Mitsubishi Electric ‘Mr. Slim’
P-Series Commercial Models

TROUBLESHOOTING TIPS / P8 ERROR CODE

These systems have very sophisticated microprocessor control systems to operate the system efficiently and to protect it from conditions which could lead to damage.

If the P8 Error Code appears on the wall controller this indicates a problem with the condensing (outdoor) unit. There are several possible causes for this fault. A few are mentioned in the literature provided by Mitsubishi, but experience has shown that many other conditions can also result in the P8 Error Code.

1. Is there power to the outdoor unit? P-series indoor and outdoor units are typically wired from separate sources. On cooling only units the indoor section is 120/1/60 volt and the outdoor section is 208-230/1/60 volt. On heat pumps both sections are 208-230/1/60 volt. The indoor unit could have power to it but not the outdoor unit, resulting in a P8 fault.

2. Is the 2-wire 12 VDC communication link between the indoor unit and outdoor unit intact? This wiring is polarity sensitive so if the wires are crossed, shorted or broken this is also a problem to look for. Ensure the wires are secure in the terminals as well. Loose wiring can cause intermittent problems.

3. There is a 208 Volt jumper for the outdoor unit control board. Verify your power supply voltage and insure this jumper is correct for what you actually measure at the unit with your meter. The outdoor board monitors the power.

4. The outdoor board monitors the temperature of the refrigerant leaving the condenser coil and modulates it’s condenser fan(s) to try and maintain a 95°F temperature. If the discharge temperature gets too high, or too low, the unit will shut off. Verify that the pipe temperature thermistor is not open or shorted, and that it is snug in the well attached to the refrigerant pipe.

5. Is the condenser fan operating? On the extra low ambient models (-40°F) there is a control to disable the condenser fan(s) during very cold weather. If this control is defective it may be preventing operation of the fan(s) in warm weather. Ensure the condenser fan is ramping up to full speed when required.

6. Is the unit operating year-round but not a -40°F low ambient design? You can determine this easily because the accumulator on -40°F units is heated and insulated. Ensure the accumulator heater is functioning in the winter.

7. Is the system undercharged, or overcharged? It is a capillary tube metering device so the refrigerant charge is critical. P-series units have an accumulator which enables it to store enough refrigerant for up to a 100’ line set. After 100’ additional refrigerant must be weighed in based on the total 1-way lineset length.

Please refer to the attached pages from the Service Manual for more information on troubleshooting.
1. OUTLINE OF MICROPROCESSOR CONTROL

- OFF-ON switching.
- COOL/DRY-FAN selector switching.
- Thermostat setting.
- TIMER mode selector-switching and Timer setting.
- HIGH-LOW fan speed switching.
- AUTO Vane selector (AIR DISCHARGE) switching.
- TEST RUN switching.
- CHECK mode switching. (Self diagnostic trouble shooting)

Indoor unit

- Room temperature thermistor (RT1)
- Pipe temperature thermistor (RT2)

INPUT to remote controller

Remote controller board

- Processes and transmits orders.

OUTPUT to remote controller

Remote controller

- LCD indicator

Non-polar, two-wire cable maximum length 550 yards
Signal

Indoor controller board

- Receives orders from remote controller and temperature data from indoor unit.
- Processes orders and data.
- Controls indoor and outdoor operation.
- Self diagnostic function.
- System control operation.
- Emergency operation.
- Set by dip switch on indoor controller board.
- Transmits the power to remote controller.

Indoor unit

OUTPUT to indoor unit

- Auto vane’s angle setting.
- Emergency stop.

Output to outdoor unit

- Compressor and outdoor fan: ON-OFF

Polar two-wire cable

Outdoor unit

Independent Control of Outdoor Unit

- Compressor protection device working
- Fan speed control.
- Crankcase heater control ON-OFF.
- Self diagnostic function
Remote controller

Once the controls are set, the same operation mode can be repeated by simply pressing the ON / OFF button.

Remote controller operation buttons

- **TIMER ON/OFF button**: This switches between continuous operation and the timer operation.
- **CLOCK/TIMER button**: This sets or switches the current time, start time and stop time.
- **OPERATION MODE button**: Press this button to switch the cooling, electronic dry (Dehumidify), fan modes.
- **SET TEMPERATURE button**: This sets the room temperature. The temperature setting can be performed in 2°F units. Setting range: Cooling 65°F to 87°F
- **FAN SPEED button**: This sets the fan speed.
- **ON/OFF button**: This switches between the operation and stop modes each time it is pressed. The lamp on this button lights during operation.
- **AIR DISCHARGE button**: This adjusts the vertical angle of the ventilation.
- **FILTER button**: This resets the filter service indication display.
- **AIR SWEEP button**: This switches the horizontal fan motion (Swing louver) ON and OFF. (This button only operates on PK wall models.)
- **CHECK-TEST RUN button**: Only press this button to perform an inspection check or test operation. Do not use it for normal operation.
Remote controller display

CENTRALLY CONTROLLED display
This indicates when the unit is controlled by optional features such as central control type remote controller.

TIMER display
This indicates when the continuous operation and time operation modes are set. It also displays the time for the timer operation at the same time as when it is set.

CLOCK display
The current time, start time and stop time can be displayed in ten second intervals by pressing the time switch button. The start time or stop time is always displayed during the timer operation.

FAN SPEED display
The selected fan speed is displayed.

AIR SWEEP display
This lamp lights during operation, goes off when the unit stops and flashes when a malfunction occurs.

SET TEMP. display
This displays the selected setting temperature.

FILTER display
This lamp lights when electricity is supplied to the unit.

