# Maintenance Manual

## R290 Monoblock

## Air to Water Heat Pump

| Capacity | Models |
|---|---|
| 4kw | ACHP-H04/4R2HA-M<br>ACHP-H04/4R2HA-M(NE) |
| 6kw | ACHP-H06/4R2HA-M<br>ACHP-H06/4R2HA-M(NE) |
| 8kw | ACHP-H08/4R2HA-M<br>ACHP-H08/5R2HA-M<br>ACHP-H08/4R2HA-M(NE) |
| 10kw | ACHP-H10/4R2HA-M<br>ACHP-H10/5R2HA-M<br>ACHP-H10/4R2HA-M(NE) |
| 12kw | ACHP-H12/4R2HA-M<br>ACHP-H12/5R2HA-M<br>ACHP-H12/4R2HA-M(NE)<br>ACHP-H12/5R2HA-M(NE) |
| 14kw | ACHP-H14/4R2HA-M<br>ACHP-H14/5R2HA-M<br>ACHP-H14/4R2HA-M(NE)<br>ACHP-H14/5R2HA-M(NE) |
| 16kw | ACHP-H16/4R2HA-M<br>ACHP-H16/5R2HA-M<br>ACHP-H16/4R2HA-M(NE)<br>ACHP-H16/5R2HA-M(NE) |

Version 2

2024-07-01

# Contents

# Part 1 General Information

## 1.1 Unit Capacities and External Appearance

| Capacity | Model | Appearance |
|---|---|---|
| **4kW** | ACHP-H04/4R2HA-M<br>ACHP-H04/4R2HA-M(NE) |  |
| **6kW** | ACHP-H06/4R2HA-M<br>ACHP-H06/4R2HA-M(NE) | |
| **8kW** | ACHP-H08/4R2HA-M<br>ACHP-H08/5R2HA-M<br>ACHP-H08/4R2HA-M(NE) |  |
| **10kW** | ACHP-H10/4R2HA-M<br>ACHP-H10/5R2HA-M<br>ACHP-H10/4R2HA-M(NE) | |
| **12kW** | ACHP-H12/4R2HA-M<br>ACHP-H12/5R2HA-M<br>ACHP-H12/4R2HA-M(NE)<br>ACHP-H12/5R2HA-M(NE) | |
| **14kW** | ACHP-H14/4R2HA-M<br>ACHP-H14/5R2HA-M<br>ACHP-H14/4R2HA-M(NE)<br>ACHP-H14/5R2HA-M(NE) | |
| **16kW** | ACHP-H16/4R2HA-M<br>ACHP-H16/5R2HA-M<br>ACHP-H16/4R2HA-M(NE)<br>ACHP-H16/5R2HA-M(NE) | |

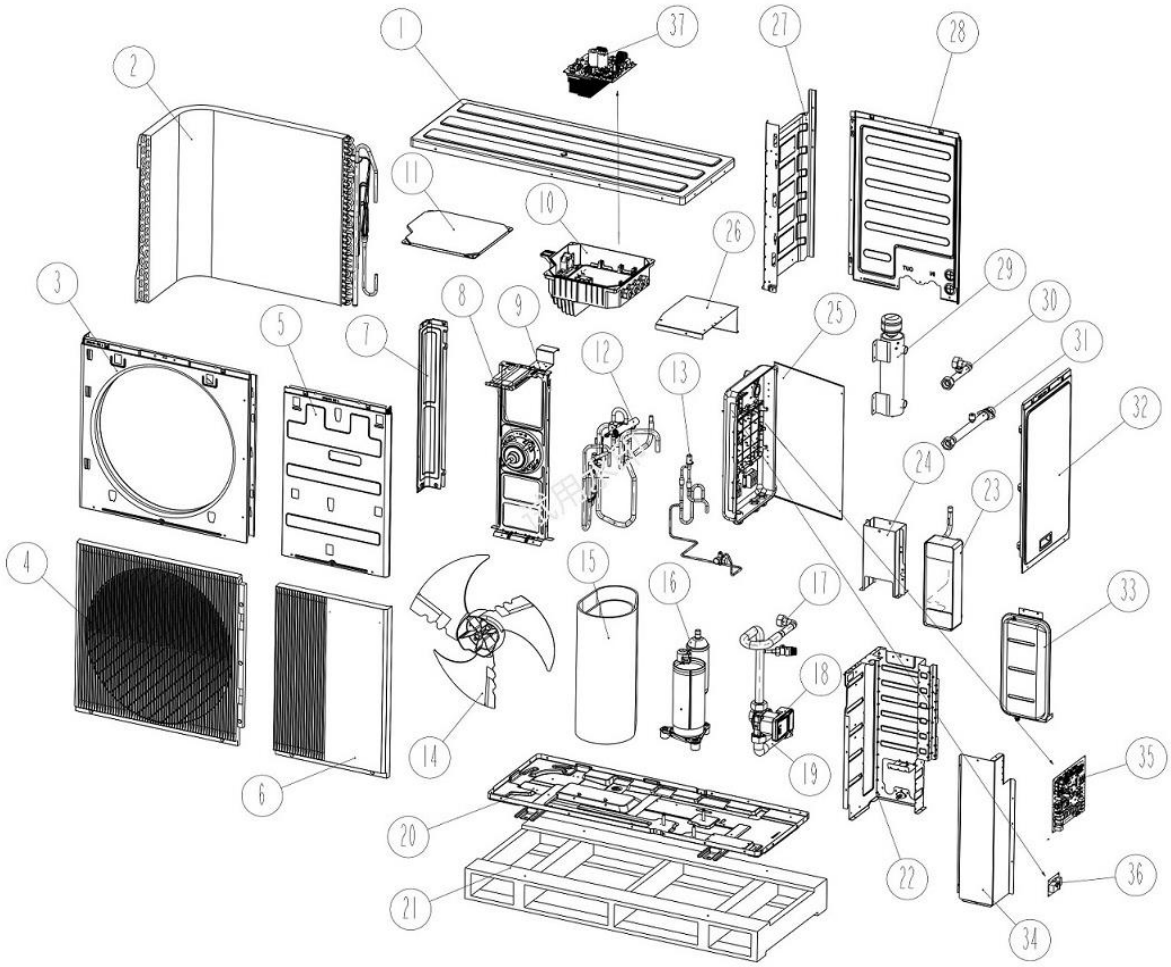
※ “NE” means “no electric heating”

# Part 2 Component Layout and Refrigerant Circuits

## 2.1 Explosion pattern

### 2.1.1 4kw/6kw

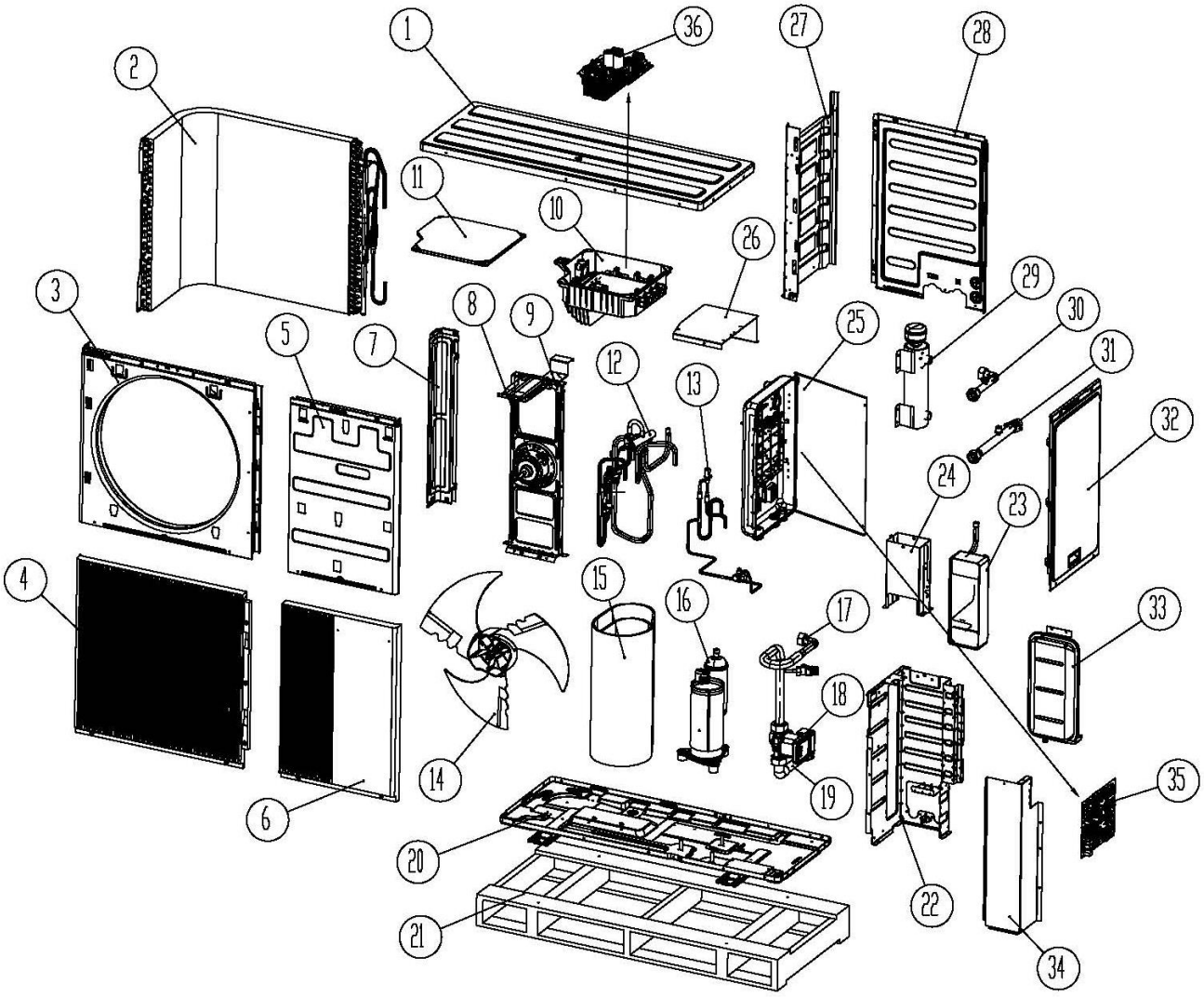
2.1.1.1 ACHP-H04/4R2HA-M；ACHP-H06/4R2HA-M



| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000046 | Top cover plate assembly | 1 |
| 2 | 16324020000170 | Condenser assembly | 1 |
| 3 | 16421061000067 | Big panel | 1 |
| 4 | 16420013000086 | Plastic filter of panel (1) | 1 |
| 5 | 16321064000068 | Small panel assembly | 1 |
| 6 | 16420013000087 | Plastic filter of panel (2) | 1 |
| 7 | 16421112000048 | Vertical shaft | 1 |
| 8 | 16430034000034 | Motor | 1 |
| 9 | 11321002000050 | Motor holder assembly | 1 |
| 10 | 16322020000030 | Electric assembly | 1 |
| 11 | 16422018000031 | Cover of electric controller box | 1 |
| 12 | 16325020000154 | Four-way valve pipeline assembly | 1 |

| | | | |
|---|---|---|---|
| 13 | 16325034000063 | Expansion valve line assembly | 1 |
| 14 | 11320009000075 | Axial flow fan | 1 |
| 15 | 16434006000160 | Silencing cotton | 1 |
| 16 | 16438003000057 | Compressor | 1 |
| 17 | 16325050000014 | Water pump inlet pipe assembly | 1 |
| 18 | 16440002000023 | Circulating water pump | 1 |
| 19 | 16325050000013 | Water pump outlet pipe assembly | 1 |
| 20 | 16321018000129 | Chassis assembly | 1 |
| 21 | 16433002000225 | Timber chassis | 1 |
| 22 | 16421002000573 | Fixed plate | 1 |
| 23 | 16325041000022 | Plate changer assembly | 1 |
| 24 | 16421123000008 | Protective case | 2 |
| 25 | 16322020000031 | Electric control assembly of water system | 1 |
| 26 | 16321052000078 | Fixed plate assembly of compressor (1) | 1 |
| 27 | 16321038000015 | Partition board assembly | 1 |
| 28 | 16321051000004 | Rear plate assembly | 1 |
| 29 | 16430021000042 | Electric heater | 1 |
| 30 | 16325049000009 | Plate outlet pipe assembly | 1 |
| 31 | 16325049000010 | Water inlet pipe assembly | 1 |
| 32 | 16321052000076 | Right side panel assembly | 1 |
| 33 | 16445001000010 | Expansion tank | 1 |
| 34 | 16321052000077 | Fixed plate assembly of compressor (2) | 1 |
| 35 | 11222542000168 | Water system control PCB | 1 |
| 36 | 11222542000169 | Relay expansion board | 1 |
| 37 | 11222550000077 | Refrigerant system control PCB | 1 |

## 2.1.1.2 ACHP-H04/4R2HA-M(NE); ACHP-H06/4R2HA-M(NE)

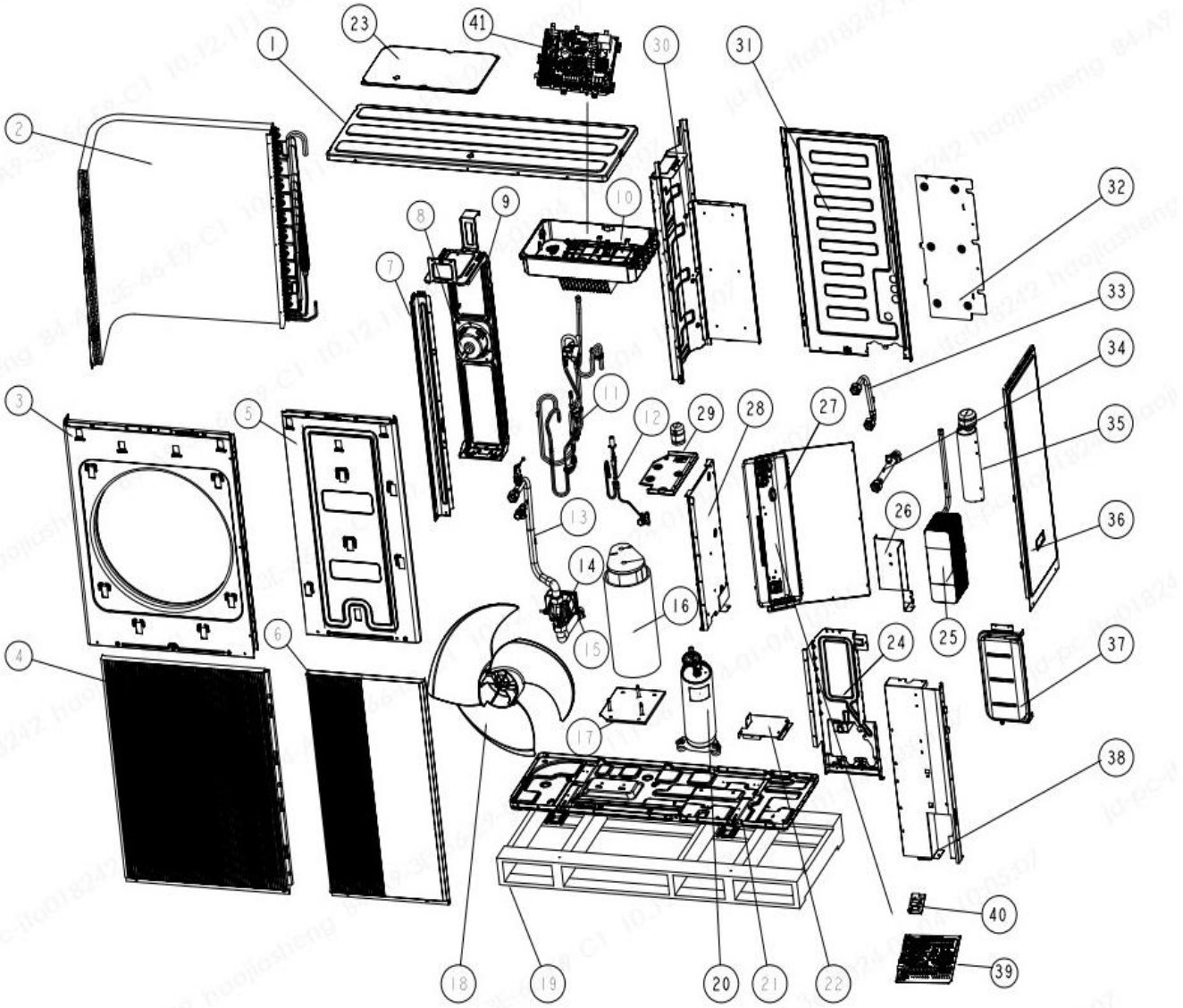



| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000046 | Top cover plate assembly | 1 |
| 2 | 16324020000170 | Condenser assembly | 1 |
| 3 | 16421061000067 | Big panel | 1 |
| 4 | 16420013000086 | Plastic filter of panel (1) | 1 |
| 5 | 16321064000068 | Small panel assembly | 1 |
| 6 | 16420013000087 | Plastic filter of panel (2) | 1 |
| 7 | 16421112000048 | Vertical shaft | 1 |
| 8 | 16430034000034 | Motor | 1 |
| 9 | 11321002000050 | Motor holder assembly | 1 |
| 10 | 16322020000040 | Electric assembly | 1 |
| 11 | 16422018000031 | Cover of electric controller box | 1 |
| 12 | 16325020000154 | Four-way valve pipeline assembly | 1 |
| 13 | 16325034000063 | Expansion valve line assembly | 1 |
| 14 | 11320009000075 | Axial flow fan | 1 |
| 15 | 16434006000160 | Silencing cotton | 1 |
| 16 | 16438003000057 | Compressor | 1 |
| 17 | 16325050000014 | Water pump inlet pipe assembly | 1 |
| 18 | 16440002000023 | Circulating water pump | 1 |
| 19 | 16325050000013 | Water pump outlet pipe assembly | 1 |

| | | | |
|---|---|---|---|
| 20 | 16321018000129 | Chassis assembly | 1 |
| 21 | 16433002000225 | Timber chassis | 1 |
| 22 | 16421002000573 | Fixed plate | 1 |
| 23 | 16325041000022 | Plate changer assembly | 1 |
| 24 | 16421123000008 | Protective case | 2 |
| 25 | 16322017000017 | Electric control assembly of water system | 1 |
| 26 | 16321052000078 | Fixed plate assembly of compressor (1) | 1 |
| 27 | 16321038000015 | Partition board assembly | 1 |
| 28 | 16321051000004 | Rear plate assembly | 1 |
| 29 | 16426030000307 | Gas-liquid separator | 1 |
| 30 | 16325049000009 | Plate outlet pipe assembly | 1 |
| 31 | 16325049000010 | Water inlet pipe assembly | 1 |
| 32 | 16321052000076 | Right side panel assembly | 1 |
| 33 | 16445001000010 | Expansion tank | 1 |
| 34 | 16321052000077 | Fixed plate assembly of compressor (2) | 1 |
| 35 | 11222542000168 | Water system control PCB | 1 |
| 36 | 11222550000077 | Refrigerant system control PCB | 1 |

### 2.1.2 8kw/10kw

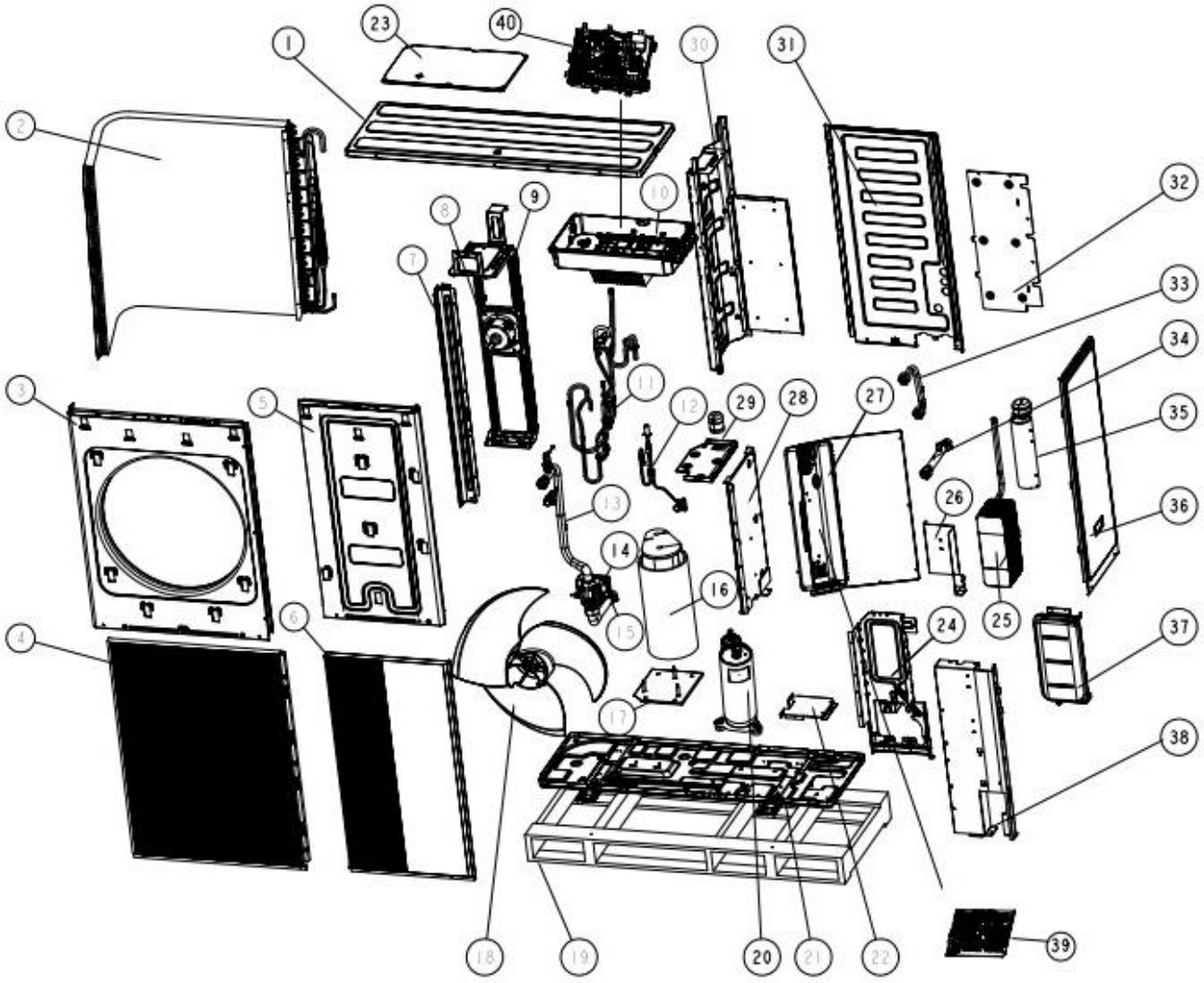
#### 2.1.2.1 ACHP-H08/4R2HA-M；ACHP-H10/4R2HA-M




| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000168 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right Side Decorated Plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000011 | Motor holder assembly | 1 |
| 10 | 16322020000034 | Electric assembly | 1 |
| 11 | 16325020000152 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000061 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000149 | Silencing cotton | 1 |

| | | | |
|---|---|---|---|
| 17 | 16321026000002 | Compressor tray assembly | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000058 | Compressor | 1 |
| 21 | 16321018000126 | Chassis assembly | 1 |
| 22 | 16421126000005 | Chassis A | 1 |
| 23 | 16422018000030 | Driver board mounting box | 1 |
| 24 | 16421099000006 | Reservoir holder | 1 |
| 25 | 16325041000020 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000015 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate assembly of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate outlet pipe assembly | 1 |
| 35 | 16430021000042 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 11222542000168 | Water system control PCB | 1 |
| 40 | 11222542000169 | Relay expansion board | 1 |
| 41 | 11222543000127 | Refrigerant system control PCB | 1 |

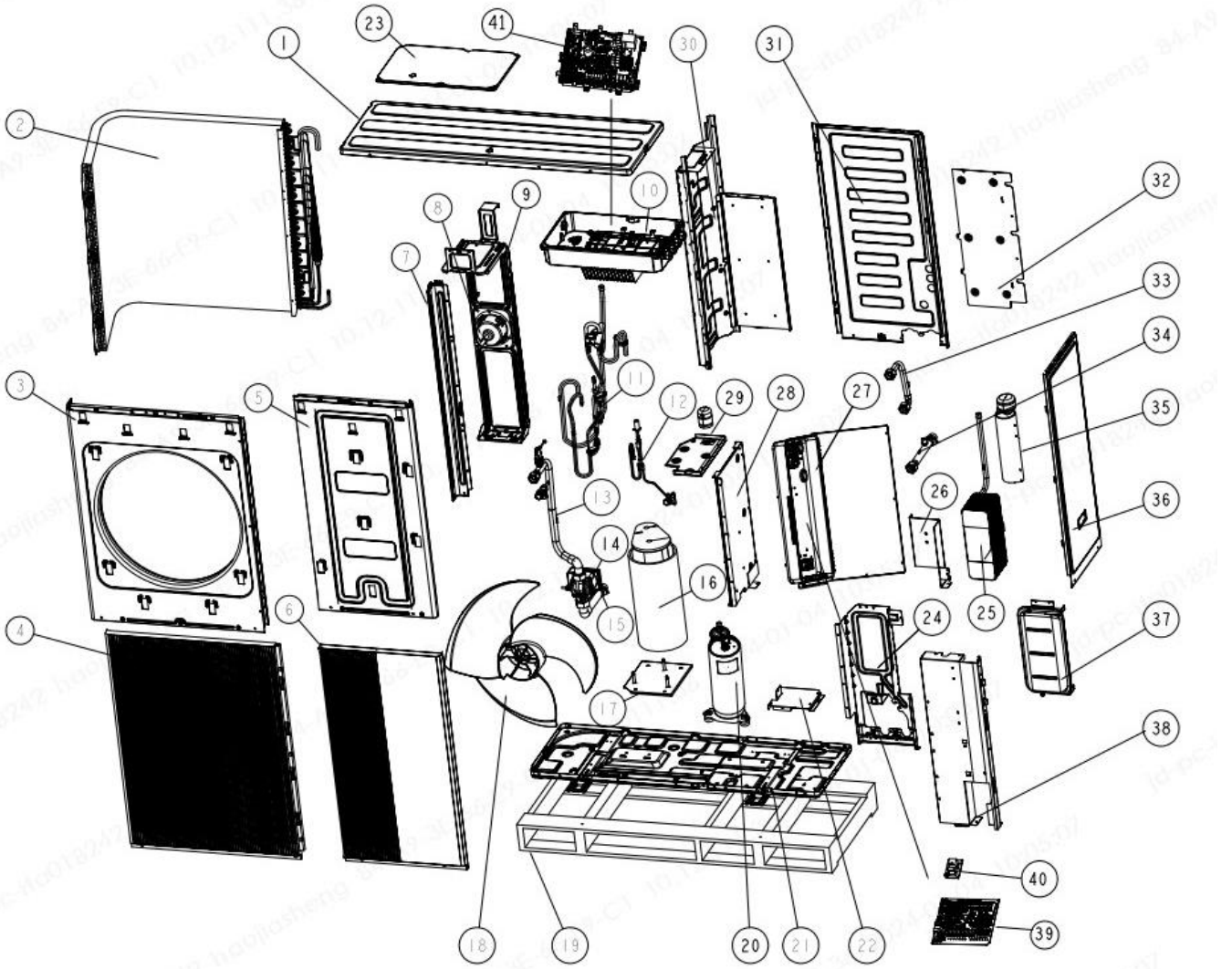
## 2.1.2.2 ACHP-H08/4R2HA-M(NE); ACHP-H10/4R2HA-M(NE)




| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000168 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right Side Decorated Plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000011 | Motor holder assembly | 1 |
| 10 | 16322020000038 | Electric assembly | 1 |
| 11 | 16325020000152 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000061 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000149 | Silencing cotton | 1 |
| 17 | 16321026000002 | Compressor tray assembly | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000058 | Compressor | 1 |

| | | | |
|---|---|---|---|
| 21 | 16321018000126 | Chassis assembly | 1 |
| 22 | 16421126000005 | chassis A | 1 |
| 23 | 16422018000030 | Driver board mounting box | 1 |
| 24 | 16421099000006 | Reservoir holder | 1 |
| 25 | 16325041000020 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000016 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate assembly of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate outlet pipe assembly | 1 |
| 35 | 16426030000307 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 11222542000168 | Water system control PCB | 1 |
| 40 | 11222543000127 | Refrigerant system control PCB | 1 |

## 2.1.2.3 ACHP-H08/5R2HA-M; ACHP-H10/5R2HA-M

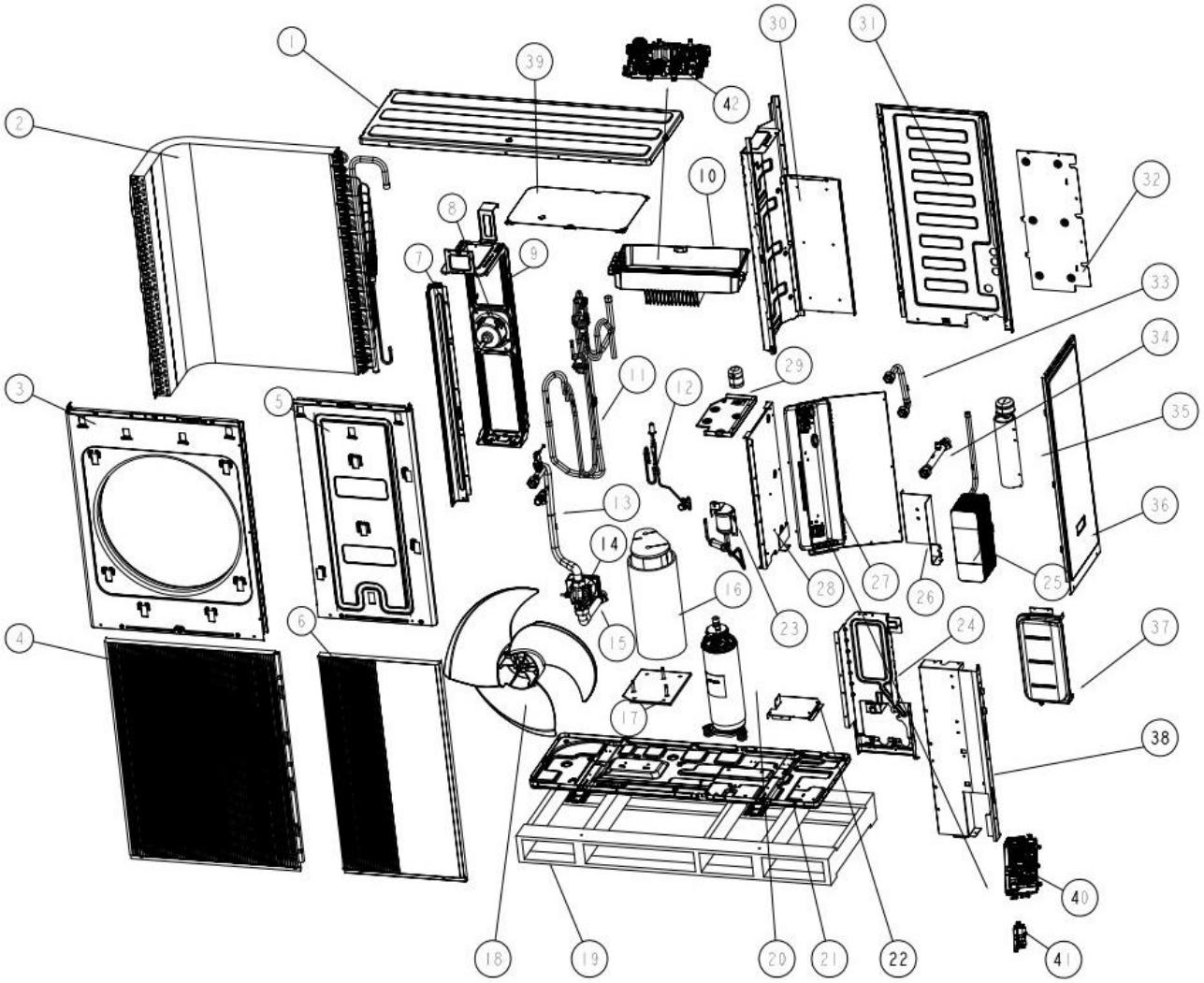



| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000168 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right Side Decorated Plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000011 | Motor holder assembly | 1 |
| 10 | 16322020000028 | Electric assembly | 1 |
| 11 | 16325020000152 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000061 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000149 | Silencing cotton | 1 |
| 17 | 16321026000002 | Compressor tray assembly | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000058 | Compressor | 1 |

| | | | |
|---|---|---|---|
| 21 | 16321018000126 | Chassis assembly | 1 |
| 22 | 16421126000005 | chassis A | 1 |
| 23 | 16422018000030 | Driver board mounting box | 1 |
| 24 | 16421099000006 | Reservoir holder | 1 |
| 25 | 16325041000020 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000014 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate assembly of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate outlet pipe assembly | 1 |
| 35 | 16430021000041 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 11222542000168 | Water system control PCB | 1 |
| 40 | 11222542000169 | Relay expansion board | 3 |
| 41 | 11222543000122 | Refrigerant system control PCB | 1 |

