load	1. Replace the outdoor unit controller. 2. Check the compressor.
4 times	Switching failure	1. Compressor connector out of place 2. Abnormal compressor load 3. Failure of the outdoor unit controller	1. Insert the connector properly. 2. Check the compressor. 3. Replace the outdoor unit controller.
5 times	Exceeded overload limit	1. Obstruction of the surroundings of the outdoor unit 2. Other causes	1. Remove the cause of obstruction. 2. Check the cycle piping.
6 times	Temperature increase of the OH thermistor	1. Defective insertion of connector 2. Refrigerant leakage 3. Other causes	1. Insert the connector properly. 2. Check the cycle piping and recharge refrigerant. 3. Replace the outdoor unit controller.
7 times	Thermistor abnormality	1. Defective insertion of connector 2. Disconnection or short-circuit of thermistor wiring 3. Failure of the outdoor unit controller	1. Insert the connector properly. 2. Replace the thermistor. 3. Replace the outdoor unit controller.
9 times	Communication error	1. Wrong connection of the F cable 2. Disconnection of the F cable 3. Failure of the outdoor unit controller 4. Failure of the indoor unit controller	1. Connect the F cable properly. 2. Replace the F cable. 3. Replace the outdoor unit controller. 4. Replace the indoor unit controller.
10 times	Power source abnormality	1. Defective connection of the reactor 2. Abnormal AC input: Out of the range (230 V ±10%) 3. Normal AC input	1. Connect the reactor properly. 2. Connect to a normal AC power source. 3. Replace the outdoor unit controller.
11 times	Stop of the outdoor unit fan due to strong wind	1. Temporary stop of the outdoor fan due to strong wind	1. Automatic restart when the wind slows down.
12 times	Outdoor fan lock error	1. Temporary stop of the outdoor fan due to strong wind 2. Propeller fan lock 3. Outdoor fan motor lock 4. Outdoor fan motor OK	1. Automatic restart when the wind slows down. 2. Remove the foreign body. 3. Replace the fan motor. 4. Replace the outdoor unit controller.
13 times	EEPROM read error	Replace the outdoor unit controller	
14 times	DC voltage abnormality	1. Abnormality of the outdoor unit controller 2. Abnormal compressor load	1. Replace the outdoor unit controller. 2. Check the compressor.
15 times	Circuit abnormal	Replace the outdoor unit controller	
16 times	High load stop	1. Service valve closed 2. Obstruction of the surroundings of the outdoor unit	1. Check the service valve. 2. Remove the cause of obstruction.

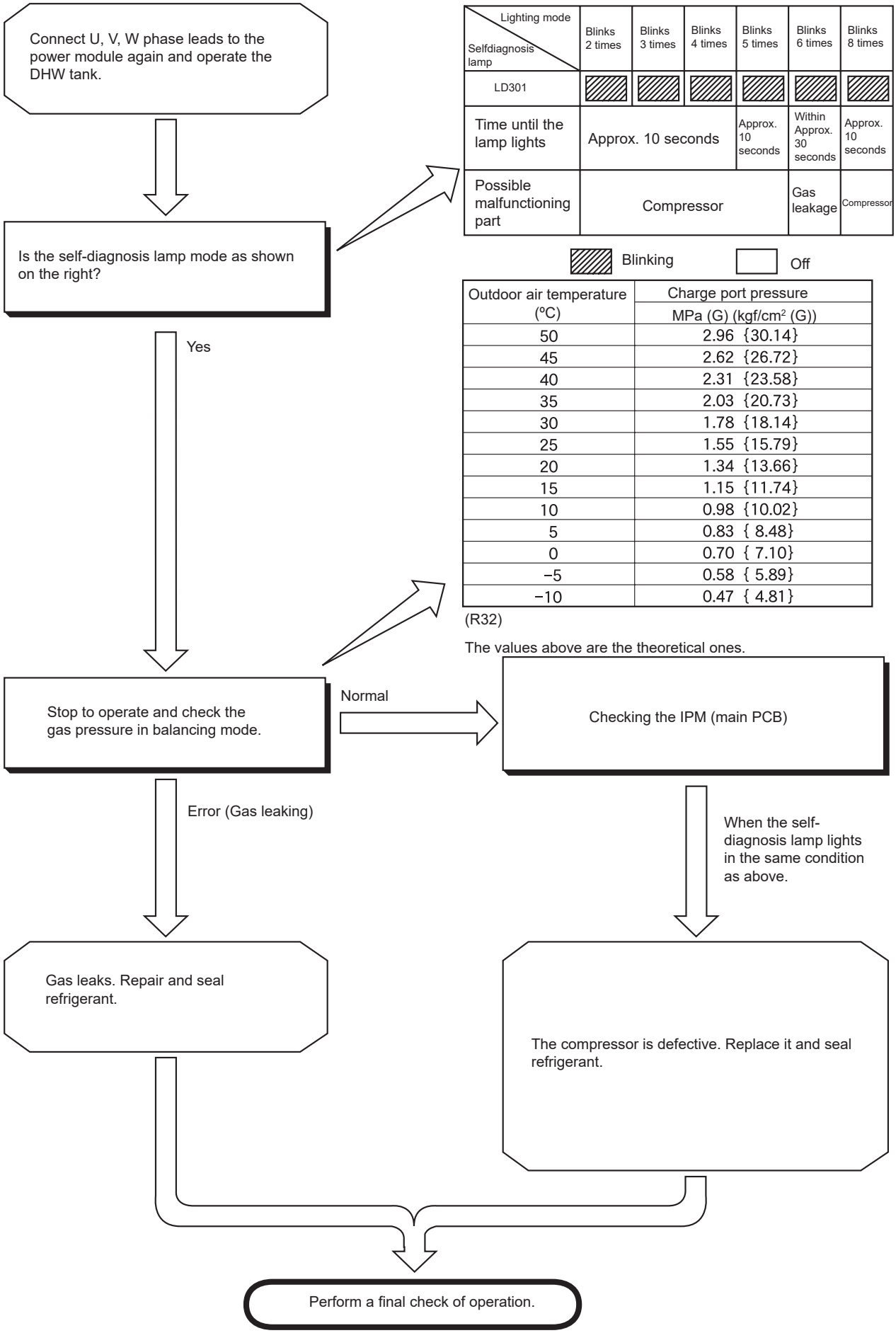
6.1.4 Checking the electrical parts of the outdoor unit




