Panasonic®

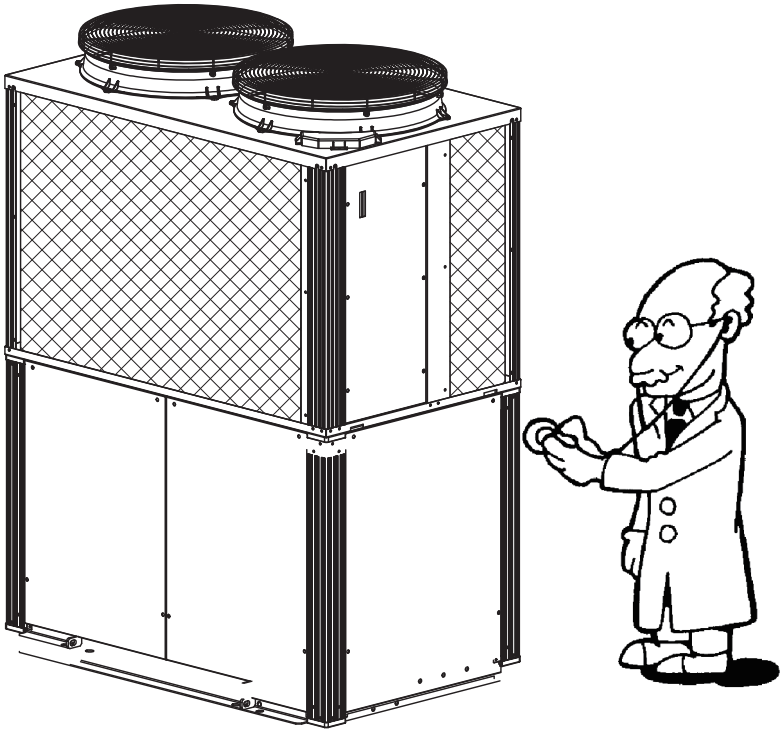
Order No. SBPAC1612012CE

TECHNICAL & SERVICE MANUAL

Gas Heat Pump Air Conditioner

Jan 2019

TROUBLESHOOTING



Applicable Models

2WAY MULTI/W ULTI
U-16GE3E5
U-20GE3E5
U-25GE3E5
U-30GE3E5

3WAY MULTI
U-16GF3E5
U-20GF3E5
U-25GF3E5

Reference No. GTS-1901-01C

◆◇◆ Applicable models ◆◇◆

< 2WAY MULTI / W MULTI >

U-16GE3E5
U-20GE3E5
U-25GE3E5
U-30GE3E5

< 3WAY MULTI >

U-16GF3E5
U-20GF3E5
U-25GF3E5

◆◇◆ Table of Contents ◆◇◆

(*) Cannot be detected when the water heat exchanger unit is connected.

(*) Cannot be detected when the water heat exchanger unit is connected.

1. Symptoms that are not malfunctions

The following symptoms are characteristic operating conditions of this system and do not indicate malfunctions:

① The fan flaps on the indoor unit operate when the unit is stopped

If the compressor outlet pressure exceeds 3.5 MPa during heating operation, the flaps on the stopped unit move to horizontal and the fan rotates in the breeze.
When this happens, it may indicate a clogged air filter.
Inspect and clean if necessary.

② Refrigerant noise is occasionally heard from the stopped indoor unit

During cooling operation of the outdoor unit, if the indoor unit is stopped for a period of time that equals the total oil recovery time period while cooling (four hours), refrigerant will circulate in the stopped unit for four minutes, so that refrigerant and oil can be recovered.
During heating operation of the outdoor unit, refrigerant will also flow in the stopped indoor unit, allowing recovery of refrigerant and oil.

③ The fan in the outdoor unit rotates slowly

The outdoor unit fan can be completely stopped or rotated at various speeds by the control system, and will be fast or slow as required. The fan is especially likely to stop or run slowly during cooling or heating operation when outside temperatures are low.
During winter, the outdoor unit fan may rotate even when the engine is stopped.

④ The unit will not switch from cooling (dry) to heating, or from heating to cooling (dry)

- If "Being controlled by operation mode" is displayed
  (When already being operated by another remote controller, the selectable operation modes are limited.)

⑤ When the following are displayed on the remote controller:

- If "Being controlled by operation mode" is displayed
  (When already being operated by another remote controller, the selectable operation modes are limited.)
- If "Operation standby" is displayed
  (In priority operation standby)
- If "Central control in progress" is displayed
  (Operation is limited by the central control unit.)
- A display appears but then vanishes
  ("Valve open" or "water circulation" has been set with the outdoor main board menu item No. 4, test operation forced setting.)

⑥ When the engine is started, an alarm displays on the 7 segment LED display.

Engine start standby is displayed during menu item No. 0, normal display.
If the unit is in start standby and each start condition is not accomplished when the engine is started, the uncompleted start condition is displayed on the 7 segment LED. There are 5 types of start conditions, some that start automatically after a set time, and some that become abnormal.
* See IV -1 4.-(3) for a list of startup conditions.

⑦ The outdoor unit does not operate at all

- The temperature controller is operating (thermo-off).

⑧ Cooling is poor/heating is poor

- Is the temperature controller (remote controller temperature) properly set?
  Is there too much load on the air conditioner?
- During demand control, because the unit operates at below the set fuel gas flow control value, cooling may be slightly bad (heating may be slightly bad).

⑨ "Inspect oil" flashes on the remote controller.

When the operating hours for the gas engine reach a designated time, "Inspect oil" flashes.
Change the engine oil.
If the engine oil is not changed within 200 operating hours after flashing, warning A02 will be displayed and operation will stop.

2. Before troubleshooting (W MULTI series)

(1) W MULTI series system overview

W MULTI series is a system that can join up to two outdoor units to the same refrigerant tube, and control each outdoor unit while performing air conditioning according to the operation load of the indoor unit.
Figure 1 gives an overview of the system.
In the example, the W MULTI series (refrigerant system 1) connecting to two outdoor units and 3WAY MULTI (refrigerant system 2) are linkwired by using an operation cable for the indoor - outdoor units.
(This is an example of a dual system consisting of two refrigerant systems.)

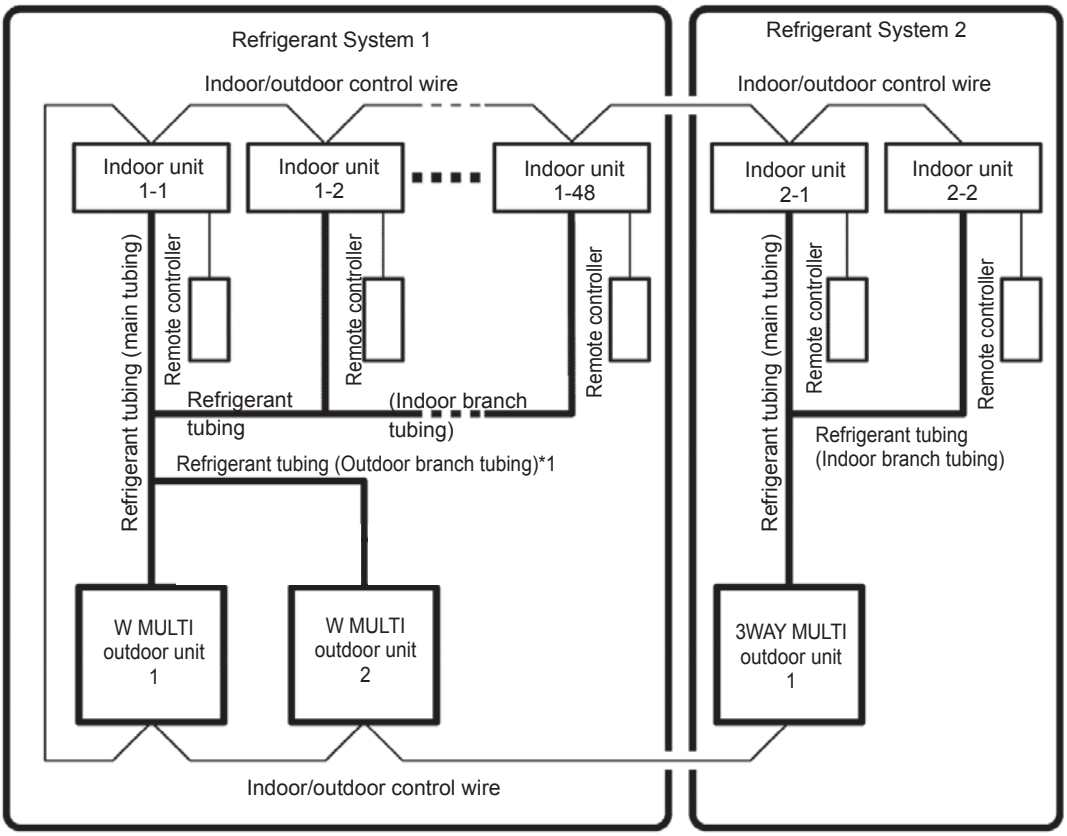


Fig. 1 GHP System Configuration Example

*1 Refrigerant tube

Figure 1 is a simplified diagram. Actually, two refrigerant tubes consisting of a gas tube (thick tube) and a liquid tube (thin tube) are used. Each W MULTI outdoor unit is connected to an outdoor branch tube, and then connected to the main tube. For the indoor unit, the refrigerant tubes branched from the main tube are connected to the gas tube and liquid tube of each indoor unit.

(2) About backup operation during maintenance work

- What is backup operation?
  In the W MULTI series, multiple outdoor units are connected to the same refrigerant tube as shown in Figure 1. Therefore, even during maintenance work of an outdoor unit, the other outdoor unit not required in maintenance work can be used to keep the indoor operating conditions. This is called a backup operation.
- Backup operation procedure
  To perform backup operation, the outdoor unit for maintenance work (hereafter referred to as "target outdoor unit") must be cut off from the system using the following procedure. Review content of the maintenance work and then select the most suitable method.
  Also, after the maintenance work is finished, always refer to [System recovery procedure] and then return the system to its normal state.

[Backup operation procedure]

To turn off power of target outdoor unit and then perform maintenance work (basic operation during inspection of outdoor unit)

<<Important>>

This is the basic operation performed during inspection work. If this operation is not performed and the power of the outdoor unit is turned off, this will cause system fault and prevent backup operation to be carried out, and serious malfunction will occur. If this happens, see [System recovery procedure] to recover the system, and then once again use the following procedure to perform setup. Automatic backup operation will kick in.

<<Step 1>>

On the outdoor main board of the target outdoor unit, set the STOP switch (SW001) to "STOP". *1

<<Step 2>>

(After confirming that the engine of the target outdoor unit is stopped) close the valves of refrigerant gas tube, refrigerant gas liquid tube, and balance tube.

<<Step 3>>

On the outdoor main board of the target outdoor unit, set the STOP switch (SW001) to "STOP". Wait for three minutes or more and then turn off the circuit breaker of the target outdoor unit. *2

Start maintenance work.

*1) Sometimes all outdoor units may stop. If there is operation input, outdoor units other than the target one will start operation again after approximately five minutes. (For details on the settings, see the next item.)

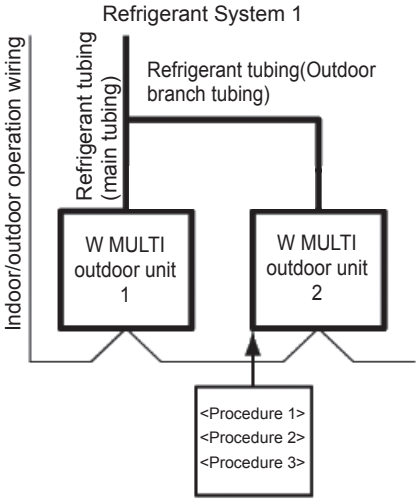
*2) Always carry out the following three tasks.

① Check to make sure <<Step 2>> is finished. If the shutoff valve is opened, refrigerant will flow from the other outdoor unit to the target outdoor unit, causing serious malfunction.

② After three minutes has elapsed from completion of <<Step 1>>, check to make sure the outdoor main board displays " P o F F " and then perform this operation. If you turn off the power immediately after performing "STOP" setting, the entire system will stop. (Backup operation cannot be performed.) If this happens, see [System recovery procedure], recover the system, and then start over again starting from <<Step 1>>.

③ There will not be any problem whether the circuit breaker of the outdoor unit in <<Step 3>> is ON or OFF. Select one of them according to the work required.

[Work example] Perform maintenance on W MULTI outdoor unit 2 in refrigerant system 1 in Figure 1.



a) For the W MULTI outdoor unit 2 indicated in the left diagram, perform <<Step 1>> to <<Step 3>> in [Backup operation procedure] in that order. Then, perform maintenance work on W MULTI outdoor unit 2.
b) When <<Step 3>> is finished, W MULTI outdoor unit 1 is reset. It'll stop even if it is operating.)
c) After approximately five minutes, if there is operation input (indoor remote controller is "Run" or test run setting on outdoor main board), W MULTI outdoor unit 1 starts up. (Backup operation starts.)
d) If test run is set from outdoor main board, W MULTI outdoor unit 1 continues to run. However, if normal operation is started by the indoor remote controller, depending on the load, all outdoor units may stop due to thermostat off.

[System recovery procedure]

If backup operation has been performed, by all means check the following items after the maintenance work, and then perform settings again to return the system to its normal state.

① Check to make sure all shutoff valves of refrigerant gas tube, refrigerant liquid tube, and balance tube of the outdoor unit are opened.
② Check to make sure the STOP switch (SW001) on the outdoor main board is set to "NORM".
③ If the power of the outdoor unit has been turned off, turn on the circuit breaker.
④ If "Test run" (No.4 Test- Cool/Heat) is set, cancel it.

* When adjusting to No.4 Test-Cool or Heat, if TEST/WARNING LED (LED052) lights, this means "Test run" is being set. In this state, press the SET (SW007) key for one second or more. The setting will be canceled (TEST/ WARNING LED (LED052) goes off.)

3. Malfunctions and Displays

(1) Malfunctions without any display

① The circuit breaker trips when power is turned on

- Short circuit or ground fault of the crankcase heater, current leakage in electrical parts

② Circuit breaker trips when operated

- Current leakage or short circuit in fan or coolant pump, current leakage or short circuit in electrical parts

③ Poor cooling

1) Problem in refrigeration circuit
   - Clog in refrigeration circuit, faulty 4-way valve, faulty electric valve in indoor/outdoor unit, compression failure, or shortage of refrigerant.
   - Shutoff valve not completely open
2) Small fan capacity
   - Clogged air filter, foreign matter in air inlet, outlet
3) Other
   - Insufficient refrigerant tubing insulation

④ Poor heating

1) Problem in refrigeration circuit
   - Clog in refrigeration circuit, faulty 4-way valve, faulty electric valve in indoor/outdoor unit, compression failure, or shortage of refrigerant.
   - Shutoff valve not completely open
2) Other
   - Insufficient refrigerant tubing insulation

⑤ Heating on standby does not clear

- Warm air is striking the room temperature sensor, temperature around room temperature sensor is high, faulty indoor control board

⑥ Auto-flap does not move well

1) The flaps swing, but wind direction cannot be set
   - Auto-flap limit switch is faulty or has a bad connection
2) Does not move (swing, air direction setting)
   - Auto-flap is faulty, indoor control board is failed, remote controller is faulty

⑦ Loud operation noise or vibration noise

1) Noise or vibration when fan operates
   - Fan is unbalanced, worn motor axis bearing, loose fan securing screw
2) Loud operation noise or vibration noise when compressor operates
   - Something is coming into contact with the refrigerant tubing or compressor

⑧ Water leakage

1) Drain water leakage
   - Clogged drain tube, mistake in draintube construction, insufficient draintube insulation
2) Condensation on refrigerant tubing
   - Insufficient tubing insulation
3) Condensation at duct outlet
   - Insufficient wind capacity, gap between duct connections

⑨ Does not stop

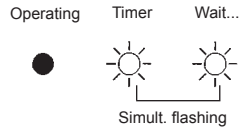
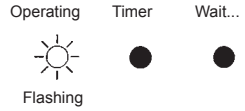
- Fused magnetic contactors, faulty indoor/outdoor control board, faulty remote controller

⑩ No display on the remote controller

- Remote controller wiring disconnected
- Remote controller wiring shorted

(2) Remote Controller alarm display

☼ : Flashing ○ : Lit ● : Off

Detection Item			Warning Display	Wireless Remote Control Lamp Display	Device Checked
Engine protective device operation	Engine system error	Engine oil pressure error	A01		Outdoor unit
		Engine oil error	A02		
		Engine high-revolution error	A03		
		Engine low-revolution error	A04		
		Ignition power source error	A05		
		Engine start failure	A06		
		Fuel gas valve error	A07		
		Engine stall	A08		
		High exhaust gas temperature	A10		
		Throttle failure	A12		
		Engine oil presure switch error	A14		
		Crankshaft angle sensor error	A23		
		Camshaft angle sensor error	A24		
		Flameout error	A26		
	Starter system error	Starter power source output short circuit	A15		
		Starter lock	A16		
		CT error (starter current detection failure)	A17		
	Coolant system error	Low coolant temperature	A19		
		High coolant temperature	A20		
		Coolant level error	A21		
		Coolant pump error	A22		
	Clutch error		A25		
	Catalyst temperature error (for only models with catalyst option)		A27		
	Remote controller detected an abnormal signal from an indoor unit	Remote controller receive failure	E01		Remote controller
		Remote controller transmission failure	E02		
	Indoor unit receive failure from remote controller (central)		E03		Indoor unit
Communication errors, mis-setting	Invalid setting	Duplicate indoor unit address setting	E08		Indoor unit
		Multiple main remote controller units set	E09		Remote controller
	Indoor unit receive failure from signal output board		E11		Indoor unit
	Automatic address setting is in progress, automatic address setting start is prohibited		E12		Outdoor unit
	Indoor unit transmission failure to remote controller		E13		Indoor unit
	Group control wiring communication failure		E18		
	Indoor unit receive failure from outdoor unit		E04		Indoor unit
	Indoor unit transmission failure to outdoor unit		E05		
	Outdoor unit receive failure from indoor unit		E06		Outdoor unit
	Outdoor unit transmission failure to indoor unit		E07		
	Automatic address alarm	Too few units	E15		
		Too many units	E16		
	No indoor unit in automatic address setting		E20		
	Outdoor main board failure		E21		
	Outdoor main board sensor error		E22		
	Communication failure between outdoor units (for only W MULTI)		E24		
	Inconsistencies in number of outdoor units (for only W MULTI)		E26		
	Incorrect outdoor unit tube connection (for only W MULTI)		E28		
	Communication failure between units		E31		

When the water heat exchanger unit is connected in the table above, please replace indoor unit with water heat exchanger unit for the alarm.

Note: Some items are not indicated, depending model.

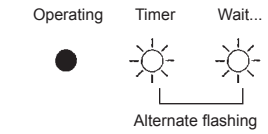
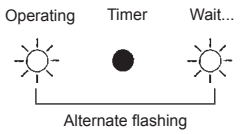
: Flashing ○ : Lit ● : Off

Detection Item			Warning Display	Wireless Remote Control Lamp Display	Device Checked
Sensor errors	Indoor unit sensor errors	Indoor heat exchanger inlet temperature sensor error (E1)	F01	Operating Timer Wait... ☼ ☼ ● Alternate flashing	Indoor unit
		Water heat exchanger refrigerant anti-icing sensor error	F02		
		Indoor heat exchanger outlet temperature sensor error (E3)	F03		
		Indoor unit intake temperature sensor error	F10		
		Indoor unit discharge temperature sensor error	F11	Operating Timer Wait... ☼ ☼ ○ Alternate flashing Lit	Outdoor unit
	Outdoor unit sensor errors	Compressor outlet temperature sensor error	F04		
		Outdoor heat exchanger inlet temperature sensor error	F06		
		Outside air temperature sensor error	F08		
		Compressor inlet temperature sensor error	F12		
		Coolant temperature sensor error	F13		
		Compressor inlet/outlet pressure sensor error	F16		
		Hot water outlet temperature sensor error (for only models that discharge hot water)	F17		
		Exhaust gas temperature sensor error	F18		
		Clutch coil temperature sensor error	F20	Operating Timer Wait... ● ☼ ● Flashing	
		Clutch coil 2 temperature sensor error	F21		
		Temperature sensor error for oil level measurement (for only W MULTI)	H08		
Compressor oil depletion error (for only W MULTI)			H07		
Indoor nonvolatile memory (EEPROM) error (*1)			F29	Operating Timer Wait... ☼ ☼ ● Simult. flashing	Indoor unit
Outdoor nonvolatile memory (EEPROM) error			F31	Operating Timer Wait... ☼ ☼ ○ Simult. flashing Lit	Outdoor unit
Invalid or missing setting	Inconsistencies in indoor/outdoor unit models (non-GHP equipment connected)		L02	Operating Timer Wait... ☼ ● ☼ Simult. flashing	Indoor unit
	Multiple main units set for group control		L03		
	Duplicate indoor unit priority setting	(priority indoor unit)	L05		Outdoor unit
		(excluding priority indoor unit)	L06		
	Group control wire present for individual-control indoor unit		L07		Indoor unit
	Indoor unit address not set		L08		
	Indoor unit capacity not set		L09		
	Duplicate system (outdoor unit) address setting		L04	Operating Timer Wait... ☼ ○ ☼ Lit Simult. flashing	Outdoor unit
	Outdoor unit capacity not set		L10		
	Indoor unit model setting failure		L13		
	Indoor unit pairing failure		L15		
	Gas type setting failure		L21		

When the water heat exchanger unit is connected in the table above, please replace indoor unit with water heat exchanger unit for the alarm.

Note: Some items are not indicated, depending in model.

: Flashing ○ : Lit ● : Off

Detection Item			Warning Display	Wireless Remote Control Lamp Display	Device Checked
Indoor unit ceiling panel connector connection failure			P09		Indoor unit
Protective device operation	Indoor protection devices	Indoor fan error / indoor fan rpm error	P01		
		Indoor unit float switch operation	P10		
		Indoor unit drain pump error Water heat exchanger unit anti-icing sensor error	P11		
		Indoor DC fan error	P12		
	Outdoor protection devices	High compressor discharge temperature	P03		Outdoor unit
		Refrigerant high-pressure switch operation	P04		
		Power source error	P05		
		Refrigerant circuit error (W MULTI / Models with suction bypass valve (85.0kW type) / 3WAY MULTI)	P13		
		O_2 sensor operation	P14		
		Complete refrigerant gas depletion	P15		
		Bypass valve error	P18		
		4-way valve lock error (not detected 3WAY MULTI)	P19		
		Refrigerant high-pressure error	P20		
		Outdoor fan error	P22		
		Clutch connection error	P26		
Group control's sub unit error (system controller)			P30		System controller
Group control error (alarm)			P31		Indoor unit
Oil change time (level) alarm Outdoor display: oiL			Oil check		Outdoor unit
Automatic backup operation (*2)			check		

When the water heat exchanger unit is connected in the table above, please replace indoor unit with water heat exchanger unit for the alarm.

Note: Some items are not indicated, depending in model.

*1: If the indoor nonvolatile memory (EEPROM) is faulty when the power supply is turned on, Alarm code F29 is not indicated, but the power source LED on the indoor board starts to flicker.

*2: In this case, operation of the system is possible, but one of the outdoor units is detected to have stopped abnormally.

- Alarm P30 (group controlled device fault) is sometimes displayed at the system controller.

4. Error Display and Troubleshooting

The description of each error display begins on a new page. Descriptions of some troubleshooting procedures span several pages. When you refer to an error display, be sure to first check whether the description of the troubleshooting procedure spans several pages.

(1) Precautions before Troubleshooting

In order to ensure correct diagnosis and prevent accidents (electric shock, equipment malfunction, measuring instrument damage, etc.), be sure to observe the following precautions.

① Be sure to use a digital tester for voltage measurement
Avoid using a tester with an indicator needle to prevent large measurement errors or operation failure.

② Unless otherwise specified, perform voltage measurement with the terminal (terminal plate and connector) connected
In some cases, measurement is also performed with the terminal disconnected.

③ Perform continuity measurement (resistance measurement) after disconnecting the terminals on both ends
Performing continuity measurement while the terminals are connected will cause a short circuit or damage to the tester.

④ If instructed to disconnect wires before performing continuity or voltage measurement, be sure to do so, then reconnect the wires before proceeding to the next step (item)

⑤ Be sure to turn off the power before connecting or disconnecting wires

⑥ Be careful not to touch any live parts (energized components) with a hand or tool while performing voltage measurement

⑦ For DC voltage measurement, the polarity is indicated by + or - after the terminal name (symbol) to prevent confusion
Connect the red lead of the tester to the + side and the black lead to - side.

(2) About the Error Detection Procedure

Some abnormal occurrences are determined as abnormalities the first time they are detected and some are not determined to be abnormalities until they are detected multiple times.
In the latter case, the engine is not forced to shut down the first time an abnormal occurrence happens. Instead, data on the abnormal occurrence is stored in nonvolatile memory, the engine is force stopped for a period of 3 minutes, and then the engine enters the restart sequence.
In the error detection procedures described on the subsequent pages, abnormal occurrences that are determined as abnormalities after being detected multiple times (e.g. 5 times) are taken to mean abnormal occurrences that are continually detected multiple times (e.g. 5 times) within 1 hour of engine operation. Regardless of continual occurrence and engine operation time, the cumulative number of occurrences (e.g. 5 times) may force the engine to shut down.

(3) Engine Start Standby

- When the engine is in standby mode waiting for the startup conditions to be met, the conditions that have not yet been met are displayed on the 7-segment LED display.
- There are 6 startup conditions. Some conditions start the engine automatically after a specified time period, while others cause it to stop with a warning.
- Display Method
  The startup conditions (see table below) light at engine start up (No. 0 normal display only)
- Startup Conditions Displayed in Engine Start Standby Mode

Start condition	Start Standby Display Code	Condition
Pressure equalization (Refrigerant high and low pressure)	P 2 0	Pressure equalizing display (max. 2 min.)
Compressor outlet temperature	P 0 3	Waiting for the temperature to drop to below 115°C. (Malfunctioning if the temperature does not drop within 10 minutes.)
Out-of-gas check in progress	P 1 5	Waiting for the compressor inlet pressure to exceed 0.1 MPa. (Malfunctioning if the pressure is not restored within 10 minutes.)
High coolant temperature	A 2 0	Waiting for the temperature to drop to below 80°C. (Malfunctioning if the temperature does not drop within 10 minutes.)
Air mix check	A C. 1 60	Checking that air in the coolant circuit is being mixed (requires a maximum of approximately 2 minutes.)
Coolant circuit check in progress	A 2 2	Waiting for the coolant pump to exceed 2500rpm^{-1}. (Malfunctioning if the pressure is not restored within 3 minutes.)
No condenser (3WAY model only)	n o. C o u d	Waiting for the 3WAY solenoid valve in the indoor and outdoor units to complete switching so the system can secure the condenser.
No evaporator (3WAY model only)	n o. E u A	Waiting for the 3WAY solenoid valve in the indoor and outdoor units to complete switching so the system can secure the condenser.

(4) Troubleshooting

A01 Engine Oil Pressure Error

① Error detection method

- When the engine oil pressure is not detected continuously for 4 seconds during engine operations (complete combustion,) the engine will be shut down momentarily and an error flag set. The reason for the engine being shut down is due to the error flag being triggered five consecutive times in one hour.

* When the engine oil pressure switch is not detected within ten seconds of the engine being started (complete combustion.)

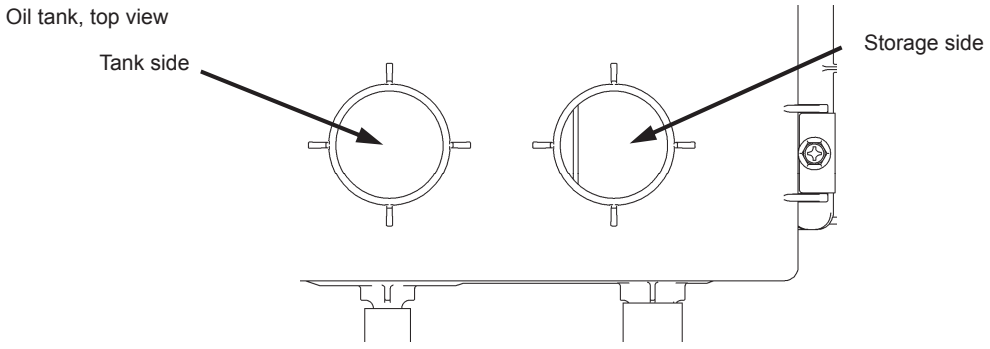
- When oil pressure (engine earth common) GK25 (short circuit) are detected at the engine oil pressure switch contact with oil pressure detected.

② Troubleshooting

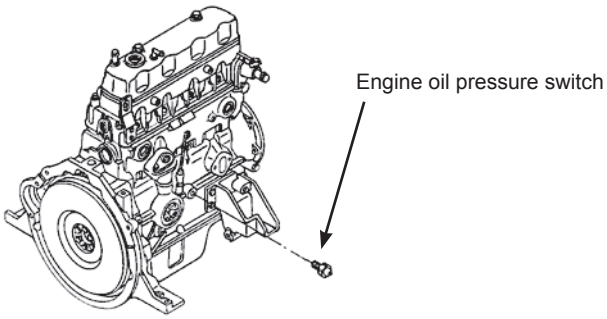
1 Oil level	1-1	Is there oil in the storage side of the oil tank?	Yes	2-1
			No	1-2
	1-2	Any oil leaks or dirty oil?	Yes	Repair
			No	1-3
	1-3	Is the tank side of the oil tank empty?	Yes	Add oil
			No	1-4
	1-4	Does the oil fill pump operate properly?	Yes	Check for pinched or clogged hose
			No	1-5
	1-5	Any oil fill pump wiring broken or disconnected?	Yes	Repair wiring
			No	Replace pump
2 Oil pressure switch	2-1	After engine operation (complete combustion), does the voltage between the oil pressure switch terminal (+) and body ground (–) measure DC 0V?	Yes	3-1
			No	2-2
	2-2	At engine start, does the oil pressure measure 49kPa (0.5kg/cm^2) or more?	Yes	Oil pressure switch defective
			No	2-3
	2-3	Is the oil filter clogged?	Yes	Replace oil filter
			No	Engine is defective
3 Wiring	3-1	Does any of the wiring below contain broken wires or suffer from poor connection, contact or crimping? • Wiring from outdoor main board connector 3P (red) CN012 No. 1 to oil pressure • Wiring from outdoor main board connector FG TM075 to (-) terminal on starter power supply	Yes	Repair wiring
			No	Replace outdoor main board

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1-1



• 2 -1



• 3-1
With oil pressure: DC0V
No oil pressure: DC12V

A02 Engine Oil Error

This function is used to advise the user that the time for changing the engine oil has arrived (or is close.) It is not a function for detecting and displaying equipment malfunctions (or suspected malfunctions) in the same way as normal error detection.

① Oil Change Notification Conditions and Display Method

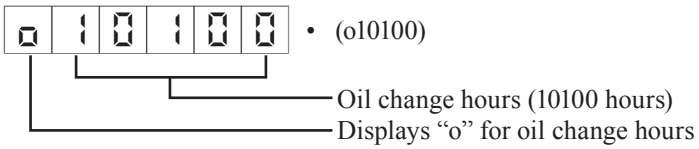
The fact that the time for changing the engine oil has arrived (or is close) is displayed on the remote controller and on the main circuit board on the outdoor unit.

Notification	Notification Conditions (Time to Change Oil *1)	Display method		Remarks
		Remote controller	Outdoor Unit Circuit Board	
Oil Inspection	9,800 or more hours	"Oil Change" blinks	0000 oiL	Operations continued
A02 Alarm	(a) 10,000 to 10,300 hours • Alarm triggered every 50 hours (b) 10,300+ hours • Alarm triggered every 4 hours	"A02" blinks	0000A02 0000 oiL (Displayed alternately)	Operations restarted when error is reset. * Error reset with the remote controller and outdoor unit circuit board. * Only 0000 oiL is displayed after reset.

*1) Oil change time: Engine operation times since the previous oil-change and time reset
(See ② below for details on how to reset the oil change time.)

② Method for resetting oil change hours timer

1) Select Menu No. 2 "Oil change hours display". The oil change hours are displayed as shown below.



2) By holding down the set key while displaying the oil change hours, the display changes to the following. Also, if an operation error results in this display, simply wait for about one second to return to the previous oil change hours display.

3) When the CLr display appears, release the set key momentarily, then quickly press and hold down the set key again.
When the following display appears, the oil change hours are reset to 0 hours.
When this display does not appear, and the previous oil change hours are displayed, repeat the process as described above.

A03 Engine High-Revolution Error

① Error detection method

Engine revolution speed is,

45.0 ~ 71.0 kW type

- Engine revolution speed is more than 2,300min^{-1} continuously for 30 seconds
- Engine revolution speed is more than 2,400min^{-1} continuously for 10 seconds
- Engine revolution speed is more than 2,500min^{-1} continuously for 1 second

85.0 kW type

- Engine revolution speed is more than 2,700min^{-1} continuously for 30 seconds
- Engine revolution speed is more than 2,800min^{-1} continuously for 10 seconds
- Engine revolution speed is more than 2,900min^{-1} continuously for 1 second

If any of above conditions occur, the engine stops momentarily and an error flag is set. An Engine Speed Too High trouble is assumed when the error flag has stopped the engine 5 consecutive times in 1 hour.

② Troubleshooting

1 Check revolution speed	1-1	Measure actual revolution speed using a revolution meter. Was there high revolution when the error occurred?	Yes	2-1
			No	4-1
2 Mixer	2-1	Is the throttle valve locked or sticking?	Yes	Repair
			No	3-1
3 Compressor	3-1	Is there a problem responsible for abnormally low load on the side of the compressor? • Is the clutch normal? → Refer to section P26 and perform a check. • Does the compressor work normally? → If an obvious change in the refrigerant pressure is not seen after the engine starts, then it indicates an error.	OK	5-1
			NG	Restore
4 Ignition pulse	4-1	Check the ignition coil, cam angle sensor, and crank angle sensor. • Checking the ignition coil → Remove the connectors from the ignition coil one by one during operation. If a change in operational status such as a decrease in the number of revolutions occurs, then it indicates that the coil is normal. • Checking the cam angle and crank angle sensors → Refer to sections A23 and A24 and perform inspection.	OK	5-1
			NG	Restore
5 Wiring	5-1	• Any poor connections, poor contact or broken wires between throttle (step motor) wiring and connector? (Wiring from outdoor main board connector 6P (black) CN066 to throttle (step motor)) • In the relay part, is the wiring for the throttle (step motor) and fuel regulating valve crossed?	Yes	Reset the power after repair wiring
			No	6-1
6 Mixer	6-1	Does the throttle (step motor) coil resistance measure about 120Ω? (Disconnect relay connector 6P-1, and measure between No. 1 (red) and No. 2/No. 3, and between No. 4 (orange) and No. 5/No. 6.)	Yes	6-2
			No	Replace mixer
	6-2	Is 4 V DC applied between control board connector 6P (black) CN066 No. 1 (+) and No. 2 (-)/No. 3 (-) as well as between No. 4 (+) and No. 5 (-)/No. 6 (-) when turning the power ON (during positioning)?	Yes	Replace mixer
			No	Replace outdoor main board

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A04 Engine Low-Revolution Error

① Error detection method

- When engine revolution speed drops to 400min^{-1} or less continuously for 3 seconds during engine operation (complete combustion), an abnormal flag is set and the engine stops. An Engine Speed Too Low condition is assumed when the error flag has stopped the engine 5 consecutive times in 1 hour.

② Troubleshooting

1 Fuel	1-1	Has the fuel gas pressure dropped? Is the fuel empty?	OK	2-1
			NG	Restore
2 Check revolution speed	2-1	Measure actual revolution speed using a revolution meter. Are the revolutions low?	Yes	3-1
			No	4-1
3 Mixer	3-1	Is the throttle valve operating?	Yes	6-1
			No	5-1
4 Ignition pulse	4-1	Check the ignition coil, cam angle sensor, and crank angle sensor. Check the ignition coil → Remove the connectors from the ignition coil one by one during operations. It is normal if changes in operational status, such as lowered revolutions, occur. Cam angle & crank angle sensors → Refer to A23 and A24 for inspections.	OK	5-1
			NG	Restore
5 Wiring	5-1	Any poor connections, poor contacts or severed wires between the throttle (step motor) wiring and connector? (Wiring from outdoor main board connector 6P (black) CN066 to throttle (step motor))	Yes	Repair Wiring
			No	8-1
6 Engine	6-1	Measure compression (See A06 5-1).	OK	6-3
			NG	6-2
	6-2	Check 6-1 again after washing the valve and adjusting the valve clearance. Any problem with compression?	OK	6-3
			NG	Replace engine head
	6-3	Are spark emissions normal?	Yes	6-6
			No	6-4
	6-4	Inspect ignition plug (see A06 2-3)	OK	6-5
			NG	Replace
	6-5	Replace the ignition coil, cam angle sensor and crank angle sensor one by one to identify the defective part.		
	6-6	Inspect the zero governor (see A06 3-1).	OK	6-7
			NG	Restore
	6-7	Is the ignition timing normal? (see A06 5-4)	OK	7-1
			NG	Adjust
7 Fuel gas regulating valve	7-1	Does the fuel regulating valve (step motor) coil resistance measure about 120Ω? (Disconnect relay connector 6P-6 and measure between No. 1 (red) and No. 2/No. 3, and between No. 4 (orange) and No. 5/No.6.)	OK	7-2
			NG	Replace mixer
	7-2	Is 4V DC being applied between the outdoor main board connector 6P (yellow) CN065 No. 5 and No. 1/No. 2 as well as between No. 3/ No. 4 when the power is on (during positioning)?	Yes	Replace mixer
			No	8-1
8 Mixer	8-1	Does the throttle (step motor) coil resistance measure about 120Ω? (Disconnect relay connector 6P-2, and measure between No. 1 (red) and No. 2/No. 3, and between No. 4 (orange) and No. 5/No. 6.)	Yes	8-2
			No	Replace mixer
	8-2	Is 4V DC being applied between the outdoor main board connector 6P (black) CN066 No. 1 (+) and No. 2 (-)/No. 3 (-) as well as between No. 4 (+) and No. 5 (-)/No. 6 (-) when the power is on (during positioning)?	Yes	Replace mixer
			No	Replace the outdoor unit's main board

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A05 Ignition Source Error

① Error detection method

When the starter power output meets the following conditions, an error is detected upon 5 consecutive occurrences in one hour.

- When an ignition voltage decrease is detected for 2.5 seconds or more.
- During cranking, when I<3.8A is detected for 4 seconds, with no revolution pulse.

Note) The starter power source magnet switch (52S) operation is as follows.

- When power is turned on, 52S turns ON upon operation signal input. If no abnormalities occur thereafter (A15, A16, A17), this stays ON, and turns OFF upon stop signal input.
- Turns OFF when error occurs.

② Troubleshooting

Try operating the outdoor unit.

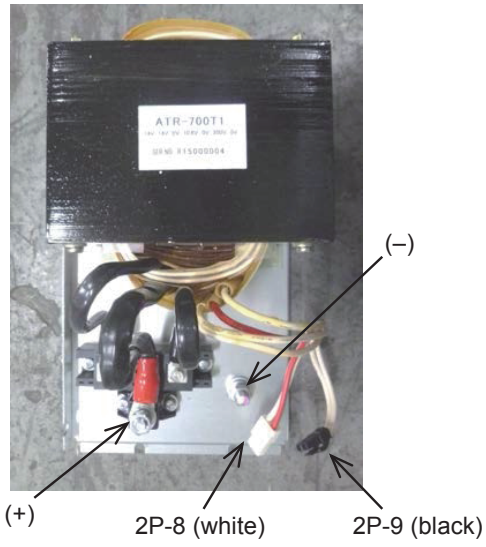
- When the starter power source magnet switch (52S) does not turn ON: Go to 1-1
- When the starter power source magnet switch (52S) turns ON, and then turns OFF after 3 seconds: Go to 2-1
- When the starter power source magnet switch (52S) turns ON but the starter does not turn ON: Go to 4-1

1 Starter power source magnet switch (52S)	1-1	Is AC200C applied between magnet switches A1 and A2 when the magnet switch is turned on?	Yes	Replace magnet switch
			No	1-2
	1-2	Is AC200C applied between power board connectors 3P (yellow)/ CN028 No. 1 and No.3 when the magnet switch is turned on?	Yes	1-3
			No	1-4
	1-3	When wiring connection/contact is poor between the outdoor unit's power board connector 3P (yellow)/CN028 and magnet switches A1-A2 → Repair wiring		
	1-4	Is AC200C being applied between the outdoor unit's power board connector 3P (white)/CN002 No. 1 and No. 2?	Yes	Replace the outdoor unit's power board
			No	1-5
	1-5	Is AC200C being applied between the filter board connector 3P (white)/CN003 No. 1 and No. 2?	Yes	1-6
			No	Replace the filter board
	1-6	When wiring connection/contact is poor between the outdoor unit's power board connector 3P (white)/CN002 and filter board 3P (white) CN003 No.1 and No.3 → Repair wiring		
2 Ignition coils	2-1	Is DC11V or more applied between the outdoor unit's main board connector 3P (black) CN006 No. 1 (+) and No. 2 (–) when the magnet switch is turned on?	Yes	Replace the outdoor unit's main board
			No	2-2
	2-2	Is DC11V or more applied between the outdoor unit's main board connector 3P (black) CN006 No. 1 (+) and No. 2 (–) when the magnet switch is turn on with the outdoor unit's main board connectors 6P (white) CN010 and 6P (black) CN011 disconnected?	Yes	2-3
			No	2-4
	2-3	Check for ground faults or short-circuits between the outdoor unit's main board connector 6P (white) CN010 and 6P (black) CN011 and each ignition coil.	OK	Replace the ignition coil
			NG	Repair Wiring
	2-4	Is AC11V or more applied between the outdoor unit's main board connector 3P (white) CN022 No. 1 (+) and No. 2 (–) when the magnet switch is turned on?	Yes	2-5
			No	3-1
	2-5	Are there any defective wiring connections/contacts or severed wires between the outdoor unit's power board connector 3P (black) CN025 and the outdoor unit's main board connector 3P (black) CN006?	Yes	Repair Wiring
			No	Replace the outdoor unit's power board
3 Ignition (starter) power	3-1	Is approximately AC11V applied between the starter power source's relay connector 2P-9 No. 1 and No. 2 when the magnet switch is turned on?	Yes	3-2
			No	3-3
	3-2	Are there any defective wiring connections/contacts or severed wires between the outdoor unit's power board connector 2P (white) CN022 and the starter power source's relay connector 2P-9 → Repair wiring		
	3-3	Is AC200V applied between the starter power source's relay connector 2P-8 No. 1 and No. 2 when the magnet switch is turned on?	Yes	Replace the starter power
			No	3-4

	3-4	Is approximately AC200V applied between the magnet switch's No. 2 and No. 6 when the magnet switch is turned on?	Yes	3-5
			No	3-6
	3-5	Are there any defective wiring connections/contacts or severed wires between the magnet switch and the starter power source's relay connector 2P-8 → Repair wiring		
	3-6	Is approximately AC200V being applied between the magnet switch No.1 and No.5?	Yes	3-7
			No	Check primary wiring→ Repair
	3-7	Is approximately AC200V applied between the magnet switch A1 and A2 when the magnet switch is turned on?	Yes	Replace the magnet switch
			No	3-8
	3-8	Are there any defective wiring connections/contacts or severed wires between the outdoor unit's power board connector 3P (yellow) CN028 and the magnet switch?	Yes	Repair Wiring
			No	3-9
	3-9	Is approximately AC200V being applied between the outdoor unit's power board connector 3P (white) CN002 No.1 and No.3?	Yes	Replace the outdoor unit's power board
			No	Check the relevant wiring and filter board
4 Starter/ starter relay (outdoor unit main board)	4-1	Is DC10V or more applied between the starter B terminal (+) and engine ground (-) when the magnet switch is on?	Yes	4-2
			No	4-3
	4-2	Is DC10V or more applied between the starter S terminal (+) and engine ground (-) when cranking is started?	Yes	Replace the starter
			No	4-5
	4-3	Is DC10V or more applied between the starter power source (+) and (-) when the magnet switch is on?	Yes	4-4
			No	3-3
	4-4	Are there any defective wiring connections/contacts between the starter power source's + terminal and the starter's B terminal, or between the starter power source's - terminal and engine ground? → Repair wiring		
	4-5	Is DC10V or more applied between the outdoor unit's power board connector CN084 (+) and the outdoor unit's main board connector FG TM075 (-) when cranking is started?	Yes	4-6
			No	4-7
	4-6	Are there any defective wiring connections/contacts between the outdoor unit's power board connector CN084 (+) and the starter's S terminal? → Repair wiring		
	4-7	Is DC10V or more applied between the outdoor unit's power board connector CN084 (+) and the outdoor unit's main board connector FG TM075 (-) when the magnet switch is on?	Yes	Replace the outdoor unit's main board
			No	4-8
	4-8	Are there any defective wiring connections/contacts between the outdoor unit's power board connector CN084 (+) and the starter power source's + terminal? → Repair wiring		

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 3-1~3-5, 4-3, 4-4, 4-6, 4-8



A06 Engine Start Failure

① Error detection method

When the engine will not start despite cranking being carried out 30 times (revolution speed detected) during engine start-up (cranking = 5 seconds ON, 10 seconds OFF.)

* Enforced pauses of 3 minutes every 5 cranks and 10 minutes every 15 cranks are in effect.

② Troubleshooting

1 Engine	1-1	Has the fuel gas pressure dropped? Is the fuel empty? Measure the pressure at the gas pressure measuring port during cranking.	OK	2-1
			NG	1-2
	1-2	Is the gas solenoid valve SW (SW002 on the outdoor unit's main board) set at NORM?	Yes	4-1
			No	Set SW at NORM
2 Plug	2-1	Are spark emissions normal? (Remove plug and check outside. Or, check with a timing light.)	Yes	3-1
			No	2-2
	2-2	Are there any poor connections, poor contacts, poor crimping or severed wires between the ignition wiring and the outdoor unit's main board connector 6P (white) CN010 and 6P (black)/CN011?	Yes	Repair Wiring
			No	2-3
	2-3	Inspect ignition plug.	OK	7-1
			NG	Replace plug
3 Zero governor	3-1	Inspect zero governor.	OK	5-1
			NG	Restore
4 Gas solenoid valve/Gas adjustment valve	4-1	Is DC180V being applied between the fuel gas solenoid valve relay connector 4P-1 (white) No. 1 (+) and No. 2 (–) and between No. 3 (+) and No. 4 (–) during cranking?	Yes	4-2
			No	6-1
	4-2	Is DC180V or more being applied between the fuel gas solenoid valve coil terminals during cranking?	Yes	4-4
			No	4-3
	4-3	Are there any poor wiring connections, crimping or severed wires between the fuel gas solenoid valve relay connector 4P-1 (white) and the solenoid valve?	Yes	Repair Wiring
			No	4-4
	4-4	Are fuel gas solenoid valve operations malfunctioning? (Check for coil breakage, foreign matter, fuel gas passage blockages, etc.)	OK	4-5
			NG	Repair (or replace)
	4-5	Are the throttle (step motor) and fuel gas regulating valves operating normally?	OK	5-1
			NG	Replace
5 Engine	5-1	Measure compression.	OK	5-3
			NG	5-2
	5-2	Check 6-1 again after washing the valve and adjusting the valve clearance. Any problem with compression?	OK	5-3
			NG	Replace engine head
	5-3	Is the air cleaner soiled? (Visual inspection)	OK	5-4
			NG	Clean/replace
	5-4	Has the ignition timing been adjusted?	Yes	6-1
			No	Adjust
6 Solenoid valve wiring/ circuit board	6-1	Is 180V DC being applied between the outdoor unit's power board connector 7P (white) CN041 pin 1 (+) and pin 3 (–) and between pin 5 (+) and pin 7 (–) during cranking?	Yes	6-2
			No	6-3
	6-2	Are there any poor connections, contacts, crimping or severed wires between the outdoor unit's power board connector 7P (white) CN041 and the fuel gas solenoid valve relay connector 4P-1 (white)?	Yes	Repair Wiring
			No	6-3
	6-3	Is 200V AC being applied between the outdoor unit's power board connector 3P (white) CN002 No. 1 to No. 3?	Yes	Replace the outdoor unit's power board
			No	6-4

	6-4	Is 200V AC being applied between the filter board connector 3P (white) CN003 No. 1 to No. 3?	Yes	6-5
			No	Replace the filter board
	6-5	Are there any poor connections, contacts or severed wires between the outdoor unit's power board connector 3P (white) CN002 and the filter board connector 3P (white) CN003 No.1 to No.3?	Yes	Repair Wiring
			No	7-1
7 Crank/cam angle sensor	7-1	Are there any poor connections, poor contacts, poor crimping or severed wires in the following wiring? • Between the outdoor unit's main board connector 3P (white) CN015 and the crank angle sensor connector? • Between the outdoor unit's main board connector 3P (brown) CN016 and the cam angle sensor connector?	Yes	Repair Wiring
			No	8-1
8 Ignition coil	8-1	Inspect the ignition coil (coil, igniter) and the ignition wiring. If they are okay, then replace the outdoor unit's main board.		

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 2-3
  1) Check the plug cap (to ascertain that it is 0.8 mm or less.)
  2) Check for insulator damage (must be no cracks or signs of electrical current leaks.)
  3) Must be no carbon or residual oil attached.

- 3-1
  1) Perform visual inspection of the zero governor.
  2) Check the air opening for smudges or other problem.
  3) Check for fuel gas leakage (smell of fuel gas).