### 2.1.3 12kw/14kw/16kw

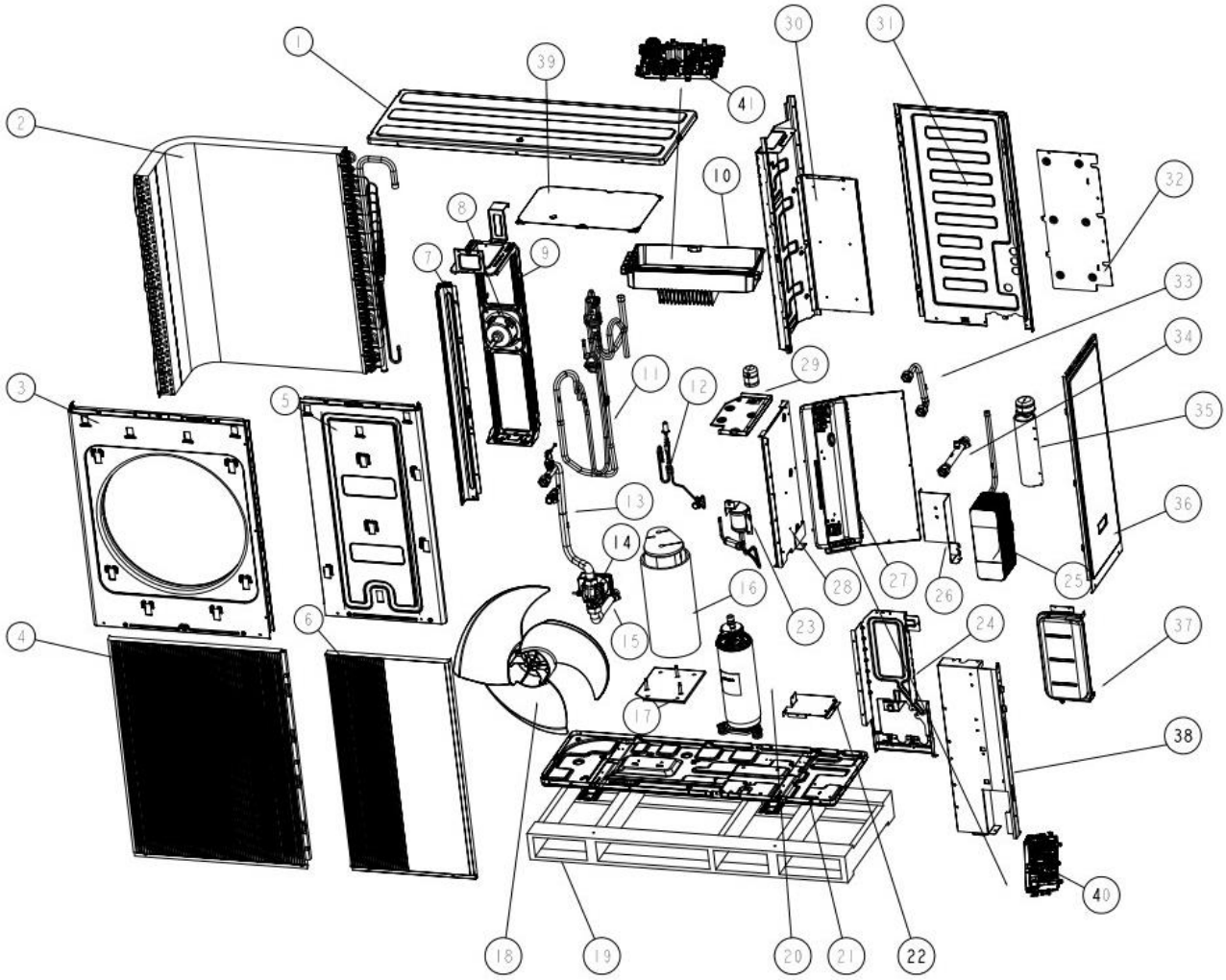
2.1.3.1 ACHP-H12/4R2HA-M；ACHP-H14/4R2HA-M；ACHP-H16/4R2HA-M




| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000169 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right Side Decorated Plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000012 | Motor holder assembly | 1 |
| 10 | 16322020000033 | Electric assembly | 1 |
| 11 | 16325020000153 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000062 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000150 | Silencing cotton | 2 |
| 17 | 16321026000002 | Compressor tray | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000059 | Compressor | 1 |

| | | | |
|---|---|---|---|
| 21 | 16321018000126 | Chassis assembly | 1 |
| 22 | 16421126000005 | Chassis fixed plate | 1 |
| 23 | 16325042000009 | Plate changer connecting pipe assembly | 1 |
| 24 | 16421099000006 | Fixed plate | 1 |
| 25 | 16325041000021 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000015 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate changer connecting pipe assembly | 1 |
| 35 | 16430021000042 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 16422018000030 | Driver board mounting box | 1 |
| 40 | 11222542000168 | Water system control PCB | 1 |
| 41 | 11222542000169 | Relay expansion board | 1 |
| 42 | 11222543000126 | Refrigerant system control PCB | 1 |

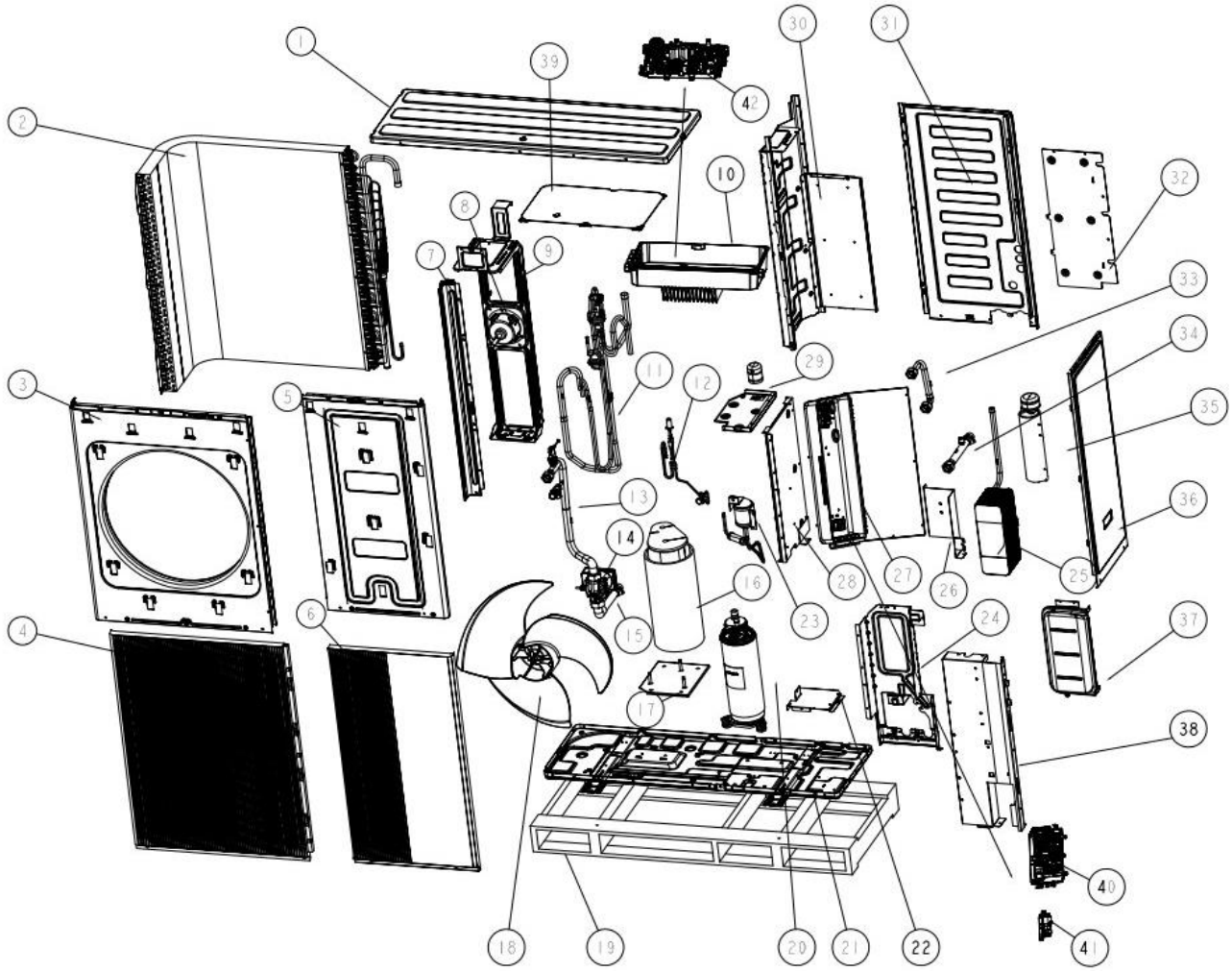
## 2.1.3.2 ACHP-H12/4R2HA-M(NE); ACHP-H14/4R2HA-M(NE); ACHP-H16/4R2HA-M(NE)




| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000169 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right Side Decorated Plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000012 | Motor holder assembly | 1 |
| 10 | 16322020000039 | Electric assembly | 1 |
| 11 | 16325020000153 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000062 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000150 | Silencing cotton | 2 |
| 17 | 16321026000002 | Compressor tray | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000059 | Compressor | 1 |
| 21 | 16321018000126 | Chassis assembly | 1 |
| 22 | 16421126000005 | Chassis fixed plate | 1 |

| | | | |
|---|---|---|---|
| 23 | 16325042000009 | Plate changer connecting pipe assembly | 1 |
| 24 | 16421099000006 | Fixed plate | 1 |
| 25 | 16325041000021 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000016 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate changer connecting pipe assembly | 1 |
| 35 | 16426030000307 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 16422018000030 | Driver board mounting box | 1 |
| 40 | 11222542000168 | Water system control PCB | 1 |
| 41 | 11222543000126 | Refrigerant system control PCB | 1 |

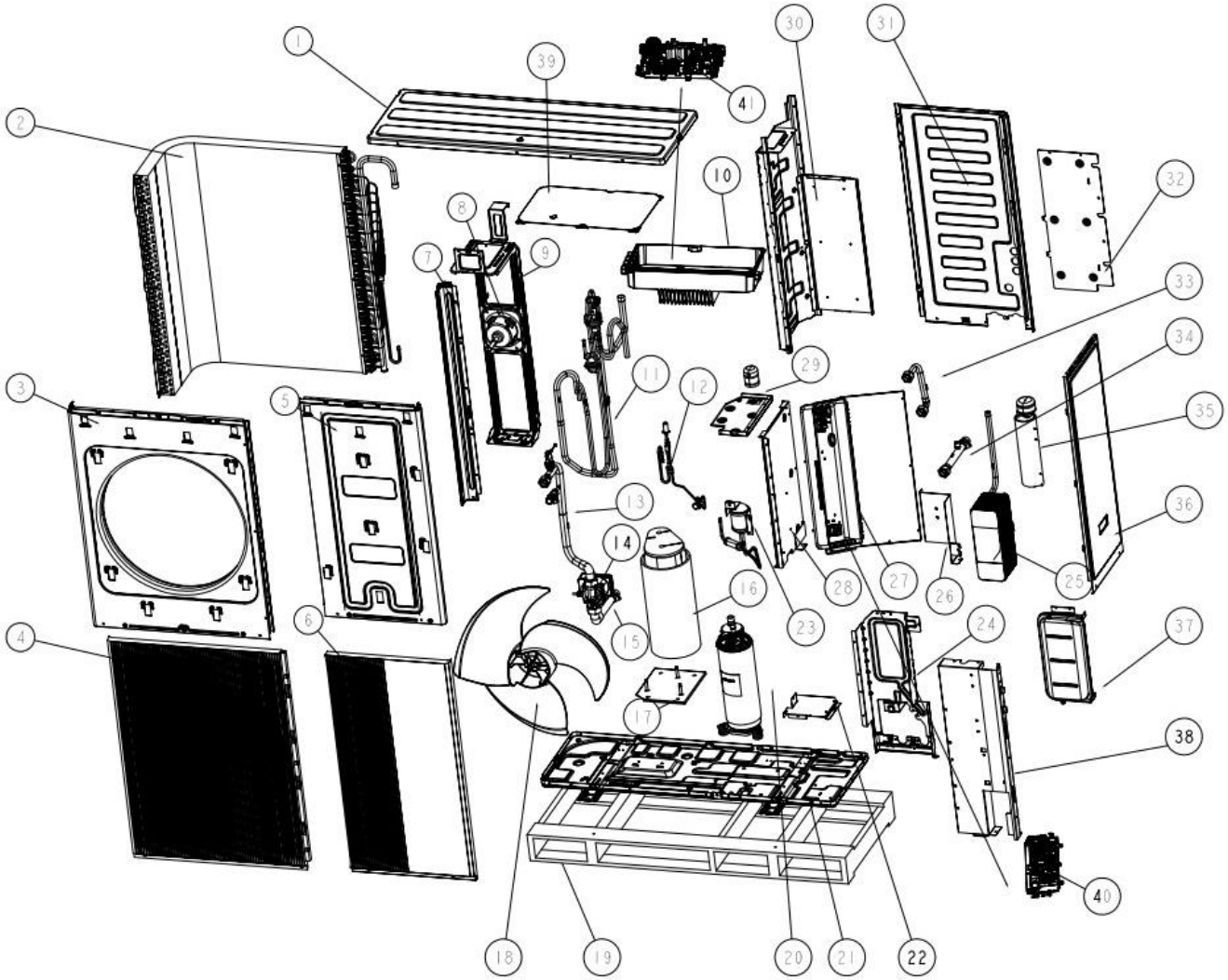
## 2.1.3.3 ACHP-H12/5R2HA-M；ACHP-H14/5R2HA-M；ACHP-H16/5R2HA-M




| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000169 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right Side Decorated Plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000012 | Motor holder assembly | 1 |
| 10 | 16322020000029 | Electric assembly | 1 |
| 11 | 16325020000153 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000062 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000150 | Silencing cotton | 2 |
| 17 | 16321026000002 | Compressor tray | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000059 | Compressor | 1 |

| | | | |
|---|---|---|---|
| 21 | 16321018000126 | Chassis assembly | 1 |
| 22 | 16421126000005 | Chassis fixed plate | 1 |
| 23 | 16325042000009 | Plate changer connecting pipe assembly | 1 |
| 24 | 16421099000006 | Fixed plate | 1 |
| 25 | 16325041000021 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000014 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate changer connecting pipe assembly | 1 |
| 35 | 16430021000041 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 16422018000030 | Driver board mounting box | 1 |
| 40 | 11222542000168 | Water system control PCB | 1 |
| 41 | 11222542000169 | Relay expansion board | 3 |
| 42 | 11222543000123 | Refrigerant system control PCB | 1 |

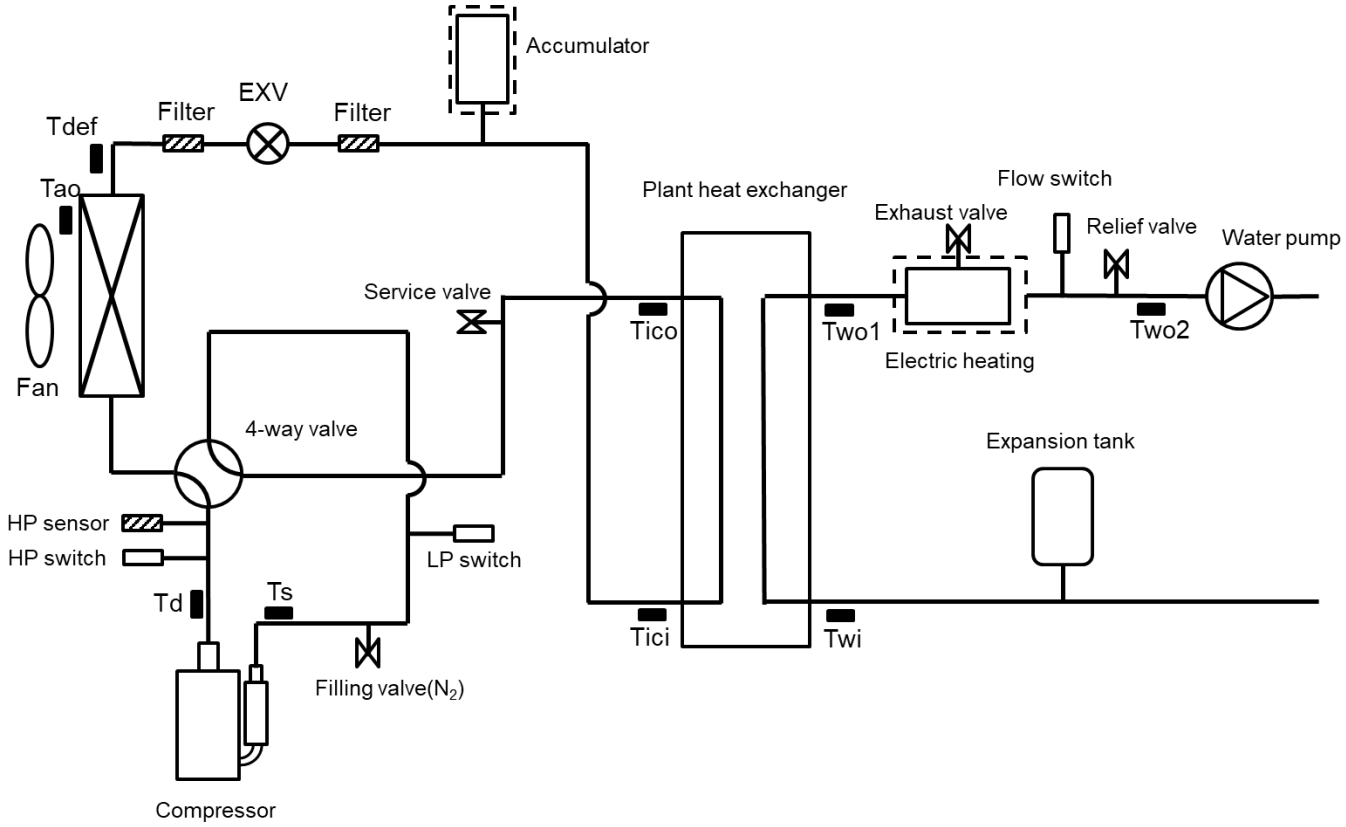
## 2.1.3.4 ACHP-H12/5R2HA-M(NE); ACHP-H14/5R2HA-M(NE); ACHP-H16/5R2HA-M(NE)




| No. | BOM Code | Part Name | Quantity |
|---|---|---|---|
| 1 | 16321027000045 | Top cover plate assembly | 1 |
| 2 | 16324020000169 | Condenser assembly | 1 |
| 3 | 16421061000065 | Big panel | 1 |
| 4 | 16420013000084 | Left side decorated plate | 1 |
| 5 | 16321064000063 | Small panel assembly | 1 |
| 6 | 16420013000085 | Right side decorated plank | 1 |
| 7 | 16421031000249 | Vertical shaft | 1 |
| 8 | 16430034000032 | Motor | 1 |
| 9 | 16321061000012 | Motor holder assembly | 1 |
| 10 | 16322020000041 | Electric assembly | 1 |
| 11 | 16325020000153 | Four-way valve pipeline assembly | 1 |
| 12 | 16325034000062 | Expansion valve line assembly | 1 |
| 13 | 16325042000010 | Water pump inlet pipe assembly | 1 |
| 14 | 16440002000023 | Circulating water pump | 1 |
| 15 | 16325050000016 | Water pump outlet pipe assembly | 1 |
| 16 | 16434006000150 | Silencing cotton | 2 |
| 17 | 16321026000002 | Compressor tray | 1 |
| 18 | 16420028000004 | Axial flow fan | 1 |
| 19 | 16433002000224 | Timber chassis | 1 |
| 20 | 16438003000059 | Compressor | 1 |
| 21 | 16321018000126 | Chassis assembly | 1 |

| | | | |
|---|---|---|---|
| 22 | 16421126000005 | Chassis fixed plate | 1 |
| 23 | 16325042000009 | Plate changer connecting pipe assembly | 1 |
| 24 | 16421099000006 | Fixed plate | 1 |
| 25 | 16325041000021 | Plate changer assembly | 1 |
| 26 | 16421123000007 | Protective case | 1 |
| 27 | 16322017000018 | Electric control assembly of water system | 1 |
| 28 | 16321052000074 | Fixed plate of compressor | 1 |
| 29 | 16321052000069 | Fixed plate assembly of compressor (1) | 1 |
| 30 | 16321052000075 | Partition board assembly | 1 |
| 31 | 16321051000003 | Rear plate assembly | 1 |
| 32 | 16321052000073 | Fixed plate assembly of compressor (2) | 1 |
| 33 | 16325049000012 | Water inlet pipe assembly | 1 |
| 34 | 16325049000013 | Plate changer connecting pipe assembly | 1 |
| 35 | 16426030000307 | Electric heater | 1 |
| 36 | 16321052000072 | Right side panel assembly | 1 |
| 37 | 16445001000010 | Expansion tank | 1 |
| 38 | 16421053000011 | Electrical heating holder | 1 |
| 39 | 16422018000030 | Driver board mounting box | 1 |
| 40 | 11222542000168 | Water system control PCB | 1 |
| 41 | 11222543000123 | Refrigerant system control PCB | 1 |

## 2.2 Piping Diagrams




*Just 12-16kW unit has accumulator

*Units containing (NE) in the model number do not include electric heating

| Code | Means | Code | Means |
|---|---|---|---|
| Td | Discharge temperature | Tico | Gas pipe temperature |
| Tao | Ambient temperature | Twi | Inlet water temperature |
| Tdef | Defrost temperature | Two1 | Outlet water temperature1 |
| Ts | Suction temperature | Two2 | Outlet water temperature 2 |
| Tici | Liquid pipe temperature | | |

## 2.3 Key components

### 2.3.1 Accumulator

Stores liquid refrigerant and oil to protect compressor from liquid hammering.

### 2.3.2 EXV (Electronic expansion valve)

Controls refrigerant flow and reduces refrigerant pressure.

### 2.3.3 Four-way valve

Controls refrigerant flow direction. Electrify in cooling mode and outage in heating mode. When electrify, the air side heat exchanger functions as a condenser and water side heat exchanger functions as an evaporator; when open, the air side heat exchanger functions as an evaporator and water side heat exchanger function as a condenser.

### 2.3.4 High- and low-pressure switches

Regulate refrigerant system pressure. When refrigerant system pressure rises above the upper limit or falls below the lower limit, the high- or low-pressure switches turn off, stopping the compressor.

### 2.3.5 Exhaust valve

Automatically removes air from the water circuit.

### 2.3.6 Pressure relief valve

Prevents excessive water pressure by opening at 43.5 psi (3 bar) and discharging water from the water circuit.

### 2.3.7 Expansion tank

Balances water system pressure.

### 2.3.8 Flow switch

Detects water flow rate to protect compressor and water pump in the event of insufficient water flow.

### 2.3.9 Electric heating

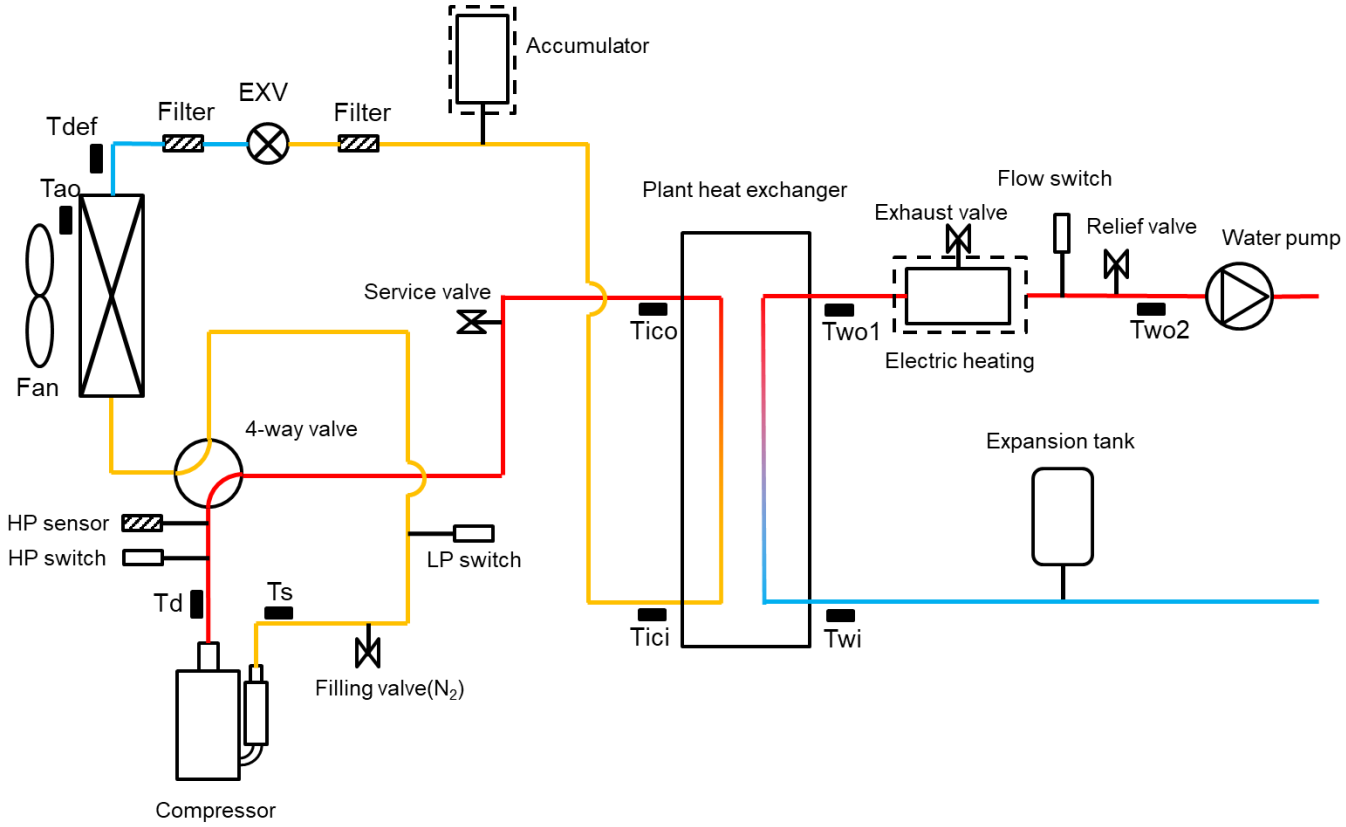
Provides additional heating capacity when the heating capacity of the heat pump is insufficient due to very low outdoor temperature.

### 2.3.10 Water pump

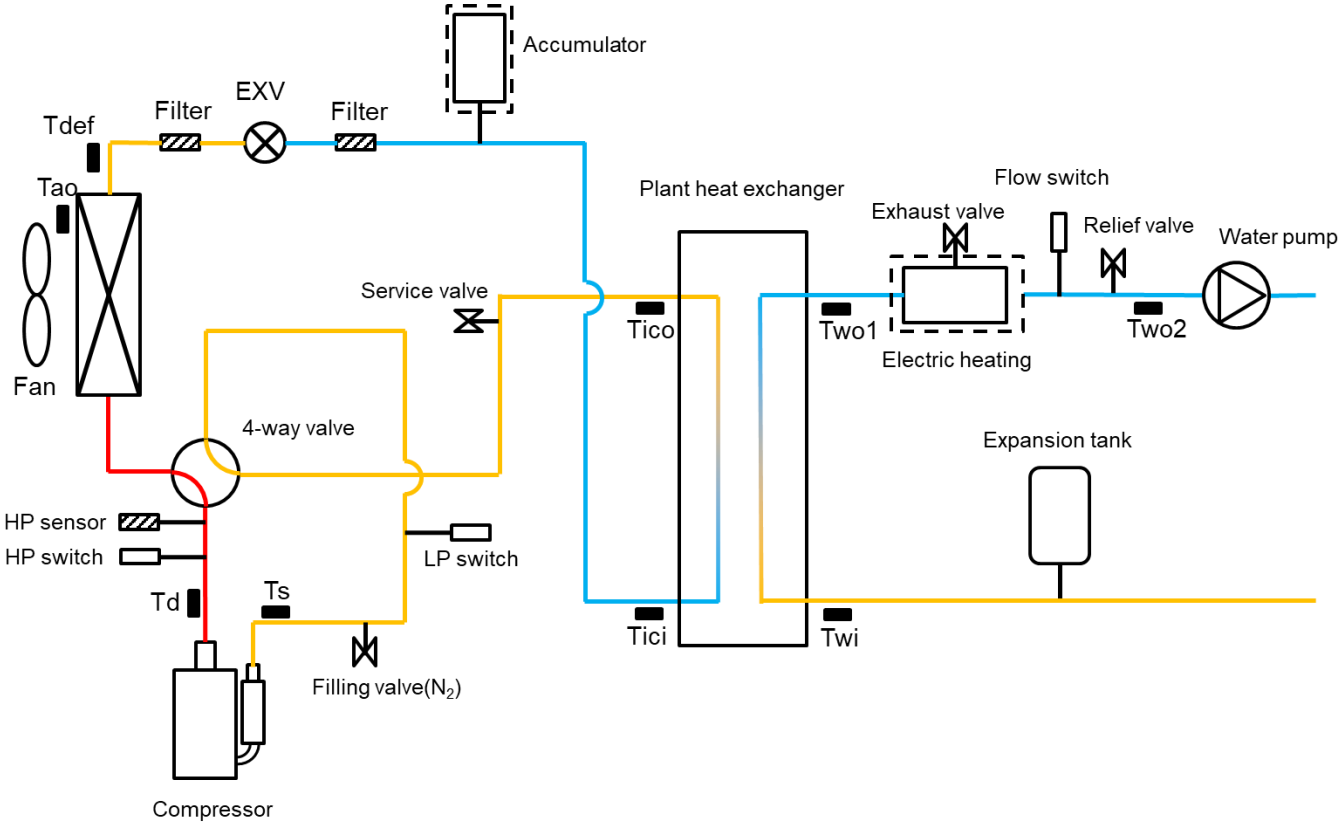
Circulates water in the water circuit.