No
LD301 blinks 10 times.
Power supply voltage error
Yes
Is there a voltage of AC 220-230 V between terminal boards L and N?
AC voltage lower than 187 V or greater than 253 V
Check the power supply.
AC voltage between 187 and 253 V
Is DC voltage between 264 and 358 V? Refer to the label on the cover of the electrical parts for the measuring points.
Abnormal
Check for loose or poorly inserted reactor.
Check the connection of the reactor wire. If it is OK, please replace the reactor.
Replace the outdoor electrical parts (due to circuit abnormality)
Normal
Replace the outdoor electrical parts (due to abnormality in the voltage detection circuit).
No
LD301 blinks 7 times.
Thermistor abnormality
Yes
Check for loose or poorly inserted thermistors.
Abnormal
Fix the connection of the thermistors.
Normal
Check the thermistors for wire breaks and short-circuits.
Abnormal
Replace any abnormal thermistors.
Normal
Replace the outdoor electrical parts (due to abnormality in the thermistor detection circuit).
No
LD301 blinks 6 times.
Increase of compressor temperature
Yes
An increase of compressor temperature has been detected by the OH thermistor.
Check whether the OH thermistor is loose or poorly inserted.
Abnormal
Fix the connection of the OH thermistor.
Normal
Check the OH thermistor for wire breaks and short-circuits
Abnormal
Replace the OH thermistor.
Normal
Inspect the refrigerating cycle. (It may be due to a cause such as refrigerant leakage)
In case that inspecting the refrigerating cycle does not help to solve the problem, replace the outdoor electrical parts (due to abnormality in the thermistor detection circuit).
No
* This is not a failure in case that operation continues after restarting.
LD301 blinks 16 times
High load stop
Yes
Compressor stopped since current exceeded the threshold value due to high load. It restarts after a fixed time (3 minutes).*
No
LD301 blinks 5 times.
Exceeded the lower limit of overload
Yes
Operation stopped due to heavy load of the compressor.
Is the heat exchanger of the outdoor unit clogged or are its surroundings blocked by something?
Yes
Remove the cause of the problem.
No
Is there any abnormality in the refrigerating cycle?
Yes
Fix the point of abnormality.
No
LD301 blinks 4 times
Switchover failure
Yes
This is a failure in starting up the compressor. Check the compressor connectors for looseness and continuity.
No
LD301 blinks 3 times.
Abnormally slow rotation
Yes
Operation stopped due to the detection of abnormality by the compressor control. It may be an abnormality of the drive circuit in case of heavy load.
No
LD301 blinks twice
Peak current cut
Yes
Operation stopped due to the detection of abnormality by the compressor control. It may be an abnormality of the compressor and an abnormality of the drive circuit in case of heavy load.
Is the service valve open?
No
Open the service valve
Yes
Check the compressor for loose connectors and continuity of the cord.
Abnormal
Fix the point of abnormality.
Normal
Is a leakage breaker installed?
No
Is the insulation of the compressor normal? Check it with a megger.
Abnormal
Replace the compressor and inspect the outdoor electrical parts.
Normal
Conduct a “self-check”
Replace the parts found to be defective based on the results of the “self-check” evaluation.


LD301 blinks 14 times
Abnormality of DC voltage
Yes
Is a leakage breaker installed?
No
Is the insulation of the compressor normal?
Abnormal
Replace the compressor and then check the outdoor electrical parts.
Normal
Replace the outdoor electrical parts.
Yes
Failure of Q601
Replace the outdoor electrical parts (Due to Q601 failure). Change the outdoor ele. unit. Q601 abnormal
No
LD301 blinks 12 times
Fan lock stopped
Yes
Operation stopped due to the detection of abnormality of the outdoor fan. It may be a momentary interruption due to strong wind, introduction of foreign objects in the propeller fan, abnormality of the outdoor fan motor or abnormality of the drive circuit.
Check whether foreign objects are inserted at the propeller fan, or if there is any abnormality at the propeller fan.
Abnormal
Remove all the foreign matter. In case that the abnormality of the propeller fan persists, replace the propeller fan.
Normal
Check whether the connectors of the outdoor fan motor are loose.
Abnormal
Insert the connector.
No
LD301 blinks 11 times
Fan stopped due to strong wind
Yes
Momentary interruption due to strong wind. Operation is resumed when the wind weakens.
Normal
Operation continues after restart.
Is the wind strong? Check whether restart is possible. (It may take several minutes before restarting)
This is not a sign of a failure in the outdoor fan motor or outdoor electrical parts.
It stops
Check the outdoor fan motor (For details, see the page on the outdoor fan motor or the label on the cover of the electrical parts). Is there an abnormality of the outdoor fan motor?
Fan motor abnormal
Replace the outdoor fan motor.
Fan motor normal
Replace the outdoor electrical parts (due to abnormality in the drive circuit of the outdoor fan).
No
LD301 blinks 15 times
Circuit abnormality
Replace the outdoor unit controller.

6.1.5 Checking the refrigerant cycle



Lighting mode / Selfdiagnosis lamp	Blinks 2 times	Blinks 3 times	Blinks 4 times	Blinks 5 times	Blinks 6 times	Blinks 8 times
LD301	▨	▨	▨	▨	▨	▨
Time until the lamp lights	Approx. 10 seconds			Approx. 10 seconds	Within Approx. 30 seconds	Approx. 10 seconds
Possible malfunctioning part	Compressor				Gas leakage	Compressor

▨ Blinking □ Off

Outdoor air temperature (°C)	Charge port pressure MPa (G) (kgf/cm² (G))
50	2.96 {30.14}
45	2.62 {26.72}
40	2.31 {23.58}
35	2.03 {20.73}
30	1.78 {18.14}
25	1.55 {15.79}
20	1.34 {13.66}
15	1.15 {11.74}
10	0.98 {10.02}
5	0.83 { 8.48}
0	0.70 { 7.10}
−5	0.58 { 5.89}
−10	0.47 { 4.81}

(R32)

The values above are the theoretical ones.

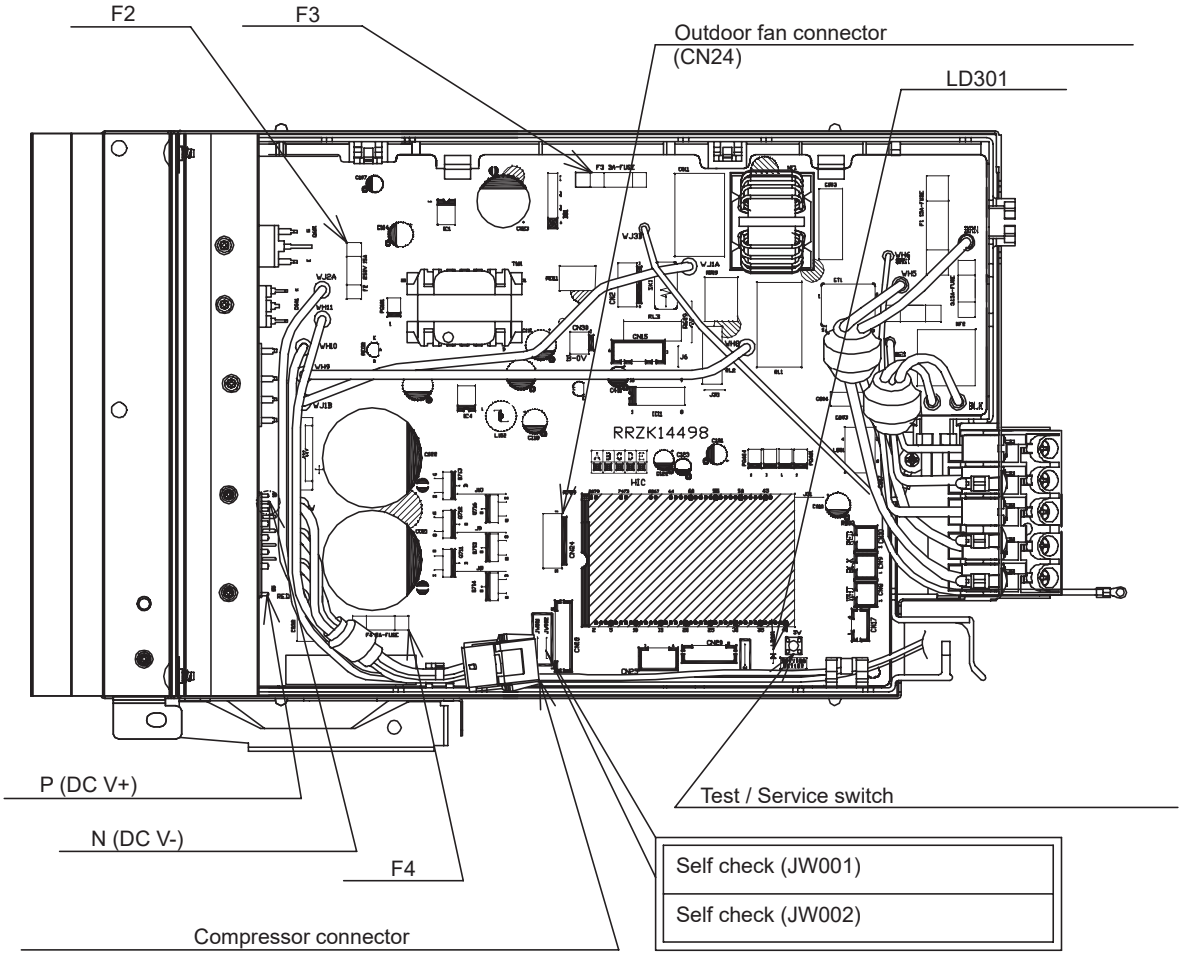
6.1.6 How to run the indoor unit with the outdoor unit test switch

If the indoor electrical parts is out of order and if you wish to run the outdoor unit.