- 5-1
  1) After warming the engine, remove all spark plugs.
  2) Set the compression gauge in the spark plug hole.
  3) Set the outdoor unit's main board to No.4 (test run/forced settings) and set the enforced cranking mode to (5tr on).
  4) Use the DOWN key or UP key to start automatic cranking (for 5 seconds.)
  5) Check that the gauge value exceeds the following threshold values. (Repeat and confirm step #4 three times for each cylinder.)

Engine	Compression Threshold (lower threshold) [Mpa]
GK25	1.62

  6) Reset the compression gauge in another cylinder and repeat again from step #3.
  7) The procedure is complete when all cylinders have been checked.

- 5-4
  See Chapter 5 "Ignition Timing Check and Adjustment" for details on the procedures.

A07 Fuel Gas Valve Error

① Error detection method

- An error flag is set when it is judged that the fuel gas valves did not close when engine operations were halted (excluding when halted owing to malfunctions) and an error will be triggered when this occurs five consecutive times.

② Troubleshooting

1 Circuit board / Gas solenoid valve	1-1	Set the STOP switch on the outdoor unit's main board to [STOP] to completely halt operations of the outdoor unit. Is 180V DC being applied between the outdoor unit's power board connector 7P (white) CN041 No.1 (+) to No.3 (-), and between No.5 (+) to No.7 (-) when the unit is halted?	Yes	1-2
			No	Replace the fuel gas solenoid valve
	1-2	Is the same problem as explained in 1-1 still occurring after the outdoor unit's power board has been replaced?	Yes	Replace the outdoor unit's main board
			No	End

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A08 Engine Stall

① Error detection method

During engine operation (complete combustion), when engine revolution speed ≤ 100min^{-1} continuously for 3 seconds, the engine is stopped momentarily and an error flag is set.

An Engine Stall condition is assumed when the error flag has stopped the engine 5 consecutive times in 1 hour.

② Troubleshooting

1 Fuel	1-1	Has the fuel gas pressure dropped? Is the fuel empty?	OK	2-1
			NG	Restore
2 Engine	2-1	Measure compression (See A06 5-1).	OK	2-3
			NG	2-2
	2-2	Check 2-1 again after washing the valve and adjusting the valve clearance. Any problem with compression?	OK	2-3
			NG	Replace engine head
	2-3	Is the air cleaner soiled? (Visual inspection)	OK	2-4
			NG	Clean and Replace
	2-4	Are spark emissions normal?	Yes	2-7
			No	2-5
	2-5	Inspect ignition plug (see A06 2-3)	OK	2-6
			NG	Replace
	2-6	Replace the ignition coil, cam angle sensor and crank angle sensor one by one to identify the defective part.		
	2-7	Inspect the zero governor (see A06 3-1).	OK	2-8
			NG	Restore
	2-8	Is the ignition timing okay? (see Chapter 5 (9)).	OK	2-9
			NG	Adjust
	2-9	Is air being sucked in? Check the rubber plug on the intake manifold.	OK	2-10
			NG	Replace
	2-10	Is 4V DC (approximately) being applied between outdoor unit's main board connector 6P (black) CN066 No. 1 (+) and No. 2 (-)/No. 3 (-) and between No. 4 (+) and No. 5 (-)/No. 6 (-) when the power is turned on (during positioning)?	Yes	2-11
			No	Replace the outdoor unit's main board
	2-11	Is DC voltage being applied between outdoor unit's main board connector 6P (yellow) CN065 No. 1 (+) and No. 2 (-)/No. 3 (-) and between No. 4 (+) and No. 5 (-)/No. 6 (-) when the power is turned on (during positioning)?	Yes	2-12
			No	Replace the outdoor unit's main board
	2-12	Inspect the mixer's stepping motor (both the throttle and the fuel gas adjustment valve.) Are any wires severed?	Yes	Replace the stepping motor
			No	2-13
	2-13	Are the throttle valve or fuel gas adjustment valves locked in place? Is it possible to easily move each valve by hand with the stepping motor removed?	Yes	3-1
			No	Replace mixer
3 Engine load check	3-1	There is a chance that the engine load could be unsuitable. Check the following, and make repairs if problems are found. • Is the air filter on the indoor unit blocked? (Especially in the heater mode.) • Has a short circuit occurred with the air on the indoor unit? (Especially in the heater mode with the remote controller's thermostat.) • Has a short circuit occurred with the air on the outdoor unit, or is the air heat exchanger on the outdoor unit closed, etc.? (When in the cooler mode.) • Is the refrigerant route blocked (strainer, dry core, etc.), is the valve closed (forgotten to open closed valves, etc.,) or is the motor-operated valve locked in place? • Has the refrigerant been over-filled?		

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A10 Exhaust Gas Temperature High

① Error detection method

During engine operation (complete combustion), when the exhaust gas temperature ≥ 130°C continuously for 10 seconds, the engine is stopped momentarily and an error flag is set.

An Exhaust Gas Temp. High error is assumed when this flag has shut down the engine once.

② Troubleshooting

1 Exhaust gas temperature	1-1	Measure the actual exhaust gas temperature. Is it high?	Yes	2-1
			No	4-1
2 Coolant amount check	2-1	Is there any sign of the coolant leaking? • Check the base and around the base. • Check the amount in the reserve tank. • Check the coolant route (detached hose, etc.)	OK	2-2
			NG	Repair the leaks and then refill with coolant and perform an air purge.
	2-2	Is the coolant pump operating normally? • Carry out an inspection while referring to A22. • Are there any fluctuations in coolant pump revolutions or repeated starts/stops, etc., when the coolant pump is operating?	OK	3-1
			NG	There is a possibility that air has become mixed in, so refill with coolant and perform an air purge.
3 Exhaust gas heat exchanger check	3-1	Is there heavy soiling on the inside of the exhaust gas tube on the exhaust gas heat exchanger?	Yes	Replace the exhaust gas heat exchanger
			No	4-1
4 Wiring and thermistor check	4-1	Measure the resistance on the exhaust gas temperature sensor (see “5. Reference Document” for details on thermistor characteristics.)	OK	Outdoor unit’s power board
			NG	Replace the sensor

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A12 Throttle (Stepping Motor) Failure

① Abnormality detection method

- When performing forced self-diagnosis mode 2 in the self-diagnosis mode, when the throttle is not operating properly, the engine is stopped and an abnormality flag is set.
  When the reason for engine shutdown is this abnormality flag, occurring one time.
- An abnormality is determined when, during engine complete combustion, the set revolution speed and actual revolution speed differ widely for 5 consecutive times in 1 hour. (Difference of ±100 revolutions during stable revolution)
  * This can only be reset from the outdoor control board.

② Troubleshooting

1 Wiring	1-1	Any poor connection/contact or broken wires for step motor (throttle) wiring and connector? (Wiring from control board connector 6P (black) CN066 to relay connector 6P-2 (white))	Yes	Repair wiring
			No	2-1
2 Mixer	2-1	Does the step motor (throttle) coil resistance measure about 120Ω? (Disconnect relay connector 6P-2, and measure between No. 1 (red) and No. 2/No. 3, and between No. 4 (orange) and No. 5/No. 6.)	Yes	2-2
			No	Replace mixer
	2-2	When turning power ON (during positioning), is about DC4V applied respectively across control board connector 6P (black) CN066 No. 1 (+) and No. 2 (–)/No. 3 (–), and across No. 4 (+) and No. 5 (–)/No. 6 (–)?	Yes	Replace mixer
			No	Replace control board

A14 Engine Oil Pressure Switch Error

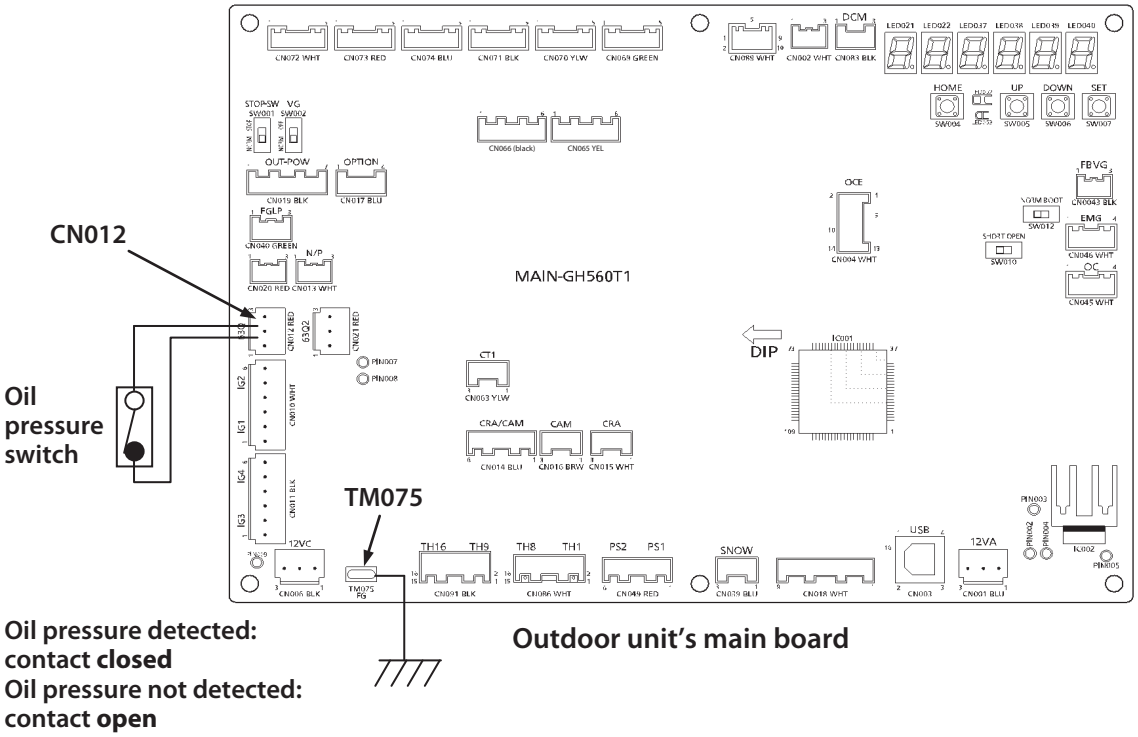
① Error detection method

- When starting the engine, if the oil pressure is detected for 6 seconds or more (contact closed) before complete combustion, an error flag is set. An abnormal stop results on the first occurrence. However, if it turns to not detected, the error flag is automatically reset and the starting sequence continues.

② Troubleshooting

1 Wiring	1-1	Can the problem be reproduced when the wire connected to the oil pressure switch is disconnected? (Note: Avoid allowing the disconnected wire from coming into contact with the frame or engine.)	Yes	1-2
			No	2-1
	1-2	Is the wiring between the outdoor unit's main board connector 3P (red) CN012 and the oil pressure switch grounded? (Disconnect the wire between the above-mentioned connector and oil pressure switch and measure the resistance between the wire and the engine.)	Yes	Repair Wiring
			No	Replace the outdoor unit's main board
2 Oil pressure switch	2-1	Disconnect the oil pressure switch from the engine and purge the oil from the oil gallery. Having done that, reconnect the oil pressure switch and start operations. If the problem occurs again, replace the oil pressure switch.		

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3



A15 Starter Power Source Output Short Circuit

① Error detection method

When the starter power primary current meets the following conditions, an error is determined upon 5 consecutive occurrences in 1 hour.

- Not during cranking: When 40A or more is detected for 0.1 second or more
- Not during cranking: When 26A or more is detected for 0.2 second or more
- Not during cranking: When 3.8A or more is detected for 5.0 second or more

Note 1) The starter power source magnet switch (52S) operation is as follows.

- 52S turns ON upon operation signal input. If no abnormalities occur thereafter (A15, A16, A17), this stays ON,and turns OFF upon stop signal input.
- Turns OFF when error occurs.

② Troubleshooting

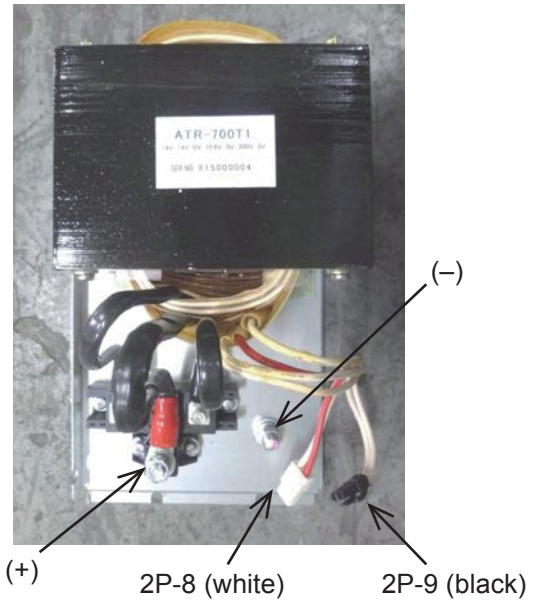
1 Starter power source (DC current)	1-1	Reoccurs even when disconnecting the two wires from the starter power sours ⊕ terminals?	Yes	1-2
			No	2-1
	1-2	Reoccurs even after disconnecting control board connector 3P (yellow) CN063 (Ignore abnormality A17 if it occurs.)	Yes	Replace control board
			No	Replace starter power sours
2 Starter	2-1	Is either of the two wires from the starter power sours ⊕ terminal to the starter short-circuit, ground faulted, or misrouted?	Yes	Repair/replace wiring
			No	Replace starter

● For work procedure for replacing outdoor main board, see “5. Reference Document”.

● For board and Electrical Wiring Diagram, see Chapter 6.

- Outdoor main board: page VI-1
- Outdoor power board: page VI-2
- Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1 -1, 2-1



A16 Starter Lock

① Error detection method

- During cranking, a Starter Locked error is assumed when any of the following conditions occur 5 times in 1 hour: the starter power primary current meets the following condition, no revolution pulse is detected, no input from the crank angle sensor, no input from the ?cam? angle sensor.
- When 32A or more is detected for 1.0 second or more

② Troubleshooting

1) Check starter

1 Starter	1-1	Check for starter lock (If there is no starter lock (includes engine and compressor) replace the outdoor main board)		

- For work procedure for replacing outdoor main board, see “5. Reference Document”.

2) Temporarily remove the compressor drive belt, and check the following rotating parts for locking.
(See Periodic Inspection and Parts Replacement Manual for installing and removing compressor drive belt)

2 Compressor	2-1	Rotates by hand with some resistance?	Yes	3-1
			No	Replace compressor
3 Engine	3-1	Temporarily remove ignition plugs from all cylinders. Can the engine crank be rotated? (To rotate the crankshaft, follow the procedure in the Periodic Inspection and Parts Replacement Manual.) Replace engine if the engine crankshaft does not rotate.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A17 CT Error (Starter Current Detection Failure)

① Error detection method

When the starter power primary current meets the following conditions, an error is determined upon 5 occurrences in 1 hour.

- During cranking: With no detection of starter current, and with revolution speed pulse detected, when 5 seconds pass during cranking or when engine attains complete combustion.

② Troubleshooting

1 CT1 (Current sensor 1)	1-1	Does the wiring from the starter power source magnet switch (52S) terminal No. 1 pass through CT1 (current sensor)?	Yes	1-2
			No	Repair wiring
	1-2	Use a clamp meter on the R-phase wiring of the starter power source to measure the current during cranking. Was the current 5A or more?	Yes	1-3
			No	2-1
	1-3	Is there a voltage of AC 0.5V or more between outdoor main board connector 3P (yellow) CN063 No. 1 and No. 3 during cranking?	Yes	Replace outdoor main board
			No	Replace current sensor 1
2 Starter power source	2-1	Broken wire or poor contact in wiring for R and T phases of starter power source?	Yes	Repair wiring
			No	Replace starter power source

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

A19 Low Coolant Temperature

① Error detection method

- If the temperature of the coolant does not exceed 60°C during engine operations (complete combustion,) the engine will be momentarily halted. (The time varies between 30 to 60 minutes depending on the temperature.)
  An emergency shutdown will occur when the engine has been halted twice because of this error.
  The cumulative number of times will be reset when the coolant maintains a temperature of 60°C or more or exceeds 85°C.

② Troubleshooting

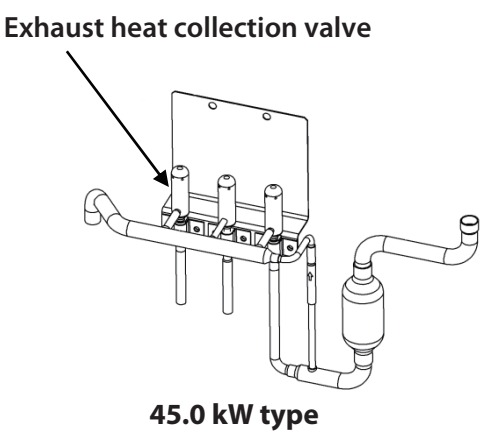
1 Coolant temperature sensor	1-1	Disconnect relay connector 2P-12 (green) on the coolant temperature sensor and then measure the resistance. Measure the surface temperature and compare the results. (See “5. Reference Document” for details on thermistor characteristics.)	OK	2-1
			NG	Replace the coolant temperature sensor
2 Three-way coolant valve	2-1	Disconnect the three-way coolant valve and check to see if it is locked. (Check power source initialization and the current output with actual valve operations.) Is the valve malfunctioning?	OK	3-1
			NG	Replace the three-way coolant valve
3 Exhaust heat collection valve	3-1	Is the exhaust heat collection valve locked open?	OK	Replace the outdoor unit’s main board
			NG	3-2
	3-2	Is the wiring to the exhaust heat collection valve severed or short-circuited?	OK	3-3
			NG	Repair Wiring
	3-3	Replace the exhaust heat collection valve (solenoid valve ASSY) and perform a test run. Does the coolant temperature rise?	Yes	Keep an eye on the situation
			No	Replace the outdoor unit’s main board

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

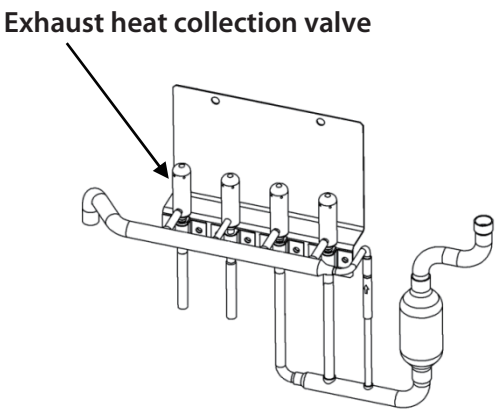
- 1-1
  Resistance values of the coolant temperature sensor (see the chart on thermistor characteristics for further details.)
  40°C: 1.2kΩ 50°C: 879Ω 60°C: 642Ω 70°C: 477Ω
  80°C: 361Ω 90°C: 227Ω 100°C: 216Ω

- 3-1
  Check to make sure the exhaust heat collection valve is not locked open by following the instructions below.
  1) Use the [Off] button on the remote controller to stop the outdoor unit in order to completely close the exhaust heat collection valve. Note: The valve will not be completely opened if the [STOP-SW] on the outdoor unit’s main board is used to halt operations. The [Off] switch on the remote controller or the enforced thermo-off switch on the outdoor unit’s main board must be used without fail.
  2) Disconnect the connector (CN072 5P white) on the exhaust heat collection valve after three or more minutes have elapsed since the outdoor unit was powered off.
  3) Resume operations of the outdoor unit in the heater mode. (Either as a test run or with remote controller operations.)
  4) Once the outdoor unit is operating, measure the temperature of the exhaust heat collection valve’s secondary duct for approximately two minutes.
  5) If it is clear that the temperature has dropped in comparison with the situation before start-up, then there is a chance that the valve is locked open. Everything is normal if the temperature does not drop.
     Note: Keep the operation time to a maximum of five minutes.
  6) Once the inspection is completed, make sure the exhaust heat collection valve connector is reconnected and the power source reset.
  * If the power source is not reset, it will be impossible for the exhaust heat collection valve to be positioned, which will hinder subsequent operations.

• 3-1, 3-2



45.0 kW type



56.0 to 85.0 kW type

A20 High Coolant Temperature

① Error detection method

When the coolant temperature ≥100°C continuously for 2 seconds or when the coolant temperature is ≥95°C for 3 consecutive seconds during engine operations (complete combustion,) the engine will be momentarily shut down and an error flag set.

The reason for the engine shutting down is because the error flag was set five times consecutively.

② Troubleshooting

1 Pump rotation	1-1	Is the coolant pump rotating during operations?	Yes	2-1
			No	See A22
2 Coolant circuit	2-1	Is the three-way electric coolant valve at the engine outlet operating normally?	Yes	2-2
			No	Repair or replace the three-way valve
	2-2	Are there any signs of coolant discharge from the reserve tank?	Yes	2-4
			No	2-3
	2-3	Is there air in the coolant?	Yes	Purge the air *
			No	3-1
	2-4	Is coolant leaking or seeping, etc., from the coolant hose?	Yes	Purge the air after repairs *
			No	Purge the air *
3 Sensor check	3-1	Disconnect relay connector 2P-12 (green) on the coolant temperature sensor and then measure the resistance. Measure the surface temperature and compare the results. (See “5. Reference Document” for details on thermistor characteristics.)	OK	3-2
			NG	Replace the coolant temperature sensor
	3-2	When the coolant temperature sensor relay connector has been reconnected, display the coolant temperature (No. 0dAtA data code 20) on the 7-segment LED on the outdoor unit’s main board. Compare this to the actual temperature measured on the surface.	OK	3-4
			NG	3-3
	3-3	Is there any water, etc. on relay connector 2P-12 (green)?	OK	Replace the outdoor unit’s main board
			NG	Repair
	3-4	Is the exhaust heat collection valve locked closed during heating operations? (This does not need to be checked if A20 occurred in the cooling mode.)	OK	Replace the outdoor unit’s main board
			NG	Replace the exhaust heat collection valve (motor-operated valve ASSY)

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

* Coolant air purging by No. 4 test run and forced setting menu 

- 2-1

  Three-way electric coolant valve inspection

  1) Operate the engine in the cooling mode, and measure the surface temperature of tubing flowing to the 2F outdoor heat exchanger.
  2) Confirm that the coolant temperature is rising, and that the coolant is flowing toward 2F.
     First opened: 70°C / Fully open: 80°C

- 2-3
  The air discharge hose must not be emitting large amounts of bubbles.
  Air bleed cock on the tube leading from the engine outlet (between the wax valve.)

- 3-1
  Resistance values of the coolant temperature sensor (see the chart on thermistor characteristics for further details.)
  40°C: 1.2kΩ 50°C: 879Ω 60°C: 642Ω 70°C: 477Ω
  80°C: 361Ω 90°C: 227Ω 100°C: 216Ω

- 3-4
  Check to make sure the exhaust heat collection valve is not locked closed by following the instructions below.
  1) Resume operations of the outdoor unit in the heater mode. (Either as a test run or with remote controller operations.)
  2) Once the outdoor unit is operating, measure the temperature of the exhaust heat collection valve's secondary duct for approximately two minutes. (see fig. A19301.)
  3) If it is clear that the temperature has not dropped in comparison with the situation before start-up, then there is a chance that the valve is locked closed. Everything is normal if the temperature does not drop.

A21 Coolant Level Error

① Error detection method

- A flag will be set if the possibility of air entering the coolant circuit is detected during air-mix confirmation operations prior to starting the engine (complete combustion.) (The engine will continue to operate.)
  An error will be triggered if this possibility is detected three consecutive times.

* However, there are also cases in which the error will be triggered after only one detected when operating after the [Automatic Air Purge Mode] ([S Air]) or when the engine is first started after an A21 error has been reset.

② Troubleshooting

1 Coolant level check	1-1	Is the prescribed amount of coolant in the reserve tank?	Yes	3-1
			No	2-1
2 Coolant leakage check	2-1	Are there any external signs of coolant leaks? Check visually.	Yes	Repair
			No	2-2
	2-2	Can any coolant be confirmed in the oil pan?	Yes	Replace the engine head or packing
			No	2-3
	2-3	Remove the drain hose from the exhaust gas heat exchanger and operate the pump. Is any coolant emitted from the outlet?	Yes	Replace the exhaust gas heat exchanger
			No	3-1
3 Air-mix check	3-1	Can any air be confirmed in the coolant circuit?	Yes	3-2
			No	4-1
	3-2	Does air continue to be emitted no matter how many times the air purging process is performed?	Yes	3-3
			No	End after air purge
	3-3	Does air continue to be emitted even after the engine has been shut down?	Yes	Check for leaks on the plate heat exchanger and repair if necessary.
			No	Replace the engine head or packing
4 Coolant pump check	4-1	Are there any severed wires, defective contacts or short circuits on the coolant pump's lock?	Yes	Replace the coolant pump
			No	5-1
5 Coolant hose connection check	5-1	Is the filler neck hose connected the right side up?	Yes	6-1
			No	Repair
6 Coolant electric three-way valve check	6-1	Is the coolant electric three-way valve operating normally?	Yes	If the problem reoccurs, replace the outdoor unit's power board or main board and keep an eye on the situation.
			No	Replace the three-way coolant valve.

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

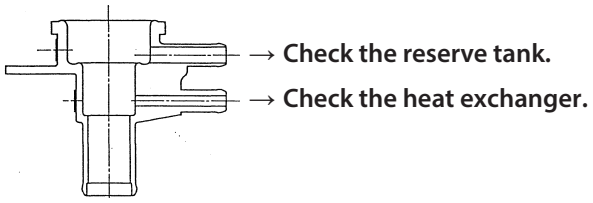
- 2-1
  Visually inspect all portions of the coolant system while stopped.
  Are there any coolant leaks, or evidence of coolant leaks? Also, are there any water leaks from any of the following four locations when the water circuit (*) is operated and the pump activated?
  * Water circuit operations: Performed with the [P u n P] enforced water circuit setting on the No.4 Test Run/Forced Settings menu.
  1) Hoses and connections
  2) Flange connections
  3) Threaded connections
  4) Tubing/welds

- 2-2
  Collect oil from oil pan and check for emulsification. (Emulsification → Mixed)

- 3-1
  Check for any fluctuations in coolant pump rotation speed and any evidence of air being mixed during air extraction when the air purge operations are performed by selecting [5 A r] in the [Automatic Air Purging Mode] on the No.4 Test Run/Forced Settings menu.

- 4-1 Coolant Pump Inspection
  If the coil resistance for each phase is around 14 to 18Ω, everything is normal.

- 5-1



- 6-1 Coolant electrical three-way valve inspection
  Start up the unit and then perform the inspection with the [P u n P] enforced water circuit setting on the No.4 Test Run/Forced Settings menu. This switches alternately between the radiator (3 minutes) and sub-evaporator (1 minute 15 seconds,) so valve operations can be determined in accordance with tube temperature fluctuations.

A22 Coolant Pump Error

① Error detection method

Errors can be determined when coolant pump rotations and driving meet the following conditions.

- When an error is triggered once owing to the coolant pump revolutions not increasing or not being able to be detected when the engine is started up.
- When either overcurrent, insufficient revolutions or excessive revolutions are detected in the coolant pump when the engine is operating, the engine will be momentarily halted and an error flag set. The reason for the engine being shut down is due to the error flag being triggered five consecutive times in one hour.

② Troubleshooting

1 Power source check	1-1	Is the voltage being supplied to the outdoor unit normal? (Check to see whether the voltage is too low or unstable)	Yes	2-1
			No	Repair the power source
2 Coolant pump	2-1	Are there any bad power cable connections when 3-phase equipment is in use? Or, is the power cable severed or the connection faulty?	Yes	2-2
			No	Repair the power cable
	2-2	Is the coolant pump locked or are there any severed wires, poor contacts or short circuits? (Coil resistance should be around 14-18Ω for each phase.)	Yes	3-1
			No	Replace the coolant pump
3 Coolant circuit	3-1	Has air entered the coolant circuit? (There is a chance of air having entered the circuit if there is a slight banging noise and pump revolutions are fluctuating during coolant pump operations.)	Yes	4-1
			No	Perform an air purge *
4 Outdoor unit's power board	4-1	Replace the outdoor unit's power board and keep an eye on the situation. Replace the coolant pump if the problem reoccurs.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

* Coolant air purging by No. 4 test run and forced setting menu 

A23 Crankshaft Angle Sensor Error
A24 Camshaft Angle Sensor Error

① Error detection method

When input from the sensor meets the following conditions, an error is determined upon 5 consecutive occurrences in 1 hour.

- When starter current was detected during cranking, but crank angle sensor input is not detected for 2 continuous seconds.
- When starter current was detected during cranking, but cam angle sensor input is not detected for 3 continuous seconds.

② Troubleshooting

1 Crank angle sensor trouble	1-1	Does the starter operate?	Yes	1-3
			No	1-2
	1-2	Check starter S terminal for short circuit or ground fault, and starter B terminal for broken wire.	OK	Replace starter
			NG	Repair wiring
	1-3	Poor connection or broken wire in crank angle sensor wiring?	Yes	Repair wiring
			No	1-4
	1-4	Replace outdoor main board. If NG, replace sensor.		
2 Cam angle sensor trouble	2-1	Poor connection or broken wire in cam angle sensor wiring?	Yes	Repair wiring
			No	2-2
	2-2	Replace outdoor main board. If NG, replace sensor.		

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

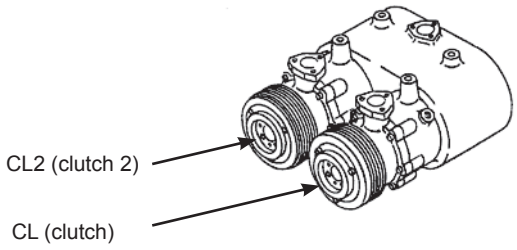
A25 Clutch Error

① Error detection method
A Clutch Error fault is detected when clutch coil temperature or clutch 2 coil temperature is 110°C or more for up to 1 minute.
Error is detected with one occurrence.

② Troubleshooting
*The compressor uses a twin clutch specification. Inspect both clutch 1 and clutch 2.

1 Compressor lock	1-1	Rotate the compressor pulley by hand while stopped, to check for compressor lock. Locked? (Both clutch 1 and clutch 2 are off, so be sure to turn the center of the pulley and not just the perimeter.)	Yes	Replace compressor
			No	2-1
2 Clutch coil sensor	2-1	Use a contact thermometer to measure the temperature of the back of the pulley. Is this temperature nearly identical (within 10°C) to that of clutch 1 and clutch 2 coil of the outdoor main board?	OK	Investigate further
			NG	2-2
	2-2	Is there a ground fault or short circuit in wiring between outdoor main board connector 2P (blue) CN060 and 2P (yellow) CN064 and their respective clutch coil sensors.	Yes	Repair wiring
			No	Replace clutch coil sensor

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3



- 2-1
  See Chapter 5 for procedure to view clutch and clutch 2 coil temperature on the outdoor main board.

A26 Flameout Error

① Error detection method

- An error is determined when the engine revolution speed fluctuates widely during engine operation. The engine is stopped and an error flag is set.
  A flameout error is assumed when this flag has shut down the engine 5 consecutive times in 1 hour.

② Troubleshooting

1 Ignition system error	1-1	Are sparks emitted properly?	Yes	1-2
			No	1-3
	1-2	Proper ignition timing?	OK	2-1
			NG	Adjust timing
	1-3	Any poor connection/contact/crimping and broken wires in wiring between the outdoor main board connector 6P (white) CN010, 6P (black) CN011 and each IG coil (igniter)?	Yes	Repair wiring
			No	1-4
	1-4	Ignition plug working properly?	Yes	1-5
			No	Replace ignition plug
	1-5	Try replacing the IG coil (igniter). If fault persists after replacement, replace the outdoor main board.		
2 Engine unit error	2-1	Measure compression (See A06 5-1).	OK	3-1
			NG	2-2
	2-2	Wash valve and adjust valve clearance. If still NG, replace engine head.		
3 Fuel regulating system error	3-1	Check operation of fuel gas regulating valve and throttle (step motor). Operating properly?	Yes	3-2
			No	Replace
	3-2	Inspect zero governor. Operating properly?	Yes	3-3
			No	Restore
	3-3	Air intake occurring? Check rubber plug on intake manifold, etc.		

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1-2
  1-2 See Chapter 5 for timing adjustment.

A27 Catalyst Temperature Error (for only models with catalyst option)

① Error detection method

- When a catalyst temperature exceeding 700°C is detected continuously for 10 seconds during engine operation, the engine is stopped and an error flag is set.
  A Catalyst Temp. Trouble is assumed when this flag has shut down the engine 5 consecutive times in 1 hour.

② Troubleshooting

1 Unit error	1-1	Check the wiring and connectors. Everything OK?	Yes	1-2
			No	Repair wiring
	1-2	Thermistor operating properly?	OK	1-3
			NG	Replace thermistor
	1-3	Inspect ignition timing. Everything OK?	Yes	Replace outdoor main board
			No	Adjust

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1-2 Thermistor resistor values

100°C	96.0KΩ
200°C	13.5KΩ
300°C	3.3KΩ
400°C	1.15KΩ
500°C	514Ω
600°C	268Ω
650°C	198Ω
700°C	151Ω
750°C	122Ω
800°C	98Ω

- 1-3 See Chapter 5 for timing adjustment.

A30 Low Fuel Gas Pressure Error

① Error detection method
An error is determined when the fuel gas supply pressure is less than the setting value during fuel gas valve operation (open) continuously for 3 seconds.
- Pressure setting: P 0.4KPa (gas low pressure switch contact ON)

② Troubleshooting

1 Check gas supply pressure	1-1	Check fuel gas supply pressure. Is the supply pressure low?	Yes	Check gas pressure and tubing diameter
			No	1-2
	1-2	When the gas supply pressure is proper, disconnect 3P (green) CN040 on the control board, and check conduction of the gas low pressure switch. Conducting?	Yes	1-3
			No	1-4
	1-3	Check for short-circuiting (or pinching) of fuel gas low pressure switch wiring. Any short-circuited wiring (from board to fuel gas low pressure switch)?	Yes	Repair/replace wiring
			No	Replace gas low pressure switch
	1-4	If the supply pressure is normal and A30 occurs, replace the control board.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E01 Remote Controller Receive Failure

① Error detection method

1) When the indoor unit is connected

An error is determined when no incoming communication is received for 3 minutes.

- When 9 or more indoor units are wired into the remote controller group.
- When inspection (inspection pin) or TEST (test pin) on the indoor control board is short-circuited.
- When the non-volatile memory (EEPROM) is not inserted or has failed upon turning power ON.
- Indoor control board failure

2) When a water heat exchanger unit is connected

An error may be assumed when no communication addressed to you is received for three minutes.

- When power is not being supplied to the water heat exchanger unit.
- When the parallel array address has not been set or is incorrectly set.
- When the terminal resistor has not been set or is incorrectly set.
- When the remote control wire is severed, short-circuited, has a ground fault or the wrong polarity.
- When a source of noise is located nearby.
- When the water heat exchanger unit's control board or peripheral equipment is defective.

② Troubleshooting

1) When the indoor unit is connected

1 Auto-address	1-1	Is auto-addressing complete?	Yes	1-2
			No	1-3
	1-2	Has auto-addressing failed (warning displayed on outdoor unit)?	OK	1-3
			NG	2-1
	1-3	Perform pre-check before auto-addressing. (See "5. Reference Document")		
2 Group control wiring	2-1	Is this indoor unit group-controlled?	Yes	2-2
			No	3-1
	2-2	Are any indoor units wired into the remote controller group turned OFF?	Yes	Turn power ON
			No	2-3
	2-3	Are 9 or more indoor units connected to one remote controller group wiring?	Yes	Repair wiring
			No	2-4
	2-4	Was the remote controller group wiring modified after auto-addressing was complete? Or, were group settings changed using the remote controller properties setting mode?	Yes	2-5
			No	3-1
	2-5	No main unit present in remote controller group wiring → Repeat auto-addressing.		
3 Indoor control board	3-1	Is the inspection pin (CN062/CN071) or TEST pin (CN064) on the indoor control board short-circuited?	Yes	Eliminate short-circuit
			No	3-2
	3-2	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	3-3
			No	3-5
	3-3	Does E01 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	3-4
			No	3-5
	3-4	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	3-5	Is the LED (LED002) blinking on the indoor control board?	Yes	3-6
			No	3-7
	3-6	Nonvolatile memory (EEPROM) on the outdoor main unit is not inserted, is incorrectly inserted or is defective → Correct or replace nonvolatile memory and program it in the remote controller properties setting mode.		
	3-7	Short-circuit or misrouting in indoor unit remote controller wiring?	Yes	Repair wiring
			No	Replace indoor control board

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- See “5. Reference Document” for checking remote controller.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor non-volatile memory (EEPROM) and replacing indoor control board.

2) When the water heat exchanger unit is connected

1 Unit power	1-1	Is electricity being supplied to the water heat exchange unit?	Yes	2-1
			No	Switch on the power
2 Remote controller (parallel array) address	2-1	Has an address been set in the remote controller?	Yes	2-2
			No	Set the address
	2-2	Is the address set in the remote controller a serial number?	Yes	2-3
			No	Set a serial number
	2-3	Do the addresses on the remote controller and on the water heat exchange unit match up?	Yes	2-4
			No	Match up t he addresses
	2-4	Does the number of addresses on the remote controller match up with the number of water heat exchanger units?	Yes	2-5
			No	Match up the number of connected units
	2-5	Is the parallel array address on the water heat exchanger unit set at anything other than [0]?	Yes	2-6
			No	Set any parallel array address other than [0]
	2-6	Is the parallel array address on the water heat exchanger unit set at [1 - 5]?	Yes	3-1
			No	Set the parallel array address at [1 - 5]
3 Terminating resistance	3-1	Are the terminating resistance switches on the remote controller and on water heat exchanger unit’s control board located at both ends of the wire linking the remote controller with the water heat exchanger unit set at [ON]?	Yes	4-1
			No	Set the terminating resistance for both ends of the link wire to [ON]
4 Remote controller wires (wires linking between the remote controller to the water heat exchanger unit)	4-1	Is the remote controller’s wire severed (connector or terminal disconnected?)	Yes	Repair the severed wire
			No	4-2
	4-2	Is the remote controller’s wire short-circuited?	Yes	Repair the short-circuit
			No	4-3
	4-3	Is the remote controller’s wire grounded?	Yes	Repair the ground
			No	4-4
	4-4	Is the remote controller’s wire polarity (+-) reversed?	Yes	Switch the wires around
			No	4-5
	4-5	Are the remote controller wire (TB5-4, TB5-5) and outdoor unit wires (TB1-(1), (2)) connected to the wrong places?	Yes	Repair the wiring
			No	5-1
5 Noise	5-1	Is a source of noise located nearby?	Yes	Set up noise countermeasures
			No	6-1

6 Water heat exchanger unit's control board and surrounding area	6-1	Is AC200V ±10% being applied between TB1 R and S?	Yes	Request improvements to the power facility manager
			No	Proceed to 6-2 after checking the wires and terminals are normal around TB1
	6-2	Is the varister (VA1) grounded or severely deteriorated?	Yes	Replace the varister (VA1)
			No	6-3
	6-3	Has the power switch (SW1) been switched on?	Yes	Proceed to 6-4 after checking the wires around SW1
			No	Set SW1 to ON
	6-4	Are suitable DC voltages being applied to the circuits on the board? (Suitable DC voltage = approximately 5V between TP1 and 2, approximately 7V between TP3 and 4, and approximately 5V between TP5 and 6)	Yes	6-8
			No	6-5
	6-5	Is the varister (VA2) short-circuited between the phases or severely deteriorated?	Yes	Replace the varister (VA2)
			No	6-6
	6-6	Is electrical voltage being output to the secondary side of the fuses (F1, F2)?	Yes	6-7
			No	Check that the wiring and terminals around the fuses are normal and replace the fuses
	6-7	Is electrical voltage being output to the secondary side of the noise filter (RF1?)	Yes	6-8
			No	Check that the wiring and terminals around RF1 are normal and replace the RF1
	6-8	Is electrical voltage being output to the secondary side of the power transformer (PT1?)	Yes	Replace the water heat exchanger unit's control board
			No	Check that the wiring and connectors around PT1 are normal and replace the PT1

- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E02 Remote Controller Transmission Failure

① Error detection method
When the remote controller (controller) itself cannot transmit. Or, when a self-transmitted signal cannot be selfreceived or changes, an error is determined.
- Breakdown of remote controller itself

② Troubleshooting

1 Remote controller group wiring	1-1	Is this indoor unit group-controlled?	Yes	1-2
			No	2-1
	1-2	Any short-circuit or broken wires for remote controller group link wiring 1 (white) and 2 (black)?	Yes	Repair wiring
			No	2-1
2 Indoor control board	2-1	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	2-2
			No	2-4
	2-2	Does E02 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	2-3
			No	2-4
	2-3	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	2-4	Short-circuit or misrouting in indoor unit remote controller wiring?	Yes	Repair wiring
			No	Replace indoor control board

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- See “5. Reference Document” for checking remote controller.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

E03 Indoor Unit Receive Failure from Remote Controller (Central)

① Error detection method

1) With indoor unit connected

An error is determined when no transmission is received from the remote controller (central) for 3 minutes, or when no transmission is received from the central equipment for 15 minutes.

- When transmission had been normal but the remote controller wiring became broken or misrouted.
- Broken indoor and outdoor operating wiring to central control equipment.
- Only sub remote controller is set.
- No remote controller, with central control equipment power OFF.
- No remote controller, and only sub remote controller is set.

2) When the water heat exchanger unit is connected

An error may be assumed when communication from the remote controller is not received by the water heat exchanger unit for 3 minutes.

- When power is not being supplied to the remote controller.
- When the parallel array address has not been set or is incorrectly set.
- When the terminal resistor has not been set or is incorrectly set.
- When the remote control wire is severed, short-circuited, has a ground fault or the wrong polarity.
- When a source of noise is located nearby.
- When the remote controller or peripheral equipment is defective.

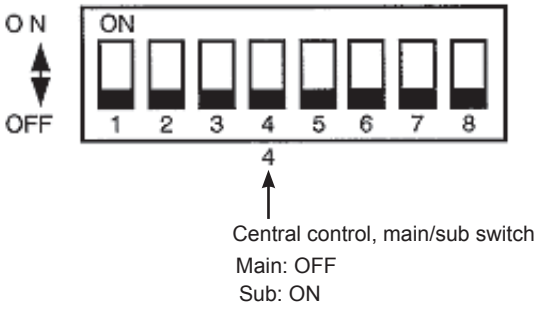
② Troubleshooting

1) When the indoor unit is connected

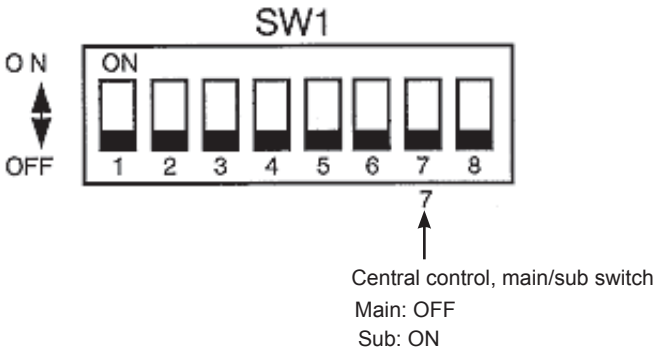
1 Central control equipment	1-1	Is central control equipment connected?	Yes	1-2
			No	2-1
	1-2	Is the central control equipment power OFF?	Yes	Turn power ON
			No	1-3
	1-3	Are all the central control main-sub switches on the connected central control equipment set to “sub”?	Yes	1-4
			No	1-5
	1-4	Of the connected central control equipment, set only the highest-ranking central control unit to “main”, and set the remaining units to “sub”. Ranking order from high to low: AMY adapter → intelligent controller → system controller → multi-controller.		
	1-5	Are any broken indoor and outdoor operating wires connected to central control equipment? (See “5. Reference Document”)	Yes	Repair wiring
			No	2-1
2 Remote controller	2-1	Is this indoor unit group-controlled?	Yes	2-2
			No	3-1
	2-2	Any broken wires for remote controller group link wiring 1 (white) and 2 (black)?	Yes	Repair wiring
			No	3-1
3 Indoor control board	3-1	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	3-2
			No	3-4
	3-2	Does E03 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	3-3
			No	3-4
	3-3	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	3-4	Short-circuit, misrouting, or broken wires in indoor unit remote controller wiring?	Yes	Repair wiring
			No	Replace indoor control board

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- See “5. Reference Document” for checking remote controller.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

• 1-4



Multi-Controller



System Controller

2) When the water heat exchanger unit is connected

1 Remote controller power	1-1	Is power being supplied to the remote controller?	Yes	2-1
			No	Switch on the power
2 Remote controller (parallel array) address	2-1	Has an address been set on the remote controller?	Yes	2-2
			No	Set the address
	2-2	Is the address set in the remote controller in series?	Yes	2-3
			No	Set a serial number
	2-3	Do the address on the remote controller and on the water heat exchanger unit match up?	Yes	2-4
			No	Match up the addresses
	2-4	Does the number of addresses on the remote controller match up with the number of water heat exchanger units?	Yes	2-5
			No	Match up the number of connected units
	2-5	Is the parallel array address on the water heat exchanger unit set at anything other than [0]?	Yes	2-6
			No	Set any parallel array address other than [0]
	2-6	Is the parallel array address on the water heat exchanger unit set at [1 - 5]?	Yes	3-1
			No	Set the parallel array address at [1 - 5]
3 Terminal resistor	3-1	Are the terminal resistor switches on the remote controller and on water heat exchanger unit's control board located at both ends of the wire linking the remote controller with the water heat exchanger unit set at ON?	Yes	4-1
			No	Set the terminal resistor for both ends of the link wire to ON
4 Remote controller wires (wires linking between the remote controller to the water heat exchanger unit)	4-1	Is the remote controller's wire severed (connector or terminal disconnected?)	Yes	Repair the severed wires
			No	4-2
	4-2	Is the remote controller's wire short-circuited?	Yes	Repair the short-circuit
			No	4-3
	4-3	Is the remote controller's wire grounded?	Yes	Repair the ground
			No	4-4
	4-4	Is the remote controller's wire polarity (+-) reversed?	Yes	Switch the wires around
			No	4-5
	4-5	Are the remote controller wire (TB5-4, TB5-5) and outdoor unit wires (TB1-①, ②) connected to the wrong places?	Yes	Repair the wiring
			No	5-1
5 Noise	5-1	Is a source of noise located nearby?	Yes	Set up noise countermeasures
			No	6-1
6 Remote controller or peripheral equipment	6-1	Have the settings been made in accordance with the remote controller's instruction manual?	Yes	6-2
			No	Repair the settings in accordance with the instruction manual
	6-2	Does a repairable fault exist in the remoter controller or remote controller board?	Yes	Restore
			No	Replace the remote controller

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E04 Indoor Unit Receive Failure from Outdoor Unit

1) When the indoor unit is connected

① Error detection method

After turning power ON, with no transmission from outdoor unit for 3 minutes. Or, an error is determined when the outdoor unit does not respond.

- Outdoor unit power is OFF.
- With link wiring, when outdoor main board terminal resistor switch (SW010) is set to "ON" for several units.
- When turning power ON after completing auto-addressing, when the number of indoor units has changed.
- When indoor unit power is not ON.
- Inspection pin (CN062/CN071) or TEST pin (CN064) on the indoor control board is short-circuited.
- Non-volatile memory (EEPROM) is not inserted when changing indoor board.
- In the remote controller detailed settings mode, the indoor address is "undetermined".
- Indoor unit addresses duplicated
- Indoor/outdoor operation wiring is short-circuited or broken.
- Error in the reception circuit on the signal output board (option board)
- Breakdown of outdoor unit
- High voltage (AC200V, etc) applied across indoor/outdoor operation wire circuit

② Troubleshooting

1 Power supply	1-1	Is/was the outdoor unit power OFF?	Yes	Turn power ON and wait 3 minutes
			No	1-2
	1-2	Is the indoor unit power OFF?	Yes	Turn power ON
			No	2-1
2 Indoor/ outdoor operation wiring	2-1	Indoor/outdoor operation wiring broken or short-circuited? (See "5. Reference Document")	Yes	Repair wiring
			No	2-2
	2-2	With link wiring, is the outdoor main board terminal resistor switch (SW010) set to "ON" for several units?	Yes	Set only one unit to "ON"
			No	2-3
	2-3	High voltage (AC200V, etc) applied across indoor/outdoor operation wire circuit?	Yes	3-2
			No	3-1
3 Indoor unit count	3-1	Did the number of indoor units increase or decrease after auto-addressing?	Yes	3-2
			No	3-3
	3-2	Perform pre-check before auto-addressing. (See "5. Reference Document")		
	3-3	In the remote controller detailed settings mode, check the indoor unit address (item code 13). Any undetermined (99) or duplicated addresses for indoor units?	Yes	3-2
			No	4-1
4 Indoor control board	4-1	Is the inspection pin (CN062/CN071) or TEST pin (CN064) on the indoor control board short-circuited?	Yes	Eliminate short-circuit
			No	4-2
	4-2	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	4-3
			No	4-5
	4-3	Does E04 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	4-4
			No	4-5
	4-4	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	4-5	Is the LED (LED002) blinking on the indoor control board?	Yes	4-6
			No	4-7
	4-6	Nonvolatile memory (EEPROM) on the outdoor main unit is not inserted, is incorrectly inserted or is defective → Correct or replace nonvolatile memory and program it in the remote controller properties setting mode.		
	4-7	Is E4 displayed on all remote controllers for other indoor units connected to this outdoor unit?	Yes	Replace outdoor main board
			No	Replace indoor control board

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor non-volatile memory (EEPROM) and replacing indoor control board.
- See "5. Reference Document" for checking remote controller.