## 2.4 Refrigerant Flow Diagrams

### 2.4.1 Heating and domestic hot water operation



### 2.4.2 Cooling and defrosting operation



# Part 3 Control

## 3.1 Start-stop control

### 3.1.1 Stop Operation

The stop operation occurs for one of the following reasons:

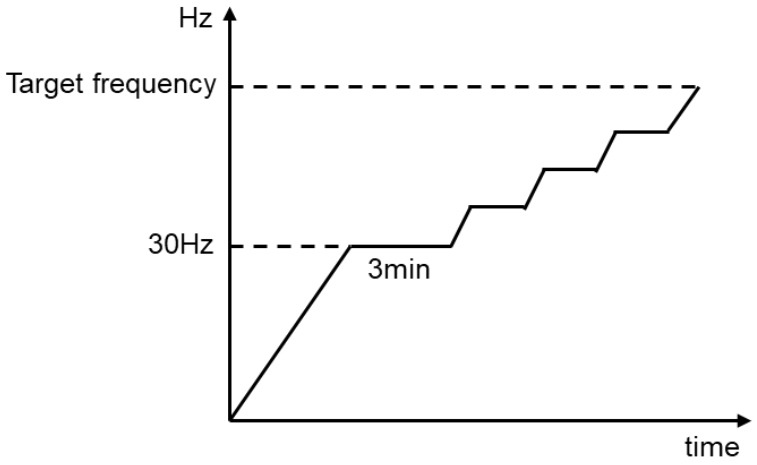
1)Abnormal shutdown: in order to protect the compressors, if an abnormal state occurs the system makes a stop with thermos off operation and an error code is displayed on the monoblock PCB digital displays and wired controller.

2)The system stops when the set temperature has been reached, the compressor stop and the water pump will stop after 150 seconds.

### 3.1.2 Startup Control

Before starting the compressor again, it needs to ensure that the minimum shutdown time of the compressor is 3 minutes. This balances the pressure in the refrigerant system and prevents frequent compressor on/off.

The compressor will run at 30Hz for 3 minutes, then the compressor frequency is controlled by temperature difference between set temperature and outlet water temperature.




### 3.1.3 Startup Control for Heating and Domestic Hot Water Operation

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | According to the compressor startup control |
| DC fan motor | FAN | ● | According to ambient temperature |
| Electronic expansion valve | EXV | ● | According to initial steps and ambient temperature |
| Four-way valve | 4-WAY | ● | Outage |

### 3.1.4 Startup Control for Cooling Operation

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | According to the compressor startup control |
| DC fan motor | FAN | ● | According to ambient temperature |
| Electronic expansion valve | EXV | ● | According to initial steps and ambient temperature |
| Four-way valve | 4-WAY | ● | Electrify |

## 3.2 Operation Control

### 3.2.1 Component Control during Normal Operation

#### 3.2.1.1 Heating and Domestic Hot Water Operation

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | According to the compressor startup control |
| DC fan motor | FAN | ● | According to ambient temperature and compressor frequency |
| Electronic expansion valve | EXV | ● | According to ambient temperature、Suction superheat and exhaust superheat control |
| Four-way valve | 4-WAY | ● | Outage |

#### 3.2.1.2 Cooling and defrosting operation

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | According to the compressor startup control |
| DC fan motor | FAN | ● | According to discharge temperature |
| Electronic expansion valve | EXV | ● | According to ambient temperature、Suction superheat and exhaust superheat control |
| Four-way valve | 4-WAY | ● | Electrify |

### 3.2.2 Compressor Output Control

Compressor frequency is controlled by temperature difference between set temperature and outlet water temperature.

#### 3.2.2.1 Compressor winding detection

When the compressor fails to start, you can judge whether the compressor is damaged according to the winding resistance value: Measure the three terminals of the compressor respectively. The resistance values between the two terminals should be the same. Otherwise, the compressor can be judged as damaged.

The compressor windings are listed as follows:

| Model | 4/6kw | 8/10kw | 12/14/16kw |
|---|---|---|---|
| Compressor type | EDTM310D85EMT (GMCC) | H420D7KZAAC6 (Panasonic) | H650D7VZAAC6 (Panasonic) |
| Normal winding Resistance (20℃) | 0.44Ω±5% | 0.63Ω±7% | 0.692Ω±7% |

### 3.2.3 Compressor Step Control

Normal up and down frequency:1Hz/s

### 3.2.4 Four-way Valve Control

When heating or DHW operation, four-way valve outage; When cooling or defrosting, four-way valve electrify.

### 3.2.5 Electronic Expansion Valve Control

Adjustment range: 0-480PLS

Power-on: Reset the electronic expansion valve

Control adjustment: Determine the initial opening according to the operating mode and outdoor ambient temperature, and then adjust according to the suction superheat and exhaust superheat

### 3.2.6 Outdoor Fan Control

| Fan speed index | Fan speed (rpm) | | | |
|---|---|---|---|---|
| | 4kW | 6kW | 8-10kW | 12-16kW |
| W1 | 300 | 300 | 240 | 240 |
| W2 | 350 | 380 | 330 | 330 |
| W3 | 400 | 450 | 420 | 420 |
| W4 | 450 | 520 | 480 | 510 |
| W5 | 500 | 600 | 550 | 600 |
| W6 | 520 | 600 | 580 | 630 |

## 3.3 Protection Control

### 3.3.1 High Pressure Protection Control

Pd > 3.2MPa, indicating high pressure protection H1

Pd < 2.6MPa, the fault is recovered

High pressure protection occurs for three consecutive times, and the fault is locked. Power off and restart is required to eliminate the fault

### 3.3.2 Low Pressure Protection Control

Pd < 0.03MPa, indicating low pressure protection H4

Pd > 0.1MPa, the fault is recovered

Low pressure protection occurs for three consecutive times, and the fault is locked. Power off and restart is required to eliminate the fault

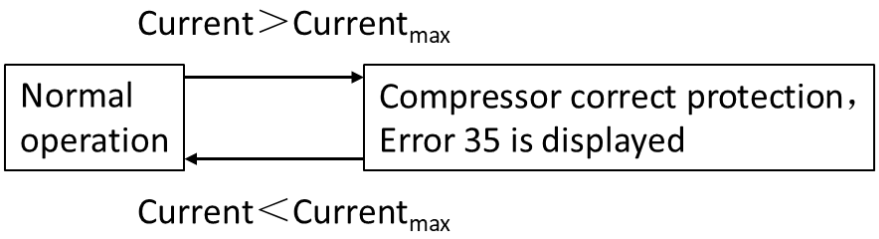
### 3.3.3 Discharge Temperature Protection Control

Td > 115℃, indicating exhaust temperature protection E3

Td < 90℃, the fault is recovered

### 3.3.4 Compressor Current Protection Control

This control protects the compressor from abnormally high currents.

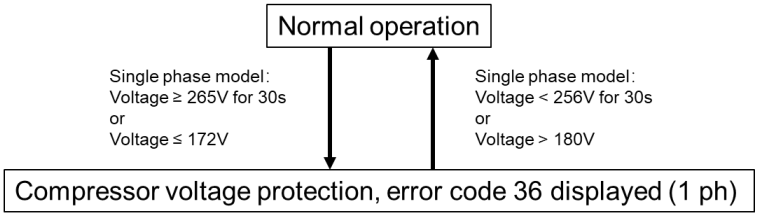


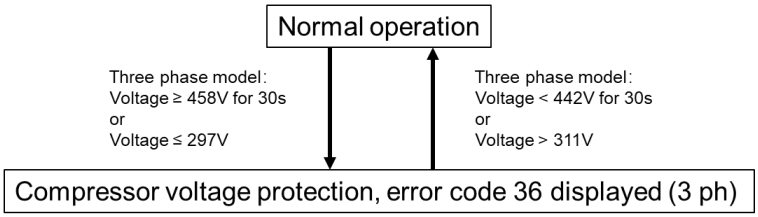

When the compressor current rises above Current$_{max}$ the system displays 35 protections and the unit stops running.

When the compressor current drops below Current$_{max}$, the compressor enters re-start control.

### 3.3.5 Voltage Protection Control

This control protects the machine from abnormally high or abnormally low voltages.




When the voltage of AC power supply is at or above 265V (458V for 3ph) for more than 30 seconds, the system displays 36 protection and the unit stops running. When the phase voltage drops below 256V (442V for 3ph) for more than 30 seconds, the refrigerant system restarts once the compressor re-start delay has elapsed. When the phase voltage is below 172V (297V for 3ph), the system displays 36 protection and the unit stops running. When the AC voltage rises to more than 180V (311V for 3ph), the refrigerant system restarts once the compressor re-start delay has elapsed.

### 3.3.6 DC Fan Motor Protection Control

The out-of-step protection signal shall be detected immediately after the fan motor is started. Once the out-of-step protection signal is detected, the machine will be stopped immediately and the fan motor will stop immediately. It is recorded as temporary out-of-step protection (no fault is displayed). If the accumulative times exceed 3 times, it will display fan motor out-of-step fault for 3B(3H).

### 3.3.7 Water Pipe Anti-Freeze Protection Control

Ambient temperature < 3˚C, and inlet water temperature or leaving water temperature <10 ˚C, run the water pump.

Ambient temperature < 0˚C, and inlet water temperature or leaving water temperature <10 ˚C, run the Electric heating and compressor.

### 3.3.8 Water Heat Exchanger Anti-Freeze Protection Control

Ambient temperature < 5˚C, and inlet water temperature or leaving water temperature <10 ˚C, run the electric heating belt of plate heat exchanger.

## 3.4 Protection Control

### 3.4.1 Oil Return Operation

In order to prevent the compressor from running out of oil, the oil return operation is conducted to recover oil that has flowed out of the compressor and into the refrigerant piping.

1) The oil return operation starts when the following condition occurs:

The compressor frequency is less than 50HZ, and the accumulated running time is 4h.

2) The oil return operation ceases when any one of the following three conditions occurs:

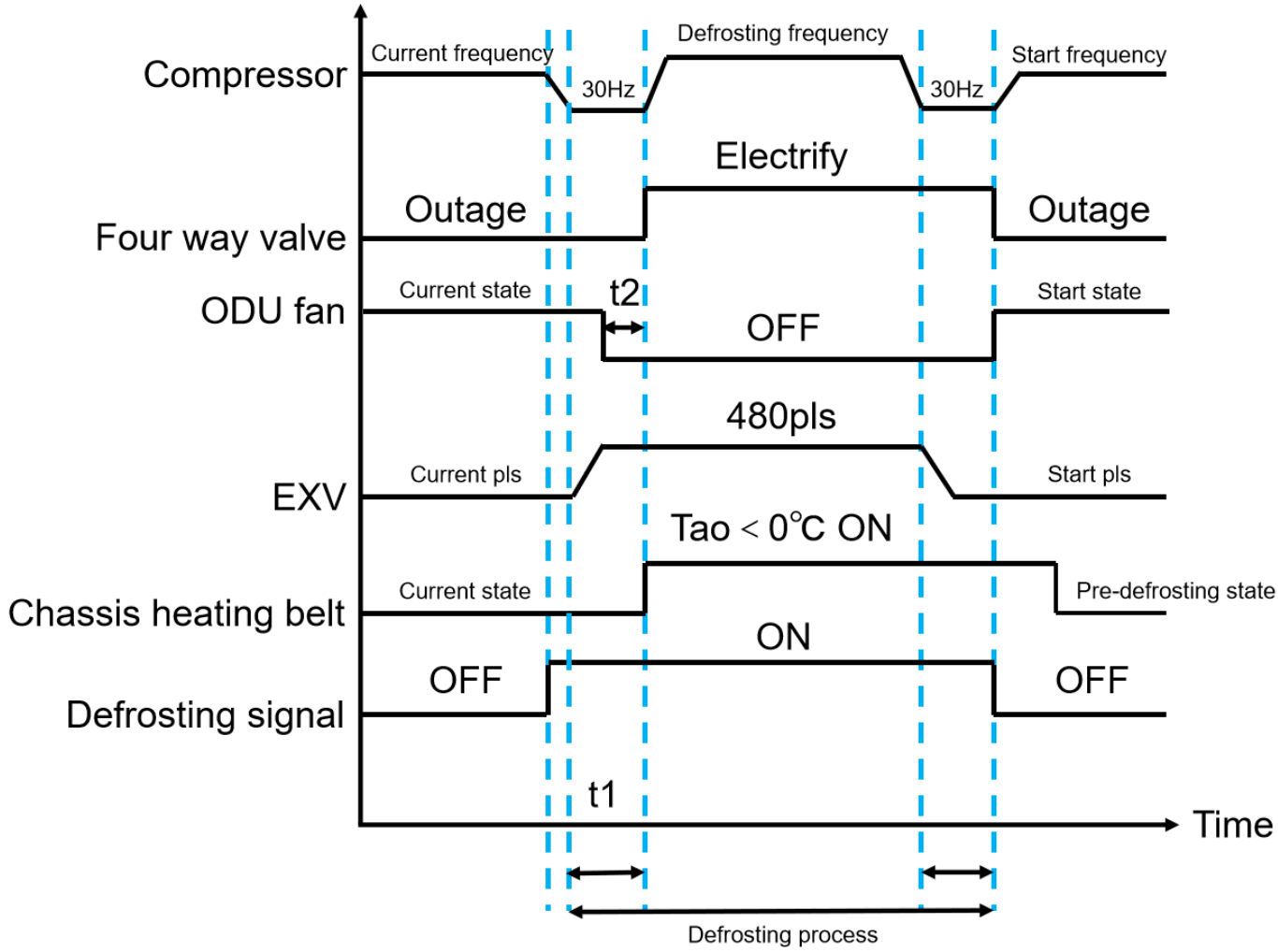
① Oil return operation duration reaches 3 minutes.

② Compressor stops.

③ Cooling mode：Thigh pressure≥58℃；Heating mode：Thigh pressure≥65℃

### 3.4.2 Defrosting Operation

In order to recover heating capacity, the defrosting operation is conducted when the monoblock air side heat exchanger is performing as a condenser. The defrosting operation is controlled according to outdoor ambient temperature, air side heat exchanger refrigerant outlet temperature and the compressor running time.




Remark: t1=15s; t2=2s

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | According to the compressor startup control |
| DC fan motor | FAN | ● | OFF |
| Electronic expansion valve | EXV | ● | 480pls |
| Four-way valve | 4-WAY | ● | Electrify |

### 3.4.3 Second zones control

After the double zone control is opened, the floor heating mixed pump continues to run.

1) If the floor heating water inlet temperature≥(Tset_FLH+dTwi_FLH_ON),the mix valve turn off.

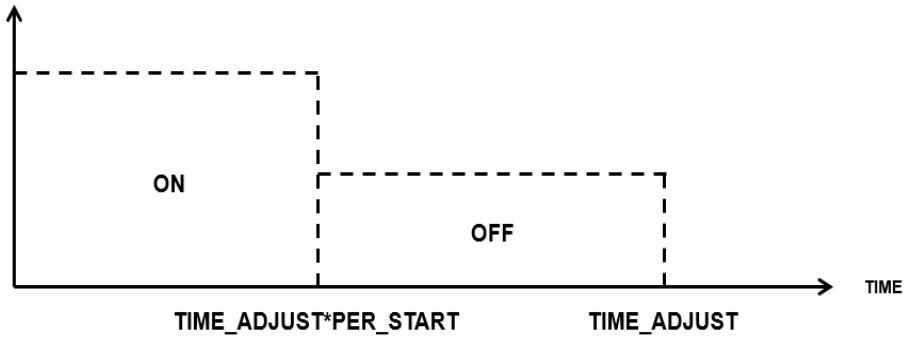
2) If the floor heating water inlet temperature＜(Tset_FLH+dTwi_FLH_OFF),the mix valve turn on..

3) If (Tset_FLH+dTwi_FLH_OFF)≤the floor heating water inlet temperature＜

(Tset_FLH+dTwi_FLH_ON),the return valve is time controlled.

4) Time control depends on floor heating mixed pump adjustment cycle (TIME_ADJUST) and opening time ratio of floor heating mixed pump (PER_START), pump running time=(TIME_ADJUST) * (PER_START).

5) The time control depends on the proportion of the mixing valve adjustment period and the opening time of the mixing valve: running time = adjustment period * opening time proportion




### 3.4.4 Buffer tank temperature control

By measure the buffer tank temperature to control heat pump turn on or turn off:

1) Cooling mode (same with outlet water temperature control):

① When buffer tank temperature is lower than (Tset – dTSC_OFF), the heat pump will turn off

② When buffer tank temperature is higher than (Tset + dTSC_ON), the heat pump will turn on

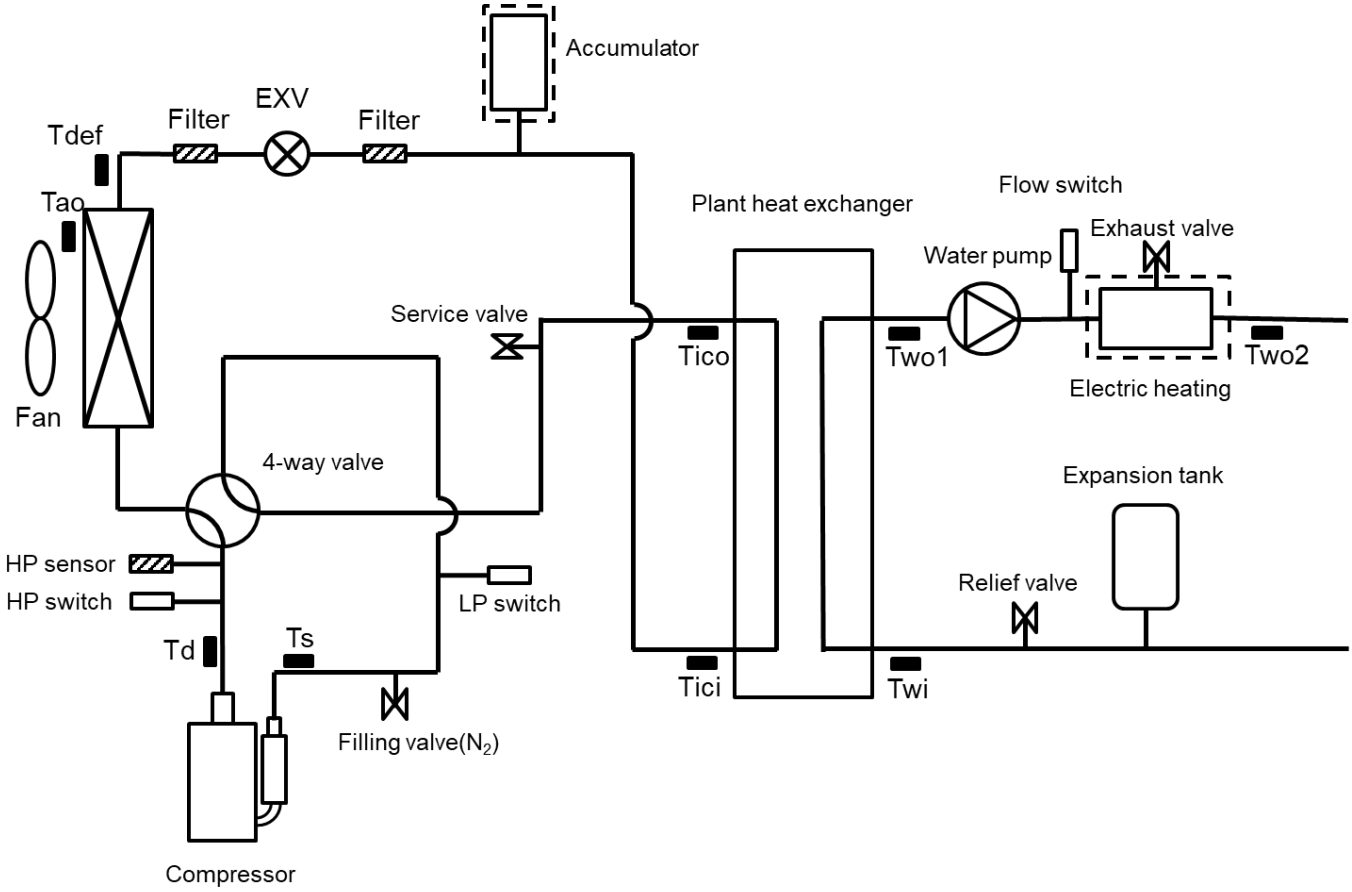
2) Heating mode (same with outlet water temperature control):

① When outlet water temperature of is higher than (Tset + dTSH_OFF), the heat pump will turn off

② When outlet water temperature of is lower than (Tset - dTSH_ON), the heat pump will turn on

# 3.5 Temperature Sensors introduction

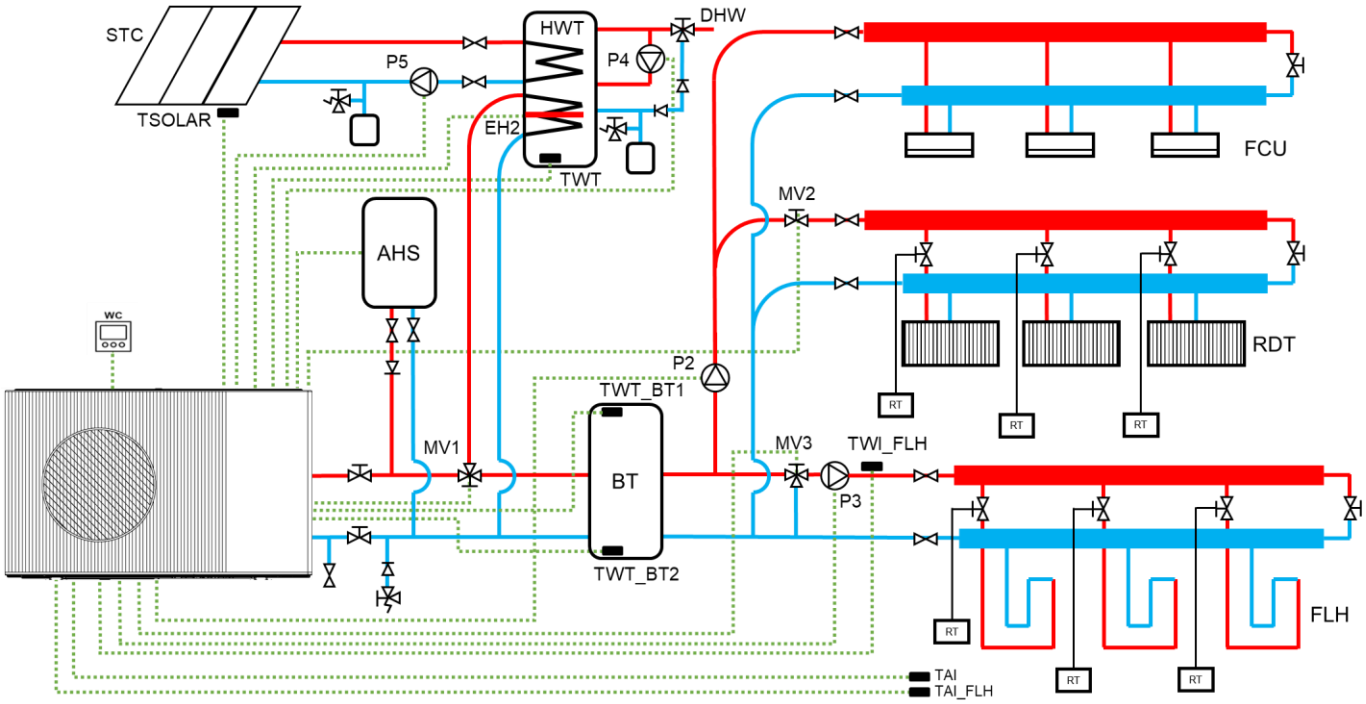
## 3.5.1 Internal system




| No. | Sensor name | Code | Mode | Functions |
|---|---|---|---|---|
| 1 | Discharge temperature sensor | Td | Heating | ◆ Discharge superheat control<br>◆ EXV control<br>◆ Discharge temperature protect control |
| | | | Cooling | ◆ Discharge superheat control<br>◆ EXV control<br>◆ Discharge temperature protect control |
| 2 | Defrosting temperature sensor | Tdef | Heating | ◆ EXV control<br>◆ Defrosting control |
| | | | Cooling | ◆ EXV control<br>◆ Defrosting control |
| 3 | Ambient temperature sensor | Tao | Heating | ◆ Compressor startup control<br>◆ Compressor step control<br>◆ EXV control<br>◆ Defrosting control<br>◆ Outdoor fan control<br>◆ Crankcase heater control<br>◆ Site heating belt control<br>◆ Water pipe Anti-Freeze protection control<br>◆ Water heat exchanger Anti-Freeze protection control |
| | | | Cooling | ◆ Compressor step control<br>◆ EXV control<br>◆ Outdoor fan control |
| 4 | Suction temperature sensor | Ts | Heating | ◆ EXV control |
| | | | Cooling | ◆ EXV control |
| 5 | Gas pipe temperature | Tico | Heating | ◆ Water pipe Anti-Freeze protection control<br>◆ Water heat exchanger Anti-Freeze protection control |
| | | | DHW | |
| 6 | Liquid pipe temperature | Tici | Heating | ◆ Compressor step control |

| | | | | |
|---|---|---|---|---|
| | | | DHW | |
| 7 | Plate heat exchanger outlet water temperature sensor | Two1 | Heating<br>DHW<br>Cooling | ◆ Compressor step control<br>◆ ON/OFF control<br>◆ Water pump speed control<br>◆ Water pipe Anti-Freeze protection control<br>◆ Water heat exchanger Anti-Freeze protection control |
| 8 | Plate heat exchanger inlet water temperature sensor | Twi | Heating<br>Cooling | ◆ Water pump speed control<br>◆ Water pipe Anti-Freeze protection control<br>◆ Water heat exchanger Anti-Freeze protection control |
| 9 | Electric heating water temperature sensor | Two2 | Heating<br>DHW | ◆ Electric heating overheat protection |

### 3.5.2 External system

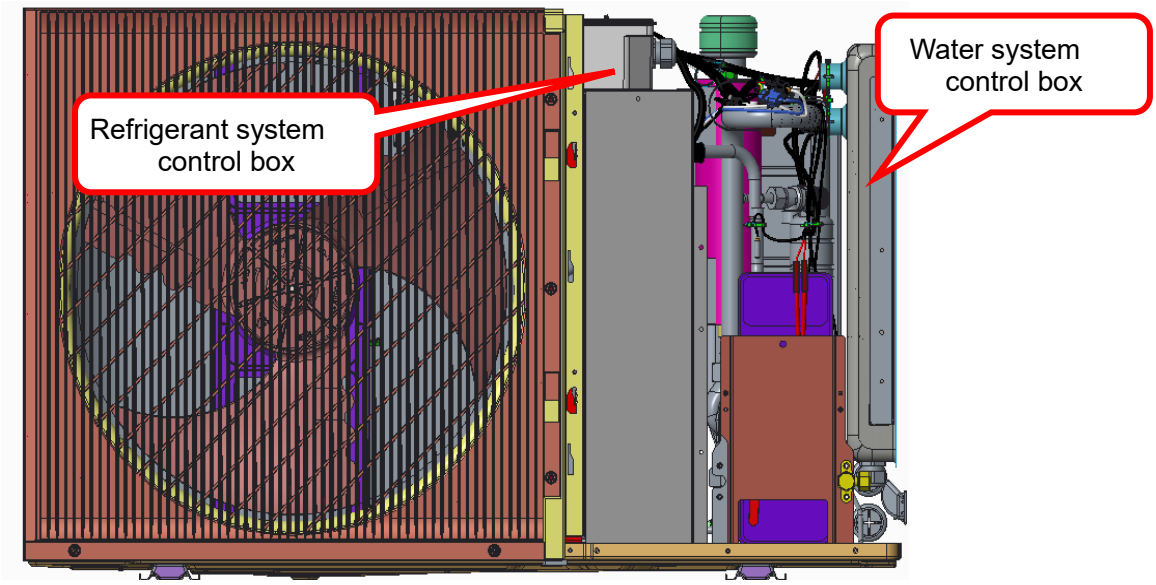


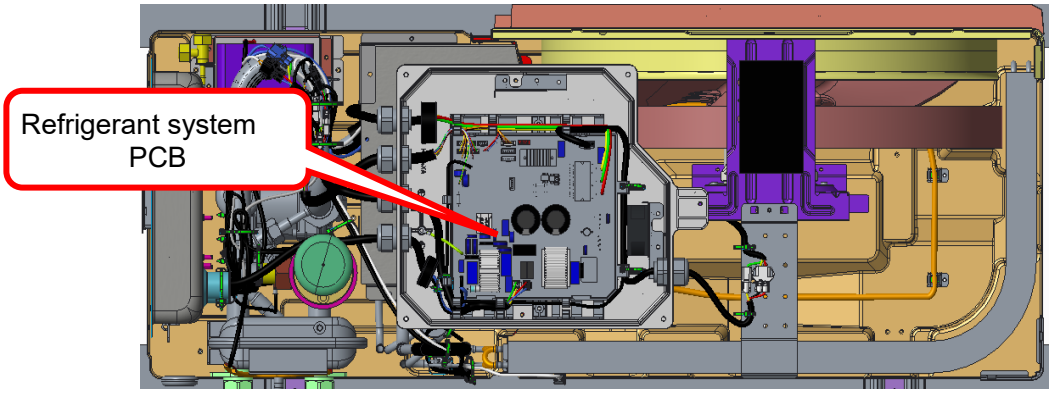

| No. | Sensor name | Code | Mode | Functions |
|---|---|---|---|---|
| 1 | Buffer tank temperature sensor | Twt_BT1<br>Twt_BT2 | Heating<br>Cooling | ◆ Buffer tank temperature control |
| 2 | Domestic hot water tank temperature sensor | Twt | Heating<br>DHW | ◆ DHW priority control<br>◆ Compressor output control<br>◆ DHW ON/OFF control |
| 3 | Floor heating water temperature sensor | Twt_FLH | Heating<br>DHW | ◆ Mixed pump control<br>◆ Compressor output control<br>◆ Mixed valve control |
| 4 | Room temperature | Tai<br>Tai_FLH | Heating<br>Cooling | ◆ Heat pump ON/OFF control |
| 5 | Solar panel temperature sensor | Tsolar | DHW | ◆ Solar panel water pump (P5) control |
| 6 | Thermostat (user-supplied) | RT | Heating<br>Cooling | ◆ Heat pump ON/OFF control |