1. Turn on the outdoor terminal boards L and N (220-230 V AC).
2. Confirm that the “LD301” blinks once from the terminal side of the outdoor unit. Afterwards (when about 30 sec elapses after the power turns on), confirm that the “LD301” changes to blinking 9 times (communication error).
3. When the “LD301” is blinks 9 times, if you press the test switch, the “LD301” lights up.
4. When you press the test switch again for 1 sec or longer, the unit stops the operation.

NOTE

- *If you press the test switch for 5 or longer, the self-check diagnosis starts. In this case, turn the power off and start the procedure from 1 again.*
- *For the initialization of the expansion valve, it may take 1 min until the operation starts.*



CAUTION

- *Applying power directly to the outdoor unit will cause a rush current to stress the outdoor unit.*
- *Before performing any of the service operations described in this chapter turn all the main switches off and the place security lockers or convenient warning indicators in order to prevent them from turning on accidentally.*
- *Do not under any circumstances run the product for more than 5 minutes.*
- *Doing work with the compressor connector removed will cause the LD301 to blink 4 times. It will not start.*
- *For another test run, turn off the breaker and turn it back on. (The test switch is accepted only once after power-on. After operation by remote control, it is not accepted.)*
- *When the operation with the test switch is over, turn off the breaker and set the connectors back.*

6.1.7 Service Call Q&A

HEATING MODE

Q1 Water comes out of the outdoor unit	A1 The outdoor unit discharges water during defrosting.

DEFROST

Q1 After the ON/OFF button is pressed to stop heating, the outdoor unit is still working and defrost icon will appear at the controller main screen	A1 Defrost is carried out: the system checks the outdoor heat exchanger and defrosts it as necessary before stopping operation.

OTHERS

Q1 Loud noise from the outdoor unit is heard when operation is started	A1 When operation is started, the compressor rotation speed goes to increase the heating capability, so noise becomes slightly louder. This does not indicate a fault.
Q2 Noise from the outdoor unit occasionally changes.	A2 The compressor rotation speed changes according to the difference between the thermostat set temperature and water temperature. This does not indicate a fault.
Q3 There is a difference between the Displayed water temperature and Actual water temperature.	A3 The temperature of the displayed water is a temperature lower in the tank. A temperature upper in the tank might be high.

6.2 Indoor unit

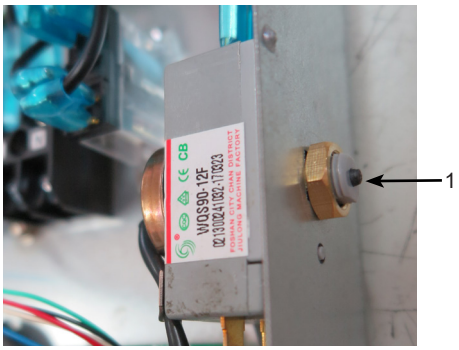
◆ Alarms through PC-ARFTE

Alarm code	Protection code	Outdoor unit LED301 Blinking times	Category	Type of abnormality	Main cause
03	-		Indoor	Transmission Alarm (Not outdoor unit detected)	Loose, disconnected, broken or short-circuited connector.
16	-		Indoor	DHW tank thermistor abnormally (THM_{DHWT})	Loose, disconnected, broken or short-circuited connector.
71	-		Indoor	Tank over-temperature limit protection	Failure of control relay.
80	-		Indoor	LCD controller transmission error	No H-link communication for a continuous period of 90 seconds between Indoor and LCD User control by connection wiring (breaking, wiring error, etc.).
102	P102	2 times	Outdoor unit	LCD controller has no power	Power supply problem or incorrect wiring. Failure of compressor or PCB. Pipe clogging, excessive refrigerant, innert gas mixing, fan motor locking at cooling operation.
103	P103	3 times	Outdoor unit	Abnormal Low Speed of the Compressor	Failure of compressor or PCB.
104	P104	4 times	Outdoor unit	Compressor Changeover Failure (Switching Failure)	Failure of compressor or PCB.
105	P105	5 times	Outdoor unit	Lower Limit of Compressor Overload	Failure of compressor or PCB.
--	P106	6 times	Outdoor unit	Stoppage by OH Thermistor High Temperature	Incorrect wiring, disconnected wiring, broken cable, sensor failure. Pipe clogging, excessive refrigerant, innert gas mixing, fan motor locking at cooling operation.
107	P107	7 times	Outdoor unit	Thermistor Failure: Thermistor disconnection short circuit	Incorrect wiring, disconnected wiring, broken cable, sensor failure.
--	P109	9 times	Outdoor unit	Stoppage by Transmission Error, communication error	Incorrect or disconnected wiring. PCB failure.
--	P110	10 times	Outdoor unit	Power Supply Voltage Error	Power supply problem or incorrect wiring. Failure of compressor or PCB.
--	P111	11 times	Outdoor unit	Fan abnormality 1	Failure of fan motor. Failure of PCB.
112	P112	12 times	Outdoor unit	Fan lock, Fan abnormality 2	Failure of fan motor. Failure of PCB.
113	P113	13 times	Outdoor unit	EEPROM Error	Failure of PCB.
114	P114	14 times	Outdoor unit	Overvoltage abnormality	Power supply problem or incorrect wiring. Failure of compressor or PCB.
115	P115	15 times	Outdoor unit	Circuit abnormality	Failure of PCB.
--	P116	16 times	Outdoor unit	Software Ip cut stop	Failure of compressor or PCB.
204	-		LCD	Indoor unit stops answering to PC-ARFTE	Loose, disconnected, broken or short-circuited connector.
205	-		LCD	Central Alarm, no Central message	Loose, disconnected, broken or short-circuited connector.

6.2.1 Operation

Condition	Check the following
Unit is not operating	Check whether a power outage has occurred, a fuse is blown or the breaker has tripped.
	Check whether the timer has been set and if it has been correctly set.
The water does not become hot or it takes a time for it to heat up	Check whether the water temperature is correctly set.
	Check whether the air outlet of the outdoor unit has been blocked.
	Check whether the unit is leaking water.
The water tank does not exceed 55 °C but is set to a higher temperature.	Check that the heater has power.
	Push the safety thermostat reset switch and check that the heater has power. (*)
Water comes out of the outdoor unit	The outdoor unit discharges water during defrosting. In a cold area, this water could freeze so the water outlet on the outdoor unit must not be blocked.
	When the outdoor unit is installed overhead, use a bush to connect a drain pipe to the water outlet to arrange proper discharge.
Water comes out of the tank unit	When the temperature of in coming water is very low and the atmosphere around the tank is very humid, dew may form on surface of the metal or piping and may drop.
Steam is coming out of the outdoor unit	This is steam generated by frost melting during defrosting in the outdoor unit.
No hot water	Check if a water outage has occurred. Turn the breaker off and close the water heater and water valve during a water outage.
Water is coming out of the safety pressure-relief valve (field-supplied)	During heating operation, water leaking is normal. The water in the tank is expanding from being heated and about 3% of tank capacity is discharged.
The timer cannot be set	Check whether the unit has been set to off-peak power supply. The timer will not work when the unit is set to off-peak power supply.