2) When the water heat exchanger unit is connected

① An error may be assumed when no regular communication occurs between the outdoor unit and water heat exchanger unit for 3 minutes.
- When the power to the outdoor unit has not been switched on.
- When the terminating resistance switch (SW010) on the outdoor unit's main board is set to [OPEN].
- When the number of indoor units set with parameter No.10 on the outdoor unit's main board is anything other than two.
- When the address switches on the water heat exchanger unit and outdoor unit do not match up.
- When an error occurs with the indoor/outdoor operation wiring (short-circuit, severed wires, ground.)
- When electrical voltage is applied to the indoor/outdoor operation wiring.
- When the outdoor unit has broken down.
- Effects of noise.

② Troubleshooting

1 Power supply	1-1	Is/was the outdoor unit power OFF?	Yes	Turn the power on and wait 3 minutes
			No	2-1
2 Setting switches	2-1	Is the terminating resistance switch (SW010) on the outdoor unit's main board set at [SHORT]?	Yes	2-2
			No	Correct to [SHORT]
	2-2	Is the number of indoor units set at two?	Yes	2-3
			No	Set [2 units]
	2-3	Do the system addresses for the water heat exchanger unit and outdoor unit match up?	Yes	3-1
			No	Make sure the water heat exchanger SW14 and the outdoor unit setting match up
3 Indoor/outdoor operation wiring	3-1	Is the indoor/outdoor operation wiring severed (connectors, terminals disconnected)?	Yes	Repair severed wires
			No	3-2
	3-2	Is the indoor/outdoor operation wiring short-circuited?	Yes	Correct the short circuit
			No	3-3
	3-3	Is the indoor/outdoor operation wiring grounded?	Yes	Correct the ground
			No	3-4
	3-4	Is the connection for the water heat exchanger unit electrical box's indoor/outdoor operation wiring located between the terminal boards TB5-1 and 2?	Yes	3-5
			No	Repair
	3-5	Is electrical voltage being applied to the indoor/outdoor operation wiring? (If no, the fuse (F1) on the outdoor unit's main board has blown.)	Yes	3-6
			No	4-1
	3-6	Repair the wiring properly so that no electrical voltage is applied. Is the outdoor unit's main board CN046 already in use?	Yes	Replace the outdoor unit's main board
			No	Reverse the connectors on the outdoor unit's main board (CN045 → CN046)
4 Outdoor unit breakdown	4-1	Has the outdoor unit broken down?	Yes	Repair the malfunction
			No	5-1
5 Noise	5-1	Is a source of noise located nearby the outdoor unit?	Yes	Set up noise countermeasures
			No	Replace the outdoor unit's main board

- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E05 Indoor Unit Transmission Failure to Outdoor Unit

① Error detection method

When a self-transmitted signal cannot be self-received, an error is determined.

- Indoor (water heat exchanger unit) control board is defective.
- Outdoor main board terminal resistor switch setting is incorrect.

② Troubleshooting

1 Indoor control board	1-1	Is the indoor/outdoor operation wiring connected to multiple outdoor units? (Link wiring?)	Yes	1-2
			No	1-3
	1-2	Is the SW010 (terminal resistor) switch on one outdoor main board set to “ON” and the remainder to “OFF”?	Yes	1-4
			No	Set only one unit to “ON”
	1-3	Is the outdoor main board SW010 (terminal resistor) switch set to “OFF”?	Yes	Set to “ON”
			No	1-4
	1-4	Indoor/outdoor operation wiring broken or short-circuited?	Yes	Repair wiring
			No	1-5
	1-5	Replace indoor (water heat exchanger unit) control board		

- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.
- See “5. Reference Document” for details on the procedure for replacing the water heat exchanger unit’s control board.

E06 Outdoor Unit Receive Failure from Indoor Unit

1) When the indoor unit is connected

① Error detection method

An error is determined when no indoor unit transmission (response) is received for 3 minutes.

- Indoor unit power is OFF.
- Indoor unit DISP pin (CN063/CN072) is short-circuited.
- Indoor/outdoor operation wiring is short-circuited or broken.
- Indoor unit signal output board (option board) is defective.

② Troubleshooting

1 Indoor power source	1-1	Is the indoor unit power OFF?	Yes	Turn power ON
			No	2-1
2 Indoor/outdoor operation wiring	2-1	Indoor/outdoor operation wiring broken or short-circuited? (See “5. Reference Document”)	Yes	Repair wiring
			No	3-1
3 Indoor control board	3-1	Is the DISP pin (CN063/CN072) or inspection pin (CN062/CN071) on the indoor control board short-circuited?	Yes	Eliminate short-circuit
			No	3-2
	3-2	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	3-3
			No	3-5
	3-3	Does E06 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	3-4
			No	3-5
	3-4	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	3-5	Indoor control board failure → Replace board		

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

2) When the water heat exchange unit is connected

① Error detection method

An error may be assumed when communication (response) from the water heat exchanger unit is not received by the outdoor unit for 3 minutes.

- When power is not being supplied to the water heat exchanger unit.
- When the outdoor unit address set for the water heat exchanger unit and the outdoor unit do not match up.
- When an error occurs with the indoor/outdoor operation wiring (short-circuit, severed wires, ground.)
- When electrical voltage is applied to the indoor/outdoor operation wiring.
- When affected by noise.
- When the water heat exchanger unit’s control board or peripheral equipment is defective.

② Troubleshooting

1 Unit power supply	1-1	Is electricity being supplied to the water heat exchanger unit?	Yes	2-1
			No	Switch on the power
2 Setting switches	2-1	Do the address settings for the water heat exchanger unit and outdoor unit match up?	Yes	3-1
			No	Make sure the water heat exchanger SW14 and the outdoor unit setting match up

3 Remote controller wires (wires linking the remote controller to the water heat exchanger unit)	3-1	Is the indoor/outdoor operation wiring severed (connectors, terminals disconnected)?	Yes	Repair severed wires
			No	3-2
	3-2	Is the indoor/outdoor operation wiring short-circuited?	Yes	Correct the short circuit
			No	3-3
	3-3	Is the indoor/outdoor operation wiring grounded?	Yes	Correct the ground
			No	3-4
	3-4	Is voltage being applied to the indoor/outdoor operational wiring? (If no, the fuse (F001) on the outdoor unit's main board has blown.)	Yes	3-5
			No	4-1
	3-5	Repair the wiring properly so that no electrical voltage is applied. Is the water heat exchanger unit's control board 2P-13 already in use?	Yes	Replace the water heat exchanger unit's control board
			No	Reverse the water heat exchanger unit's control board connectors (2P-12 → 2P-13)
4 Outdoor unit breakdown	4-1	Has the outdoor unit broken down?	Yes	Repair the malfunction
			No	5-1
5 Noise	5-1	Is a source of noise located nearby?	Yes	Set up noise countermeasures
			No	6-1
6 Water heat exchange unit's control board and surrounding area	6-1	Is AC200V ±10% being applied between R and S on TB1?	Yes	Proceed to 6-2 after having confirmed that the wiring and terminals are normal around TB1
			No	Request improvements to the power facility manager
	6-2	Is the varister (VA1) grounded or severely deteriorated?	Yes	Replace the varister (VA1)
			No	6-3
	6-3	Is the power switch (SW1) on?	Yes	Proceed to 6-4 after having confirmed that the wiring is normal around SW1
			No	Set SW1 to ON
	6-4	Are suitable DC voltages being applied to CN1 (6P-1)? (Suitable DC voltage = approximately 5V between TP1 and 2, approximately 7V between TP3 and 4, and approximately 5V between TP5 and 6)	Yes	6-8
			No	6-5

6 Water heat exchange unit's control board and surrounding area	6-5	Is the varister (VA2) short-circuited between the phases or severely deteriorated?	Yes	Replace the varister (VA2)
			No	6-6
	6-6	Is electrical voltage being output to the secondary side of the fuses (F1, F2)?	Yes	6-7
			No	Check that the wiring and terminals around the fuses are normal and replace the fuses
	6-7	Is electrical voltage being output to the secondary side of the noise filter (RF1?)	Yes	6-8
			No	Check that the wiring and terminals around RF1 are normal and replace the RF1
	6-8	Is electrical voltage being output to the secondary side of the power transformer (PT1?)	Yes	Replace the water heat exchanger unit's control board
			No	Check that the wiring and connectors around PT1 are normal and replace the PT1

- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E07 Outdoor Unit Transmission Failure to Indoor Unit

① Error detection method

When a self-transmitted signal cannot be self-received (is mismatched) for 3 minutes, an error is determined.

- Outdoor main board is defective
- Outdoor main board terminal resistor switch setting is incorrect.

② Troubleshooting

1 Outdoor main board	1-1	"Is the indoor/outdoor operation wiring connected to multiple outdoor units? (Link wiring?) * Link wiring not available when water heat exchanger unit is connected."	Yes	1-2
			No	1-3
	1-2	Is the SW010 (terminal resistor) switch on one outdoor main board set to "ON" and the remainder to "OFF"?	Yes	1-4
			No	Set only one unit to "ON"
	1-3	Is the outdoor main board SW010 (terminal resistor) switch set to "OFF"?	Yes	Set to "ON"
			No	1-4
	1-4	Indoor/outdoor operation wiring broken or short-circuited? (See "5. Reference Document")	Yes	Repair wiring
			No	1-5
	1-5	Replace outdoor main board		

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E08 Duplicated Indoor Unit Address Setting

① Error detection method

An error is determined when the Indoor unit address is duplicated.

- In the remote controller detailed settings mode, the indoor address setting is duplicated.
- Several indoor units with no indoor unit address setting have the DISP pin (CN063/CN072) short-circuited.

② Troubleshooting

1 Link wiring	1-1	Is the water heat exchanger unit connected and link wiring in effect?	Yes	Stop using link wiring
			No	2-1
2 Indoor unit's control board	2-1	Is the DISP pin (CN063/CN072) on the indoor unit's control board short-circuited?	Yes	Eliminate short-circuit
			No	2-2
	2-2	Perform pre-check before auto-addressing. (See "5. Reference Document.") Does E08 remain after repeating auto-addressing?	Yes	2-3
			No	2-4
	2-3	The non-volatile memory (EEPROM) on the indoor board is defective → Replace		
	2-4	To change indoor unit address, instead of using the remote controller's advanced settings, use the remote controller's address change mode.		

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- See instructions packaged with servicing indoor board for procedure on replacing indoor non-volatile memory (EEPROM).

E09 Multiple Main Remote Controller Units Set

① Error detection method

An error is determined when multiple main remote controllers exist within a remote controller group.

- Forgot to set a remote controller “sub” when controlling with two remote controllers.
- Forgot to set a remote controller “sub” when controlling with a wireless remote controller and a wired remote controller

② Troubleshooting

1 Remote controller	1-1	Set one of the two remote controllers to “Sub”.

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1-1

  Sub remote setup procedure (E type)

  ① Hold down the [Change mode] and [Set] buttons for 4 seconds or more.

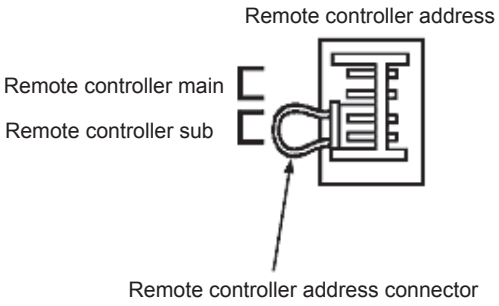
  ② “Setup”, an item code “ 01 ” and setup data “ 0001 ” appears on the remote controller LCD.

  ③ Use the [▼] / [▲] buttons to switch to “ 0000 ” setup data.

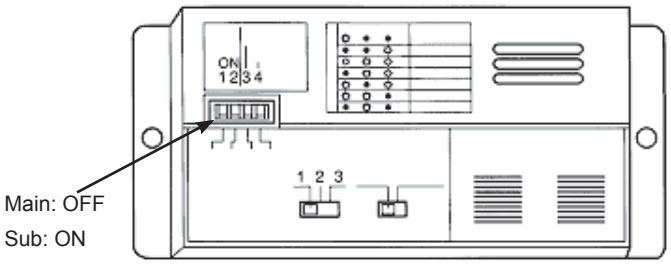
  ④ Press the [Set] button (the setting is completed when flashing changes to steady light)

  ⑤ Press the [Inspect] button to return to normal remote controller display.

Wired remote controller (B type)



Wireless remote controller



E11 Indoor Unit Receive Failure from Signal Output Board (Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

After confirming existence of the signal output board, an error is determined upon no reception from the signal output board.

- Signal output board is defective.
- Wiring to signal output board is defective.

② Troubleshooting

1 Signal output board	1-1	Wiring to signal output board (option board) broken or short-circuited?	Yes	Repair wiring
			No	1-2
	1-2	Replace the signal output board (option board) and wiring. Is E11 displayed again?	Yes	Replace indoor control board
			No	Replace signal output board

- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

E12 Automatic Address Setting Is in Progress: Automatic Address Setting Start is Prohibited (Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

An error is determined when an auto-addressing startup command is received from another unit during auto-addressing.

- In a system with multiple outdoor units, with indoor/outdoor operation wiring connected (with link wiring), an auto-addressing startup command was issued by another unit during auto-addressing.

② Troubleshooting

1 Autoaddress	1-1	In a system with multiple outdoor units, with indoor/outdoor operation wiring connected (with link wiring), an auto-addressing startup command was issued by another unit during auto-addressing. Wait until current auto-addressing is complete.

E13 Indoor Unit Transmission Failure to Remote controller

① Error detection method

When a signal transmitted from the indoor unit (water heat exchanger unit) to the remote controller cannot be self-received, an error is determined.

- Indoor unit (water heat exchanger unit) control board is defective.
- Short-circuit or broken wires in remote controller wiring 1 (white) and 2 (black) (with indoor unit connected)

② Troubleshooting

<table>
<tr><td rowspan="2">1
Equipment check</td><td rowspan="2">1-1</td><td rowspan="2">What units are connected?</td><td colspan="2">Indoor unit</td><td>2-1</td></tr>
<tr><td colspan="2">Water heat exchanger unit</td><td>3-1</td></tr>
<tr><td rowspan="3">2
Indoor unit's control board</td><td rowspan="2">2-1</td><td rowspan="2">Are remote controller wires 1 (white) or 2 (black) short-circuited or severed?</td><td>Yes</td><td colspan="2">Repair Wiring</td></tr>
<tr><td>No</td><td colspan="2">2-2</td></tr>
<tr><td>2-2</td><td colspan="4">Replace the indoor unit's control board.</td></tr>
<tr><td rowspan="3">3
Water heat exchange unit's control board</td><td rowspan="2">3-1</td><td rowspan="2">Are remote controller wires TB5-4 or TB-5-5 short-circuited or miss-wired?</td><td>Yes</td><td colspan="2">Repair Wiring</td></tr>
<tr><td>No</td><td colspan="2">3-2</td></tr>
<tr><td>3-2</td><td colspan="4">Replace the water heat exchanger unit's control board.</td></tr>
</table>

- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.
- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.

E15 Automatic Address Alarm (Too Few Units)

1) When the indoor unit is connected

① Error detection method

An error is determined when the indoor unit count responding to transmission is less than the indoor unit count set on the outdoor unit. (Also detected apart from auto-addressing.)

- The actual number of indoor units is less than the number of indoor units set on the outdoor unit.
- Connected indoor unit power is OFF
- An indoor unit has a short-circuited inspection pin (CN062/CN071) or TEST pin (CN064) upon power ON.
- High voltage (AC200V, etc) was applied across indoor/outdoor operation wire circuit.
- Initial communication between the outdoor unit and the remote controller is impossible (when the group address is not set).

② Troubleshooting

1 Power supply	1-1	Is the indoor unit power OFF?	Yes	Turn power ON
			No	2-1
2 Indoor/ outdoor operation wiring	2-1	Indoor/outdoor operation wiring broken or short-circuited? (See “5. Reference Document”)	Yes	Repair wiring
			No	2-2
	2-2	High voltage (AC200V, etc) applied across indoor/outdoor operation wire circuit?	Yes	3-2
			No	3-1
3 Indoor unit count	3-1	Did the number of indoor units change after auto-addressing? Or, was the indoor unit count setting changed on the outdoor main board?	Yes	3-2
			No	4-1
	3-2	Perform pre-check before auto-addressing. (See “5. Reference Document”)		
4 Indoor control board	4-1	Is the inspection pin (CN062/CN071) or TEST pin (CN064) on the indoor control board short-circuited?	Yes	Eliminate short-circuit
			No	4-2
	4-2	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	4-3
			No	4-5
	4-3	Does E15 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	4-4
			No	4-5
	4-4	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	4-5	Is the LED blinking on the indoor control board?	Yes	4-6
			No	5-1
	4-6	Nonvolatile memory (EEPROM) on the outdoor main unit is not inserted, is incorrectly inserted or is defective → Correct or replace nonvolatile memory and program it in the remote controller properties setting mode.		
5 Outdoor main board	5-1	On the outdoor main board, use setting No. 10 to set the indoor unit count. Then compare the indoor unit connection status using No. 9 (indoor unit check), and investigate the unaccounted indoor unit in detail.		

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- See “5. Reference Document” for checking remote controller.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor non-volatile memory (EEPROM) and replacing indoor control board.

* In systems that link wiring systems where a water heat exchanger unit is connected, the state of hot and cold water may output an Automatic Address Setting Warning.
Should this happen, remove link wiring and set a different address.

2) When the water heat exchanger unit is connected

① Error detection method

An error may be assumed when the outdoor unit's connection setting on the indoor unit is incorrect, and when an error exists in the connected equipment or when an error exists because the power has not been switched on, etc.

(The number of indoor units connected must be set at two on the outdoor unit when a water heat exchanger unit is connected.)

- The setting for number of indoor units connected is set at three or more on the outdoor unit.
- The power to the connected water heat exchanger unit has not been switched on.
- High voltage (AC200V, etc.) has been applied to the indoor/outdoor operation wiring circuit.

② Troubleshooting

1 Power supply	1-1	Is the power to the water heat exchanger unit's switched off?	Yes	Switch on the power
			No	2-1
2 Indoor/outdoor operation wiring	2-1	Is the indoor/outdoor operation wiring severed or short-circuited?	Yes	Repair Wiring
			No	2-2
	2-2	Is high voltage (AC200V, etc.) being applied to the indoor/outdoor operation wiring circuits?	Yes	4-1
			No	3-1
3 Water heat exchanger unit count	3-1	Has the number of connected indoor units set with the No.10 parameter on the outdoor unit's main board been amended to a figure other than two?	Yes	3-2
			No	Reset the outdoor unit's power supply
	3-2	Set the number of connected indoor units to two with the No.10 parameter on the outdoor unit's main board.		
4 Remote controller wires (link wiring between the remote controller and the water heat exchanger unit)	4-1	Is the water heat exchanger unit's control board 2P-13 already in use?	Yes	Replace the water heat exchanger unit's control board
			No	Reverse the water heat exchanger unit's control board connectors (2P-12 → 2P-13)

- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

E16 Automatic Address Alarm (Too Many Units)

① Error detection method

An error is determined when the indoor unit count (water heat exchanger units) responding to transmission exceeds the indoor unit count (water heat exchanger units) set on the outdoor unit. (Also detected apart from auto-addressing.)

- The actual number of indoor units exceeds the number of indoor units set on the outdoor unit (with indoor unit connected).

② Troubleshooting

1) When the indoor unit is connected

1 Autoaddress	1-1	Perform pre-check before auto-addressing. (See “5. Reference Document”)

2) When the water heat exchanger unit is connected

1 Power supply	1-1	Is the power to the water heat exchanger unit’s switched off?	Yes	Switch on the power
			No	2-1
2 Indoor/outdoor operation wiring	2-1	Is the indoor/outdoor operation wiring severed or short-circuited?	Yes	Repair Wiring
			No	2-2
	2-2	Is high voltage (AC200V, etc.) being applied to the indoor/outdoor operation wiring circuits?	Yes	4-1
			No	3-1
3 Water heat exchanger unit count	3-1	Has the number of connected indoor units set with the No.10 parameter on the outdoor unit’s main board been amended to a figure other than two?	Yes	3-2
			No	Reset the outdoor unit’s power supply
	3-2	Set the number of connected indoor units to two with the No.10 parameter on the outdoor unit’s main board.		
4 Remote controller wires (link wiring between the remote controller and the water heat exchanger unit)	4-1	Is the water heat exchanger unit’s control board 2P-13 already in use?	Yes	Replace the water heat exchanger unit’s control board
			No	Reverse the water heat exchanger unit’s control board connectors (2P-12 → 2P-13)

- See “5. Reference Document” for details on the procedure for replacing the water heat exchanger unit’s control board.

E18 Group Control Wiring Communication Failure
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

When remote controller group control main unit cannot communicate with sub unit. An error is determined when the remote controller group control sub unit has not communicated with the main unit for 3 minutes.

- An indoor unit within group control is not powered ON.
- Inspection pin (CN062/CN071) or TEST pin (CN064) is short-circuited on an indoor unit within group control.
- Indoor unit DISP pin (CN063/CN072) is short-circuited on a sub indoor unit within group control.
- Remote controller group wiring is broken.
- Multiple indoor units within group control are set as “main.”
- An indoor unit within group control is set as “independent.”

② Troubleshooting

1 Indoor unit	1-1	Is the indoor unit power OFF?	Yes	Turn power ON
			No	1-2
	1-2	Is the inspection pin (CN062/CN071) or TEST pin (CN064) or DISP pin (CN063/CN072) on the indoor control board short-circuited?	Yes	Eliminate short-circuit
			No	2-1
2 Remote controller group Wiring	2-1	Remote controller group wiring broken?	Yes	Repair wiring
			No	2-2
	2-2	In the remote controller detailed settings mode, check the group settings (item code 14). Multiple main units (1), or any independent (0) settings?	Yes	2-3
			No	3-1
	2-3	Remote controller group wiring routed as intended?		2-4
				2-5
	2-4	Repeat auto-addressing process.		
	2-5	After repairing remote controller group wiring, repeat auto-addressing process.		
3 Indoor control board	3-1	Is an option board (CN060) or wireless remote controller (CN041) connected to the indoor control board?	Yes	3-2
			No	3-4
	3-2	Does E18 disappear several minutes after disconnecting said connector on the indoor control board? (When controlling with two remote controllers and the wireless remote controller is the main, set the other remote controller as the main).	Yes	3-3
			No	3-4
	3-3	Replace the removed option board or wireless remote controller operating unit, wiring and all.		
	3-4	Replace indoor control board		

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- There is no TEST pin on the indoor board for AC motor models.
- See “5. Reference Document” for checking remote controller.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

E20 No Indoor Unit in Automatic Address Setting
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method
An error is determined when an indoor unit is not recognized at auto-addressing start up or upon turning the outdoor unit power ON.
- Indoor unit address is not properly assigned.
- Indoor unit power is OFF.

② Troubleshooting

1 Power supply, wiring	1-1	Indoor unit address properly assigned?	Yes	1-2
			No	Set address
	1-2	Is the indoor unit power ON?	Yes	1-3
			No	Turn power ON
	1-3	The indoor/outdoor control wire may not be connected between the indoor unit and outdoor unit. Check wiring connections on indoor/outdoor control wire.		

E21 Outdoor Main Board Failure

① Error Detection Method

- The board circuit or microcomputer has been damaged.
- The operation of the microcomputer has been encumbered by exogenous.

② Troubleshooting

1 Outdoor board failure	1-1	Turn the power OFF, then turn it ON and check if E21 reoccurs.	Yes	Replace outdoor main board
			No	2-1
2 Exogenous noise	2-1	Are there noise generating devices around the outdoor unit?	Yes	Implement a measure to protect the outdoor unit against noise.
			No	3-1
3 Deterioration of outdoor board	3-1	Does E21 reoccur?	Yes	Replace outdoor main board
			No	Keep an eye on the situation

E22 Outdoor Main Board Sensor Error

① Error Detection Method

- The voltage of the outdoor main board sensor input circuit is unstable.

② Troubleshooting

1 Outdoor main board	1-1	Turn the outdoor unit OFF, then turn it ON, and keep an eye on the situation. If the error reoccurs, replace the outdoor main board.

E24 Communication Failure between Outdoor Units (for only W MULTI)

① Error detection method

An Outdoor Communication Unit Failure is assumed when communications between outdoor units in the same refrigerant system are not possible for 2 minutes.

- An outdoor unit address has not been properly assigned.
- Outdoor unit power is OFF.

② Troubleshooting

1 Power supply, wiring	1-1	Have outdoor unit addresses and outdoor unit and number of connected outdoor units been properly entered?	Yes	1-2
			No	Enter the data correctly.
	1-2	Have all outdoor units in the same system been turned on?	Yes	1-3
			No	Turn power ON
	1-3	The indoor/outdoor operation wiring may not be connected between the indoor unit and outdoor unit. Check wiring connections on indoor/outdoor operation wiring.		

E26 Inconsistencies in Number of Outdoor Units (for only W MULTI)

① Error detection method

A Mismatch of Outdoor Unit Count is assumed when the number of outdoor units in the same refrigerant system
(No. 10 first on) does not match made setting in a W MULTI (*) system.

* A unit with an outdoor unit address (No. 10 First sub) of something other than “0” in an outdoor main board is identified as a W MULTI unit.

② Troubleshooting

1 Check board setting	1-1	Is the outdoor unit a W MULTI unit?	Yes	1-2
			No	1-3
	1-2	Have the system address, outdoor unit address and number of connected outdoor units for the same refrigerant system been properly entered? • System address ... No. 10 First out • Outdoor unit address ...No. 10 First sub • Number of connected outdoor units ...No. 10 First on	Yes	2-1
			No	Enter the data correctly.
	1-3	Is the outdoor unit address set to “0”? * For systems other than W MULTI, be sure to set “0.” A system set to something other than “0” is recognized as W MULTI.	Yes	3-3
			No	Set to “0.”
2 Check wiring	2-1	Is the wiring (indoor/outdoor operation wiring) between W MULTI outdoor units in the same refrigerant system connected?	Yes	3-1
			No	Repair wiring.
3 Check the power supply and wiring	3-1	Are all W MULTI outdoor units in the same refrigerant system turned on?	Yes	3-2
			No	Turn power ON
	3-2	Is the SW010 (terminal resistor) switch on the outdoor main board correctly set?* Regardless of system addresses, 1 outdoor unit in the same link wiring must be set to “Short” (terminal resistor “on”).	Yes	3-3
			No	Enter the data correctly.
	3-3	Replace outdoor main board		

E31 Communication Failure between Units

① Error detection method

- When communications between the boards inside the outdoor unit is not possible for 30 seconds.

② Troubleshooting

1 Board check	1-1	Turn the power to the outdoor unit off and on. Does E31 reoccur after one minute?	Yes	4-3
			No	1-2
	1-2	Operate the engine for about 5 minutes with a trial run, etc. Does E31 reoccur?	Yes	2-1
			No	3-1
2 Ground check	2-1	Is the outdoor unit grounded?	Yes	2-2
			No	Connect to ground
	2-2	Is there any conduction between power control box and ground wire connected to outdoor unit? (Check with a tester)	Yes	3-1
			No	4-2
3 Error history check	3-1	Check the error history. Has E31 occurred frequently within a short period of time?	Yes	4-3
			No	4-1
4 Recovery	4-1	This could be the effects of random noise. Leave the situation as it is and keep it under observation.		
	4-2	Polish the contacts with a wire brush, etc. to attain conduction between the electrical box and ground wire connected to the outdoor unit.		
	4-3	Are there any poor connections, contacts, crimping or severed wires between the outdoor unit's power board connector 3P (white) CN024 and the outdoor unit's main board connector 3P (white) CN083?	Yes	Repair Wiring
			No	4-4
	4-4	Replace the outdoor unit's power board and keep an eye on the situation. Replace the outdoor unit's main board if E31 occurs again.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

F01·02·03·10·11 Indoor Unit Temperature Sensor Error

① Error detection method

An indoor unit temperature sensor error constantly detects any broken wires or short circuits, and an error is determined when error conditions are met once.

Error conditions are given below.

1) With indoor unit connected

Display	Sensor name	Broken wire detection resistance	Short-circuit detection resistance
F01	Indoor heat exchanger inlet temperature sensor (E1)	330kΩ or more	Less than 30Ω
F03	Indoor heat exchanger outlet temperature sensor (E3)	330kΩ or more	Less than 30Ω
F10	Indoor unit intake temperature sensor	270kΩ or more	Less than 24Ω
F11	Indoor unit discharge temperature sensor	270kΩ or more	Less than 24Ω

2) With water heat exchanger unit connected

Display	Sensor name	Broken wire detection resistance	Short-circuit detection resistance
F01	Water heat exchanger refrigerant inlet temperature sensor (E1)	330kΩ or more	Less than 30Ω
F02	Water heat exchanger anti-freeze sensor (E2)	330kΩ or more	Less than 30Ω
F03	Water heat exchanger refrigerant outlet temperature sensor (E3)	330kΩ or more	Less than 30Ω
F10	Hot and cold water inlet sensor	270kΩ or more	Less than 24Ω
F11	Hot and cold water outlet sensor	270kΩ or more	Less than 24Ω

② Troubleshooting

1) When the indoor unit is connected

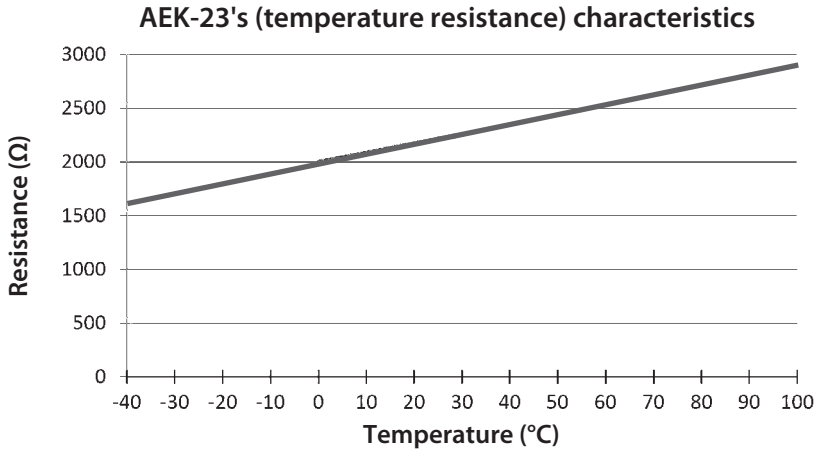
1 Check wiring	1-1	Poor connection/contact/crimping or broken wire or pinched wire in sensor connector and wiring?	Yes	Repair wiring
			No	2-1
2 Check temperature sensor	2-1	Disconnect the sensor connector and measure the resistance value. Is the resistance between the broken wire detection value and the short-circuit detection value?	Yes	Replace indoor (water heat exchanger unit) control board
			No	Replace temperature sensor

- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

2) When the water heat exchanger unit is connected

1 Wiring check	1-1	Are there any poor connections, contacts, crimping or severed wires or pinched wires in the sensor's connectors or connector wiring?	Yes	Repair Wiring
			No	2-1
2 Temperature sensor check	2-1	Disconnect the sensor's connector and measure the resistance. Is the resistance between the broken wire detection value and the short-circuit detection value?	Yes	Replace the water heat exchanger unit's control board
			No	Replace the temperature sensor

- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3



F04·06·08·12·13·17·18/H08 Outdoor Unit Temperature Sensor Error

* H08 (temperature sensor for measuring the oil level) will only detect the oil surface with W MULTI.
  Re-check the settings if it is not the relevant model.
  Setting confirmation method: The [No.10] – [FirSt] – [Sub] display on the outdoor unit's control board:
  It is not a W MULTI if this is set at [Sub 00].
  It is set for W MULTI if this is set at [Sub 01] or [Sub 02].

* The two-inlet temperature sensor for the outdoor unit's heat exchanger unit is only connected to the 3WAY.
  A F06 message will be issued if the outdoor unit is set as a 3WAY model but is a model other than a 3WAY model.
  In this event, the model setting must be checked and corrected.
  Setting confirmation method: The [No.10] – [2-3] display on the outdoor unit's control board:
  Set at 3WAY if set at [02].
  Correct this if the outdoor unit is not actually a 3WAY model.
  If the setting is correct or if F06 is still issued after the setting has been corrected, refer to (1) and (2) below and carry out a normal malfunction check.

① Error detection method
An outdoor unit temperature sensor error constantly detects any broken wires or short circuits, and an error is determined when error conditions are met once.
Error conditions are given below.

Display	Sensor name	Severed wire detection resistance	Short-circuit detection resistance
F04	Compressor outlet temperature sensor	(Note 1)	130Ω or less
F06	Outdoor heat exchanger inlet temperature sensor	400kΩ or more	130Ω or less
	Outdoor heat exchanger 2 inlet temperature sensor (3WAY only)	400kΩ or more	130Ω or less
F08	Outside air temperature sensor	400kΩ or more	130Ω or less
F12	Compressor inlet temperature sensor	400kΩ or more	130Ω or less
F13	Coolant temperature sensor	62kΩ or more	22Ω or less
F17	Hot water outlet temperature sensor	400kΩ or more	130Ω or less
F18	Exhaust gas temperature sensor	(Note 2)	130Ω or less
H08	Temperature sensor for oil level measurements (W MULTI only)	400kΩ or more	130Ω or less

Note 1: Detects severed wires in the compressor's outlet temperature sensor.
When the pressure is more than 1.0 MPa and the compressor's outlet temperature is less than 6°C for 3 consecutive minutes during complete combustion.
Note 2: Detects severed wires in the exhaust temperature sensor.
When the coolant temperature is ≥80°C, the exhaust gas temperature is ≤30°C and the exhaust gas temperature does not change for 5 minutes during complete combustion.

② Troubleshooting

1 Check installation	1-1	Is the sensor correctly installed at the prescribed location?	Yes	2-1
			No	Repair
2 Check wiring	2-1	Poor connection/contact/crimping or broken wire or pinched wire in sensor connector and wiring?	Yes	Repair wiring
			No	3-1
3 Check temperature sensor	3-1	Disconnect the sensor connector and measure the resistance value. Is the resistance between the broken wire detection value and the short-circuit detection value?	Yes	Replace the outdoor main board or outdoor power board.
			No	Replace temperature sensor

- For work procedure for replacing outdoor main board, see "5. Reference Document".
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

F16 Compressor Inlet/Outlet Pressure Sensor Error

① Error detection method
When pressure in the following chart is detected.

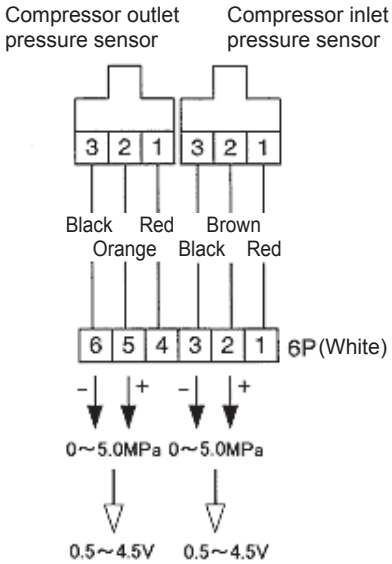
Detect Open	Detect Short Circuit
– 0.5MPa (0V)	5.5MPa (4.9V)

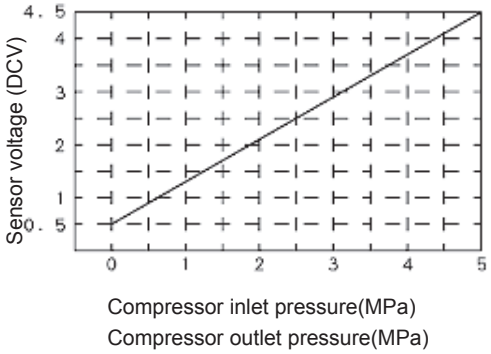
② Troubleshooting

1 Check pressure sensor	1-1	Install gauge on large tube and small tube service port, and open valve (see *1 below for procedure) to equalize pressure within refrigeration circuit. Gauge display nearly identical to outdoor main board display?	Yes	Operate again
			No	2-1
2 Check wiring	2-1	Is there a DC 5V voltage between the following terminals of the outdoor main board connector 6P (red) CN049? No. 1 (+) and No. 3 (-), and No. 4 (+) and No. 6 (-)	Yes	2-2
			No	Replace outdoor main board
	2-2	Is the voltage between the following terminals of the outdoor main board connector 6P (red) CN049 appropriate for the pressure? No. 2 (+) and No. 3 (-), and No. 5 (+) and No. 6 (-)	Yes	Replace outdoor main board
			No	2-3
	2-3	Wiring connection/contact poor, or wire broken, between outdoor main board connector 6P (red) CN049 and compressor inlet/outlet pressure sensors?	Yes	Repair wiring
			No	Replace pressure sensor

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

*1 Perform from outdoor main board. Issue “V OPEN” command from Maintenance Panel Menu 4, then press the Set key (SW005) to light the LED. The valve opens. Press again to turn off the LED, and the valve closes.





F20 Clutch Coil Temperature Sensor Error
F21 Clutch Coil 2 Temperature Sensor Error

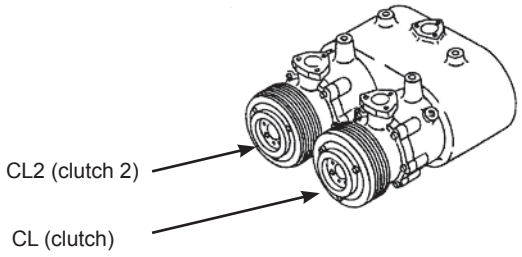
① Error detection method

- Detected in the following situations.
  Broken wire detected: Sensor resistance exceeds 1800kΩ
  Short circuit detected: Less than 850Ω

② Troubleshooting

1 Check sensor	1-1	Disconnect outdoor main board connector and measure resistance between the wires. Is it 1800 kΩ or more?	Yes	Replace sensor
			No	1-2
	1-2	Measure resistance between CN060 wires. Less than 850Ω?	Yes	Replace sensor
			No	Replace outdoor main board

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- Clutch coil temperature sensor: between No. 15 pin and No. 16 pin of connector CN086
- Clutch coil 2 temperature sensor: between No. 9 pin and No. 10 pin of connector CN086



F29 Indoor Nonvolatile Memory (EEPROM) Error

① Error detection method

- An error is determined when the nonvolatile memory (EEPROM) on the indoor (water heat exchanger unit) control board cannot be read or written.

② Troubleshooting

1 Nonvolatile memory	1-1	Is the nonvolatile memory on the indoor (water heat exchanger unit) control board correctly oriented in the IC socket, and inserted firmly?	Yes	1-2
			No	Repair
	1-2	Replace the nonvolatile memory (provided with the servicing board). Does this eliminate the error?	Yes	Defective EEPROM
			No	Replace indoor control board

- See the instruction manual supplied with the Servicing Indoor Board for details on the procedures for replacing the indoor non-volatile memory (EEPROM) and the indoor control board.
- Recover EEPROM malfunctions when connected to a water heat exchanger units by replacing the board.
- See “5. Reference Document” for details on the procedure for replacing the water heat exchanger unit’s control board.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

F31 Outdoor Nonvolatile Memory (EEPROM) Error

① Error detection method

- An error is determined when the nonvolatile memory (EEPROM) on the outdoor main board cannot be written.

② Troubleshooting

1 Nonvolatile memory	1-1	Is the nonvolatile memory on the outdoor main board correctly oriented in the IC socket, and inserted firmly?	Yes	1-2
			No	Repair
	1-2	Turn OFF the outdoor unit, then turn ON and observe. If the error recurs, replace nonvolatile memory (provided with service board). Does this eliminate the error?	Yes	Defective EEPROM
			No	Replace indoor control board

- For a procedure on replacing non-volatile memory (EEPROM) and an outdoor main board, see “5 Reference Document.”
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

H07 Compressor Oil Depletion Error (only for W MULTI series)

* Re-check the settings if the system model is not the relevant model.
Setting confirmation method: Change the display on the outdoor unit's main board in the order [No.10] – [FirSt] – [Sub] and check the value of [Sub].
[Sub 00]: The system is not set for W MULTI.
[Sub 01] or [Sub 02]: The system is set for W MULTI.

① Error Detection Method

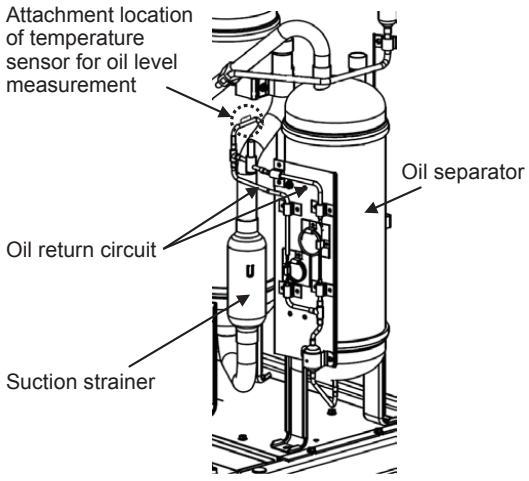
Each outdoor unit is inspected for lack of oil. When the oil level 0 (insufficient) continues for 20 minutes, the engine is stopped temporarily.

- An H07 failure is assumed when the cumulative count of the number of times the engine was stopped due to insufficient oil level reaches 8.
- The cumulative count is cleared when the oil level becomes 1 (normal) or 2 (sufficient).

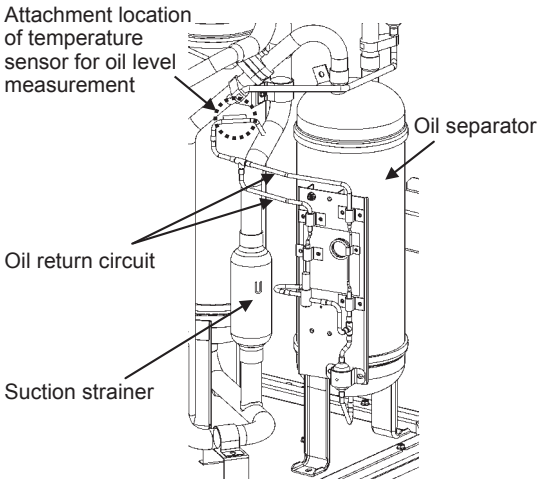
② Troubleshooting

1 Sensor	1-1	Is the temperature sensor for oil level measurement installed correctly? (Disconnection or floating is an intolerable state.)	Yes	1-2
			No	Resecure the temperature sensor in place
	1-2	Are the characteristics of the temperature sensor for oil level measurement normal? (Check the resistance value of temperature sensor TH11.)	Yes	1-3
			No	Replace the temperature sensor
	1-3	Can the measurement results of the temperature sensor for oil level measurement be considered to be correct? * Compare the value for No. 26 displayed on [No.00] on the outdoor unit's main board (temperature measurement for the oil level) with the actual temperature measured with a thermometer or the like.	Yes	2-1
			No	Replace the outdoor unit's main board
2 Regular oil return circuit check	2-1	Operate the outdoor unit and check the temperature of the regular oil return circuit. Is the temperature rising? * Check the temperature at the top of the capillary on the oil return circuit (near the temperature sensor for oil level measurement) with a thermometer or the like, or check the temperature measured by the temperature sensor for oil level measurement displayed on the outdoor unit's main board. * Normally, a clear rise in the temperature can be seen approximately 5 to 10 minutes after the engine has been started up, though this may be different depending on the condition.	Yes	3-1
			No	Replace the regular oil return circuit
3 Dry core check	3-1	Is the dry coil clogged? * Operate the heater and check the temperature difference between at the dry core's inlet and outlet.	Yes	4-1
			No	Replace
4 Suction strainer check	4-1	Is the suction strainer clogged? (It is especially important to check this on renewal dedicated units.)	Yes	5-1
			No	Replace
5 Compressor oil replenishment	5-1	Replenish 4 L of compressor oil (for the entire system) and keep an eye on the situation.		

- 2-1, 4-1



45.0 to 71.0 kW type



85.0 kW type

L02 Inconsistencise in Indoor/Outdoor Unit Models (non-GHP equipment connected)

① Error detection method

- An error is detected when indoor units other than GHP models are connected.
- An error is detected when package type L series indoor units and building multi outdoor units are connected.

② Troubleshooting

1 Indoor unit	1-1	Check the following, and remove or replace all non-GHP models. • Indoor unit model • Indoor control board

- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

L03 Multiple Main Units Set for Group Control
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

An error is determined when multiple main (master) units exist within a remote controller group control.

- When remote controller group wiring is changed after auto-addressing is complete.
- When multiple main units are set in remote controller detailed settings mode.

② Troubleshooting

1 Remote controller group wiring	1-1	Remote controller group wiring routed as intended?	Yes	1-2
			No	1-3
	1-2	In remote controller detailed settings mode, set one main unit (1) in group settings (item code 14). Then, either manually set all others as sub units (2), or repeat auto-addressing.		
	1-3	After repairing remote controller group wiring, repeat auto-addressing process.		

- See “5. Reference Document” for detailed remote controller settings.

L04 Duplicate System (Outdoor Unit) Address Setting

① Error detection method

An error is determined when identical system (outdoor unit) addresses exist within the same link wiring.

- When the system (outdoor unit) address settings were forgotten during link wiring.
- When the system (outdoor unit) address settings were accidentally duplicated during link wiring.
- When link wiring was performed with a water heat exchanger unit connected.

② Troubleshooting

1 System address	1-1	Check to ensure that unique system addresses has been set for each outdoor unit connected to the same link wiring (indoor/outdoor operation wiring). Correct any duplicate addresses that are found and perform the auto-addressing process.
2 Link wiring forbidden	2-1	Link wiring is not possible when the water heat exchanger unit is connected. Disconnect the link wiring.

L05·06 Duplicate Indoor Unit Priority Setting
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

An error is determined when multiple indoor units have the operation mode priority setting within the same refrigeration tubing system.

- The indoor unit with the priority setting displays L05.
- The indoor units without the priority setting display L06.
- When multiple units have the operation mode priority setting, set in remote controller simple settings mode.

② Troubleshooting

1 Operation mode priority setting	1-1	Check operation mode priority (item code 04) in remote controller simple settings mode, and assign operation mode priority setting (1) to only one indoor unit.

- See “5. Reference Document” for detailed remote controller settings.

L07 Group Control Wire Present for Individual-Control Indoor Unit (Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

An error is determined when remote controller group wiring includes an indoor unit set for independent operation.

- When remote controller group wiring is set up after auto-addressing is complete.
- When group settings for an indoor unit wired into a remote controller group are changed to “Independent” in remote controller detailed settings mode.

② Troubleshooting

1 Remote controller group wiring	1-1	Remote controller group wiring routed as intended?	Yes	1-2
			No	1-3
	1-2	In the remote controller detailed settings mode, check the group settings (item code 14). If set to Independent (0), correct it or repeat auto-addressing process.		
	1-3	After repairing remote controller group wiring, repeat auto-addressing process.		

- See “5. Reference Document” for detailed remote controller settings.

L08 Indoor Unit Address Not Set

① Error detection method

An error is determined when the indoor unit capacity is not set.

- When the indoor unit address was not set when new non-volatile memory (EEPROM) was installed.
- When indoor unit address in the remote controller detailed settings mode is “invalid.”

② Troubleshooting

1 Indoor unit Set address	1-1	Use the remote controller detailed settings mode to check indoor unit addresses (item code 13) and set an indoor unit address to replace invalid (0) ones.

- See “5. Reference Document” for detailed remote controller settings.

L09 Indoor Unit Capacity Not Set
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

An error is determined when the indoor unit capacity is not set.

- When the indoor unit capacity setting was forgotten after installing a new nonvolatile memory (EEPROM).
- In the remote controller detailed settings mode, the indoor unit capacity is “invalid”.

② Troubleshooting

1 Indoor unit capacity setting	1-1	In the remote controller detailed settings mode, check the indoor unit capacity setting (item code 11). If set to “Invalid” (0), set the correct indoor unit capacity.

- See “5. Reference Document” for detailed remote controller settings.

L10 Outdoor Unit Capacity Not Set

① Error detection method

An error is determined when the outdoor capacity, coolant, generator or engine type is not set.

- When new non-volatile memory (EEPROM) is installed and the outdoor unit settings (capacity, refrigerant, and engine type) are not made.
- When the outdoor unit model setting is “Invalid”.

② Troubleshooting

1 Outdoor unit model setting	1-1	On the outdoor main board, use menu item No. 10 to check outdoor unit capacity, refrigerant, generator and engine type and to set them up correctly.

- Display the outdoor unit model using the outdoor main board menu item No. 03.
- For information on model settings and clearing non-volatile memory (EEPROM) (memory clear) using menu item No. 10 on the outdoor main board, see “5 Reference Document.”

- 1-1

  After changing the model, the nonvolatile memory (EEPROM) is cleared (memory clear).

  Outdoor unit model display (menu item No. 03)

- - - - - -	Undetermined
4503	45.0kW type (2WAY W MULTI · 3WAY MULTI)
5603	56.0kW type (2WAY W MULTI · 3WAY MULTI)
7103	71.0kW type (2WAY W MULTI · 3WAY MULTI)
8503	85.0kW type (2WAY MULTI)

L13 Indoor Unit Model Type Setting Failure

① Error detection method

Errors are determined when the types, capacity levels and models that cannot be connected have not been set.

- When the water heat exchanger unit and an indoor unit other than a water heat exchanger unit have been connected together within the same cooling system.
- When a cooling coil and an indoor unit other than a cooling coil have been connected together within the same cooling system.

Note: The term "connected together" as used above means "connected in combination" from an electrical point of view. Consequently, even if the refrigerant tubes are in a different system, they are assumed to be connected when indoor and outdoor operation wiring is linked and they share the same system address. If this combination represents "models that cannot be used in combination" as explained above, an error will be triggered.