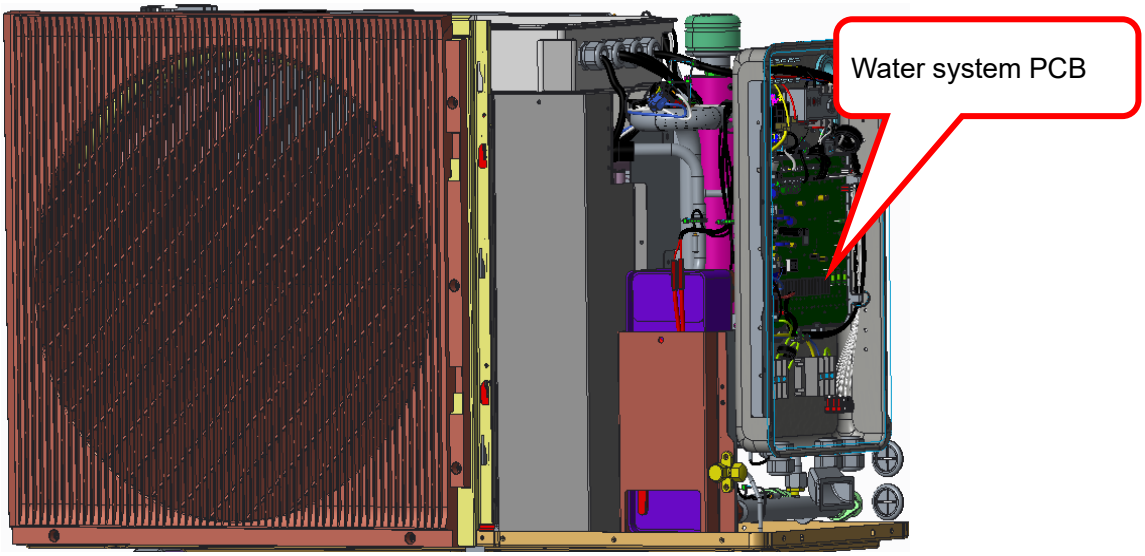
# Part 4 Diagnosis and Troubleshooting

## 4.1 Electric Control Box Layout

### 4.1.1 ACHP-H04/4R2HA-M; ACHP-H06/4R2HA-M; ACHP-H04/4R2HA-M(NE); ACHP-H06/4R2HA-M(NE);



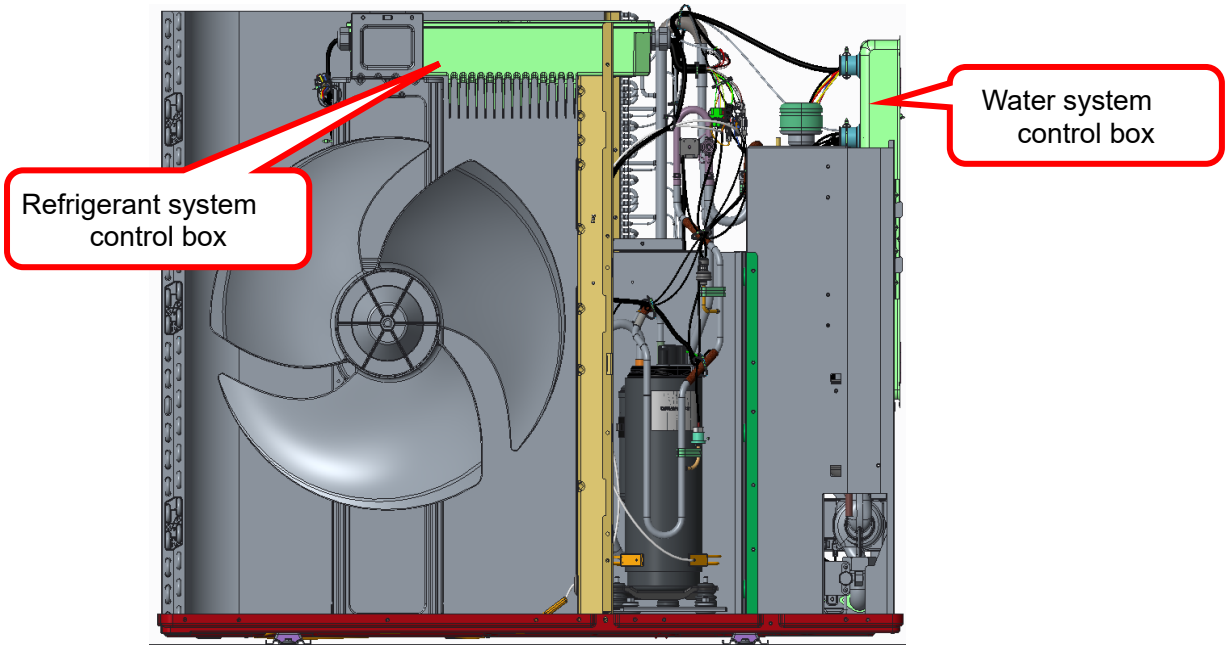



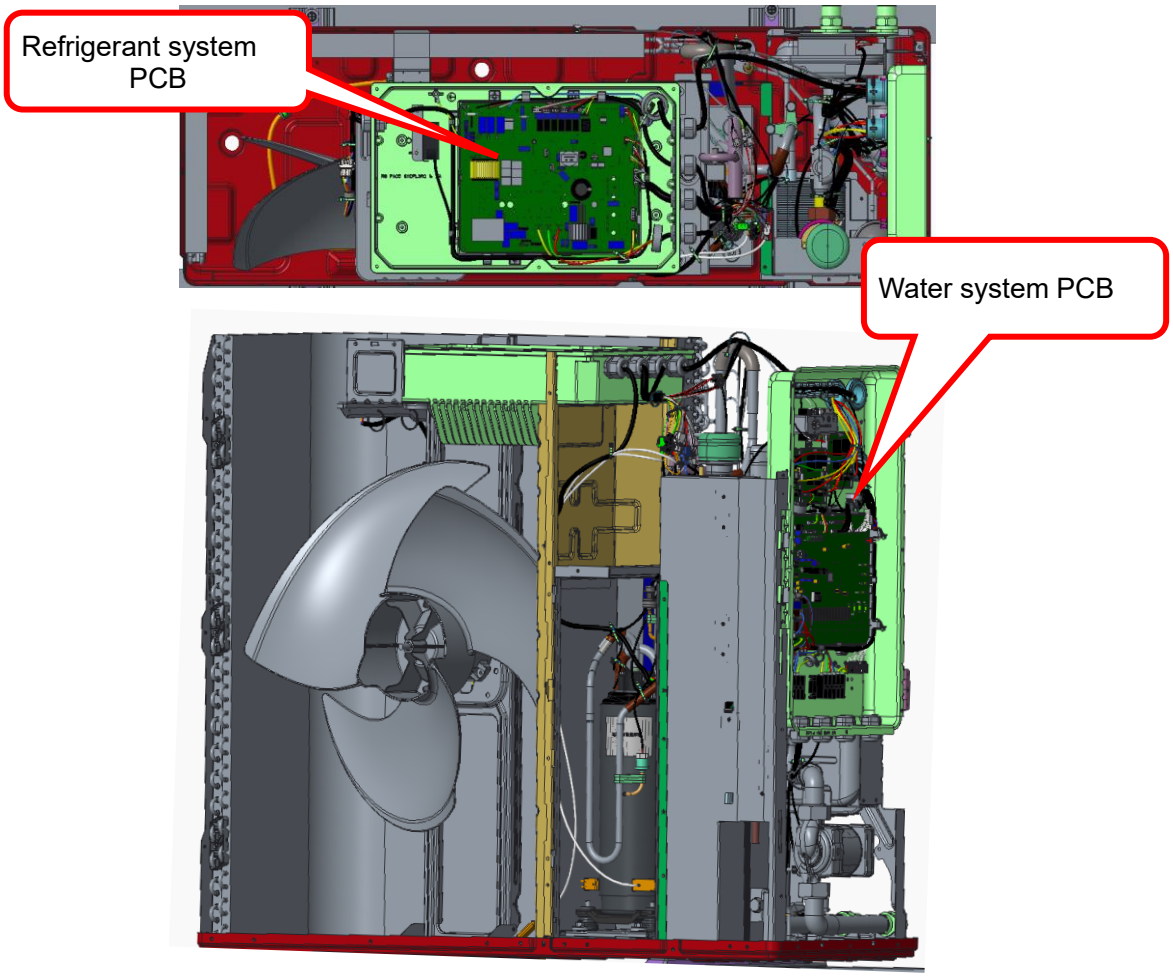




### 4.1.2 ACHP-H08/4R2HA-M; ACHP-H10/4R2HA-M;

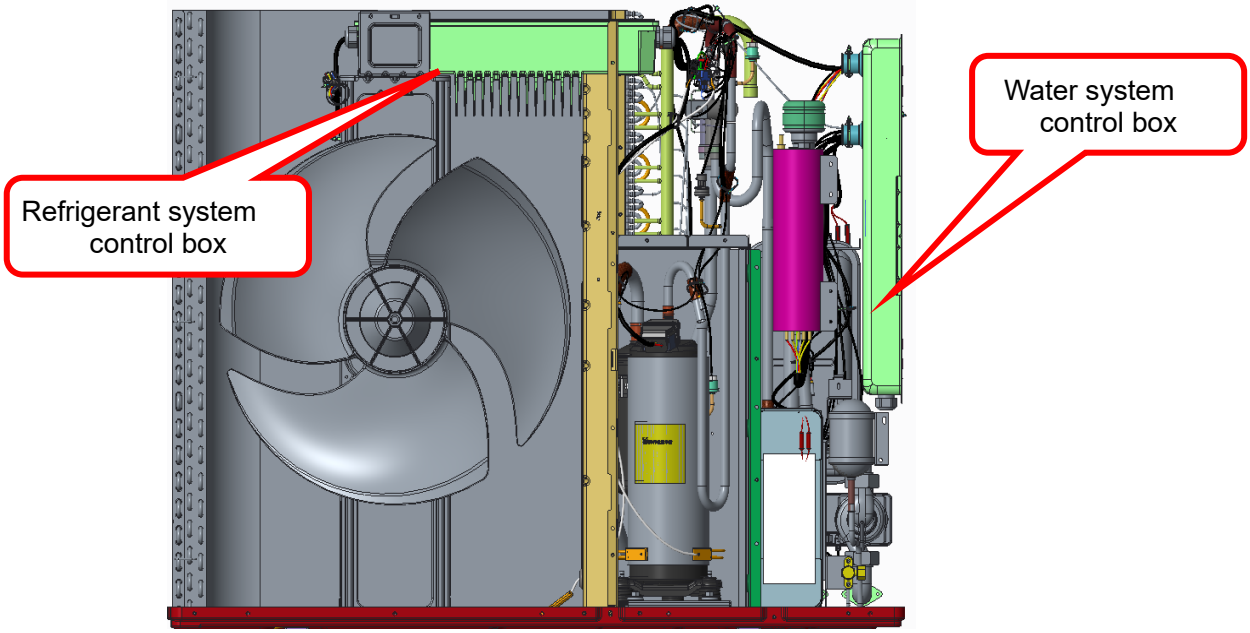
**ACHP-H08/5R2HA-M; ACHP-H10/5R2HA-M;**

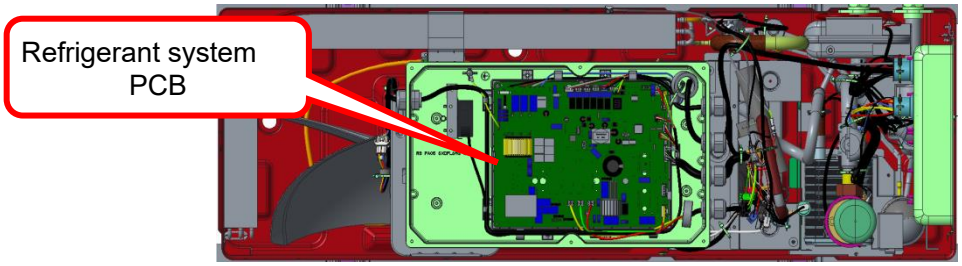
**ACHP-H08/4R2HA-M(NE); ACHP-H10/4R2HA-M(NE)**

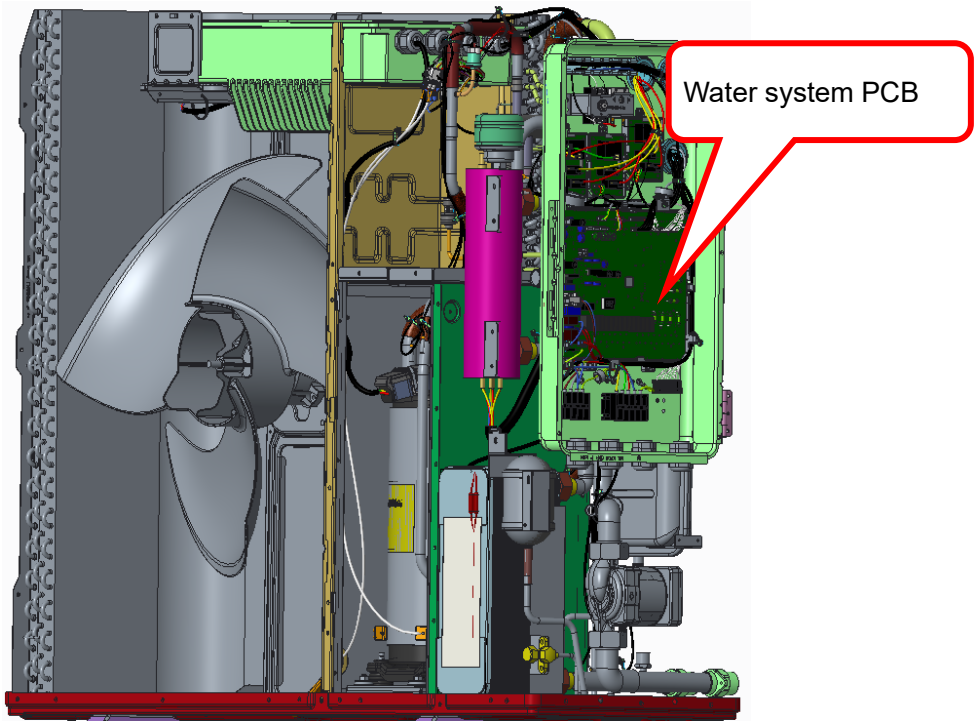


### 4.1.3 ACHP-H12/4R2HA-M; ACHP-H14/4R2HA-M; ACHP-H16/4R2HA-M; ACHP-H12/5R2HA-M; ACHP-H14/5R2HA-M; ACHP-H16/5R2HA-M; ACHP-H12/4R2HA-M(NE); ACHP-H14/4R2HA-M(NE); ACHP-H16/4R2HA-M(NE) ACHP-H12/5R2HA-M(NE); ACHP-H14/5R2HA-M(NE); ACHP-H16/5R2HA-M(NE)



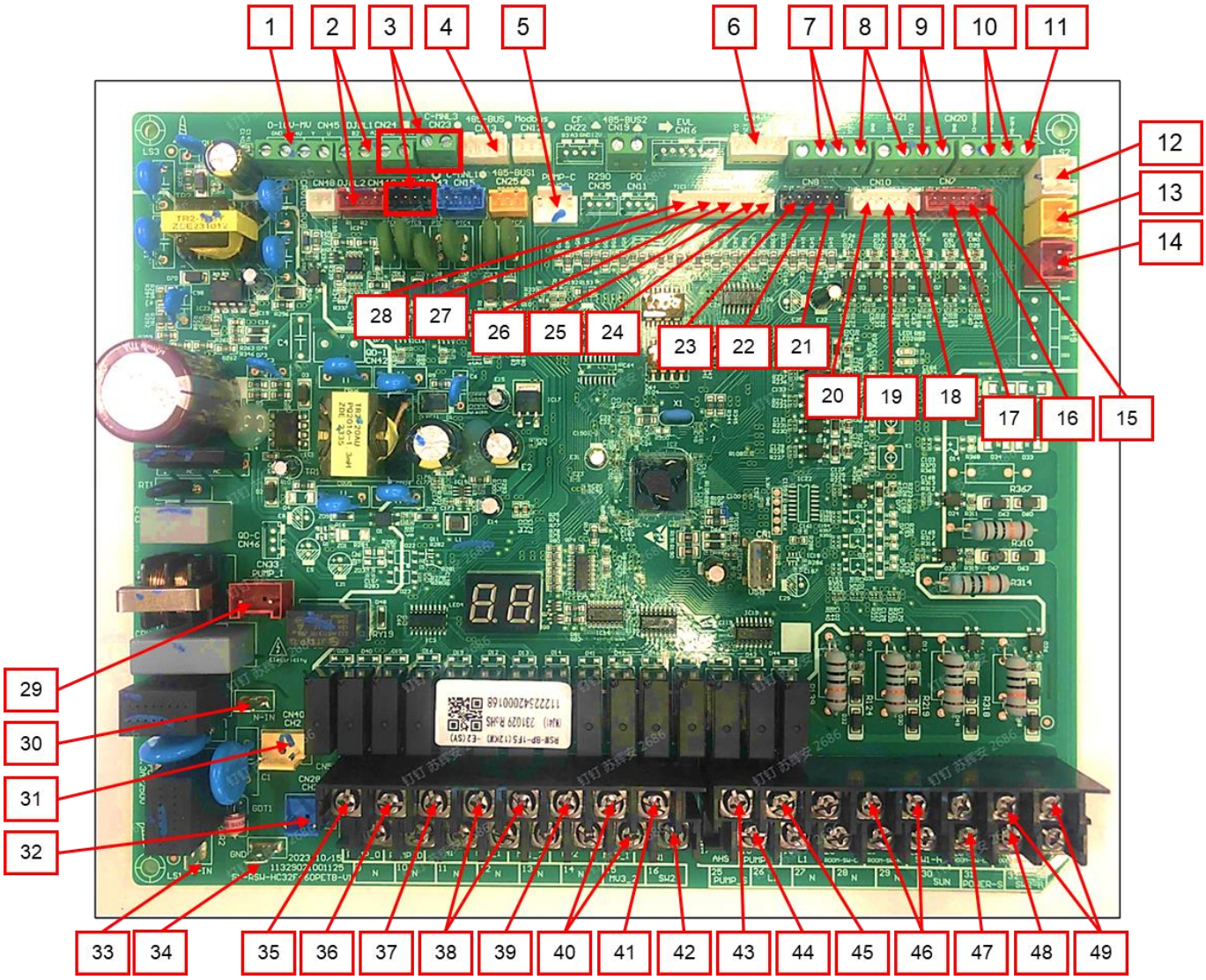



# 4.2 PCB

## 4.2.1 Water System PCB

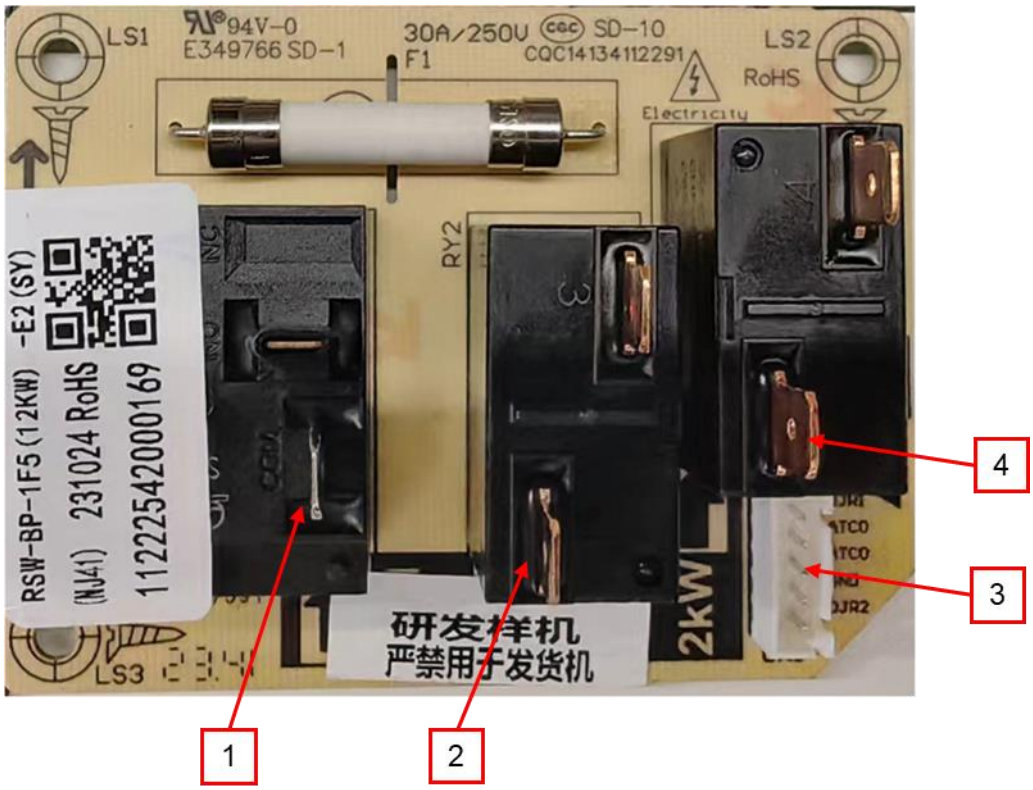
### 4.2.1.1 Main PCB Material code: 11222542000168




| No. | Remark | No. | Remark |
|---|---|---|---|
| 1 | Water mixing valve | 26 | Plate heat exchanger inlet temperature (TWI) |
| 2 | Parallel | 27 | Indoor coil outlet (TICO) |
| 3 | Wired controller | 28 | Indoor coil inlet (TICI) |
| 4 | Refrigerant system communication | 29 | Variable frequency pump |
| 5 | Direct current pump | 30 | Zero line |
| 6 | Relay PCB | 31 | Antifreeze heating zone |
| 7 | Thermostat switch (low voltage) (sub) | 32 | Expansion tank heating belt |
| 8 | Smart Grid 2 | 33 | Firing line |
| 9 | Smart Grid 1 | 34 | Ground line |
| 10 | Thermostat switch (low voltage) (main) | 35 | External water pump |
| 11 | Back-up electric heating | 36 | DHW water pump |
| 12 | Target flow switch | 37 | Water tank electric heating 1 |
| 13 | Anti-freeze low pressure switch | 38 | Three-way valve 1 |
| 14 | Electric heating protection switch | 39 | Two-way valve |
| 15 | Room temperature 1 (main zone) | 40 | Three-way valve 2 |

| | | | |
|---|---|---|---|
| | (TAI) | | |
| 16 | Solar water heater temperature (TSOLAR) | 41 | Defrost signal |
| 17 | Room temperature 2 (second zone) (TAI_FLH) | 42 | Compressor signal |
| 18 | Reserve | 43 | Auxiliary heat source |
| 19 | Buffer tank temperature 2 (TWT_BT2) | 44 | Solar water pump |
| 20 | Buffer tank temperature 1 (TWT_BT1) | 45 | Floor heating mixing pump |
| 21 | Reserve | 46 | Thermostat switch (high voltage) (main) |
| 22 | Floor heating inlet temperature (TWI_FLH) | 47 | Solar switch |
| 23 | DHW water tank temperature (TWT) | 48 | Standby power supply |
| 24 | Plate heat exchanger outlet temperature (TWO1) | 49 | Thermostat switch (high voltage) (sub) |
| 25 | Electric heating outlet temperature (TWO2) | | |

4.2.1.2 Expansion board Material code: 11222542000169

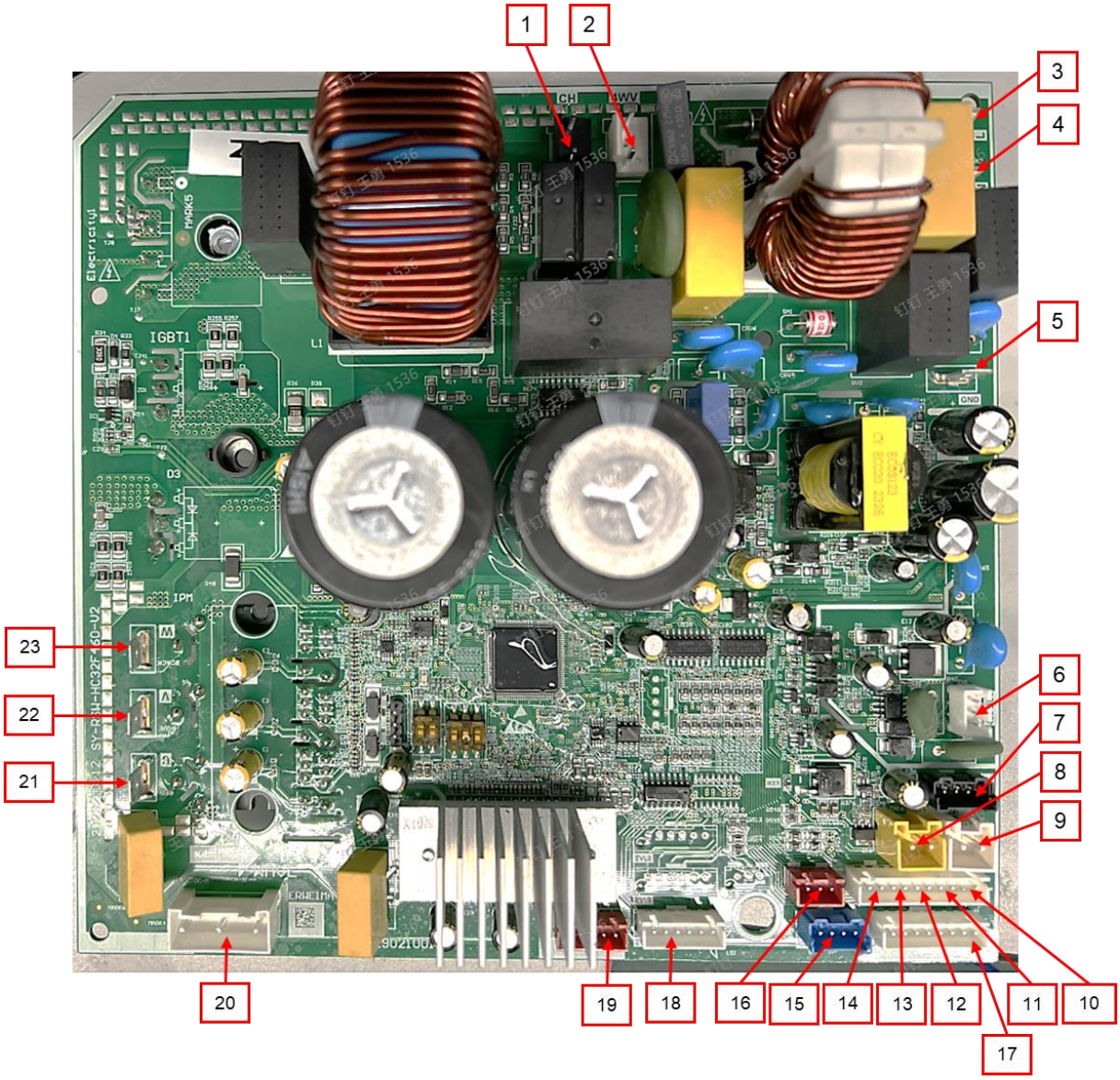



| Num. | Remark | Num. | Remark |
|---|---|---|---|
| 1 | Firing line | 3 | Water system PCB |
| 2 | 1kW electric heating firing line | 4 | 2kW electric heating firing line |

### 4.2.2 Refrigerant System PCB

#### 4.2.2.1 4-6kW (ACHP-H04/4R2HA-M、ACHP-H06/4R2HA-M

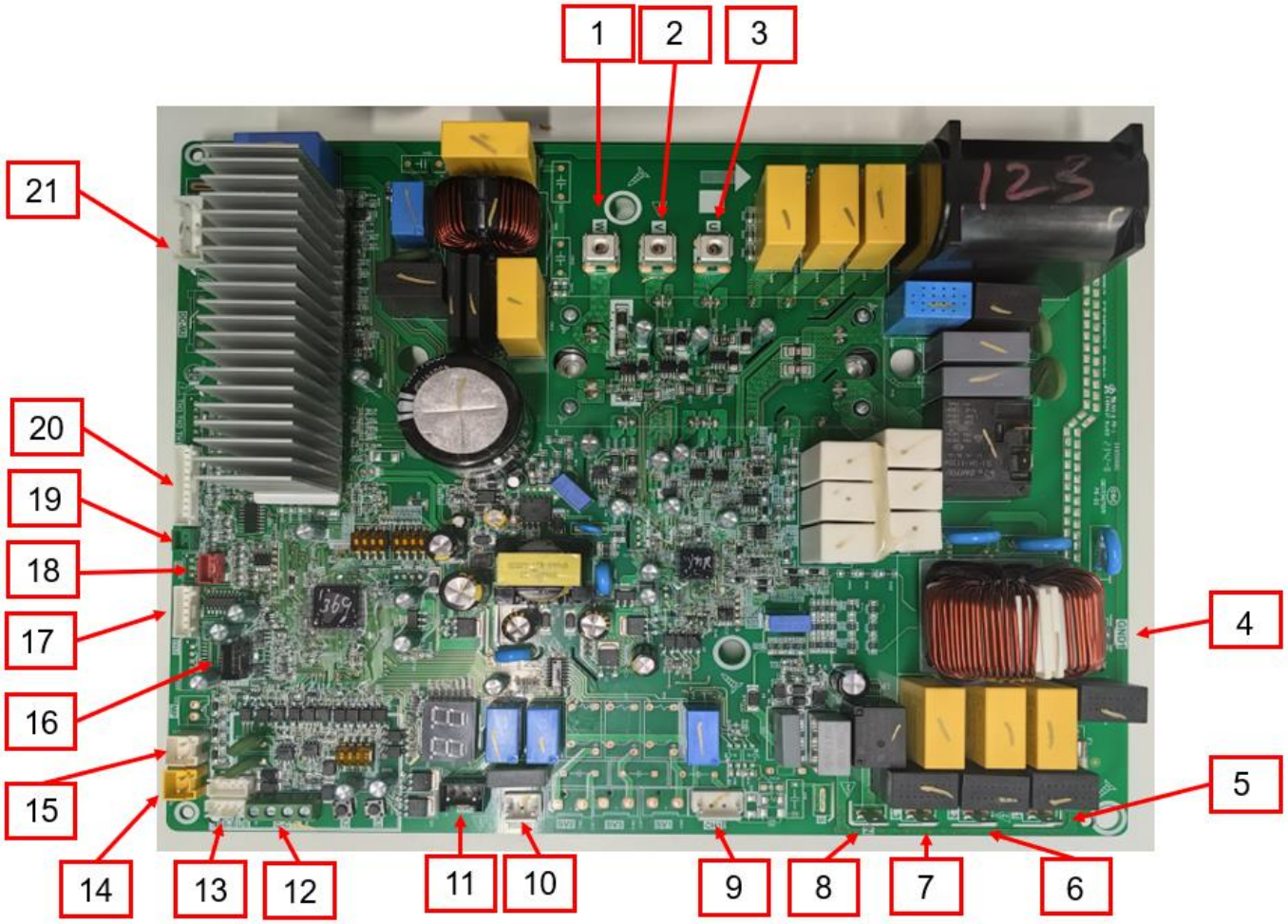
Main PCB Material code：11222542000175




| No. | Remark | No. | Remark |
|---|---|---|---|
| 1 | Chassis heater | 13 | Suction temperature sensor (TS) |
| 2 | 4-way valve | 14 | Outdoor ambient temperature sensor (TAO) |
| 3 | AC-L | 15 | Reserve |
| 4 | AC-N | 16 | High pressure sensor |
| 5 | GND | 17 | Reserve |
| 6 | Water system communication | 18 | EXV |
| 7 | DC fan | 19 | Reserve |
| 8 | High pressure switch | 20 | DC motor |
| 9 | Low pressure switch | 21 | Compressor-U |
| 10 | Discharge temperature sensor (TD) | 22 | Compressor-V |
| 11 | Mid coil temperature sensor (TCM) | 23 | Compressor-W |
| 12 | Defrost temperature sensor (TDEF) | | |