Operation lamp
This lamp lights when the filter needs to be cleaned.

CHECK MODE display
This display lights in the check mode or when a test operation is performed.

CENTRALLY CONTROLLED display
This indicates when the unit is controlled by optional features such as central control type remote controller.

CHECK display
This indicates when a malfunction has occurred in the unit which should be checked.

Caution
● Only the ○ display lights when the unit is stopped and power supplied to the unit.
● When power is turned ON for the first time the (CENTRAL CTRL) display appears to go off momentarily but this is not a malfunction.
● When the central control remote control unit, which is sold separately, is used the ON-OFF button, OPERATION MODE button and SET TEMP. button do not operate.
● “NOT AVAILABLE” is displayed when the AIR DISCHARGE button are pressed.
(AIR DISCHARGE function is not provided for PC series.)
**REFRIGERANT SYSTEM DIAGRAM**

**PU12/18/24EKh**

**PU18/24EKh**

**PU30/36EKh, PU42EK2h, PU42EK7h**

**PU30/36EK1h, PU42EK21h**

- Refrigerant pipe (Option) \( \Phi \frac{5}{8} \) (with heat insulator)
- Flexible tube
- Flared connection
- Ball valve
- Charge plug
- Check plug
- Fusible plug
- Accumulator
- Compressor
- Charge plug
- Check plug
- High Pressure Switch
- Outdoor unit thermistor TH3
- Outdoor heat exchanger
- Strainer
- Capillary tube
- Flow of refrigerant

**Capillary tube size (ODxIDxLength)**
- For PU12EK \((\Phi 0.126x0.071x31.5)\)
- For PU18EK, PU18EKh \((\Phi 0.126x0.063x31.5)\) x 2 sets
- For PU24EK, PU24EKh \((\Phi 0.126x0.063x17.3)\) x 2 sets

**NOTE:** The symbol \( \Phi \) indicates the diameter.

**PU30/36EK, PU42EK2, PU42EK7**

**PU30/36EK1, PU42EK21**

- Refrigerant pipe (Option) \( \Phi \frac{3}{4} \) (with heat insulator)
- Flexible tube
- Flared connection
- Ball valve
- Charge plug
- Check plug
- Fusible plug
- Accumulator
- Compressor
- Charge plug
- Check plug
- High Pressure Switch
- Outdoor unit thermistor TH3
- Outdoor heat exchanger
- Strainer
- Capillary tube
- Flow of refrigerant

**Capillary tube size (ODxIDxLength)**
- For PU30EK, PU30EKh \((\Phi 0.157x0.079x29.1)\) x 2 sets
- For PU36EK, PU36EKh \((\Phi 0.157x0.079x17.7)\) x 2 sets
- For PU42EK2, PU42EK21 \((\Phi 0.157x0.079x7.1)\) x 2 sets
- For PU42EK7 \((\Phi 0.157x0.079x21.7)\) x 2 sets
2. INDOOR UNIT CONTROL

2-1 COOL operation

<How to operate>
1. Press the ON/OFF button.
2. Press MODE button to set operation mode to Cool.
3. To set desired temperature, press SET TEMP. button.

**NOTE:** Set temperature changes by 2°F in the range 65~87°F, each time SET TEMP. button is pressed.

<COOL operation time chart>

Operation starts by ON/OFF button ON.

- Thermostat
  - ON
  - OFF

- Indoor fan
  - ON LOW or HIGH
  - OFF

- Auto vane
  - CLOSE

- Compressor
  - ON
  - OFF

The room temperature displayed on Remote controller becomes equal to set temperature.

The room temperature displayed on Remote controller rises above set temperature.

Operation stops by ON/OFF button OFF.

Initially 10° (Changeable by remote controller setting)

Minimum 3 minutes *1

*1 Even if the room temperature displayed on remote controller rises above the set temperature during this period, the compressor will not start until this period has ended.
(1) Compressor control

① 3-minute time delay
To prevent overload, the compressor will not start within 3 minutes after stop.

② The compressor runs when room temperature is higher than set temperature.
The compressor stops when room temperature is equal to or lower than the set temperature.
The compressor maintains the previous state when the room temperature minus the set temperature is 0 degrees or more, or lower than 2 degrees.

③ The compressor stops in check mode or during protective functions.

④ Coil frost prevention
To prevent indoor coil frost, the compressor will stop when the indoor coil thermistor (RT2) reads 34°F or below after the compressor has been continuously operated for at least 16 minutes or more. When the indoor coil temperature rises to 50°F or above, the compressor will start in a 3-minute time delay.

*2 When the indoor coil temperature is 30°F or less, the compressor starts in 6 minutes.

NOTE : By turning OFF the dip switch SW1-3 on indoor controller board, the start temperature of coil frost prevention changes from 34°F to 38°F.

⑤ Coil frost protection
When indoor coil temperature becomes 5°F or below, coil frost protection will proceed as follows.

<Start condition>
After the compressor has been continuously operated for 3 minutes or more, and the indoor coil temperature has been 5°F or below for 3 minutes, the coil frost protection will start.

<Coil frost protection>
Compressor stops for 6 minutes, and then restarts.
If the start condition is satisfied again during the first 10 minutes of compressor operation, both the indoor and outdoor units stop, displaying a check code of “P6” on the remote controller.

<Termination conditions>
Coil frost protection is released when the start condition is not satisfied again during the allowance, or when the COOL mode stops or changes to another mode.

(2) Indoor fan control
Indoor fan speed depends on the remote controller setting.
However, if an outdoor unit abnormality is detected, the indoor fan speed will be low, regardless of the remote controller setting.

