Changes for the Better

MITSUBISHI ELECTRIC

# AIR-COOLED ROOFTOP PACKAGED AIR CONDITIONERS

2004

# TECHNICAL & SERVICE MANUAL

<Unit>

## HEAT PUMP

Models

**PRH-P8MYA**
**PRH-P10MYA**
**PRH-P16MYA**
**PRH-P20MYA**

For use with the R407C

# Contents

# 1 PRECAUTIONS FOR DEVICES THAT USE R407C REFRIGERANT

**⚠ Caution**

**Use ester oil, ether oil or alkylbenzene (small amount) as the refrigerator oil to coat flares and flange connections.**

- The refrigerator oil will degrade if it is mixed with a large amount of mineral oil.

**Use liquid refrigerant to seal the system.**

- If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.

**Do not use a refrigerant other than R407C.**

- If another refrigerant (R22, etc.) is used, the chlorine in the refrigerant may cause the refrigerator oil to deteriorate.

**Use a vacuum pump with a reverse flow check valve.**

- The vacuum pump oil may flow back into the refrigerant cycle and cause the refrigerator oil to deteriorate.

**Do not use the following tools that have been used with conventional refrigerants.**
**(Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, refrigerant recovery equipment)**

- If the conventional refrigerant and refrigerator oil are mixed in the R407C, the refrigerant may deteriorated.
- If water is mixed in the R407C, the refrigerator oil may deteriorate.
- Since R407C does not contain any chlorine, gas leak detectors for conventional refrigerants will not react to it.

**Do not use a charging cylinder.**

- Using a charging cylinder may cause the refrigerant to deteriorate.

**Be especially careful when managing the tools.**

- If dust, dirt, or water gets in the refrigerant cycle, the refrigerant may deteriorate.

**If the refrigerant leaks, recover the refrigerant in the refrigerant cycle, then recharge the cycle with the specified amount of the liquid refrigerant indicated on the air conditioner.**

- Since R407C is a nonazeotropic refrigerant, if additionally charged when the refrigerant leaked, the composition of the refrigerant in the refrigerant cycle will change and result in a drop in performance or abnormal stopping.

## [1] Necessary Apparatus and Materials and Notes on Their Handling

The following tools should be marked as dedicated tools for R407C.

<<Comparison of apparatus and materials used for R407C and for R22>>

| Apparatus Used | Use | R22 | R407C |
|---|---|---|---|
| Gauge manifold | Evacuating, refrigerant filling | Current product | ◎ |
| Charging hose | Operation check | Current product | ◎ |
| Charging cylinder | Refrigerant charging | Current product | ◎ Do not use |
| Gas leakage detector | Gas leakage check | Current product | ◎ Shared with R134a |
| Refrigerant collector | Refrigerant collection | R22 | ◎ For R407C use only |
| Refrigerant cylinder | Refrigerant filling | R22 | ◎ Identification of dedicated use for R407C: Record refrigerant name and put brown belt on upper part of cylinder. |
| Vacuum pump | Vacuum drying | Current product | △ Can be used by attaching an adapter with a check valve. |
| Vacuum pump with a check valve | | Current product | △ |
| Flare tool | Flaring of pipes | Current product | △ |
| Bender | Bending of pipes | Current product | △ |
| Application oil | Applied to flared parts | Current product | ◎ Ester oil or Ether oil or Alkybenzene (Small amount) |
| Torque wrench | Tightening of flare nuts | Current product | △ |
| Pipe cutter | Cutting of pipes | Current product | △ |
| Welder and nitrogen cylinder | Welding of pipes | Current product | △ |
| Refrigerant charging meter | Refrigerant charging | Current product | △ |
| Vacuum gauge | Checking the vacuum degree | Current product | △ |

Symbols: ◎To be used for R407C only. △ Can also be used for conventional refrigerants.

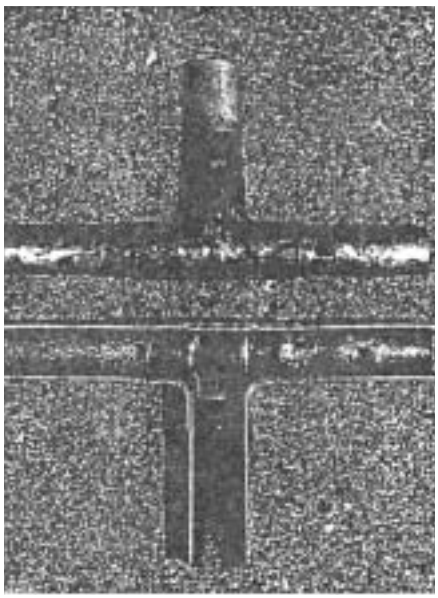
Tools for R407C must be handled with more care than those for conventional refrigerants. They must not come into contact with any water or dirt.

## [2] Brazing

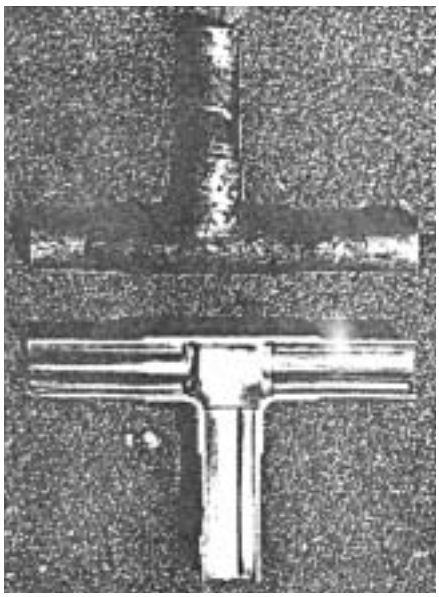
No changes from the conventional method, but special care is required so that foreign matter (ie. oxide scale, water, dirt, etc.) does not enter the refrigerant circuit.

Example: Inner state of brazed section

When non-oxide brazing was not used



When non-oxide brazing was used



**Items to be strictly observed:**

1. Do not conduct refrigerant piping work outdoors on a rainy day.
2. Apply non-oxide brazing.
3. Use a brazing material (BCuP-3) which requires no flux when brazing between copper pipes or between a copper pipe and copper coupling.
4. If installed refrigerant pipes are not immediately connected to the equipment, then braze and seal both ends of them.

**Reasons:**

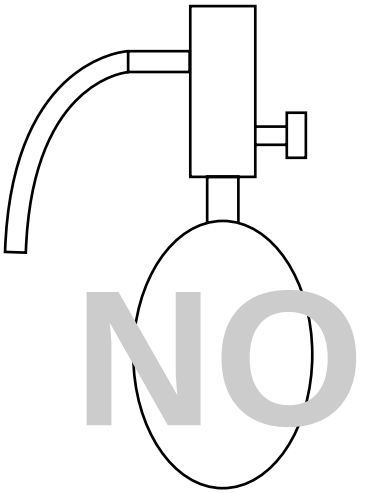
1. The new refrigerant oil is 10 times more hygroscopic than the conventional oil. The probability of a machine failure if water infiltrates is higher than with conventional refrigerant oil.
2. A flux generally contains chlorine. A residual flux in the refrigerant circuit may generate sludge.

**Note:**

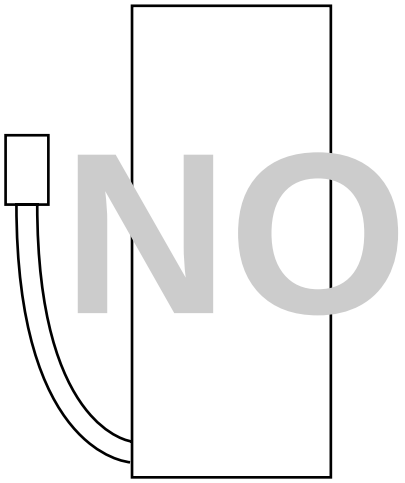
- Commercially available antioxidants may have adverse effects on the equipment due to its residue, etc. When applying non-oxide brazing, use nitrogen.

## [3] Airtightness Test

No changes from the conventional method. Note that a refrigerant leakage detector for R22 cannot detect R407C leakage.




Halide torch




R22 leakage detector

**Items to be strictly observed:**

1. Pressurize the equipment with nitrogen up to the design pressure and then judge the equipment's airtightness, taking temperature variations into account.
2. When investigating leakage locations using a refrigerant, be sure to use R407C.
3. Ensure that R407C is in a liquid state when charging.

**Reasons:**

1. Use of oxygen as the pressurized gas may cause an explosion.
2. Charging with R407C gas will lead the composition of the remaining refrigerant in the cylinder to change and this refrigerant can then not be used.

**Note:**

- A leakage detector for R407C is sold commercially and it should be purchased.

## [4] Vacuuming

1. Vacuum pump with check valve
   A vacuum pump with a check valve is required to prevent the vacuum pump oil from flowing back into the refrigerant circuit when the vacuum pump power is turned off (power failure).
   It is also possible to attach a check valve to the actual vacuum pump afterwards.

2. Standard degree of vacuum for the vacuum pump
   Use a pump which reaches 0.5 Torr (500 MICRON) or below after 5 minutes of operation.
   In addition, be sure to use a vacuum pump that has been properly maintained and oiled using the specified oil. If the vacuum pump is not properly maintained, the degree of vacuum may be too low.

3. Required accuracy of the vacuum gauge
   Use a vacuum gauge that can measure up to 5 Torr. Do not use a general gauge manifold since it cannot measure a vacuum of 5 Torr.

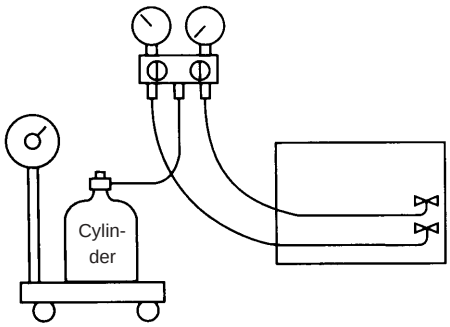
4. Evacuating time
   - Evacuate the equipment for 1 hour after –755 mmHg (5 Torr) has been reached.
   - After envacuating, leave the equipment for 1 hour and make sure the that vacuum is not lost.

5. Operating procedure when the vacuum pump is stopped
   In order to prevent a backflow of the vacuum pump oil, open the relief valve on the vacuum pump side or loosen the charge hose to drawn in air before stopping operation.
   The same operating procedure should be used when using a vacuum pump with a check valve.

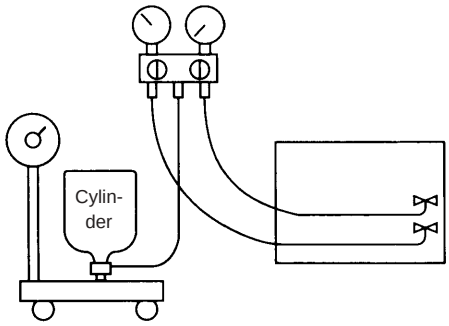
## [5] Charging of Refrigerant

R407C must be in a liquid state when charging, because it is a non-azeotropic refrigerant.