### 4.2.2.2 8-10kW(ACHP-H08/5R2HA-M、ACHP-H10/5R2HA-M)

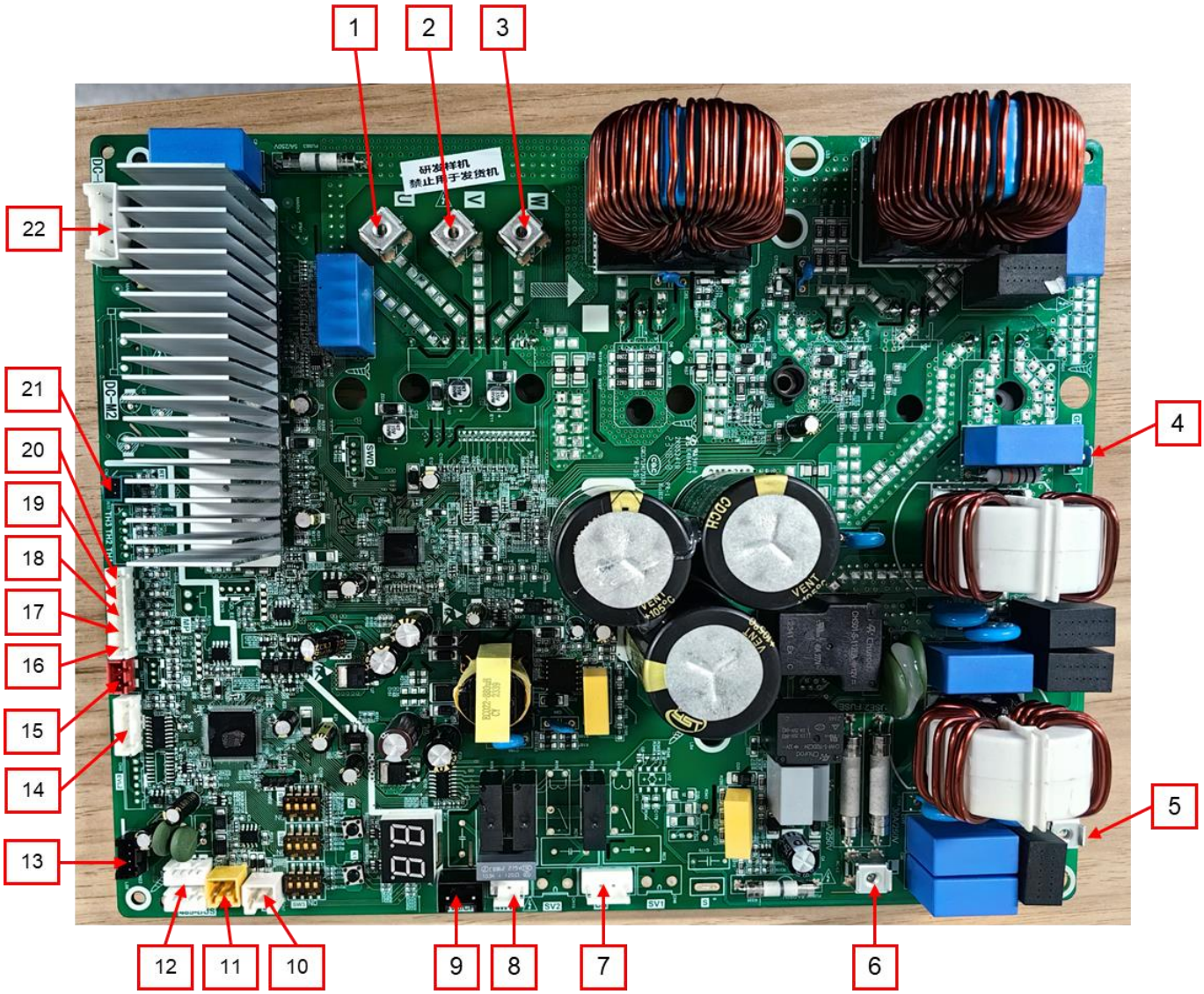
Main PCB Material code：11222543000122




| Num. | Remark | Num. | Remark |
|---|---|---|---|
| 1 | Compressor-W | 14 | High pressure switch |
| 2 | Compressor-V | 15 | Low pressure switch |
| 3 | Compressor-U | 16 | DC fan |
| 4 | GND1 | 17 | EXV |
| 5 | L1 | 18 | High pressure sensor |
| 6 | L2 | 19 | Electric control box radiator temperature sensor (TRD) |
| 7 | L3 | 20 | Outdoor ambient temperature sensor (TAO) |
| 8 | N | 21 | Suction temperature sensor (TS) |
| 9 | Oil heater | 22 | Defrost temperature sensor (TDEF) |
| 10 | 4-way valve | 23 | Mid coil temperature sensor (TCM) |
| 11 | Chassis heater | 24 | Discharge temperature sensor (TD) |
| 12 | Central control port | 25 | DC motor |
| 13 | Water system communication | | |

### 4.2.2.3 8-10kW(ACHP-H08/4R2HA-M、ACHP-H10/4R2HA-M、ACHP-H08/4R2HA-M(NE)、ACHP-H10/4R2HA-M(NE))

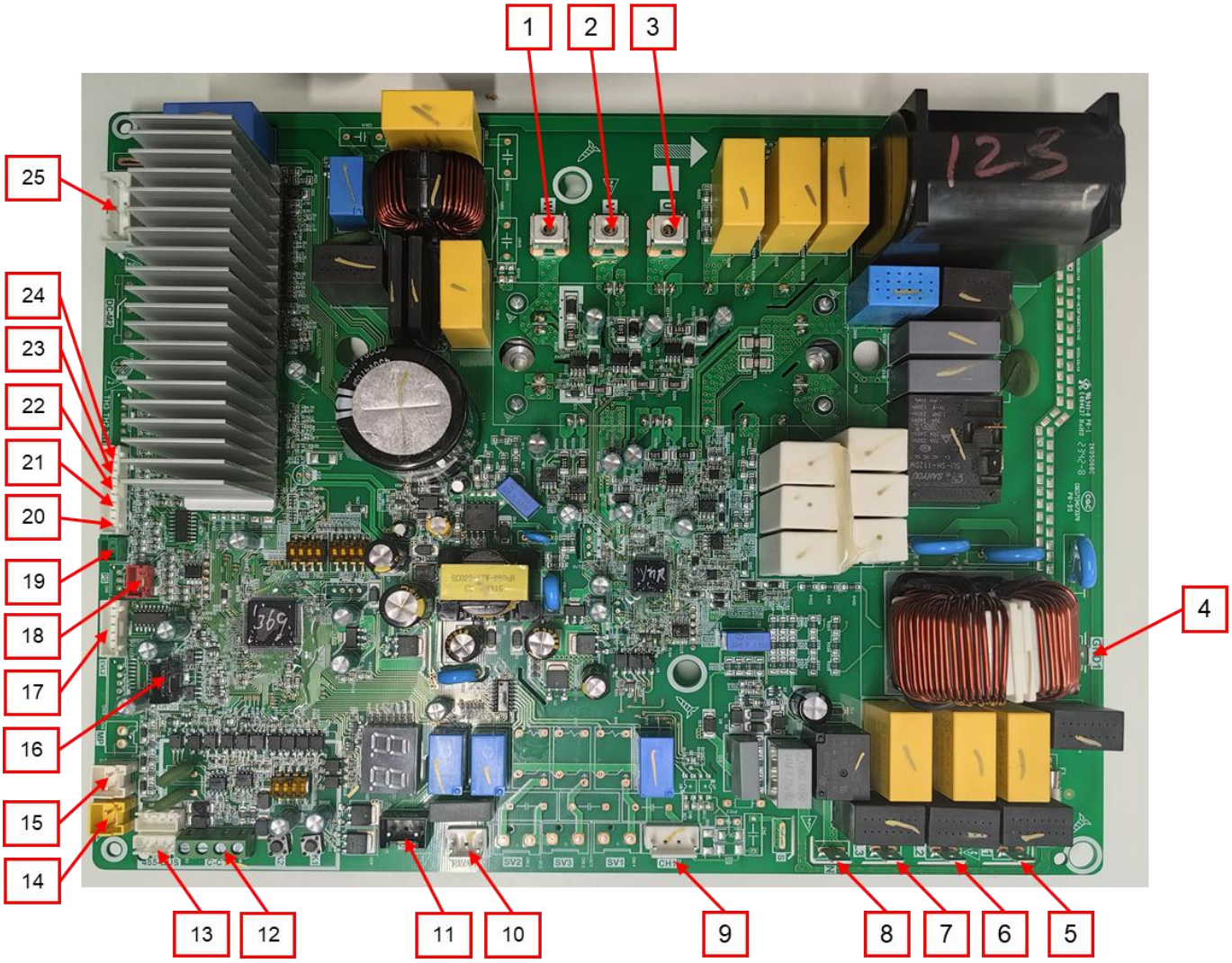
Main PCB　Material code：11222543000127




| Num. | Remark | Num. | Remark |
|---|---|---|---|
| 1 | Compressor-W | 12 | Water system communication |
| 2 | Compressor-V | 13 | DC fan |
| 3 | Compressor-U | 14 | EXV |
| 4 | GND1 | 15 | High pressure sensor |
| 5 | L | 16 | Discharge temperature sensor (TD) |
| 6 | N | 17 | Mid coil temperature sensor (TCM) |
| 7 | Chassis heater | 18 | Defrost temperature sensor (TDEF) |
| 8 | 4-way valve | 19 | Suction temperature sensor (TS) |
| 9 | Oil heater | 20 | Outdoor ambient temperature sensor (TAO) |
| 10 | Low pressure switch | 21 | Electric control box radiator temperature sensor (TRD) |
| 11 | High pressure switch | 22 | DC motor |

### 4.2.2.4 12-16kW(ACHP-H12/5R2HA-M、ACHP-H14/5R2HA-M、ACHP-H16/5R2HA-M)

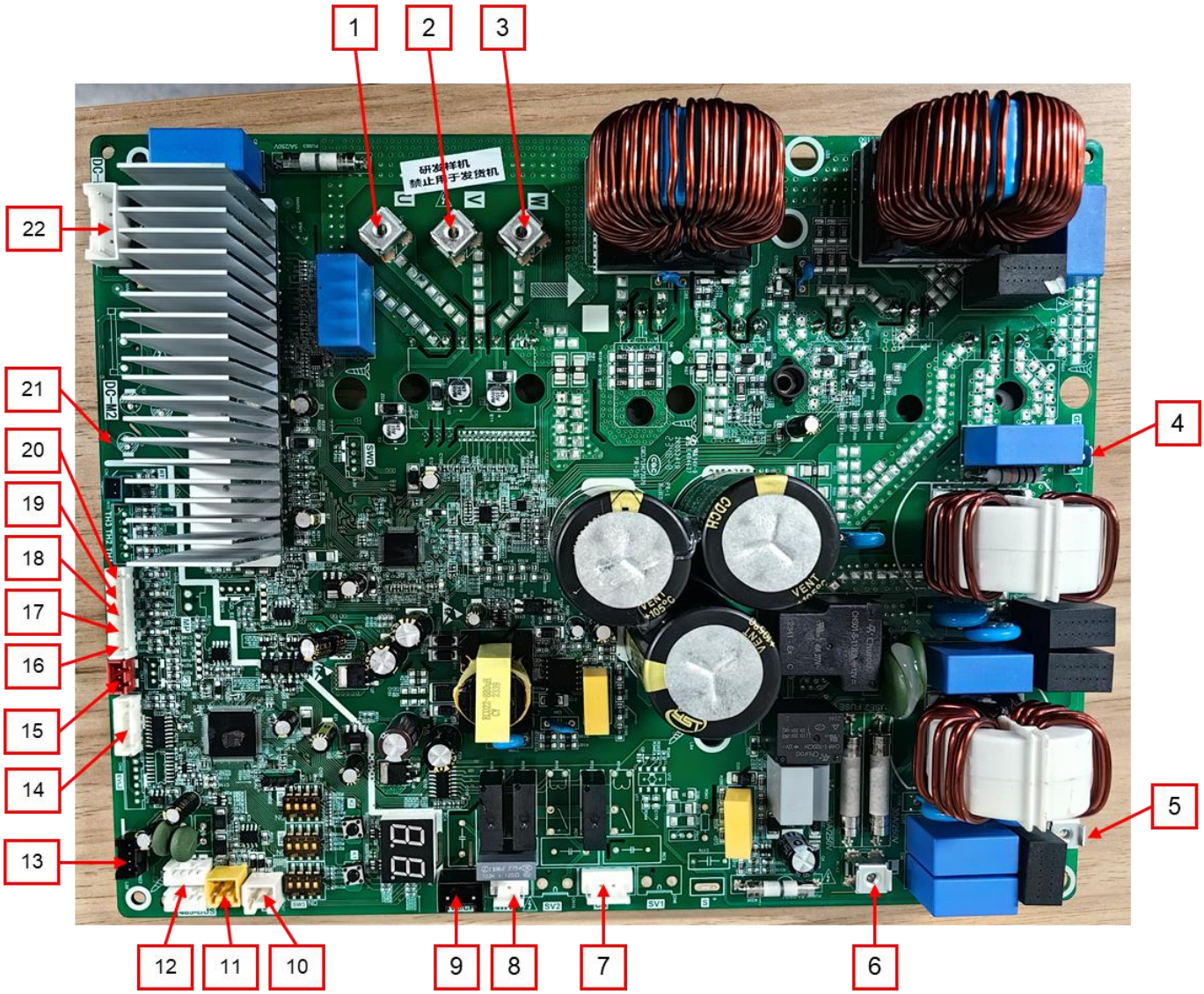
Main PCB Material code：11222543000123




| Num. | Remark | Num. | Remark |
|---|---|---|---|
| 1 | Compressor-W | 14 | High pressure switch |
| 2 | Compressor-V | 15 | Low pressure switch |
| 3 | Compressor-U | 16 | DC fan |
| 4 | GND1 | 17 | EXV |
| 5 | L1 | 18 | High pressure sensor |
| 6 | L2 | 19 | Electric control box radiator temperature sensor (TRD) |
| 7 | L3 | 20 | Outdoor ambient temperature sensor (TAO) |
| 8 | N | 21 | Suction temperature sensor (TS) |
| 9 | Oil heater | 22 | Defrost temperature sensor (TDEF) |
| 10 | 4-way valve | 23 | Mid coil temperature sensor (TCM) |
| 11 | Chassis heater | 24 | Discharge temperature sensor (TD) |
| 12 | Central control port | 25 | DC motor |
| 13 | Water system communication | | |

4.2.2.5 12-16kW(ACHP-H12/4R2HA-M、ACHP-H14/4R2HA-M、ACHP-H16/4R2HA-M、ACHP-H12/4R2HA-M(NE)、ACHP-H14/4R2HA-M(NE)、ACHP-H16/4R2HA-M(NE))

Main PCB Material code：11222543000126




| Num. | Remark | Num. | Remark |
|---|---|---|---|
| 1 | Compressor-W | 12 | Water system communication |
| 2 | Compressor-V | 13 | DC fan |
| 3 | Compressor-U | 14 | EXV |
| 4 | GND1 | 15 | High pressure sensor |
| 5 | L | 16 | Discharge temperature sensor (TD) |
| 6 | N | 17 | Mid coil temperature sensor (TCM) |
| 7 | Chassis heater | 18 | Defrost temperature sensor (TDEF) |
| 8 | 4-way valve | 19 | Suction temperature sensor (TS) |
| 9 | Oil heater | 20 | Outdoor ambient temperature sensor (TAO) |
| 10 | Low pressure switch | 21 | Electric control box radiator temperature sensor (TRD) |
| 11 | High pressure switch | 22 | DC motor |

### 4.2.3 DIP switch setting

#### 4.2.3.1 Panel 1: SW1 AC & DHW/AC

| | 1 | 2 | 3 | 4 | Function selection |
|---|---|---|---|---|---|
| SW1 | ▮ | ▮ | ▮ | ▮ | AC & DHW |
| | ▮ | ▮ | ▮ | ▯ | AC |

#### 4.2.3.2 Panel 1: SW2 Master/Slave

| | 1 | 2 | 3 | 4 | Function selection |
|---|---|---|---|---|---|
| SW2 | ▮ | ▮ | ▮ | ▮ | MASTER |
| | ▮ | ▮ | ▮ | ▯ | SLAVE 1 |
| | ▮ | ▮ | ▯ | ▮ | SLAVE 2 |
| | ▮ | ▮ | ▯ | ▯ | SLAVE 3 |
| | ▮ | ▯ | ▮ | ▮ | SLAVE 4 |
| | ▮ | ▯ | ▮ | ▯ | SLAVE 5 |
| | ▮ | ▯ | ▯ | ▮ | SLAVE 6 |
| | ▯ | ▯ | ▯ | ▯ | SLAVE 7 |

#### 4.2.3.3 Panel 2: SW1 Capacity

| | 1 | 2 | 3 | 4 | Function selection |
|---|---|---|---|---|---|
| SW1 | ▮ | ▮ | ▮ | ▯ | 4KW |
| | ▮ | ▮ | ▯ | ▮ | 6KW |
| | ▮ | ▮ | ▯ | ▯ | 8KW |
| | ▮ | ▯ | ▮ | ▮ | 10KW |
| | ▮ | ▯ | ▮ | ▯ | 12KW |
| | ▮ | ▯ | ▯ | ▮ | 14KW |
| | ▮ | ▯ | ▯ | ▯ | 16KW |

※ ▯ is OFF, ▮ is ON

# 4.3 Troubleshooting

## 4.3.1 Phenomenon analysis

Symptom 1: The compressor of the unit cannot start normally.

| Possible causes | Corrective action |
|---|---|
| The unit start-up beyond its operating water temperature range (the water temperature is too low). | **The unit uses the auxiliary heater to reach the minimum water temperature first (15°C).**<br>**Check the following items：**<br>➢ The power supply to the auxiliary heater is s correct.<br>➢ The auxiliary heater thermal protector is not activated.<br>➢ The auxiliary heater contactors are not broken. |

Symptom 2: The unit is not heating or cooling as expected.

| Possible causes | Corrective action |
|---|---|
| The temperature setting is wrong. | Check the temperature setting on the wired controller. |
| The water flow is too low. | **Check the following items：**<br>➢ All shut-off valves of the water circuit are open normally.<br>➢ There are no foreign objects in the water filter.<br>➢ There is no air in the water system.<br>➢ The water pressure is >1 bar.<br>➢ The expansion vessel is not broken.<br>➢ The water resistance is not too high for the pump. |
| The water volume in the installation is too low. | Make sure that the water volume in the installation is above the minimum required value. |

Symptom 3: The pump is making noise (cavitation).

| Possible causes | Corrective action |
|---|---|
| There is air in the water system. | Evacuate the air from the water system. |
| The water pressure at the pump inlet is too low. | Check the following items：<br>➢ The water pressure is ＞1bar.<br>➢ The water pressure sensor is not broken.<br>➢ The expansion vessel is not broken.<br>➢ The pre-pressure setting of the expansion vessel is correct. |

Symptom 4: The system is making gurgling noises after commissioning.

| Possible causes | Corrective action |
|---|---|
| There is air in the water system. | Evacuate the air from the water system. |

| | |
|---|---|
| Hydraulic balance problem | The actions are performed by the installer:<br>➢ Adjust the hydraulic balance so that the flow is correctly distributed.<br>➢ If the hydraulic balance still fails, adjust the pump Settings |

Symptom 5: The pressure relief valve opens.

| Possible causes | Corrective action |
|---|---|
| The water volume in the installation is too high. | Make the water volume below the maximum allowed value. |
| The water circuit head it too high. | The water circuit head is related to the height of the unit installation. |

Symptom 6: The pressure relief valve leaks.

| Possible causes | Corrective action |
|---|---|
| Dirt is blocking the water pressure relief valve outlet. | ➢ Check for correct operation of the pressure relief valve by turning the black knob on the valve counter clockwise.<br>➢ If you do not hear a clacking sound, contact your local dealer.<br>➢ If the water keeps running out of the unit, close both the water inlet and outlet shut-off valves first and then contact your dealer |

Symptom 7: The hot water temperature does not meet the requirement.

| Possible causes | Corrective action |
|---|---|
| One of the temperature sensors in the tank is broken. | Replace the tank temperature sensors. |

Symptom 8: Insufficient space heating occurs when the ambient temperature is low.

| Possible causes | Corrective action |
|---|---|
| If the system is equipped with auxiliary heater, the auxiliary heater not function. | Check the following items：<br>➢ The auxiliary heater has been activated.<br>➢ The circuit breaker for the backup heater's overcurrent protection has been tripped.<br>➢ The thermal protector for the auxiliary heater has not been activated. If it has, please check the following and then press the reset button located in the switch box:<br>◆ The water pressure.<br>◆ Evacuate the air from the water system. |

| | |
|---|---|
| There is air in the system. | Evacuate the air from the water system. |
| Excessive heat pump capacity is being utilized for the purpose of domestic hot water. | ➢ Make sure the Space heating priority settings have been appropriately configured.<br>➢ Increase the "space heating priority temperature" threshold to trigger auxiliary heater operation at a higher outdoor temperature. |

Symptom 9: The pressure at the tapping point is temporarily unusually high.

| Possible causes | Corrective action |
|---|---|
| The pressure relief valve has sustained damage. | ➢ Replace the pressure relief valve.<br>➢ Clean the complete tank, including the piping. |

Symptom 10: The water pump is block.

| Possible causes | Corrective action |
|---|---|
| If the pump remains inactive for an extended period, it may become obstructed by lime deposits. | Remove the screw of the stator housing and use a screwdriver to turn back and forth the ceramic shaft of the rotor until the rotor is DE blocked. |

### 4.3.2 Error Code Table

| Refrigerant system fault | |
|---|---|
| CODE | Fault code description |
| B1(H1) | High pressure switch fault |
| B4(H4) | Low pressure switch fault |
| BD(HJ) | Three-phase power supply lacks phase or phase sequence error |
| BE(HE) | Unit AC input voltage is too high protection |
| C1 | Outdoor ambient temperature sensor fault |
| C2 | Defrost temperature sensor fault |
| C3 | Discharge temperature sensor fault |
| C6 | Suction temperature sensor fault |
| D2(J2) | Communication fault between refrigerant system and water system |
| D5(J5) | Outdoor unit number，address，capacity setting fault |
| D7(J7) | EE fault |
| E1 | 4-way valve fault |
| E3 | Compressor discharge temperature too high protection |
| E6 | Electric control box radiator temperature too high protection |
| F1 | High pressure sensor fault |
| F3 | High pressure too high protection |
| F7 | Electric control box chamber temperature sensor fault |
| 31 | Compressor drive IPM module protection |
| 32 | Compressor drive hardware protection |
| 33 | Compressor drive software protection |
| 35 | Compressor drive over current protection |
| 36 | Compressor drive over or low-voltage protection |
| 37 | Compressor drive built in temperature sensor fault |
| 38 | Compressor drive under phase protection |
| 39 | Compressor drive high temperature protection |
| 3A | DC fan motor module high temperature protection |
| 3B(3H) | DC fan motor module turn on failure or out-of-step operation protection |
| 3C | DC fan motor over current protection |
| 3D(3J) | DC fan motor over or low-voltage protection |
| 3E | Compressor drive AC current input protection |
| 3F | Compressor drive PFC module protection |
| 61 | Heat dissipation fan fault |
| Water system fault | |
| CODE | Fault code description |

| | |
|---|---|
| A1 | Indoor ambient temperature sensor 1 fault |
| A3 | Refrigerant liquid pipe temperature sensor fault |
| A4 | Refrigerant gas pipe temperature sensor fault |
| A5 | Water pump fault |
| A7 | Water flow switch fault |
| A8 | EE fault |
| A9 | Communication fault between refrigerant system and water system |
| AA | Communication fault between wired controller and water system |
| AF | Electric heating overheat protection |
| 93 | Electric heating outlet water temperature sensor fault |
| 94 | Inlet water temperature sensor fault |
| 95 | Outlet water temperature sensor fault |
| 96 | Water tank temperature sensor fault |
| 98 | Water flow switch early close fault |
| 79 | Floor heating room temperature sensor fault |
| 7A | Communication fault between master unit and slave unit |
| 7B(7H) | Buffer tank 2 temperature sensor fault |
| 7C | Buffer tank 1 temperature sensor fault |
| 7D(7J) | Communication fault between water PCB and expansion board unit |
| 7E | Floor heating water temperature sensor fault |
| 7F | Solar water temperature sensor fault |

**Note：**

**Description of double fault codes：Since the LED display on PCB cannot distinguish between capital D and 0, capital B and 8, so, D will be replaced by J on the LED light board, and B will be replaced by H. It still displays normally on the wire controller and monitoring software**

### 4.3.3 Troubleshooting

#### 4.3.3.1 Water system

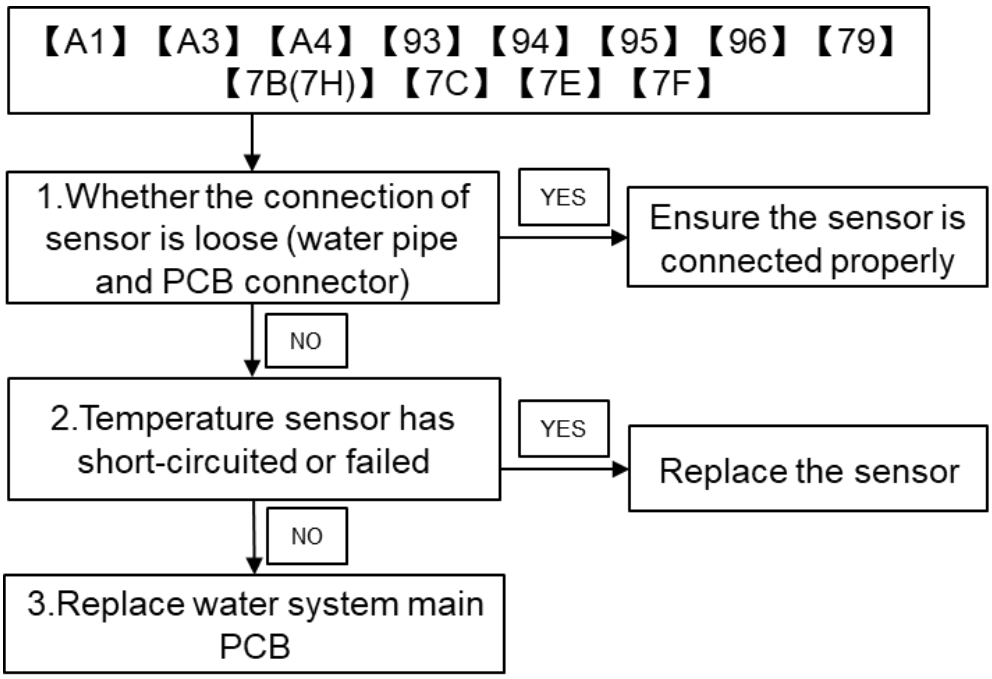
a) Temperature sensor fault

| Temperature sensor fault | |
|---|---|
| CODE | Fault code description |
| A1 | Indoor ambient temperature sensor 1 fault |
| A3 | Refrigerant liquid pipe temperature sensor fault |
| A4 | Refrigerant gas pipe temperature sensor fault |
| 93 | Electric heating outlet water temperature sensor fault |
| 94 | Inlet water temperature sensor fault |
| 95 | Outlet water temperature sensor fault |
| 96 | Water tank temperature sensor fault |
| 79 | Floor heating room temperature sensor fault |
| 7B(7H) | Buffer tank 2 temperature sensor fault |
| 7C | Buffer tank 1 temperature sensor fault |
| 7E | Floor heating water temperature sensor fault |
| 7F | Solar water temperature sensor fault |

**Error logic:**

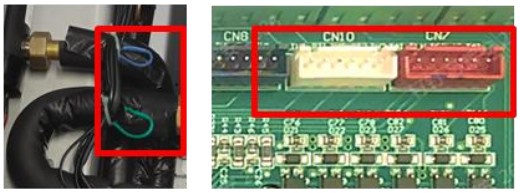
- Error appear：The sensor connection port be disconnected and lasts for 10s
- Error disappear：The sensor connection port be connected and lasts for 10s

**Check step:**



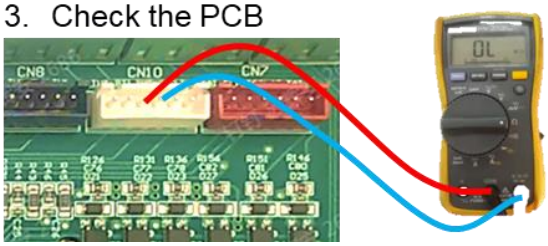
**Example:**

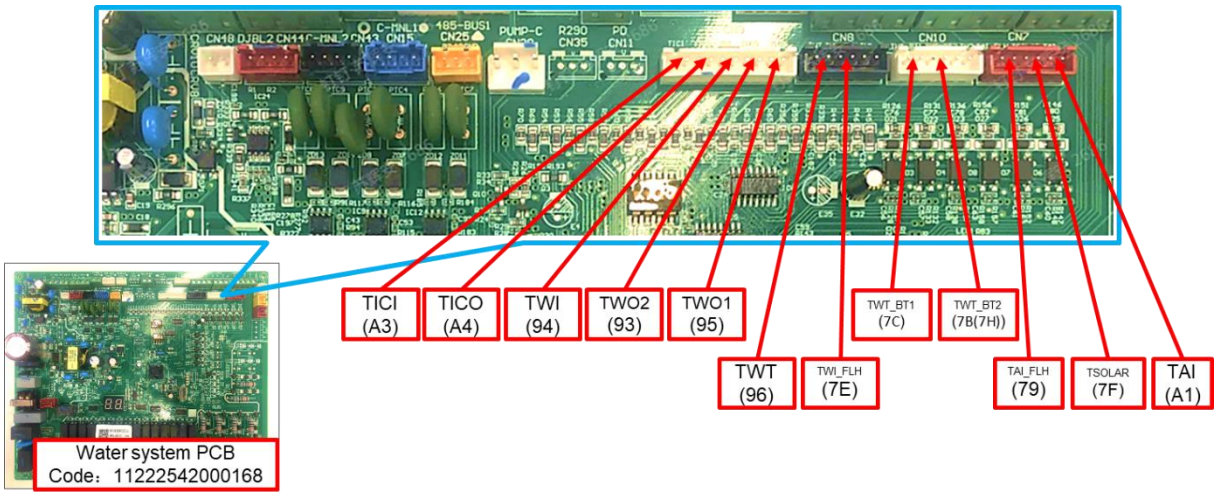
1. Check the connection point

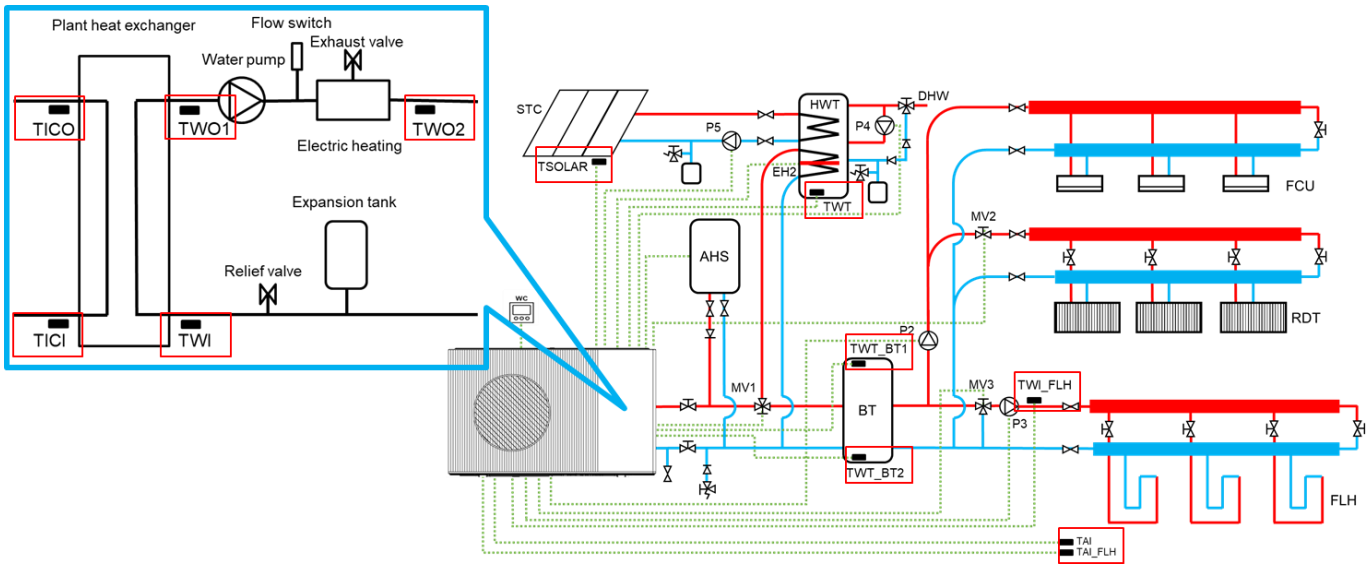



2. Check whether the sensor is faulty

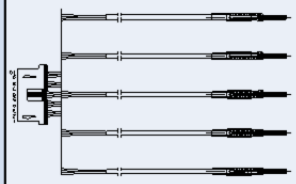
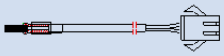
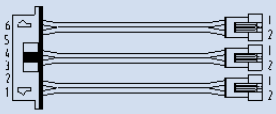