When the outdoor unit abnormality detection is released and the fan speed returns to the set speed, the quiet cycle control will work.

(a) Normal control
(i) Fan speed depends on the remote controller setting regardless of the thermostat on/off.
(ii) Fan speed will remain on low if an abnormality in outdoor unit is detected. (5 minutes)

① Start-up of outdoor unit abnormality detection.
② Release of outdoor unit abnormality detection.
③ Unit stop due to outdoor unit abnormality with P8 indication.

NOTE 1 : Fan stops immediately if the unit stops or the check mode is started.
(3) Auto vane control
Auto vane position is set to 10 degrees airflow at the start-up of COOL operation. It can then be changed by the remote controller.

(a) Vane position set mode & swing mode.
(i) Every time AIR DISCHARGE button is pressed, setting will be change.
(ii) Airflow direction can be changed with AIR DISCHARGED button.

1. Fan speed: LOW

   10°  60°  70°  SWING

PK12FK3 does not provide SWING function.

2. Fan speed: HIGH

   10°  30°  60°  70°  SWING

PK12FK3 does not provide SWING function.

<AUTO RETURN>
When discharge 60° or 70° continues for 1 hour with the fan speed at LOW, the discharge direction turns to the horizontal discharge automatically.
After that, 60° or 70° is available by setting with the remote controller, and it continues for 1 hour.
If the discharge direction changes from 60° or 70°, the direction returns to the horizontal discharge when 1 hour has passed since the discharge 60° started.
If the discharge direction changes from 60° (or 70°) to the horizontal discharge, the 1-hour timer to return the horizontal discharge is cancelled.

<Remote controller display>

Changes by pressing the AIR DISCHARGE button.
(4) Detecting abnormalities in the outdoor unit

After the compressor has been continuously operated for 3 minutes, if the difference between the indoor coil temperature and room temperature is out of RANGE C for 1 minute, the indoor fan speed will turn to low. Five minutes later, if the difference is still out of RANGE C, the outdoor unit is functioning abnormally. Thus, the compressor stops and check code “P8” appears on remote controller.

RANGE A: Pipe temperature is more than 9 degrees above room temperature.
RANGE B: Pipe temperature is within 9 degrees either way of room temperature.
RANGE C: Pipe temperature is more than 9 degrees below room temperature.

<table>
<thead>
<tr>
<th>Pipe temperature minus room temperature (degree)</th>
<th>RANGE A</th>
<th>RANGE B</th>
<th>RANGE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>+9</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>0</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>-9</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
</tbody>
</table>
## 1. TROUBLE IN TEST RUN

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>The display “CENTRALLY CONTROLLED” on remote controller does not disappear.</td>
<td>1) Wrong address setting of remote controller/indoor controller board. 2) Timer adapter is connected to the remote controller. 3) Signal transmission error between indoor unit and remote controller.</td>
<td>1) Check the address setting of remote controller and indoor controller. 2) Make sure the timer adapter is used correctly. 3) ① Turn another remote controller’s DIP SW17-7 ON to make it sub controller. ② Connect the sub controller to the unit, and turn circuit breaker ON. ● If the display “centrally controlled” disappears, replace the original remote controller. ● If the display remains the same, replace the indoor controller board.</td>
</tr>
<tr>
<td>When remote controller POWER button is turned ON, the check code “E0” appears.</td>
<td>1) Signal transmission error between indoor unit and remote controller</td>
<td>1) ① Connect a sub remote controller. ② Turn circuit breaker ON.  If the display “centrally controlled” remains, replace the indoor controller board. ③ If the display disappears, turn the remote controller POWER button ON and check as follows.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remote controller</th>
<th>Sub remote controller</th>
<th>Malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Display</td>
<td>E0 Display</td>
<td>Malfunction of indoor unit</td>
</tr>
<tr>
<td>Operating Display</td>
<td>Operating Display</td>
<td>Malfunction of Remote controller</td>
</tr>
<tr>
<td>No Display</td>
<td>E0 Display</td>
<td>Malfunction of Indoor Unit and Remote Controller</td>
</tr>
<tr>
<td>No Display</td>
<td>Operating Display</td>
<td>Malfunction of Remote controller</td>
</tr>
</tbody>
</table>

When remote controller POWER button is turned ON, operating display appears, but disappears soon.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Short circuit of indoor/outdoor connecting wire</td>
<td>1), 2) Check the wire</td>
</tr>
<tr>
<td>2) Short circuit of transmission wire.</td>
<td>3) Turn the circuit breaker OFF, and then turn ON.</td>
</tr>
<tr>
<td>3) Wrong operation of remote controller due to noise wave emitted by other appliances.</td>
<td>If the remote controller remains abnormal, despite the above measures, replace the indoor controller board.</td>
</tr>
</tbody>
</table>

Despite turning POWER button ON, the remote controller display does not appear.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Damaged remote controller.</td>
<td>1) Measure the voltage between terminals of remote controller. If no voltage, remove the terminals and measure the voltage between wires. If the voltage is between 6VDC and 12V, replace the remote controller.</td>
</tr>
<tr>
<td>2) Short circuit of transmission wire.</td>
<td>2) ~ 8) Check each point.</td>
</tr>
<tr>
<td>3) Bad contact of indoor CN40.</td>
<td>If it is not defective, replace the indoor controller board.</td>
</tr>
<tr>
<td>4) CN40 is attached to a sub unit.</td>
<td></td>
</tr>
<tr>
<td>5) Damaged power board.</td>
<td></td>
</tr>
<tr>
<td>6) Bad contact of CN2D.</td>
<td></td>
</tr>
<tr>
<td>7) Blown fuse.</td>
<td></td>
</tr>
<tr>
<td>8) Circuit breaker OFF.</td>
<td></td>
</tr>
</tbody>
</table>
2. SELF DIAGNOSTIC FUNCTION WITH REMOTE CONTROLLER (WIRED REMOTE CONTROLLER)

2-1 When malfunction occurs during operation
When a malfunction occurs, the indoor and outdoor units stop and the malfunction is displayed on the LCD of the remote controller.