For a cylinder with a syphon attached

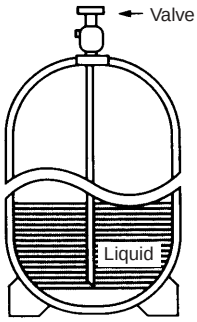


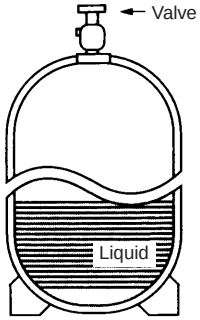

For a cylinder without a syphon attached




Cylinder color identification R407C-Gray
R410A-Pink

Charged with liquid refrigerant



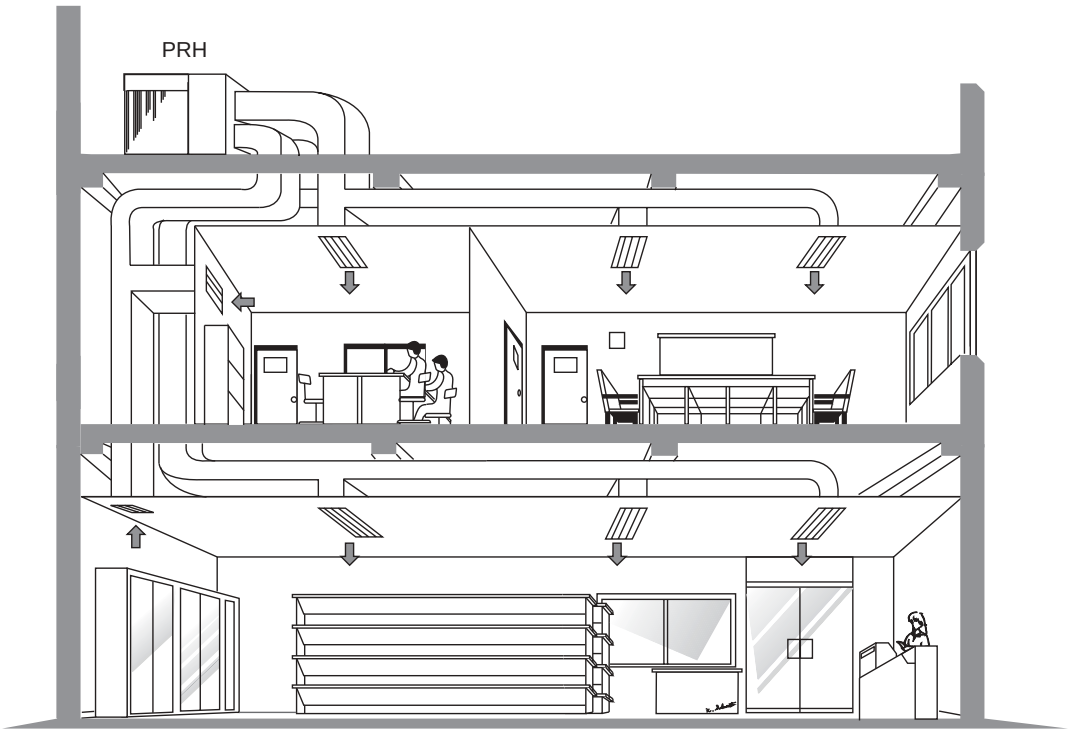

**Reasons:**

1. R407C is a mixture of 3 refrigerants, each with a different evaporation temperature. Therefore, if the equipment is charged with R407C gas, then the refrigerant whose evaporation temperature is closest to the outside temperature is charged first while the rest of refrigerants remain in the cylinder.

**Note:**

- In the case of a cylinder with a syphon, liquid R407C is charged without turning the cylinder up side down. Check the type of cylinder before charging.

## 2 TYPICAL INSTALLATION EXAMPLE




## 3 MODEL-DESIGNATION BREAKDOWN

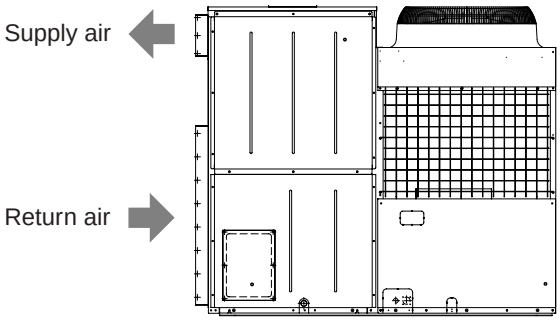
**P R H — P 1 0 M Y A — E U**

- **P R H** — Series symbol
  Self-contained type
  (rooftop type)
- **H** — Heat pump type
- **P** — Refrigerant
  P=R407C
- **1 0** — Compressor horse power
  P8=8HP
  P10=10HP
  P16=16HP
  P20=20HP
- **M** — Design sequence
- **Y** — Series symbol
  Y=3-phase
  380V,400V,415V,50Hz,3N~
- **A** — Design sequence
- **E U** — Service reference

## 4 PART NAMES AND FUNCTIONS

### Unit

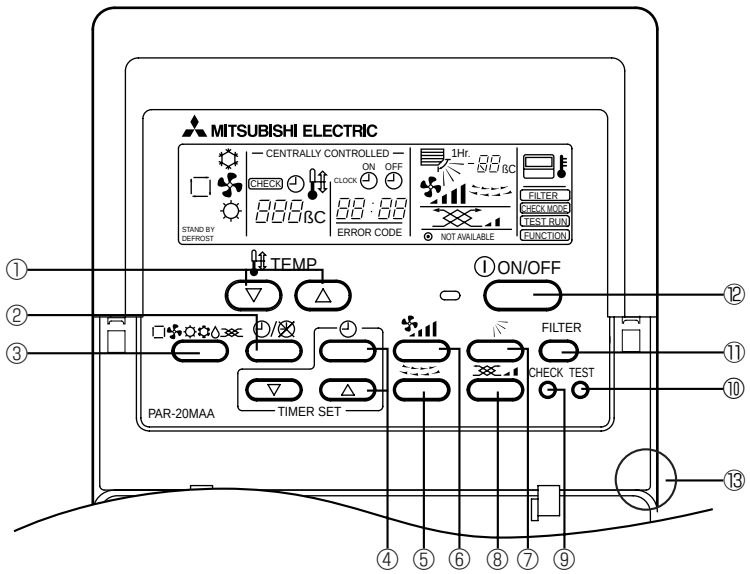
- Return air : Sucks the ambient air in.
- Supply air : Blows the air back out into the room.




### Remote controller (PAR-20MAA)

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

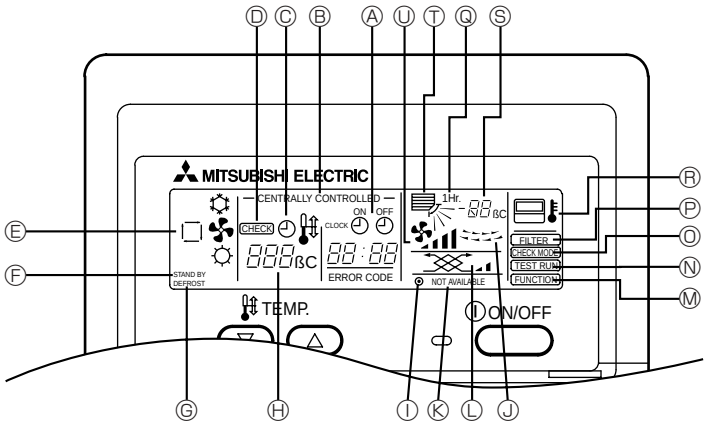
**[Operation buttons]**




① [Room temperature adjustment] Button
② [Timer/continuous] Button
③ [Selecting operation] Button
④ [Time selection] Button
[Time-setting] Button
⑤ [Louver] Button (This button does not operate in this model)
⑥ [Fan speed adjustment] Button
⑦ [Up/down airflow direction] Button (This button does not operate in this model)
⑧ [Ventilation] Button
⑨ [Checking/built-in] Button
⑩ [Test run] Button
⑪ [Filter] Button (This button does not operate in this model)
⑫ [ON/OFF] Button
⑬ Position of built-in room temperature

- Never expose the remote controller to direct sunlight. Doing so can result in the erroneous measurement of room temperature.
- Never place any obstacle around the lower right-hand section of the remote controller. Doing so can result in the erroneous measurement of room temperature.

**[Display]**




Ⓐ Current time/Timer
Ⓒ Centralized control
Ⓓ Abnormality control
Ⓔ Operation mode: ☼ COOL, ▢ AUTO, ✣ FAN, ☼ HEAT
Ⓕ Preparing for Heating mode
Ⓖ Defrost mode
Ⓗ Set temperature
Ⓘ Power ON
Ⓙ Louver
Ⓚ Not available function
Ⓛ Ventilation
Ⓜ Function setting mode
Ⓝ Test run mode
Ⓞ Error check mode
Ⓟ Filter sign
Ⓠ Set effective for 1 hr.
Ⓡ Sensor position
Ⓢ Room temperature
Ⓣ Airflow
Ⓤ Fan speed

**Caution:**

- Only the Power display lights when the unit is stopped and power supplied to the unit.
- When power is turned ON for the first time the (CENTRAL CTRL) display appears to go off momentarily but this is not a malfunction.
- When the central control remote control unit, which is sold separately, is used the ON-OFF button, operation switch button and TEMP. adjustment button do not operate.
- "NOT AVAILABLE" is displayed when the Airflow direction button or Louver button are pressed. This indicates that this room unit is not equipped with the fan direction adjustment function and the louver function.
- When power is turned ON for the first time, it is normal that "H0" is displayed on the room temperature indication (For max. 2 minutes). Please wait until this "H0" indication disappear then start the operation.

## 5 SPECIFICATIONS

| Specifications of air-source heat pump type packaged air conditioner (Rooftop unit) | | | | | | |
|---|---|---|---|---|---|---|
| Model name | | | PRH-P8MYA | | PRH-P10MYA | |
| Mode | | | Cooling | Heating | Cooling | Heating |
| Capacity | | kW | 20.9 | 23.7 | 26.0 | 30.5 |
| | | kcal/h | 18,000 | 19,000 | 22,400 | 26,200 |
| | | Btu/h | 71,430 | 75,400 | 88,890 | 104,000 |
| Refrigerant | | | R407C | | | |
| Power source | | | 3N~ 380/400/415V 50Hz | | | |
| Electrical characteristics | Power consumption | kW | 8.12 | 8.02 | 10.22 | 9.82 |
| | Operating current | A | 14.7 | 14.5 | 18.8 | 18.2 |
| Remote controller temperature setting range | | | 19°C to 30°C | 17°C to 28°C | 19°C to 30°C | 17°C to 28°C |
| Indoor-side air flow direction | | | Convertible(Side flow<factory setting> or top flow) | | | |
| Indoor-side fan | Type x Quantity | | Sirrocco fan x 2 | | | |
| | Air flow rate | CMM | 70 | | 90 | |
| | External static pressure | Pa | 100 | | 100 | |
| | Motor type | | Three-phase induction motor | | | |
| | Motor output | kW | 1.1 | | 1.5 | |
| Indoor-side heat exchanger type | | | Cross fin | | | |
| Outdoor-side fan | Type x Quantity | | Propeller fan x 1 | | | |
| | Air flow rate | CMM | 185 | | | |
| | Motor type | | Three-phase induction motor | | | |
| | Motor output | kW | 0.38 | | | |
| Outdoor-side heat exchanger type | | | Cross fin | | | |
| Compressor | Type | | Hermetic | | | |
| | Motor output | kW | 5.5 | | 7.5 | |
| | Oil type | | FVC68D(ether oil) | | | |
| | Crankcase heater | kW | 0.05 (240V) | | | |
| External finish | | | Polyester powder (MUNSELL 5Y8/1) | | | |
| External dimension | H x W x D | mm | 1,715 x 2,000 x 926 | | | |
| Air filter | | | Field supplied | | | |
| Drain pipe Thread | | | R1 | | | |
| Noise level | | dB(A) | 59 | | 60 | |
| Net weight | | kg | 407 | | 412 | |
| Protection devices | | | High pressure switch , Low pressure switch , fuse<br>Over current relay(compressor , indoor-side fan motor)<br>inner thermal switch in outdoor-side fan motor | | | |

Note 1. Cooling and Hetaing capacity indicates the maximum value at operation under the following condition.
Cooling Indoor : 27°CDB/19°CWB Outdoor : 35°CDB
Heating Indoor : 20°CDB Outdoor : 7°CDB/6°CWB
2. The operating noise measuring point is 1m from the bottom of unit (1m from the front of the unit) in an anechoic room. (Noise level is A-scale value)
3. Refrigerant charge volumes are factory charged.
4. The range of working voltage is with in ±10% voltage of power supply.
5. Specification subject to change without notice.