3. Check the PCB



**Related parts:**

| SENSOR NEME | CODE | | PICTURE | LENGTH (cm) | RESISTANCE (kΩ) | AUX SUPPLY |
|---|---|---|---|---|---|---|
| | Patch wire | Sensor | | | | |
| TICI | 16430007000290 | |  | 130 | 20 | Y |
| TICO | | | | 100 | 20 | |
| TWI | | | | 125 | 20 | |
| TWO2 | | | | 84 | 20 | |
| TWO1 | | | | 106 | 20 | |
| TWT | 16430045000019-12 | 16430007000280 |  | 1000 | 20 | Y |
| TWI_FLH | | / | | / | 20 | N |
| TWT_BT1 | 4-6kW: 16430045000021-13 | / |  | / | 20 | N |
| TWT_BT2 | | | | / | 20 | N |
| TAI_FLH | 8-16kW: 16430045000019-12 | / | | / | 20 | N |
| TSOLAR | | | | / | 20 | N |
| TAI | | | | / | 20 | N |

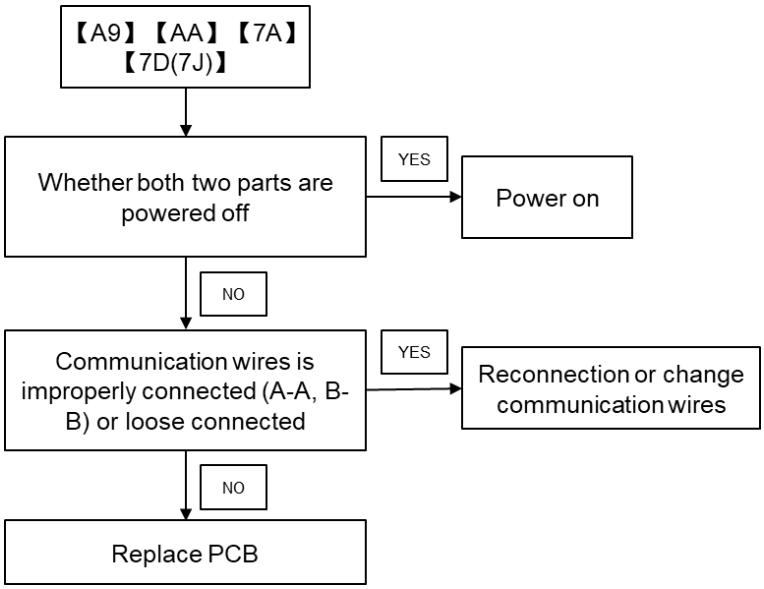
b) Communication fault

| Communication fault | |
|---|---|
| CODE | Fault code description |
| A9 | Communication fault between refrigerant system and water system |
| AA | Communication fault between wired controller and water system |
| 7A | Communication fault between master unit and slave unit |

**Error logic:**

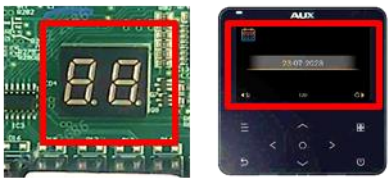
- Error appear：Communication data is not received normally for 15s between each communication module
- Error disappear：The communication data can be received normally

**Check step:**



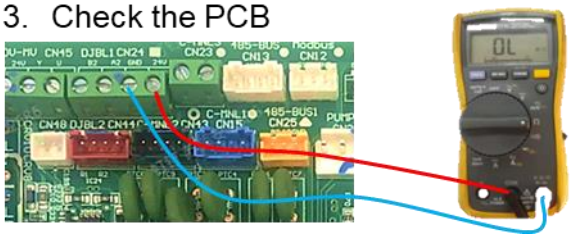

**Example:**

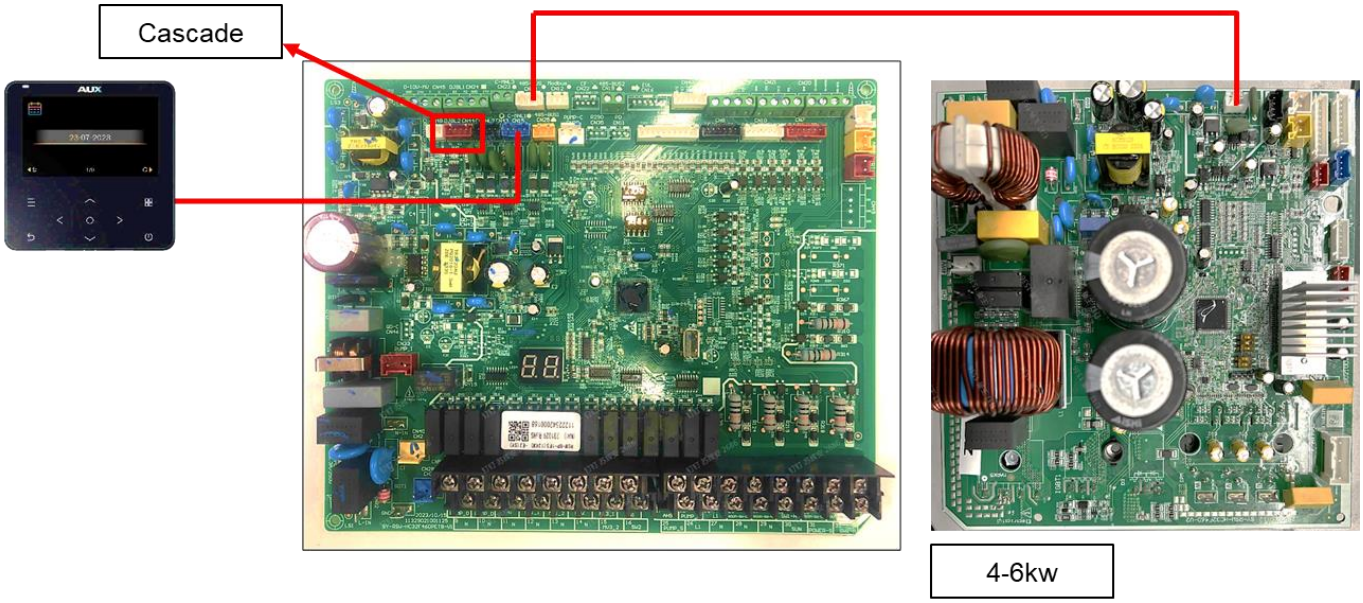
1. Check power supply

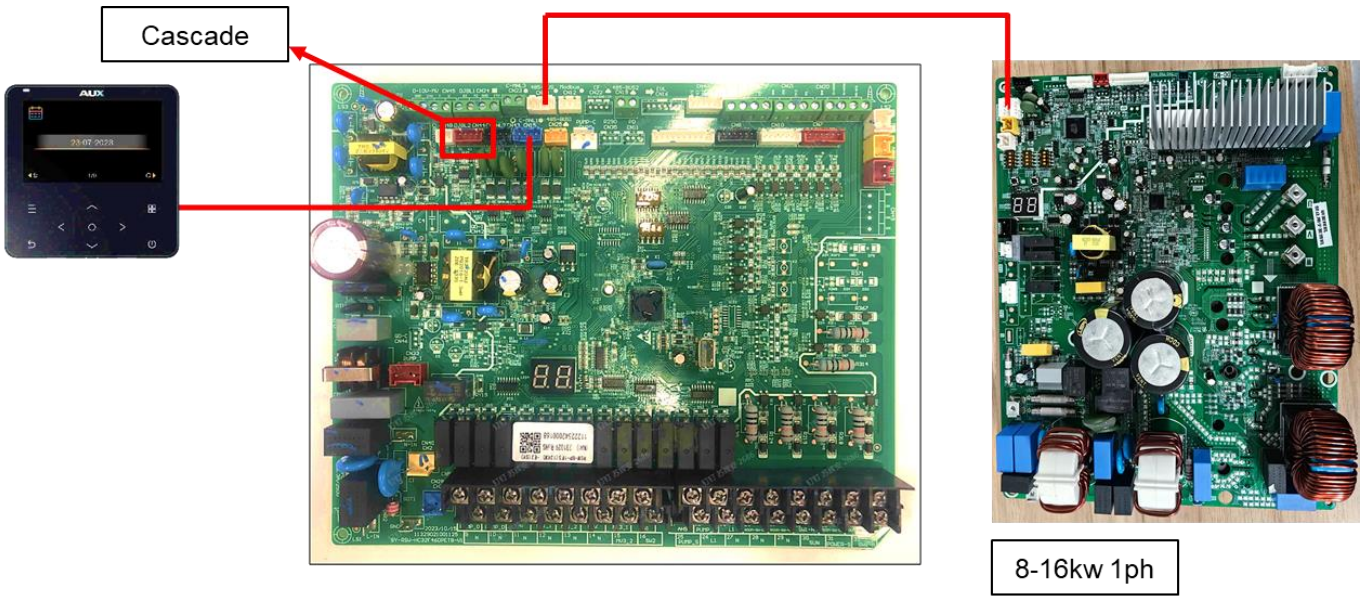


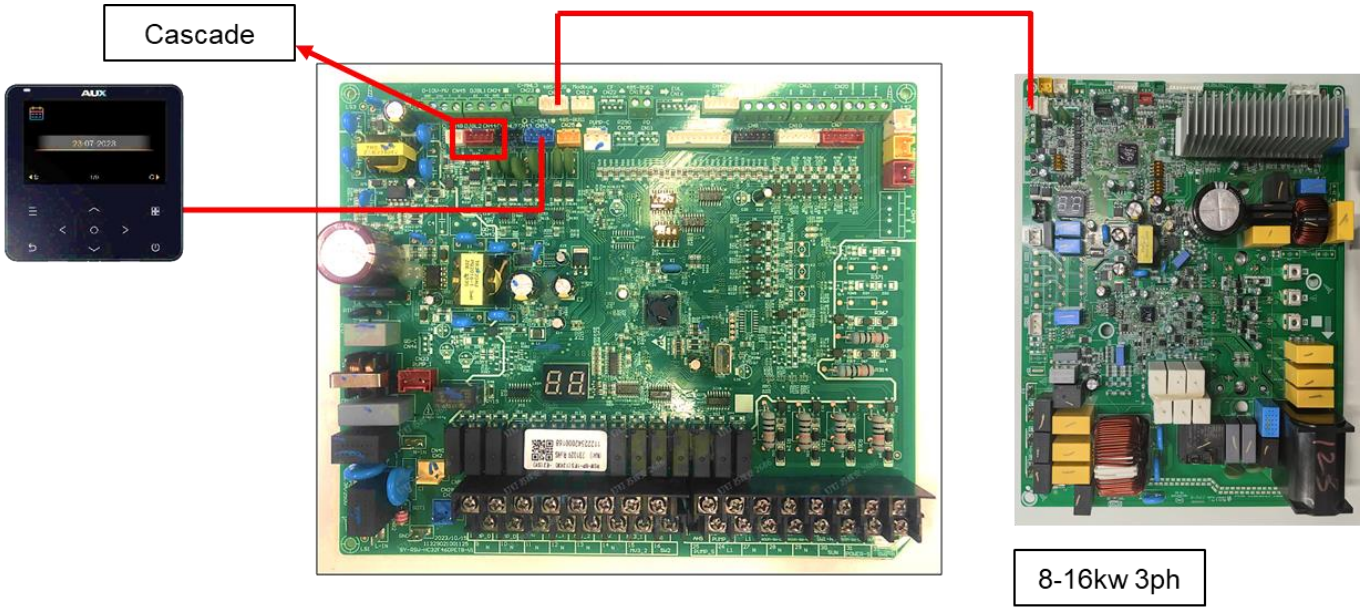
2. Check the wiring sequence

3. Check the PCB



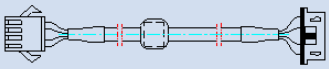
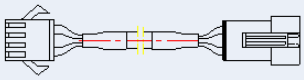
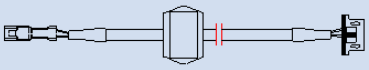
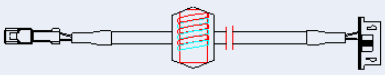

Cascade
4-6kw


Cascade
8-16kw 1ph


Cascade
8-16kw 3ph

## Related parts:

| NAME | CODE | PICTURE | MODEL |
|---|---|---|---|
| Water system PCB | 11222542000168 |  | CJ控制板RSW-BP-1F5(12KW)(水力模块)-E2(SY) |
| Refrigerant system PCB | 4-6kW: 11222542000175 |  | CJ控制板RSW-BP-DC4-1T1(R290)整-E1(SY) |
| | 8-10kW 3ph: 11222543000122 |  | CJ模块板QD-33161FH420D7KZAAC6R290-10-1(SY) |
| | 12-16kW 3ph: 11222543000123 | | CJ模块板QD-33161FH650D7VZAAC6R290-16-1(SY) |
| | 8-10kW 1ph: 11222543000127 |  | CJ模块板QD-12201FH420D7KZAAC6-R290-1(SY) |
| | 12-16kW 1ph: 11222543000126 | | CJ模块板QD-12201FH650D7VZAAC6-R290-1(SY) |
| Wired controller | 16322033000003 |  | XK08-RS(AUX)485-E1-彩屏 |

| NAME | CODE | PICTURE | LENGTH (cm) |
|---|---|---|---|
| Wired controller connect wire | 16422008000091 |  | 100 |
| | 16422008000090 |  | 1000 |
| PCB connect wire | 4-6kW: 16430045000021-10 |  | 65 |
| | 8-16kW: 16430045000019-9 |  | 95 |

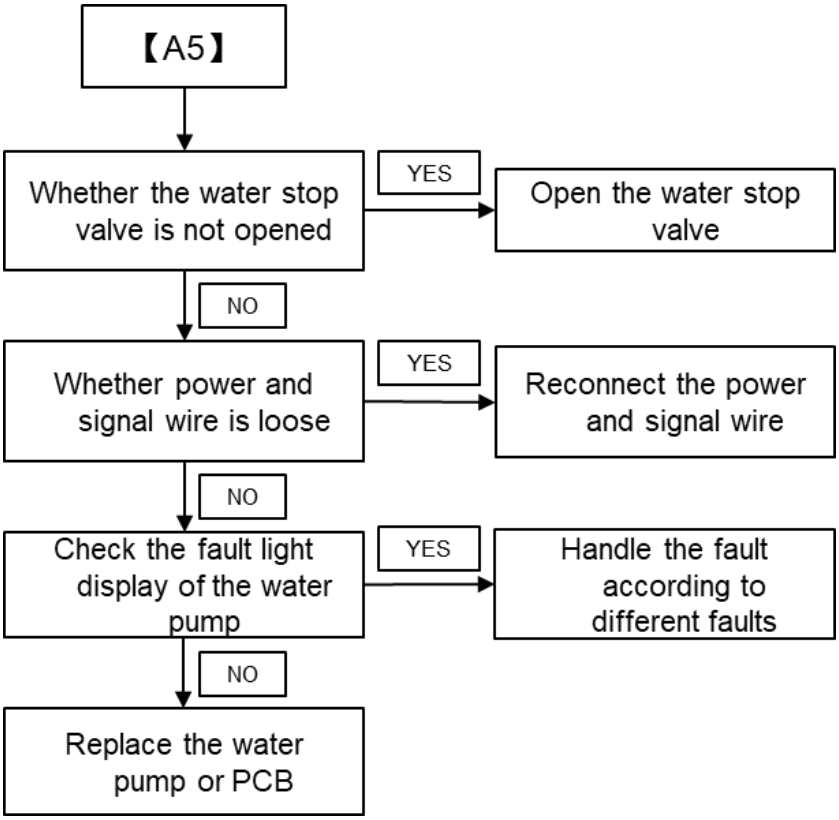
c) Water system component fault

| Water system component fault | |
|---|---|
| CODE | Fault code description |
| A5 | Water pump fault |
| AF | Electric heating overheat protection |
| A7 | Water flow switch fault |
| 98 | Water flow switch short circuit protection |

**A5 Error logic:**

- Error appear：When port PUMP-C detects pump failure feedback or cannot receive pump feedback signals
- Error disappear：The feedback signals can be received normally

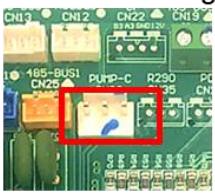
**Check step:**



**Example:**

1. Check stop valve turn on or not

2. Check the signal wire connect




3. Check the pump signal light

| LED status | Pump condition | Instructions |
|---|---|---|
| | Plugging protection | Feedback duty cycle 90% or phase current abnormal abrupt change, more than 0.45S |
| | Over/under voltage protection | Input voltage < 170V<br>Or<br>Input voltage > 270V |
| | Lack-phase protection | The pump detects a current imbalance |
| | Over current protection | Current trigger value 2.5A<br>Peak value > 20A,<br>the delay < 0.6μm |
| | Over temperature protection | IPM temperature > 110℃； Lasts for 50s |
| | No PWM signal | / |
| | PWM signal control | / |

light
delight

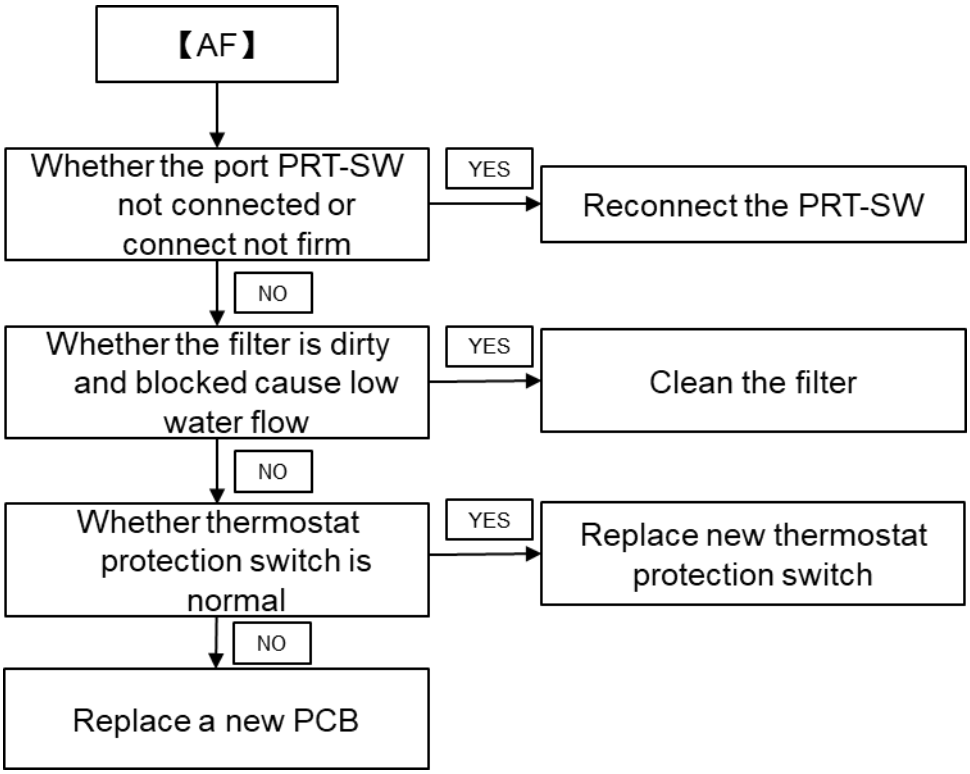
**Related parts:**

| NAME | CODE | PICTURE | Argument | |
|---|---|---|---|---|
| APM25-9-130 PWM1(S) | 16422008000091 |  | Voltage | 230V±10% |
| | | | Frequency | 50/60Hz |
| | | | Power input | 4~95W |
| | | | Current | 0.04~0.9A |
| | | | Rotational speed | 1000~4500r/min |
| | | | Max head | 9m |
| | | | Flow rate | 4.5m3/h |

**AF Error logic:**

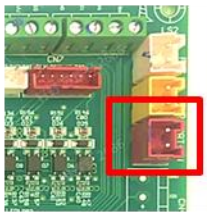
- Error appear：When Port : PRT-SW be disconnected(water temperature > 90±3℃), then will appear error code AF
- Error disappear：The fault is rectified after the protection switch automatically resets or manually resets after the water temperature decreases

**Check step:**

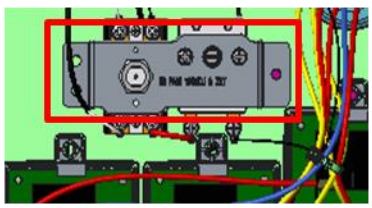



**Example:**

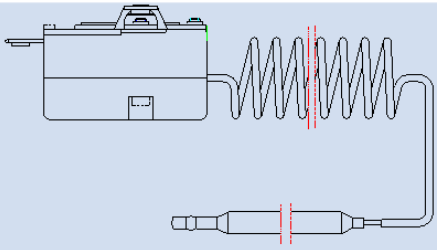
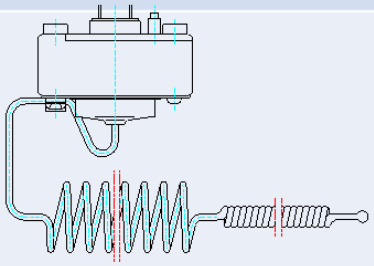
1. Check connect firm or not



2. Check the filter and thermostat



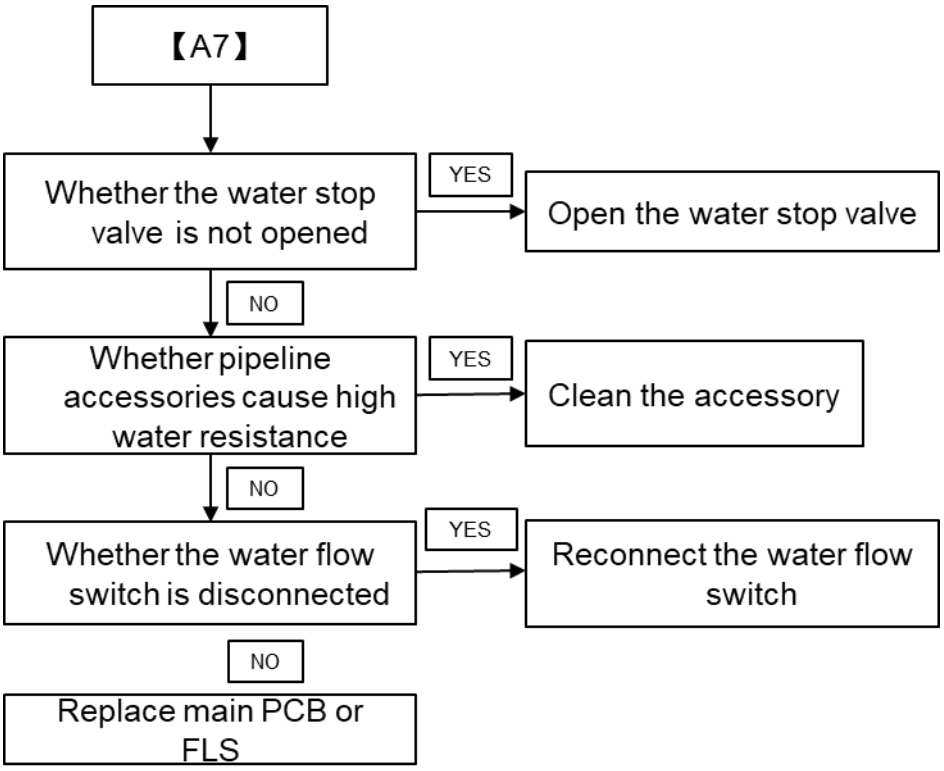
**Related parts:**

| NAME | CODE | PARAMETERS | PICTURE |
|---|---|---|---|
| Thermostat AUTO | 16430025000011 | 90±3℃ |  |
| Thermostat MANUAL | 16430025000009 | 95±5℃ |  |

**A7 Error logic:**

- Error appear：Within 150s after the pump turn on，if the FLS disconnected time ⩾ 20s，or during the pump is normal running，if the FLS disconnected time ⩾ 5s，A7 will disappear
- Error disappear：FLS is back to normal

**Check step:**



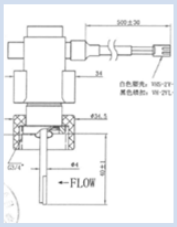

**Example:**

1. Check stop valve turn on or not

2. Check the pipeline

3. Check the FLS

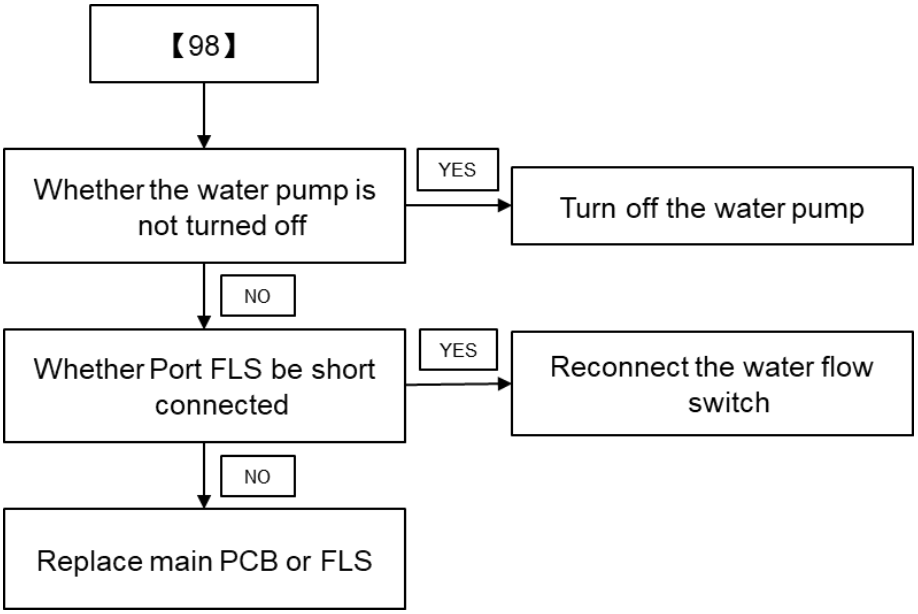
**Related parts:**

| NAME | CODE | PARAMETERS | PICTURE |
|---|---|---|---|
| FLS | 16445032000007 | 4-6kW：<br>0.36±10%m3/h |  |
| | 16445032000009 | 8-16kW：<br>0.6±0.1m3/h | |

**98 Error logic:**

- Error appear：After the pump stop running, if the FLS still connect ⩾ 5s
- Error disappear：FLS is back to normal

**Check step:**




**Example**:

1. Check the water pump

2. Check the FLS

**Related parts:**

| NAME | CODE | PARAMETERS | PICTURE |
|---|---|---|---|
| FLS | 16445032000007 | 4-6kW：0.36±10%m3/h |  |
| | 16445032000009 | 8-16kW：0.6±0.1m3/h | |

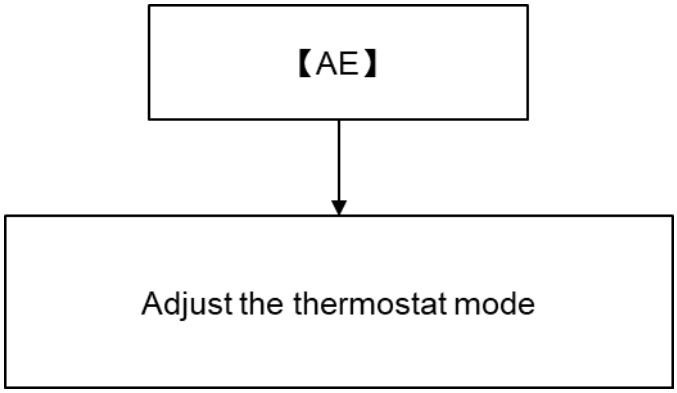
d) Different mode operation fault

| Different mode operation fault | |
|---|---|
| CODE | Fault code description |
| AE | Different mode operation fault |

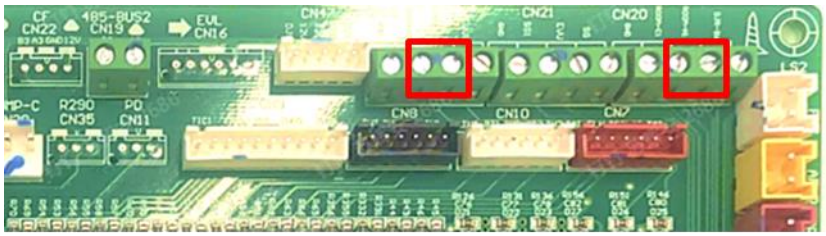
**AE Error logic:**

- Error appear：When two or more adjustable mode thermostats are connected and the mode settings conflict
- Error disappear：Mode setting normal

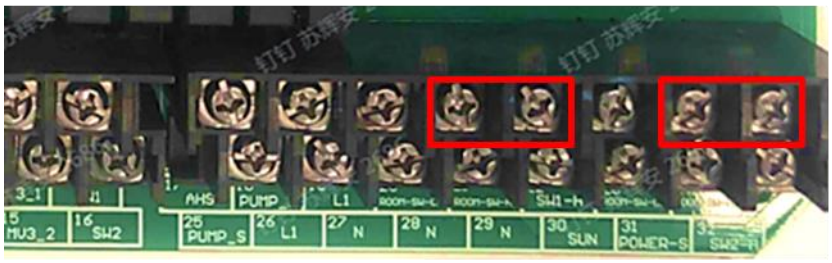
**Check step:**




**Related parts:**




Thermostat switch (low voltage)




Thermostat switch (high voltage)

4.3.3.2 Refrigerant system

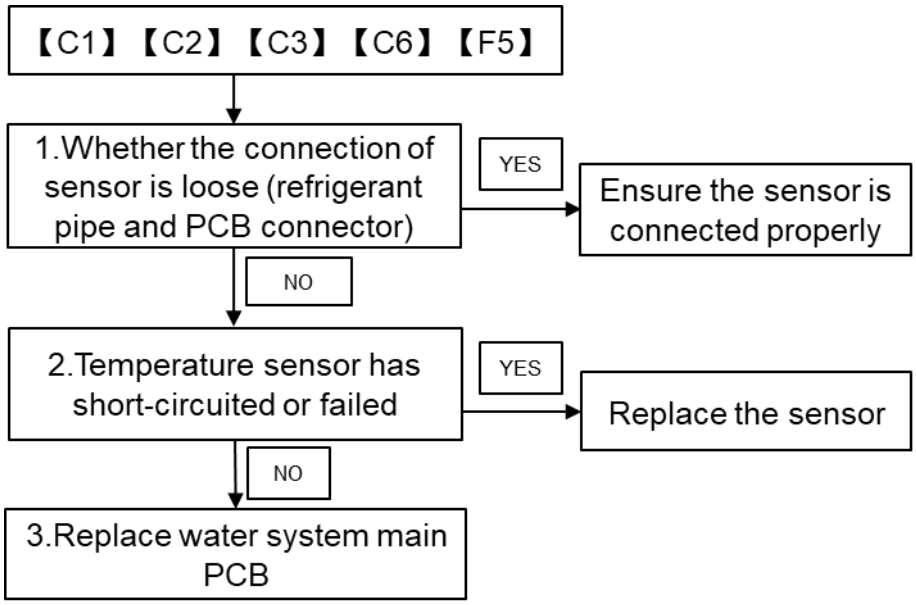
a) Temperature sensor fault

| Temperature sensor fault | |
|---|---|
| CODE | Fault code description |
| C1 | Outdoor ambient temperature sensor fault |
| C2 | Defrost temperature sensor fault |
| C3 | Discharge temperature sensor fault |
| C6 | Suction temperature sensor fault |
| E3 | Compressor discharge temperature too high protection |
| E6 | Radiator temperature too high protection |
| E7 | Electric control box chamber temperature too high protection |
| F5 | Radiator temperature sensor fault |
| F7 | Electric control box chamber temperature sensor fault |