(1) ON the set temperature display part, “CHECK” appears, and the unit address and the check code are displayed alternately at one-second intervals. (Check mode)

Example

<table>
<thead>
<tr>
<th>Check code</th>
<th>Unit address</th>
</tr>
</thead>
</table>

(2) When one remote controller controls several units in the group control, the LCD shows the unit address and check code of the first malfunctioning unit.

(3) To cancel the check mode, press the ON/OFF button. In remote ON/OFF control, press the remote ON/OFF switch. In centralised control, turn OFF the ON/OFF button of centralised controller.

NOTE: The latest check code is memorised, even if the check mode is cancelled by the way mentioned above. It takes 60 seconds maximum to display the memorised check code.

2-2 How to use the self diagnostic function for service
A. For normal control with one unit and one remote controller

(1) Pressing the CHECK button on the remote controller twice starts the self diagnostic function.

(2) During the self diagnostic function, “CHECK MODE” appears at two positions on the remote controller display. Then, at least 10 seconds later, the unit address and the check code is alternately displayed at one-second intervals.

(3) Check and repair the unit according to the check code. (Refer to the next page.)

B. For group control using one remote controller

(1) Pressing the CHECK button on the remote controller twice starts the self diagnostic function.

(2) Press the ▲ SET TEMP. button or ▼ SET TEMP. button on the remote controller to advance or go back to the unit address. Each time ▲ SET TEMP. button is pressed, the unit address advances by one. Each time ▼ SET TEMP. button is pressed, the unit address goes back by one.

The check code and the unit address, appear alternately.

(3) The check code “U8” means no malfunction has occurred since installation.

The check code “E0” means the following conditions:
- The unit address displayed on the remote controller does not apply to any unit.
- power is not supplied to the unit.
- Signal transmitting/receiving circuit is abnormal.

(4) Check and repair the unit according to the check code. (Refer to the next page.)
<table>
<thead>
<tr>
<th>Check code</th>
<th>Diagnosis of malfunction</th>
<th>Cause</th>
<th>Check points</th>
</tr>
</thead>
</table>
| E0        | Signal transmitting/receiving error  
(Indoor controller does not respond to remote controller signal.) | During individual unit control  
1) Bad contact of transmission wire  
2) Signal transmitting/receiving circuit is abnormal. | 1) Check the transmission wire.  
2) Check with another remote controller. If “E0” is still indicated, replace the indoor controller board.  
If other check code appears, replace the original remote controller. |
| P1        | Abnormality of room temperature thermistor (RT1) | 1) Bad contact of thermistor  
2) Damaged thermistor | 1) Check the thermistor.  
2) Measure the resistance of the thermistor. Normal resistance should be as follows.  
32°F····15kΩ  
86°F····4.3kΩ  
50°F····9.6kΩ  
104°F···3.0kΩ  
68°F····6.3kΩ  
If the resistance is normal, replace the indoor controller board. |
| P2        | Abnormality of indoor coil thermistor (RT2) | 1) Bad contact of transmission wire  
2) Signal transmitting/receiving circuit is abnormal.  
3) Wrong operation due to noise wave emitted by other appliances | 1) Check the transmission wire.  
2) Check with another remote controller. If “P3” is still indicated, replace the indoor board.  
If other check code appears, replace the original remote controller.  
3) Short-circuit between 1 and 2 of CN40 and attach CN40 to the following units.  
● Second unit in twin control  
● Second and third units in triple control  
● Sub units in group control |
| P3        | Signal transmission error  
(Remote controller does not respond to indoor controller signal.) | 1) Bad contact of transmission wire  
2) Signal transmitting/receiving circuit is abnormal.  
3) Wrong operation due to noise wave emitted by other appliances | 1) Check the transmission wire.  
2) Check with another remote controller. If “P3” is still indicated, replace the indoor board.  
If other check code appears, replace the original remote controller.  
3) Short-circuit between 1 and 3 of CN40 and attach CN40 to the following units.  
● Second unit in twin control  
● Second and third units in triple control  
● Sub units in group control |
| P4        | Abnormality of drain sensor | 1) Bad contact of transmission wire  
2) Damaged thermistor | 1) Check the connector.  
2) Measure the resistance of the thermistor. Normal resistance should be as follows.  
32°F····6kΩ  
59°F····3.2kΩ  
86°F···2.8kΩ  
50°F···3.9kΩ  
104°F···2.2kΩ  
68°F····1.8kΩ  
95°F···1.3kΩ  
If the resistance is normal, replace the indoor controller board. |
| P5        | Malfunction of drain pump  
2) Damaged drain sensor | 1) Malfunction of drain pump  
2) Damaged drain sensor | 1) Check the drain pump.  
2) Check the drain sensor. (Check the drop of water is on.)  
If the resistance is normal, replace the indoor controller board. |
| P6        | Freezing protection/overheating protection is working. | 1) Short cycle of air cycle  
2) Damaged fan  
4) Abnormal refrigerant | 1) Clear obstructions from the air cycle.  
2) Clean the air filter  
3) Check the fan.  
4) Check the refrigerant temperature. |
| P7        | System error | 1) Wrong address-setting  
2) Signal transmitting/receiving circuit of remote controller is abnormal.  
3) Wrong SW6-setting | 1) Check the address-setting.  
2) Check with another remote controller. If check code other than “P7” appears, replace the original remote controller.  
3) Check SW6 setting. |
| P8        | Abnormality in outdoor unit | 1) Wrong wiring of indoor/outdoor connecting wire  
2) Reversed phase  
3) Protection device is working  
4) Damaged outdoor coil thermistor | 1) Check the indoor/outdoor connecting wire.  
2) Change the connection of electric wiring.  
3) Check the protection device.  
4) Measure the resistance of the outdoor coil thermistor. If the resistance is normal, replace the outdoor controller board. |
4. OTHER TROUBLES AND CAUSES