*(*) In case of activation of the safety thermostat the heater is deactivated. It is necessary to push the thermostat reset switch **-1-** after the temperature cools down.*



6.2.2 Troubleshooting by alarm code (related to tank)

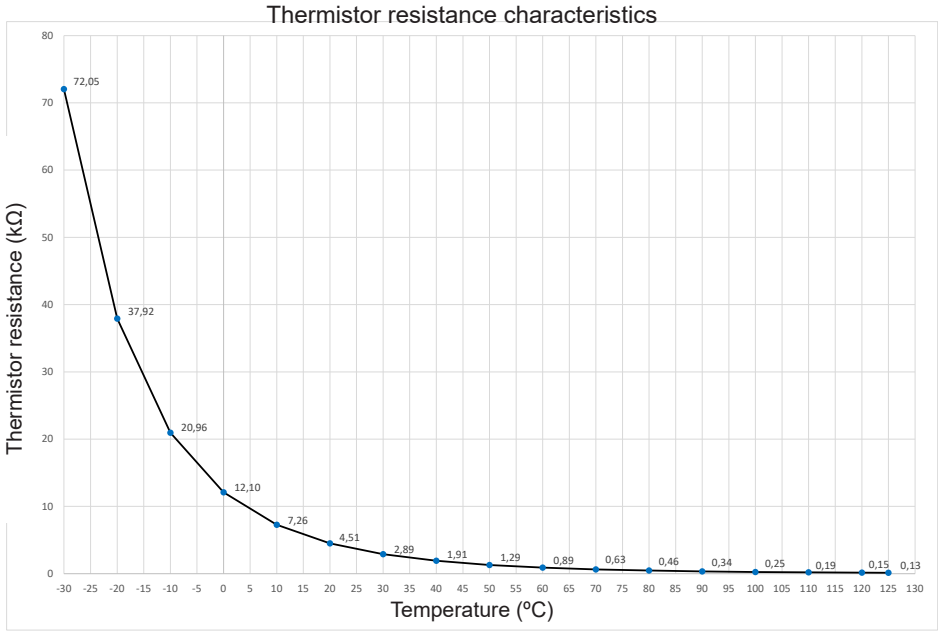
Alarm code	03	Abnormal transmission between the indoor unit and the outdoor unit

- This alarm is displayed when an Outdoor unit is not detected for three minutes after the normal transmission between the indoor units and the outdoor units. Also an abnormal transmission is maintained for 30 seconds after the micro-computer is Power ON. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.

Alarm code	16	DHW tank thermistor abnormally (THM_{DHWT})

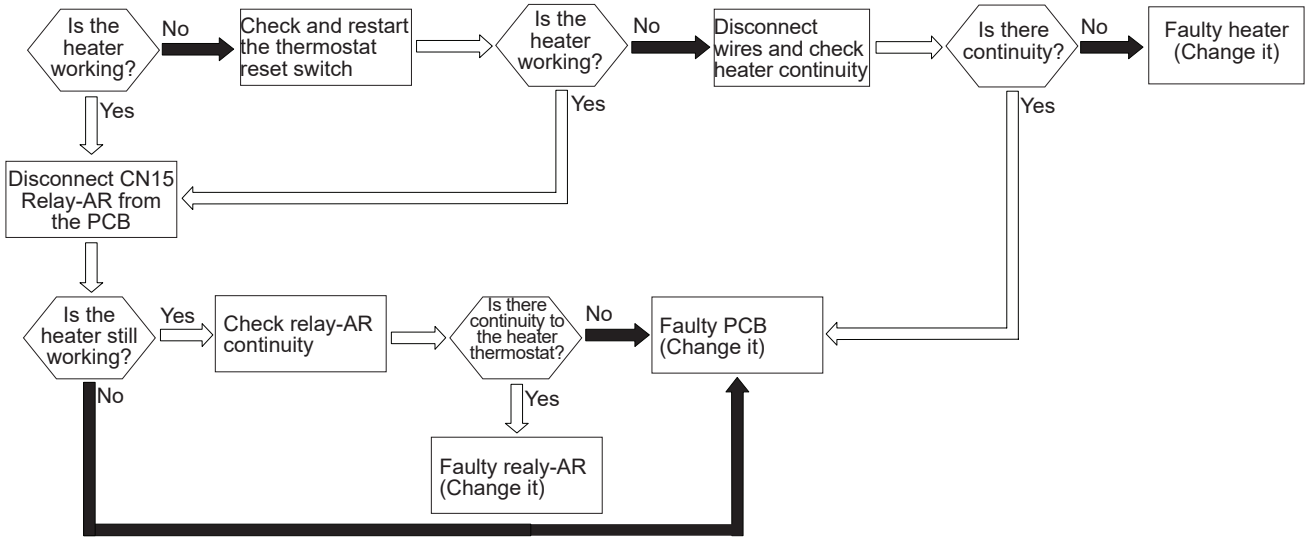
- This alarm code is displayed when the thermistor is short-circuited (greater than 100ºC) or cut (less than -10ºC) when DHW is enabled.
- This alarm forces all operations to stop (Outdoor & Indoor Units).
- The unit should be stopped to release the alarm.





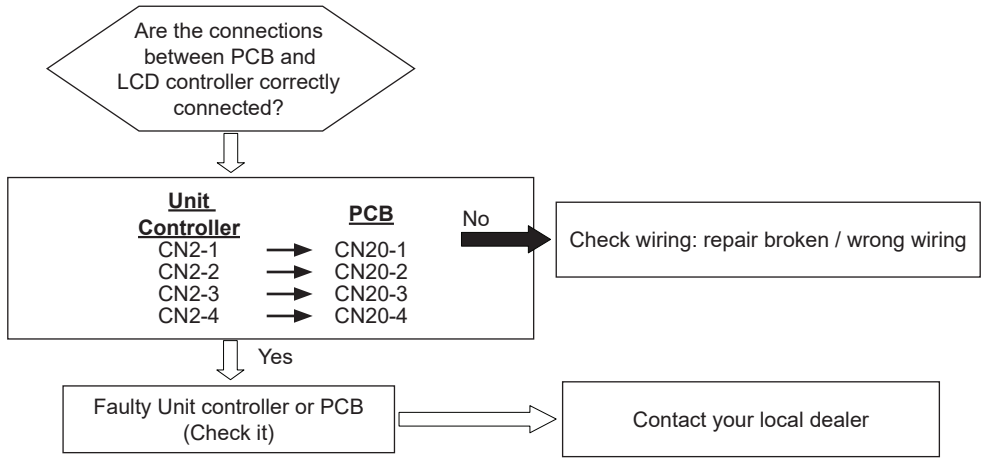
Alarm code	71	Tank over-temperature limit protection

- The alarm code is displayed on the LCD controller when the temperature of the water is higher than 86 °C.
- This alarm forces the heat pump and the heater to stop.
- The unit should be stopped to release the alarm.



Alarm code	80	Communication failure between Indoor unit and LCD controller (PC-ARFTE)

- The alarm code is displayed on the unit controller when there is no communication between indoor unit PCB and the unit controller for 90 seconds.
- This alarm forces all operations to stop.
- The unit should be stopped to release the alarm.



Alarm code	204	Indoor unit stops answering to Master PC-ARFTE

- This alarm is displayed when an indoor unit stops answering to Master PC-ARFTE for more than 3 minutes.
- Alarm recovery: When the communication is established again the alarm is recovered.