- When the indoor unit type has been mistakenly set in the remote controller's advanced mode.

② Troubleshooting

1 Indoor/ outdoor unit check	1-1	Is the connected unit a water heat exchanger unit?	Yes	1-2
			No	1-4
	1-2	Is a unit other than a water heat exchanger unit connected to the system?	Yes	1-3
			No	1-9
	1-3	An indoor unit other than a water heat exchanger unit is connected together. It is a model that cannot be connected, so change it to a connectable unit.		
	1-4	Is the connected indoor unit a cooling coil?	Yes	1-5
			No	1-7
	1-5	Is an indoor unit other than a cooling coil connected to the system?	Yes	1-6
			No	1-7
	1-6	An indoor unit other than a cooling coil is connected together. It is a model that cannot be connected, so change it to a connectable unit.		
	1-7	Check the type setting (item code 10) for the indoor unit set with the remote controller's advanced mode. Does the setting match up to the actual indoor unit's type? * Setting value 32: Cooling coil	Yes	1-9
			No	1-8
	1-8	Amend the type setting (item code 10) with the remote controller's advanced mode, and reset the power supply for the outdoor unit. Is the alarm triggered again?	Yes	1-9
			No	End
	1-9	There is a chance that the actual piping connections do not match up with the unit's address setting. Check the status of the indoor and outdoor unit connections, and set the address correctly with the remote controller's advanced mode if there is a problem. If no problem can be found or the problem reoccurs after being repaired, replace the circuit board.		

- For information on the remote control's advanced settings, see Chapter 5 "Reference Document."

* When the address settings for the indoor and outdoor unit and the type settings for the indoor unit have been amended, make sure that the power supply to the outdoor unit is reset without fail. (The new configuration will be recognized during initial communications.)

L15 Defective Pairing of Indoor Units

① Error detection method

1) In the case of double-duct models

Detects defective combinations (type, capacity, group and unit count settings) in double-duct units.

② Troubleshooting

1) In the case of double-duct models

No.	Problem	Recovery
1	Another indoor unit is connected to the system to which a double-duct unit is connected.	Connect only one indoor unit to the system*1.
2	Another indoor unit is group-connected to the remote controller group in the double-duct unit.	Disconnect the other indoor unit from the group and reset the group settings (item code 14 in the remote controller's advanced settings)*2.
3	A defective setting exists in the remote control group settings between the two built-in indoor units' control boards.	Set one of the two boards to "1" (main) and the other to "2" (sub) in the group settings (item code 14 in the remote controller's advanced settings).
3	The type or capacity settings differ between the two built-in indoor units' control boards.	Set the type and capacity parameters to the same setting for both indoor unit's control boards with the remote controller's advanced settings.
4	The remote control group wiring is severed or short-circuited between the two built-in indoor units' control boards.	Repair the wiring.
5	One of the two built-in indoor units' control boards is malfunctioning.	If there is no problem with the power supply, etc., replace the board.

*1 It is necessary for only one indoor unit to be connected to the outdoor unit to which a double-duct model is connected.

*2 A group has been established between the two indoor boards in the indoor unit, so groups cannot be set for other indoor units.

L16 Faulty Water Heat Exchanger Unit Settings

* Only detected when the water heat exchanger unit is connected.
Re-check the settings if it is not the relevant model.

① Error detection method
An error is determined in accordance with the criteria shown below the first time the settings on the water heat exchanger unit's control board are incorrect.

- When the temperature during heating with SW4 and 5 is outside of the temperature setting.
- When the temperature during cooling (water) with SW1 to 3 is outside of the temperature setting.
- When the temperature during cooling (brine) with SW1 to 3 is outside of the temperature setting.
- When the setting for the anti-icing control switch with SW8-1 is incorrect.

② Troubleshooting

1 Set temperature check during heating	1-1	Are the settings for SW4 and SW5 between 35°C and 55°C?	Yes	2-1
			No	Revise settings
2 Set temperature check during cooling (water)	2-1	Is it used as a water chiller?	Yes	2-2
			No	3-1
	2-2	Is SW1-2 set at OFF?	Yes	2-3
			No	Proceed to 2-3 after changing to OFF
	2-3	Is SW1-3 set at OFF?	Yes	2-4
			No	Proceed to 2-4 after changing to OFF
	2-4	Are the settings for SW2 and SW3 between 5°C and 15°C? (If the answer is "No" for either 2-2 or 2-3, diagnostics will end even if 2-4 is "Yes.")	Yes	4-1
			No	Revise settings
3 Set temperature check during cooling (brine)	3-1	Is SW1-2 set at ON?	Yes	2-2
			No	Proceed to 2-2 after changing to ON
	3-2	Are the settings for SW1, SW2 and SW3 between -15°C and 15°C? (If the answer is "No" for 3-1, diagnostics will end even if 3-2 is "Yes.")	Yes	4-2
			No	Revise settings
4 Anti-icing control switch setting check	4-1	Is SW8-1 set at OFF?	OK	5-1
			NG	Change to OFF
	4-2	Is SW8-1 set at ON?	OK	5-1
			NG	Change to ON
5 Miscellaneous	5-1	Momentarily reverse (switch to the opposite sides) all dip switches (SW1-2. SW1-3, SW1-8) and then try returning them to their previous positions. Has the problem been solved?	Yes	End diagnostics
			No	5-2
	5-2	Move the position of the rotary switches (SW2 to 5) around at random, and then try returning them to within the set range. Has the problem been solved?	Yes	End diagnostics
			No	Replace the control board

- For details on the procedures for replacing the water heat exchanger unit's control board, see Chapter 5 "Reference Document."
- For details on board and electrical wiring diagrams, see Chapter 6.

- 1-1
  Set SW4 at tens place and SW5 at ones place. The set temperature range is between +35°C and +55°C.
  (Example: If SW2 is set at "4" and SW3 at "5", the set temperature is "+45°C".)

- 2-4
  The coolant temperature setting is performed with SW2 and SW3 (green rotary switches).
  Set SW2 at tens place and SW3 at ones place. The set temperature range is between +5°C and +15°C.
  (Example: If SW2 is set at “0” and SW3 at “7”, the set temperature is “+7°C”.)

- 3-2
  Position 3 on SW1 (3P dip switch) selects whether the temperature is to be set at a positive value or a negative value.

Set Temperature	SW1 Position 3
Negative (-)	ON (knob at the top)
Positive (+)	OFF (knob at the bottom)

  Set SW2 at tens place and SW3 at ones place. The set temperature range is between -15°C and +5°C.
  (Example: If SW1 position 3 is set at “ON”, SW at “0” and SW3 at “5”, the set temperature is “-5”.)
  A setting between +5°C and +15°C can be set. In this event, set position 1 on SW8 (4P dip switch) to OFF (with the knob at the bottom).

L19 Duplicated Water Heat Exchanger Unit Parallel Array Addresses

* Only detected when the water heat exchanger unit is connected.
Re-check the settings if it is not the relevant model.

① Error detection method
An error is determined in accordance with the criteria shown below when duplicated water heat exchanger unit parallel array addresses are detected

- When using the RS-485 line to enable the use of the remote controller (CZ-10RTGXA), multiple water heat exchanger units with the same parallel address (SW6) are connected within the same wiring array. Duplicated addresses are determined when detected for the first time. (However, duplicated addresses set at "0" are not detected.)

② Troubleshooting

1 Number of units connected check	1-1	Are two or more water heat exchanger units managed by the remote controller (CZ-10RTGXA)?	Yes	2-1
			No	1-2
	1-2	Set "0" on the water heat exchanger unit's control board (SW6) without any connections made for TB5-4 or 5 on the terminal board.		
2 Duplicated parallel array address check	2-1	Eradicate the duplicated parallel array addresses on the water heat exchanger unit's control board (SW6) within the RS-485 wiring array.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

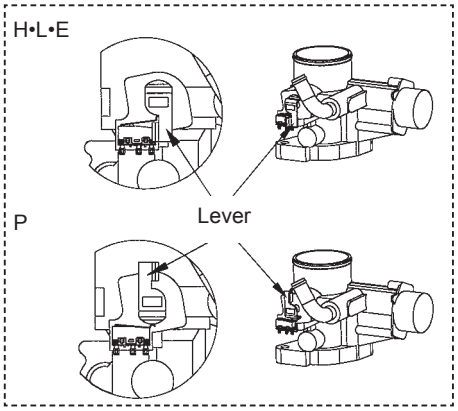
L21 Gas Type Setting Failure

① Error detection method
A Gas Type Setting Failure is assumed on the first occurrence of a mismatch between the gas type setting on the outdoor main board and the fuel change switch setting.
However, a mismatch is not detected after the gas type is confirmed.

* The factory default gas type setting and fuel change switch setting are both "Band H/L (Natural Gas)." Note: To use E-grade Band P (LPG) as the fuel gas, the fuel flow control value and gas type need to be set.

- Setting the fuel regulating valve
  * Leave the power breaker to the outdoor unit OFF.
  1. Set the P/N switch lever attached to the engine mixer to the position shown in the illustration.
     Rotate it 180-degrees clockwise (up until the stopper.)Do not apply excessive force to rotate it further than this.
  2. Attach the short-circuit connector supplied to the N/P switch CN013 on the outdoor unit's control board.

  * Switch the outdoor unit's power breaker to ON.
  3. Attach the <Gas type> label and <Gas type setting and adjustment completed> label inside the electrical box to the prescribed PL NAME position.



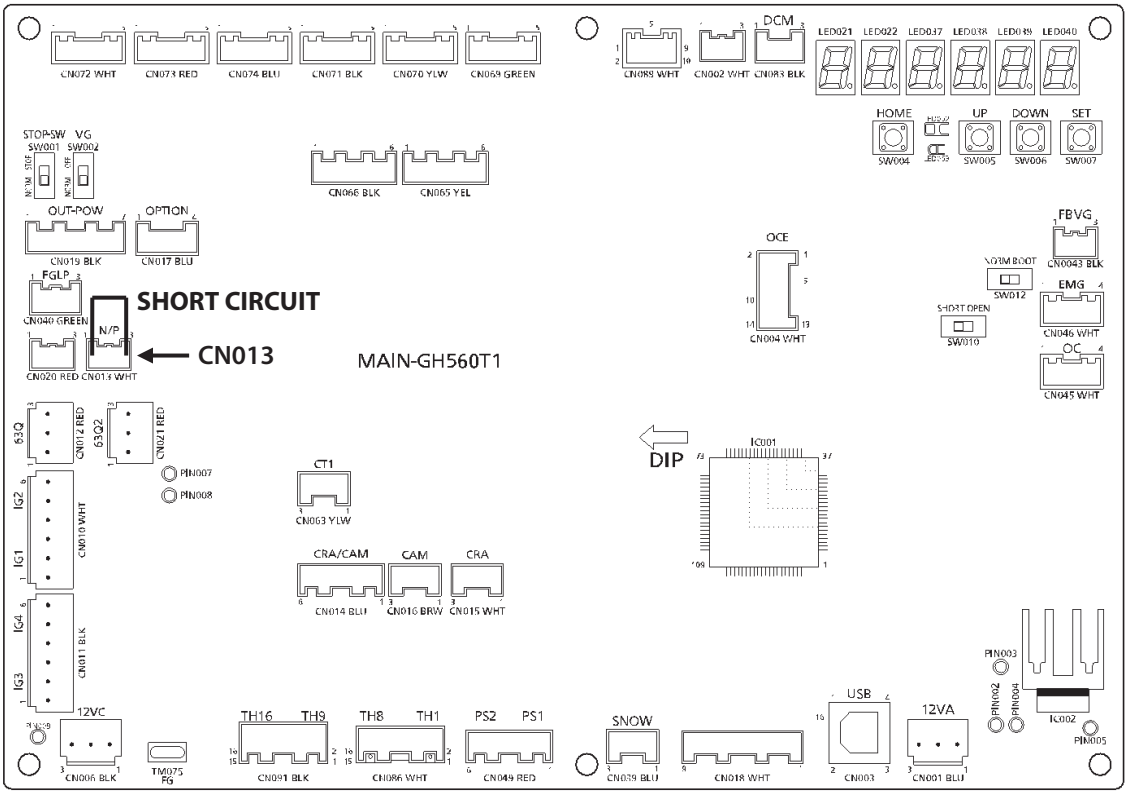
② Troubleshooting

1 Situation	1-1	Was the error detected during startup (before steady operation)?	Yes	2-1
			No	3-1
2 Gas type setting short-circuit connector	2-1	Does the gas type setting match the supplied gas type classification? • Check the gas type setting in the outdoor unit's control board menu 10 (initial settings). • Check the setting of the mixer's fuel change switch.	Yes	2-2
			No	Change settings
	2-2	Is the supplied short-circuit connector attached to the 3P (white) CN013 connector on the outdoor unit's main board? Gas type 0: Detach the supplied connector and check that there is conduction between pin No. 1 and 3. Gas types 1 to 5: Check that the supplied short-circuit connector is not attached.	Yes	Replace the outdoor unit's main board
			No	2-3
	2-3	Is the gas type set to type 0?	Yes	2-4
			No	2-5
	2-4	Connect the supplied short-circuit connector to the N/P switch (CN013) on the outdoor unit's control board.		
	2-5	Detach the supplied short-circuit connector from the N/P switch (CN013) on the outdoor unit's control board.		
3 Supply gas type check	3-1	Is the supply gas type Band H/L/E (Natural Gas)?	Yes	3-2
			No	Change the gas type setting
	3-2	Make sure that air is not mixed into the supply gas. See the Note.		

- For the procedure for replacing the outdoor unit's main board, see "5. Reference Document".

Note: Even when the settings for short-circuit connector, supply gas type and other settings are all right, there are rare cases where error determination is not performed correctly depending on the condition of supply gas (air mixing, for example) or condition of operating load. Make sure that all the settings are correct and try several times. For cooling mode, increase the load to some extent by, for example, increasing the number of indoor units to be operated (note that trial operation mode for cooling operates all the indoor units).

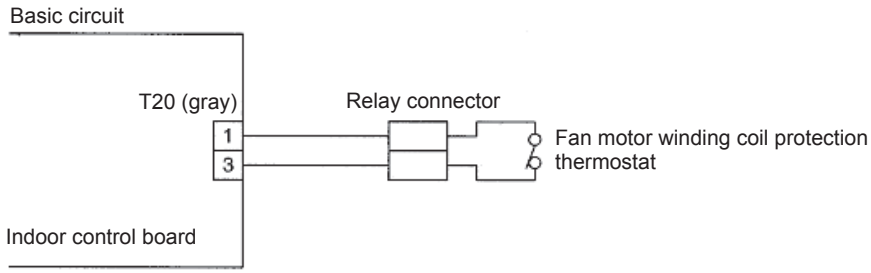
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3


CN072 WHT
CN073 RED
CN074 BLU
CN071 BLK
CN070 YLW
CN069 GREEN
CN089 WHT
CN002 WHT
DCM
CN083 BLK
LED021
LED022
LED037
LED038
LED039
LED040
HOME
UP
DOWN
SET
SW004
SW005
SW006
SW007
STOP-SW
VG
SW001
SW002
CN066 BLK
CN065 YEL
OUT-POW
OPTION
CN019 BLK
CN017 BLU
FGLP
CN040 GREEN
N/P
SHORT CIRCUIT
CN013
CN020 RED
CN013 WHT
MAIN-GH560T1
OCE
CN004 WHT
FBVG
CN0043 BLK
NORM BOOT
SW012
EMG
CN046 WHT
SHORT OPEN
SW010
OC
CN045 WHT
63Q
CN012 RED
63Q2
CN021 RED
PIN007
PIN008
IG2
IG1
IG4
IG3
CN010 WHT
CN011 BLK
CT1
CN063 YLW
CRA/CAM
CAM
CRA
CN014 BLU
CN016 BRW
CN015 WHT
DIP
IC001
PIN003
PIN002
PIN004
IC002
PIN005
USB
CN003
12VA
CN001 BLU
12VC
CN006 BLK
TM075
FG
TH16
TH9
TH8
TH1
PS2
PS1
CN091 BLK
CN086 WHT
CN049 RED
SNOW
CN039 BLU
CN018 WHT

P01 Indoor Fan Error/Indoor Unit Fan rpm Error
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

- Detects when indoor control board connector T20 (gray) CN076 1-3 are open and assumes an error has occurred.
- The sensor connected to T20 (gray) CN076 may be an internal thermostat built into the fan motor, or a thermal magnet switch, depending on the model.
- The internal thermostat turns the contact OFF when the fan motor coil temperature rises, and automatically recovers as the coil temperature decreases, turning the contact ON.
- The thermal magnet switch turns the contact OFF when the fan motor operation current becomes excessive, and turns the contact ON when normal or when recovered.
- The wiring method and protective devices differ among indoor units. For details, see the electric diagram diagrams for each indoor unit.



- Models not listed below have one fan motor, with an internal thermostat contact connected between No.1 and No.3 T20 (gray) CN076.
- Models with two fan motors, with the internal thermostat contacts connected in-line between No.1 and No.3 of T20 (gray) CN076.
- If a fan stop signal comes from the indoor unit or data does not come from the indoor unit for three minutes (communication error) even though the outdoor unit forces the indoor fan to stop, a P01 warning will result.

② Troubleshooting

1 Fan motor	1-1	Is there AC 200V between indoor control board connector IN (black) CN067 No.3 and connector T20 (gray) CN076 No.3?	Yes	1-4
			No	1-2
	1-2	Any poor contact or broken wires in wiring between No.1 and No.3 of connector T20 (gray)?	Yes	Repair
			No	1-3
	1-3	The fan motor winding coil protection thermostat has activated. Check for dirty filter, fan motor lock, foreign matter caught in the fan, etc. For a three-phase motor, check for missing phase.		
	1-4	Operate again to check activation. Immediate error upon operation?	Yes	Replace indoor control board
			No	1-3
	1-5	Poor connection or broken wires in communication lines?	Yes	Repair
			No	Replace indoor control board

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor control board for procedure on replacing indoor control board.

P03 High Compressor Discharge Temperature

① Error detection method

- When the compressor discharge temperature ≥ 130°C during engine operation (complete combustion), the engine is stopped and an error flag is set.
  A Compressor Discharge Temp. High fault is assumed when this flag has shut down the engine 5 consecutive times.
- Revolution speed setting > minimum revolution speed is not included in pre-trip.
- Not included in pre-trip when liquid valve opening ≤ 400 step.

② Troubleshooting

1 Sensor	1-1	Disconnect compressor outlet temperature sensor connector 2P (red) CN054 and measure resistance. Appropriate value? (See “5. Reference Document” for thermistor characteristics.)	Yes	2-1
			No	Replace sensor
2 Out of gas	2-1	Out of gas? Determine using compressor outlet pressure, compressor inlet pressure, and indoor/outdoor electric valve opening.	Yes	Repair leak and charge gas.
			No	3-1
3 Tubing	3-1	Any symptoms of pump down? Determine with indoor coil temperature	Yes	Inspect indoor unit tubing
			No	Inspect outdoor unit tubing
4 Inspect outdoor solenoid valves (For three-way device)	4-1	Adjust outdoor solenoid valves. Use trial operation mode to check that the solenoid valves operate normally in each operating mode (cooling/heating) and measure tube temperature around solenoid valves to assess. (For information on solenoid valve operation in each operating mode, see the sections Control functions - Operating control in the “Outdoor unit manual.” Does the solenoid valve operate normally?	Yes	Replace outdoor main board
			No	4-2
	4-2	Adjust the power board. Does the power board CN013 output the solenoid power supply voltage (AC 200V)?	Yes	4-3
			No	Replace power board
	4-3	Any poor connection and broken wires in wiring between the power board and the relay board?	Yes	Repair wiring
			No	4-4
	4-4	Adjust the outdoor main board. In No. 4 test mode when “v_open” (valve open), is there a drive output voltage (12 V DC) from discharge valves 1-1, 1-2, discharge valve 2, suction valve 2-1 and 2-2? (9P (white) CN018) Discharge valve 1-1, 1-2: between No. 3 - 9 Discharge valve 2:between No. 4-9 Suction valve 2-1, 2-2: between No. 6 - 9 Does suction valve 1 output a drive voltage (DC 12V) during cooling operation? Suction valve 1: between No. 3 - 9 * Note that suction valve 1 closes when powered (the other valves operate in the opposite way)	Yes	4-5
			No	Replace outdoor main board
	4-5	Any poor connection and broken wires in wiring between the outdoor main board and the relay board?		Repair wiring
				4-6
	4-6	Adjust the relay board. In No. 4 test mode when “v_open” (valve open), is there an output voltage (AC 200V) from discharge valves 1-1, 1-2, discharge valve 2, suction valve 2-1 and 2-2? Does suction valve 1 output a voltage (AC 200V) during cooling operation?	Yes	4-7
			No	Replace relay board
	4-7	Adjust the solenoid valve coil. (Be sure to turn the power off before starting work.) Disconnect the connectors of discharge valve 1-1, 1-2, discharge valve 2, suction valve 1, suction valve 2-1 and 2-2 from the relay board and measure the resistance between No. 1 and 3. Normal value (20°C) discharge valve 1-1, 1-2: 543 ohm discharge valve 2: 1132 ohm Suction valve 1: 1197 ohm suction valve 2-1, 2-2: 543 ohm Is the coil operating normally?	Resistance is normal	Replace solenoid valve
			Abnormal resistance	Replace the solenoid valve coil

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1-1

30°C→45.0kΩ	40°C→29.6kΩ	50°C→20.0kΩ	60°C→13.8kΩ
70°C→9.7kΩ	80°C→6.9kΩ	90°C→5.1kΩ	100°C→3.8kΩ
110°C→2.8kΩ	120°C→2.15kΩ	130°C→1.66kΩ	

P04 Refrigerant High-Pressure Switch Operation

① Error detection method

- When high pressure switch turns OFF

Setting: 4.15MPa

* Turns ON when contact is not defective (switch automatically resets)

② Troubleshooting

1 Model setting check	1-1	Is the outdoor unit a renewal-dedicated unit?	Yes	1-2
			No	2-1
	1-2	Is the model setting correct? (Is the parameter a renewal setting?) Check to make sure the setting is [No.10FirSt]-[rEF02].	Yes	2-1
			No	Revise settings
2 Operation possibility	2-1	Are operations possible?	Yes	3-1
			No	3-2
3 High pressure switch	3-1	Measure the high pressure to discover if it is high. Are malfunctions occurring?	Yes	Refer to section P20
			No	3-2
	3-2	Is the high pressure switch conducting? Is there conduction in the high pressure switch side when the 63PH4P (white) CN014 connector on the outdoor unit's power board is disconnected?	Yes	Replace the outdoor unit's power board
			No	Replace the high pressure switch

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

P05 Power Source Error

① Error detection method

An error is determined when the power source status meets the following condition.

- Open phase
- Instant power failure exceeding 100ms (5 times/h)

② Troubleshooting

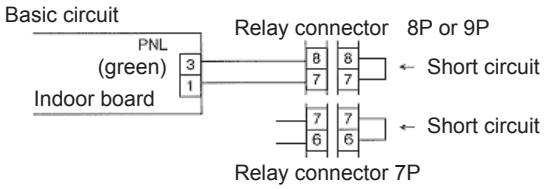
1 Power supply	1-1	Are all power supply voltages AC 200 V? (Measure between terminal boards R-S, S-T and T-R.)	Yes	1-2
			No	Check power supply
	1-2	Is the power supply voltage applied to all of the board-in connectors (CN005 to CN007) on the filter board AC 200?	Yes	1-4
			No	1-3
	1-3	Check for faulty connections and defective parts in the power supply wiring between the terminal board and filter board → Repair		
	1-4	Turn the power off and then on again and check for reoccurrence. Is the alarm triggered again?	Yes	Replace the outdoor unit's power board
			No	1-5
	1-5	There may have been multiple momentary power failures. Check the power supply wiring connections (for poor contacts), and if no error is found, keep an eye on the situation.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

P09 Indoor Unit Ceiling Panel Connector Connection Failure
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

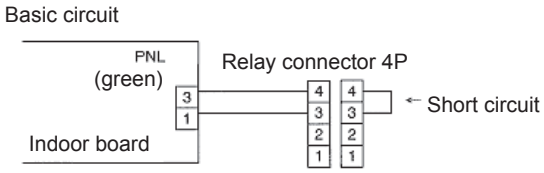
- Detects when indoor control board connector PNL (3P green) CN080 1 and 3 are open, and determines an error.
- The wiring method and connectors differ among indoor units. For details, see the electric wiring diagrams for each indoor unit.
- This input short-circuits on the following models when a ceiling panel or front panel connector is connected, thus detecting a panel connection.



Applicable models

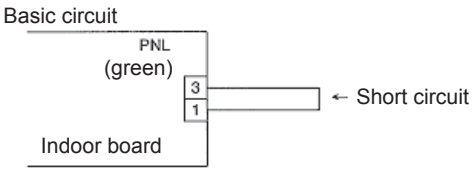
S-22/28/36/45/56/73ML	8P (ceiling panel)
S-28/36/45/56/73MD	7P (ceiling panel)
S-22/28/36/45/56/73/106/140/160MU	7P (ceiling panel)
S-22/28/36/45/56MY	

- The following models short-circuit this input upon shipping, to prevent this error.



Applicable models

FR7/9/12/16/18/25	(front panel)
TDR12/16/18/25/36/48	(ceiling panel)



Applicable models All indoor units not listed above

② Troubleshooting

1	1-1	Is a ceiling panel connection relay connector 7P (red) or 8P (red) or 9P (red) connected? Or, is a short-circuiting connector 4P (white) connected?	Yes	1-2
			No	Connect
	1-2	Disconnect the indoor board connector PNL (green) CN080. Conduction between No.1 and No.3 in socket?	Yes	Replace indoor control board
			No	1-3
	1-3	Poor connection between connector PNL (green) CN080 and ceiling panel, or poor connection/broken wire between connector PNL (green) CN080 and short-circuit connector → Repair		

- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

P10 Indoor Unit Float Switch Operation
(Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

- Detects when indoor control board connector FS (red) CN034/CN030 1-3 are open, and determines an error.
- The sensor connected between No.1 and No.3 of connector FS (red) CN034/CN030 is normally a drain float switch. However, some models do not have a drain float switch. These models have No.1 and No.3 of connector FS (red) CN034/CN030 short-circuited with a wire.
- The drain float switch turns the contact OFF when the drain water overflows, and the contact turns ON when the water level falls.
- The connection method and protective devices differ among indoor units. For details, see the electric circuit diagrams for each indoor unit.
- Models with built-in drain float switch
  S-22/28/36/45/56/73ML
  S-28/36/45/56/73MD
  S-22/28/36/45/56/73/106/140/160MU
  S-22/28/36/45/56MY
  S-73/106/140/224/280ME
  S-22/28/36/45/56/60/73/90/106/140/160MF
  S-22/28/36/45/56MM

- Models shipped with connector FS (red) CN034/CN030 No.1 and No.3 short-circuited with a wire Models not listed above

② Troubleshooting

1	1-1	Model with drain float switch built in?	Yes	1-3
			No	1-2
	1-2	Check for poor contact or broken wire in Indoor control board connector FS (red) CN034/CN030 1-3 wiring (connector) → Repair		
	1-3	Drain water overflowed?	Yes	1-4
			No	1-8
	1-4	Drain pump operating?	Yes	1-10
			No	1-5
	1-5	Is AC200V applied to drain pump?	Yes	Replace drain pump
			No	1-6
	1-6	Is AC200V applied across indoor control board connector DP (blue) CN068 No. 1-No. 3?	Yes	1-7
			No	Replace indoor control board
	1-7	Check for poor contact or broken wire in Indoor control board connector DP (blue) CN068 1-3 wiring → Repair		
	1-8	Conduction in drain float switch? Unplug connector and check.	Yes	1-9
			No	Replace drain float switch
	1-9	Repair any poor connections, broken wires, etc. in the drain float switch connector and between No. 1 and No. 3 indoor control board connectors FS (red) CN034/CN030.		
	1-10	Check draining of drain hose/tubes and repair as necessary (clean or replace filter for UH)		

- The designation (/) is used in the table to indicate indoor boards for DC and AC motor models.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.

P11 Indoor Unit Drain Pump Error

① Error Detection Method

- The DC drain pump system is locked due to freezing or clogging with foreign material.
- There is an error on the main unit of the DC drain pump.
- There is a problem in the EEPROM detailed settings.

② Troubleshooting

1 DC drain pump check	1-1	Is the DC drain pump is locked due to freezing or clogging with foreign material?	Yes	Unclog the DC drain pump
			No	1-2
	1-2	Is the drain pump failing? Use a tester to measure the resistance between pins 1 and 3 of the connector (white) to check for short-circuiting. Resistance of several kΩ: Pump is not failing; Short-circuiting: Pump is failing	Yes	Replace the drain pump main unit
			No	1-3
	1-3	Are the EEPROM detailed settings correct? Correct settings: Item 8B=3, item 8C=1	Yes	Replace the board (possibility of lock detection circuit failure)
			No	Set the EEPROM item values as shown in the left column

P11 Water Heat Exchanger Unit Anti-icing Sensor Error (for only water heat exchanger unit)

① Error detection method

An error is detected as follows:

- When anti-freeze temperature is detected, and recovery temperature is not reached within 3 minutes.

* Anti-freeze temperatures (When any one of the following conditions is reached.)

	Water chiller
Hot and cold water outlet temperature	Less than +2°C
Anti-freeze temperature	Less than +2°C
	Less than 0°C

* Recovery temperature (when all conditions below are met)

	Water chiller
Hot and cold water outlet temperature	+4°C or more
Anti-freeze temperature	+4°C or more

② Troubleshooting

1 Water heat exchanger unit check	1-1	Has the water chiller parameter been set despite the fact that the unit is a brine chiller? (Proceed to 1-2 if it is being used as a water chiller.)	Yes	Switch the power off and repair
			No	1-2
	1-2	Is the cold/hot water pump shut down?	Yes	Switch on the cold/hot water pump
			No	1-3
	1-3	Is the flow volume insufficient?	Yes	Maintain the correct flow volume
			No	1-4
	1-4	Have the sensors installed properly in the correct positions?	Yes	Replace the water heat exchanger unit's control board
			No	Repair

- For details on procedure to replace the water heat exchanger unit control board, see the instructions supplied with the service water heat exchanger control board.

P12 Indoor DC Fan Error (DC fan motor model only)

① Error detection method

- Open circuits and short-circuits in the indoor control board connector CN141 (white) on the motor side are detected and assessed as faults.

② Troubleshooting

1 Fan motor	1-1	Any poor connections or broken wires in indoor control board connector CN141 (white)?	Yes	Repair
			No	1-2
	1-2	Disconnect indoor control board connectors CN141 (white). Turn the fan by hand to check if it turns smoothly?	Yes	1-3
			No	Replace the fan motor.
	1-3	Check if the resistance between No. 1-2, 2-3 and 3-1 on the motor side of indoor control board connectors CN141 (white) is correct? 28 - 90 model: about 70 - 100 Ω 112 - 160 model: about 35 - 50 Ω Any ground faults between the cabinet and No. 1, 2 and 3?10 MΩ or more	Yes	1-4
			No	Replace the fan motor.
	1-4	Check if the resistance between No. 1-4 on the motor side of indoor control board connectors CN141 (white) is correct? 5k to 20kΩ	Yes	1-5
			No	Replace the fan motor.
	1-5	Connect CN141 (white), turn on the power and use a tester to measure the voltages between indoor control board connector CN141 (white) No. 2-3, No. 2-4 and No. 2-5. Is the pin voltage between 0 and 5 V when the fan is slowly turned? Is the voltage between No. 1-2 5 V?	Yes	1-6
			No	Replace the fan motor.
	1-6	Check the indoor control board and replace if defective.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.
- 1-3, 1-4

P13 Refrigerant circuit Error (W MULTI / Models with suction bypass valve (85.0kW type))

① Error detection method

- The indoor unit outputs this warning when it determines that a compressor inspection is required.
  The outdoor unit has determined the necessity of inspecting the suction bypass valve (85.0kW type).
- The system stops and there is no automatic reset when this warning is output.
  When there is no difference between compressor outlet and inlet pressure (≤0.2 MPa *) 3 minutes after the engine was turned on, the engine stops and an error flag is set. An Cooling Circuit Fault is assumed when the error flag has stopped the engine 5 consecutive times in 1 hour.
  * This indicates that the difference in initial pressure and after 3 minutes is 0.2 Mpa or less.
- Suction bypass valve error
  When it is suspected that the suction bypass valve is locked open (no pressure/temperature changes are observed during the opening/closing process), the engine is stopped temporarily and an error flag is set. The cumulative count of the number of times the engine was stopped because of this error flag has reached 5. (The cumulative count is cleared when normal start-up has been done.)

② Troubleshooting

1 Temporary stop cause check	1-1	Is cause code 53 recorded as the temporary stop cause?	Yes	2-1
			No	4-1
2 Suction bypass valve check	2-1	Operate the system in trial operation mode (for heating). Make sure that the compressor is running normally, and check if the suction bypass valve is locked open. Is there a temperature difference between at the inlet (top) and outlet (bottom) of the suction bypass valve? * In heating mode, the suction bypass valve is always OFF (closed), and if no problem exists, the inlet and outlet pressure and temperature of the suction bypass valve are roughly equal to the outlet and inlet pressure and temperature of the compressor, respectively.	Yes	3-1
			No	4-1
3 Suction bypass valve replacement	3-1	Replace the suction bypass valve		
4 Inspection of pressure sensor	4-1	Inspect the pressure sensor (for the inspection method, see item “F16”).	OK	5-1
			NG	Repair
5 Check the amount of system refrigerant	5-1	Use the No. 4 test mode “v_open” (valve open) to establish pressure equalization. Check if both high and low pressures are lower than saturation pressure at ambient temperature to assess whether the amount of refrigerant gas is extremely low. (Assessed as out of gas when the pressure comparison indicates “much lower “) Out of refrigerant gas?	Yes	Check for refrigerant leaks and repair as necessary
			No	6-1
6 Inspect the compressor.	6-1	Turn off the outdoor unit (be sure to do this before work)		
	6-2	Use the instructions in A25 Clutch Trouble to adjust the compressor lock. Does it lock? (Adjust both clutch 1 and 2.)	Yes	7-1
			No	6-3
	6-3	Use the instructions in P26 Clutch Connection Fault, to adjust operation and wiring of clutch 1 and 2. Any problems?	Yes	See section on P26.
			No	Keep under observation
7 Replace compressor	7-1	Replace a compressor that is locked. Measure the amount of chiller oil in the compressor when it is removed. Fill the new compressor with an equal amount of chiller oil (new oil) before attaching it to the outdoor unit.	Yes	8-1
8 Clean the cooling tubes. (Cleaning using liquid normally handled by a device)	8-1	Use our “Replacement material” as a guide to cleaning the system using liquids that are normally present in the system.	No	Process completed

P13 Refrigerant Circuit Error (3WAY)

① Error detection method

- The indoor unit outputs this warning when it determines that a compressor, outdoor solenoid valves, system refrigerant should be inspected.
- For detailed inspection procedure, see P13 Refrigerant Circuit Fault (W MULTI).
- The system stops and there is no automatic reset when this warning is output.

② Troubleshooting

1 Pressure sensor inspection	1-1	For adjustment of the pressure sensor, see (adjustment procedure section F16).	OK	2-1
			NG	Repair
2 Inspect system refrigerant	2-1	Use the No. 4 test mode “v_open” (valve open) to equalize the pressure to assess whether amount of refrigerant is extremely low when it is lower in pressure than saturated pressure at ambient temperature. (Assessed as out of gas when extremely low) Out of refrigerant gas?	Yes	Check for refrigerant leaks and repair.
			No	3-1
3 Inspect the compressor.	3-1	Turn off the outdoor unit (be sure to do this before work)		
	3-2	Use the instructions in P26 Clutch Connection Fault, to adjust operation and wiring of clutch 1 and 2. Any problems?	Yes	4-1
			No	7-1
4 Inspect refrigerant oil.	4-1	Replace the compressor and check the refrigerant oil in the replaced compressor for contamination.	Not contaminated	5-1
			Contaminated	6-1
5 Replace compressor (1)	5-1	After replacing the compressor, perform a trial operation and check the equipment. Check completed if OK.		
6 Replace compressor (2)	6-1	Perform a flashing cleaning to clean the inside of the refrigerant tubes.		
7 Inspect outdoor solenoid valves	7-1	Adjust outdoor solenoid valves. Use trial operation mode to check that the solenoid valves operate normally in each operating mode (cooling/heating) and measure tube temperature around solenoid valves to assess. (For information on solenoid valve operation in each operating mode, see the sections Control functions - Operating control in the “Outdoor unit manual.” Does the solenoid valve operate normally?	Yes	Replace outdoor main board
			No	7-2
	7-2	Adjust the power board. Does the power board CN013 output the solenoid power supply voltage (AC 200V)?	Yes	7-3
	7-3	Any poor connection and broken wires in wiring between the power board and the relay board?	Yes	Repair wiring
			No	7-4
	7-4	Adjust the outdoor main board. In No. 4 test mode when “v_open” (valve open), is there a drive output voltage (DC 12V) from discharge valves 1-1, 1-2, discharge valve 2, suction valve 2-1 and 2-2? (9P (white) CN018) Discharge valve 1-1, 1-2: between No. 3 - 9 Discharge valve 2:between No. 4-9 Suction valve 2-1, 2-2: between No. 6 - 9 Does suction valve 1 output a drive voltage (DC 12V) during cooling operation? Suction valve 1: between No. 3 - 9 * Note that suction valve 1 closes when powered (the other valves operate in the opposite way)	Yes	7-5
			No	Replace outdoor main board

	7-5	Any poor connection and broken wires in wiring between the outdoor main board and the relay board?	Yes	Repair wiring	
			No	7-6	
	7-6	Adjust the relay board. In No. 4 test mode when “v_open” (valve open), is there an output voltage (AC 200V) from discharge valves 1-1, 1-2, discharge valve 2, suction valve 2-1 and 2-2? Does suction valve 1 output a voltage (AC 200V) during cooling operation?	Yes	7-7	
			No	Replace relay board	
	7-7	Adjust the solenoid valve coil. (Be sure to turn the power off before starting work.) Disconnect the connectors of discharge valve 1-1, 1-2, discharge valve 2, suction valve 1, suction valve 2-1 and 2-2 from the relay board and measure the resistance between No. 1 and 3. Normal value (20°C) discharge valve 1-1, 1-2: 543 Ω discharge valve 2: 1132 Ω Suction valve 1: 1197 Ω suction valve 2-1, 2-2: 543 Ω Is the coil operating normally?	Resistance is normal		Replace solenoid valve
			Abnormal resistance		Replace the solenoid valve coil

P15 Complete Refrigerant Gas Depletion

① Error detection method

- Engine startup is delayed when compressor inlet pressure ≤0.1 Mpa. A delay that lasts 10 minutes is counted as a fault.
- During engine operation (complete combustion) when (compressor inlet pressure ≤ 0.1 MPa) or (outdoor heat exchanger outlet temperature - saturation temperature) ≥ 30deg) *1 continues for 3 minutes, the engine is stopped and an error flag is set. A Refrigerant Gas Completely Absent fault is assumed when this flag has shut down the engine 5 consecutive times.

*1 Only during cooling (heat exchange outlet temperature is the outdoor heat exchanger outlet during cooling)

- Not detected for 7 minutes from complete combustion. If the compressor inlet pressure ≤ 0.01 MPa for a 3 minute interval, an error will be detected even within seven minutes of complete combustion.

② Troubleshooting

1 Check pressure sensor	1-1	Install a gauge on a large tube and small tube service port, open the valve (open valve using outdoor main board No. 4 trial operation forced setting) to equalize pressure in the refrigerant circuit. The values on the outdoor main board display and the gauge should be roughly identical. Is it 0.1 MPa or less?	Yes	3-1
			No	2-1
2 Check wiring	2-1	Check compressor inlet pressure sensor wiring. OK?	Yes	Replace pressure sensor
			No	Repair wiring
3 Check compressor relief valve	3-1	Check the compressor relief valve. Are there any leaks or signs of leaks?	Yes	Repair leak and charge gas.
			No	3-2
	3-2	Is the tubing clogged?	Yes	Unclog tubing Charge gas.
			No	3-3
	3-3	Are there any other places with leakage?	Yes	Repair leak and charge gas.
			No	Replace compressor

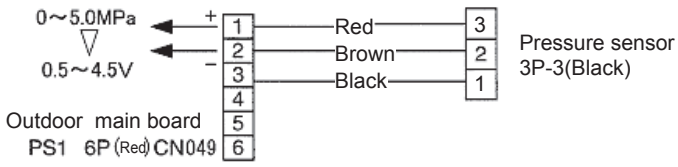
W MULTI

4 Determine the outdoor unit with non-uniform refrigerant flow	4-1	Is a warning output when No.1 outdoor unit is operating and No.2 outdoor unit stops?	Yes	No.2 outdoor unit failure 5-1
			No	4-2
	4-2	Is a warning output when No.2 outdoor unit is operating and No.1 outdoor unit stops?	Yes	No.1 outdoor unit failure 5-1
			No	Investigate another cause
5 Investigate the cause of the outdoor unit error	5-1	Is there a problem with the expansion valve?	Yes	Replace the expansion valve
			No	5-2
	5-2	Is there a problem with the liquid valve?	Yes	Replace the liquid valve
			No	5-3
	5-3	Is there a problem with the four-way valve?	Yes	Replace the four-way valve
			No	Repair leak and charge gas

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

- 1-1
  For outdoor main board menu item No. 04 to open valve using trial operation/forced settings, see Chapter 5.

- 2-1



P18 Bypass Valve Error

① Error detection method

- A warning is output if it is determined that the outdoor unit needs a bypass valve inspection.
- In practical terms, what happens is that each time there is a small difference ($\Delta P \leq 0.1$ MPa) between the high and low pressure (ΔP = high pressure - low pressure) 90 seconds after stopping the engine stops, a suspected error counter increments, and the data is recorded as "pre-trip" warning history data. After the counter reaches 5, a warning is output on the next complete combustion startup.

② Understanding the warning history

The latest P18 data in the warning history is issued immediately after a complete combustion startup. It is not the data used for detecting the error. If a pre-trip error was detected (when the suspected error counter reaches 5), that data is the next more recent P18 data.

③ Troubleshooting

1 Bypass valve inspection	1-1	● Bypass valve inspection ① During operation, use the No. 4 test mode "v_close" (close valve) to close the bypass valve (step 0). Check whether refrigerant is not leaking on entering the bypass.	OK	1-2
			NG	Replace the bypass valve unit
	1-2	● Bypass valve inspection ② After completing the above inspections, stop the engine and use No.4 test mode "v_open" (open valve) to open the bypass to check that the bypass valve operates normally despite the fluctuations in tube temperature around the bypass valve.	OK	2-1
			NG	1-3
	1-3	● Outdoor main board inspection Is there approximately 12 V of pressure at bypass valve output ports 5 (+) and 1 to 4 (-) when the power is on?	Yes	1-4
			No	Replace outdoor main board
	1-4	● Electric valve coil inspection Are the resistance values for electric valve connectors 5 and 1 to 4 about 40 Ω?	Yes	Replace the bypass valve unit
			No	Replace the bypass valve coil
2 Four-way valve Inspect outdoor solenoid valves	2-1	Is the outdoor unit a 3WAY MULTI-device?	Yes	2-3
			No	2-2
	2-2	Is the four-way valve free from leakage?	OK	3-1
			NG	Replace the four-way valve
	2-3	Are the outdoor solenoid valves (discharge valves 1 and 2, and suction valves 1 and 2) free from leakage? * Suction valve 1 closes when current flows through it (other solenoid valve remain open)	OK	3-1
			NG	Replace the solenoid valve.
3 Liquid valve inspection	3-1	● Liquid valve inspection ① Any refrigerant leaks past the liquid valve when the liquid valve is completely closed (step 0)?	OK	4-1
			NG	Replace the liquid valve unit
4 Expansion valve inspection	4-1	Is the operation mode heating? * Note: If you are operating with a 3WAY MULTI, try 4-2 and 4-3 before shutting down the engine as this might be due to cooling and heating mixed operation.	Yes	4-2
			No	4-3
	4-2	● Outdoor expansion valve inspection Check that there are no refrigerant leaks past the outdoor expansion valve when the engine is stopped in heating mode.	OK	5-1
			NG	Replace the outdoor expansion valve unit
	4-3	● Indoor electric valve inspection Stop the indoor unit during cooling operation (multiple indoor unit operation, indoor electric valve opening = 20 steps) and check to make sure there is no coolant leakage beyond the indoor electric valve.	OK	5-1
			NG	Replace indoor electric valve unit
5 Pressure sensor inspection	5-1	Pressure sensor inspection (refer to the section on F16 for the inspection procedure)	OK	Replace outdoor main board
			NG	Repair

- For work procedure for replacing outdoor main board, see "5. Reference Document".

P19 Four-way Valve Lock Error (not detected 3WAY MULTI)

① Error detection method

- Determined after 6 minutes of complete combustion time has passed during heating operation.
- An error is determined in thermostat ON indoor units, when the highest indoor heat exchanger outlet (E3) temperature is detected to be lower than the outdoor heat exchanger inlet for 5 minutes continuously.
- (W MULTI only) Handled as a fault only when four-way valve control (performed at first startup following a power supply reset or heating/cooling switch) fails.
- (W MULTI only) when a pressure differential fault (the high pressure of an outdoor unit working at full combustion in proximity with an another outdoor unit working at low pressure) detected between W MULTI outdoor units is assessed as a fault.

② Troubleshooting (common)

1 Check four-way valve	1-1	Check the 4 way valve temperature during heater operation. Switched to heater side?	Yes	2-1
			No	1-2
	1-2	During heater operation, is the control board VRR connector (CN033) voltage about AC0V?	Yes	2-2
			No	1-3
	1-3	“After stopped, turn OFF outdoor unit. Disconnect control board VRR connector (CN033) and measure wiring resistance. (Normal value: about 1kΩ) Short-circuited or broken wire?”	Yes	2-3
			No	2-4
2 Actions	2-1	Check wiring and thermistor for indoor units with no temperature increase. (Any broken wires or short-circuits?)		
	2-2	Replace power board.		
	2-3	Replace four-way valve coil and wiring		
	2-4	Replace 4 way valve.		

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

③ Troubleshooting (W MULTI only)

1 Pressure sensor inspection	1-1	(Check all W MULTI outdoor units) Is the actual difference between compressor inlet pressure displayed on the outdoor main board and output pressure (gauge data, etc.) 0.1 MPa or less?	Yes	2-1
			No	Replace pressure sensor
2 Check outdoor unit operation	2-1	Use a collective stop setting to temporarily stop the outdoor unit and perform four-way valve adjustment control according to one of the procedures described below. After resetting the power supply on all W MULTI outdoor units, use the remote controller or the outdoor main board to start desired mode. Use the trial operation setting from the outdoor main board or the remote controller to switch between cooling and heating to start operation.	2-2	
	2-2	Do all the W MULTI outdoor units start and continue running for 5 minutes?	Yes	2-4
			No	2-3
	2-3	Check why operation does not continue and remedy the problem. When the device stops immediately after startup → Check error history and use the code to find troubleshooting information. When the system does not start up → IV - 1 (3) see section on engine start standby	2-1	
	2-4	Use a different mode (cooling or heating) to restart from 1-1. If no error is found, keep under observation.		

P20 Refrigerant High-Pressure Error

① Error detection method

- When the high pressure sensor value ≥ 3.75 MPa during engine operation, the engine stops and an error flag is set. A Refrigerant Pressure Too High fault is assumed when this flag has stopped the engine 5 consecutive times in 1 hour.
- When revolution speed setting is more than minimum revolution speed and fan frequency is less than 50% of maximum frequency, an error is not generated. (The engine stops momentarily.)