## Specifications of air-source heat pump type packaged air conditioner (Rooftop unit)

| Model name | | | PRH-P16MYA | | PRH-P20MYA | |
|---|---|---|---|---|---|---|
| Mode | | | Cooling | Heating | Cooling | Heating |
| Capacity | | kW | 41.8 | 47.4 | 52.0 | 61.0 |
| | | kcal/h | 36,000 | 40,800 | 44,800 | 52,400 |
| | | Btu/h | 142,860 | 150,800 | 177,780 | 208,000 |
| Refrigerant | | | R407C | | | |
| Power source | | | 3N~ 380/400/415V 50Hz | | | |
| Electrical characteristics | Power consumption | kW | 16.60 | 15.94 | 21.44 | 19.24 |
| | Operating current | A | 29.6 | 29.2 | 36.6 | 35.4 |
| Remote controller temperature setting range | | | 19°C to 30°C | 17°C to 28°C | 19°C to 30°C | 17°C to 28°C |
| Indoor-side air flow direction | | | Convertible(Side flow<factory setting> or top flow) | | | |
| Indoor-side fan | Type x Quantity | | Sirrocco fan x 2 | | | |
| | Air flow rate | CMM | 140 | | 180 | |
| | External static pressure | Pa | 200 | | 200 | |
| | Motor type | | Three-phase induction motor | | | |
| | Motor output | kW | 2.2 | | 3.7 | |
| Indoor-side heat exchanger type | | | Cross fin | | | |
| Outdoor-side fan | Type x Quantity | | Propeller fan x 2 | | | |
| | Air flow rate | CMM | 185 x 2 | | | |
| | Motor type | | Three-phase induction motor | | | |
| | Motor output | kW | 0.38 x 2 | | | |
| Outdoor-side heat exchanger type | | | Cross fin | | | |
| Compressor | Type | | Hermetic | | | |
| | Motor output | kW | 5.5 x 2 | | 7.5 x 2 | |
| | Oil type | | FVC68D(ether oil) | | | |
| | Crankcase heater | kW | 0.05 (240V) x 2 | | | |
| External finish | | | Polyester powder (MUNSELL 5Y8/1) | | | |
| External dimension | H x W x D | mm | 1,735 x 2,000 x 2,130 | | | |
| Air filter | | | Field supplied | | | |
| Drain pipe Thread | | | R1 | | | |
| Noise level | | dB(A) | 62 | | 63 | |
| Net weight | | kg | 857 | | 872 | |
| Protection devices | | | High pressure switch , Low pressure switch , fuse<br>Over current relay(compressor , indoor-side fan motor)<br>inner thermal switch in outdoor-side fan motor | | | |

Note
1. Cooling and Hetaing capacity indicates the maximum value at operation under the following condition.
   Cooling Indoor : 27°CDB/19°CWB Outdoor : 35°CDB
   Heating Indoor : 20°CDB Outdoor : 7°CDB/6°CWB
2. The operating noise measuring point is 1m from the bottom of unit (1m from the front of the unit) in an anechoic room. (Noise level is A-scale value)
3. Refrigerant charge volumes are factory charged.
4. The range of working voltage is with in ±10% voltage of power supply.
5. Specification subject to change without notice.

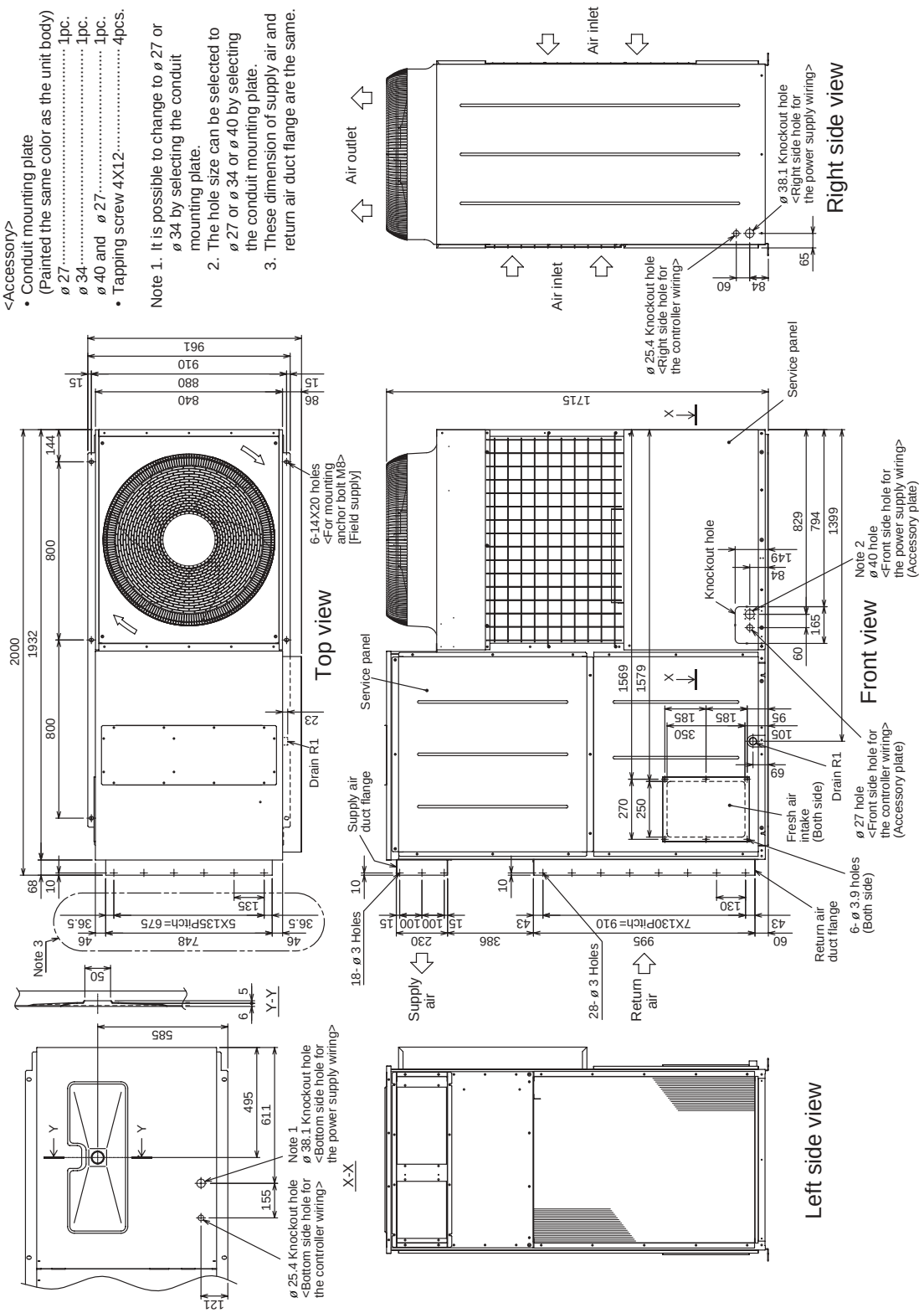
## 6 ELECTRICAL DATA

| VOLT | ITEM | | PRH-P8MYA | | PRH-P10MYA | |
|---|---|---|---|---|---|---|
| | | | Cooling | Heating | Cooling | Heating |
| 415V | TOTAL INPUT | kW | 8.12 | 8.02 | 10.22 | 9.82 |
| | TOTAL RATED CURRENT | A | 14.7 | 14.5 | 18.8 | 18.2 |
| | POWER FACTOR | % | 76 | 76 | 75 | 75 |
| | START CURRENT | A | 111 | 111 | 134 | 134 |
| | COMPRESSOR INPUT | kW | 6.96 | 6.86 | 8.71 | 8.31 |
| | RATED CURRENT | A | 11.9 | 11.7 | 14.9 | 14.3 |
| | O/D FAN INPUT | kW | 0.31 | 0.31 | 0.31 | 0.31 |
| | RATED CURRENT | A | 1.1 | 1.1 | 1.1 | 1.1 |
| | I/D FAN External static pressure | Pa | 100 | 100 | 100 | 100 |
| | INPUT | kW | 0.85 | 0.85 | 1.2 | 1.2 |
| | RATED CURRENT | A | 1.7 | 1.7 | 2.8 | 2.8 |
| 400V | TOTAL INPUT | kW | 8.12 | 8.02 | 10.22 | 9.82 |
| | TOTAL RATED CURRENT | A | 14.7 | 14.5 | 18.8 | 18.2 |
| | POWER FACTOR | % | 79 | 79 | 78 | 77 |
| | START CURRENT | A | 111 | 111 | 134 | 134 |
| | COMPRESSOR INPUT | kW | 6.96 | 6.86 | 8.71 | 8.31 |
| | RATED CURRENT | A | 11.9 | 11.7 | 14.9 | 14.3 |
| | O/D FAN INPUT | kW | 0.31 | 0.31 | 0.31 | 0.31 |
| | RATED CURRENT | A | 1.1 | 1.1 | 1.1 | 1.1 |
| | I/D FAN External static pressure | Pa | 100 | 100 | 100 | 100 |
| | INPUT | kW | 0.85 | 0.85 | 1.2 | 1.2 |
| | RATED CURRENT | A | 1.7 | 1.7 | 2.8 | 2.8 |
| 380V | TOTAL INPUT | kW | 8.12 | 8.02 | 10.22 | 9.82 |
| | TOTAL RATED CURRENT | A | 14.7 | 14.5 | 18.8 | 18.2 |
| | POWER FACTOR | % | 83 | 84 | 82 | 81 |
| | START CURRENT | A | 111 | 111 | 134 | 134 |
| | COMPRESSOR INPUT | kW | 6.96 | 6.86 | 8.71 | 8.31 |
| | RATED CURRENT | A | 11.9 | 11.7 | 14.9 | 14.3 |
| | O/D FAN INPUT | kW | 0.31 | 0.31 | 0.31 | 0.31 |
| | RATED CURRENT | A | 1.1 | 1.1 | 1.1 | 1.1 |
| | I/D FAN External static pressure | Pa | 100 | 100 | 100 | 100 |
| | INPUT | kW | 0.85 | 0.85 | 1.2 | 1.2 |
| | RATED CURRENT | A | 1.7 | 1.7 | 2.8 | 2.8 |