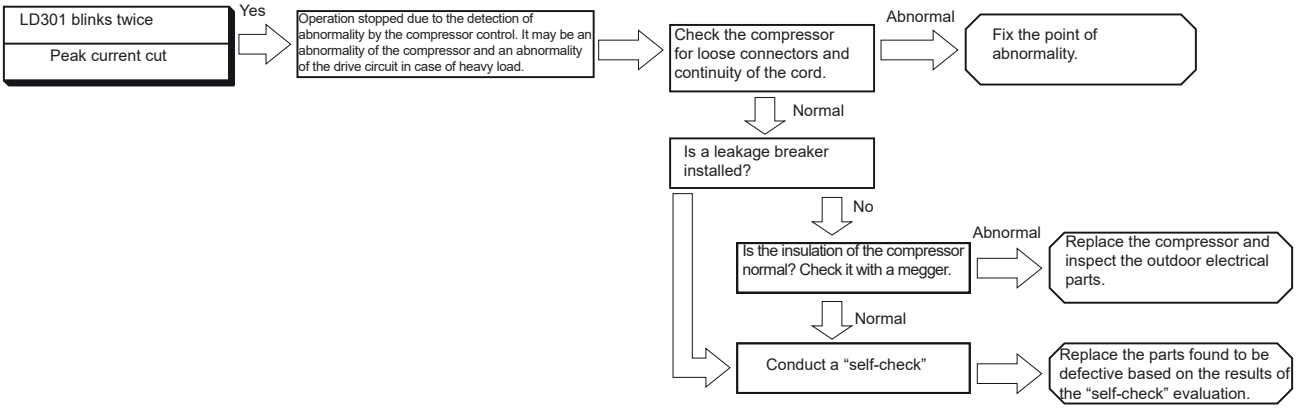
Alarm code	205	Central Alarm, no Central message

- This alarm is displayed there is no messages from the central for more than 30 seconds.
- Alarm recovery: When the communication is established again the alarm is recovered.

6.3 Troubleshooting by protection code (Outdoor unit)

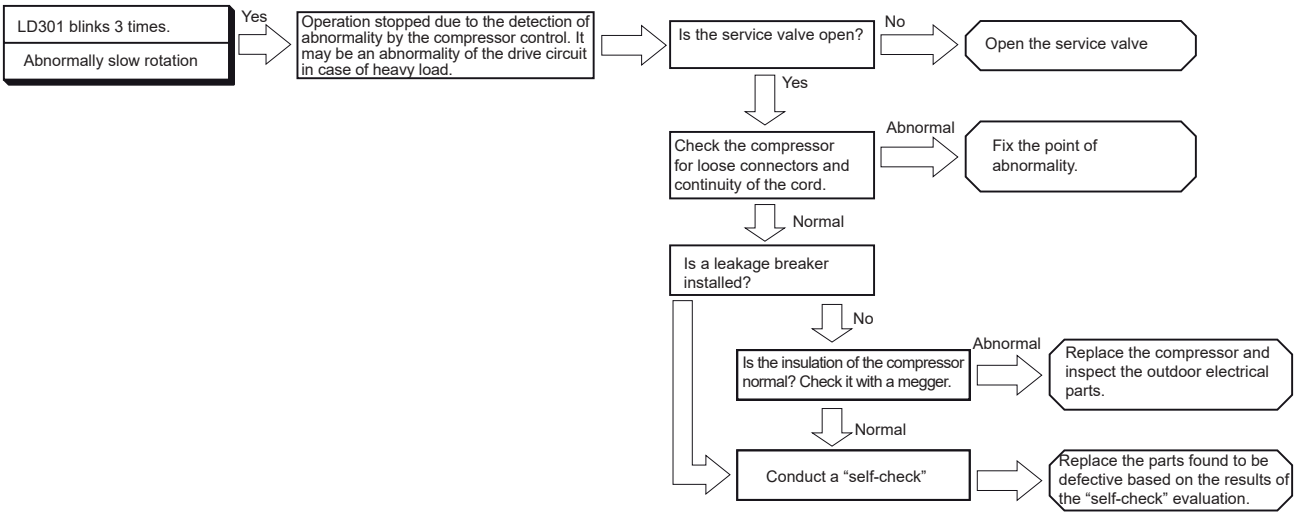
Protection code	P102	LCD controller has no power

- Outdoor unit LED301 blinks 2 times
- This protection code is displayed 3 times before alarm 102 appears at the LCD controller.



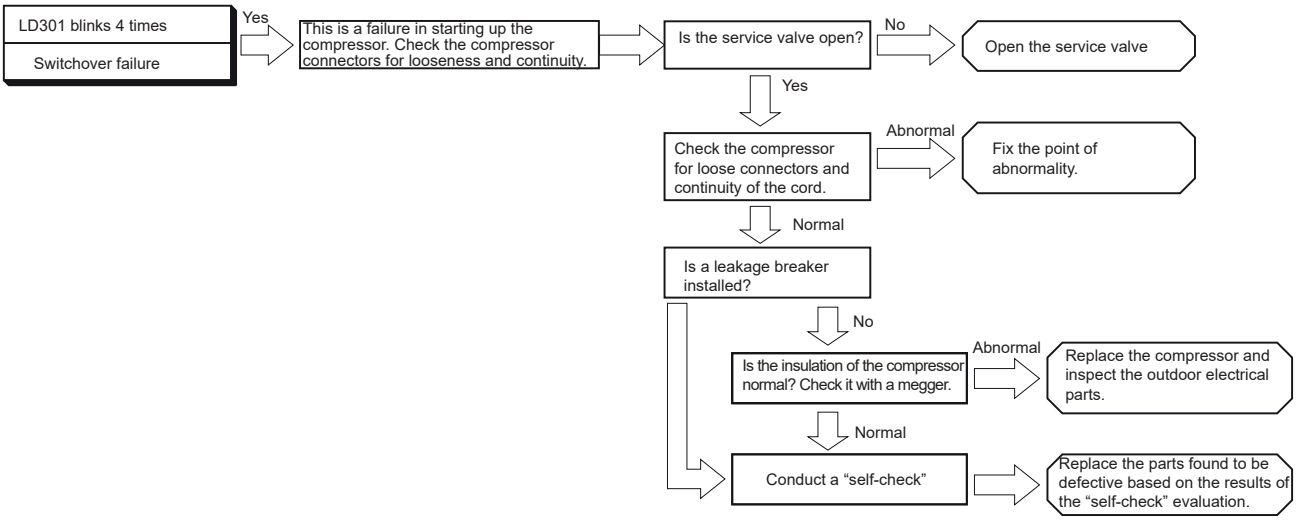
Protection code	P103	Abnormal low speed of the compressor

- Outdoor unit LED301 blinks 3 times
- This protection code is displayed 3 times before alarm 103 appears at the LCD controller.