② Troubleshooting

1 Cooling/ heating mode	1-1	Operating in the cooling mode or heating mode?	Cooling	2-1
			Heating	3-1
2 Outdoor unit's heat exchanger check	2-1	Is the heat exchanger clogged by foreign matter or other debris (visual inspection)?	Yes	Remove
			No	2-2
	2-2	Is there an air shortage?	Yes	Revise installation
			No	2-3
	2-3	Is the fan on the outdoor unit operating?	Yes	12-1
			No	Refer to section P22
3 Tubing	3-1	Are there any crushed tubes, torn strainers, closed servicing valves, or other problems? Check the temperature of the indoor unit's coil.	Yes	Repair
			No	4-1
4 Unit check	4-1	Which is connected, an indoor unit or a water heat exchanger unit?	Proceed to 5-1 when the indoor unit is connected	
			Proceed to 8-1 when the water heat exchanger unit is connected	
5 Indoor unit's heat exchanger check	5-1	Is the air filter on the indoor unit clogged?	Yes	Clean the filter
			No	5-2
	5-2	Is the fan on the indoor unit operating?	Yes	6-1
			No	Repair
6 Indoor unit's motor-operated valve check	6-1	Check the indoor unit's motor-operated valve. Does the valve open? (Check the indoor unit's heat exchanger temperature when in the heating mode.)	Yes	7-1
			No	6-2
	6-2	Check the indoor unit's control board. (Is there any voltage between No. 5 (+) and No. 1-4 (-) of the indoor unit's control board PMV6P (white) CN082 when the power is switched on?)	Yes	6-3
			No	Replace the indoor unit's control board
	6-3	Check the motor-operated valve coil. (Does a resistance of approximately 46 Ω exist between No. 5 and No. 1-4 of the motor-operated valve connector 5P (white)* or 6P (white)?)	Yes	Replace the valve
			No	Replace the valve coil
7 Indoor unit's coil sensor	7-1	Are indoor unit's coil sensors E1, E2, and E3 disconnected from their measurement points? Check this by displaying the indoor coil temperature on the outdoor unit.	Yes	Repair
			No	11-1
8 Cold/hot water check	8-1	Is a correct cold/hot water (brine) flow volume being maintained?	Yes	Maintain the rated flow volume
			No	8-2
	8-2	Is the cold/hot water (brine) pump operating?	Yes	9-1
			No	Repair

9 Water heat exchanger unit's motor-operated valve check	9-1	Check the motor-operated valve on the water heat exchanger unit. Does the valve open? (Check the temperature of the water heat exchanger unit's coil in the heating mode.)	Yes	10-1
			No	9-2
	9-2	Check the water heat exchanger unit's control board. (Is there any voltage between No. 5 (+) and No. 1-4 (-) and between No. 10 (+) and No. 6-9 (-) of the water heat exchanger unit's control board 10P-1 (white) and 10P-2 (black) when the power is switched on?)	Yes	9-3
			No	Replace the water heat exchanger unit's control board
	9-3	Check the motor-operated valve. (Does a resistance of approximately 46 Ω exist between No. 5 and 1-4 of the motor-operated valve connector 6P-1 (white)?)	Yes	Replace the valve
			No	Replace the valve coil
10 Water heat exchanger unit's coil sensor	10-1	Are coil sensors TH1 to 3 on the water heat exchanger unit disconnected from the measurement points? Check this by displaying the temperature of the water heat exchanger unit's coil on the outdoor unit.	Yes	Repair
			No	11-1
11 Outdoor unit's motor-operated valve check	11-1	Check the outdoor unit's motor-operated valve. Coil resistance: 46 Ω (between No. 5 (+) and No. 1 to 4 (-)), 32 Ω for 3WAY	OK	12-1
			NG	Replace
12 High pressure sensor	12-1	Check the high pressure sensor.	OK	13-1
			NG	Repair
13 Bypass valve	13-1	Is the bypass valve operating normally? (Wiring and coil unit.) Coil resistance: 46 Ω (between No. 5 (+) and No. 1 to 4 (-))	Yes	14-1
			No	Replace
14 Engine	14-1	Is the engine throttle sticking?	Yes	Repair
			No	Inspection needed
15 Outdoor unit's solenoid valve check (in the case of 3WAY)	15-1	Measure the tube temperature around the solenoid valve in the trial run mode to check that the solenoid valves are operating normally in each operation mode (cooling/heating). (For details on solenoid valve operations in each operating mode, see the section explaining the control functions through to operation control in the "Outdoor Unit Manual.") Are the solenoid valves operating normally?	Yes	Replace the outdoor unit's main board
			No	15-2
	15-2	Check the outdoor unit's power board. Is the outdoor unit's power board CN013 outputting the solenoid power supply voltage (AC 200 V)?	Yes	15-3
			No	Replace the outdoor unit's power board
	15-3	Are there any poor connections or severed wires in the wiring between the outdoor unit's power board and relay board?	Yes	Repair wiring
			No	15-4
	15-4	Check the outdoor unit's main board. Does a drive output voltage (DC 12 V) from discharge valves 1-1, 1-2, discharge valve 2, suction valve 2-1 and 2-2 exist with "v_open" (valve open) in the No. 4 test mode? [9P (white) CN018] Discharge valves 1-1, 1-2: between No. 3–9 Discharge valve 2: between No. 4-9 Suction valves 2-1, 2-2: between No. 6-9 Does suction valve 1 output a drive voltage (DC 12 V) during cooling operations? Suction valve 1: between No. 3-9 * Note that suction valve 1 closes when electricity is supplied (the other solenoid valves operate in reverse).	Yes	15-5
			No	Replace the outdoor unit's main board

	15-5	Are there any poor connections or severed wires in the wiring between the outdoor unit's main board and relay board?	Yes	Repair wiring
			No	15-6
	15-6	Check the relay board. Does an output voltage (AC 200 V) from discharge valves 1-1, 1-2, discharge valve 2, suction valve 2-1 and 2-2 exist with "v_ open" (valve open) in the No. 4 test mode? Does suction valve 1 output voltage (AC 200 V) during cooling operations?	Yes	15-7
			No	Replace the relay board
	15-7	Check the solenoid valve coil. (The power must be turned off before starting work.) Disconnect the connectors of the discharge valve 1-1, 1-2, discharge valve 2, suction valve 1, suction valve 2-1 and 2-2 from the relay board and measure the resistance between No. 1 and 3. Normal values (20°C): Discharge valves 1-1, 1-2: 543 Ω, Discharge valve 2: 1,132 Ω Suction valve 1: 1,197 Ω, Suction valves 2-1, 2-2: 543 Ω Is the coil operating normally?	Resistance normal	Replace the solenoid valve
			Resistance abnormal	Replace the solenoid valve's coil

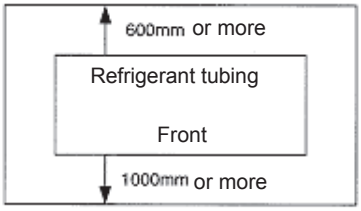
- See instructions packaged with servicing indoor board for procedure on replacing indoor control board.
- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.

- 2-2

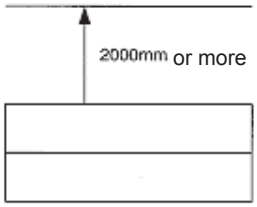
Any air shortage?

An air shortage is likely if the installation conditions pictured below are not met.

Unit perimeter



Unit top



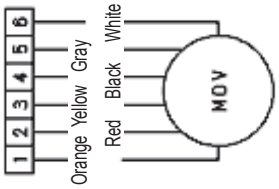
- 6-1

Indoor electric valve check

Electric valve opening determination standards:

During heating operation, after 30 minutes have passed in complete combustion, the indoor coil outlet temperature must exceed 40°C.

Check using No.0 Operation data display.

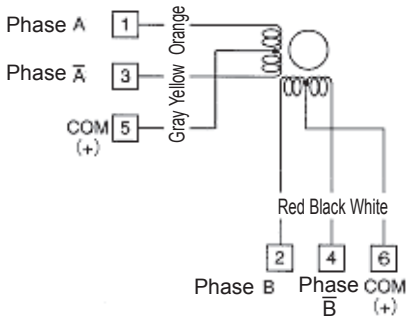


- 6-2

Normal if a pulse voltage is applied across indoor control board connector PMV 6P (white) CN082 No. 5 and No. 1-4 after turning power ON. (About DC4V measured on tester)

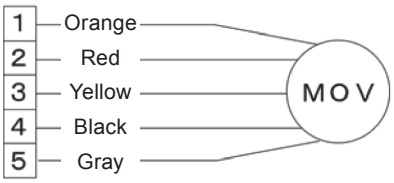
- 6-3

Unplug indoor electric valve connector 6P (white), and measure resistance of electric valve coil between No.5 and No.1-4 using a tester. Replace coil if 0Ω or ∞ (46Ω is normal).



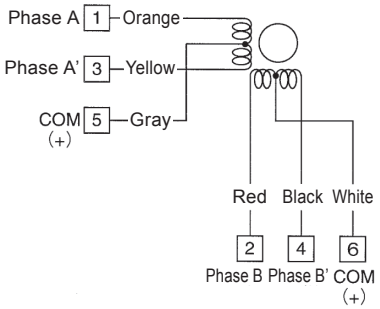
● 9-1

Checking the Water Heat Exchanger Unit's Motor-Operated Valve
Standard for determining that the motor-operated valve is open:
The temperature of the water heat exchanger's coolant outlet must be 40°C or higher when 30 minutes have elapsed after reaching complete combustion in the heating mode.
Check this by the No. 0 operation data display.



● 9-2

Switch on the power between No. 5 and No. 1-4 and between No. 10 and No. 6-9 of the water heat exchanger unit's control board connectors 10P-1 (white) and 10P-2 (black). Then if a pulse voltage exists, everything is normal.
(Approximately DC 4 V when measured with a tester.)



● 9-3

Disconnect the water heat exchanger unit's solenoid valve connector 6P-1 (white), and measure the motor-operated valve coil's resistance between No. 5 and No. 1-4 with a tester. If the resistance is 0 Ω or ∞, replace the coil.
(Approximately 46 Ω is normal.)

● 11-1

Check outdoor electric valve and backup stop valve
Check by using the following procedure to display the P20 stop data (nonvolatile memory) on the 7-segment LED.

a. In No.1 Error data display, lightly press the set key once.
b. Select data code 1-3 using the up and down keys, and press set key for 1 second or more.
c. Use the up and down keys to change the display data to compare outdoor heat exchanger inlet temperature (data code 16) with compressor inlet temperature (data code 14). If the outlet temperature is lower, the outdoor solenoid valve may be locked.

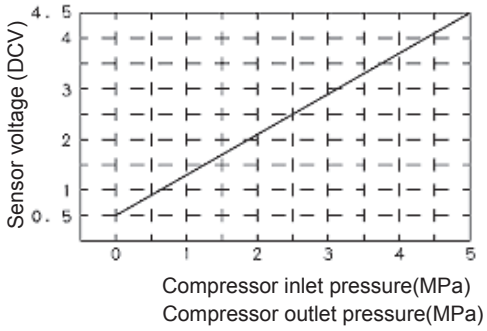
● 12-1

Check high pressure sensor

Compare control board display and gauge display.

① Confirm pressure while stopped	Install gauge on high pressure side, and display the outdoor main board compressor outlet pressure. Use No.0 Operation data display (data code 11). Is the difference between display value and gauge pressure within 0.1MPa?	Yes	To ②
		No	To ③
② Confirm pressure while operating	Operate heater or cooler, and check the outdoor main board compressor outlet pressure display. Is the difference between the display value and gauge pressure within 0.1MPa?	Yes	Pressure sensor is normal
		No	To ③
③ Check outdoor main board voltage	a. Is there a DC 5V voltage between the outdoor main board connector 6P (red) CN049 No. 4 and No. 6?	Yes	To b
		No	Replace outdoor main board
	b. Is there a voltage equivalent to gauge pressure between the outdoor main board connector 6P (red) CN049 No. 5 and No. 6?	Yes	Replace outdoor main board
		No	To c
	c. Wiring connection/contact poor, or wire broken, between control board connector 6P (red) CN049 and compressor outlet pressure sensor?	Yes	Repair wiring
		No	Replace pressure sensor

● For work procedure for replacing outdoor main board, see “5. Reference Document”.



● 13-1

Check bypass valve	Operate for several minutes, then stop with a difference in compressor inlet pressure and outlet pressure, and open the valve using outdoor main board menu item No. 04. Is the pressure equalized?	Yes	Bypass valve is normal
		No	Bypass valve is defective (does not open)

P22 Outdoor Unit Fan Error

① Error detection method

- An Outdoor Unit Fan Trouble is assumed when outdoor fan (fan motor) rpm and drive has exceeded the following conditions 5 consecutive times in 1 hour.
  - When outdoor fan (fan motor) revolution is not detected.
  - When an overcurrent is detected in the outdoor fan circuit.
- When the power board has been incorrectly installed.

② Troubleshooting

1 Power board	1-1	Is the power board correctly installed? POW-GH850M2E	Yes	2-1
			No	Replace it with the correct board.
2 Outdoor fan motor	2-1	Any outdoor fan motor locking, broken wires, poor contact, or short circuits? (Coil resistance should be around 2-6Ω for each phase.)	Yes	Replace outdoor fan motor
			No	2-2
	2-2	Is the fan motor connection position correct on the power supply board? Is FM1 connected to FM1, and FM2 to FM2? (Confirm that 3P black and 5P black connectors are paired together.)	OK	2-3
			NG	Correct the connection
	2-3	Replace power board and keep under observation. If P22 reoccurs, replace outdoor fan motor.		

- For work procedure for replacing outdoor main board, see “5. Reference Document”.
- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

P23 Water Heat Exchanger Unit Interlock Error (for only water heat exchanger unit)

① Error detection method

An error is detected when the following conditions are met:

- After a hot and cold water pump operation command, when the hot and cold water pump interlock signal (no voltage, a contact) is not ON within 5 minutes.
- When the hot and cold water pump interlock signal turned ON once, but turned OFF again while the hot and cold water pump operation signal continued.

② Troubleshooting

1 Water heat exchanger unit's electrical box	1-1	Is the hot/cold water pump operation command wiring connected to the auxiliary hot/cold water pump electrical relay? (Notes 1, 3)	Yes	1-2
			No	Request equipment wiring
	1-2	Is a hot/cold water pump interlock connected? (Notes 2, 3)	Yes	1-3
			No	Request equipment wiring
	1-3	Are any signal lines severed, faulty or short-circuited?	Yes	Repair
			No	1-4
	1-4	Is the power to the auxiliary equipment's control board switched off?	Yes	Switch on the power
			No	1-5
	1-5	Is there any chattering in auxiliary equipment's hot/cold water pump electrical relay or in the hot/cold water flow switch? (Note 4)	Yes	Request equipment repair
			No	Replace the water heat exchanger unit board

Note 1: Hot/cold water pump operation command•••TB3: between No. 1 and No. 2 (No voltage a contact output)
Note 2: Hot/cold water pump interlock••••••••••••TB4: between No. 1 and No. 2 (No voltage a contact input)
Note 3: Operations are possible when there is a short-circuit between No. 1 and No. 2 on the TB4 terminal board, but this may lead to the coolant freezing or other problems owing to a reduced flow volume, so an interlock must be connected without fail.
Note 4: Switch on the flow switch to confirm that the correct flow volume is being maintained in series with the signals operated by the coolant pump. Check the settings for the flow switch.

- See "5. Reference Document" for details on the procedure for replacing the water heat exchanger unit's control board.

P26 Clutch Connection Error

① Error detection method

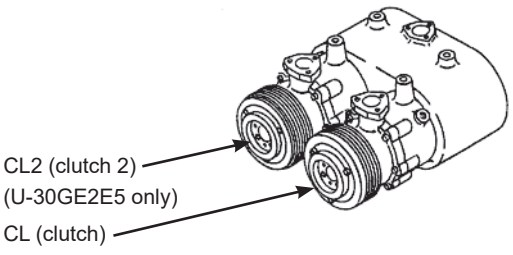
A clutch connection failure will be recognized as abnormality only when it occurs 5 times due to the following main cause.

- The revolution speed does not slow down and the high and low differential pressure of refrigerant circuit remains unchanged for 3 minutes while the clutches are in the on-state during complete combustion of the engine.

② Troubleshooting

1 Clutch	1-1	Does each clutch operate normally? * Continue to operate the air conditioner for enough time (approx. 10 to 20 minutes) until the clutches come into the on-state, under enough air conditioning load (test run mode and so on).	Yes	5-1
			No	2-1
2 Wiring	2-1	Check the conductivity of wiring in the malfunctioning clutch.	Yes	2-2
			No	Repair wiring
	2-2	Check the poor contact in wiring of the malfunctioning clutch.	Yes	3-1
			No	Repair wiring
3 Board	3-1	Check if DC voltage (about 12 V) is applied between No. 1 pin and No. 4 pin of the connector CN019 (7P: white) on the main board in the outdoor unit.	Yes	4-1
			No	Replace the main board in the outdoor unit.
4 Electric component	4-1	Does the relay (RY004) on the power board in the outdoor unit operate normally? (Check the sound of relay operation.)	Yes	5-1
			No	Replace the power board in the outdoor unit
5 Compressor	5-1	Is the compressor defective? * The compressor is considered to be normal if the pressure of the refrigerant circuit becomes larger (increase in high pressure and decrease in low pressure) after the clutches have come into the on-state.	Yes	Replace the compressor.
			No	Keep it under observation.

- For board and Electrical Wiring Diagram, see Chapter 6.



P30 Group Control's Sub Unit Error (* warning displayed only on system controller)

① Error detection method
When an error occurs on a group control sub unit (for all abnormalities), the system controller displays P30.

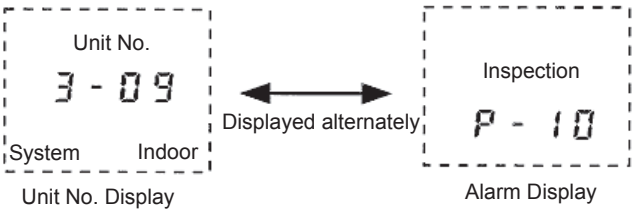
② Troubleshooting

1	1-1	Confirm error details using one of the following methods. ①Check warning display on wired remote controller. ②Check warning history in system controller servicing check mode.
	1-2	Troubleshoot the warning found in 1-1.

- For board and Electrical Wiring Diagram, see Chapter 6.
  - Outdoor main board: page VI-1
  - Outdoor power board: page VI-2
  - Outdoor Unit Electrical Wiring Diagram: page VI-3

● 1-1②
System controller service check mode (warning history)

Indoor unit/outdoor unit warning history monitoring mode (also clears warning history)
① Press the Inspect icon and Set button continuously for 4 seconds or more.
② Service Check lights, and the item code " 01 " lights.
③ When the group number is selected (when [1] is flashing), when any warning history exists, the newest warning history is displayed alternately with the unit number.
* Temperature settings are not available.



④ To check older warning history, press the temperature setting ▲ button or ▼ button, and select the item code (01~04).
⑤ To check warnings for other groups, press the Switch Group ◀ button or ▶ button, and select the group number.
⑥ To clear the warnings, press the cancel button.
(This deletes the entire warning history for the currently selected group.)
⑦ To end the servicing check, press the Inspect button.

P31 Group Control Error (Cannot be detected when the water heat exchanger unit is connected.)

① Error detection method

Under the following conditions, all non-master units in the remote controller group display this error and stop.

- When remote controller linking wiring is connected to an indoor unit independently controlled by a remote controller (L07)
- When multiple master units exist within remote controller group wiring (L03).
- When indoor unit fails to receive from remote controller (central) (E03).

② Troubleshooting

1 Remote controller group wiring	1-1	Is this indoor unit independently controlled by remote controller?	Yes	1-2
			No	1-3
	1-2	In the remote controller detailed settings mode, confirm independent control, then disconnect the remote controller group link wiring.		
	1-3	In the remote controller detailed settings mode, check the group settings. If set to “Independent”, correct settings.		

- See “5. Reference Document” for detailed remote controller settings.

oiL Oil Change Time Alarm

① Error detection method
When the oil change time exceeds the EEPROM setting-200 hours. (A02 warning is issued when EEPROM time setting is exceeded.)
Note:
- Engine does not stop with warning.
- No warning detection when the gas type setting is “1.”
- When warning is issued, “Check Oil” flashes on remote controller display.

② Troubleshooting
It is time to change the engine oil. After changing the oil, reset the oil change time on the outdoor main board.

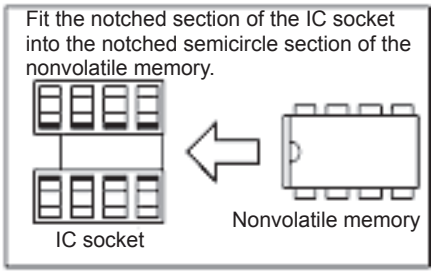
5. Reference Document

(1) Outdoor Main Board Replacement Sequence and Remote Controller Service Function

① Outdoor Main Board Replacement Sequence

To replace the outdoor main board, perform the work through the following sequence.

1) Turn off the power supply, and replace the outdoor main board.
2) Transfer the nonvolatile memory (EEPROM) from the old board to the new board.
   - Because engine operation time, oil check time and other data, as well as the various setting values are stored in the nonvolatile memory (EEPROM) inside the outdoor main board, when replacing the outdoor main board the nonvolatile memory needs to be removed from the old board and transferred to the new board.
   - The operation data, setting values and other information will be carried over into the new board.
   - Handle the nonvolatile memory with care.
     Because the nonvolatile memory needs to be installed in a certain direction (see diagram below), be careful to correctly connect it to the designated sockets. Faulty directional installation will cause the memory to break.

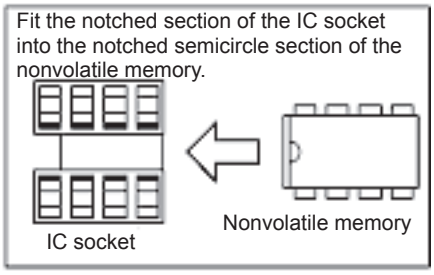


   - Because the legs are easily bent, be careful when removing or plugging in the memory.
3) Turn on the power supply, and confirm operation.

② Outdoor Nonvolatile Memory (EEPROM) Replacement Sequence

- When replacing the outdoor main board, in the event of nonvolatile memory breakage or F31 error, the work of replacing the outdoor nonvolatile memory should be conducted in the following sequence.
- A nonvolatile memory is also used in the indoor unit, but be aware that there is no compatibility between the memories.

1) To ensure reproduction of the nonvolatile memory contents, before removing the nonvolatile memory make notes of the various judgment values in the parameter setting mode, as well as operation monitor data code numbers 1 to 4, 6 to 9, and oil change time.
2) Install the nonvolatile memory package in the service board in the outdoor main board.
   - Handle the nonvolatile memory with care.
   - Because the nonvolatile memory needs to be installed in a certain direction (see diagram below), be careful to correctly connect it to the designated sockets. Faulty directional installation will cause the memory to break.

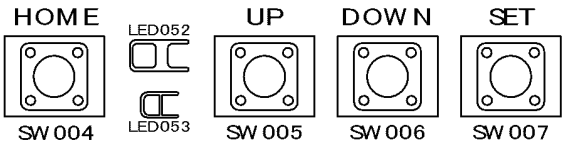


   - Because the legs are easily bent, be careful when removing or plugging in the memory.
3) Turn on the power supply.
4) At the initial setting, match outdoor unit capacity (models, etc.) to the outdoor models.
5) For subsequent outdoor unit settings, set the other parameters to the best of your knowledge.
6) Confirm operation.
7) Always be sure to readjust engine ignition timing.

(2) Switch and LED

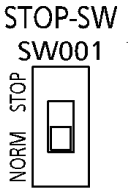
① SW004, SW005, SW006, SW007 (HOME, UP, DOWN, SET)

- These switches are used to perform7-segment LED service display changes and type settings.
- These key switches are used to determine (maintain operation of) various items, raise and lower items being displayed, etc.



② SW001 (All stop switch)

- This switch is used to terminate all the units at the same time.
- Moving this switch to the “Stop” side executes all units to stop, and is thus used during maintenance and other occasions when it is necessary to have the units not operate.
- The switch is set to “STOP” at the factory before shipment, and thus needs to be switched to the “NORM” side for test run.



- For W MULTI system
  For W MULTI system, total off can be set to each outdoor unit individually. (Outdoor units without total off set operate as outdoor units with CCU function.)

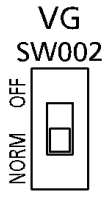
  Caution:
  Because outdoor units set to total off have their valves opened, if other outdoor units are operated this way, refrigerant will flow to the outdoor units with total off set, causing malfunction. Therefore, be sure to close the valves of refrigerant gas tube, refrigerant liquid tube, and balance tube of the outdoor units set to total off. If all outdoor units of the system are set to total off, then there is no need to close the shutoff valves.

Use the following procedure to turn off circuit breaker of one or more outdoor units and perform maintenance.

1. For one unit, set the STOP switch the “STOP” side. (“ PAUSE ” appears.)
2. After approximately 3 minutes, “ POFF ” appears. (*2) Then, turn off the circuit breaker of the outdoor unit.
3. Close the valves of refrigerant gas tube, refrigerant liquid tube, and balance tube.
4. After the work is finished, open the closed valves of refrigerant gas tube, refrigerant liquid tube, and balance tube.
5. Set the STOP switch to the “NORM” side, and then turn on the circuit breaker.
6. When all outdoor units are in complete combustion state and until vane comes out (about the time when all outdoor units simultaneously continue operation for one minute or more)
7. For the next targeted outdoor unit, perform the procedure starting from step 1.

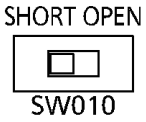
③ SW002 (Fuel gas solenoid forced off switch)

- This switch is provided for the forced shutdown of the gas solenoid valve.
- Moving this switch to the “OFF” side causes the forced shutdown of the gas solenoid valve. However, when cranking is carried out with the gas valve closed, it immediately stops at “A07”. Therefore, when measuring engine compression or for other purposes, use “GASOFF” (fuel gas solenoid valve forced closing setting) of test run and forced setting function “No. 4 TEST”.



④ SW010 (Terminal resistor On/Off switch)

- This switch is used for matching on communication lines.
- When only one outdoor unit is connected to a single communication line, confirm that the setting is on the "SHORT" side.
- The factory setting is "SHORT"
- When more than one outdoor unit is connected to a single communication line, always set one unit to the "SHORT" side and the rest of the outdoor units to the "OPEN" side.

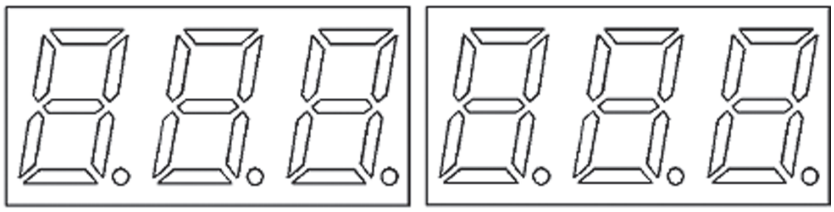


Caution:

Setting the terminal resistor switch for multiple outdoor units to the "SHORT" side can cause communication flaws.

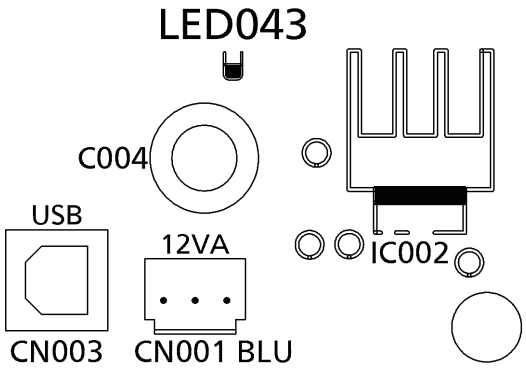
⑤ The 7-segment LED

- This LED indicates the operating status of indoor and outdoor units, changes in set values and various other displays using switches SW004 to SW007.
- The 7-segment LED has 6 digits.

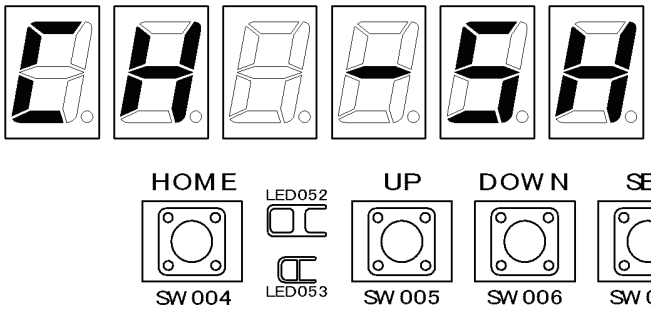


⑥ Indoor/Outdoor communications LED (LED043)

- The communications monitor LED for use between outdoor and indoor units.



(3) Display Component Specifications



① Warning display (red)
During warnings, TEST/WARNING LED (LED052) flashes.

② Forced setting display (red)
Upon forced settings during normal display, the TEST/WARNING LED (LED052) lights.
During display of forced settings on the menu item display, the TEST/WARNING LED (LED052) lights. (This may be used to search for forced setting items during setting.)

③ Level LED display (green)
The Level LED (LED053) displays the setting menu stage level and other information.
Level 0 is unlit, Level 1 is light, Level 2 is flashing.

④ Displays immediately after power is turned ON
When the power supply is turned on, the following displays appear.
- 7-segment LED, TEST/WARNING LED (LED052), Level LED (LED053) light up (5 seconds)
- Model name display (1 second)
- Version display (1 second)

Example: 8.8.8.8.8.8. (All segments light)
Example: 450.1 (Model name display)
Example: U 100 (Version display)

When the power supply is turned on while pressing the SET (SW007) key, the contents of the nonvolatile memory can be cleared.

•Memory clear procedure
1. Turn on the power supply while pressing the SET (SW007) key. After 1 second or more, "CLr" will be displayed.
2. Press the SET (SW007) key again. Activating the nonvolatile memory erase function at this time will display "End".
3. Check for power on display
"(If the End display fails to appear, repeat the aforementioned operation until it does appear.)"
When the memory is cleared at this time, all the contents of the nonvolatile memory are reset to the initial state.

⑤ Outdoor unit normal display
Example: U.01.20

Number of indoor units (20 units)
System address (01)

(4) Operation Unit Specifications

① Operation

Three keys DOWN (SW006), UP (SW005) and SET (SW007) are basically used to perform all display and setting operations.

Pressing the HOME (SW004) for one second activates return to the normal display at any time (this key is installed in a slightly separated position).

② Unified operation sequence

Category selection is performed with the UP (SW005) and DOWN (SW006) keys, and then set with the SET (SW007) key.

Setting changes are performed with the UP (SW005) and DOWN (SW006) keys, and confirmed with the SET (SW007) key.

The HOME (SW004) key is used to display the normal display (the contents of any settings in progress will be canceled).

Simultaneously pushing the HOME key (SW004) and DOWN (SW006) key for 1 second displays the version.

Pressing the SET (SW007) key for one second while operation data is displayed (No. 0) cancels all forced settings.

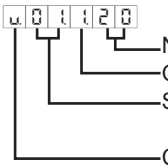
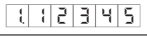
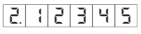
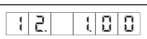
* The times appearing for flashing cycles, operation key depressed period and other indications are approximate values, and not necessarily the accurate times.

(5) Normal Display (Level 0)

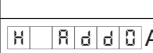
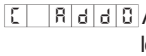
The normal display appears after passing through the display subsequent to turning the power supply ON, when selecting menu No. 0, or when no key operation occurs for 10 minutes.

① Normal Display (Level 0)

On this outdoor unit system, the following data displays are repeated at 2-second intervals..

Display sequence	Display contents	Display examples	Remarks
1	Number of indoor units Outdoor unit address System address CCU function		Indoor units - 20 units W MULTI - 1 or 2, other - always 0 System 01 Without dots: W MULTI without CCU function (sub unit) *All other than those described above: with dots
2	Engine operation time		12345 hours
3	Engine operation count		12345 times
4	Compressor inlet pressure		1.0 MPa
5	Compressor outlet pressure		2.0 MPa

When conducting automatic addressing, in place of engine operation time, the display will indicate that automatic addressing is in progress.

Display sequence	Display contents	Display examples	Remarks
1	Automatic addressing	 Automatic addressing progress level (0 to 5)	Heating automatic address
		Automatic addressing progress level (0 to 5)	Cooling automatic address
2	Automatic addressing on other outdoor unit		Prohibit operation during automatic addressing on other outdoor unit

② Heater Remaining Power-on Time Display (Level 0)

Conditions : 5 hours yet to elapse since turning on outdoor unit power supply.
Engine yet to be operated since turning on outdoor unit power supply.
Compressor outlet temperature is 60.0 °C or below.

Display : 

Remarks : This display indicates that crank case heater remaining power-on time is 5 hours.
This figure (5) decreases by one for the passage of each hour (4, 3…), returning to the normal display after 5 hours.

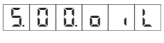
③ 3-Minute Off Display (Level 0)

Conditions : Engine startup forcibly delayed by 3 minutes.

Display : 7-segment display flashes at 1-second cycles.
Excluded when the No. 9 indoor unit status is displayed.

④ Warning Display (Level 0)

Conditions : Warning being issued

Display : TEST/WARNING LED flashing. Warning contents displayed on 7-segment LED.
ex)  : Oil check warning

⑤ Error Display (Level 0)
Conditions : Error being issued
Display : TEST/WARNING LED flashing. Warning contents displayed on 7-segment LED.
"When a multiple number of error occur, each error will be displayed in approx. 1-second cycles, in the sequence of: Outdoor error → Outdoor warning → Indoor error."
Example: " 00 A0 1 ": Outdoor unit fault

⑥ Forced Setting Activated Display (Level 0)
Conditions : Forced setting effective.
Display : TEST/WARNING LED flashing.
(Under these conditions during the normal display, pressing the SET (SW007) key for 1 second cancels all forced settings.)

⑦ Startup Wait Display (Level 0)
Displayed when waiting for startup.
Display examples

P03	High compressor outlet temperature
P15	Complete gas depletion check underway
A20	High coolant temperature
A21	Low coolant level
A22	During coolant circuitry check
P20	Depending on unequalized pressure
A11	Low engine oil level

⑧ Total OFF Display (Level 0)
Setting the STOP switch (S001) to "STOP" activates total off.
The normal display at this time is "PAuSE"
Examples

PAuSE	During total OFF display (when STOP switch input is set to "STOP").
P oFF	*In the case of W MULTI, this display appears after 3 minutes.

⑨ System OFF Display (Level 0)
The following display appears during stopped system after system stop command is received.
However, this does not apply during automatic addressing.
When the system is off, all key operations are invalidated other than the Version Display.

StoP

⑩ Version Display (Level 0)
During a simultaneous long press of the HOME (SW004) key and DOWN (SW006) key, the following display appears every 1 second.

U 100	Main microcomputer version

⑪ Other displays
During a simultaneous long press of the HOME (SW004) key and UP (SW005) key, the following display appears every 1 second.

Display contents	Display examples	Remarks
Communication collision rate and usage rate (item names)	CoLUSE	*This is only an item name (collision rate and usage rate)
(Value)	7 12	Communication collision rate= 7/ communication usage rate= 12

Caution:
Items other than those described above may appear on this display, but they are not related to this model.

(6) Menu Display

Press the UP (SW005) or DOWN (SW006) key to select menu items.
During and after item changes, the menu number display appears for about 1 second (0.7 seconds), followed by the letter display.
Selecting an item and then pressing the SET (SW007) key selects that item.
The HOME (SW004) key always displays " n o 0 0 " (contents will not change during setting).
When no operations occur for 10 minutes in areas other than item " n o 0 0 ", item " n o 0 0 " will be displayed (contents will not change during setting).

	Menu item	Letter display	Description
↑ DOWN	n o 0 0	u 0 1 0 2 0	Operation data display (forced setting release, data setting)
	n o 0 1	0 0 0 A 0 0	Error data display (Error reset, log display)
	n o 0 2	n 1 0 0 0 0	Oil change time display (change time clear)
	n o 0 3	3 5 5 2	Model type display (double-speed setting)
	n o 0 4	t E S t	Test run/outdoor unit forced setting
	n o 0 5	S E t o u t	Outdoor unit setting
	n o 0 6	S E t i n	Indoor unit setting
	n o 0 7	S E t G E	Generator setting
	n o 0 8	S E t r P n	Forced engine rpm setting
UP↓	n o 0 9	i n S t S	Indoor unit status display
	n o 1 0	F i r S t	Initial setting
	n o 1 1	1 7 0 3 0 1	Date display

① Operation Data Display: No. 00 (n 0 0 0)

The normal (or special) display usually appears, with key operation used to display current data.

1) Normal display (Level 0)

The following data displays are repeated at 2-second intervals with this outdoor unit system.

Display sequence	Display contents	Display examples	Remarks
1	System address, indoor unit count	u 0 1 1 2 0	System 01, 20 indoor units
2	Engine operation time	1 1 2 3 4 5	12,345 hours
3	Engine operation count	2 1 2 3 4 5	12,345 times
4	Compressor inlet pressure	1 2. 1 0 0	1 MPa
5	Compressor outlet pressure	1 3. 2 0 0	2.0 MPa

2) Total OFF Setting Display (Level 0)

In normal display state, moving the outdoor board STOP switch (SW001) to the "STOP" side causes a shutdown of all units. In the normal display state, Total OFF is normally displayed as P A u 5 E "PAuSE". As usual, pressing the SET (SW007) key (changing to Level 1) activates the display of operation data.

3) Operation Data Display (Level 1)

In status 1 or 2, pressing the SET (SW007) key activates the display of the system data.

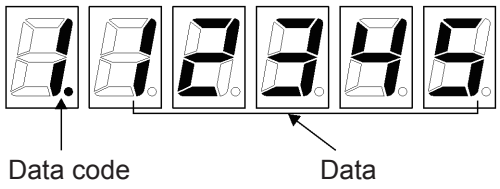
Example: u 0 1 0.2 0 - Pressing the SET (SW007) key -> 0. d A t A

Pushing the HOME (SW004) key for 1 second or more, or with no operation for 10 minutes, activates the normal display.

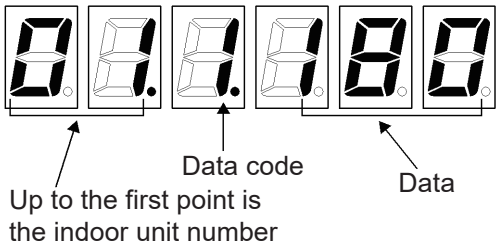
Data is displayed by selecting with the UP (SW005) and DOWN (SW006) keys.

Dta displey example

Outdoor unit data



Indoor unit data



4) Forced Setting Release

Pressing the SET (SW007) key in the normally displayed status for one second causes all forced set items to be canceled.

5) Data setting operation (Level 2)

Setting start operation method : Press the SET (SW007) key for one second in the setting data code select mode.
This activates the forced setting in progress display. (TEST/WARNING LED light)

Setting change operation method : After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys make it possible to change the setting details of the selected setting categories.

Setting confirm operation method : After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second.
This cancels the forced setting in progress display, making it possible to once again enter setting item selection operation mode.
(TEST/WARNING LED off)

Setting cancel operation method : Press the HOME (SW004) key for one second before confirming setting.
This returns operation to normal. (TEST/WARNING LED off)

The setting details will not change when pressing the HOME (SW004) key for one second during setting item select operation.)
Data setting operation is possible from items No. 0 to No. 8.

The following data is displayed.

Data code	Measurement item		Display examples	Standard operation data	
	Data name	Unit		During cooling operations	During heating operations
1	Engine operation time	Hrs	1.12345		
2	Engine operation count	Times	2. 2345		
3	Starter operation time	Seconds	3. 234		
4	Starter operation count	Times	4. 1345		
5	Current oil change time	Hrs	5.12345		
6					
7					
8					
9					
A					
b					
c					
d					
E	Clutch on time	Hrs	E. 1500		
F	Clutch on count	Times	F. 150		
G	Clutch 2 on time	Hrs	G. 1500		
H	Clutch 2 on count	Times	H. 150		
i					
J					
K					
L					
n					
o					
P	Oil error time	Hrs	P.000000		
q					
10	Engine revolution setting	min^{-1}	10.2200	600~2200	
11	Engine revolutions	min^{-1}	11.2200	600~2200	
12	Compressor inlet pressure	MPa	12. 0.10	0.60~0.90	0.30~1.10
13	Compressor outlet pressure	MPa	13. 1.00	2.30~3.20	2.40~3.30
14	Compressor inlet temperature	°C	14. 35.0	5~30	0~30
15	Compressor outlet temperature	°C	15.1 10.0	70~110	80~110
16	Outdoor unit heat exchange inlet temperature	°C	16. 45.0	30~50	-5~10

17	Outdoor unit heat exchange 2 inlet temperature (3WAY only)	°C	17 450	30~50	-5~10
18					
19					
20	Refrigerant temperature	°C	20. 650	60~83	55~83
21	Outside air temperature	°C	21 280		
22	Clutch coil temperature	°C	22. 500		
23	Catalyst temperature	°C	23250.0		
24	Hot water outlet temperature (optional)	°C	24 700		
25					
26	Oil level measurement temperature (W MULTI)	°C	26. 540	30~100	30~100
27					
28					
29					
30					
31	Clutch coil 2 temperature	°C	31 500	30~90	30~90
32					
33					
34	Exhaust gas temperature	°C	34. 650	45~90	40~80
35					
36					
37					
38	Outdoor unit fan 1	%	38.1000	0~121	0~121
39	Outdoor unit fan 2	%	39.1000	0~121	0~121
40					
41	Outdoor unit fan revolutions 1	min^{-1}	41 650	0~680	0~680
42	Outdoor unit fan revolutions 2	min^{-1}	42. 650	0~680	0~680
43					
44	Coolant pump setting	min^{-1}	443700	3700	3700
45	Coolant pump revolutions	min^{-1}	453700	3700	3700
46	Throttle	Step	46. 100		
47	Fuel gas regulating valve	Step	47 330		
48	Liquid valve	Step	48. 220	0~100	0~480
49	Bypass valve	Step	49. 100	20	20
50	Outdoor unit solenoid valve 1	Step	50. 480	480	0~480
51	Outdoor unit solenoid valve 2	Step	51 480	480	0~480
52	Three-way coolant valve	Step	52.1950	50	50~1950
53	Exhaust heat collection valve	Step	53. 200	0	80~480
54	Three-way hot water extraction valve (optional)	Step	54. 50	50~1950	50~1950
55	Revolution speed variable (F_rpm)		55. 0.2	0~10	0~10
56					
57					
58	Compressor oil level (W MULTI)	–	58. 2		
59	Engine load ratio		59. 3.0	0~6	0~6
60	Engine ignition time	Degrees	60. 10	8~40	8~40
61	Cylinder number during flameouts		61 1		
62					
63					
64					
65	Gas demand control value	m^3/h	65. 0.0.0		
66					

67					
68					
69					
70	Thermostat on unit count	Units	70 20		
71	Average thermostat on intake temperature	°C	71 19.4		
72	Average thermostat on discharge temperature	°C	72 15.0		
73	Average thermostat on E1 temperature	°C	73 5.0		
74					
75	Average thermostat on E3 temperature	°C	75 7.0		

• Indoor unit data

1	No.1 indoor unit solenoid value opening	Step	01 180	64~350	300~480
2	No.1 indoor unit intake temperature	°C	012 29.0		
3	No.1 indoor unit discharge temperature	°C	013 15.0		
4	No.1 indoor unit E1 temperature	°C	014 10.0		
5					
6	No.1 indoor unit E3 temperature	°C	016 10.0		
1	No.2 indoor unit solenoid valve opening	Step	021 180		
↓	*1				
6	No.24 indoor unit E3 temperature	°C	246 10.0		

*1 Indoor unit data displays show the data of number (maximum 24 units) of connected indoor units, in the same order.

② Error Data Display: No. 1 (Level 0) < n o 0 1 >
Error data displays and error resets are conducted.
Error data, including pretrips, are stored in the nonvolatile memory for the 3 most recent incidents.
When an error occurs for the 4 time and beyond, the oldest error data is erased and the 3 most recent incidents are stored.
A profile of error data is as follows.

- Error code
- Outdoor unit operation data at occurrence of error
- Outdoor unit operation data at occurrence of error
- Outdoor unit warning data 5 seconds before occurrence of error
- Outdoor unit warning data 10 seconds before occurrence of error
- Outdoor unit warning data 15 seconds before occurrence of error

1) Display at time of no error (Level 0)
The following display appears.
0. 0 0. A 0 0

2) Display at occurrence of error (Level 0)
Displays current error code.
0. 0 0. A 0 2 (Example of engine oil error)

3) Error reset operation sequence
During display of current error code, pressing the SET (SW007) key for 1 second activates the outdoor unit error reset.
When the cause of the error has yet to be removed, an error will occur again immediately after reset.
Resetting cannot be performed under the following circumstances.

Reset cannot be conducted under the following situations:

- Indoor unit error: Indoor unit error reset requires that the indoor unit be turned off.
- Oil use time: Oil use time reset must be conducted with the “Oil Use Time Display.”
- A11 (Engine oil level fault) cannot be reset. (Error continue until the oil level returns to normal).

4) Error code, temporary stop cause code display (Level 1)
During displays with no error and displays when error incidents occur, pressing the SET (SW007) key causes the error code and temporary stop cause code to be displayed.
Data is displayed by selecting with the UP (SW005) and DOWN (SW006) keys.

	Data code	Data name	Display examples	Remarks
↓ DOWN	0.	Current error code	0.0.A00	No error
	1.	Most recent error log code	1. P15	P15
	2.	Second most recent error log code	2. A20	A20
	3.	Third most recent error log code	3. A04	A04
	4.1.	Stop log 1	4.1. 12	Temporary stop cause code *2 12
			12345	Engine operation time when it occurs *1
	4.2.	Stop log 2	4.2. P20	P20
			12340	
	~	~	~	
	4.9.	Stop log 9	4.9. 11	Temporary stop cause code 11
			12335	
	4.A.	Stop log 10	4.A. 2	Temporary stop cause code 2
			12330	
	4.B.	Stop log 11	4.B. P03	P03
			12325	
	4.C.	Stop log 12	4.C. A20	A20
			12320	
	5. 1	Malfunction log code 1 (warning code)	5.1 A08	A08
	5. 2	Malfunction log code 2 (warning code)	5.2 F12	F12
↑ UP	5. 3	Malfunction log code 3 (warning code)	5.3 P22	P22
	5. 4	Malfunction log code 4 (warning code)	5.4 A08	A08
	5. 5	Malfunction log code 5 (warning code)	5.5 P22	P22
	6.	Error log clear	6. CLr	Clear log

Note:
*1: Stop cause (or fault code) and stopped engine's operation time are displayed alternatively.
*2: Cause code are listed below.

No.	Stop Cause	No.	Stop Cause
1	Temporary stop due to insufficient differential pressure of refrigerant during startup	18	–
2	When the discharge temperature is high, but the liquid valve is not yet open.	19	The coolant temperature is high, but the 3-way coolant valve is not completely open.
3	When the discharge temperature is high, but the engine speed is still too high.	20	Excessive revolutions in the advantage mode.
4	When the high-pressure area is high, but the fan output is still too low.	21	Momentary stop due to compressor oil return control of the renewal unit.
5	When the high-pressure area is high, but the engine speed is still too high.	22	Momentary stop due to refrigerant 3-way valve positioning control.
6	When the high-pressure area is high, but the unit is in advantage mode.	23	Momentary stop due to the possibility of a flameout.
7	When the high-pressure area is high, but it is less than 3 minutes since the engine was started.	24	Momentary stop due to the possibility of the outdoor unit running out of refrigerant.
8	Momentary stop during heating high-load learning control 2.	25	Momentary stop due to the possibility of a clutch connection error.
9	Pause due to no compressor oil (W MULTI only.)	26	Momentary stop due to a rapid rise in high pressure.
10	When the compressor intake temperature is high, but the high pressure is also high.	27	Momentary stop due to a high coolant temperature continuing.
11	When the discharge temperature is high, but the indoor unit is emitting exhaust.	28	Momentary stop due to outdoor unit mode switching being in progress (3WAY only.)
12	The high pressure is high, but it is still within 4 minutes of outdoor unit refrigerant outlet control.	29	Momentary stop due to the alignment of 4-way valves with another unit failing (W MULTI only.)
13	The high pressure is high, but auto-addressing for the heater is in progress.	43	High-pressure avoided during low-capacity heater operations.
14	The high pressure is high, but auto-addressing is in progress.	44	Momentary stop due to engine oil control.
15	Momentary stop due to heating high-load learning control being in progress.	45	Engine stall due to load variation being in progress.
16	The engine has stalled during clutch control.	46	Engine stall due to special high-pressure avoidance control being in progress.
17	Momentary stop due to 24 hour continual operations.		

5) Error Data Display (Level 2)

During error log code display, pressing the SET (SW007) key for one second or more activates the error data display at that time.

Example: [U] [P] [1] [5] — Pressing the SET (SW007) key → [U] [1] [2] [3] [4] [5]

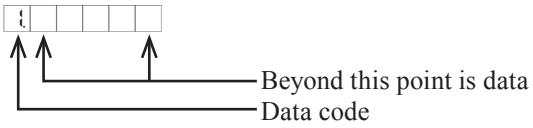
Pressing the SET (S007) key again for one second or more, or when there are no operations for 10 minutes, returns to the normal display.

Example: [U] [1] [2] [3] [4] [5] — Pressing the SET (SW007) key → [d] [0] [U] [0] [2] [0]

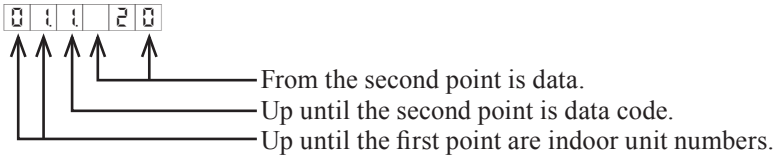
Data is displayed by selecting with the UP (SW005) and DOWN (SW006) keys.

Data display example

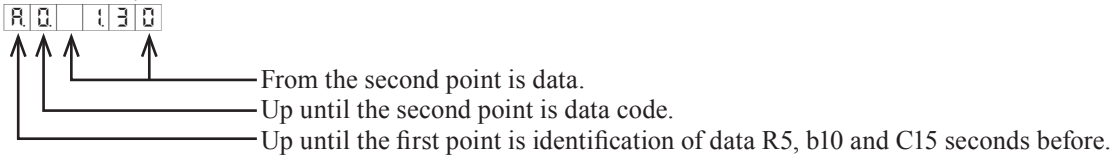
Outdoor unit data



Indoor unit data



Data from 5, 10 and 15 seconds before is identified as follows.