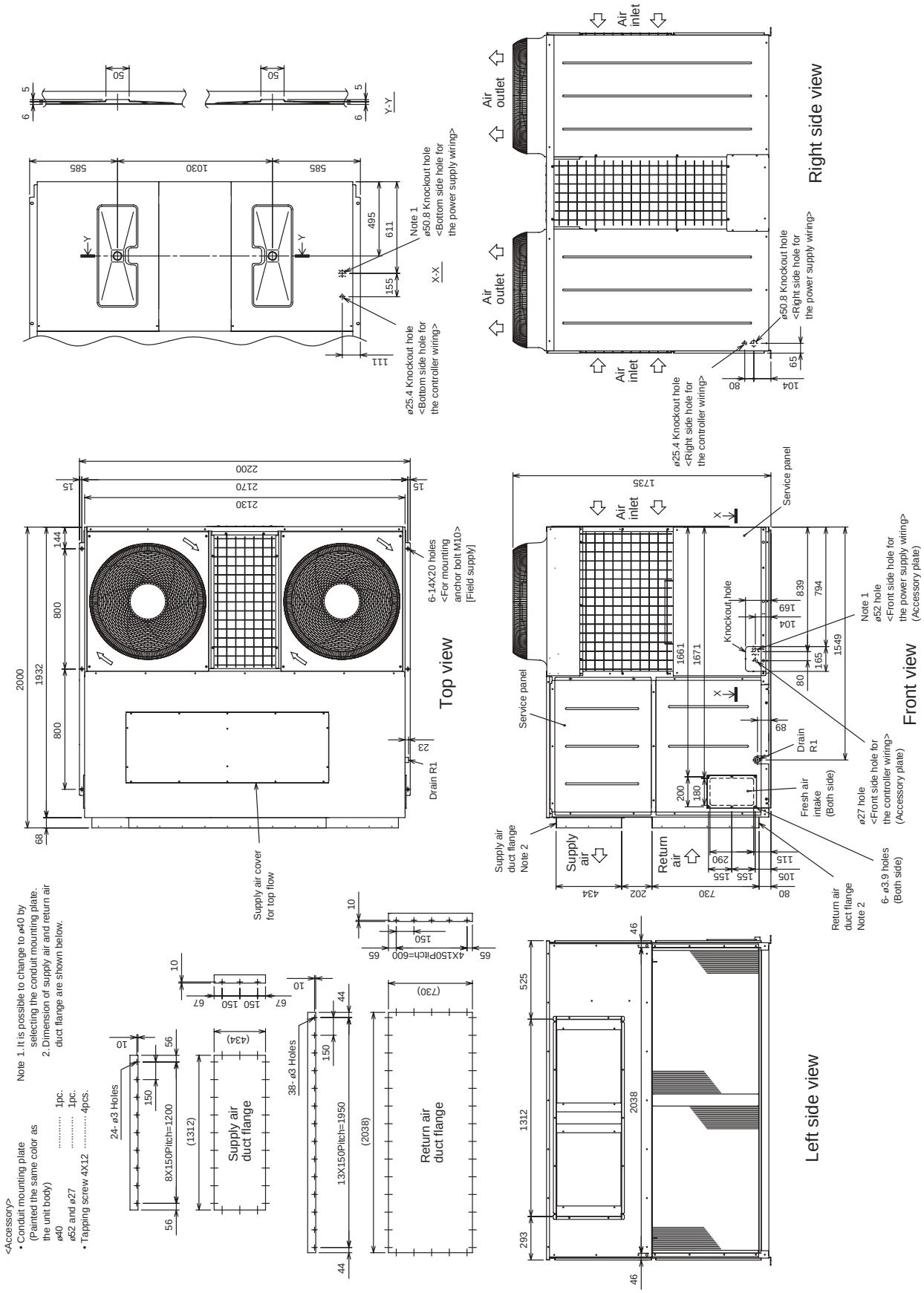
| VOLT | ITEM | | PRH-P16MYA | | PRH-P20MYA | |
|---|---|---|---|---|---|---|
| | | | Cooling | Heating | Cooling | Heating |
| 415V | TOTAL INPUT | kW | 16.60 | 15.94 | 21.44 | 19.24 |
| | TOTAL RATED CURRENT | A | 29.6 | 29.2 | 36.6 | 35.4 |
| | POWER FACTOR | % | 78 | 75 | 81 | 75 |
| | START CURRENT | A | 126 | 126 | 152 | 151 |
| | COMPRESSOR INPUT | kW | 14.38 | 13.72 | 18.82 | 16.62 |
| | RATED CURRENT | A | 23.8 | 23.4 | 29.8 | 28.6 |
| | O/D FAN INPUT | kW | 0.62 | 0.62 | 0.62 | 0.62 |
| | RATED CURRENT | A | 2.2 | 2.2 | 2.2 | 2.2 |
| | I/D FAN External static pressure | Pa | 200 | 200 | 200 | 200 |
| | INPUT | kW | 1.6 | 1.6 | 2.0 | 2.0 |
| | RATED CURRENT | A | 3.6 | 3.6 | 4.6 | 4.6 |
| 400V | TOTAL INPUT | kW | 16.60 | 15.94 | 21.44 | 19.24 |
| | TOTAL RATED CURRENT | A | 29.6 | 29.2 | 36.6 | 35.4 |
| | POWER FACTOR | % | 80 | 78 | 84 | 78 |
| | START CURRENT | A | 126 | 126 | 152 | 151 |
| | COMPRESSOR INPUT | kW | 14.38 | 13.72 | 18.82 | 16.62 |
| | RATED CURRENT | A | 23.8 | 23.4 | 29.8 | 28.6 |
| | O/D FAN INPUT | kW | 0.62 | 0.62 | 0.62 | 0.62 |
| | RATED CURRENT | A | 2.2 | 2.2 | 2.2 | 2.2 |
| | I/D FAN External static pressure | Pa | 200 | 200 | 200 | 200 |
| | INPUT | kW | 1.6 | 1.6 | 2.0 | 2.0 |
| | RATED CURRENT | A | 3.6 | 3.6 | 4.6 | 4.6 |
| 380V | TOTAL INPUT | kW | 16.60 | 15.94 | 21.44 | 19.24 |
| | TOTAL RATED CURRENT | A | 29.6 | 29.2 | 36.6 | 35.4 |
| | POWER FACTOR | % | 85 | 82 | 89 | 82 |
| | START CURRENT | A | 126 | 126 | 152 | 151 |
| | COMPRESSOR INPUT | kW | 14.38 | 13.72 | 18.82 | 16.62 |
| | RATED CURRENT | A | 23.8 | 23.4 | 29.8 | 28.6 |
| | O/D FAN INPUT | kW | 0.62 | 0.62 | 0.62 | 0.62 |
| | RATED CURRENT | A | 2.2 | 2.2 | 2.2 | 2.2 |
| | I/D FAN External static pressure | Pa | 200 | 200 | 200 | 200 |
| | INPUT | kW | 1.6 | 1.6 | 2.0 | 2.0 |
| | RATED CURRENT | A | 3.6 | 3.6 | 4.6 | 4.6 |