**C1; C2; C3; C6; F5; F7 Error logic:**

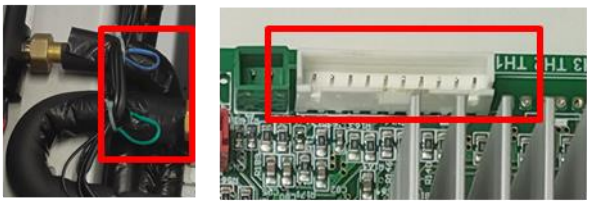
- Error appear：The sensor connection port be disconnected and lasts for 10s
- Error disappear：The sensor connection port be connected and lasts for 10s

**Check step:**



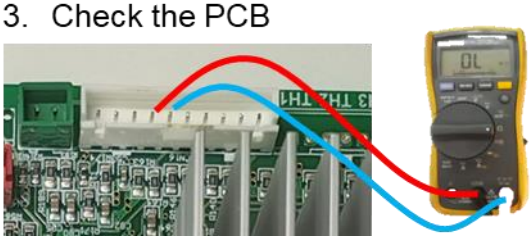
**Example:**

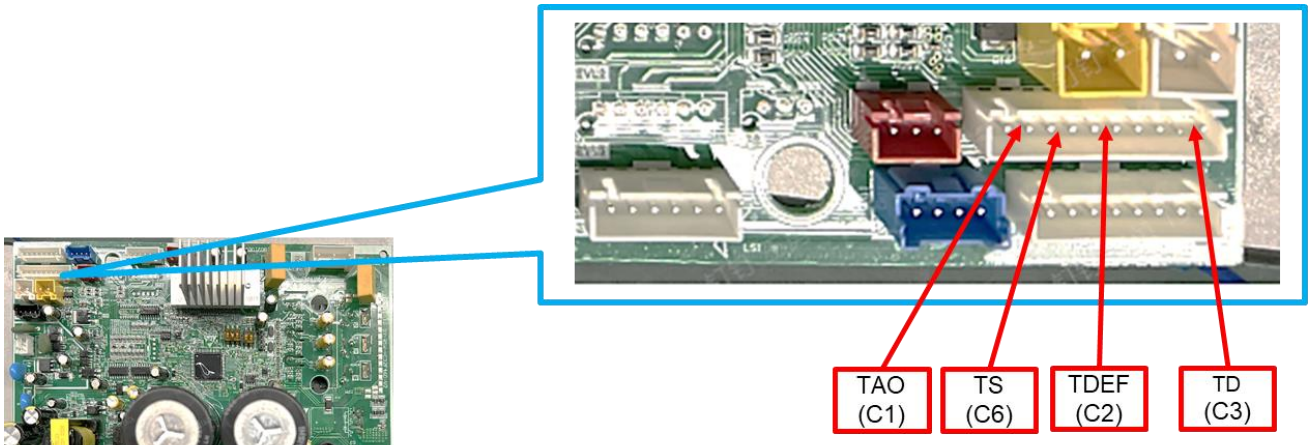
1. Check the connection point



2. Check whether the sensor is faulty

3. Check the PCB

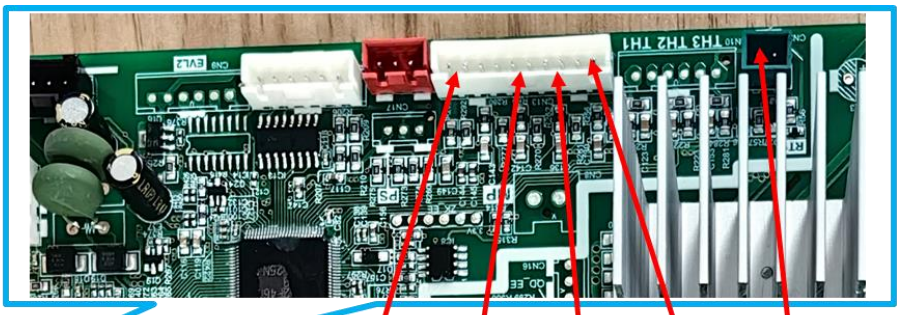





4-6kw Refrigerant system PCB
Code：11222542000175

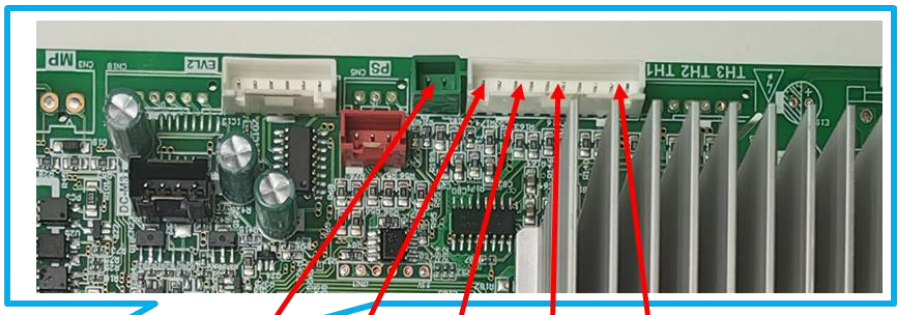
PS: The Electric control box chamber temperature sensor is a chip resistor. If this sensor fails, you are advised to replace the PCB

4-6kW units don't have radiator temperature sensor (TRD)



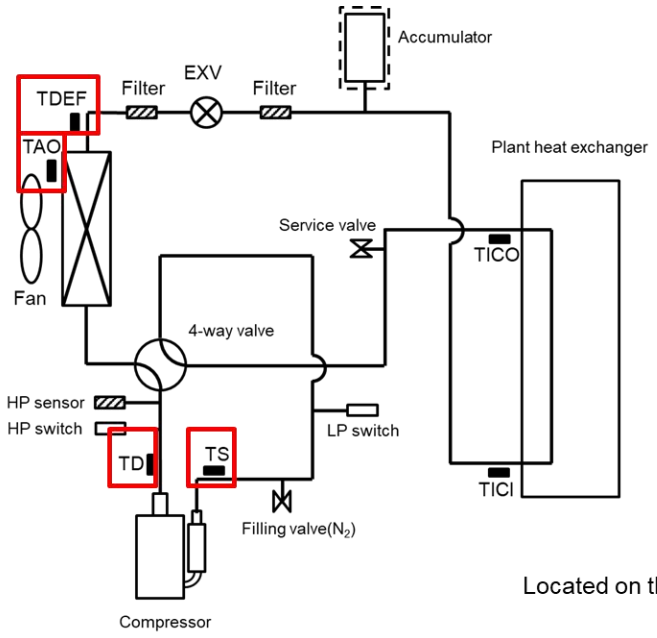

8-16kw 1ph Refrigerant system PCB
Code: 11222543000127(8-10)
11222543000126(12-16)

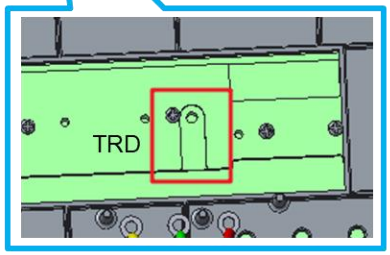
PS: The Electric control box chamber temperature sensor is a chip resistor. If this sensor fails, you are advised to replace the PCB




8-16kw 3ph Refrigerant system PCB
Code: 11222543000122(8-10)
11222543000123(12-16)

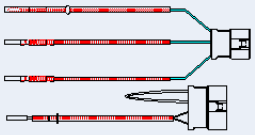
PS: The Electric control box chamber temperature sensor is a chip resistor. If this sensor fails, you are advised to replace the PCB




Located on the back of the refrigerant system electric control box (8-16kW)

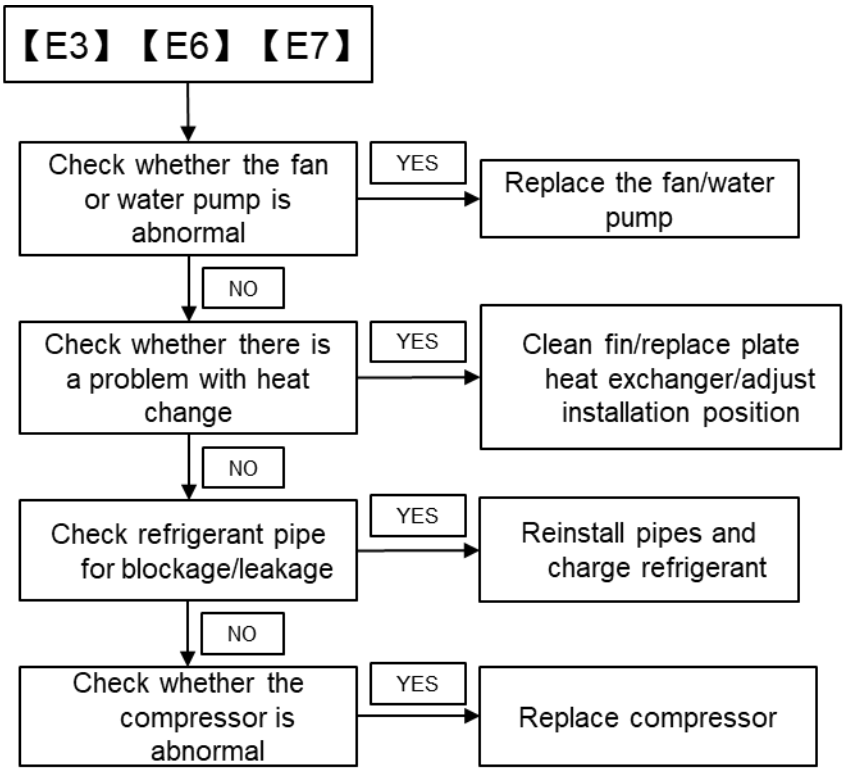
**Related parts:**

| SENSOR NEME | CODE | | PICTURE | LENGTH (cm) | RESISTANCE (kΩ) | AUX SUPPLY |
|---|---|---|---|---|---|---|
| | Patch wire | Sensor | | | | |
| TAO | 116430007000288 | |  | 60 | 15 | Y |
| TS | | | | 75 | 20 | |
| TDEF | | | | 150 | 20 | |
| TD | | | | 65 | 50 | |
| TRD | 11329013000133 | |  | 23 | 20 | |

**E3; E6; E7 Error logic:**

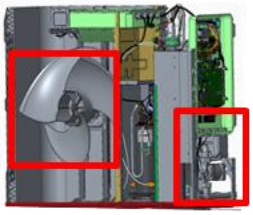
- Protection appear：When the sensor detects that the temperature is higher than the EE protection value for 10s, the fault code appears and the unit frequency limits or stops
- Protection disappear：Temperature drops below the protection value

**Check step:**

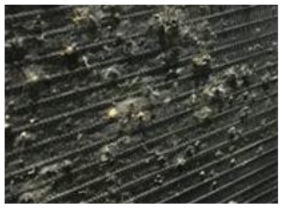


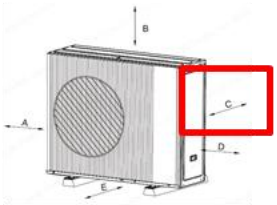

**Example:**

1. Check the fan and pump

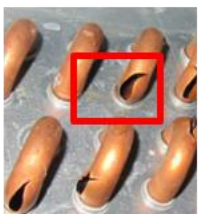


2. Check the heat exchange efficiency

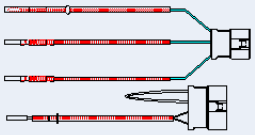




3. Check the pipe



**Related parts:**

| SENSOR NEME | CODE | | PICTURE | LENGTH (cm) | RESISTANCE (kΩ) | AUX SUPPLY |
|---|---|---|---|---|---|---|
| | Patch wire | Sensor | | | | |
| TAO | 116430007000288 | |  | 60 | 15 | Y |
| TS | | | | 75 | 20 | |
| TDEF | | | | 150 | 20 | |
| TD | | | | 65 | 50 | |
| TRD | 11329013000133 | |  | 23 | 20 | |

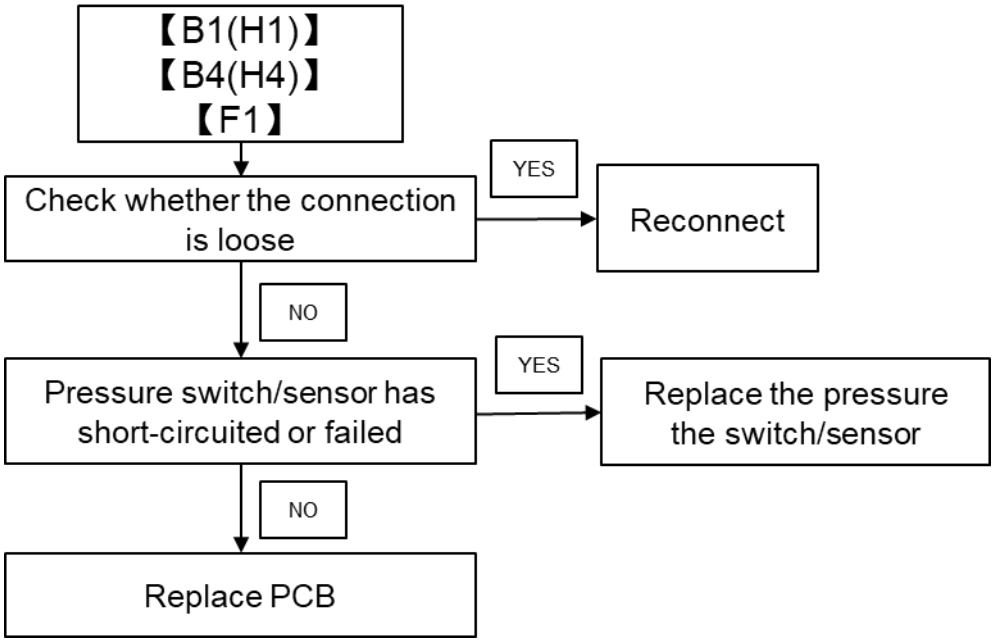
i. Pressure fault

| Pressure fault | |
|---|---|
| CODE | Fault code description |
| B1(H1) | High pressure switch fault |
| B4(H4) | Low pressure switch fault |
| F1 | High pressure sensor fault |
| F3 | High pressure too high protection |

**B1(H1); B4(H4); F1 Error logic:**

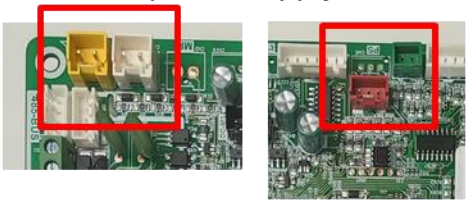
- Error appear：High / Low pressure switch/sensor be disconnected and lasts for 3s
- Error disappear：The error will disappear under the situation which the switch be connected more than 10s during first 2 times within 1 h
- Error locked：The error will be locked under the situation which the switch be disconnected the 3 times within 1h, it is necessary to repower to clean the error

**Check step:**

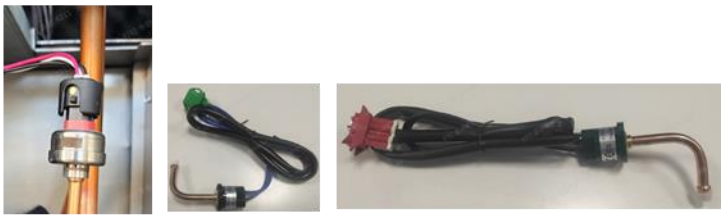


**Example:**

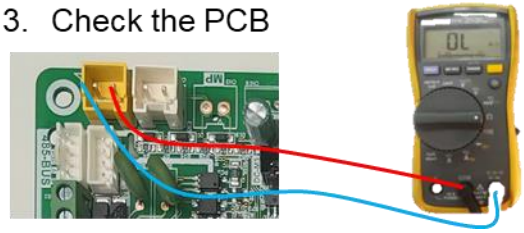
1. Check power supply

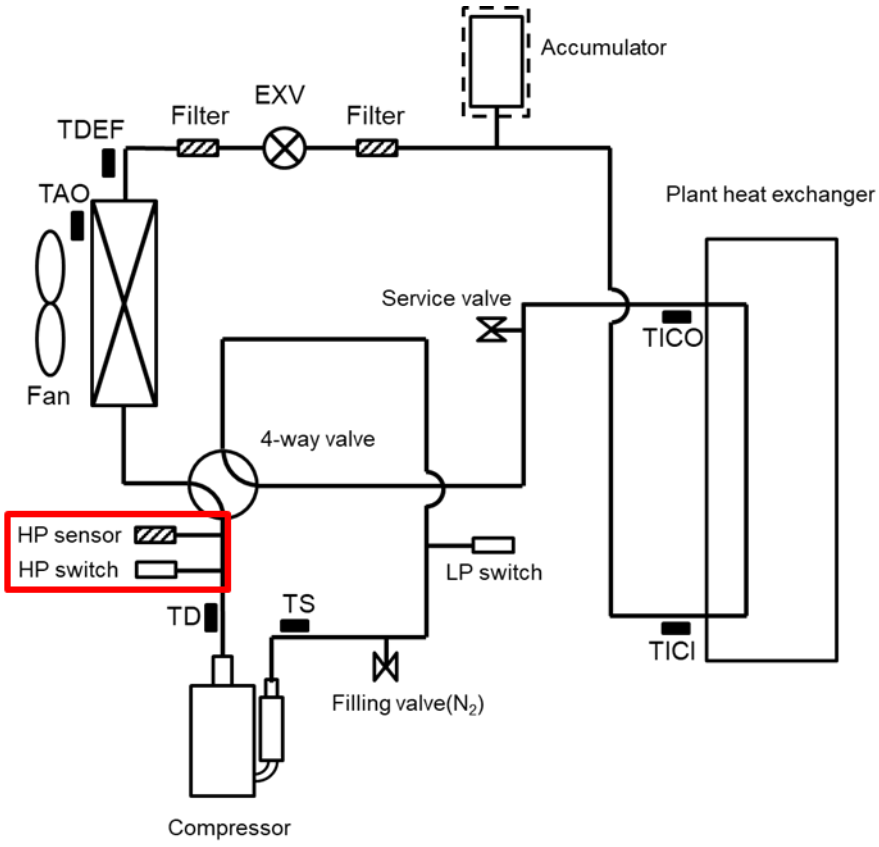


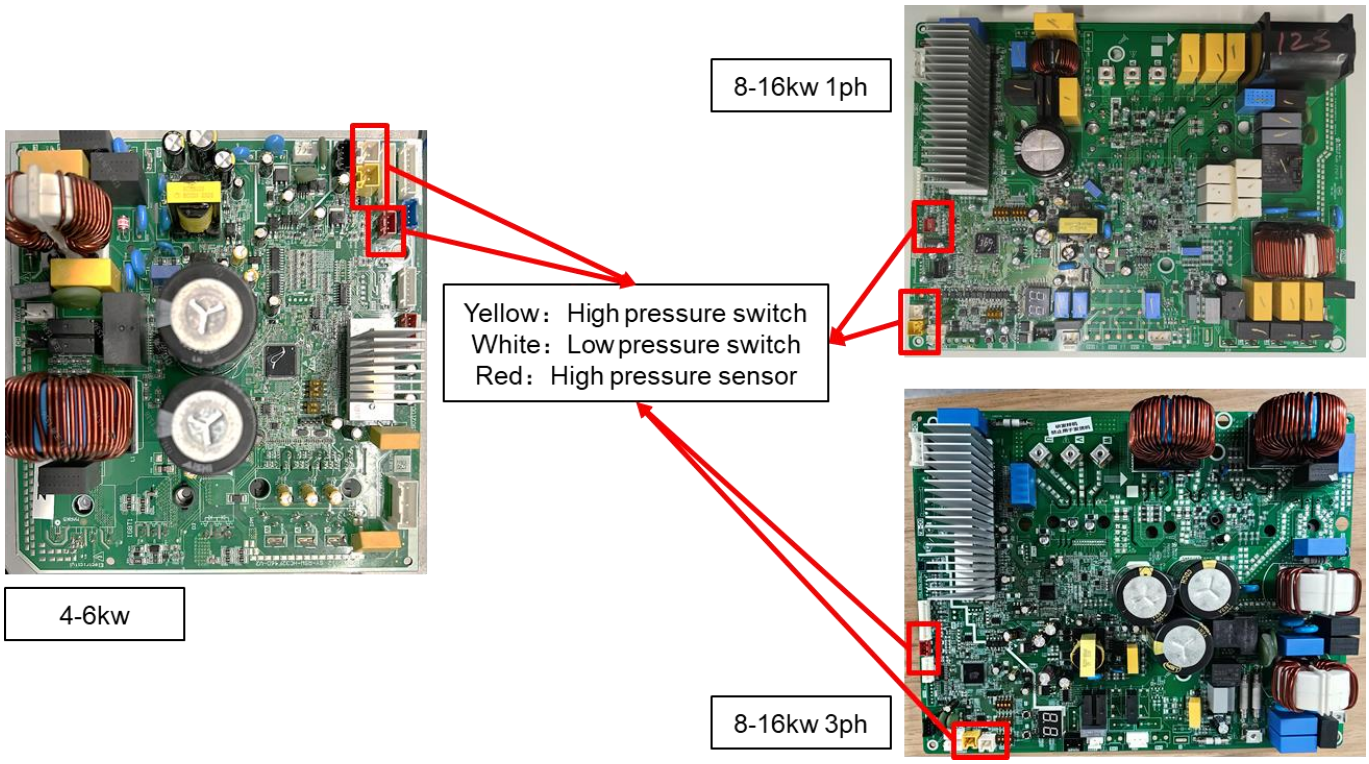
2. Check the switch/sensor



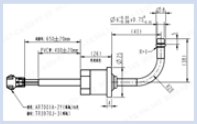
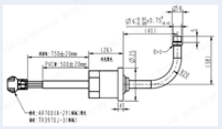
3. Check the PCB







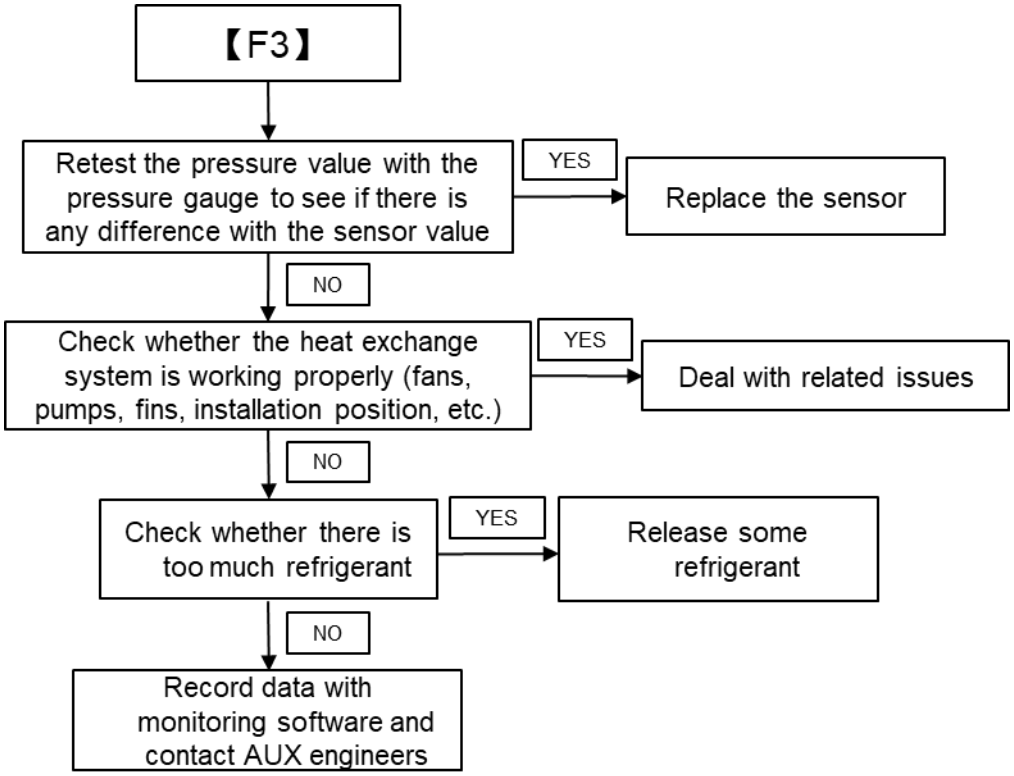

**Related parts:**

| NAME | CODE | PICTURE | Breaking pressure (MPa) | Reset pressure (MPa) |
|---|---|---|---|---|
| High pressure switch | 16426068000006 |  | 3.2 | 2.6 |
| Low pressure switch | 16426068000005 |  | 0.03 | 0.1 |

**F3 Protect logic:**

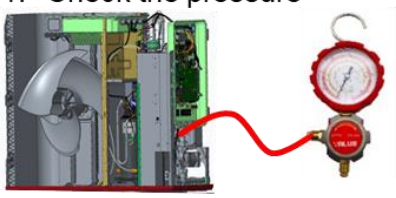
- Protection appear：High pressure sensor detected Pd ≥ 3.1 Mpa

**Check step:**




**Example:**

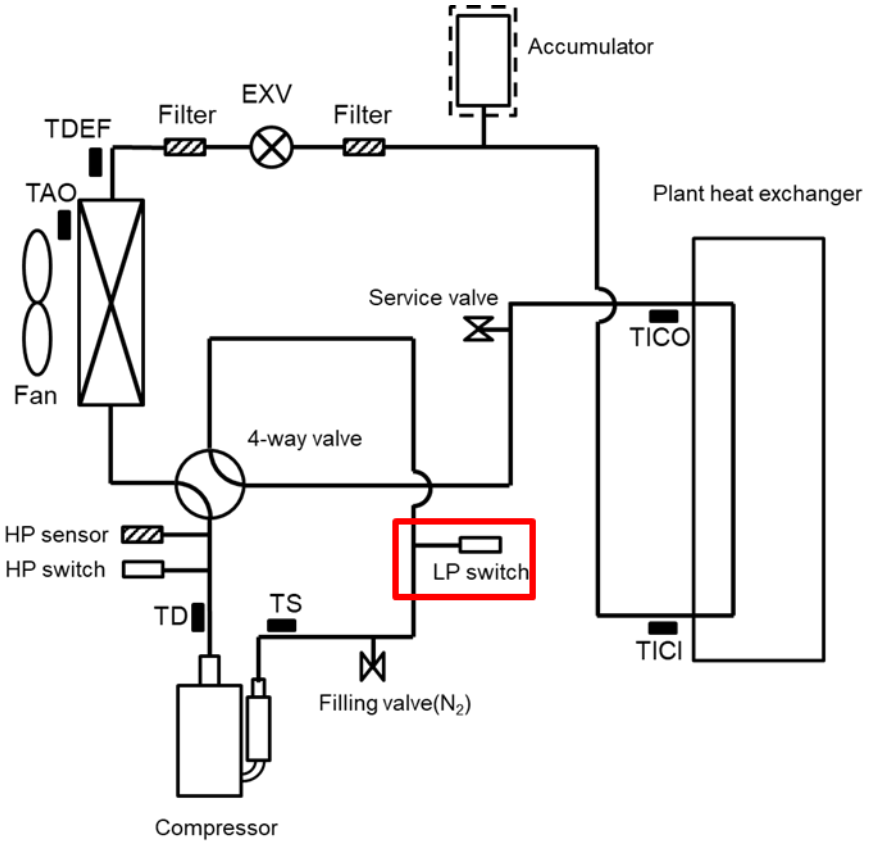
1. Check the pressure

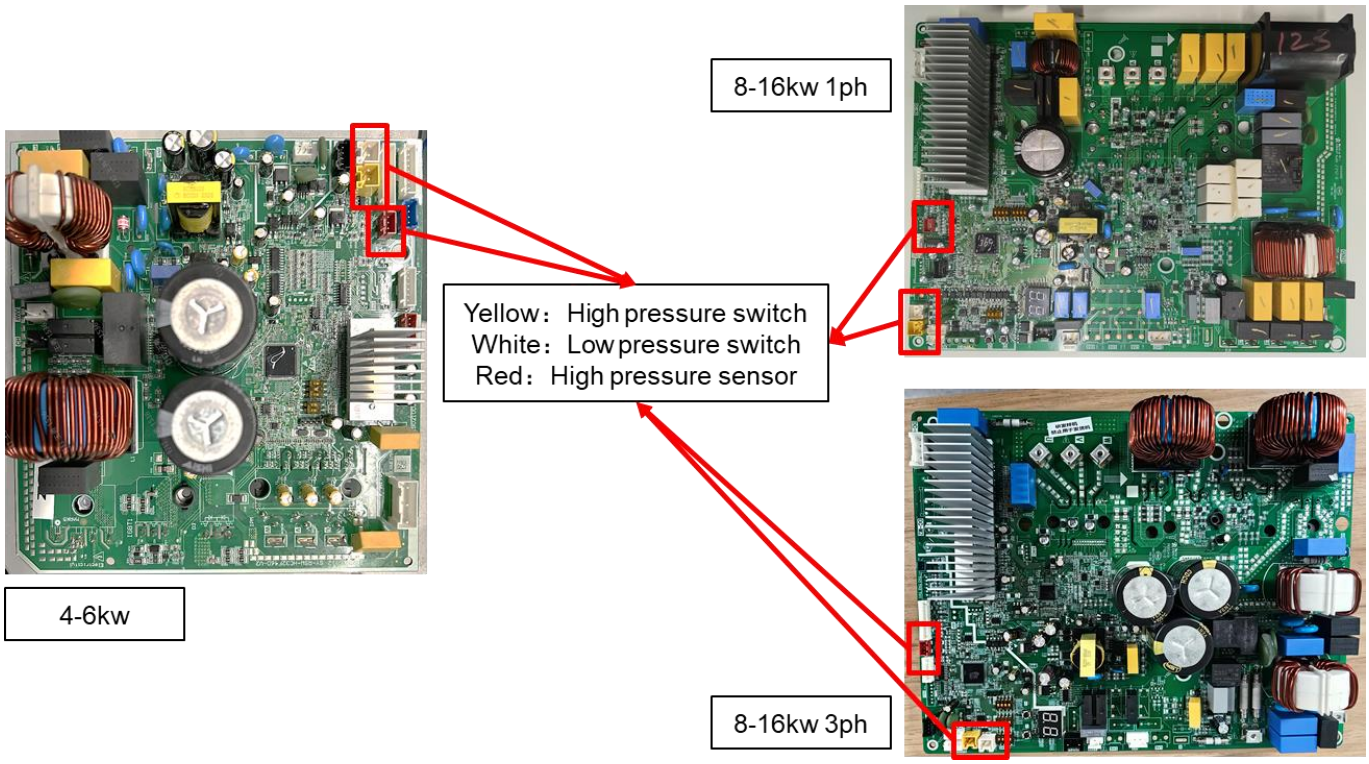


2. Check the heat exchange efficiency

3. Check the refrigerant


4. Save monitoring data




**Related parts:**

| NAME | CODE | PICTURE | Pressure range (MPa) |
|---|---|---|---|
| High pressure sensor | 16426069000008 |  | 0 ~ 3.5 |