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vane motor does not work.</td>
<td>Vane motor is damaged.</td>
</tr>
<tr>
<td>Limit switch does not work.</td>
<td>Vane motor relay is damaged.</td>
</tr>
<tr>
<td>Connector is poorly connected.</td>
<td>Limit switch is damaged.</td>
</tr>
<tr>
<td>Vane motor is poorly assembled.</td>
<td>The size of the cam is wrong.</td>
</tr>
</tbody>
</table>

Unit stops after 5 to 20 seconds operation Protection function is working. Refer to check code on remote controller display. See page OC274-40.

Air discharge display is OFF and air discharge button does not operate. Indoor controller board deems the auto vanes are not attached to the unit. Indoor controller is damaged. Dip switch setting is wrong. Indoor controller is damaged. Vane motor is damaged. Vane motor limit switch is poorly connected. Auto vane is wired after power is turned to ON. Indoor controller is damaged. Vane motor limit switch is damaged. Vane motor is damaged. Poorly connected

In this case, remote controller is normal.

Power ON/OFF button is not available. Beep sound is heard, but display is turned OFF. Indoor/outdoor connecting wire is connected incorrectly. Indoor/outdoor connecting wire shorts. Compressor protector is damaged. Defroster is broken.

Beep sound is not heard, and display remains OFF. Remote controller is damaged. Transmission wire is damaged. Connector is poorly connected. Indoor terminal block is poorly connected. Remote controller terminal block is poorly connected.

“CENTRALLY CONTROLLED” is displayed.
### 5. HOW TO CHECK THE PARTS

<table>
<thead>
<tr>
<th>Parts name</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room temperature thermistor (RT1)</td>
<td>Disconnect the connector, then measure the resistance using a tester.</td>
</tr>
<tr>
<td>Pipe temperature thermistor (RT2)</td>
<td>(Surrounding temperature 50°F to 86°F)</td>
</tr>
<tr>
<td></td>
<td>(Refer to the thermistor)</td>
</tr>
<tr>
<td><strong>Normal</strong></td>
<td><strong>Abnormal</strong></td>
</tr>
<tr>
<td>4.3kΩ to 9.6kΩ</td>
<td>Open or short</td>
</tr>
</tbody>
</table>

#### Fan motor (MF)

Measure the resistance between the terminals using a tester. (Surrounding temperature 68°F)

<table>
<thead>
<tr>
<th>Motor terminal or Relay connector</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PK</td>
<td>Open or short</td>
</tr>
<tr>
<td>12FK3</td>
<td>18,24FK3</td>
<td>30,36FK3</td>
</tr>
<tr>
<td>Red-Black</td>
<td>34.81Ω±10%</td>
<td>33.1Ω±10%</td>
</tr>
<tr>
<td>White-Black</td>
<td>40.84Ω±10%</td>
<td>30.8Ω±10%</td>
</tr>
</tbody>
</table>

Opening and closing temperature of protector.
Open: 266±41°F (Fan motor OFF)
Close: 176±68°F (Fan motor ON)

#### Vane motor (MV)

Measure the resistance between the terminals using a tester. (Surrounding temperature 68°F to 86°F)

<table>
<thead>
<tr>
<th>Brown-Yellow</th>
<th>Brown-Blue</th>
<th>Red-Orange</th>
<th>Red-Pink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Abnormal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>186 to 214Ω</td>
<td>Open or short</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<Thermistor Characteristic graph>

Thermistor \( R_0 = 15k\Omega \pm 3\% \)
Fixed number of \( B = 3480k\Omega \pm 2\% \)

\[
R_t = 15 \exp \left\{ 3480 \left(\frac{1}{273+t} - \frac{1}{273}\right) \right\}
\]

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32°F</td>
<td>15kΩ</td>
</tr>
<tr>
<td>50°F</td>
<td>9.6kΩ</td>
</tr>
<tr>
<td>68°F</td>
<td>6.3kΩ</td>
</tr>
<tr>
<td>77°F</td>
<td>5.4kΩ</td>
</tr>
<tr>
<td>86°F</td>
<td>4.3kΩ</td>
</tr>
<tr>
<td>104°F</td>
<td>3.0kΩ</td>
</tr>
</tbody>
</table>
4. How to check the parts  PL12AK/PL18AK/PL24AK/PL30AK/PL36AK/PL42AK

<table>
<thead>
<tr>
<th>Parts name</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room temperature thermistor</td>
<td>Disconnect the connector then measure the resistance using a tester.</td>
</tr>
<tr>
<td>Liquid pipe thermistor</td>
<td>(Surrounding temperature 50°F~86°F)</td>
</tr>
<tr>
<td></td>
<td>Normal                         Abnormal</td>
</tr>
<tr>
<td></td>
<td>4.3kΩ~9.6kΩ                    Open or short</td>
</tr>
</tbody>
</table>