## 7 EXTERNAL DIMENSIONS

- **Models PRH-P8MYA/P10MYA**

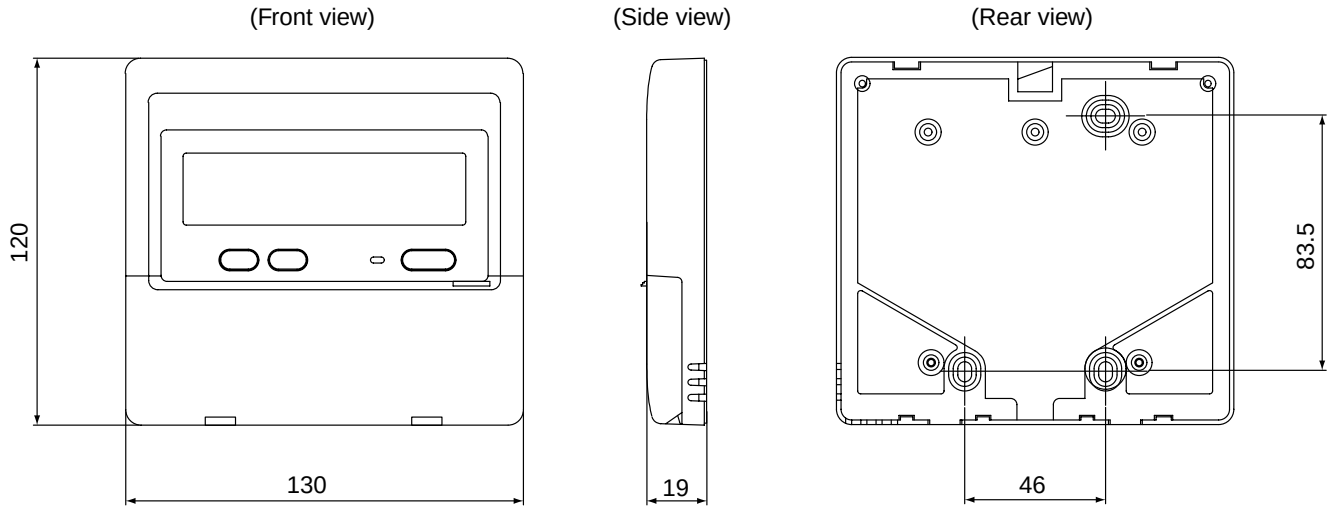


• **Models PRH-P16MYA/P20MYA**



## 8 REMOTE CONTROLLER

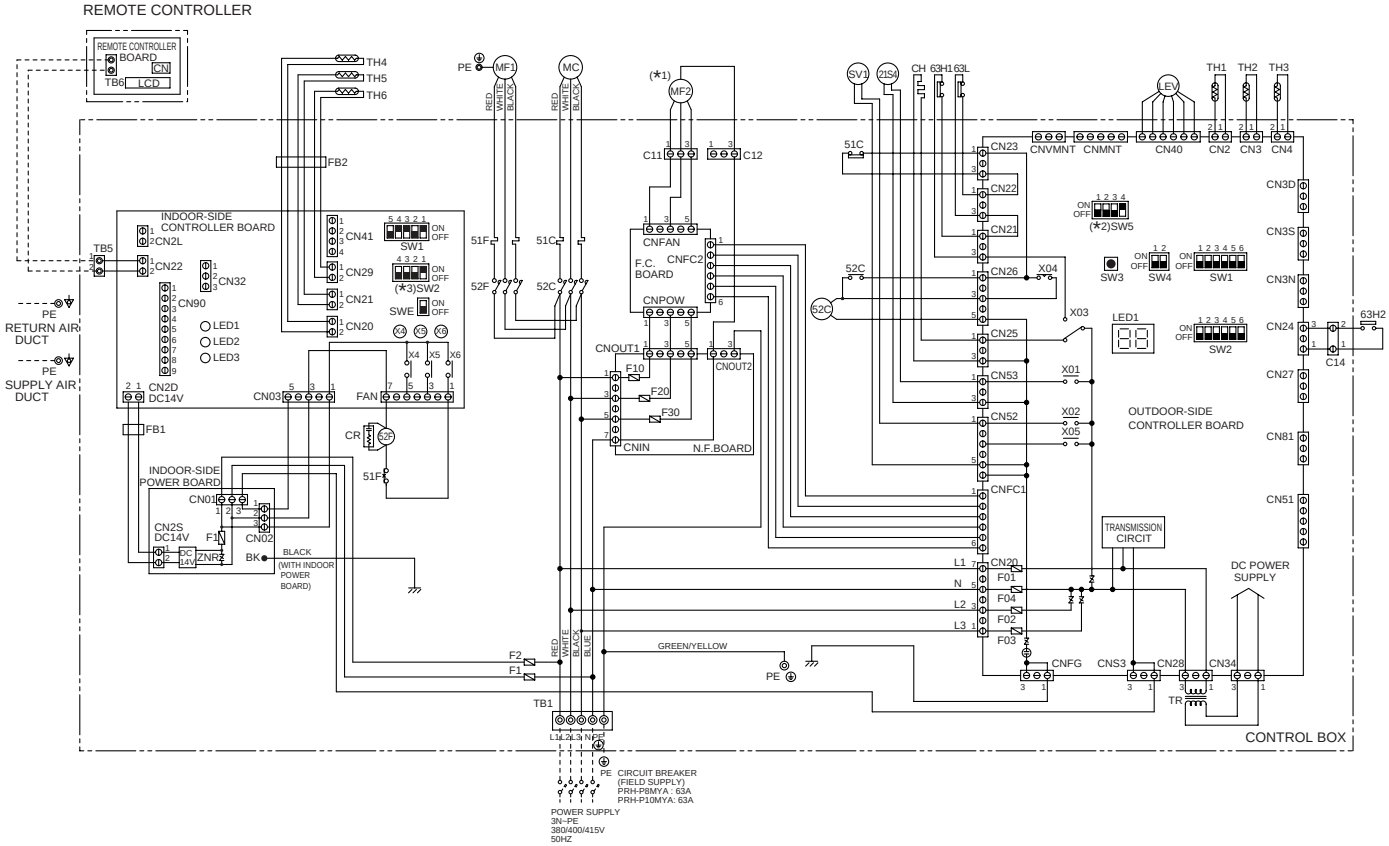
- **Model PAR-20MAA**



# 9 ELECTRICAL WIRING DIAGRAM

## [1] Unit

- **Models PRH-P8MYA/P10MYA**




| Symbol | Name | Symbol | Name | | | Symbol | | Name |
|---|---|---|---|---|---|---|---|---|
| F1,F2 | FUSE (15A 250VAC CLASS T) | 52F | MAGNETIC CONTACTOR (INDOOR-SIDE FAN MOTOR) | | | INDOOR-SIDE POWER BOARD | F1 | FUSE (4A 250VAC CLASS T) |
| 51C | OVER CURRENT RELAY (COMPRESSOR) | TH1 | THERMISTOR | LIQUID PIPE TEMP | OUT DOOR -SIDE | | ZNR | VARISTOR |
| 52C | MAGNETIC CONTACTOR (COMPRESSOR) | TH2 | | DISCHARGE TEMP | | OUTDOOR-SIDE CONTROLLER BOARD | F01-F04 | FUSE (6.3A 250VAC CLASS F) |
| 63L | PRESSURE SWITCH (LOW PRESSURE) | TH3 | | COND/EVA TEMP | | | LED1 | LED (FOR SERVICE) |
| 63H1 | PRESSURE SWITCH (HIGH PRESSURE) | TH4 | | ROOM TEMP | IN DOOR -SIDE | | X01-X05 | AUXILIARY RELAY |
| 63H2 | PRESSURE SWITCH (FOR CONTROL) | TH5 | | LIQUID PIPE TEMP | | | SW1-5 | SWITCH |
| MC | COMPRESSOR MOTOR | TH6 | | COND/EVA TEMP | | N.F. BOARD | F10-F30 | FUSE (6.3A 250VAC CLASS F) |
| MF2 | FAN MOTOR (OUTDOOR-SIDE) | CR | SURGE KILLER | | | | | |
| TR | TRANSFORMER | FB1,FB2 | FERRITE CORE | | | | | |
| 21S4 | 4-WAY VALVE | INDOOR-SIDE CONTROLLER BOARD | X4-6 | AUXILIARY RELAY | | | | |
| SV1 | SOLENOID VALVE | | SW1 | SWITCH (MODEL SELECTION) | | | | |
| CH | CRANK CASE HEATER (COMPRESSOR) | | SW2 | SWITCH (CAPACITY CORD) | | | | |
| LEV | ELECTRONIC EXPANSION VALVE | | SWE | SWITCH (EMERGENCY OPERATION) | | | | |
| TB1,5 | TERMINAL BLOCK | | LED1 | LED (POWER SUPPLY) | | | | |
| MF1 | FAN MOTOR (INDOOR-SIDE) | | LED2 | LED (POWER SUPPLY<REMOTE CONTROLLER>) | | | | |
| 51F | OVER CURRENT RELAY (INDOOR-SIDE FAN MOTOR) | | LED3 | LED (TRANSMISSION<INDOOR-SIDE·OUTDOOR-SIDE>) | | | | |

REMOTE CONTROLLER

| Symbol | Name |
|---|---|
| TB6 | TERMINAL BLOCK |

**Note**: 1. The dotted lines show field wiring.
2. Color of earth wire is yellow and green twisting.
3. Specification subject to change without notice.
4. This motor(*1) includes auto reset type internal thermostat.
5. SW5(*2)[outdoor-side controller board] is shown PRH-P10MYA setting.
In case of PRH-P8MYA setting is shown as below.


[outdoor-side controller board]

(*2) SW5

6. SW2(*3)[indoor-side controller board] is shown PRH-P10MYA setting.
In case of PRH-P8MYA setting is shown as below.

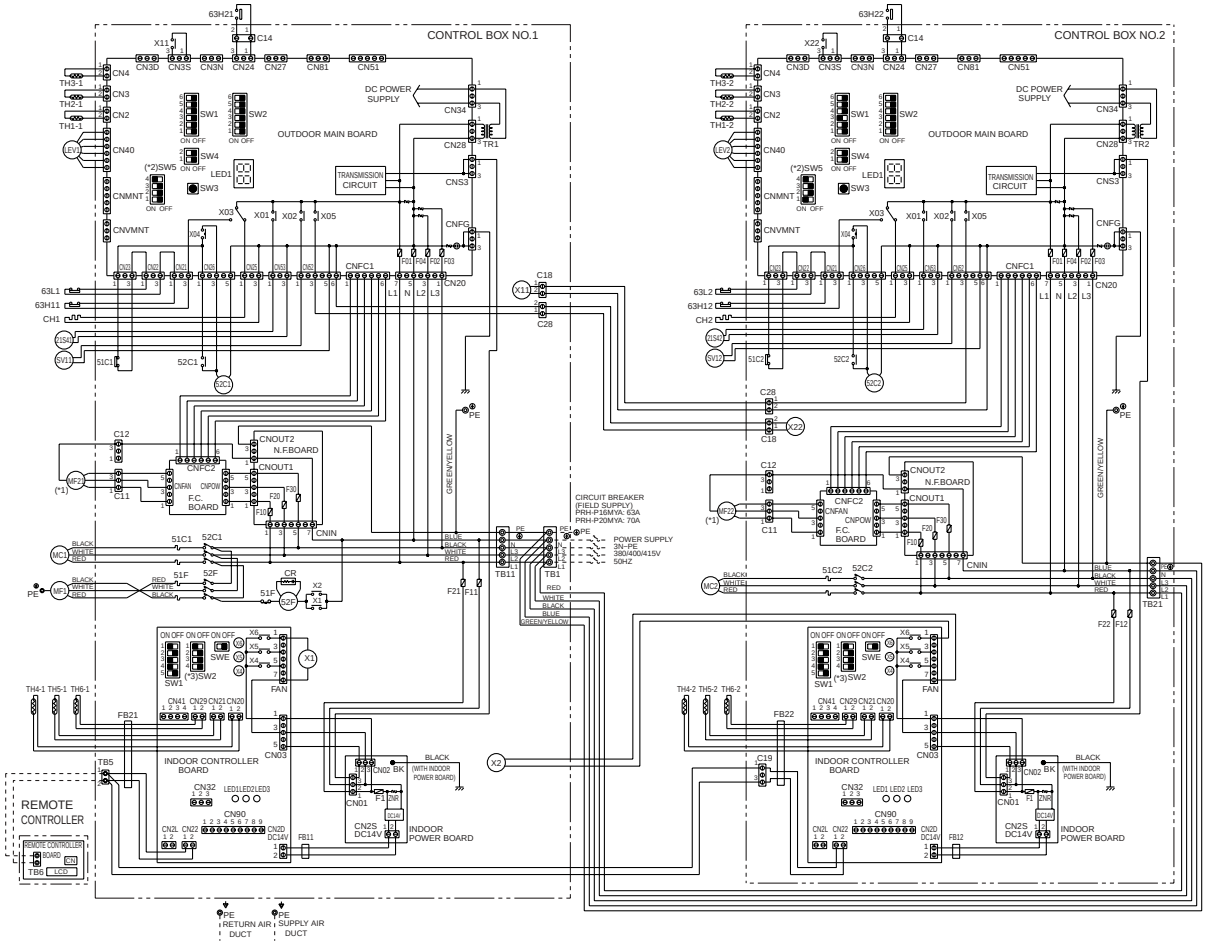

[intdoor-side controller board]

(*3) SW2

7. Emergency operation
If a trouble occurs with either the remote controller or the unit microcomputer and no other trouble exists, emergency operation for cooling or heating can be performed by changing the setting of switch (SWE) on the indoor-side controller board.
8. ⊡ mark is connector.

**Caution,**
1. To protect compressor and fan motor (indoor-side) from abnormal current, over current relays is installed. Therefore, do not change factory over current relays is installed. Therefore, do not change factory set value of over current relays.