The data displayed is as follows:

- Outdoor Unit Data

Data code	Data name	Unit	Display examples	Remarks
None	Date of malfunction	YYMMDD	[1] [7] [0] [3] [0] [1]	March 01, 2017
None	Time of malfunction	HHMMSS	[0] [8] [1] [9] [4] [1]	08:19:41
1	Engine operation time	Hr	[U] [1] [2] [3] [4] [5]	12,345 hours
2	Engine operation count	Times	[2] [2] [3] [4] [5]	2,345 times
3	Starter operation time	Seconds	[3] [2] [3] [4]	234 seconds
4	Starter operation count	Times	[4] [1] [3] [4] [5]	1,345 times
5				
6				
7				
8	Clutch 2 time		[8] [2] [0] [0] [0]	2,000 hours
9	Clutch 2 count		[9] [2] [0] [0]	200 times
A				
b				
c				
d				
E				
F				
G				
H				
i				
J				
K				
L				
n				

Data code	Data name	Unit	Display examples	Remarks
o				
P				
q				
10	Engine revolution setting	min^{-1}	10 2200	2,200 min^{-1}
11	Engine revolutions	min^{-1}	11 2200	2,200 min^{-1}
12	Compressor inlet pressure	Mpa	12 0.10	0.10 MPa
13	Compressor outlet pressure	MPa	13 100	1.00 MPa
14	Compressor inlet temperature	°C	14 350	35.0°C
15	Compressor outlet temperature	°C	15 1100	110.0°C
16	Outdoor unit heat exchange inlet temperature	°C	16 450	45.0°C
17	Outdoor unit heat exchange 2 inlet temperature (3WAY only)			
18				
19				
20	Refrigerant temperature	°C	20 650	65.0°C
21	Outside air temperature	°C	21 280	28.0°C
22	Clutch coil temperature	°C	22 500	50.0°C
23	Catalyst temperature	°C	23 2500	250.0°C
24	Hot water outlet temperature (optional)	°C	24 700	70.0°C
25				
26	Oil level measurement temperature (W MULTI)	°C	26 540	54.0°C
27				
28				
29				
30				
31	Clutch coil 2 temperature	°C	31 500	50.0°C
32				
33				
34	Exhaust gas temperature	°C	34 650	65.0°C
35				
36				
37				
38	Outdoor unit fan 1	%	38 1000	100%
39	Outdoor unit fan 2	%	39 1000	100%
40				
41	Outdoor unit fan revolutions 1	min^{-1}	41 650	650 min^{-1}
42	Outdoor unit fan revolutions 2	min^{-1}	42 650	650 min^{-1}
43				
44	Coolant pump setting	min^{-1}	44 3700	3,700 min^{-1}
45	Coolant pump revolutions	min^{-1}	45 3700	3,700 min^{-1}
46	Throttle	Step	46 100	100 steps
47	Fuel gas regulating valve	Step	47 330	330 steps
48	Liquid valve	Step	48 220	220 steps
49	Bypass valve	Step	49 100	100 steps
50	Outdoor unit solenoid valve 1	Step	50 480	480 steps
51	Outdoor unit solenoid valve 2	Step	51 480	480 steps
52	Three-way coolant valve	Step	52 1950	1,950 steps
53	Exhaust heat collection valve	Step	53 200	200 steps
54	Three-way hot water extraction valve (optional)		54 50	50 steps

Data code	Data name	Unit	Display examples	Remarks
55	Revolution speed variable (F_rpm)		55 02	0.2
56				
57				
58	Compressor oil level (W MULTI)	-	58 2	Level 2
59				
60	Engine ignition time	Degree	60 10	10 degrees
61				
62				
63				
64				
65				
66				
67				
68				
69				
70	Thermostat on unit count	Unit	70 20	20 units
71	Average thermostat on intake temperature	°C	71 194	19.4°C
72	Average thermostat on discharge temperature	°C	72 150	15.0°C
73	Average thermostat on E1 temperature	°C	73 50	5.0°C
74				
75	Average thermostat on E3 temperature	°C	75 70	7.0°C

- Indoor Unit Data

Data code	Data name	Unit	Display examples	Remarks
1	No.1 indoor unit solenoid valve opening	Step	01 180	180 steps
2	No.1 indoor unit intake temperature	°C	01 290	29.0°C
3	No.1 indoor unit discharge temperature	°C	01 150	15.0°C
4	No.1 indoor unit E1 temperature	°C	01 100	10.0°C
5				
6	No.1 indoor unit E3 temperature	°C	01 100	10.0°C
1	No.2 indoor unit solenoid valve opening	Step	02 180	180 steps
↕	* 1			
6	No.24 indoor unit E3 temperature	°C	24 100	10.0°C

*1: The data for the indoor units connected will be displayed when the latest error history data is being displayed (after initial communication has been completed.)

● Outdoor Unit Data 5 Seconds Earlier (A.1 to A.i)

Data code	Data name	Unit	Display examples	Remarks
A.1	Engine revolution setting	min^{-1}	A.1 2200	2,200 min^{-1}
A.2	Engine revolutions	min^{-1}	A.2 2200	2,200 min^{-1}
A.3	Compressor inlet pressure	MPa	A.3 0.10	0.10 MPa
A.4	Compressor outlet pressure	MPa	A.4 1.00	1.00 MPa
A.5	Compressor inlet temperature	°C	A.5 35.0	35.0°C
A.6	Compressor outlet temperature	°C	A.6 110.0	110.0°C
A.7	Outdoor unit fan 1	%	A.7 100.0	100%
A.8	Outdoor unit fan revolutions 1	min^{-1}	A.8 650	650 min^{-1}
A.9	Coolant pump revolutions	min^{-1}	A.9 3700	3,700 min^{-1}
A.A	Throttle	Step	A.A 100	100 steps
A.b	Fuel gas regulating valve	Step	A.b 330	330 steps
A.C	Liquid valve	Step	A.C 220	220 steps
A.d	Bypass valve	Step	A.d 100	100 steps
A.E	Outdoor unit solenoid valve 1	Step	A.E 480	480 steps
A.F	Outdoor unit solenoid valve 2	Step	A.F 480	480 steps
A.G	Revolution speed variable (F_rpm)		A.G 0.2	0.2
A.H				
A.i	Engine ignition time	Degree	A.i 10	10 degrees

● Outdoor Unit Data 10 Seconds Earlier (b.1 to b.i)

Data code	Data name	Unit	Display examples	Remarks
b.1	Engine revolution setting	min^{-1}	b.1 2200	
		≀	Same as the outdoor unit data 5 seconds earlier	
b.i	Engine ignition time	Degree	b.i 10	

● Outdoor Unit Data 15 Seconds Earlier (C.1 to C.i)

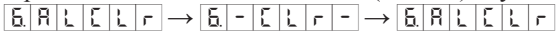
Data code	Data name	Unit	Display examples	Remarks
C.1	Engine revolution setting	min^{-1}	C.1 2200	
		≀	Same as the outdoor unit data 5 seconds earlier	
C.i	Engine ignition time	Degree	C.i 10	

Note: The data during normal display will be displayed with the same digits, but there are cases in which accuracy is deteriorated.

6) Error log clear

Clears all of the error log and temporary stop causes for this outdoor unit.

Operation method: Press the SET (SW007) key for one second.



(clearing) (complete)

7) Error (alarm) code list

Error Code	Error (Alarm) Contents	Error Code	Error (Alarm) Contents
A00	No error occurred		(System F: Defective sensors, memories and other parts)
	(System A: Engine system protective device operation)	F01	Indoor unit heat exchanger inlet temperature sensor error
A01	Engine oil pressure error		E1 sensor error (when the water heat exchanger unit is connected)
A02	Engine oil error		
A03	Engine high-revolution error	F02	Anti-icing sensor error (when the water heat exchanger unit is connected)
A04	Engine low-revolution error		
A05	Ignition power supply error	F03	Indoor unit heat exchanger outlet temperature sensor error
A06	Engine start failure		
A07	Fuel gas valve error		E3 sensor error (when the water heat exchanger unit is connected)
A08	Engine stall		
A10	High exhaust gas temperature	F04	Compressor outlet temperature sensor error
A12	Throttle failure	F06	Outdoor unit heat exchanger inlet temperature sensor error
A14	Engine oil pressure switch error		
A15	Starter power supply output short circuit		Outdoor unit heat exchanger 2 inlet temperature sensor error (3WAY only)
A16	Starter lock		
A17	CT error (starter current detection failure)	F08	Outside air temperature sensor error
A19	Low coolant temperature	Fl0	Indoor unit intake temperature sensor error
A20	High coolant temperature		Water intake temperature sensor error (when the water heat exchanger unit is connected)
A21	Coolant level error		
A22	Coolant pump error	F11	Indoor unit discharge temperature sensor error
A23	Crankshaft angle sensor error		Water discharge temperature sensor error (when the water heat exchanger unit is connected)
A24	Camshaft angle sensor error		
A25	Clutch error	F12	Compressor inlet temperature sensor error
A26	Flameout error	F13	Coolant temperature sensor error
A27	Catalyst temperature error (for only models fitted with a catalyst)	F16	Compressor inlet/outlet pressure sensor error
		F18	Exhaust gas temperature sensor error
		F20	Clutch coil temperature sensor error
	(System E: Communication system errors)	F21	Clutch 2 coil temperature sensor error
E01	Remote controller receive failure	F29	Indoor unit non-volatile memory (EEPROM) error
E02	Remote controller transmission failure	F31	Outdoor unit non-volatile memory (EEPROM) error
E03	Indoor unit receive failure from the remote controller (central)		
E04	Indoor unit receive failure from the outdoor unit		(System L: Duplicate address and other setting defects)
E05	Indoor unit transmission failure to outdoor unit		
E06	Outdoor unit receive failure from the indoor unit	L02	Inconsistencies in indoor/outdoor units (non-GHP equipment connected)
E07	Outdoor unit transmission failure to the indoor unit	L03	Multiple main units set for group control
E08	Duplicate indoor unit address setting	L04	Duplicate system (outdoor unit) address setting
E09	Multiple main remote controller units set	L05	Duplicate indoor unit priority setting (priority indoor unit)
E11	Indoor unit receive failure from the signal output board	L06	Duplicate indoor unit priority setting (excluding priority indoor units)
E12	Auto-address start forbidden due to auto-address in progress	L07	Group control wiring exists for individual-control indoor unit
E13	Indoor unit transmission failure to the remote controller	L08	Indoor unit address not set
E15	Automatic address alarm (too few units)	L09	Indoor unit capacity not set
E16	Automatic address alarm (too many units)	L10	Outdoor unit capacity not set
E18	Group control wiring communication failure	L13	Indoor unit model setting defect
E20	No indoor unit	L15	Indoor unit pairing defect
E21	Outdoor Unit's Main Board Failure	L16	Water heat exchanger unit setting defect (when the water heat exchanger unit is connected)
E22	Outdoor Unit's Main Board Sensor Error		
E24	Communication failure between outdoor units (only detected with W MULTI)	L19	Duplicated water heat exchanger unit parallel address (when the water heat exchanger unit is connected)
E26	Inconsistency in number of outdoor units (only detected with W MULTI)	L21	Gas type setting failure
E31	Communication failure between units		

Error Code	Error (Alarm) Contents
	(System P: Indoor/outdoor protective device operations)
P01	Indoor fan error / indoor fan rpm error
P03	High compressor discharge temperature
P04	Refrigerant high-pressure switch operations
P05	Power supply error
P09	Indoor unit ceiling panel connector connection defect
P10	Indoor unit float switch operations
P11	Water heat exchanger unit anti-icing sensor error (when the water heat exchanger unit is connected)
P12	Indoor DC fan error
P13	Refrigerant circuit error (only detected with W MULTI and 3WAY)
P15	Total refrigerant gas depletion
P18	Bypass valve failure
P19	4-way valve lock error (not detected with 3WAY)
P20	Refrigerant high-pressure error
P22	Outdoor unit fan error
P23	Water heat exchanger unit interlock error (when the water heat exchanger unit is connected)
P26	Clutch connection error
P31	Group control error
	(Others)
H07	Compressor oil depletion error (only detected with W MULTI)
H08	Oil level sensor error (only detected with W MULTI)
P30	Group sub unit error (error detected with the system controller)
P31	Group control error
oiL	Oil change time (level) alarm
GE	Backup operating display without power generation when an error occurs with the converter (only detected with HP)

Note: Depending on the model, some items are not displayed.

③ Oil Change Time Display: No. 02 (Level 0) < n o 0 2. >
This function displays the oil change time.
Key operations are used to perform the oil change time clear setting.

1) Oil change time display (Level 0)
This display indicates the current oil change time.
Example: o 1 2 3 4 (Example: 1,234 hours)

2) Oil setting selection operations (Level 1)
Press the SET key when the oil change time is displayed to display the following.
The use of the DOWN and UP keys at this time enable the oil change time clear setting to the selected.

	Display	Function
↑Down ↓Up	o 1 2 3 4	Oil change time display / clear setting.
	o 1 L A d d	Forced oil refill setting.

3) Oil change time display and clear setting (Level 1)
Hold down the SET key for one or more seconds while the oil change time display and clear setting is selected, and the display changes to the following.

o 1 2 3 4 – holding down the SET key for one or more seconds → C L r
When C L r display appears, release the SET key momentarily, then quickly press and hold down the SET key again.
When the following display appears, the oil change hours are set to 0.
C L r – quickly press and hold down the SET key again for one or more seconds → E n d
After E n d display is shown for one second, the oil change hours display appears.
o 0 (0 hours)
When the oil change hours are not set to 0, repeat the same process.

4) Forced oil refill setting (Level 1)
Operating method: Hold down the SET key for one second while the forced oil refill setting is selected.
(TEST/WARNING LED light)
Releasing method: Hold down the SET key for one second in forced oil refill setting mode.
(TEST/WARNING LED off)
Or when 30 minutes has elapsed since the refill started.
Operation: Driving the oil pump.
The forced setting in progress display appears during the forced oil refill. (TEST/WARNING LED light)

④ Model Type Display: No. 03 (Level 0) < n o 0 3 >

This function is used to display the outdoor unit model type.
It may also be used for the double-speed setting (fast-forwarding the forced 3-minute off timer).
Operating the UP (SW005) and DOWN (SW006) keys causes the menu to change.

1) Model type display (Level 0)
Outdoor unit model types are displayed in the following way.

	Display
Not set	- - - - - -
45.0kW models	4 5 0 3
56.0kW models	5 6 0 3
71.0kW models	7 1 0 3
85.0kW models	8 5 0 3

2) Double-speed setting (Level 0)

Operating method : Pressing the SET (SW007) key for one second in the model type display mode moves to the double-speed setting display. (TEST/WARNING LED light)

Releasing method : Press the SET (SW007) key for one second in the double-speed setting mode. (TEST/WARNING LED off)

Operation : The 3-minute off time timer counts at 10 times or greater speed than normal. The forced setting in progress display appears during the double-speed setting. (TEST/WARNING LED light)

⑤ Test Run and Outdoor Unit Forced Settings: No. 4 (Level 0) < n o 0 4 >
Key operation is used to determine the settings for forced test run, forced bypass valve closing, forced water circuit and forced valve opening.

1) Test run and forced setting display (Level 0)
Displays of the test run and forced settings selected with the menu.
t E S t

2) Forced setting selection operation (Level 1)
Pressing the SET (SW007) key in the test run/forced setting display mode causes the following display to appear.
Operating the UP (SW005) and DOWN (SW006) keys in this mode makes it possible to select the settings for forced cooling test run, forced heating test run, forced valve opening, forced water circuit, forced bypass valve closing, forced engine distributor mode, forced engine feedback, and forced engine adjustment valve closing.

	Display	Function
↑Down ↓Up	C o o L	Forced cooling test run setting
	H E A t	Forced heating test run setting
	U o P E n	Forced valve opening setting
	P u n P	Forced water circuit setting
	U C L o S E	Forced bypass valve closing
	S A ir	Coolant air purging mode
	E S P A r	Forced engine distributor mode
	E F E E d	Forced engine feedback
	E C L o S E	Forced engine adjustment valve closing
	o u t d E F	Forced defrosting operation setting (not possible with W MULTI or 3WAY)
	d is P S	Pressure sensor ignored
	G A S o F F	Forced gas solenoid valve closing
	S t r o n	Forced cranking mode

3) Forced cooling test run setting (Level 2)
Display : C o o L
Rejection conditions : Heating test run in progress, valve open, all stop operation in progress, automatic addressing in progress, indoor unit operation in progress.
Operating method : Press the SET (SW007) key for one second while forced cooling test run is not in progress. (TEST/WARNING LED light)
Operation details : Cooling test run is activated.
Forced setting in progress display (TEST/WARNING LED light) is shown during this time.
Releasing method : Press the SET (SW007) key for one second during forced cooling test run.
The forced-setting used in forced cooling test run will be canceled at this time.
(TEST/WARNING LED off)

4) Forced heating test run setting (Level 2)
Display : H E A t
Rejection conditions : Cooling test run underway, valve open, all stop operation in progress, automatic addressing in progress, indoor unit operation in progress.
Operating method : Press the SET (SW007) key for one second while forced heating test run is not set.
(TEST/WARNING LED light)
Operation details : Forced setting in progress display (TEST/WARNING LED light) is shown during this time.
Releasing method : Push the SET (SW007) key for 1 second during forced cooling heating operation.
The forced setting used in forced heating test run will be canceled at this time.
(TEST/WARNING LED off)

5) Force valve opening setting (Level 2)... Used for evacuation, etc.

Display : U oPEn

Rejection conditions : Forced cooling test run in progress, forced heating test run in progress, bypass valve being closed

Operating method : Press the SET (SW007) key for one second while forced valve opening is not set. (TEST/WARNING LED light)

Operation details : Indoor unit electric valve, outdoor unit electric valve 1, outdoor unit electric valve 2, liquid valve and bypass valve fully open.
Forced setting in progress display (TEST/WARNING LED light) is shown during this time.

Releasing method : Press the SET (SW007) key for one second in forced valve open setting mode.
The forced setting in progress display will be canceled at this time, returning to forced setting select operation. (TEST/WARNING LED off)

6) Force water circuit setting (Level 2)... Used for cooling water system air discharging, etc.

Display : PumP

Rejection conditions : None

Operating method : Press the SET (SW007) key for one second when the forced water circuit is not set. (TEST/WARNING LED light)

Operation details : Coolant pump operating.
The coolant electric 3-way valve repeats a cycle of 50 steps for 3 minutes and then 1950 steps for 1 minute and 16 seconds.
The hot water electric 3-way valve repeats a cycle of 1950 steps for 30 seconds, 50 steps for 3 minutes, and 1950 steps for 46 seconds.
Forced setting in progress display (TEST/WARNING LED light) is shown during this time.

Releasing method : Press the SET (SW007) key for one second in forced water circuit mode.
The forced setting in progress display will be canceled at this time, returning to forced setting select operation. (TEST/WARNING LED off)

7) Forced bypass valve closing setting (Level 2) ...Used for pump down, etc.

Display : UCLoSE

Rejection conditions : Valve is open.

Operating method : Press the SET key for one second without forced bypass valve closing being set. (The TEST/WARNING LED will be illuminated.)

Operation details : Fully close the bypass valve. Perform the necessary operations on the liquid valve, the indoor and indoor units' expansion valves, and the outdoor unit's fan pump down.
The forced setting in progress message will be displayed during this (the TEST/WARNING LED will be illuminated.)

Release method : Press the SET key for one second while the forced bypass valve is closed.
The forced setting in progress message will be cleared (the TEST/WARNING LED will be extinguished) and the display will return to the forced setting selection operation.

8) Coolant air discharge mode (level 2)... Used for coolant air discharge.

* Be sure to set up the air discharge tool. If the air discharge is not enough, perform this control operation again and then check to make sure the air has been discharged.

Display : S AIr

Rejection conditions : Test run in progress, automatic addressing in progress, stopping due to abnormality

Operating method : When the coolant air discharge mode is not set, press the SET (SW007) key for one second. (TEST/WARNING LED light)

Operation details : Operate the coolant pump, coolant 3-way electric valve, and hot water 3-way electric valve to discharge air.

* During operation in air discharge mode, coolant pump, coolant 3-way electric valve, and hot water 3-way electric valve are controlled automatically to discharge air.

Forced setting in progress display (TEST/WARNING LED light) is shown during this time.

Releasing method : Automatic operation is canceled.
The forced setting in progress display will be canceled. (TEST/WARNING LED off)

9) Forced engine distributor mode (Level 2) ... Used when fixing ignition timing.
   Display : E 5PAr
   Rejection conditions : None
   Operating method : Press the SET (SW007) key for one second while forced engine distributor mode is not set. (TEST/WARNING LED light)
   Operation details : Activates forced engine distributor mode.
   Forced setting in progress display (TEST/WARNING LED light) is shown during this time.
   Releasing method : Press the SET (SW007) key for one second while in forced engine distributor mode.
   The forced setting in progress display will be canceled at this time, returning to forced setting select operation. (TEST/WARNING LED off)

10) Forced engine feedback (Level 2)
   Display : E FEEd
   Rejection conditions : None
   Operating method : Press the SET (SW007) key for one second while forced engine feedback is not set. (TEST/WARNING LED light)
   Operation details : Activates feedback control.
   Forced setting in progress display (TEST/WARNING LED light) is shown during this time.
   Releasing method : Press the SET (SW007) key for one second during forced engine feedback.
   The forced setting in progress display will be canceled at this time, returning to forced setting select operation. (TEST/WARNING LED off)

11) Forced engine adjustment valve position (Level 2)
   Display : ECLo5E
   Rejection conditions : Indoor unit operation in progress.
   Operating method : Press the SET (SW007) key for one second while the forced engine adjustment valve closing is not set. (TEST/WARNING LED light)
   Operation details : Set fuel gas adjustment valve at full closing position.
   Forced setting in progress display (TEST/WARNING LED light) is shown during this time.
   Releasing method : Press the SET (SW007) key for one second when forced engine adjustment valve is being closed.
   Forced setting in progress display is canceled (TEST/WARNING LED off) and forced setting selection operation returns. (After positioning, forced engine adjustment valve closing position is canceled automatically.)

12) Forced defrosting operation setting (Level 2)... Used when frost builds up on the outdoor unit's heat exchanger when in the heating mode.
* Cannot be set with W MULTI and 3WAY.
* This setting applies a load to the equipment, and it must not be set if no frost has built up on the outdoor unit's heat exchanger.
* Defrosting operations perform the enforced cooling cycle (even when the indoor unit is in the heating mode.) It is therefore necessary to be the permission of the customer before making this setting.

Display : o u t d E F
Rejection conditions : Operations are paused when defrosting operations are in progress (with the exception of the forced defrosting operations.)
Operating method : Press the SET key for one second without forced defrosting operations being set. (The TEST/WARNING LED will be illuminated.)
If the operation signals are not issued by the indoor unit, perform operations with the test run setting or the remote controller, etc. (This is possible in both the cooling and heating modes.)
Operation details : If the engine is operating when the enforced setting is made, operations will be temporarily paused.
The cooling cycle defrosting operations will be performed for ten minutes. However, if operation signals are not issued by the indoor unit, the equipment will go into standby mode without operating.
The forced setting in progress message will be displayed during this (the TEST/WARNING LED will be illuminated.)
Release method : Press the SET key for one second while the forced defrosting operations are set.
The forced setting in progress message will be cleared (the TEST/WARNING LED will be extinguished) and the display will return to the forced setting selection operation.
The setting will be cleared automatically once the defrosting operations have been performed for 10 minutes and when 20 minutes has elapsed since the defrosting settings was made (including the standby time.)

13) Pressure sensor ignored (Level 2)
Display : d . S P S
Rejection conditions : None
Operating method : Press the SET key for one second. (The TEST/WARNING LED will be illuminated.)
Operation details : Fix the value of the pressure sensor.
The forced setting in progress message will be displayed during this (the TEST/WARNING LED will be illuminated.)
Release method : Press the SET key for one second with the pressure sensor being ignored.
The forced setting in progress message will be cleared (the TEST/WARNING LED will be extinguished) and the display will return to the forced setting selection operation.

14) Forced fuel gas solenoid valve closing (Level 2)
Display : G A S o F F
Rejection conditions : None
Operating method : Press the SET (SW007) key for one second when forced fuel gas electric valve closing is not being set. (TEST/WARNING LED light)
Operation details : Fuel gas electric valve1 is blocked.
Forced setting in progress display (TEST/WARNING LED light) is shown during this time.
Releasing method : Press the SET (SW007) key for one second or more when forced fuel gas electric valve closing is being set.
The forced setting in progress display will be canceled at this time, returning to forced setting select operation. (TEST/WARNING LED off)

15) Forced cranking mode (Level 2)... Used when measuring engine compression.

Display : 5tr on

Rejection conditions : During total stop.

Operation method : Press the SET key for one second without the forced cranking mode being set. (The TEST/WARNING LED will be illuminated.)

Operation details : Operations will be halted automatically when the engine is operating.
Uses the DOWN and UP keys to implement cranking after the engine has been halted.
The engine's maximum revolution speed will be displayed on the 7-segment LED between the start and end of cranking.
Cranking can be performed as many times as required with the DOWN and UP keys.
The forced setting in progress message will be displayed during this (the TEST/WARNING LED will be illuminated.)

* Only cranking will be performed in this mode. Engine operations will not be performed.

Release method : Press the SET key for one second while the forced cranking mode is set.
The forced setting in progress message will be cleared (the TEST/WARNING LED will be extinguished) and the display will return to the forced setting selection operation.

* The HOME key cannot be used in the forced cranking mode. The display will also not return to the normal display if no key operations are performed for 10 minutes. Clear the forced setting and then press the HOME key to return to the normal display.

<Outline of Usage Methods>

① Press the SET key for one second when 5tr on is displayed.
0 will be displayed and the TEST/WARNING LED (red) will be illuminated.
Engine operations will be halted automatically if they are in progress.

② Check to make sure the engine has stopped and then press either the DOWN or UP keys.
(However, the keys cannot be pressed while the 7-segment LED is blinking.)

③ Cranking will start 3 seconds later and last for 5 seconds.

④ The engine's maximum revolution count will be displayed during cranking.
Display example: 275 (Maximum revolution count during cranking: 275min^{-1})

⑤ Repeat from step ② to perform cranking once again.
In this event, the revolutions displayed in step ④ will be reset to before cranking at 0.

⑥ Press the SET key for one second to end the process.
5tr on will be displayed and the TEST/WARNING LED (red) will be extinguished.
(This clears the forced cranking mode. The display will return to the normal display if left in this state with no key operations for 10 minutes, and when the HOME key is pressed for one second.)

⑥ Outdoor Unit Setting: No. 5 (Level 0) < n o 0 5 >
Key operation is used to perform the outdoor unit setting.

1) Outdoor unit setting display (Level 0)
Displays selection of outdoor unit setting mode at the menu.
S E t o u t

2) Outdoor unit setting item select operation (Level 1)
Pressing the SET (SW007) key while in the outdoor unit setting display mode activates the following display.
Example : 1 1 2 3 4 (Example: Data code 1, engine operation time 1234 hours)
Pressing the UP (SW005) and DOWN (SW006) keys in this mode makes it possible to select the date code.

3) Outdoor unit setting operation (Level 2)

Setting start operation method	:	Press the SET (SW007) key for one second in the setting data code select mode. This activates the forced setting in progress display. (TEST/WARNING LED light)
Setting change operation method	:	After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys make it possible to change the setting details of the selected setting categories.
Setting confirm operation method	:	After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. This cancels the forced setting in progress display, making it possible to once again enter the outdoor unit setting item selection operation mode. (TEST/WARNING LED off)
Setting cancel operation method	:	Press the HOME (SW004) key for one second before confirming setting. This returns operation to normal. (TEST/WARNING LED off)

The setting details will not change when pressing the HOME (SW004) key for 1 second during outdoor unit setting item select operation

4) Outdoor Unit Setting List

	Data code	Data	Data code	Data
	00		70	
	~		71	
	3F		72	
	40		73	
	41		74	
	42	Minimum set revolution speed	75	
	43	Maximum set revolution speed	76	
	44	Oil change time display switch	77	Mixer offset
			78	
			79	
			7A	
			7B	
	45		7C	
	46	Automatic cooling/heating mode	7D	
	47		7E	
	48		7F	Engine linked operation time setting
	49		80	
	4A		81	
	4B		82	
	4C		83	
	4D		84	Reference system
	4E		85	Cooler/heater auto-control
	4F		86	Revolution speed differential reference
	50	α1 (Cooling high-pressure offset)	87	
↑Down	51	α2 (Heating high-pressure offset)	88	Ignition time offset
	52	α3 (Cooling low-pressure offset)	89	
	53	α4 (Heating low-pressure offset)	8A	
	54	α5 (Cooling low-pressure offset 2)	8B	
	55	α6 (Heating low-pressure offset 2)	8C	
	56	Fuel adjustment valve offset	8D	
	57	Silent	8E	
			8F	
			90	
			91	
			92	
			93	
Up↓	58	Silent start	94	
	59	Silent end	95	
	5A		96	
	5B	Anti-freezing temperature	97	Indoor unit solenoid valve open/close
	5C	Throttle offset	98	Indoor unit drain pump on/off
	5D	Outdoor unit solenoid valve heater thermostat on initial opening	99	Catalyst temperature sensor existence
	5E		9A	
	5F		9B	
	60	Thermostat off diff	9C	
	61	Thermostat on diff	9D	
	62	Cooling/heating switch diff	9E	
	63	GUF thermostat off diff	9F	
	64	GUF thermostat on diff		
	65	GUF cooling/heating switch diff		
	66	Outdoor unit solenoid valve heater operation lowest opening		
	67			
	68			
	69			
	6A			
	6B			
	6C			
	6D			
	6E			
	6F	Anti-freezing timer		

(The default value is the reference value. Subject to amendment without prior notice.)

	Data code	Data	Data code	Data
↑Up ↓Down	A0		D0	
	A1		D1	
	A2	Energy-saving mode setting *	D2	
	A3		D3	
	A4		D4	
	A5		D5	
	A6		D6	
	A7	Refrigerant shut-off value (optional) existence	D7	
	A8	W MULTI oil collection control setting	D8	
	A9		D9	
	AA		DA	
	AB		DB	
	AC		DC	
	AD		DD	
	AE		DE	
	AF		DF	
	B0		E0	
	B1		E1	
	B2		E2	
	B3		E3	
	B4		E4	
	B5		E5	
	B6		E6	
	B7		E7	
	B8	Fan output when snowfall sensor input is “yes”	E8	
	B9		E9	
	BA		EA	
	BB		EB	
	BC		EC	
	BD		ED	
	BE		EE	
	BF	Gas demand flow volume rated value	EF	
	C0		F0	
	C1		F1	
	C2		F2	
	C3		F3	
	C4		F4	
	C5		F5	
	C6		F6	
	C7	Outdoor unit sequential startup within the system	F7	
	C8		F8	
	C9		F9	
	CA		FA	
	CB		FB	
	CC		FC	
	CD		FD	
	CE		FE	
	CF		FF	

(The default value is the reference value. Subject to amendment without prior notice.)

5) Energy-saving mode setting (Energy-saving mode dose not function on 3WAY MULTI units.)
Data code A2
Use the remote controller to turn the energy-saving mode on or off. Settings described here will be effective only when the energy-saving mode is selected on the remote controller.

●: Effective

Setting value	Engine rotational speed restriction	Discharge temperature prioritizing	Target discharge temperature shift		Energy saving clutch control	
			2°C	1°C	Cooling	Heating
0	●	–	–	–	–	–
1	●	●	–	–	–	–
2	●	–	●	–	–	–
3	●	●	●	–	–	–
4	●	–	–	●	–	–
5	●	●	–	●	–	–
6	●	–	●	●	–	–
7	●	●	●	●	–	–
8	●	–	–	–	●	–
9	●	●	–	–	●	–
10	●	–	●	–	●	–
11	●	●	●	–	●	–
12	●	–	–	●	●	–
13	●	●	–	●	●	–
14	●	–	●	●	●	–
15	●	●	●	●	●	–
16	●	–	–	–	–	●
17	●	●	–	–	–	●
18	●	–	●	–	–	●
19	●	●	●	–	–	●
20	●	–	–	●	–	●
21	●	●	–	●	–	●
22	●	–	●	●	–	●
23	●	●	●	●	–	●
24	●	–	–	–	●	●
25	●	●	–	–	●	●
26	●	–	●	–	●	●
27	●	●	●	–	●	●
28	●	–	–	●	●	●
29	●	●	–	●	●	●
30	●	–	●	●	●	●
31	●	●	●	●	●	●

- Descriptions of the setting items
  a) Engine rotational speed restriction (the basic function of energy-saving mode)
  This function is always in effect when the energy-saving mode is selected on the remote controller. Although restriction of maximum engine speed reduces the performance by 10 to 15%, it is possible to operate at higher efficiency.
  b) Discharge temperature prioritizing (an optional setting of energy-saving mode)
  A GHP system is designed to operate so that the indoor discharge temperature decreases in cooling mode or increases in heating mode as much as possible. As the room temperature nears the setting on the remote controller, the engine speed is decreased so that the discharge temperature nears the target value (usually 12°C in cooling mode, and 45°C in heating mode). With this function selected, the engine speed is controlled so that the discharge temperature nears the target value even when the difference between the room temperature and the set temperature is rather great. Basically, this function produces a higher energy saving efficiency in locations where the temperature will not easily near the set value on the remote controller such as high-traffic rooms or open spaces.

c) Target discharge temperature shift (2°C/1°C) (an optional setting of energy-saving mode)
This function shifts the target discharge temperature by 2°C or 1°C (3°C when both are selected). For example, when the setting (2°C) for target discharge temperature shift is selected, the actual target discharge temperature will be 12+2=14°C in cooling mode and 45-2=43°C in heating mode (both in the direction of performance restriction).
Combination of this function with the function 2 above is expected to give even a higher energy saving efficiency, but attention must be paid because the starting performance decreases.

d) Energy saving clutch control (cooling/heating) (an optional setting of energy-saving mode)
This function puts the compressor clutch switching control into energy-saving mode, improving operation efficiency. However, care needs to be used because the degree of comfort may decrease due to fluctuations of the indoor discharge temperature depending on the situation, such as when there are substantial fluctuations of indoor air conditioning load.
The effect of energy saving is none in the following case.
- When indoor air conditioning load is extremely large or extremely small.

6) W MULTI oil recovery control setting
Data code A8
Details of heating startup oil recovery setting

●: Effective

Setting value	Without 4-way valve reversal control for heating oil recovery	Without expansion valve opening control for heating oil recovery	Without heating reverse cycle oil recovery control	Without oil recovery control between cooling systems
0	–	–	–	–
1	●	–	–	–
2	–	●	–	–
3	●	●	–	–
4	–	–	●	–
5	●	–	●	–
6	–	●	●	–
7	●	●	●	–
8	–	–	–	●
9	●	–	–	●
10	–	●	–	●
11	●	●	–	●
12	–	–	●	●
13	●	–	●	●
14	–	●	●	●
15	●	●	●	●

7) Gas demand control
a) Setting method
Make this setting on the outdoor unit's main board.

Setting location	No. 5 "Outdoor Unit Setting" BF
Initial value (factory default setting)	'20' (gas demand control function disabled)
Available setting range	-10 to 20
Meanings of setting values	Control value for rated gas flow rate for heating (in steps of 5%) Ex.) To restrict to 110% of rated value: setting value = '2' To restrict to 100% of rated value: setting value = '0' To restrict 95% of rated value: setting value = '-1' To disable the gas demand function: setting value = '20'
Recommended setting value	2 or greater (110% of rating for heating or greater) * However, note that when 10 or greater (150% of rating for heating or greater) is set, the gas demand function does not work except under very rare conditions. (This is because the restriction is too loose.)

b) Adjustment method

- Basically, set the percentage of the rated flow rate to which to restrict the actual flow rate depending on the fuel piping.
- The “rated flow rate” mentioned here means the rated flow rate under the “standard heating condition” indicated in the catalog or the like. The value differs depending on the model and the gas type.
- For example, 100% performance cannot be attained under the low-temperature heating condition even when “restriction to 100% of the rating” is set by the gas demand control function. This is because the flow rate under the low-temperature heating condition is greater than the flow rate under the standard heating condition. In many cases the heating effect is insufficent, though the degree of insufficiency differs depending on the number of indoor units to be operated.
- The gas demand control function compares the gas flow rate estimated from the number of revolutions of engine, degree of opening of liquid valve, etc. with the flow rate restriction value set on the outdoor unit’s main board, and controls the outdoor unit performance so that the estimated flow rate does not exceed the restriction value. However, adjustment is necessary after the setting is made because there is an error of about ±10% between the estimated flow rate and actual flow rate around the rated flow rate.
- Although the available setting range for restriction value is from -50% to +195% of the rating, these values are based on the flow rate under rated condition, and care must be used in regard of restriction on the minus side because air conditioning performance may substantially degrade depending on overload condition or low-temperature condition.
- This function has a direct effect on air conditioning performance, so it is strongly recommended that the restriction value be determined after thorough discussion with the customer.

⑦ Indoor Unit Setting: No. 6 (Level 0) < n o 0 6 >

Key operation is used for indoor unit settings (operation impossible when connecting the water heat exchanger).

1) Indoor unit setting display (Level 0)
   Shows menu selected indoor unit status display.
   S E t , n

2) Outdoor unit setting item select operation (Level 1)
   Pressing the SET (SW007) key in the indoor unit setting display mode activates the following display. (Occurs only upon completion of initial communication)
   Example : 1 1 1 (Example: Indoor No. 1 unit, data code 1, with gas tube valve)
   Operating the UP (SW005) and DOWN (SW006) keys in this mode makes it possible to select setting categories.
   Pressing the HOME (SW004) key or conducting no operations for 10 minutes activates a return to the HOME display.

3) Outdoor unit setting operation (Level 2)
   Setting start operation method : Press the SET (SW007) key for one second in the setting data code select mode.
   This activates the forced setting in progress display. (TEST/WARNING LED light)
   Setting change operation method : After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys make it possible to change the setting details of the selected setting categories.
   Setting confirm operation method : After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. This cancels the forced setting in progress display, returning to indoor unit setting item select operation. (TEST/WARNING LED off)
   Setting cancel operation method : "Pushing the HOME (SW004) key for 1 second before setting confirm operation returns operation to normal."
   (Setting details will not be cancelled when pushing the HOME (SW004) key for more than 1 second during indoor unit setting item select operation.)

4) Indoor unit setting list

	Data code	Data	Remarks
↓Down	1	Indoor unit setting 1 (indoor unit 1)	0/1 (Gas tube valve present/absent)
	2	Indoor unit setting 2	0= Lowest priority to 4= Highest priority
	3	Indoor unit setting 3	0/1 (Normal/Drain pump intermittent control)
	4	Indoor unit setting 4	0/1 (Normal/Drain pump continuous control)
	5	Indoor unit setting 5	0/1 (Normal/No cool air prevention control with heater thermostat-off)
	6	Indoor unit setting 6	0/1 (Normal/No air speed control with heater thermostat-off)
	7	Indoor unit setting 7	0/1 (Normal/No heater high-pressure avoidance control)
	8	Indoor unit setting 8	0/1 (Normal/Heater stop indoor frost prevention control)
	9	Indoor unit setting 9	0/1 (Normal/No refrigerant discharge control with heater thermostat-off)
	A	Indoor unit setting A	0/1 (Normal/Air speed lower limit with heater thermostat-on LL)
	B	Indoor unit setting B	0 to 8 (Cooling indoor fan odor compensation)
	C	Indoor unit setting C	0/1 (Normal/Air speed select when dry thermostat off LL ↔ stop)
	D	Indoor unit setting D	0 to 120 (Heating thermostat on upper limit:0,4,…480step)
	E	Indoor unit setting E	0 to 120 (Heating thermostat on lower limit:0,4,…480step)
	F	Indoor unit setting F	0 to 120 (Initial heating discharge:0,4,…480step)
	G	Indoor unit setting G	0 to 120 (Initial cooling thermostat on:0,4,…480step)
	H	Indoor unit setting H	0 to 120 (Heating high pressure avoidance:0,4,…480step)
	I	Indoor unit setting I	0 to 120 (Cooling thermostat on lower limit:0,4,…480step)
	J	Indoor unit setting J	0 to 120 (Heating thermostat off:0,4,…480step)
	K	Indoor unit setting K	0 to 120 (Cooling thermostat off oil recovery:0,4,…480step)
	L	Indoor unit setting L	-35 to 92 (Cooling discharge temperature:0= depending on model type, -35 to 92°C)
↑Up	N	Indoor unit setting N	-35 to 92 (Heating discharge temperature:0= depending on model type, -35 to 92°C)

⑧ Forced engine rpm setting No. 08 (Level 0) < n o 0 8 >
Forced setting of setting engine rpm is possible.

1) Forced engine rpm setting display (Level 0)
Displays selection of the forced engine rpm setting at the menu.
S E t r P n

2) forced engine rpm setting (Level 1)
Pressing the SET (SW007) key in the forced engine rpm setting display mode activates the following display cycle, which is repeated at 1-second intervals.
1 0. 1 4 0 0 (Example: forced engine rpm= 1400min^{-1})
1 1. 1 4 0 0 (Example: Engine rpm= 1400min^{-1})
1 2. 0. 5 6 (Example: Compressor inlet pressure=0.56MPa)
1 3. 2. 7 0 (Example: Compressor outlet pressure= 2.70MPa)
1 5. 8 5. 0 (Example: Compressor outlet temperature = 85.0°C)

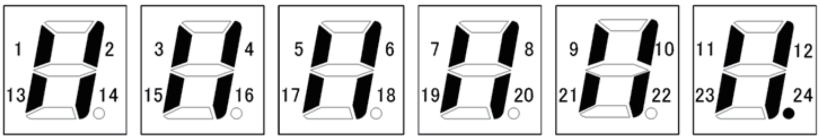
3) Forced engine rpm setting operation (Level 2)
Start operation method : Press the SET (SW007) key for one second when forced engine rpm has not been set. This will fix the set engine rpm at the forced engine rpm. The forced setting in progress display appears during this time. (TEST/WARNING LED light)
Change operation method : Operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values.
End operation method : Press the SET (SW007) key for one second when the forced engine rpm is set. This cancels the forced setting in progress display, returning to forced setting select operation. (TEST/WARNING LED off)

4) Other
Setting range : From the lowest to the highest rpm in that machine's control status, measured in 100 rpm units.
Clutch : Moves to clutch engaged rpm during clutch work, conducting clutch engaged operation.
Rotation restriction : To protect the compressor, if the compressor inlet pressure is below 0.05MPa, setting rotation's upper limit is set to 1400min^{-1}.

⑨ Indoor Unit Status Display: No. 9 (Level 0) < n o 0 9. >
Displays of connected indoor unit status.
Also possible to activate forced thermostat-off settings for specific indoor units.

1) Indoor unit status display (Level 0)
Shows menu selected indoor unit status display.
i n   S t S

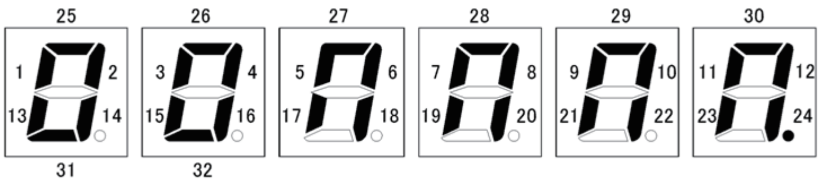
2) Indoor unit thermostat status display (Level 1)
In the indoor unit display mode, pressing the SET (SW007) key displays the indoor unit thermostat status.



(Example: No. 1 - 24 units connected) Note: 1 dot at lower right

Lit : Thermostat on unit
Flashing : ● 1-sec. cycle flashing indicates thermostat-off unit numbers
● 0.5-sec. cycle flashing indicates forced thermostat-off status unit numbers

Display examples
No. 1 to 32 units connected

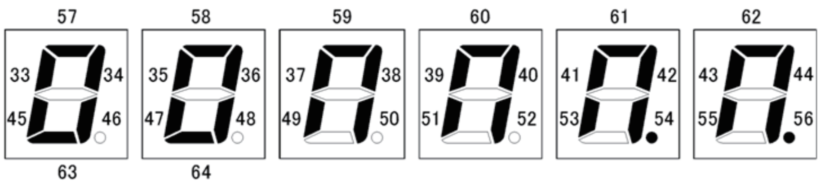


Note: 1 dot at lower right

1 to 12 units from upper left to upper right of vertical line
13 to 24 units from lower left to lower right of vertical line
25 to 30 units from top left to top right of horizontal line
31 units, 32 units from bottom left horizontal line

Operate the UP (SW005) and DOWN (SW006) keys.

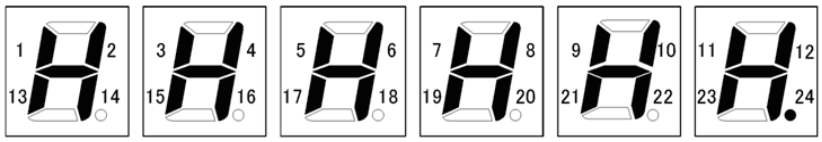
No. 33 to 64 units connected



Note: 2 dots at lower right

33 to 44 units from upper left to upper right of vertical line
45 to 56 units from lower left to lower right of vertical line
57 to 62 units from top left to top right of horizontal line.
63 unit, 64 unit from bottom left to bottom right of horizontal line.

3) Indoor unit forced thermostat off setting (Level 2)
Press the SET (SW007) key during indoor unit thermostat status display.

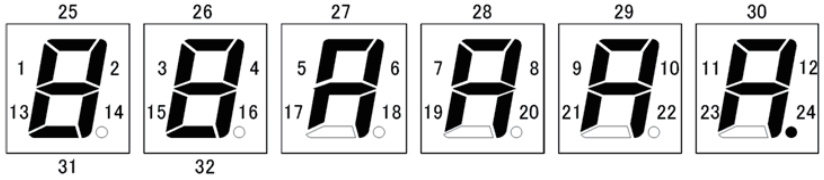


(Example: No. 1 - 24 units connected) Note: 1 dot at lower right

Lit : Normal status unit
Flashing : ● 1-sec. cycle flashing indicates thermostat-off unit numbers
● 0.5-sec. cycle flashing indicates forced thermostat-off status unit numbers
● High speed flashing indicates selected unit to perform setting

Setting unit
Forced thermostat-off setting method : Press the SET (SW007) key for one second when forced thermostat-off is not set. (TEST/WARNING LED light)
Forced thermostat-off release method : Press the SET (SW007) key for one second when forced thermostat-off is set. (TEST/WARNING LED off)

Display examples
No. 1 to 32 units connected

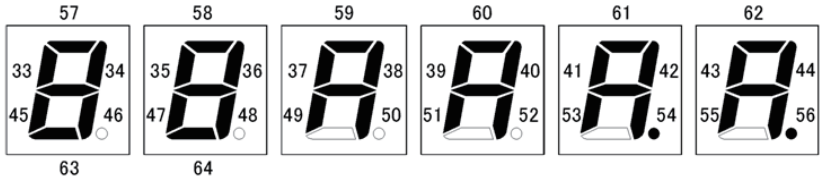


Note: 1 dot at lower right

1 to 12 units from upper left to upper right of vertical line
13 to 24 units from lower left to lower right of vertical line
25 to 30 units from top left to top right of horizontal line
31 units, 32 units from bottom left horizontal line

Operate the UP (SW005) and DOWN (SW006) keys.
If the number exceeds 32 units, automatically No. 33 to 48 units are displayed.

No. 33 to 64 units connected



Note: 2 dots at lower right

33 to 44 units from upper left to upper right of vertical line
45 to 56 units from lower left to lower right of vertical line
57 to 62 units from top left to top right of horizontal line.
63 unit, 64 unit from bottom left to bottom right of horizontal line.

Note: The example above displays up to 48 units, but the number of indoor units that can be connected is restricted separately by each model.

⑩ Initial Setting: No. 10 (Level 0) < n o 1 0 >
Key operation is used to perform the initial setting.
Initial setting details are as follows.

1) Initial setting display (Level 0)
Displays selection of the initial setting at the menu.
F , r S t

2) Initial setting item select operation (Level 1)
Pressing the SET (SW007) key in the initial setting display mode activates the following display.
Example: o u t 1 (Example: With system address 1)
Operating the UP (SW005) and DOWN (SW006) keys in this mode makes it possible to select the settings for system address, outdoor unit address, number of outdoor unit connected, number of indoor unit connected, format, gas type, old refrigerant indoor unit compliance, engine, heating automatic address, and cooling automatic address.

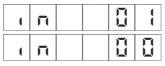
	Display	Function
↑Down ↓Up	o u t 0 1	System address setting
	S u b 0 0	Outdoor unit address setting (W MULTI only)
	o n 0 1	Number of outdoor units connected setting (W MULTI only)
	, n 0 1	Number of indoor units connected setting
	7 1 0 1	Outdoor unit model displays
	G A S 0 2	Gas type setting
	r E F 0 1	Refrigerant setting (must not be amended) *1
	G E n 0 1	Generator setting (must not be amended) *1
	L - C 0 0	Model setting 1 (must not be amended) *1
	2 - 3 0 0	Model setting 2 (must not be amended) *1
	F o r 0 1	Destination setting 1 (must not be amended) *1
	o Y u 0 0	Hot water setting
	o , L 0 0	Oil change time display setting
	S o u 0 0	Single-phase setting
	P , P E	Tube connection confirmation (W MULTI only)
	H A d d 0	Heater auto-address setting
	C A d d 0	Cooler auto-address setting

*1 Settings r E F, G E n, L - C, 2 - 3 and F o r are set at the time of shipment and must not be amended as a basic principle. If the values differ after replacing the non-volatile memory or clearing the memory, etc., reset the values to those listed above.