(Refer to the thermistor)

- **Vane motor**
  - Measure the resistance between the terminals using a tester.  
  - (Surrounding temperature 68°F~86°F)
  - Connector
  - Normal
  - Abnormal
  - Red Ñ Yellow: 300Ω
  - Red Ñ Blue
  - Red Ñ Orange
  - Red Ñ White

- **Fan motor**
  - Measure the resistance between the terminals using a tester.  
  - (Surrounding temperature 68°F~86°F)
  - Motor terminal or Relay connector
  - Normal
  - Abnormal
  - PL
  - 12/18AK: 21.7Ω
  - 24/36/42AK: 8.5Ω
  - Open or short

- **Drain pump**
  - Measure the resistance between the terminals using a tester.  
  - (Surrounding temperature 68°F~86°F)
  - Normal
  - Abnormal
  - 101Ω
  - Open or short

- **Drain sensor**
  - Measure the resistance between the terminals using a tester.  
  - (Surrounding temperature 50°F~86°F)
  - Normal
  - Abnormal
  - 0.6kΩ~6.0kΩ
  - Open or short

(Refer to the thermistor)
## 5. How to check the parts

<table>
<thead>
<tr>
<th>Parts name</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room temperature thermistor (RT1)</td>
<td>Disconnect the connector then measure the resistance using a tester.</td>
</tr>
<tr>
<td>Liquid pipe thermistor (RT2)</td>
<td>(Ambient temperature 50°F to 86°F)</td>
</tr>
<tr>
<td></td>
<td>(Refer to the thermistor)</td>
</tr>
<tr>
<td></td>
<td><strong>Normal</strong></td>
</tr>
<tr>
<td></td>
<td>4.3kΩ to 9.6kΩ</td>
</tr>
<tr>
<td>Vane motor (MV)</td>
<td>Measure the resistance between the terminals using a tester.</td>
</tr>
<tr>
<td></td>
<td>(Ambient temperature 77°F)</td>
</tr>
<tr>
<td></td>
<td><strong>Connector</strong></td>
</tr>
<tr>
<td></td>
<td>PC24/30/36/42GK</td>
</tr>
<tr>
<td></td>
<td>PC24/30/36/42GK</td>
</tr>
<tr>
<td></td>
<td>PC24/30/36/42GK</td>
</tr>
<tr>
<td></td>
<td>PC24/30/36/42GK</td>
</tr>
<tr>
<td>Fan motor (MF)</td>
<td>Measure the resistance between the terminals using a tester.</td>
</tr>
<tr>
<td></td>
<td>(Ambient temperature 77°F)</td>
</tr>
<tr>
<td></td>
<td><strong>Motor terminal or Relay connector</strong></td>
</tr>
<tr>
<td></td>
<td>PC</td>
</tr>
<tr>
<td></td>
<td>PC</td>
</tr>
<tr>
<td></td>
<td>PC</td>
</tr>
<tr>
<td></td>
<td>PC</td>
</tr>
<tr>
<td></td>
<td>PC</td>
</tr>
</tbody>
</table>

Opening and closing temperature of protector.  
Open: 266±41°F (Fan motor OFF)  
Close: 176±68°F (Fan motor ON)

<Thermistor Characteristic graph>

Thermistor R₀=15kΩ ± 3%  
Fixed number of B=3480kΩ ± 2%

\[ R_t = 15 \exp \left\{ \frac{1}{273 + \{(t-32)/1.8\}} - \frac{1}{273} \right\} \]

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32°F</td>
<td>15kΩ</td>
</tr>
<tr>
<td>50°F</td>
<td>9.6kΩ</td>
</tr>
<tr>
<td>68°F</td>
<td>6.3kΩ</td>
</tr>
<tr>
<td>77°F</td>
<td>5.4kΩ</td>
</tr>
<tr>
<td>86°F</td>
<td>4.3kΩ</td>
</tr>
<tr>
<td>104°F</td>
<td>3.0kΩ</td>
</tr>
</tbody>
</table>

< Thermistor for lower temperature >
1. Protection function
   (1) As soon as a reversed phase, an open phase, or a P.C. board trouble is sensed, the operation stops and the check code is displayed by LED on the outdoor controller board.
   (2) When a protection function such as high pressure switch and overcurrent relay works for the first time, the operation stops and restarts after 3-minute time delay mode. When the second protection function works, the operation stops and the check code is displayed by LED. This condition continues until the outdoor unit receives OFF command from the indoor controller board. Check code indication continues until the outdoor unit receives the ON command from the indoor controller board.
   (3) The second protection function is not necessary to be the same as the first one. The content of the second protection function is loaded in the memory, which is cleared when SW1 turns to ON or the next check mode starts.

2. Control by outdoor coil thermistor
   (1) Unit control
      Outdoor coil temperature range for control is from -40°F to 194°F. When reading 194°F or above, the outdoor coil thermistor is regarded as short-circuit. When reading -40°F or below, the outdoor coil thermistor is regarded as open-circuit. An open circuit is not sensed for the first 7 min. after the compressor start up, but is sensed during defrosting operation or for the first 10 seconds after the compressor start-up.
   (2) Target temperature of outdoor coil temperature
      Fan rotational frequency is controlled so that the outdoor coil temperature keeps 95°F ± 4°F.

3. Unit operation control
   The compressor receives signal from the indoor unit and make the outdoor unit start or stop.