- **Models PRH-P16MYA/P20MYA**




| Symbol | Name | Symbol | Name | | Symbol | | Name |
|---|---|---|---|---|---|---|---|
| F11,12,21,22 | FUSE (15A 250VAC CLASS T) | 52F | MAGNETIC CONTACTOR (INDOOR FAN MOTOR) | | INDOOR POWER BOARD | F1 | FUSE (4A 250VAC CLASS T) |
| 51C1,51C2 | OVER CURRENT RELAY (COMPRESSOR) | TH1-1,TH1-2 | LIQUID PIPE TEMP | OUT DOOR | | ZNR | VARISTOR |
| 52C1,52C2 | MAGNETIC CONTACTOR (COMPRESSOR) | TH2-1,TH2-2 | DISCHARGE TEMP | | OUTDOOR MAIN BOARD | F01-F04 | FUSE (6.3A 250VAC CLASS F) |
| 63L1,63L2 | PRESSURE SWITCH (LOW PRESSURE) | TH3-1,TH3-2 | COND/EVA TEMP | | | LED1 | LED (FOR SERVICE) |
| 63H11,63H12 | PRESSURE SWITCH (HIGH PRESSURE) | TH4-1,TH4-2 | ROOM TEMP | IN DOOR | | X01-X05 | AUXILIARY RELAY |
| 63H21,63H22 | PRESSURE SWITCH (FOR CONTROL) | TH5-1,TH5-2 | LIQUID PIPE TEMP | | | SW1-5 | SWITCH |
| MC1,MC2 | COMPRESSOR MOTOR | TH6-1,TH6-2 | COND/EVA TEMP | | N.F. BOARD | F10-F30 | FUSE (6.3A 250VAC CLASS F) |
| MF21,MF22 | FAN MOTOR (OUTDOOR) | CR | SURGE KILLER | | | | |
| TR1,TR2 | TRANSFORMER | FB11,12,21,22 | FERRITE CORE | | | | |
| 21S41,21S42 | 4-WAY VALVE | INDOOR CONTROLLER BOARD | X4-6 | AUXILIARY RELAY | | | |
| SV11,SV12 | SOLENOID VALVE | | SW1 | SWITCH (MODEL SELECTION) | | | |
| CH1,CH2 | CRANK CASE HEATER (COMPRESSOR) | | SW2 | SWITCH (CAPACITY CORD) | | | |
| LEV1,LEV2 | ELECTRONIC EXPANSION VALVE | | SWE | SWITCH (EMERGENCY OPERATION) | | | |
| TB1,5,11,21 | TERMINAL BLOCK | | LED1 | LED (POWER SUPPLY) | | | |
| MF1 | FAN MOTOR (INDOOR) | | LED2 | LED (POWER SUPPLY<REMOTE CONTROLLER>) | | | |
| 51F | OVER CURRENT RELAY (INDOOR FAN MOTOR) | | LED3 | LED (TRANSMISSION<INDOOR·OUTDOOR>) | | | |

REMOTE CONTROLLER

| Symbol | Name |
|---|---|
| TB6 | TERMINAL BLOCK |

**Note**: 1. The dotted lines show field wiring.
2. Color of earth wire is yellow and green twisting.
3. Specification subject to change without notice.
4. This motor(*1) includes auto reset type internal thermostat.
5. SW5(*2)[outdoor main board] shows PRH-P20MYA setting.
In case of PRH-P16MYA setting is shown as below.

Control box no.1

(*2) SW5 1 2 3 4 ON / OFF [outdoor main board]

Control box no.2

(*2) SW5 1 2 3 4 ON / OFF [outdoor main board]

6. SW2(*3)[indoor controller board] shows PRH-P20MYA setting.
In case of PRH-P16MYA setting is shown as below.

4 3 2 1 ON / OFF [intdoor controller board]

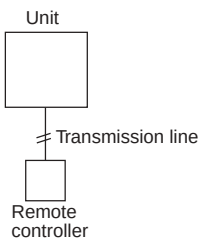
(*3) SW2

7. Emergency operation
If a trouble occurs with either the remote controller or the unit microcomputer and no other trouble exists, emergency operation for cooling or heating can be performed by changing the setting of switch (SWE) on the indoor controller board.
8. ⊡ mark is connector.

**Caution,**
1. To protect compressor and fan motor (indoor) from abnormal current, over current relays is installed. Therefore, do not change factory set value of over current relays.

# [2] Skeleton of Transmission Line Connection

## (1) System



# 10 Technical Data to Meet LVD

## [1] Standard Operation Data

### (1) PRH-P8MYA

| Operating condition | | | | Cooling | | | Heating | | |
|---|---|---|---|---|---|---|---|---|---|
| Operating condition | Voltage | | V | 380 | 400 | 415 | 380 | 400 | 415 |
| | Power source frequency | | Hz | 50 | 50 | 50 | 50 | 50 | 50 |
| | Indoor air condition (DB/WB) | | °C | 27/19 | 27/19 | 27/19 | 20/– | 20/– | 20/– |
| | Outdoor air condition (DB/WB) | | °C | 35/– | 35/– | 35/– | 7/6 | 7/6 | 7/6 |
| | Refrigerant charge | | kg | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 |
| Electrical characteristics | Total | Rated current | A | 14.7 | 14.7 | 14.7 | 14.5 | 14.5 | 14.5 |
| | Compressor current | | A | 11.9 | 11.9 | 11.9 | 11.7 | 11.7 | 11.7 |
| | O/D FAN | Rated current | A | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| | I/D FAN | Rated current | A | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| Refrigerant circuit | Discharge pressure | | MPa | 2.25 | 2.25 | 2.25 | 1.72 | 1.72 | 1.72 |
| | Suction pressure | | MPa | 0.56 | 0.56 | 0.56 | 0.38 | 0.38 | 0.38 |
| | Discharge refrigerant temperature | | °C | 77 | 77 | 77 | 66 | 66 | 66 |
| | Suction refrigerant temperature | | °C | 10 | 10 | 10 | -1 | -1 | -1 |
| | Liquid pipe temperature (at piping sensor) | | °C | 48 | 48 | 48 | 0 | 0 | 0 |
| | Compressor shell bottom temperature | | °C | 33 | 33 | 33 | 28 | 28 | 28 |

### (2) PRH-P10MYA

| Operating condition | | | | Cooling | | | Heating | | |
|---|---|---|---|---|---|---|---|---|---|
| Operating condition | Voltage | | V | 380 | 400 | 415 | 380 | 400 | 415 |
| | Power source frequency | | Hz | 50 | 50 | 50 | 50 | 50 | 50 |
| | Indoor air condition (DB/WB) | | °C | 27/19 | 27/19 | 27/19 | 20/– | 20/– | 20/– |
| | Outdoor air condition (DB/WB) | | °C | 35/– | 35/– | 35/– | 7/6 | 7/6 | 7/6 |
| | Refrigerant charge | | kg | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 |
| Electrical characteristics | Total | Rated current | A | 18.8 | 18.8 | 18.8 | 18.2 | 18.2 | 18.2 |
| | Compressor current | | A | 14.9 | 14.9 | 14.9 | 14.3 | 14.3 | 14.3 |
| | O/D FAN | Rated current | A | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| | I/D FAN | Rated current | A | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| Refrigerant circuit | Discharge pressure | | MPa | 2.31 | 2.31 | 2.31 | 1.83 | 1.83 | 1.83 |
| | Suction pressure | | MPa | 0.55 | 0.55 | 0.55 | 0.37 | 0.37 | 0.37 |
| | Discharge refrigerant temperature | | °C | 78 | 78 | 78 | 70 | 70 | 70 |
| | Suction refrigerant temperature | | °C | 9 | 9 | 9 | –1 | –1 | –1 |
| | Liquid pipe temperature (at piping sensor) | | °C | 48 | 48 | 48 | 3 | 3 | 3 |
| | Compressor shell bottom temperature | | °C | 32 | 32 | 32 | 25 | 25 | 25 |

### (3) PRH-P16MYA

| Operating condition | | | | Cooling | | | Heating | | |
|---|---|---|---|---|---|---|---|---|---|
| Operating condition | Voltage | | V | 380 | 400 | 415 | 380 | 400 | 415 |
| | Power source frequency | | Hz | 50 | 50 | 50 | 50 | 50 | 50 |
| | Indoor air condition (DB/WB) | | °C | 27/19 | 27/19 | 27/19 | 20/– | 20/– | 20/– |
| | Outdoor air condition (DB/WB) | | °C | 35/– | 35/– | 35/– | 7/6 | 7/6 | 7/6 |
| | Refrigerant charge ∗1 | | kg | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 |
| Electrical characteristics | Total | Rated current | A | 29.6 | 29.6 | 29.6 | 29.2 | 29.2 | 29.2 |
| | Compressor current | | A | 23.8 | 23.8 | 23.8 | 23.4 | 23.4 | 23.4 |
| | O/D FAN | Rated current | A | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| | I/D FAN | Rated current | A | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 | 3.6 |
| Refrigerant circuit | Discharge pressure | | MPa | 2.27 | 2.27 | 2.27 | 1.80 | 1.80 | 1.80 |
| | Suction pressure | | MPa | 0.52 | 0.52 | 0.52 | 0.40 | 0.40 | 0.40 |
| | Discharge refrigerant temperature | | °C | 79 | 79 | 79 | 68 | 68 | 68 |
| | Suction refrigerant temperature | | °C | 7 | 7 | 7 | 0 | 0 | 0 |
| | Liquid pipe temperature (at piping sensor) | | °C | 49 | 49 | 49 | 2 | 2 | 2 |
| | Compressor shell bottom temperature | | °C | 31 | 31 | 31 | 25 | 25 | 25 |