3) System address setting (Level 2)

Rejection conditions	:	Not accepted during indoor operation
Setting start operation method	:	Press the SET (SW007) key for one second.
Setting change operation method	:	After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values. (TEST/WARNING LED light)
Example: 	:	When pressing the UP (SW005) key
	:	When pressing the DOWN (SW006) key
Setting confirm operation method	:	After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. (TEST/ WARNING LED off)
Setting cancel operation method	:	Press the HOME (SW004) key for one second before confirming setting.
Setting range	:	01 to 31

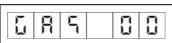
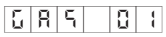
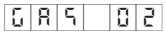
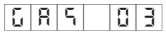
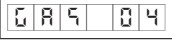
4) Number of connecting indoor units setting (Level 2)

Rejection conditions	:	Not accepted during indoor operation
Setting start operation method	:	Press the SET (SW007) key for one second.
Setting change operation method	:	After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values. (TEST/WARNING LED light)
Example: 	:	When pressing the UP (SW005) key
	:	When pressing the DOWN (SW006) key
Setting confirm operation method	:	After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. (TEST/ WARNING LED off)
Setting cancel operation method	:	Press the HOME (SW004) key for one second before confirming setting.
Setting range	:	00 Not set 01 to 48 Number of indoor unit connected in same system 1 to 48 units*

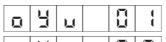
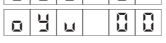
(*)The number of indoor units that can be connected is restricted separately by each model.

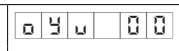
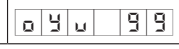
5) Gas type setting (Level 2)

Rejection conditions	:	Not accepted during indoor operation
Setting start operation method	:	Press the SET (SW007) key for one second.
Setting change operation method	:	After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values. (TEST/WARNING LED light)
Example: 	:	When pressing the UP (SW005) key
	:	When pressing the DOWN (SW006) key
Setting confirm operation method	:	After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. (TEST/ WARNING LED off)
Setting cancel operation method	:	Press the HOME (SW004) key for one second before confirming setting.
Setting range	:	00 to 0F

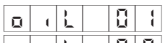
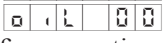
0	Propane G31	
1	—	
2	Natural gas G20	
3	Natural gas G25	
4	—	

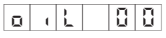
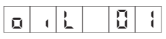
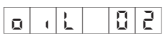
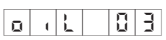
6) Hot water setting (Level 2)

Rejection conditions : Not accepted during indoor operation
Setting start operation method : Press the SET (SW007) key for one second.
Setting change operation method : After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values. (TEST/WARNING LED light)
Example:  : When pressing the UP (SW005) key
 : When pressing the DOWN (SW006) key
Setting confirm operation method : After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. (TEST/WARNING LED off)
Setting cancel operation method : Press the HOME (SW004) key for one second before confirming setting.
Setting range : 00 to 99

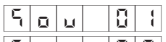
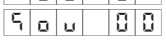
0	No discharge	
1	Hot water discharge thermostat off temperature	
~	to	~
99	•	

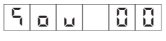
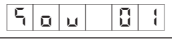
7) Oil change display setting (Level 2)

Rejection conditions : Not accepted during indoor operation
Setting start operation method : Press the SET (SW007) key for one second.
Setting change operation method : After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values. (TEST/WARNING LED light)
Example:  : When pressing the UP (SW005) key
 : When pressing the DOWN (SW006) key
Setting confirm operation method : After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. (TEST/WARNING LED off)
Setting cancel operation method : Press the HOME (SW004) key for one second before confirming setting.
Setting range : 00 to 03

0	Inspection and error	
1	None	
2	Error only	
3	Inspection only	

8) Single phase setting (Level 2)

Rejection conditions : Not accepted during indoor operation
Setting start operation method : Press the SET (SW007) key for one second.
Setting change operation method : After entering the setting start operation mode, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the setting values. (TEST/WARNING LED light)
Example:  : When pressing the UP (SW005) key
 : When pressing the DOWN (SW006) key
Setting confirm operation method : After entering the setting start operation or setting change operation completed, press the SET (SW007) key for one second. (TEST/WARNING LED off)
Setting cancel operation method : Press the HOME (SW004) key for one second before confirming setting.
Setting range : 00 to 01

0	•	
1	Single phase	

9) Tube connection confirmation (Level 2) <Cannot be set if not W MULTI>

Rejection conditions	:	Indoor unit operation in progress, cooling automatic addressing in progress
Setting start operation method	:	Push the SET (SW005) key for 1 second. (Forced / error LED light)
Setting change operation method	:	Automatic completion. Press the SET (SW005) key for one second when turning off. (Forced / error LED off)

10) Heating automatic address setting (Level 2)

Rejection conditions	:	Not accepted during indoor operation
Setting start operation method	:	Press the SET (SW007) key for one second. (TEST/WARNING LED light)
Setting change operation method	:	Automatic completion. Press the SET (SW007) key for one second when turning off. (TEST/WARNING LED off)

Automatic address setting status is successively displayed as shown below.
The meaning of the numbers is as follows.

0: Automatic address start setup	H Add 0
1: Indoor unit automatic address setup wait	H Add 1
2: Engine operation in progress	H Add 2
3: Indoor unit checking in progress	H Add 3
4: Address setting in progress	H Add 4
5: Setting complete	H Add 5

11) Cooling automatic address setting (Level 2)

Rejection conditions	:	Not accepted during indoor operation
Setting start operation method	:	Press the SET (SW007) key for one second. (TEST/WARNING LED light)
Setting change operation method	:	Automatic completion. Press the SET (SW007) key for one second when turning off. (TEST/WARNING LED off)

Automatic address setting status is successively displayed as shown below.
The meaning of the numbers is as follows.

0: Automatic address start setup	C Add 0
1: Indoor unit automatic address setup wait	C Add 1
2: Engine operation in progress	C Add 2
3: Indoor unit checking in progress	C Add 3
4: Address setting in progress	C Add 4
5: Setting complete	C Add 5

⑪ Date Display: No. 11 (Level 0) < n o 1 1 >
Display of the current date
Key operation is used to display the time and set the date.

1) Date display (Level 0)
Displays the date.
Example: 1 7 0 3 0 1 (Example: March 1, 2017)

2) Date display (Level 1)
In the date display mode, pressing the SET (SW007) key activates the next display.
Example: 1 7 0 3 0 1 (Example: March 1, 2017)
In this state, pressing the UP (SW005) and DOWN (SW006) keys toggles between the dates and time displays.

	Display	Function
↑DOWN ↓UP	1 7 0 3 0 1	Date display
	1 1 0 6 2 5	Time display

3) Clock setting (Level 2)
In the date display or time display mode, pressing the SET (SW007) key for one second or more activates the clock setting function.
Example: 1 7 0 3 0 1 (Example: Year 2017)

Item	Data name	Display examples	Remarks
1	Year	1 . . . 1 7	2017
2	Month	2 . . . 0 3	March
3	Day	3 . . . 0 1	1
4	Hour	4 . . . 1 1	11:00 a.m.
5	Minutes	5 . . . 0 6	6 min.

Each time the SET (SW007) key is pressed, the set items is confirmed, and the set item moves to the next one in the order shown. The set item returns to Item 1 after Item 5.
As each item is displayed, operating the UP (SW005) and DOWN (SW006) keys makes it possible to change the value settings.
When clock is set, the clock stops and the number of seconds is set to 0.
When completing the clock setting, push the HOME (SW004) key for 1 second.
This clock may be set for up to year 2099 (with adjustments for leap years, it may be set for beyond that year as well).

When the power supply is turned on, detecting a halt in RTC oscillation causes the clock to be set at the initial value.

(8) Ignition Timing Check and Adjustment

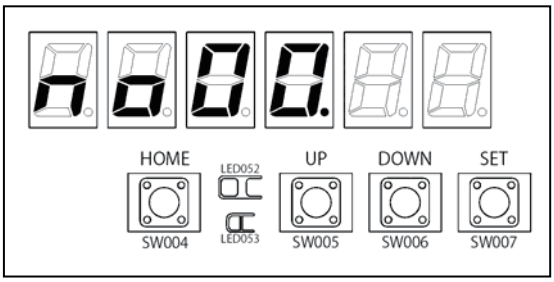
① Preparation for work

Turn off remote controllers for all indoor units. Confirm outdoor units have stopped.

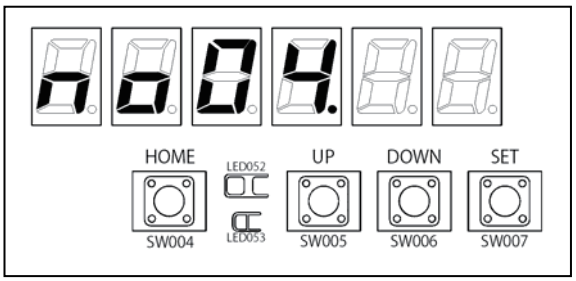
② Distributor mode setting

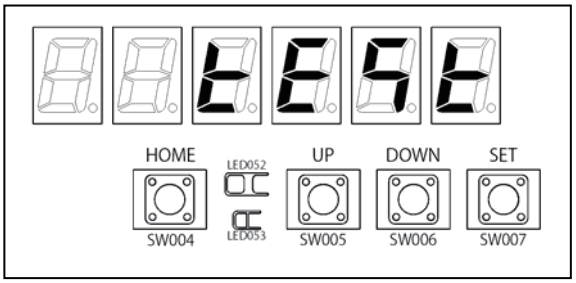
Set the distributor mode by selecting " E SPAr " from the " n004 " test run forced setting display.

1) Press the HOME key (SW004) for one second or more.
Menu item number " n000 "(right figure) will be displayed.

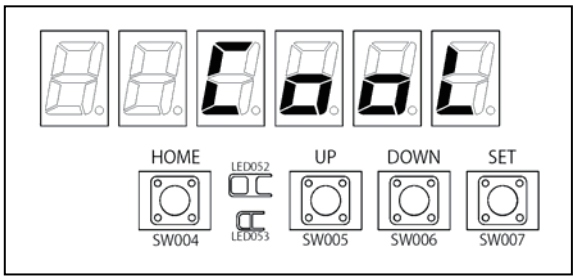


2) Press the UP (SW005) or DOWN (SW006) key, displaying the menu item numbers. Select menu item " n004 " in the figure below. The display " tEST " (figure below) will appear.

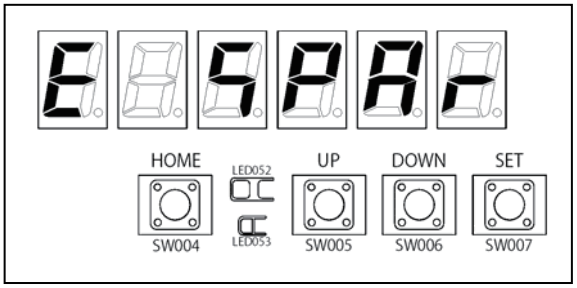




3) Press the SET key (SW007). " CooL " (right figure) will bedisplayed. The LEVEL LED (LED053) will light.



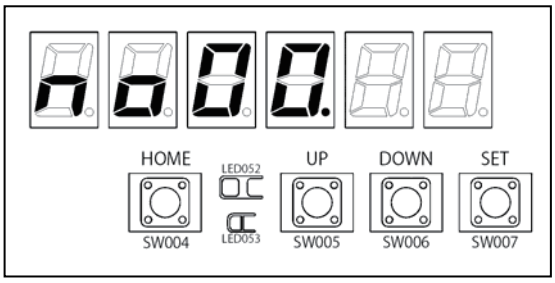
4) Press the UP (SW005) or DOWN (SW006) key to display " E SPAr " (right figure). Press the SET key (SW007) for one second or more.
The TEST/WARNING LED (LED052) will light, and the distributor mode will be set.



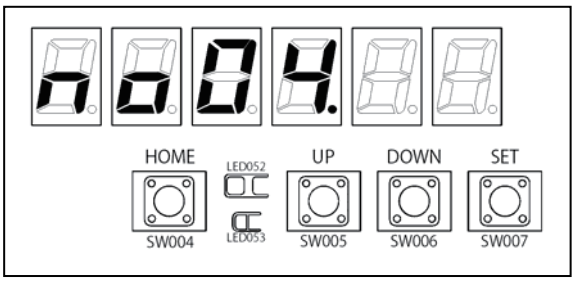
③ Start test run and set engine rotational speed
Start test run, and select " n o 0 8 " forced engine rpm setting, and set 800 [min^{-1}].

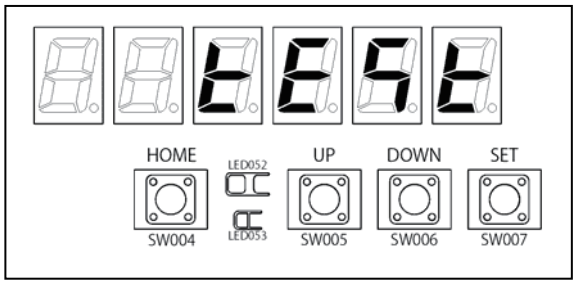
Start test run.

1) Press the HOME key (SW004) for one second or more.
Menu item number " n o 0 0 "(right figure) will be displayed.

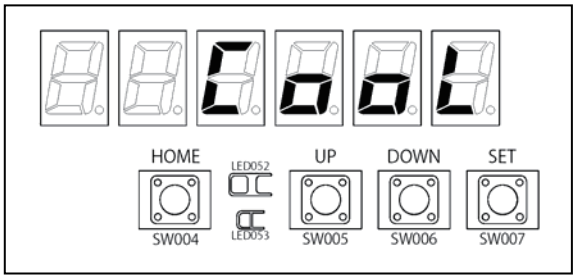


2) Press the UP (SW005) or DOWN (SW006) key, displaying the menu item numbers. Select menu item " n o 0 4 " in the figure below. The display " t E S t " (figure below) will appear.



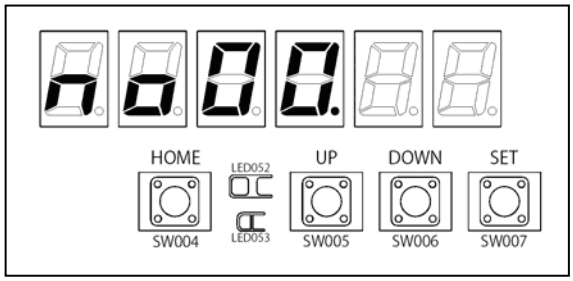


3) Press the SET key (SW007). " C o o L " (right figure) will be displayed. The LEVEL LED (LED053) will light.
Press the SET key (SW007) for one second or more.
The TEST/WARNING LED (LED052) will light, and the test run will start.

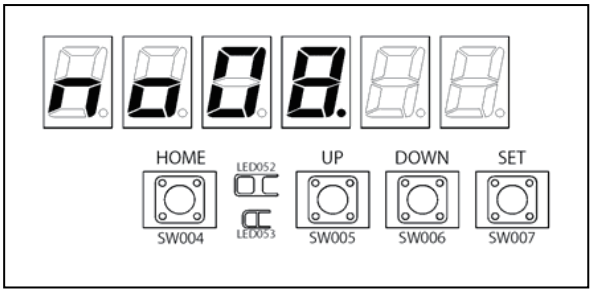


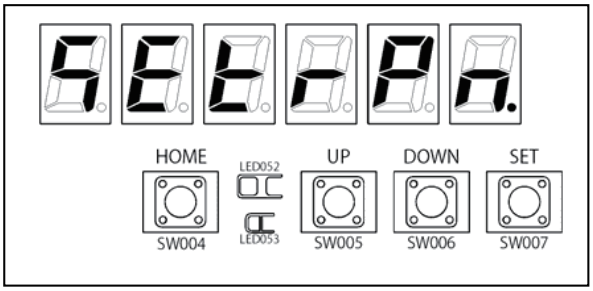
Set the engine rotational speed to 800 [min^{-1}].

4) Press the HOME key (SW004) for one second or more.
Menu item number " n o 0 0 " (right figure) will be displayed.



5) Press the UP (SW005) or DOWN (SW006) key, displaying the menu item numbers. Select menu item " n o 0 8 " in the figure below. The display " S E t r P n " (figure below) will appear.





6) Press the SET key (SW007). The LEVEL LED (LED053) will light, and the status with the engine rotating at the forced (set) speed will be displayed at one-second intervals, as shown below.

Display	Item
10.1400 (10.1400)	Forced engine rotational speed (Example: 1400 min^{-1})
11.1400 (11.1400)	Engine rotational speed (Example: 1400 min^{-1})
12. 0.56 (12.0.56)	Compressor inlet pressure (Example: 0.56MPa)
13. 2.70 (13.2.70)	Compressor outlet pressure (Example: 2.70MPa)
15. 85.6 (15.85.0)	Compressor outlet temperature (Example: 85.0°C)

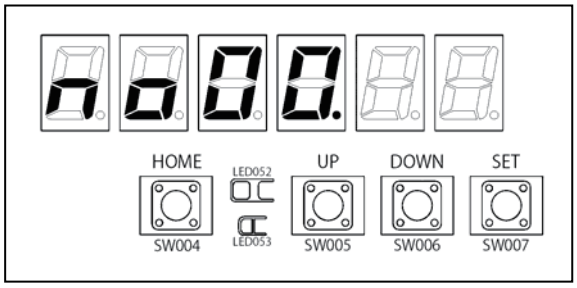
7) In this state, press the UP (SW005) or DOWN (SW006) key to set the engine rotational speed to 800 [min^{-1}]. Press the SET key (SW007) for one second or more, to confirm the set engine rotational speed. The TEST/WARNING LED (LED052) will light.

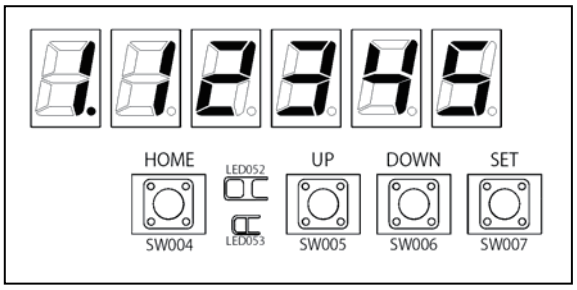
Caution: The forced engine rpm can be set within the range from the minimum speed to the maximum speed governed by the engine, in units of 100 revolutions.

④ Ignition timing check

When the operation conditions stabilize, select " no00 " operation data display, and display " 60 " (engine ignition timing). Check that this value is the value shown in table 1.

1) Press the HOME (SW004) key for one second or more. Menu item number " no00 " (figure below) will be displayed. The TEST/WARNING LED (LED052) will light. After that, " 12345 " (as in the example below where the engine has 12345 operating hours) will be displayed. The TEST/WARNING LED (LED052) will light. In this state, press the SET (SW007) key.
The LEVEL LED (LED053) will light.





2) Press the UP (SW005) or DOWN (SW006) key to display " 60 " (engine ignition timing). Check that this value is the one shown in table 1 below.
Table 1 Ignition timing adjustment value: at 800 [min^{-1}] (GK25).

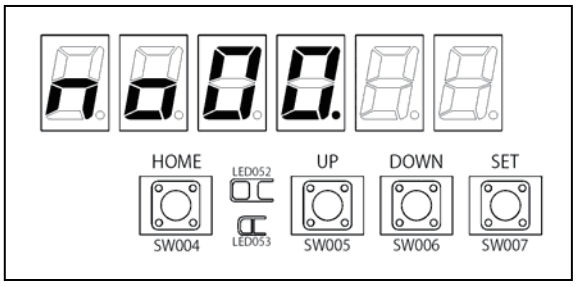
GK25 engine	10˚BTDC

3) Attach the timing light on the high-tension wire for the no. 1 cylinder of the engine, and check the ignition timing (refer to table 1 above). Compare it to the " 60 " (engine ignition timing) value displayed in 2) above.

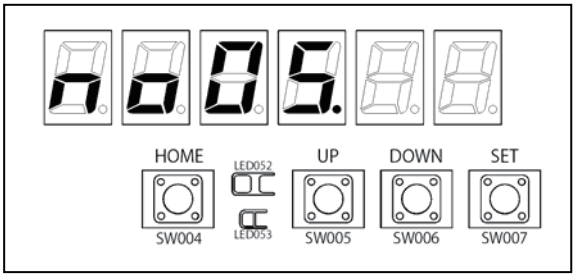
⑤ Correction for distorted amount

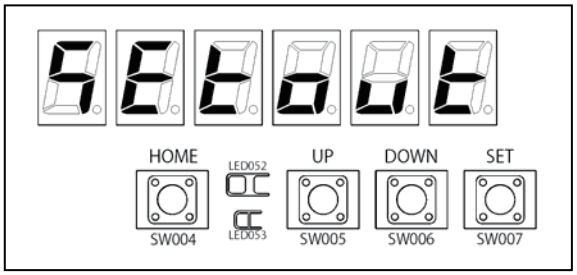
If the value is different than that displayed by “ ６０ ” (engine ignition timing) set in item (④) above, select “ ８８ .” (ignition timing offset) in “ ｎｏ０５ ” engine settings, and correct for the distorted amount.

1) Press the HOME key (SW004) for one second or more.
Menu item number “ ｎｏ００ ”(right figure) will be displayed.

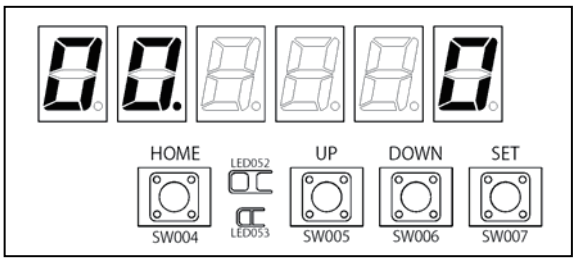


2) Press the UP (SW005) or DOWN (SW006) key, displaying the menu item numbers. Select menu item “ ｎｏ０５ ” in the figure below. The display “ ５ＥＴ ｏｕＴ ” (figure below) will appear.





3) In this state, press the SET key (SW007).
The display will change to “ ００ ０ ” (right figure) and the LEVEL LED (LED053) will light.



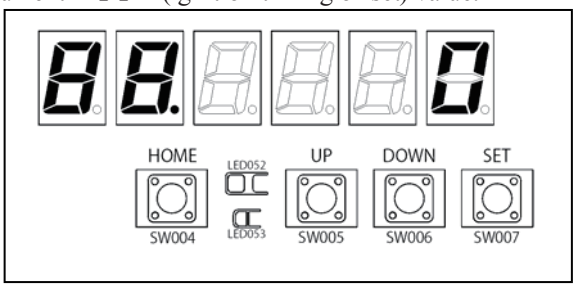
4) Next, press the UP (SW005) or DOWN (SW006) key, to display “ ８８ ” (ignition timing offset).

5) Make the correction

Correction example a)

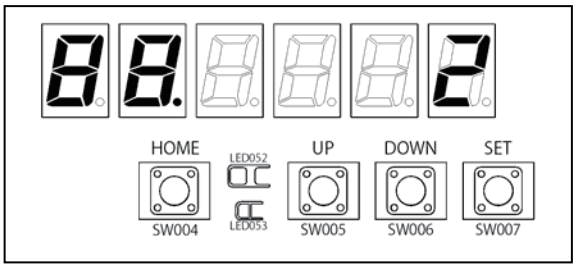
The adjustment value is 10° BTDC, but the observed value was 8° BTDC. Press the UP (SW005) or DOWN (SW006) key to set a correction of +2 in relation to the current " 88 " (ignition timing offset) value.

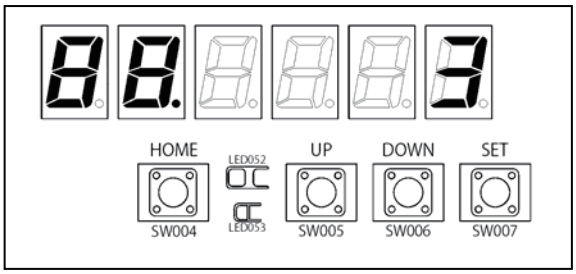
i) Display the current " 88 " (ignition timing offset) value, and check it. The current value is zero (0).
The display for " 88 0 " will be as shown at right.



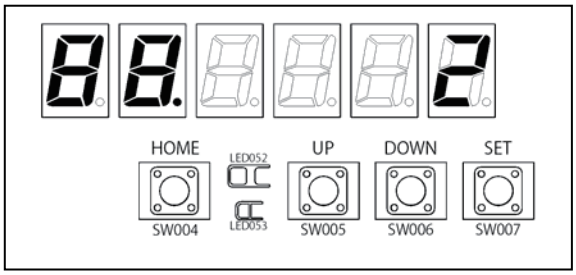
ii) With " 88 " (ignition timing offset) displayed, press the SET key (SW007) for one second or more.
The TEST/WARNING LED (LED052) will light, and LEVEL LED (LED053) will flash.

iii) Press the UP (SW005) or DOWN (SW006) key to set a correction of +2 in relation to the current value checked in "ii)."
The display will show " 88 2 " (right figure).
Caution: The display example at right is an example for when the current value checked in "i)" is zero (0). If the current value is "1" and a +2 correction is set in relation to that value, the value will become "3" after the setting is made. The display will show " 88 3 " (figure below right).



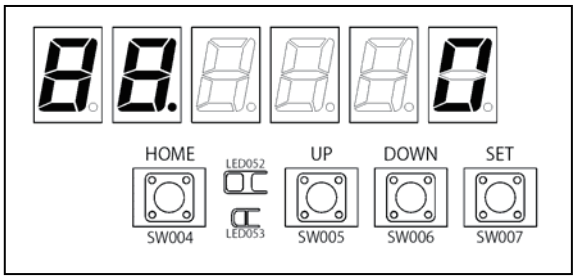


iv) With " 88 2 " (right figure) displayed, press the SET key (SW007) for one second or more. The TEST/WARNING LED (LED052) will go out, and LEVEL LED (LED053) will light. The ignition timing offset mode will be cancelled, and the setting process will be ended.



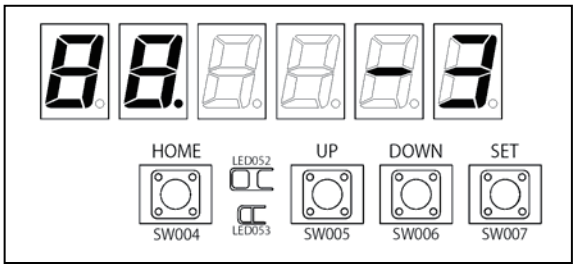
Correction example b)
The adjustment value is 10°BTDC, but the observed value was 13° BTDC. Press the UP (SW005) or DOWN (SW006) key to set a correction of -3 in relation to the current " 88 " (ignition timing offset) value.

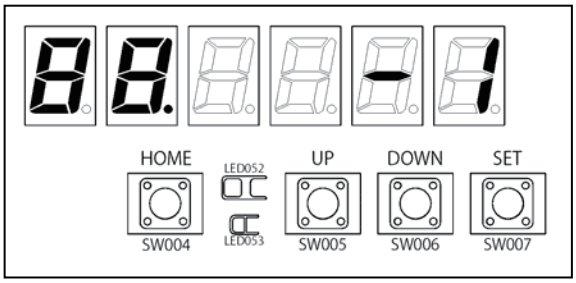
i) Display the current " 88 " (ignition timing offset) value, and check it. The current value is zero (0).
The display for " 88 0 " will be as shown at right.



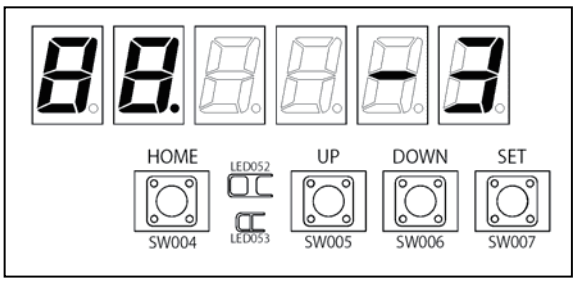
ii) With " 88 " (ignition timing offset) displayed, press the SET key (SW007) for one second or more.
The TEST/WARNING LED (LED052) will light, and LEVEL LED (LED053) will flash.

iii) Press the UP (SW005) or DOWN (SW006) key to set a correction of -3 in relation to the current value checked in "ii)."
The display will show " 88 -3 " (right figure).
Caution: The display example at right is an example for when the current value checked in "i)" is zero (0).
If the current value is "2" and a -3 correction is set in relation to that value, the value will become "-1" after the setting is made. The display will show " 88 -1 " (figure below right).





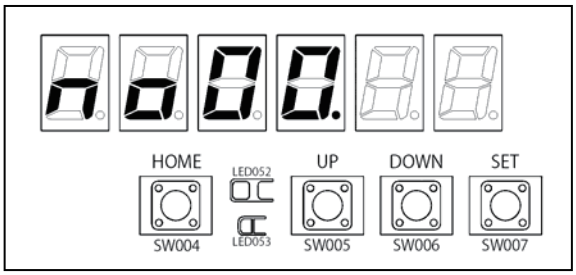
iv) With " 88 -3 " (right figure) displayed, press the SET key (SW007) for one second or more. The TEST/WARNING LED (LED052) will go out, and LEVEL LED (LED053) will light. The ignition timing offset mode will be cancelled, and the setting process will be ended.



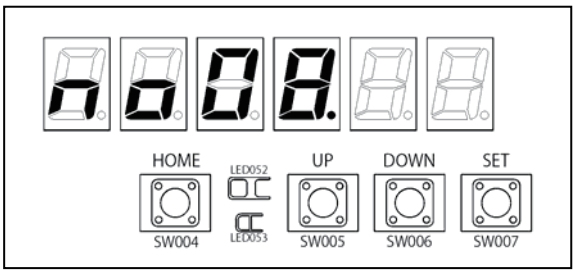
⑥ Cancel settings

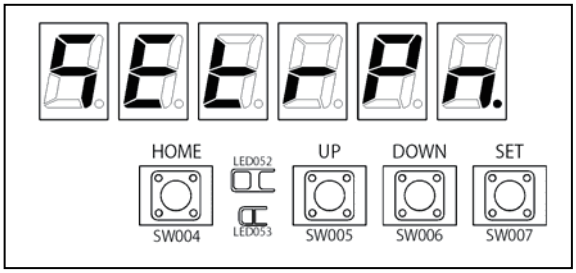
When ignition timing correction is finished, cancel the forced rotational speed setting and the distributor mode. Make sure to do this.

1) Press the HOME key (SW004) for one second or more.
Menu item number " n o 0 0 " (right figure) will be displayed.



2) Press the UP (SW005) or DOWN (SW006) key, displaying the menu item numbers. Select menu item " n o 0 8 " in the figure below. The display " S E t r P n " (figure below) will appear.



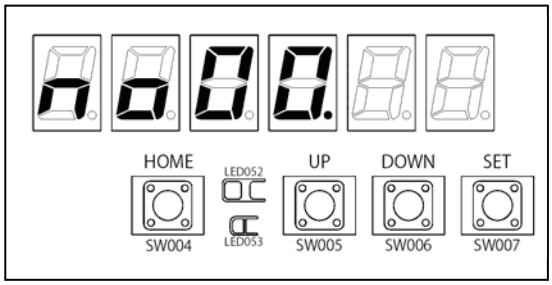


3) Press the SET key (SW007). The LEVEL LED (LED053) and TEST/WARNING LED (LED052) will light, and the status with the engine rotating at the forced (set) speed will be displayed at one-second intervals, as shown below.

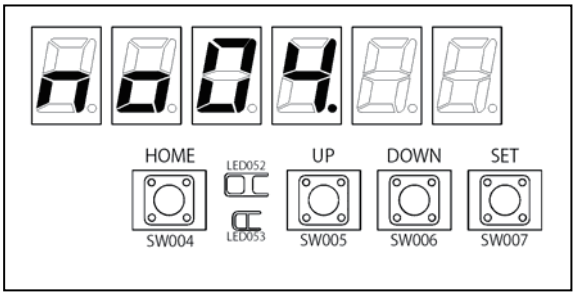
Display	Item
1 0. 1 4 0 0 (10.1400)	Forced engine rotational speed (Example: 1400 min^{-1})
1 1. 1 4 0 0 (11.1400)	Engine rotational speed (Example: 1400 min^{-1})
1 2. 0. 5 6 (12.0.56)	Compressor inlet pressure (Example: 0.56MPa)
1 3. 2. 7 0 (13.2.70)	Compressor outlet pressure (Example: 2.70MPa)
1 5. 8 5. 6 (15.85.0)	Compressor outlet temperature (Example: 85.0°C)

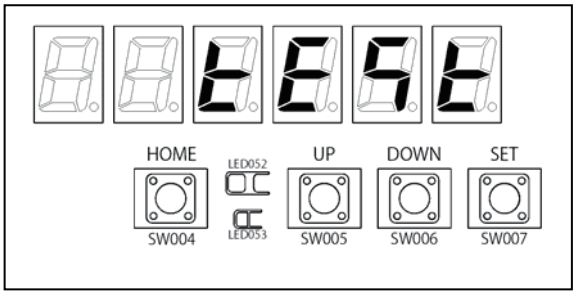
4) Press the SET key (SW007) for one second or more. The TEST/WARNING LED (LED052) will go out, and the forced rotational speed setting mode will be canceled.

5) Press the HOME key (SW004) for one second or more.
Menu item number " n o 0 0 " (right figure) will be displayed.

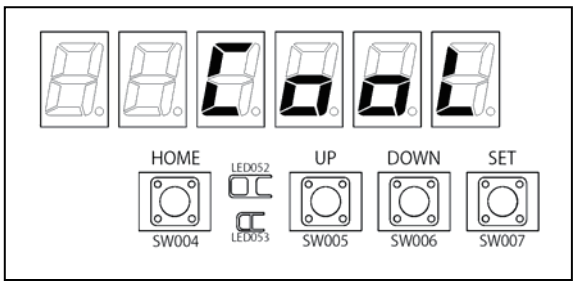


6) Press the UP (SW005) or DOWN (SW006) key and select menu item number " n o 0 4 " The display " t E S t " (figure below) will appear.

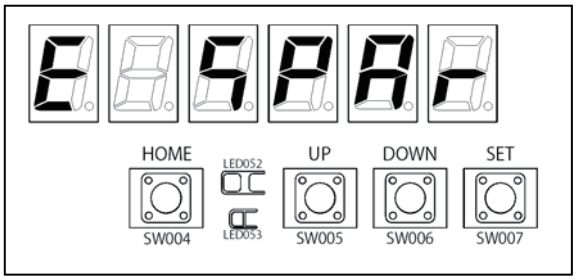




7) Press the SET key (SW007). “ Cool ” (right figure) will be displayed. The LEVEL LED (LED053) and TEST/WARNING LED (LED052) will light.

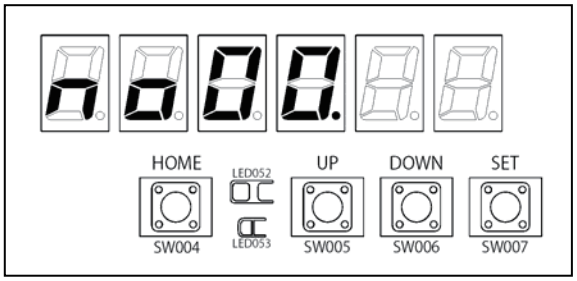


8) Press the UP (SW005) or DOWN (SW006) key, to display “ E SPAr ” (right figure). Press the SET key (SW007) for one second or more. The TEST/WARNING LED (LED052) will go out, and distributor mode will be cancelled.

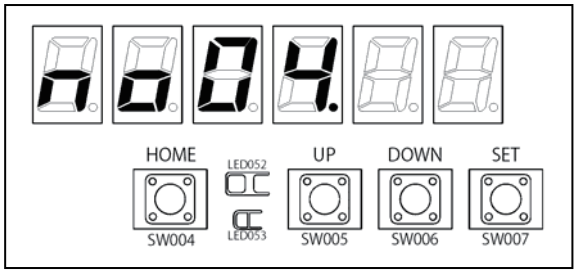


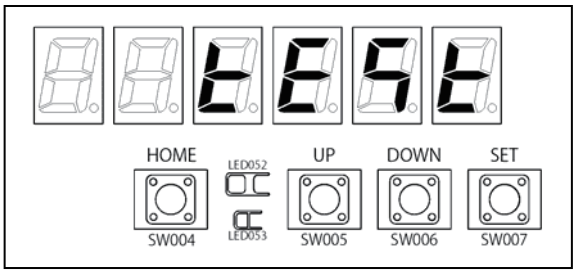
⑦ Stop test run

1) Press the HOME key (SW004) for one second or more.
Menu item number “ no00 ” (right figure) will be displayed.

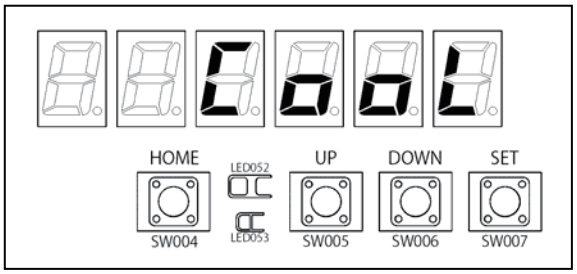


2) Press the UP (SW005) or DOWN (SW006) key, displaying the menu item numbers. Select menu item “ no04 ” in the figure below. The display “ tEST ” (figure below) will appear.





3) Press the SET key (SW007). “ Cool ” (right figure) will be displayed. The LEVEL LED (LED053) and TEST/WARNING LED (LED052) will light.
4) Press the SET key (SW007) for one second or more.
The TEST/WARNING LED (LED052) will go out, and the test run will be stopped.

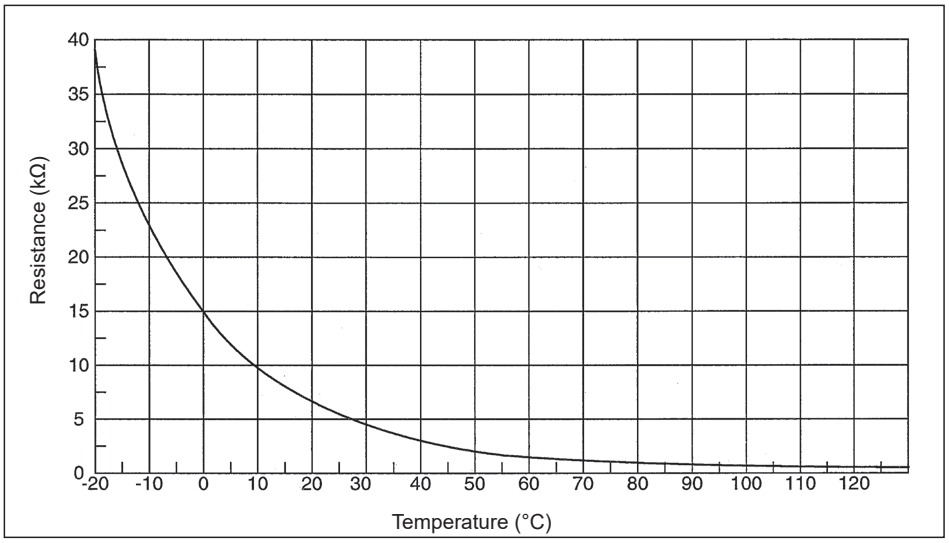


⑧ Running condition check

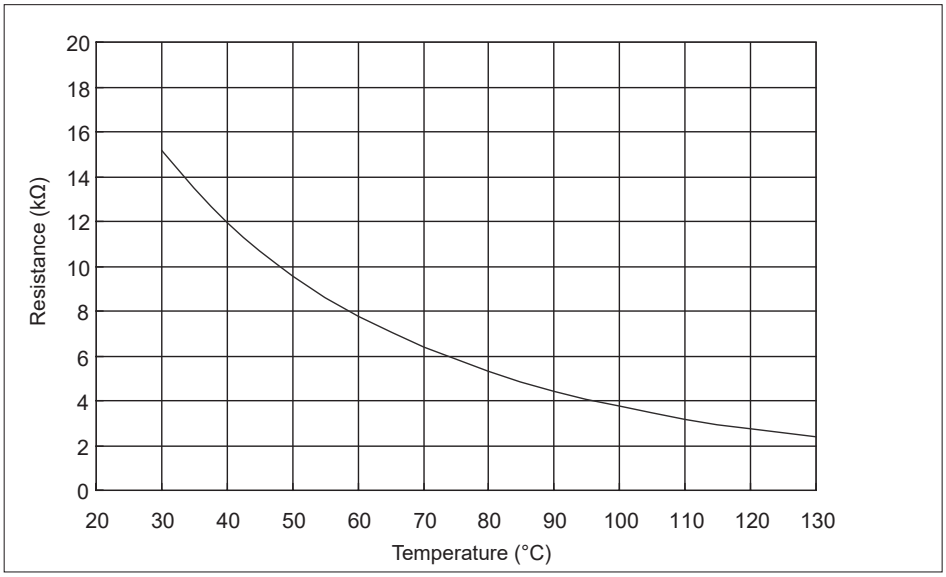
1) Make sure that no abnormal noise or vibration occurs.
2) Make sure there is no looseness in the fastening parts for each unit.

(9) Thermistor characteristic graph

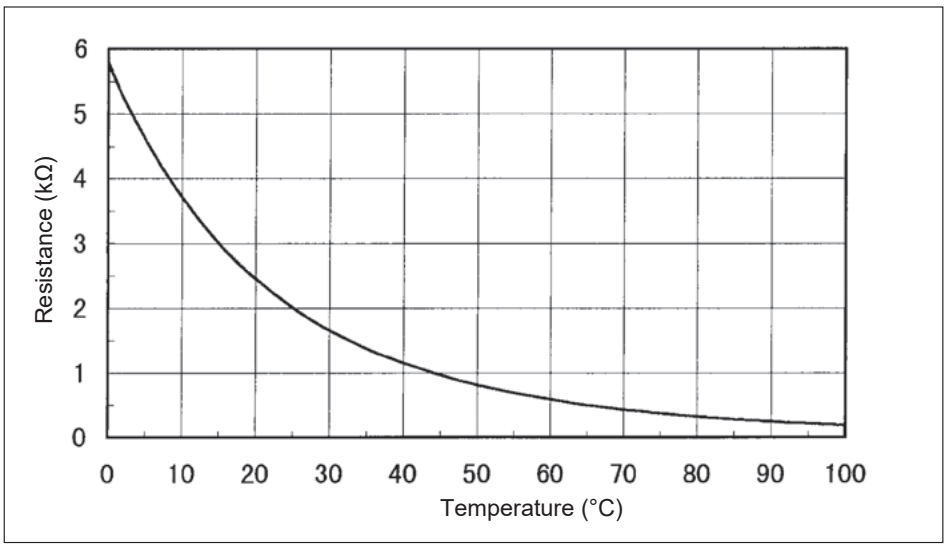
① Indoor unit heat exchanger inlet temperature sensor, indoor unit heat exchanger outlet temperature sensor, outside air temperature sensor, compressor inlet temperature sensor, outdoor unit heat exchanger inlet temperature sensor, hot water outlet temperature sensor



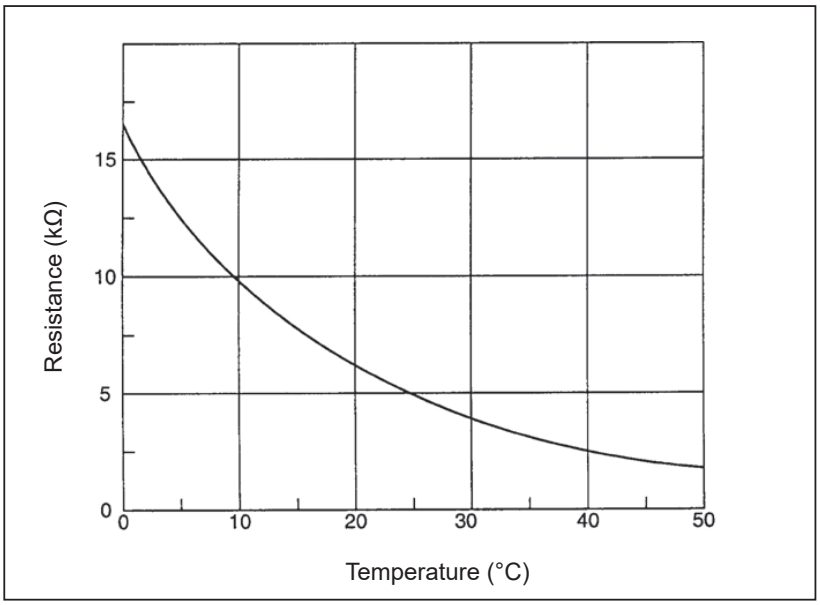
② Compressor outlet temperature sensor, exhaust gas temperature sensor, generator temperature sensor



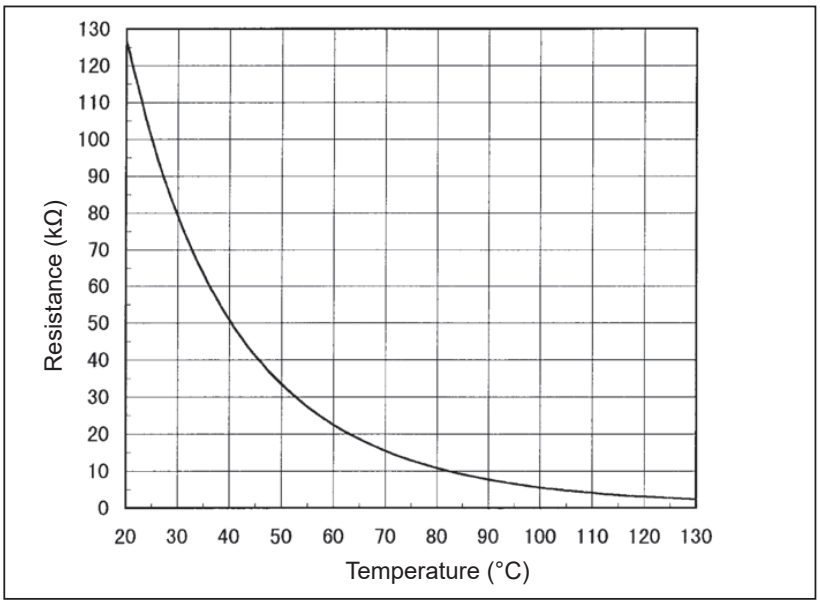
③ Coolant temperature sensor



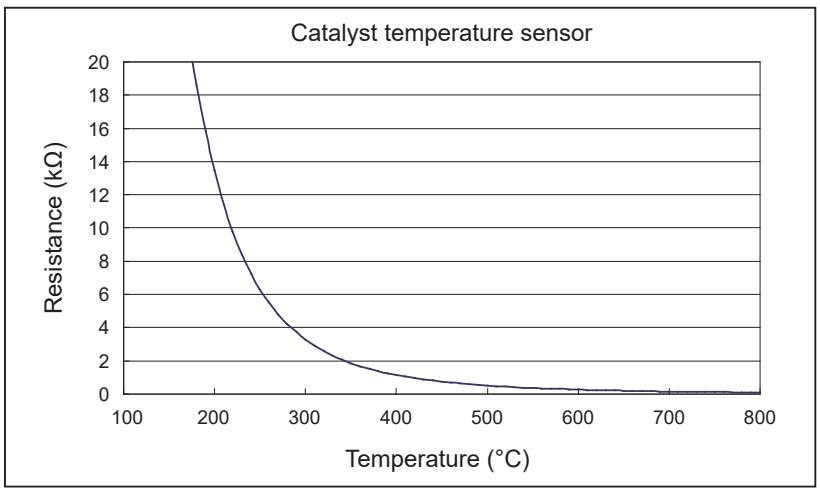
④ Indoor unit intake temperature sensor, indoor unit discharge temperature sensor



⑤ Clutch coil temperature sensor, clutch-2 coil temperature sensor



⑥ Catalyst temperature sensor



(10) Checks Prior to Automatic Addressing

* When an outdoor unit alarm is displayed, perform the following checks after troubleshooting.

1 Indoor/outdoor power source	1-1	Indoor and outdoor units turned on?	Yes	2-1
			No	Turn on the power
2 Indoor/outdoor control wires	2-1	Have the inside/outside control wires been laid? Is there a break or disconnection of wires?	Yes	2-2
			No	Wiring and connection
	2-2	Was a high voltage (200 V AC), etc. applied to the control wire circuit? Has a fuse on the control board blown? [Confirmation of each outdoor and indoor unit]	Yes	2-3
			No	3-1
	2-3	There is a problem with the wiring of the power cable and indoor/outdoor control wires. Turn off the power, check and repair faulty wiring, and then connect all indoor/outdoor control wires to the backup control board and controller.		
3 Outdoor settings	3-1	Does the setting of connected indoor unit count (No. 10) on the outdoor control board match the actual count of connected indoor units?	Yes	3-2
			No	Correct the setting
	3-2	Are the indoor/outdoor control wires connected to multiple outdoor units? (Wire-linked?)	Yes	3-3
			No	3-6
	3-3	Is SW010 (terminal resistor ON/OFF switch) on the outdoor main board set to ON for only one outdoor unit and set to OFF for all other outdoor units *1?	Yes	3-4
			No	Correct the setting
	3-4	Are there any duplicate settings for outdoor units?	Yes	3-5
			No	3-6
	3-5	For link wiring, set a system address for each outdoor unit in the order of 1, 2, 3, and then perform automatic addressing.		
	3-6	Perform automatic addressing.		

*1: Terminal resistor is basically “ON(SHORT)” for one unit only, but depending on the installation status can be set to “ON(SHORT)” for up to 3 units.

•2-3

Backup connectors and terminals for indoor/outdoor control wires (for communication)

Equipment	Primary	Backup
Outdoor Unit	CN045 (for communication)	CN046 (EMG)
Indoor unit	CN040(0C)	CN044(EMG)
System controller	Terminal block No. A7 and B7	Terminal plate No. 3 (Indoor/outdoor backup control wire)
Intelligent controller	Terminal block No. 2	Terminal block No. A6 and B6

* For a system linking wiring systems, if the systems are connected to water heat exchange unit, depending on the state of the hot / cold water, automatic address alarm may occur.
If this happens, remove the link wiring and set address individually.