4. Fan control
   Fan rotational frequency is phase-controlled so that the outdoor coil temperature reaches the target temperature. This control enables cooling operation even if the outdoor temperature is low. Fan rotational frequency is adjusted by fan output. Fan output is divided into 256 steps from 0 to 255 and is controlled every 30 seconds.
   (1) Initial setting
      A. When power is turned to on, or when the compressor restarts after interval of 30 minutes or more :
         ● If the outdoor coil thermistor reads 46°F or above, the fan output step becomes 100.
         ● If the outdoor coil thermistor reads below 46°F, the fan output step becomes 200.
      B. When the compressor restarts within 30 minutes after stop, the fan output step is the same as the fan output before the compressor stops.
      C. When the operation mode is changed within 30 minutes after the compressor stop, the fan output step becomes 100.
      D. When the operation mode is changed after the compressor interval of more than 30 minutes, the fan output step is the same as described in A.
   (2) For the first 2 minutes after the compressor start-up, the fan operates at the initial setting output, and then every other 30 seconds, the fan output is adjusted depending on the difference between the outdoor coil temperature and the target temperature. But as soon as the outdoor coil temperature becomes 122°F or above, the fan output step becomes 255.
   (3) When the outdoor coil thermistor reads 122°F or above, the fan output step becomes 255.
   (4) When the high pressure switch (63H1) functions, the fan output step becomes 255. After that, when the switch returns, the fan control returns to the normal control.

5. Crankcase heater control
   (1) With jumper wire J3
      The crankcase heater is ON from the power is turned to on till the compressor starts, and turns to ON 1 hour after the compressor stop.
   (2) Without jumper wire J3
      The crankcase heater is ON from the power is turned to on till the compressor starts, and repeats ON/OFF on a 1-hour schedule.
6. Fixed fan-output

While the compressor is operating and the fan output step is indicated by LED, pushing SW2 fixes the fan output of that time. The fixed fan-output can be released when either of the following conditions is satisfied.

1. SW2 is pushed again.
2. SW3 setting is changed.
3. The compressor stops.

7. Function of switches on the outdoor controller board

SW1 : Clears the check code memory (push-button switch)
SW2 : Switches the output state indication and the check code display (push-button switch)
SW3-1 and 3-2 : Switches the output state indication items (dip-switch)

For further information, please refer to page 18.

8. Operation during the power-on-reset state

(1) When the circuit breaker is turned to ON, the microprocessor enters the power-on-reset state, which continues until the direct current for the microprocessor control reaches 12V. Then the microprocessor starts operation in the following order.

1. Each I/O port clearance
2. Function input
   Function depends on jumper wires set beforehand in the factory.

(2) If an open phase or a reversed phase is sensed, LED blinks every other second.

NOTE

❈ If power is not supplied to the transformer and the microprocessor, the microprocessor does not work and can sense neither a reversed phase nor an open phase.
❈ If a contact point of protective device such as the high pressure switch has already been opened in the power-on-reset state, it is regarded as an open phase.
In this case, all LED are OFF.

9. 100% fan output

Fan output is fixed to 255 (100%) by shorting CN22. However, the fan stops during compressor OFF or defrosting operation. Open circuit of CN22 enables the fan control to start.

10. Time shortening

Short circuit of CN21 shortens the time listed below.

1) Fan control period : 30 sec. → 3 sec.
2) Three-minute time delay function : 3 min. → 3 sec.
3) Compressor ON/OFF time for bypass valve ON/OFF : 30 min. → 30 sec.
4) Compressor ON time to start other functions : x min. → x sec.
1. SERVICE DATA INDICATION BY SWITCHES ON OUTDOOR CONTROLLER BOARD

Setting dip switches SW2 and SW3 on the outdoor controller board enables LED to show the output state and check code. Output state is shown by LED lighting, and check code by blinking.

SW1 : Turning SW1 ON clears the check code. If SW1 is turned ON while the check code is blinking, the indication changes to output state indication.

**NOTE** : SW1 is usually available independent of SW3 setting. As an exception, when the check code shows a reversed phase or an open phase during the power-on-reset state, SW1 is not available.

SW2 : SW2 is turned ON by pressing, and OFF by releasing.
- When SW3-1 and SW3-2 are OFF, pressing SW2 changes indication between output state and check code alternately.
- When SW2 is turned On with SW3-1 OFF and SW3-2 ON, the compulsory defrosting starts.

SW3 : Output state indication items depend on the combination of SW3-1 ON/OFF and SW3-2 ON/OFF.

### Trouble Shooting

<table>
<thead>
<tr>
<th>Check code</th>
<th>Outdoor coil temperature (bit)</th>
<th>Fan output step (bit)</th>
<th>Total time of compressor operation (Hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW3-1 OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>SW3-2 OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LED</th>
<th>Blinking</th>
<th>Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD1</td>
<td>Reversed phase</td>
<td>Compressor ON command from indoor controller</td>
</tr>
<tr>
<td>LD2</td>
<td>Open phase</td>
<td>Heating operation command from indoor controller</td>
</tr>
<tr>
<td>LD3</td>
<td>Outdoor coil thermistor is abnormal.</td>
<td>During 63H1 function</td>
</tr>
<tr>
<td>LD4</td>
<td>63H2 function</td>
<td>Compressor ON</td>
</tr>
<tr>
<td>LD5</td>
<td>51C function</td>
<td>Outdoor fan ON</td>
</tr>
<tr>
<td>LD6</td>
<td>26C function</td>
<td>4-way valve ON</td>
</tr>
<tr>
<td>LD7</td>
<td>Overheat protection</td>
<td>Bypass valve ON</td>
</tr>
<tr>
<td>LD8</td>
<td>Input circuit on controller board is abnormal</td>
<td>Crankcase heater ON</td>
</tr>
</tbody>
</table>

---

OC247A-18
1-1 Outdoor coil temperature
To obtain data on the outdoor coil temperature, add the number of bits of lighting LEDs, and see the graph to find the temperature.