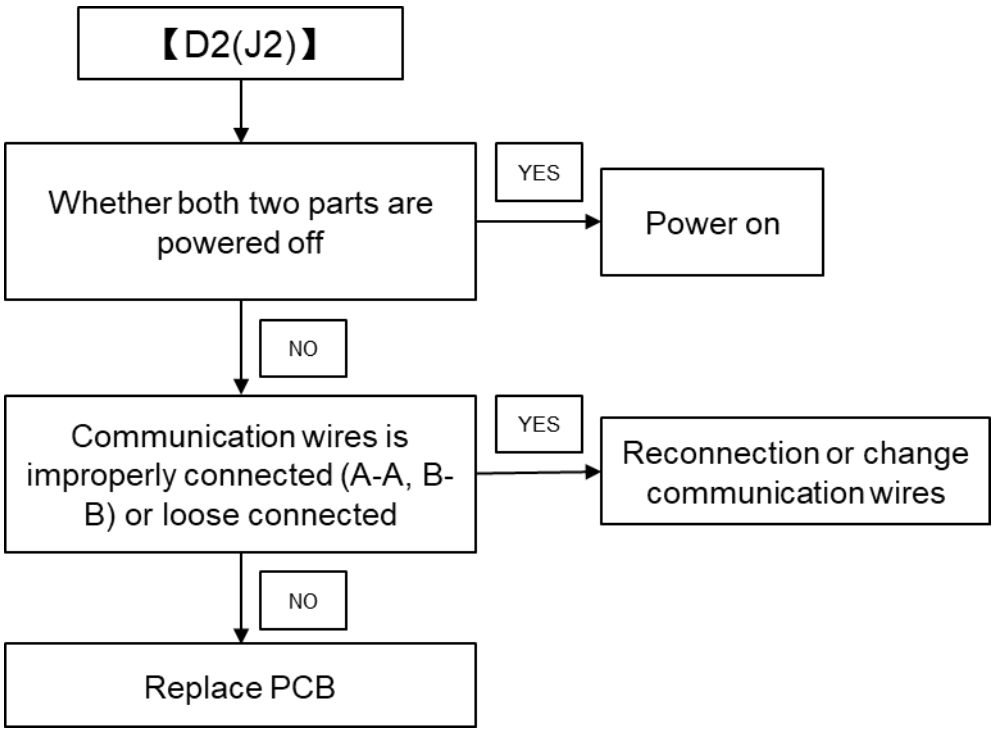
b) Control fault

| Control fault | |
|---|---|
| CODE | Fault code description |
| D2(J2) | Communication fault between refrigerant system and water system |
| D5(J5) | Outdoor unit number, address, capacity setting fault |

**D2(J2) Error logic:**

- Error appear：Communication data is not received normally for 15s between each communication module
- Error disappear：The communication data can be received normally

**Check step:**

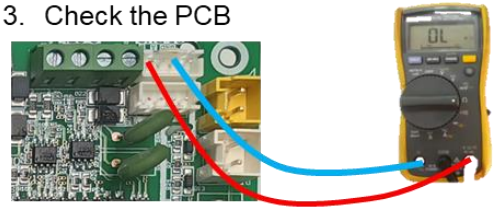



**Example**:

1. Check power supply

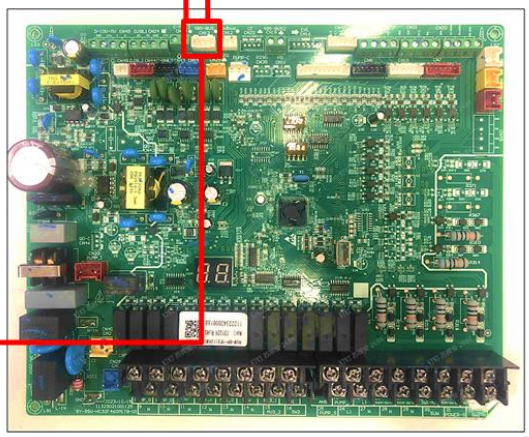
2. Check the wiring sequence

3. Check the PCB



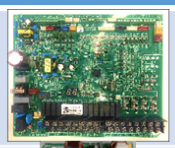
8-16kw 3ph

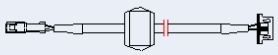
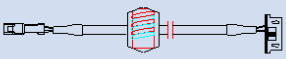
8-16kw 1ph



4-6kw

**Related parts:**

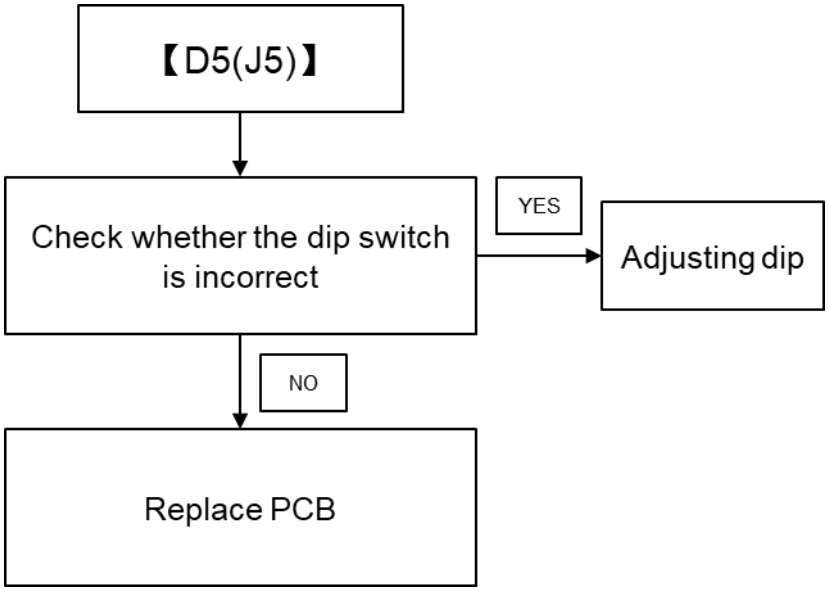
| NAME | CODE | PICTURE | MODEL |
|---|---|---|---|
| Water system PCB | 11222542000168 |  | CJ控制板RSW-BP-1F5(12KW)(水力模块)-E2(SY) |
| Refrigerant system PCB | 4-6kW: 11222542000175 |  | CJ控制板RSW-BP-DC4-1T1(R290)整-E1(SY) |
| | 8-10kW 3ph: 11222543000122 |  | CJ模块板QD-33161FH420D7KZAAC6R290-10-1(SY) |
| | 12-16kW 3ph: 11222543000123 | | CJ模块板QD-33161FH650D7VZAAC6R290-16-1(SY) |
| | 8-10kW 1ph: 11222543000127 |  | CJ模块板QD-12201FH420D7KZAAC6-R290-1(SY) |
| | 12-16kW 1ph: 11222543000126 | | CJ模块板QD-12201FH650D7VZAAC6-R290-1(SY) |

| NAME | CODE | PICTURE | LENGTH (cm) |
|---|---|---|---|
| PCB connect wire | 4-6kW: 16430045000021-10 |  | 65 |
| | 8-16kW: 16430045000019-9 |  | 95 |

**D5(J5) Error logic:**

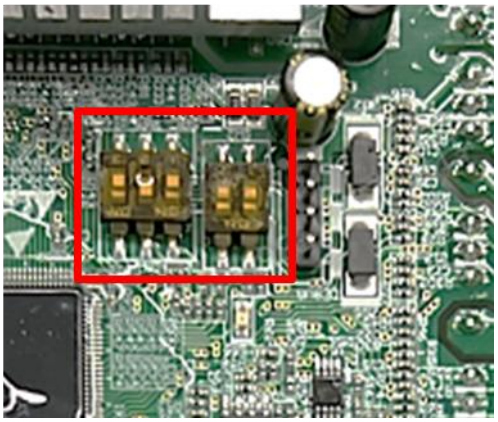
- Error appear：The dip of the PCB is different from the example in the dial table
- Error disappear：The dip switch is restored

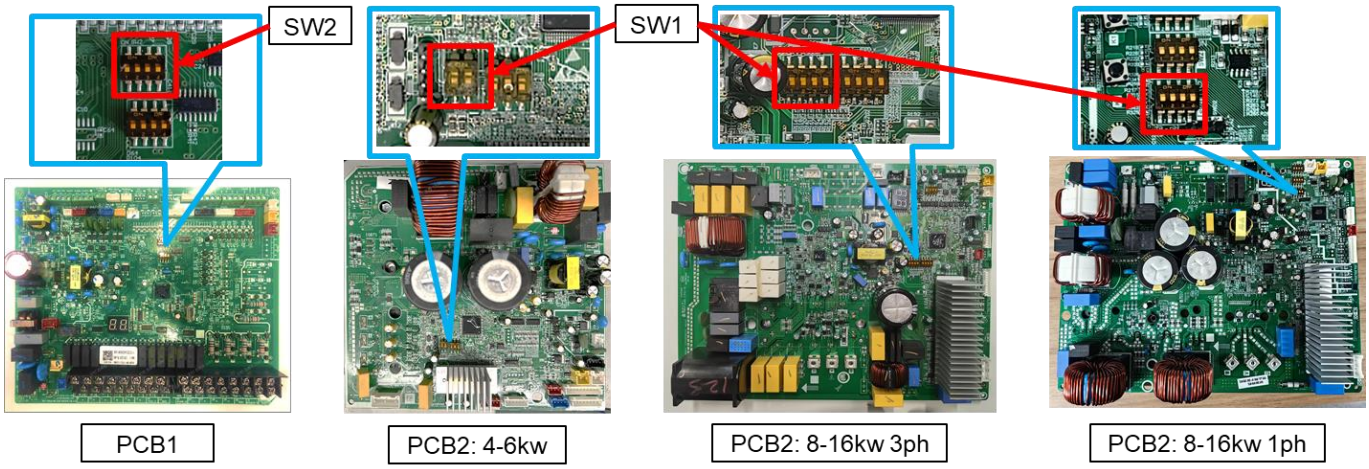
**Check step:**

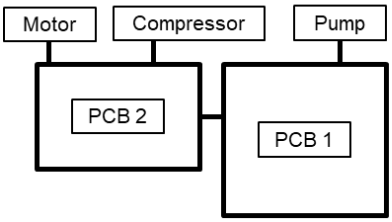



**Example**:

1. Check dip setting








PCB connection diagram

= ON

= OFF

| | 1 | 2 | 3 | 4 | Function selection |
|---|---|---|---|---|---|
| PCB1 SW2 | | | | | MASTER |
| | | | | | SLAVE 1 |
| | | | | | SLAVE 2 |
| | | | | | SLAVE 3 |
| | | | | | SLAVE 4 |
| | | | | | SLAVE 5 |
| | | | | | SLAVE 6 |
| | | | | | SLAVE 7 |

| | 1 | 2 | 3 | 4 | Function selection |
|---|---|---|---|---|---|
| PCB2 SW1 | | | | | / |
| | | | | | 4KW |
| | | | | | 6KW |
| | | | | | 8KW |
| | | | | | 10KW |
| | | | | | 12KW |
| | | | | | 14KW |
| | | | | | 16KW |

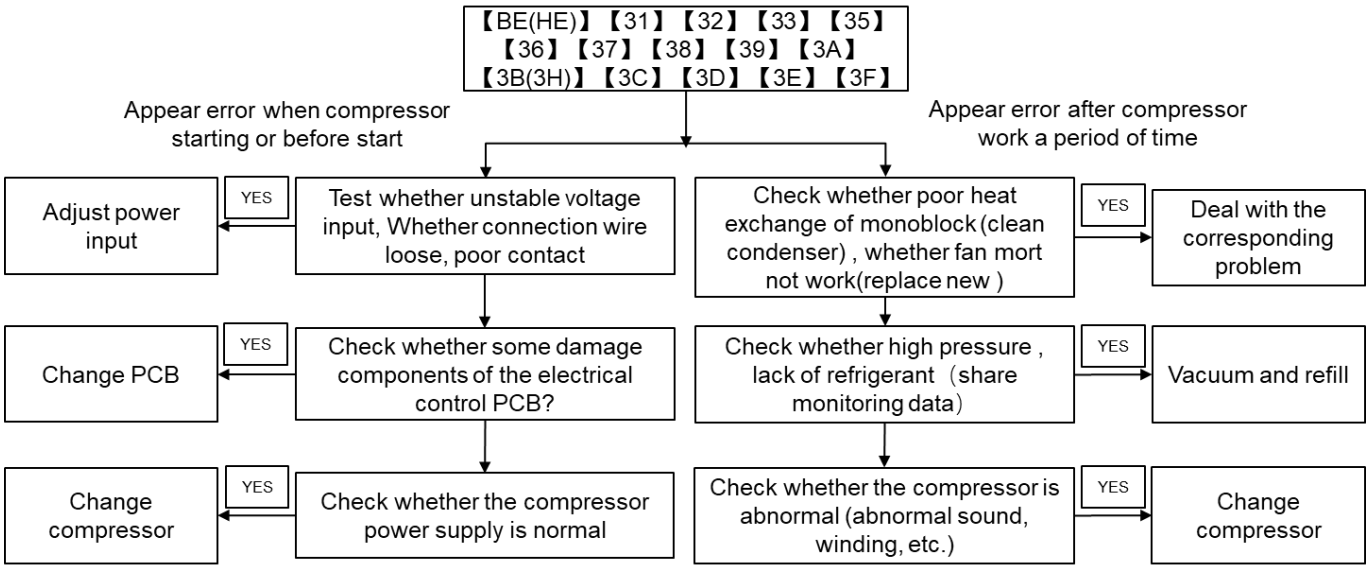
c) Electric system fault

| Electric system fault | |
|---|---|
| CODE | Fault code description |
| BE(HE) | Unit AC input voltage is too high protection |
| D7(J7) | EE fault |
| 31 | Compressor drive IPM module protection |
| 32 | Compressor drive hardware protection |
| 33 | Compressor drive software protection |
| 35 | Compressor drive over current protection |
| 36 | Compressor drive over or low-voltage protection |
| 37 | Compressor drive built in temperature sensor fault |
| 38 | Compressor drive under phase protection |
| 39 | Compressor drive high temperature protection |
| 3A | DC fan motor module high temperature protection |
| 3B(3H) | DC fan motor module turn on failure or out-of-step operation protection |
| 3C | DC fan motor over current protection |
| 3D(3J) | DC fan motor over or low-voltage protection |
| 3E | Compressor drive AC current input protection |
| 3F | Compressor drive PFC module protection |
| 61 | Heat dissipation fan fault |

**BE(HE); 31; 32; 33; 35; 36; 37; 38; 39; 3A; 3B(3H); 3C; 3D; 3E; 3F Error logic:**

- Error appear：When the drive module PCB temperature, current, voltage too high over than the protection value or compressor abnormal cause high current will stop run, appear error
- Error disappear：： After a fault stops, 150s automatically restarts and locks after six consecutive times

**Check step:**



## Related parts:

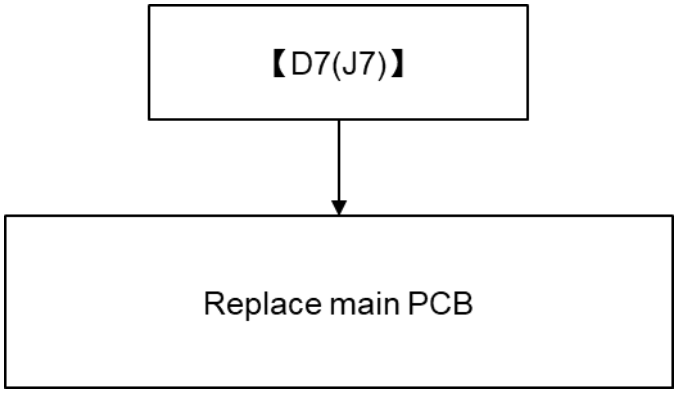
| NAME | CODE | PICTURE | MODEL |
|---|---|---|---|
| Refrigerant system PCB | 4-6kW: 11222542000175 |  | CJ控制板RSW-BP-DC4-1T1(R290)整-E1(SY) |
| | 8-10kW 3ph: 11222543000122 |  | CJ模块板QD-33161FH420D7KZAAC6R290-10-1(SY) |
| | 12-16kW 3ph: 11222543000123 | | CJ模块板QD-33161FH650D7VZAAC6R290-16-1(SY) |
| | 8-10kW 1ph: 11222543000127 |  | CJ模块板QD-12201FH420D7KZAAC6-R290-1(SY) |
| | 12-16kW 1ph: 11222543000126 | | CJ模块板QD-12201FH650D7VZAAC6-R290-1(SY) |

| NAME | CODE | PICTURE | Normal winding Resistance (20℃)(kΩ) | MODEL |
|---|---|---|---|---|
| Compressor | 4-6kW: 11222542000175 |  | 0.44Ω±5% | EDTM310D85EMT (GMCC) |
| | 8-10kW: 11222543000122 |  | 0.63Ω±7% | H420D7KZAAC6 (Panasonic) |
| | 12-16kW: 11222543000123 |  | 0.692Ω±7% | H650D7VZAAC6 (Panasonic) |

**D7(J7) Error logic:**

- Error appear：EPROM hardware or software abnormal, then will appear error

**Check step:**



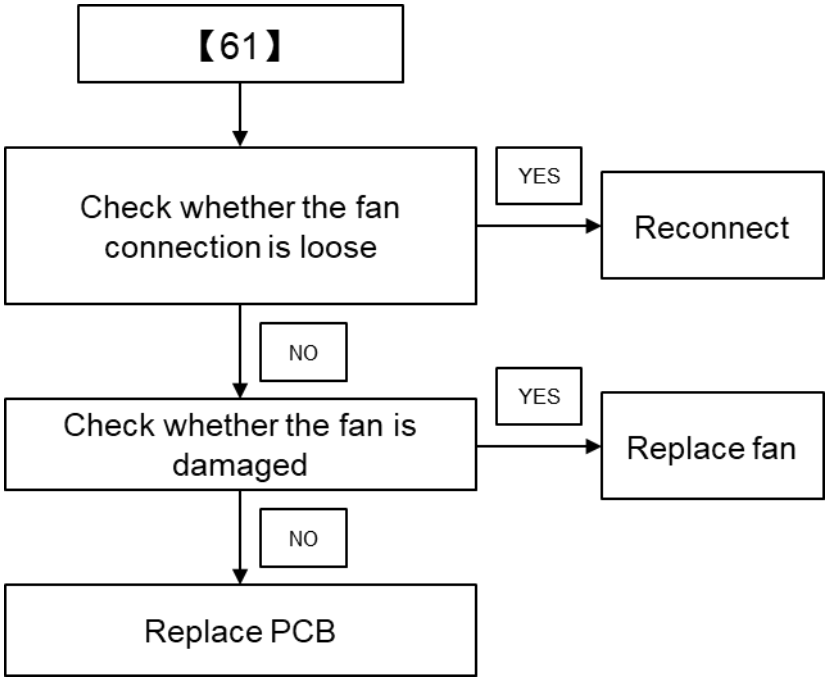

**Related parts:**

| NAME | CODE | PICTURE | MODEL |
|---|---|---|---|
| Refrigerant system PCB | 4-6kW: 11222542000175 |  | CJ控制板RSW-BP-DC4-1T1(R290)整-E1(SY) |
| | 8-10kW 3ph: 11222543000122 |  | CJ模块板QD-33161FH420D7KZAAC6R290-10-1(SY) |
| | 12-16kW 3ph: 11222543000123 | | CJ模块板QD-33161FH650D7VZAAC6R290-16-1(SY) |
| | 8-10kW 1ph: 11222543000127 |  | CJ模块板QD-12201FH420D7KZAAC6-R290-1(SY) |
| | 12-16kW 1ph: 11222543000126 | | CJ模块板QD-12201FH650D7VZAAC6-R290-1(SY) |

**61 Error logic:**

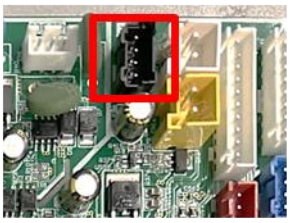
- Error appear：After the unit reaches the fan start condition for 30s, the fan does not start or stop
- Error disappear：After a fault stops, 150s automatically restarts

**Check step:**



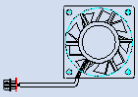

**Example**:

1. Check connection



2. Check the fan


**Related parts:**

| NAME | CODE | PICTURE | OPERATING VOLTAGE (V) |
|---|---|---|---|
| Cooling fan | 16430046000001 |  | DC 7~13.2 |

# Appendix

## Temperature sensor resistance meter

15kΩ

| Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) |
|---|---|---|---|---|---|---|---|---|---|
| -20 | 146735 | 7 | 34608 | 34 | 10202 | 61 | 3590 | 88 | 1457 |
| -19 | 138447 | 8 | 32957 | 35 | 9786 | 62 | 3464 | 89 | 1412 |
| -18 | 130677 | 9 | 31394 | 36 | 9389 | 63 | 3343 | 90 | 1369 |
| -17 | 123390 | 10 | 29914 | 37 | 9011 | 64 | 3227 | 91 | 1328 |
| -16 | 116554 | 11 | 28512 | 38 | 8650 | 65 | 3115 | 92 | 1288 |
| -15 | 110138 | 12 | 27183 | 39 | 8306 | 66 | 3008 | 93 | 1250 |
| -14 | 104113 | 13 | 25925 | 40 | 7976 | 67 | 2905 | 94 | 1212 |
| -13 | 98454 | 14 | 24731 | 41 | 7662 | 68 | 2806 | 95 | 1176 |
| -12 | 93137 | 15 | 23600 | 42 | 7362 | 69 | 2711 | 96 | 1142 |
| -11 | 88138 | 16 | 22526 | 43 | 7075 | 70 | 2620 | 97 | 1108 |
| -10 | 83438 | 17 | 21508 | 44 | 6801 | 71 | 2532 | 98 | 1076 |
| -9 | 79016 | 18 | 20541 | 45 | 6539 | 72 | 2448 | 99 | 1045 |
| -8 | 74855 | 19 | 19623 | 46 | 6289 | 73 | 2367 | 100 | 1014 |
| -7 | 70938 | 20 | 18751 | 47 | 6049 | 74 | 2288 | 101 | 985 |
| -6 | 67249 | 21 | 17923 | 48 | 5820 | 75 | 2213 | 102 | 957 |
| -5 | 63773 | 22 | 17136 | 49 | 5600 | 76 | 2141 | 103 | 930 |
| -4 | 60498 | 23 | 16388 | 50 | 5391 | 77 | 2072 | 104 | 903 |
| -3 | 57410 | 24 | 15676 | 51 | 5190 | 78 | 2005 | 105 | 878 |
| -2 | 54498 | 25 | 15000 | 52 | 4997 | 79 | 1940 | 106 | 853 |
| -1 | 51750 | 26 | 14356 | 53 | 4813 | 80 | 1878 | 107 | 829 |
| 0 | 49157 | 27 | 13744 | 54 | 4637 | 81 | 1818 | 108 | 806 |
| 1 | 46709 | 28 | 13161 | 55 | 4467 | 82 | 1761 | 109 | 784 |
| 2 | 44397 | 29 | 12606 | 56 | 4305 | 83 | 1705 | 110 | 762 |
| 3 | 42213 | 30 | 12078 | 57 | 4150 | 84 | 1652 | | |
| 4 | 40150 | 31 | 11574 | 58 | 4001 | 85 | 1601 | | |
| 5 | 38199 | 32 | 11095 | 59 | 3858 | 86 | 1551 | | |
| 6 | 36354 | 33 | 10637 | 60 | 3721 | 87 | 1503 | | |

20kΩ

| Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) |
|---|---|---|---|---|---|---|---|---|---|
| -20 | 195679 | 7 | 46130 | 34 | 13599 | 61 | 4771 | 88 | 1925 |
| -19 | 184604 | 8 | 43930 | 35 | 13044 | 62 | 4603 | 89 | 1865 |
| -18 | 174225 | 9 | 41848 | 36 | 12515 | 63 | 4441 | 90 | 1808 |
| -17 | 164494 | 10 | 39876 | 37 | 12010 | 64 | 4286 | 91 | 1753 |
| -16 | 155367 | 11 | 38008 | 38 | 11528 | 65 | 4137 | 92 | 1700 |
| -15 | 146804 | 12 | 36239 | 39 | 11068 | 66 | 3994 | 93 | 1648 |
| -14 | 138765 | 13 | 34562 | 40 | 10629 | 67 | 3857 | 94 | 1599 |
| -13 | 131215 | 14 | 32971 | 41 | 10210 | 68 | 3725 | 95 | 1551 |
| -12 | 124123 | 15 | 31463 | 42 | 9809 | 69 | 3598 | 96 | 1505 |
| -11 | 117458 | 16 | 30033 | 43 | 9426 | 70 | 3476 | 97 | 1460 |
| -10 | 111191 | 17 | 28675 | 44 | 9060 | 71 | 3359 | 98 | 1417 |
| -9 | 105296 | 18 | 27387 | 45 | 8710 | 72 | 3246 | 99 | 1375 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| -8 | 99750 | 19 | 26163 | 46 | 8376 | 73 | 3138 | 100 | 1335 |
| -7 | 94529 | 20 | 25001 | 47 | 8056 | 74 | 3034 | 101 | 1296 |
| -6 | 89612 | 21 | 23897 | 48 | 7750 | 75 | 2934 | 102 | 1259 |
| -5 | 84981 | 22 | 22848 | 49 | 7457 | 76 | 2837 | 103 | 1223 |
| -4 | 80617 | 23 | 21850 | 50 | 7176 | 77 | 2744 | 104 | 1188 |
| -3 | 76503 | 24 | 20902 | 51 | 6908 | 78 | 2655 | 105 | 1154 |
| -2 | 72623 | 25 | 20000 | 52 | 6651 | 79 | 2569 | 106 | 1121 |
| -1 | 68963 | 26 | 19142 | 53 | 6405 | 80 | 2486 | 107 | 1089 |
| 0 | 65509 | 27 | 18325 | 54 | 6169 | 81 | 2407 | 108 | 1059 |
| 1 | 62249 | 28 | 17548 | 55 | 5943 | 82 | 2330 | 109 | 1029 |
| 2 | 59169 | 29 | 16807 | 56 | 5727 | 83 | 2256 | 110 | 1000 |
| 3 | 56260 | 30 | 16102 | 57 | 5519 | 84 | 2185 | | |
| 4 | 53511 | 31 | 15431 | 58 | 5321 | 85 | 2116 | | |
| 5 | 50912 | 32 | 14791 | 59 | 5130 | 86 | 2050 | | |
| 6 | 48455 | 33 | 14181 | 60 | 4947 | 87 | 1986 | | |

## 50kΩ

| Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) | Temp(℃) | R(Ω) |
|---|---|---|---|---|---|---|---|---|---|
| -20 | 477969 | 7 | 114677 | 34 | 34032 | 61 | 11893 | 88 | 4728 |
| -19 | 451300 | 8 | 109256 | 35 | 32645 | 62 | 11469 | 89 | 4579 |
| -18 | 426282 | 9 | 104121 | 36 | 31322 | 63 | 11062 | 90 | 4436 |
| -17 | 402803 | 10 | 99256 | 37 | 30059 | 64 | 10672 | 91 | 4297 |
| -16 | 380760 | 11 | 94644 | 38 | 28853 | 65 | 10297 | 92 | 4163 |
| -15 | 360057 | 12 | 90272 | 39 | 27701 | 66 | 9937 | 93 | 4034 |
| -14 | 340603 | 13 | 86126 | 40 | 26601 | 67 | 9591 | 94 | 3910 |
| -13 | 322317 | 14 | 82192 | 41 | 25550 | 68 | 9259 | 95 | 3790 |
| -12 | 305123 | 15 | 78459 | 42 | 24546 | 69 | 8940 | 96 | 3674 |
| -11 | 288947 | 16 | 74916 | 43 | 23586 | 70 | 8633 | 97 | 3562 |
| -10 | 273725 | 17 | 71551 | 44 | 22668 | 71 | 8338 | 98 | 3454 |
| -9 | 259394 | 18 | 68356 | 45 | 21790 | 72 | 8054 | 99 | 3350 |
| -8 | 245898 | 19 | 65320 | 46 | 20951 | 73 | 7781 | 100 | 3249 |
| -7 | 233183 | 20 | 62435 | 47 | 20148 | 74 | 7519 | 101 | 3151 |
| -6 | 221200 | 21 | 59693 | 48 | 19379 | 75 | 7267 | 102 | 3057 |
| -5 | 209902 | 22 | 57085 | 49 | 18644 | 76 | 7024 | 103 | 2967 |
| -4 | 199246 | 23 | 54605 | 50 | 17940 | 77 | 6791 | 104 | 2879 |
| -3 | 189193 | 24 | 52245 | 51 | 17266 | 78 | 6566 | 105 | 2794 |
| -2 | 179704 | 25 | 50000 | 52 | 16620 | 79 | 6350 | 106 | 2712 |
| -1 | 170746 | 26 | 47863 | 53 | 16002 | 80 | 6141 | 107 | 2633 |
| 0 | 162285 | 27 | 45828 | 54 | 15409 | 81 | 5941 | 108 | 2556 |
| 1 | 154291 | 28 | 43890 | 55 | 14841 | 82 | 5748 | 109 | 2482 |
| 2 | 146736 | 29 | 42044 | 56 | 14297 | 83 | 5562 | 110 | 2411 |
| 3 | 139594 | 30 | 40285 | 57 | 13775 | 84 | 5382 | | |
| 4 | 132839 | 31 | 38608 | 58 | 13275 | 85 | 5210 | | |
| 5 | 126449 | 32 | 37010 | 59 | 12795 | 86 | 5043 | | |
| 6 | 120402 | 33 | 35486 | 60 | 12335 | 87 | 4883 | | |

## R290 Temp-Pressure form

| P(bar) | Temp(℃) | P(bar) | Temp(℃) | P(bar) | Temp(℃) |
|---|---|---|---|---|---|
| 1 | -42.412 | 13 | 37.8 | 25 | 68.3 |
| 1.5 | -32.818 | 13.5 | 39.4 | 25.5 | 71.6 |
| 2 | -25.451 | 14 | 41.0 | 26 | 72.6 |
| 2.5 | -19.382 | 14.5 | 42.5 | 26.5 | 73.6 |
| 3 | -14.176 | 15 | 44.0 | 27 | 74.5 |
| 3.5 | -9.5889 | 15.5 | 45.5 | 27.5 | 75.5 |
| 4 | -5.4707 | 16 | 46.9 | 28 | 76.5 |
| 4.5 | -1.7215 | 16.5 | 48.3 | 28.5 | 77.4 |
| 5 | 1.7287 | 17 | 49.6 | 29 | 78.3 |
| 5.5 | 4.931 | 17.5 | 51.0 | 29.5 | 79.2 |
| 6 | 7.9241 | 18 | 52.3 | 30 | 80.1 |
| 6.5 | 10.738 | 18.5 | 53.6 | 30.5 | 81.0 |
| 7 | 13.396 | 19 | 54.8 | 31 | 81.9 |
| 7.5 | 15.918 | 19.5 | 56.1 | 31.5 | 82.8 |
| 8 | 18.318 | 20 | 57.3 | 32 | 83.7 |
| 8.5 | 20.611 | 20.5 | 58.4 | 32.5 | 84.5 |
| 9 | 22.806 | 21 | 59.6 | 33 | 85.4 |
| 9.5 | 24.914 | 21.5 | 60.8 | 33.5 | 86.2 |
| 10 | 26.942 | 22 | 61.9 | 34 | 87.1 |
| 10.5 | 28.897 | 22.5 | 63.0 | 34.5 | 87.9 |
| 11 | 30.785 | 23 | 64.1 | 35 | 88.7 |
| 11.5 | 32.611 | 23.5 | 65.2 | | |
| 12 | 34.38 | 24 | 66.2 | | |
| 12.5 | 36.096 | 24.5 | 67.2 | | |

# Update record

| Time | Version | Name | Content |
|---|---|---|---|
| 2023/11/10 | 1 | Choy | Added the Maintenance manual |
| 2024/07/01 | 2 | Choy | Corrigendum |