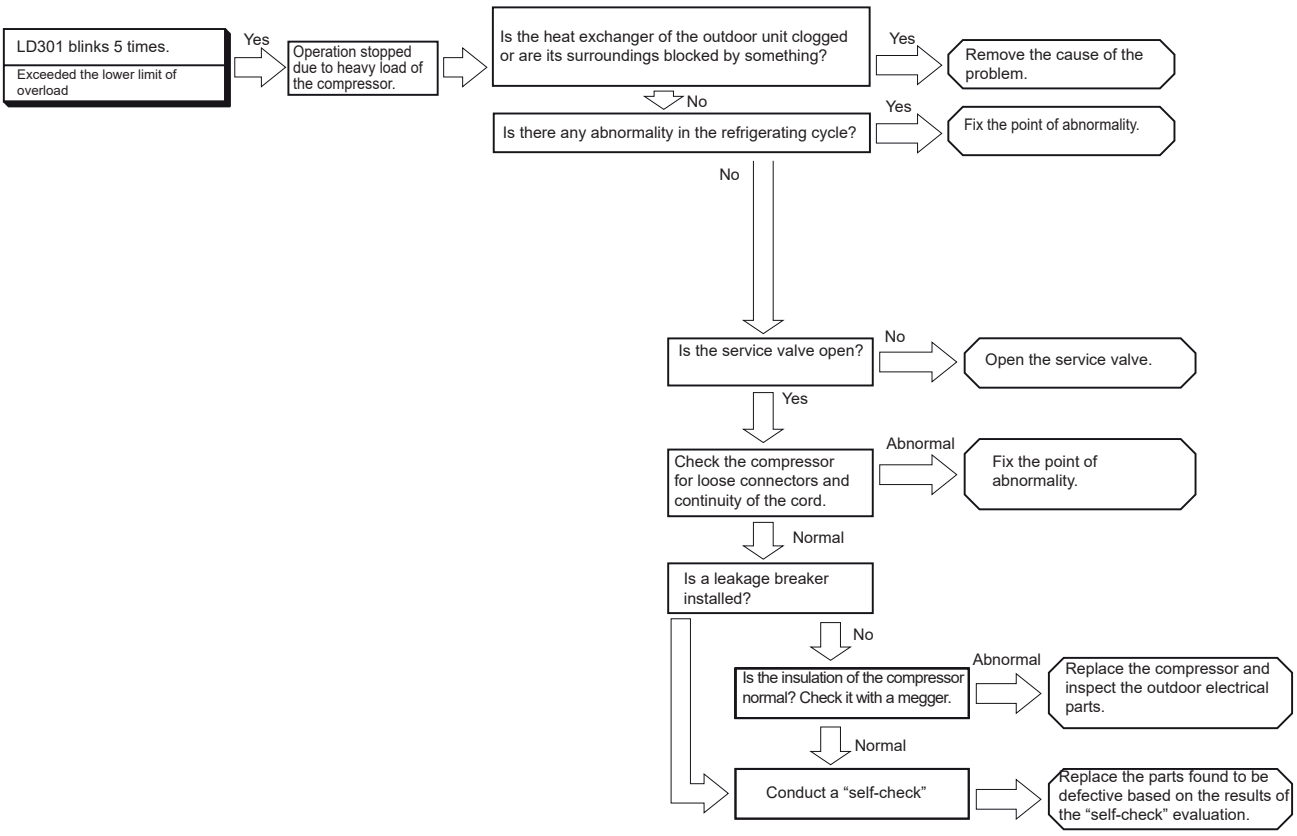
Protection code	P104	Compressor changeover failure (switching failure)

- Outdoor unit LED301 blinks 4 times
- This protection code is displayed 3 times before alarm 104 appears at the LCD controller.



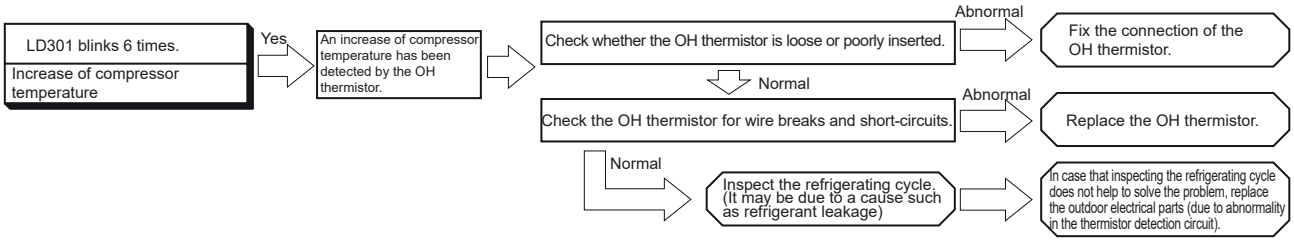
Protection code	P105	Lower limit of compressor overload

- Outdoor unit LED301 blinks 5 times
- This protection code is displayed 3 times before alarm 105 appears at the LCD controller.



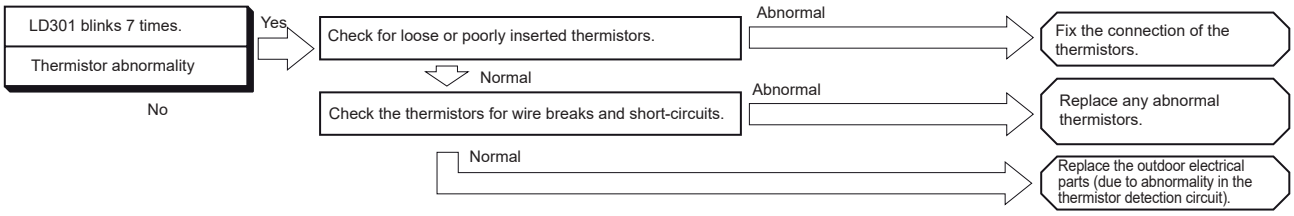
Protection code	P106	Stoppage by OH Thermistor High Temperature

- Outdoor unit LED301 blinks 6 times.
- This protection code is displayed continuously until the abnormal situation ends, without leading to an alarm.



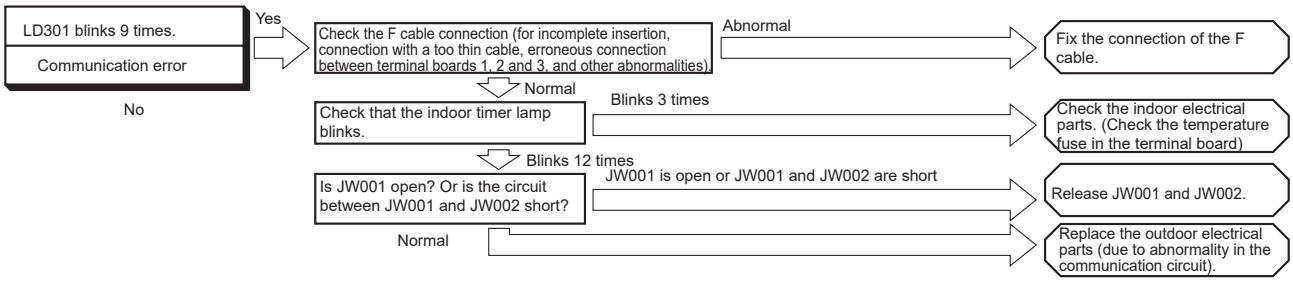
Protection code	P107	Thermistor failure

- Outdoor unit LED301 blinks 7 times.
- This protection code is displayed 3 times before alarm 107 appears at the LCD controller.



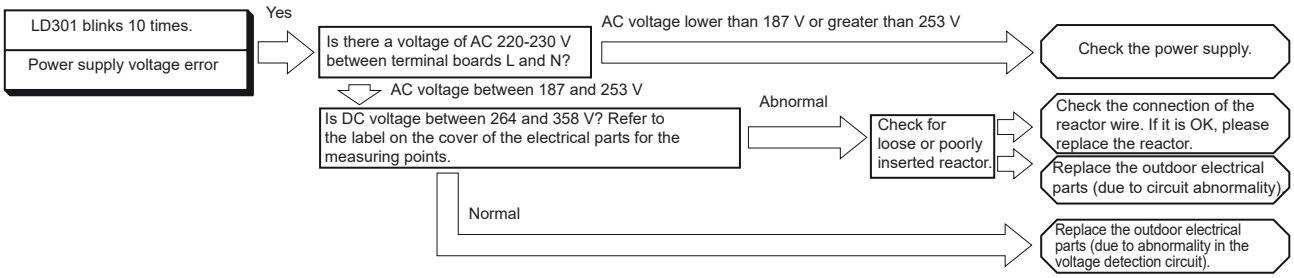
Protection code	P109	Stoppage by transmission error, communication error

- Outdoor unit LED301 blinks 9 times.
- This protection code is displayed continuously until the abnormal situation ends, without leading to an alarm.