∗1: For each refrigerant circuit

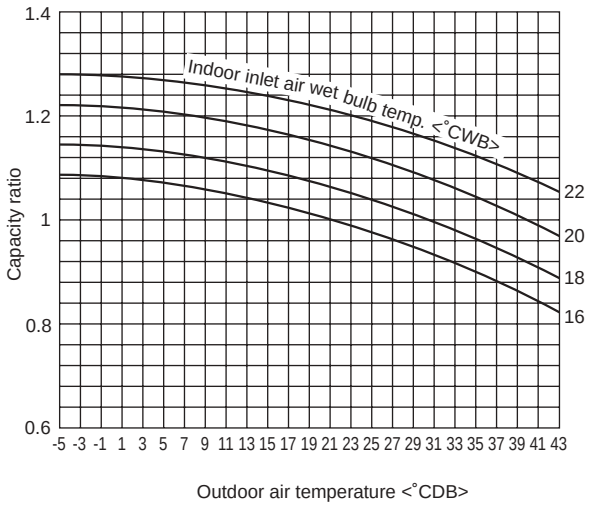
### (4) PRH-P20MYA

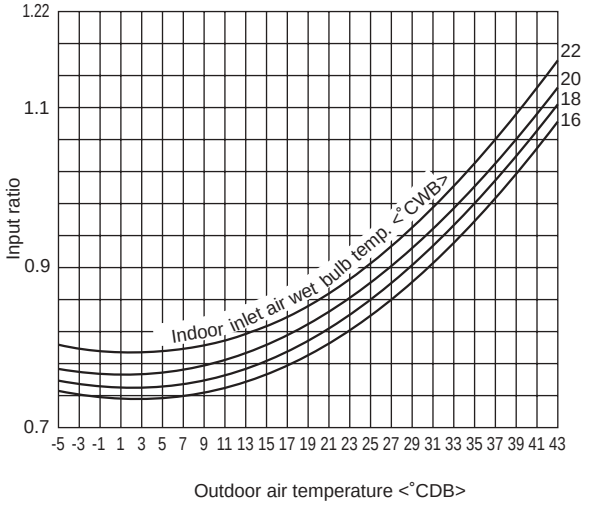
| Operating condition | | | | Cooling | | | Heating | | |
|---|---|---|---|---|---|---|---|---|---|
| Operating condition | Voltage | | V | 380 | 400 | 415 | 380 | 400 | 415 |
| | Power source frequency | | Hz | 50 | 50 | 50 | 50 | 50 | 50 |
| | Indoor air condition (DB/WB) | | °C | 27/19 | 27/19 | 27/19 | 20/– | 20/– | 20/– |
| | Outdoor air condition (DB/WB) | | °C | 35/– | 35/– | 35/– | 7/6 | 7/6 | 7/6 |
| | Refrigerant charge ∗1 | | kg | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 |
| Electrical characteristics | Total | Rated current | A | 36.6 | 36.6 | 36.6 | 35.4 | 35.4 | 35.4 |
| | Compressor current | | A | 29.8 | 29.8 | 29.8 | 28.6 | 28.6 | 28.6 |
| | O/D FAN | Rated current | A | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| | I/D FAN | Rated current | A | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Refrigerant circuit | Discharge pressure | | MPa | 2.28 | 2.28 | 2.28 | 1.80 | 1.80 | 1.80 |
| | Suction pressure | | MPa | 0.52 | 0.52 | 0.52 | 0.40 | 0.40 | 0.40 |
| | Discharge refrigerant temperature | | °C | 79 | 79 | 79 | 68 | 68 | 68 |
| | Suction refrigerant temperature | | °C | 7 | 7 | 7 | 0 | 0 | 0 |
| | Liquid pipe temperature (at piping sensor) | | °C | 49 | 49 | 49 | 2 | 2 | 2 |
| | Compressor shell bottom temperature | | °C | 31 | 31 | 31 | 25 | 25 | 25 |

∗1: For each refrigerant circuit

## [2] Cooling Capacity Curves

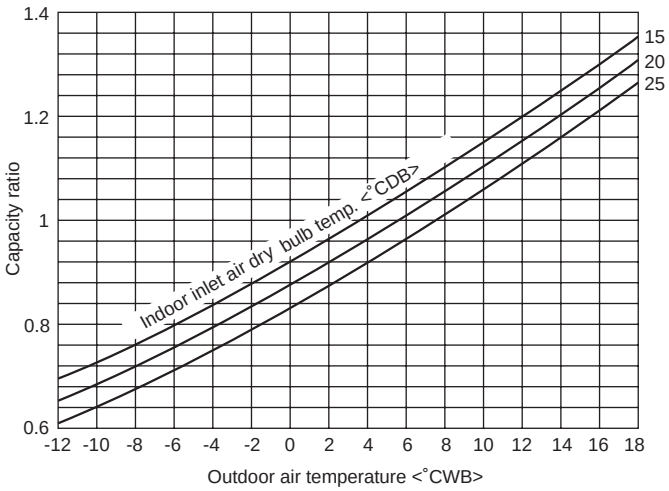
• PRH-P8MYA/P10MYA/P16MYA/P20MYA

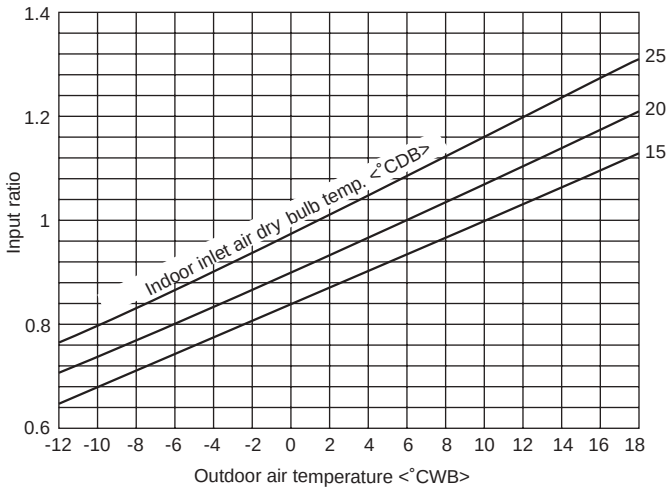



## [3] Heating Capacity Curves

• PRH-P8MYA/P10MYA/P16MYA/P20MYA



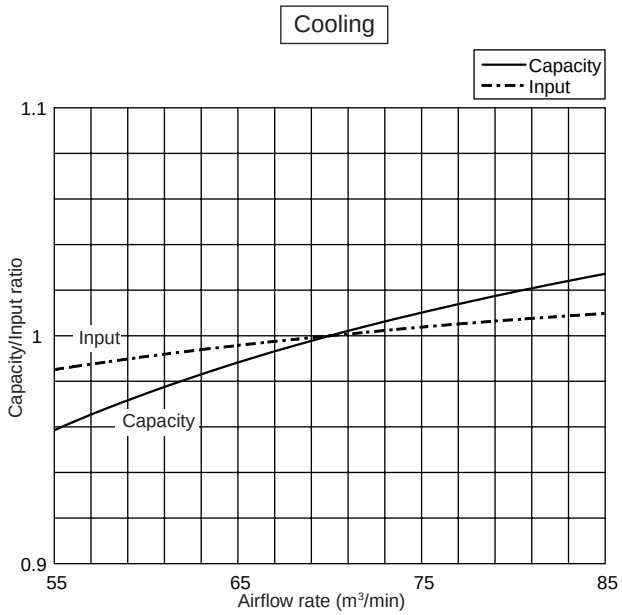



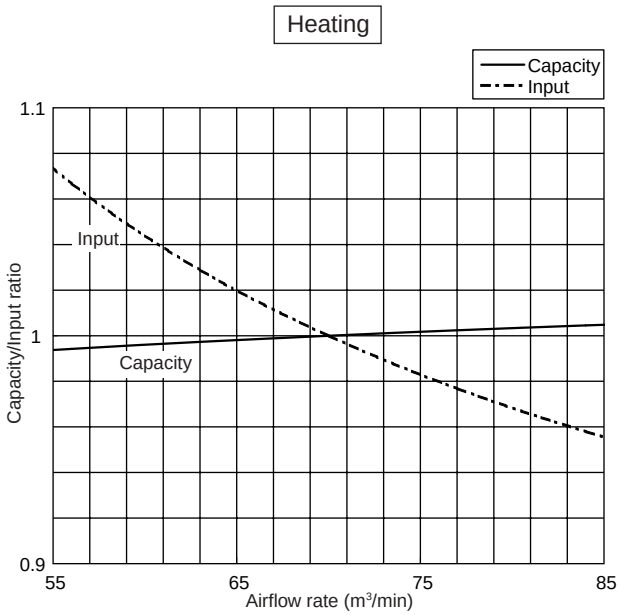

## [4] Reduction Ratio by Frosting

| Outdoor unit inlet wet bulb temperature (°CWB) | Heating capacity reduction ratio |
|---|---|
| 6 | 1.0 |
| 4 | 0.98 |
| 2 | 0.88 |
| 0 | 0.85 |
| –2 | 0.86 |
| –4 | 0.89 |
| –6 | 0.92 |
| –8 | 0.92 |
| –10 | 0.92 |

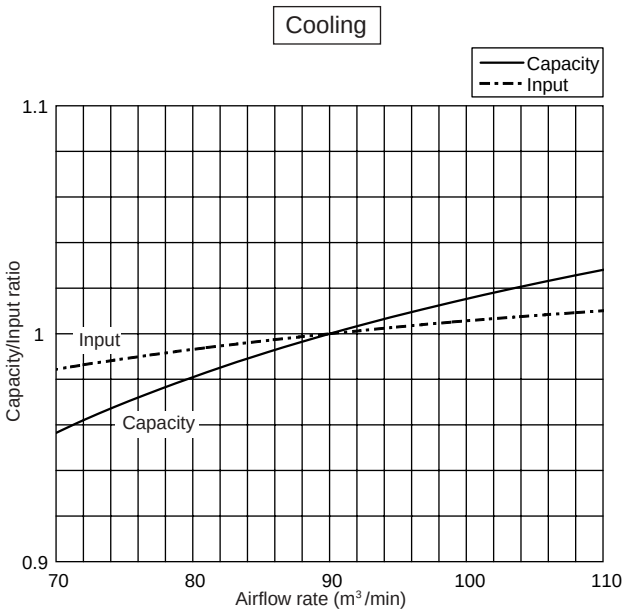
## [5] Capacity/Input Ratio against Changes in Room Airflow Rate