1-2 Fan output step
To obtain data on the fan output step, add the number of bits of lighting LEDs, and see the graph below to find the fan rotational frequency.

1-3 Total time of compressor operation
Compressor operation time is indicated in 256 hour units. To obtain the compressor operation time, add the hours of lighting LEDs. During the compressor operation time indication, SW2 is not available.

1-4 Check code indication
● When a protection function works for the first time during operation, the operation stops and restarts after the 3-minutes time delay mode. When the protection function works again, the operation stops. (Check mode) When both SW3-1 and SW3-2 are OFF, the check code is indicated.
● If the outdoor controller board receives the compressor ON command from the indoor controller board during check mode the indication changes to output state indication.
● By pressing SW2 during normal operation, operation will continue.
● The latest check code is indicated.
## 2. TROUBLESHOOTING ACCORDING TO CHECK CODE

<table>
<thead>
<tr>
<th>Blinking LED</th>
<th>Diagnosis of malfunction</th>
<th>Cause</th>
<th>Check point</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD1</td>
<td>Reversed phase</td>
<td>This model does not have this function.</td>
<td>No need to be checked.</td>
</tr>
<tr>
<td>LD2</td>
<td>Open phase</td>
<td>This model does not have this function.</td>
<td>No need to be checked.</td>
</tr>
</tbody>
</table>
| LD3          | Outdoor coil thermistor is abnormal. (Open circuit or short circuit) | ● Outdoor coil thermistor is broken.  
● Thermistor was connected incorrectly. | ● Measure the resistance of the thermistor.  
● Check the thermistor. If normal, replace the outdoor controller board. |
| LD4          | High pressure switch (63H2) function | ● 63H2 was badly connected.  
● 63H2 was working. | ● Check 63H2 and the outdoor fan motor.  
● Check if refrigerant supply is low.  
● Check if air cycle is short-cycled. |
| LD5          | Thermal relay function   | This model does not have this function. | No need to be checked. |
| LD6          | Thermal switch (26C) function | ● 26C was connected incorrectly.  
● 26C is working. | ● Check 26C.  
● Check if refrigerant supply is low.  
● Check if the capillary tube is clogged. |
| LD7          | Over heat protection     | ● The thermistor is broken.  
● Coil temperature is over 153°F. | ● Measure the resistance of the thermistor.  
● Check the outdoor fan motor.  
● Check if air cycle is short-cycled. |
| LD8          | Input circuit of outdoor controller board is abnormal. | ● Pulse input is abnormal. | ● Replace the outdoor controller board. |

## 3. WHEN OUTDOOR UNIT DOES NOT WORK

<table>
<thead>
<tr>
<th>Cause</th>
<th>Check points</th>
</tr>
</thead>
</table>
| 1) Indoor/outdoor connecting wires are poorly connected. (Refer to next page.)  
2) Power supply is poorly connected.  
3) Connector or transformer is broken.  
4) Fuse (6A) in the outdoor controller board is blown. | 1) Check the connecting wires.  
2) Check the power supply.  
3) Check connector and transformers.  
4) Check the fuse. |
4. WRONG WIRING ON SITE
4-1 Between remote controller and indoor unit
If wire is disconnected between the remote controller and the indoor unit, the POWER ON display does not appear despite turning the power switch ON. The beep sound is not heard, either.

4-2 Phenomena due to wrong wiring between indoor and outdoor units

<table>
<thead>
<tr>
<th>Wrong wiring</th>
<th>Thermostat</th>
<th>Phenomena</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor unit 1 to Outdoor unit 1</td>
<td>OFF</td>
<td>The outdoor unit stops.</td>
</tr>
<tr>
<td>Outdoor unit 2 to Indoor unit 2</td>
<td>OFF</td>
<td>The outdoor unit stops.</td>
</tr>
<tr>
<td>Disconnect between 1 and 1 or 2 and 2.</td>
<td>OFF</td>
<td>Operation stops.</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>9 minutes later, the check code “P8” appears on the remote controller display.</td>
</tr>
</tbody>
</table>

5. HOW TO CHECK THE PARTS

<table>
<thead>
<tr>
<th>Parts name</th>
<th>Check points</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTDOOR COIL THERMISTOR (TH3)</td>
<td>Disconnect the connector then measure the resistance using a tester. (Surrounding temperature 50°F~86°F)</td>
</tr>
<tr>
<td></td>
<td>Normal Abnormal</td>
</tr>
<tr>
<td></td>
<td>4.3kΩ~9.6kΩ Open or short</td>
</tr>
<tr>
<td>FAN MOTOR (MF1,2,3,4) [Pu12,18,24,30]</td>
<td>Measure the resistance between the terminals using a tester. (Surrounding temperature 68°F)</td>
</tr>
<tr>
<td>Motor terminal or Relay connector</td>
<td>Normal Abnormal</td>
</tr>
<tr>
<td>PU12,18</td>
<td>PU24,30</td>
</tr>
<tr>
<td>White - Blue</td>
<td>77.3Ω</td>
</tr>
<tr>
<td>Blue - Red (Brown)</td>
<td>134.6Ω</td>
</tr>
<tr>
<td>CRANKCASE HEATER (HC)</td>
<td>Measure the resistance between the terminals using a tester.</td>
</tr>
<tr>
<td></td>
<td>Normal Abnormal</td>
</tr>
<tr>
<td></td>
<td>PU12,18</td>
</tr>
</tbody>
</table>

OUTDOOR UNIT