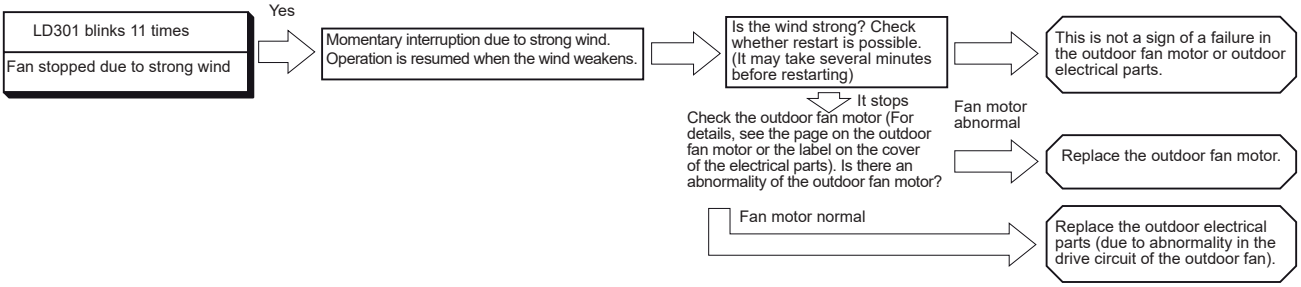
Protection code	P110	Power supply voltage error

- Outdoor unit LED301 blinks 10 times.
- This protection code is displayed continuously until the abnormal situation ends, without leading to an alarm.



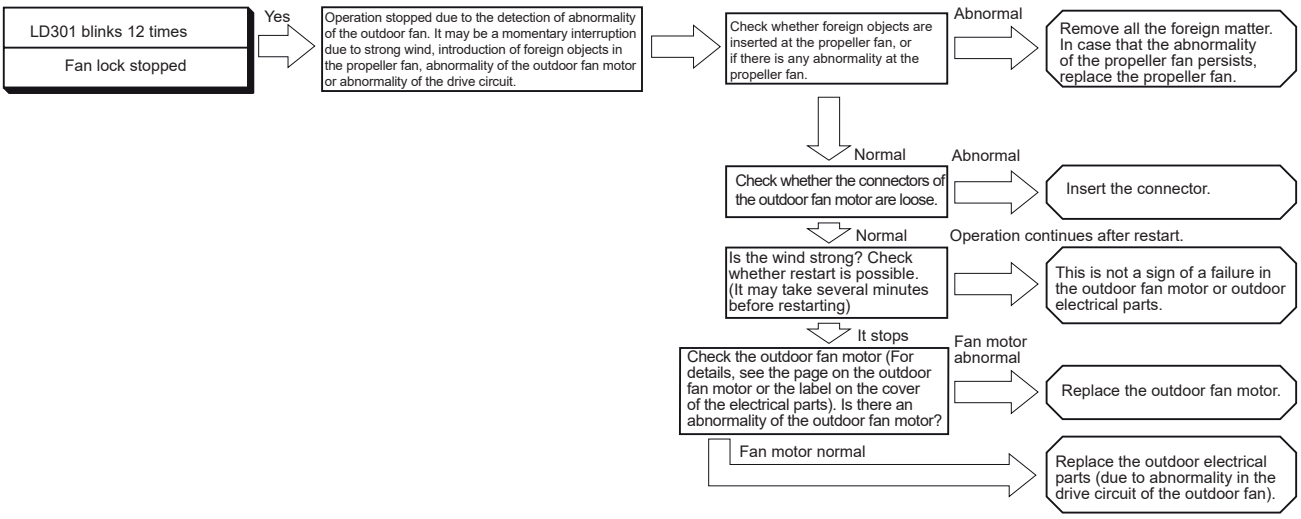
Protection code	P111	Fan abnormality 1

- Outdoor unit LED301 blinks 11 times.
- This protection code is displayed continuously until the abnormal situation ends, without leading to an alarm.



Protection code	P112	Fan lock, Fan abnormality 2

- Outdoor unit LED301 blinks 12 times.
- This protection code is displayed 3 times before alarm 112 appears at the LCD controller.



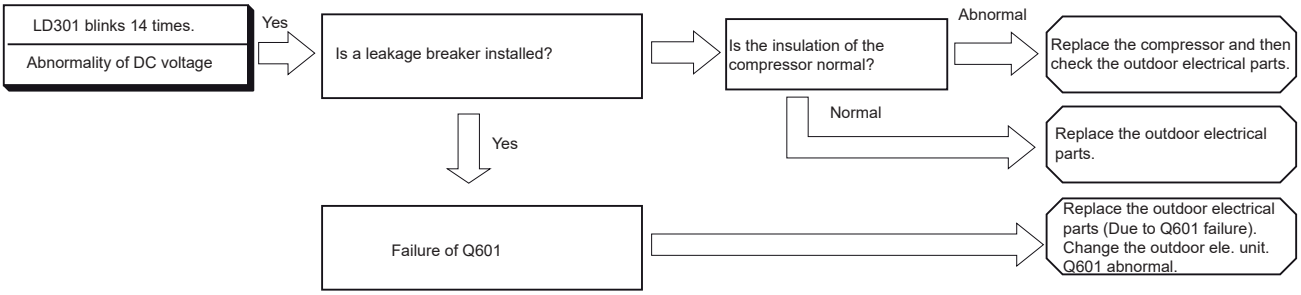
Protection code	P113	EEPROM error

- Outdoor unit LED301 blinks 13 times.
- This protection code is displayed 3 times before alarm 113 appears at the LCD controller.



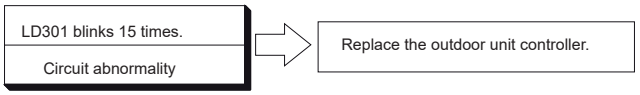
Protection code	P114	Overvoltage abnormality

- Outdoor unit LED301 blinks 14 times.
- This protection code is displayed 3 times before alarm 114 appears at the LCD controller.