(11) Indoor/outdoor control wire connection confirmation

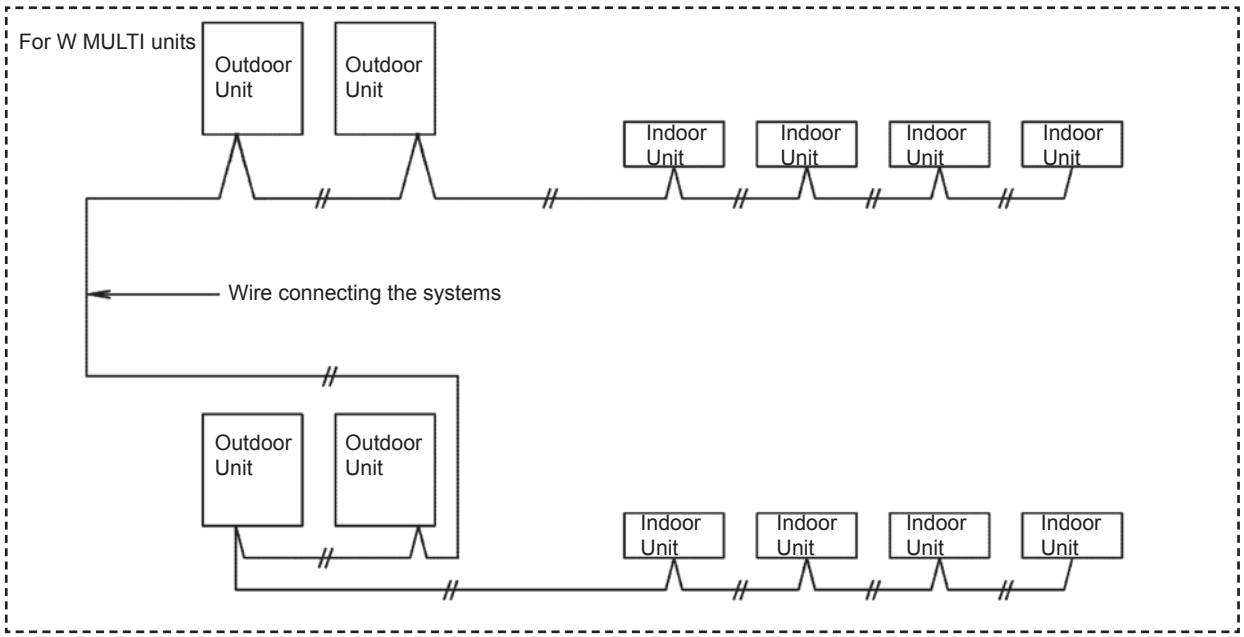
Check the control wire connection regardless of whether there is a warning or not. Before performing the check, turn off the power of all devices (including controllers) that are connected to the indoor/outdoor control wire.

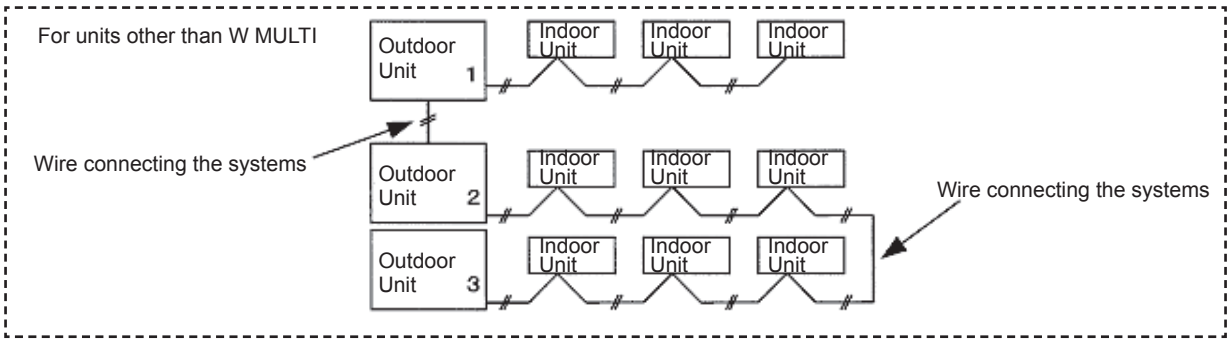
1 Ground fault check	1-1	Measure the resistance between one end of the indoor/outdoor control wire and the point of ground screw, as well as the resistance between the other operating line end and the point of ground screw. Are both measured resistance values in MΩ unit (infinite)?	Yes	2-1
			No	1-2
	1-2	Because the indoor/outdoor control wire has a ground fault, search for the location of the ground fault.		
2 Short circuit check	2-1	Measure the resistance between the indoor/outdoor control wires on the terminal board of the outdoor unit. The measured resistance value is around 35 to 75Ω? When setting multiple “ON (SHORT)” to switches with terminal resistor, the resistance value mentioned above is 1 over number of units. *1	Yes	3-1
			No	2-2
	2-2	If the wiring has a short circuit, search for the location of the short circuit on the indoor/outdoor control wire. If it is open, check the terminal resistor of outdoor board, and check the wiring from outdoor board to outdoor terminal board.		
3 Wire break or disconnection check	3-1	Measure the resistance between the indoor/outdoor control wires on the boards of all devices that are connected to the control wires. Any location with measured resistance values in MΩ units (infinite)?	Yes	3-2
			No	4-1
	3-2	Because the wiring has a break, search for the location of the break.		
4 Shield wire check	4-1	A shield wire is used as an indoor/outdoor control wire?	Yes	4-2
			No	5-1
	4-2	Only one end of the shield wire is grounded?	Yes	5-1
			No	4-3
	4-3	Ground only one end of the shield wire.		
5 Others	5-1	Check total wire length and the number of branch connections and connected units.		

*1: Terminal resistor is basically “ON (SHORT)” for one unit only, but depending on the installation status can be set to “ON (SHORT)” for up to 3 units.

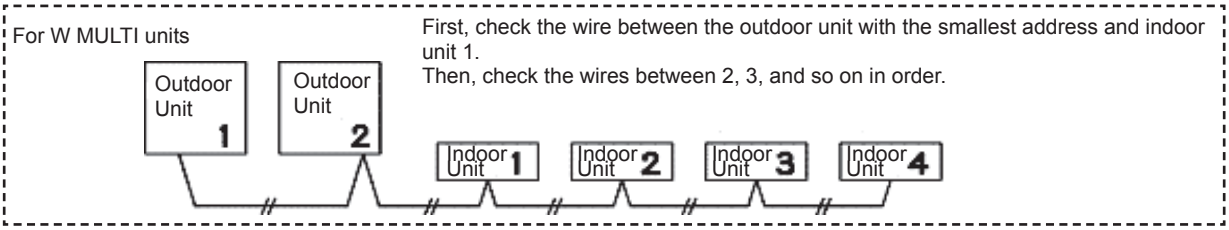
- Device ground check
  Is earth ground securely obtained?

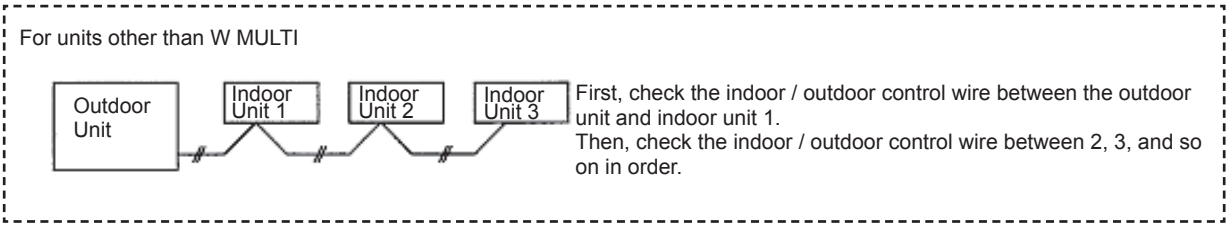
- If an error is found in the wiring connections, the following check procedure allows you to quickly identify the location of the error. When performing the check procedure, it is convenient if you have a drawing showing the layout of devices and wiring routes to refer to.
  - In systems that are comprised of multiple wiring systems linked together, you can quickly identify the location of the error by removing the ‘link’ and determining whether each individual system is good or not good. A warning in a certain system does not necessarily mean that the cause of the error is in that system. Check the indoor/outdoor control wires of all systems, since the abnormality may be in the wiring of a system other than that where the warning is triggered.



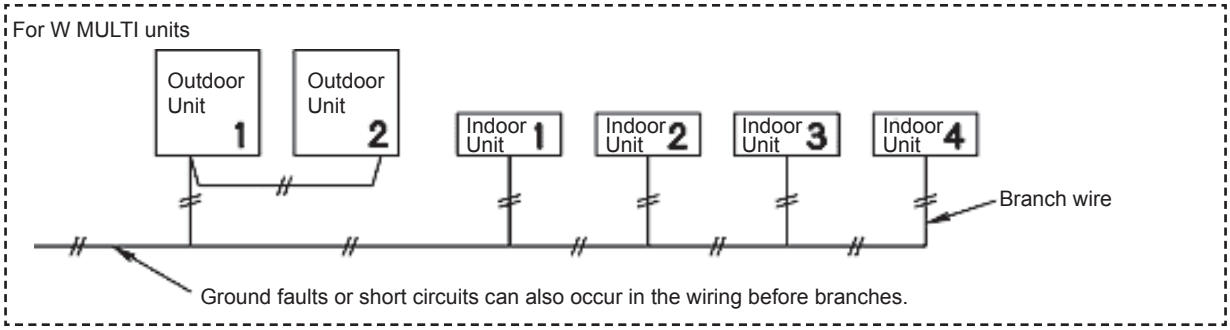


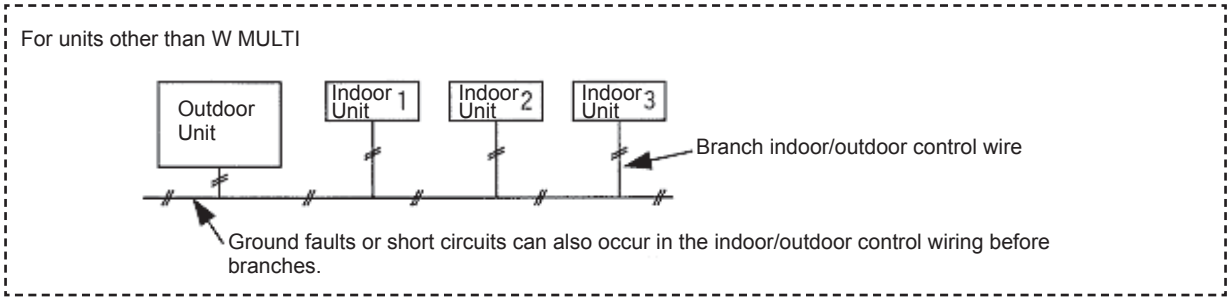
- When the wiring route is divided into segments by the terminal block of each unit, it is advisable to check the wiring connection on a segment by segment basis, starting with the segment between the outdoor unit and indoor unit 1, then the segment between the indoor units 1 and 2, and so on. This allows you to find the location of the connection failure between units.





- If the device contains control wire branched from indoor/outdoor control wire, there may be failure in the indoor/outdoor control wire before branches.

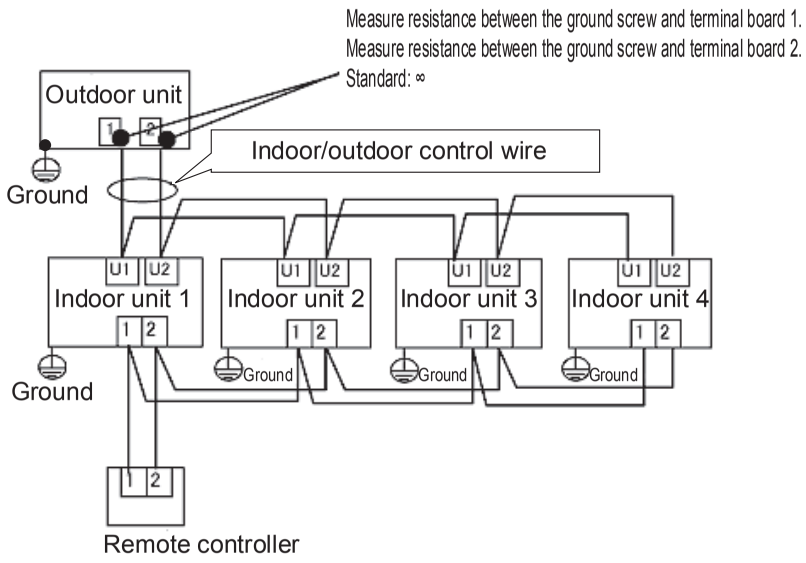




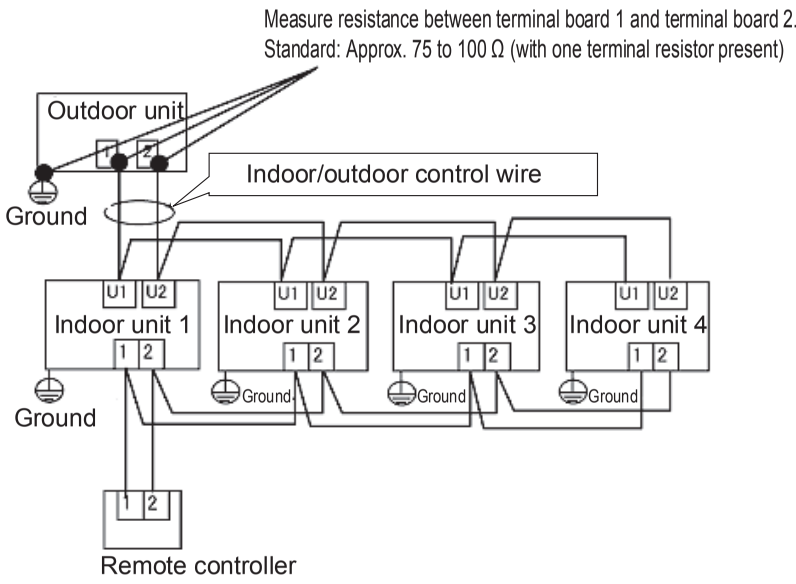
- If communication error occurs, check the sensor's ground fault.
- Check sensors (thermistor) ground fault.
  Before checking, turn off the device and remove target sensor from the board before performing measurement.

6 Ground fault check	6-1	Measure the resistance between one end of the indoor/outdoor control wire and the point of ground screw, as well as the resistance between the other operating line end and the point of the ground screw. Are both measured resistance values in MΩ unit (infinite)?	Yes	Good
			No	6-2
	6-2	Replace thermistor and wiring		

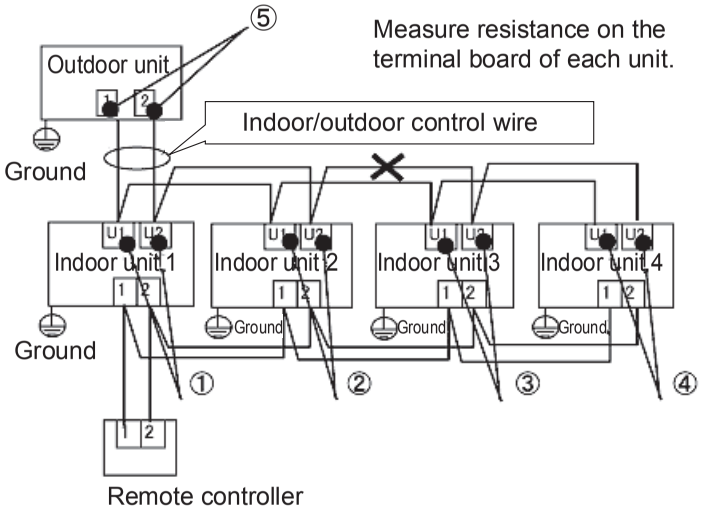
Ground fault check



Short circuit check



Wire break or disconnection check

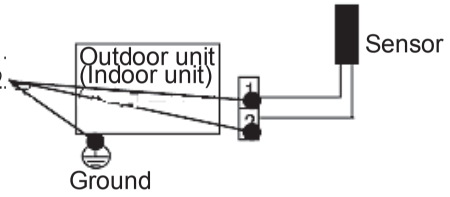


Measure resistance on the terminal board of each unit.

Example: A wire break or disconnection occurs at x (with one outdoor unit terminal resistor present).
The resistance value for (1), (2), and (5) is approx. 75 to 100 Ω.
The resistance value for (3) and (4) is ∞.
* If the resistance for (5) is ∞, check the terminal resistor for the outdoor unit control board, and check wiring between the outdoor unit control board and the outdoor unit terminal board.

Sensor ground fault check (* Sensor ground faults will also result in communication faults.)
· Sensor type (thermistor) ground fault check (turn off power for units)
For each of the indoor/outdoor units connected by the operation cable, measure the resistance between the sensor wiring and ground screw for both of the sensor wires and ground screws.

Measure resistance between the ground screw and terminal board 1.
Measure resistance between the ground screw and terminal board 2.
Standard: ∞
If there is resistance, a sensor ground fault has occurred.



① Number units to connect

1) Number of units to connect

- Number of outdoor units that can be connected …… Max 30
- Number of outdoor units that can be connected …… Max 64 *
- Centralized control devices that can be connected …… Max 10

(* Total number of each type of devices within 1 link wiring is up to 100.)

2) Indoor and outdoor unit operation lines

- Wiring Non-polar biaxial wires
- Wire types

Eco electrical wire code	Previous code	Name (previous name)	Applicable standard
EM-CEE	CVV	Heat-resistant polyethylene sheath control cable (Vinyl insulated vinyl sheath control cable)	JIS C 3401
ECO120	VCT	Heat-resistant polyethylene insulated heat-resistant polyethylene sheath cabtire round cable (Vinyl insulated vinyl cabtire cable)	JIS4501 JIS C 3312
EM-ECTF	VCTF	Heat-resistant polyethylene insulated heat-resistant polyethylene sheath cabtire round cord (Vinyl cabtire round cord)	JIS C 3306
EM-EEF	VVF	600V heat-resistant polyethylene flat cable (600V vinyl insulated vinyl sheath flat cable)	JIS C 3342
EM-CPEES	CPEVS	Shielded polyethylene insulated heat-resistant polyethylene sheath communication cable for city use (Shielded polyethylene insulated vinyl sheath cable for city use)	-
EM-K-CPEE	KPEVS	Shielded polyethylene insulated heat-resistant polyethylene sheath instrumentation cable for city use (Shielded polyethylene insulated vinyl sheath cable for city use)	JIS C 5402
EM-MEE-S	MVVS	Heat-resistant polyethylene cord for use with covered microphones (Vinyl cord for use with covered microphones)	JCS4271

Note: Either block out the light or use UV-resistant cables if wiring is affected by ultraviolet rays (sunlight, lighting, etc.)

- Cable thickness : $0.5mm^2$ - $2mm^2$
- Insulated length : Maximum 1km for the entire cable length
- Precautions
  1. Do not lay signal cables next to power line in order to prevent miss-operations.
  2. Maintain a distance of 50 mm or more between the power lines of other air-conditioning units manufactured by Panasonic.
  3. Maintain a distance of 300 mm or more between other power lines.
  4. In the event of the cables needing to be laid within the above-mentioned distances, make sure one of them is enclosed in a steel power-line conduit.
  5. When shielded cables are in use, make sure one side is grounded.
  6. Do not use the same cable for signal cables and power cables. (Fig.1)
  7. Do not use multi-core cables for two or more signal cables. (Fig.2)
  8. Wiring
     - Bus systems must be used as a basic principle for multiple systems.(Fig.3)
       Only a maximum of 16 branches can be used. (Fig.3)
       The length of the cable between branches must be 2 m or more. (Fig.3)
       If there are more than 17 branches, reduce the number of branch locations. (Fig.4)
       (Putting 2 refrigerant systems to 1 wiring system, etc.)
       Not include in branch within 1 m. (Fig.5)
       Branches can only contain a maximum of 3 cables. 4 or more cables are prohibited. (Fig.6)
       A branch after the branching of a wire is prohibited. (Fig.7)
       Looped cables are prohibited. (Fig.8)
     - Consecutive suspension systems must be used as a basic principle for single systems. (Fig.9)
- Terminal resistance
  To be set at one location when one outdoor unit is in use, and at two locations when multiple units are in use.

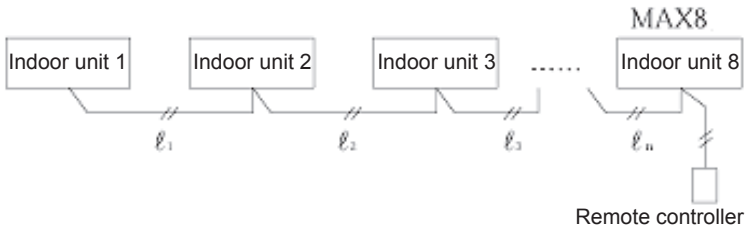
3) Remote control wiring

- Wiring
  - Between the remote controller and the indoor unit: Non-polar biaxial wires
  - Between indoor units: Non-polar biaxial wires
- Wire types

Eco electrical wire code	Previous code	Name (previous name)	Applicable standard
EM-ECTF	VCTF	Heat-resistant polyethylene insulated heat-resistant polyethylene sheath cabtire round cord (Vinyl cabtire round cord)	JIS C 3306
ECO120	VCT	Heat-resistant polyethylene insulated heat-resistant polyethylene sheath cabtire round cable (Vinyl insulated vinyl cabtire cable)	JCS4501 JIS C 3312
EM-MEE-S	MVVS	Heat-resistant polyethylene cord for use with covered microphones (Vinyl cord for use with covered microphones)	JCS4271

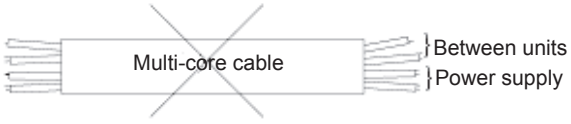
Note: Either block out the light or use UV-resistant cables if wiring is affected by ultraviolet rays (sunlight, lighting, etc.)

- Cable thickness : $0.5mm^2$ - $2mm^2$
- Insulated length
  - Maximum 500 m for the entire cable length (400 m when wireless remote controllers and simple remote controllers equipped with backlights are used within the group.)
  - Maximum 200 m for the entire cable length between indoor units. ($\ell_1 + \ell_2 + \ell_3 + \ell_n$ = Max 200 m)

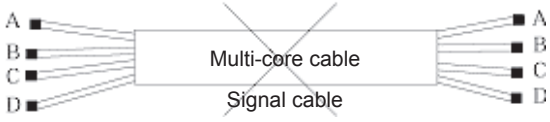


- Precautions
  1. Do not lay signal cables next to power line in order to prevent miss-operations.
  2. Maintain a distance of 50 mm or more between the power lines of other air-conditioning units manufactured by Panasonic.
  3. Maintain a distance of 300 mm or more between other power lines.
  4. In the event of the cables needing to be laid within the above-mentioned distances, make sure one of them is enclosed in a steel power-line conduit.
  5. When shielded cables are in use, make sure one side is grounded.
  6. Do not use the same cable for signal cables and power cables. (Fig.1)
  7. Do not use multi-core cables for two or more signal cables. (Fig.2)
  8. If high-frequency equipment exists nearby, make sure the units are installed at least 3 m away from them.
     Enclose the remote controller in a steel box and the remote controller wires in a steel conduit or steel conduit pipe.
  9. Remote controller wires can be connected to a maximum of two items of control equipment to which connections are possible. However only one can be used per group for simple remote controllers equipped with backlights. They cannot be used in combination.
  10. It is prohibited for the refrigerant system to be shared between units and for certain indoor units to be group controlled. Failure to observe this may result in misaligned modes and certain indoor units not operating.

(Figure 1)



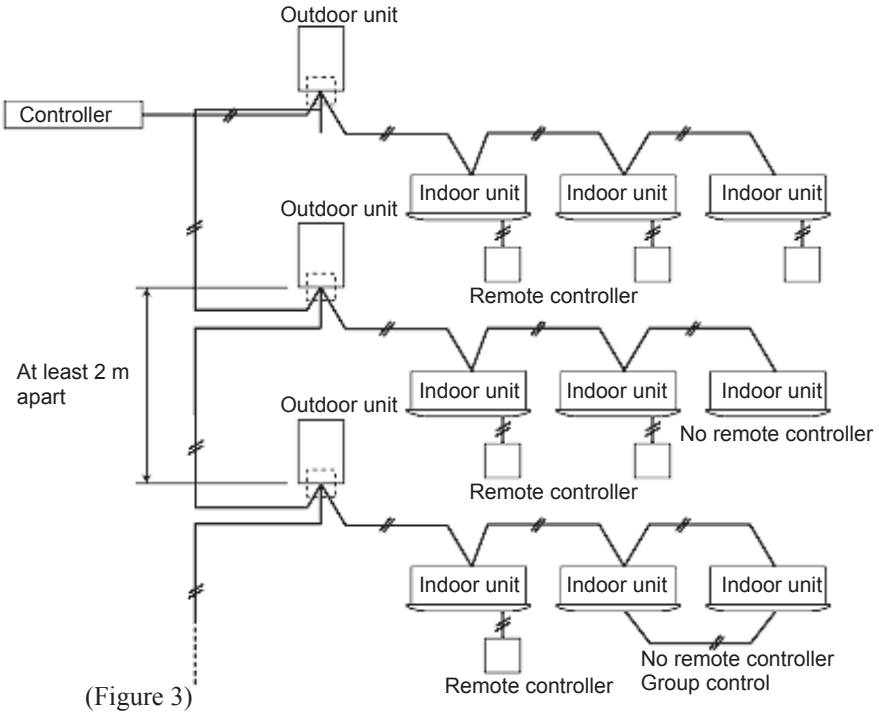
(Figure 2)



② Control wire

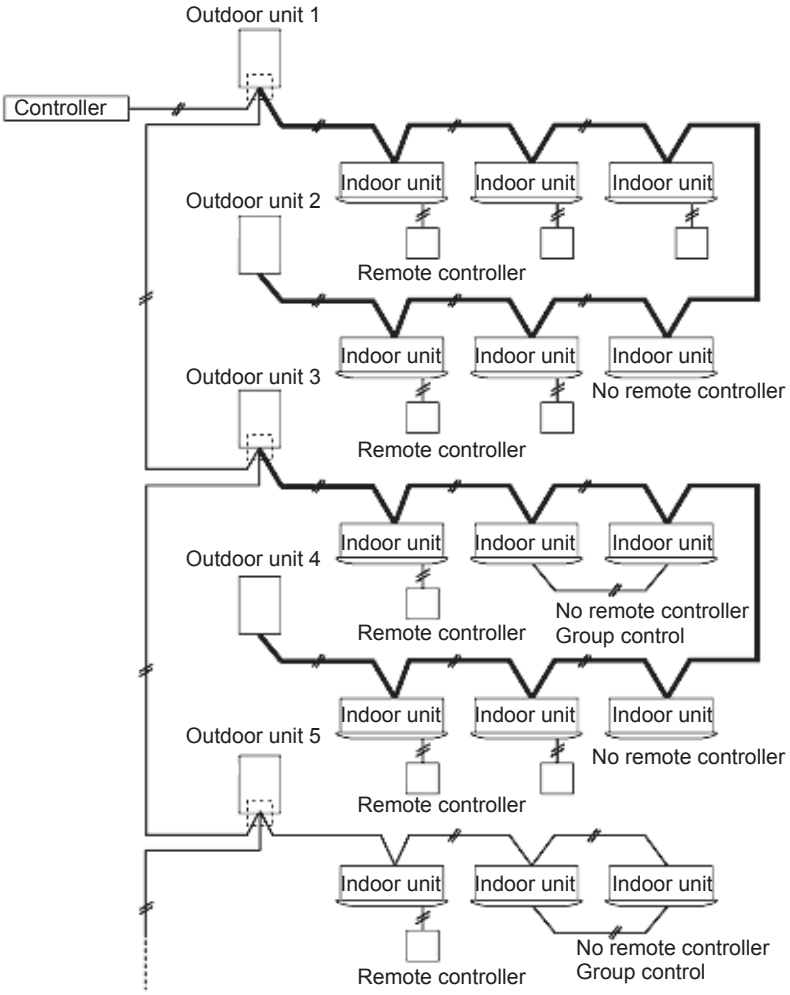
- Indoor/outdoor control wire connection example

1) Bus system (can be branched to max 16 location). Outdoor link is basic. (Figure 3)



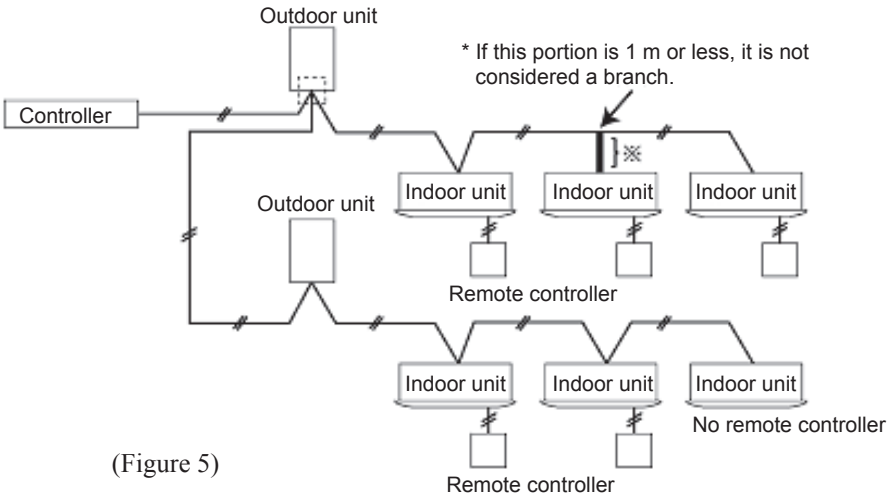
(Figure 3)

2) In 1), if there are more than 17 branches, reduce the number of branch locations. (Figure 4)
<Example>Putting 2 refrigerant systems to 1 wiring system



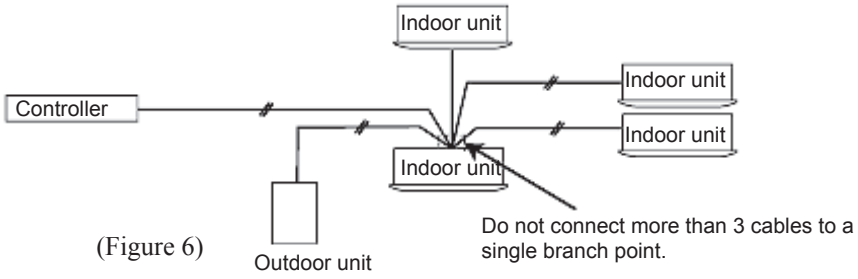
(Figure 4)

3) Wiring without branching (Figure 5)
Column: Part of indoor wiring branches.



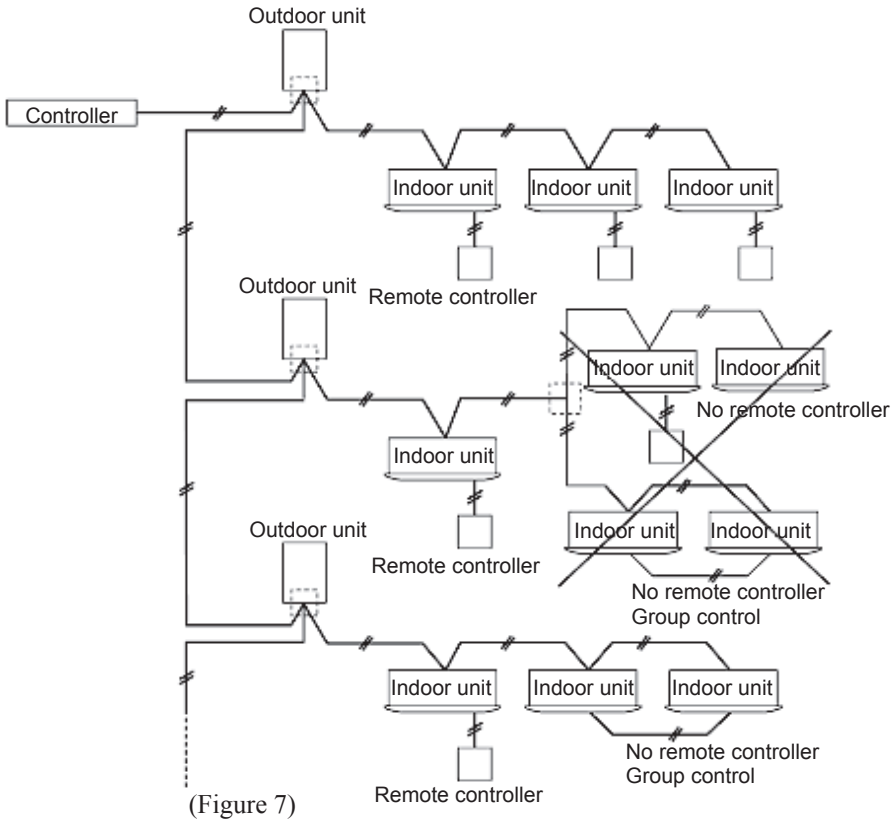
(Figure 5)

4) Star system is prohibited. (Figure 6)



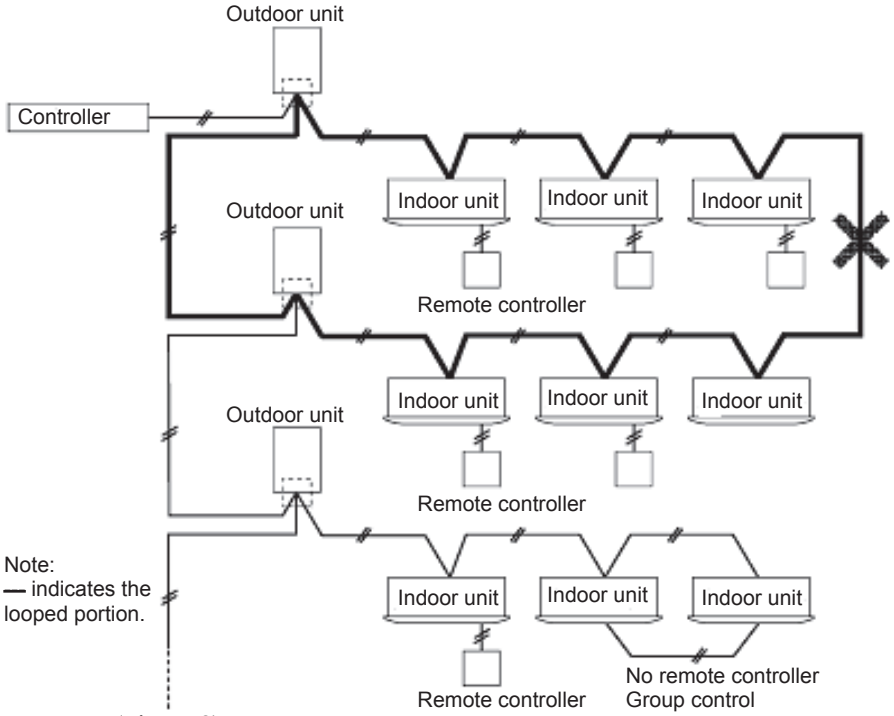
(Figure 6)

5) Branches after branching (branching of location that cannot be branched in a single stroke) are prohibited. (Figure 7)



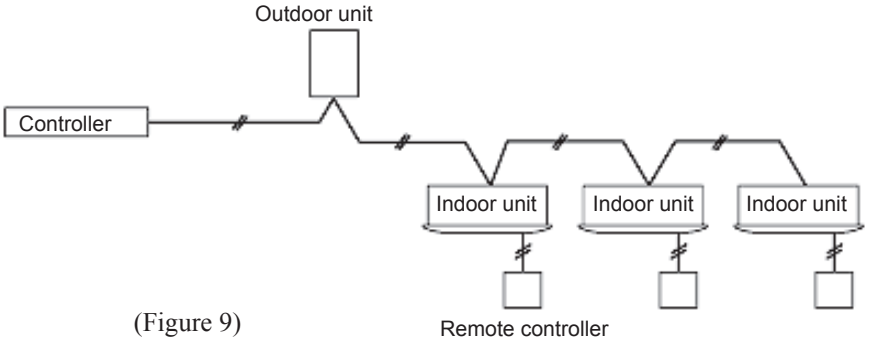
(Figure 7)

6) Loop wiring is prohibited. (Figure 8)
Example: As shown in the figure, do not have wiring where part of it is looped or the entire wiring is looped.



(Figure 8)

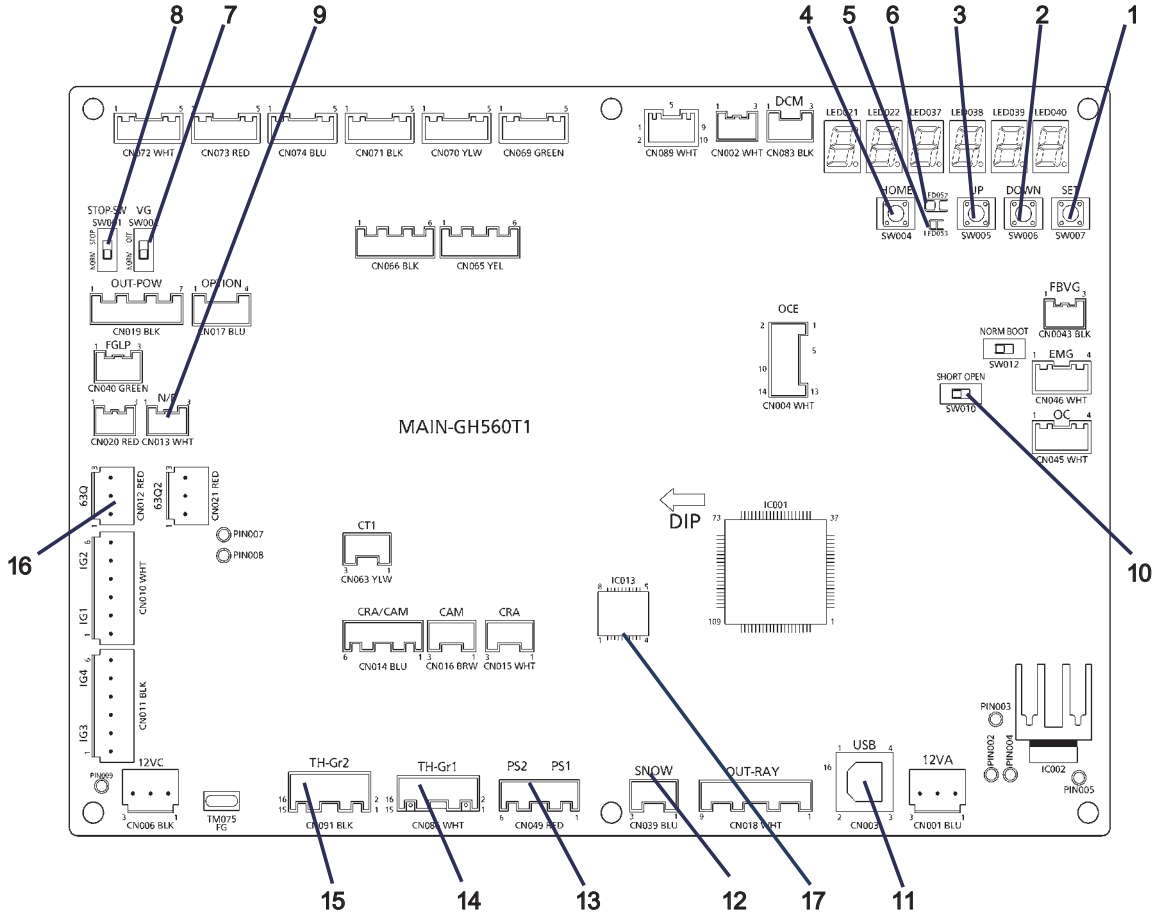
7) Daisy chain system (Figure 9)



(Figure 9)

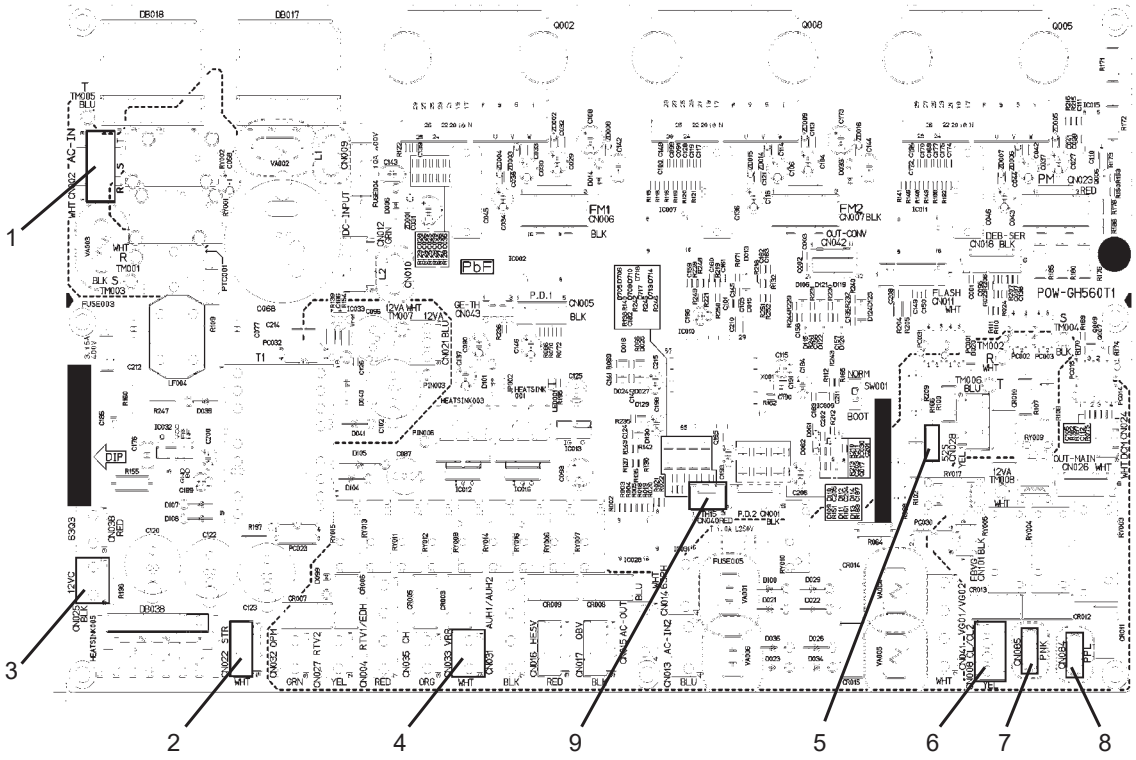
6. Board and Outdoor Unit Electrical Wiring Diagrams

(1) Outdoor main board



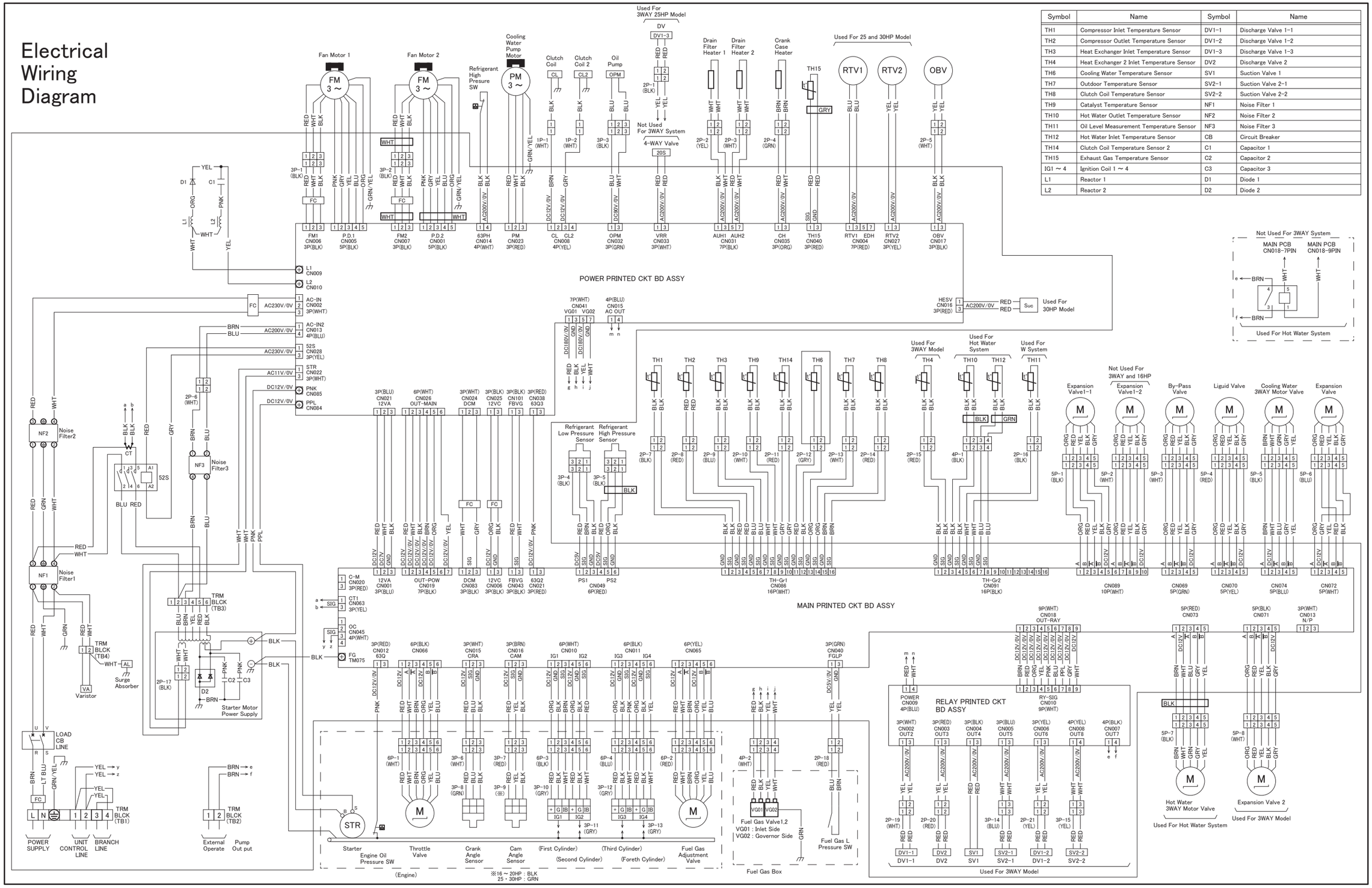
No.	Name	No.	Name	
1	SET key (SW007)	14	CN086 (WHITE) TH1 to TH3, TH6 to TH8, TH9, TH14	
2	DOWN key (SW006)	15	CN091 (BLACK) TH4 to TH5, TH10 to TH13, TH16 to TH17	
3	UP key (SW005)	16	CN012 (RED) Oil Pressure SW Input	
4	HOME key (SW004)	17	EEPROM	
5	LEVEL LED (LED053)	TH1: Compressor inlet temperature		TH11: Oil level measurement temperature
6	TEST/WARNING LED (LED052)	TH2: Compressor outlet temperature		TH14: Clutch 2 coil temperature
7	Fuel gas solenoid valve forced closing switch (SW002)	TH3: Heat exchanger inlet temperature		TH16: Overcooling outlet temperature
8	STOP SW (SW001)	TH4: Sub-evaporator outlet temperature		TH17: Cooling water outlet temperature
9	CN013 (WHITE) N/P (gas type changeover port)	TH5: Heat exchanger inlet temperature		
10	Terminal resistor ON/OFF switch (SW010)	TH6: Coolant temperature		
11	USB port	TH7: Outdoor air temperature		
12	CN039 (BLUE) snowfall sensor	TH8: Clutch 1 coil temperature		
13	CN049 (RED) Compressor outlet/inlet pressure sensors PS1: Inlet, PS2: outlet	TH9: Catalyst temperature		
		TH10: Hot water outlet/sub-evaporator		

(2) Outdoor power board



No.	Name
1	CN002 (white)
2	CN022 (white)
3	CN025 (black)
4	CN033 (white) VRR
5	CN028 (yellow)
6	CN041 (white)
7	CN085 (pink)
8	CN084 (purple)
9	CN040 (red) Exhaust temp.

(3) Outdoor Unit Electrical Wiring Diagram



Symbol	Name	Symbol	Name
TH1	Compressor Inlet Temperature Sensor	DV1-1	Discharge Valve 1-1
TH2	Compressor Outlet Temperature Sensor	DV1-2	Discharge Valve 1-2
TH3	Heat Exchanger Inlet Temperature Sensor	DV1-3	Discharge Valve 1-3
TH4	Heat Exchanger 2 Inlet Temperature Sensor	DV2	Discharge Valve 2
TH6	Cooling Water Temperature Sensor	SV1	Suction Valve 1
TH7	Outdoor Temperature Sensor	SV2-1	Suction Valve 2-1
TH8	Clutch Coil Temperature Sensor	SV2-2	Suction Valve 2-2
TH9	Catalyst Temperature Sensor	NF1	Noise Filter 1
TH10	Hot Water Outlet Temperature Sensor	NF2	Noise Filter 2
TH11	Oil Level Measurement Temperature Sensor	NF3	Noise Filter 3
TH12	Hot Water Inlet Temperature Sensor	CB	Circuit Breaker
TH14	Clutch Coil Temperature Sensor 2	C1	Capacitor 1
TH15	Exhaust Gas Temperature Sensor	C2	Capacitor 2
IG1 ~ 4	Ignition Coil 1 ~ 4	C3	Capacitor 3
L1	Reactor 1	D1	Diode 1
L2	Reactor 2	D2	Diode 2

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