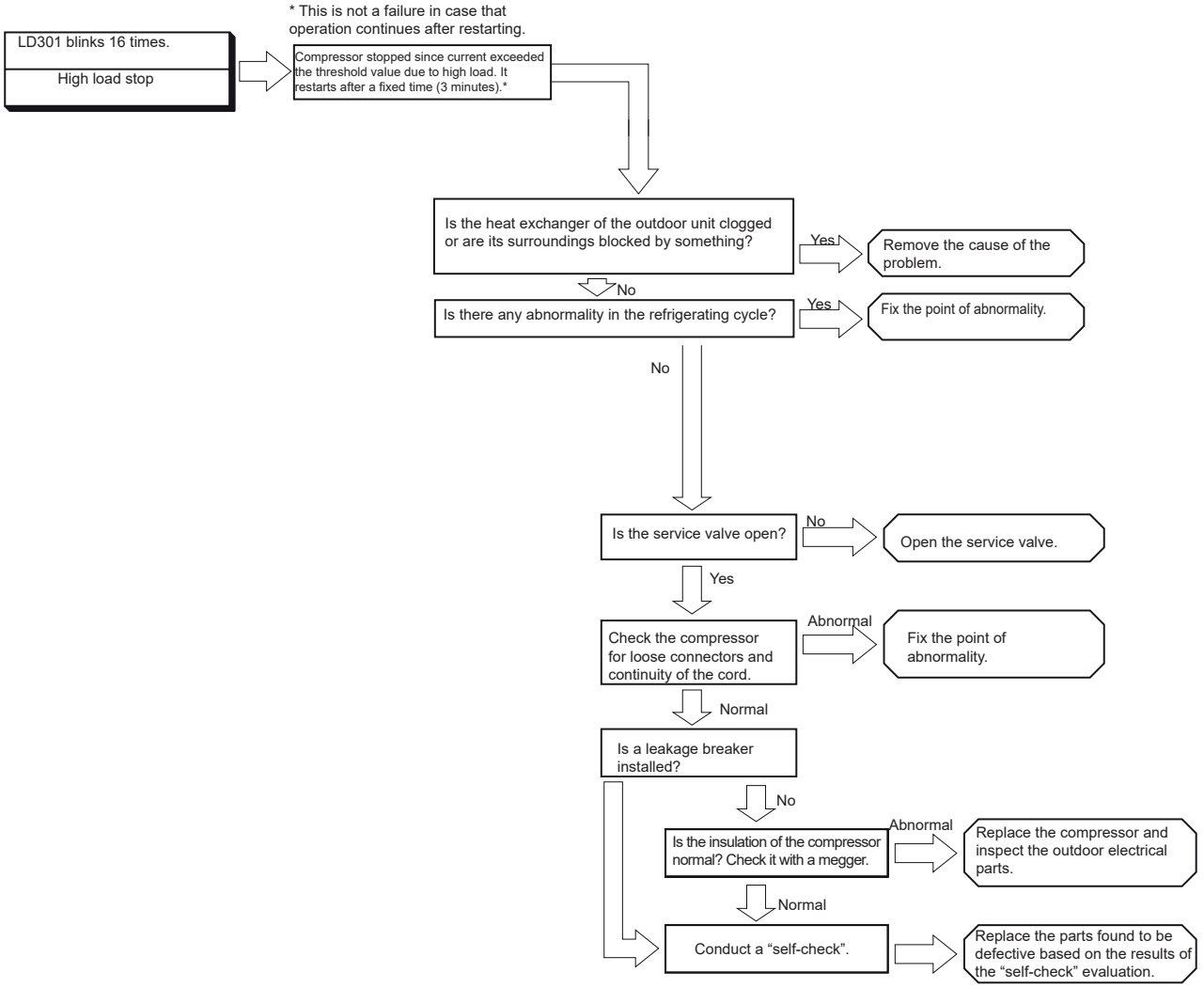
Protection code	P115	Circuit abnormality

- Outdoor unit LED301 blinks 15 times.
- This protection code is displayed 3 times before alarm 115 appears at the LCD controller.



Protection code	P116	Software Ip cut stop

- Outdoor unit LED301 blinks 16 times.
- This protection code is displayed continuously until the abnormal situation ends, without leading to an alarm.



7. Maintenance notes

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7.1 Maintenance work

CAUTION

- *All inspections and checks of the outdoor unit and indoor unit have to be carried out by a licensed technician and never by the user itself.*
- *Before any inspection and check the unit main power supply has to be switched OFF.*
- *Wait minimum 10 minutes or more from all power supply have been turned OFF.*
- *Take care with the crankcase heater. It could operate even when compressor is OFF.*
- *Take care with the electrical box components. Some of them could remain hot after switch OFF the unit.*

NOTE

All these maintenance operations must be done with appropriate materials and following this manual.

7.1.1 Outdoor unit

1 Fan and fan motor
- Lubrication: All the fan motors are pre-lubricated and sealed at the factory. Therefore no lubrication maintenance is required.
- Sound and vibration: Check for abnormal sounds and vibrations.
- Rotation: Check the clockwise rotation and the rotating speed.
- Insulation: Check the electrical insulation resistance.

2 Heat exchanger
- Clog: Inspect the heat exchanger at regular intervals and remove any accumulated dirt and any accumulated dust from the heat exchanger. You should also remove other obstacles such as the growing grass and the pieces of paper which might restrict the airflow.

3 Refrigerant piping connection
- Leakage: Check for the refrigerant leakage at the piping connection between the outdoor and the indoor unit.
- Pressure: Check the R32 refrigerant pressure using the check joints of the outdoor unit.

4 Cabinet
- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws.
- Insulation material: Check for any peeled thermal insulator on the cabinet. Repair the thermal insulator.

5 Electrical equipment
- Activation: Check for an abnormal activation of the magnetic contactor, the auxiliary relay, the PCB and others.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

6 Control device and protection device
- Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the Installation and operation manual.

7 R32 compressor
- Sound and vibration: Check for abnormal sounds and vibrations.
- Activation: Check that the voltage drop of the power supply line is within 15% at the start and within 2% during the operation.

8 Reverse valve
- Activation: Check for any abnormal activation sound.

9 Ground wire
- Ground line: Check for the continuity to earth.

7.1.2 Indoor unit

◆ General procedure

To ensure good operation and reliability of the indoor unit its main parts and field wiring have to be checked periodically.

The following checks have to be done by qualified technicians at least once a year:

1 Cabinet
- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Tighten the loosened screws and replace the lost screws.
- Insulation material: Check for any peeled thermal insulator on the indoor part of the covers.

2 Water piping connection
- Leakage: Check there are no water leakages neither in the inlet and outlet water connections, nor in the main water circuit nor the tank connections. Check all the joints, connections and circuit elements.

NOTE

- *If leakage is detected in the inlet/outlet water connections, repair it and remember to replace the gaskets.*
- *Pay special attention to the water pipe connection placed over the electrical box.*

3 Security water valve for DHW:
- Operation: Check the correct operation of the security water valve (pressure relief valve) at the DHW inlet connection. Remember that this element must ensure that the following functions are provided: Pressure protection, non-return function, shut-off valve, filling and draining.

4 Refrigerant piping connection
- Leakage: Check for the refrigerant leakage at the refrigerant piping connections in the indoor unit. Check the different connections of the plate heat exchanger.

5 Electrical equipment
- Activation: Check for an abnormal activation of the magnetic contactor, the relay, the PCBs and others.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

6 Control device and protection device
- Setting: Do not readjust the setting in the field.

7 Ground wire
- Ground line: Check for the continuity to earth in the main electrical components.

8 Anode
- The Mg anode should be replaced yearly or once its size has been reduced to the half. It may loose its function for protection against corrosion if this period is exceeded. It is recommended to replace the Mg anode every 1 year depending on the quality of the water.

◆ Draining of the DHW

1 Switch OFF the main power supply of the indoor unit.

2 Close the main DHW inlet valve (water inlet shut-off valve) in order to avoid the tank filling.

3 Close the shut-off valve of the DHW outlet.

4 Connect a drain hose to the cold water inlet for DHW and lead the other end to the general draining.

5 Open manually the hot water outlet for DHW.

6 Open manually the cold water inlet and wait a long time until all the water has been removed.

7 Lean the unit in order to allow removal of the water remaining inside the tank through the cold water inlet.

CAUTION

- *When draining the DHW, the leaved water could be hot and could keep in pressure. Perform the draining* procedure carefully.
- *When draining the DHW, Check Water Pressure always and keep Open a hot water tap to allow draining without creating a vacuum.*

◆ Filling the DWH tank with water

Follow the steps below when starting up the unit for the first time or when it has not been used for an extended period of time.

1 Open the outlet water taps of the DHW, to expel all the air from inside the tank.

2 Turn on all the connected mixer taps (hot water side).

3 Open the inlet valve of the DHW tank in order to fill the tank. If there is a shut-down valve installed in the DHW tank outlet, open it to allow circulation through the DHW installation.

4 When water begins to flow from the outlet water taps of the DHW installation, close all these taps.

5 Turn off all the connected mixer taps.

6 Inspection

a. After filling the tank, check all pipe, heater and anode joints and the tank for leakage.

b. Check operation of the pressure relief valve.

c. After heating water for the first time, check water leakage from the pipe, heater and anode joints and the tank once more.

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