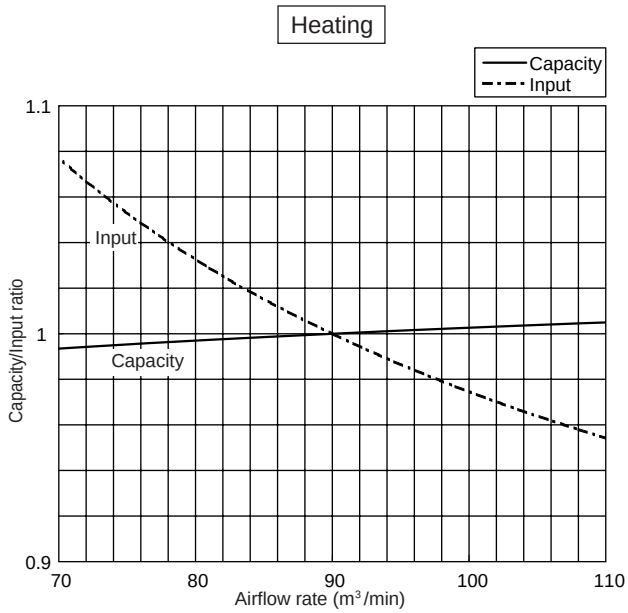
**• Model PRH-P8MYA**



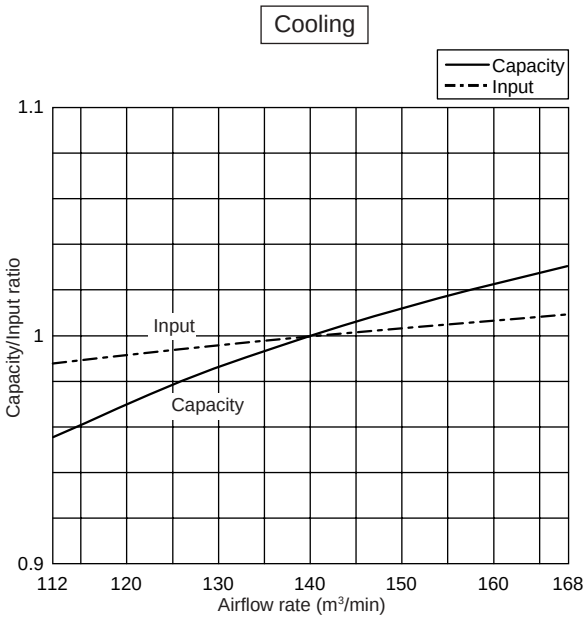



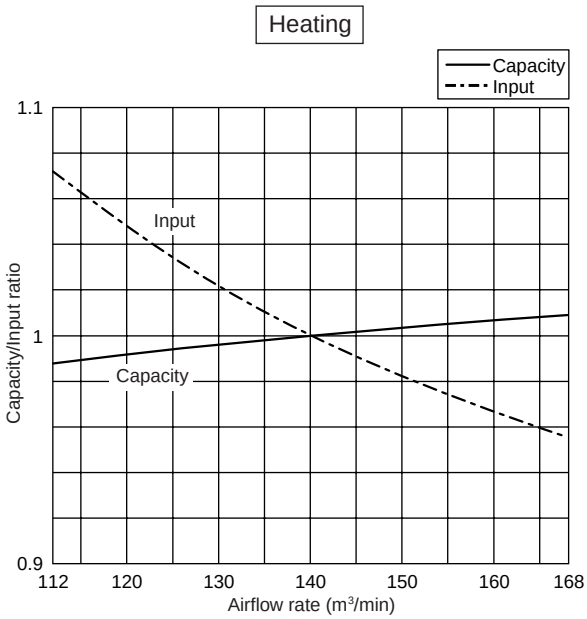

**• Model PRH-P10MYA**



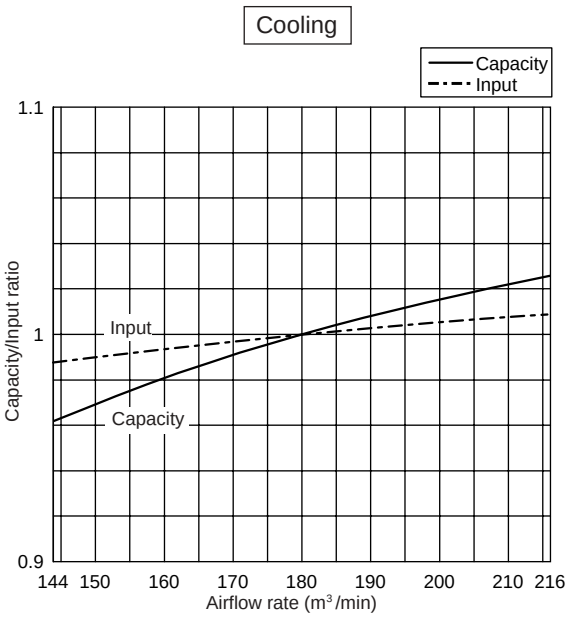



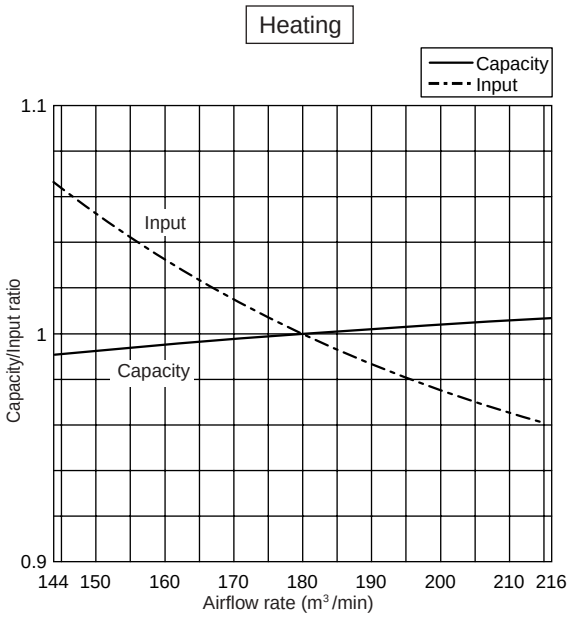
**• Model PRH-P16MYA**



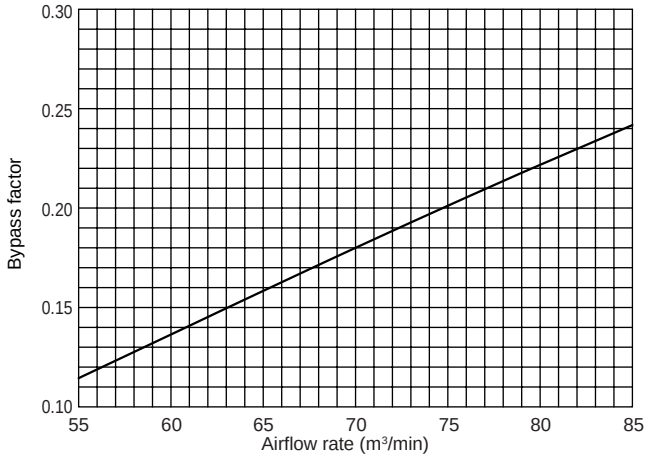

**• Model PRH-P20MYA**



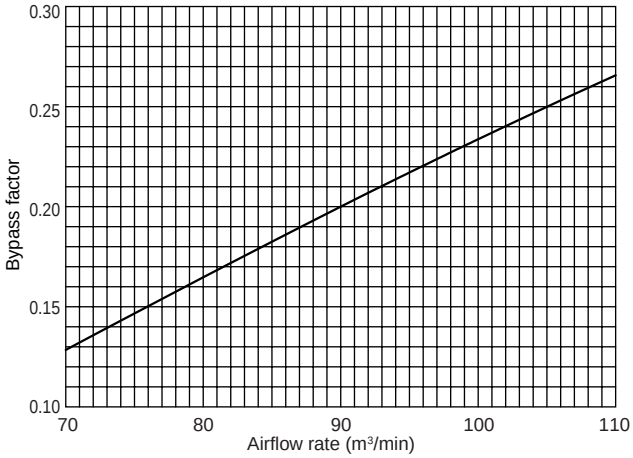



## [6] Bypass Factor Curves

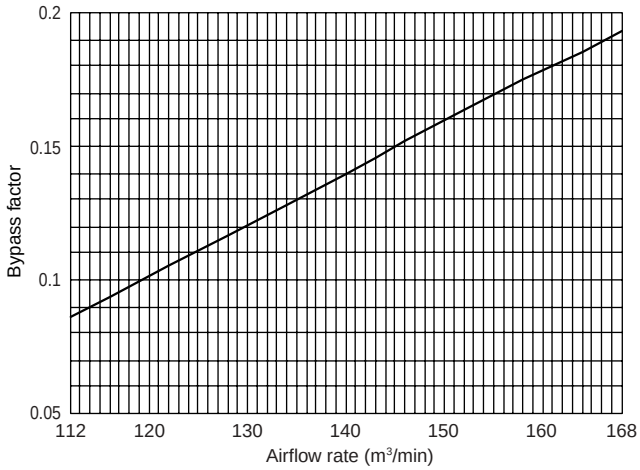
PRH-P8MYA



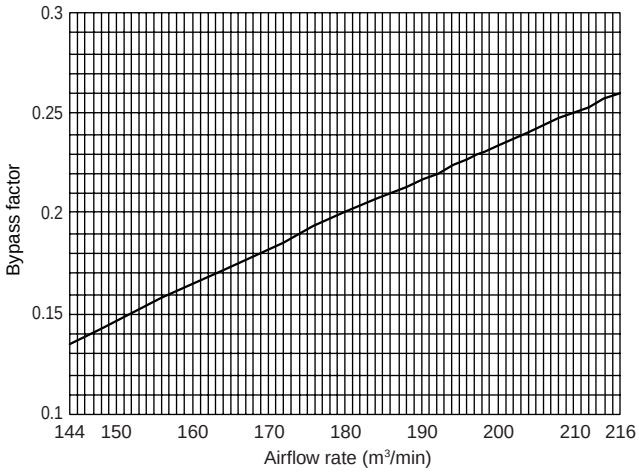

PRH-P10MYA




PRH-P16MYA




PRH-P20MYA




## [7] Cooling Sensible Heating Capacity Table

**(1) PRH-P8MYA (Airflow rate 70m³/min)**

(unit : kcal/h)

| Outdoor temp. (°C) | Indoor inlet air temperature (DB/WB°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 23/16 | | 25/18 | | 27/19 | | 28/20 | | 30/22 | |
| | CA | SHC | CA | SHC | CA | SHC | CA | SHC | CA | SHC |
| 20 | 18100 | 14400 | 19300 | 14300 | 20000 | 15300 | 20800 | 15300 | 21900 | 15000 |
| 25 | 17500 | 14100 | 18700 | 14100 | 19500 | 15100 | 20300 | 15100 | 21500 | 14900 |
| 30 | 16900 | 13900 | 18100 | 13800 | 18900 | 14800 | 19700 | 14900 | 20900 | 14700 |
| 35 | 16200 | 13600 | 17400 | 13500 | 18000 | 14500 | 19000 | 14600 | 20200 | 14400 |
| 40 | 15300 | 13200 | 16600 | 13200 | 17400 | 14200 | 18200 | 14300 | 19500 | 14200 |
| 43 | 14800 | 12900 | 16000 | 12900 | 16900 | 14000 | 17700 | 14100 | 19000 | 14000 |

**(2) PRH-P10MYA (Airflow rate 90m³/min)**

(unit : kcal/h)

| Outdoor temp. (°C) | Indoor inlet air temperature (DB/WB°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 23/16 | | 25/18 | | 27/19 | | 28/20 | | 30/22 | |
| | CA | SHC | CA | SHC | CA | SHC | CA | SHC | CA | SHC |
| 20 | 22500 | 18000 | 24000 | 17900 | 24900 | 19100 | 25800 | 19100 | 27300 | 18800 |
| 25 | 21800 | 17700 | 23300 | 17600 | 24300 | 18900 | 25200 | 18800 | 26700 | 18600 |
| 30 | 21000 | 17300 | 22500 | 17200 | 23500 | 18500 | 24500 | 18500 | 26000 | 18300 |
| 35 | 20100 | 16900 | 21600 | 16900 | 22400 | 18100 | 23600 | 18200 | 25200 | 18000 |
| 40 | 19100 | 16500 | 20600 | 16400 | 21600 | 17800 | 22700 | 17800 | 24200 | 17700 |
| 43 | 18400 | 16200 | 20000 | 16200 | 21000 | 17500 | 22000 | 17600 | 23600 | 17400 |

**(3) PRH-P16MYA (Airflow rate 140m³/min)**

(unit : kcal/h)

| Outdoor temp. (°C) | Indoor inlet air temperature (DB/WB°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 23/16 | | 25/18 | | 27/19 | | 28/20 | | 30/22 | |
| | CA | SHC | CA | SHC | CA | SHC | CA | SHC | CA | SHC |
| 20 | 36200 | 29500 | 38600 | 29300 | 40000 | 31300 | 41600 | 31300 | 43800 | 30800 |
| 25 | 35000 | 28900 | 37400 | 28700 | 39000 | 30900 | 40600 | 30900 | 43000 | 30500 |
| 30 | 33800 | 28400 | 36200 | 28200 | 37800 | 30400 | 39400 | 30400 | 41800 | 30000 |
| 35 | 32400 | 27800 | 34800 | 27700 | 36000 | 29700 | 38000 | 29900 | 40400 | 29500 |
| 40 | 30600 | 27000 | 33200 | 27000 | 34800 | 29200 | 36400 | 29300 | 39000 | 29000 |
| 43 | 29600 | 26500 | 32000 | 26500 | 33800 | 28800 | 35400 | 28900 | 38000 | 28700 |

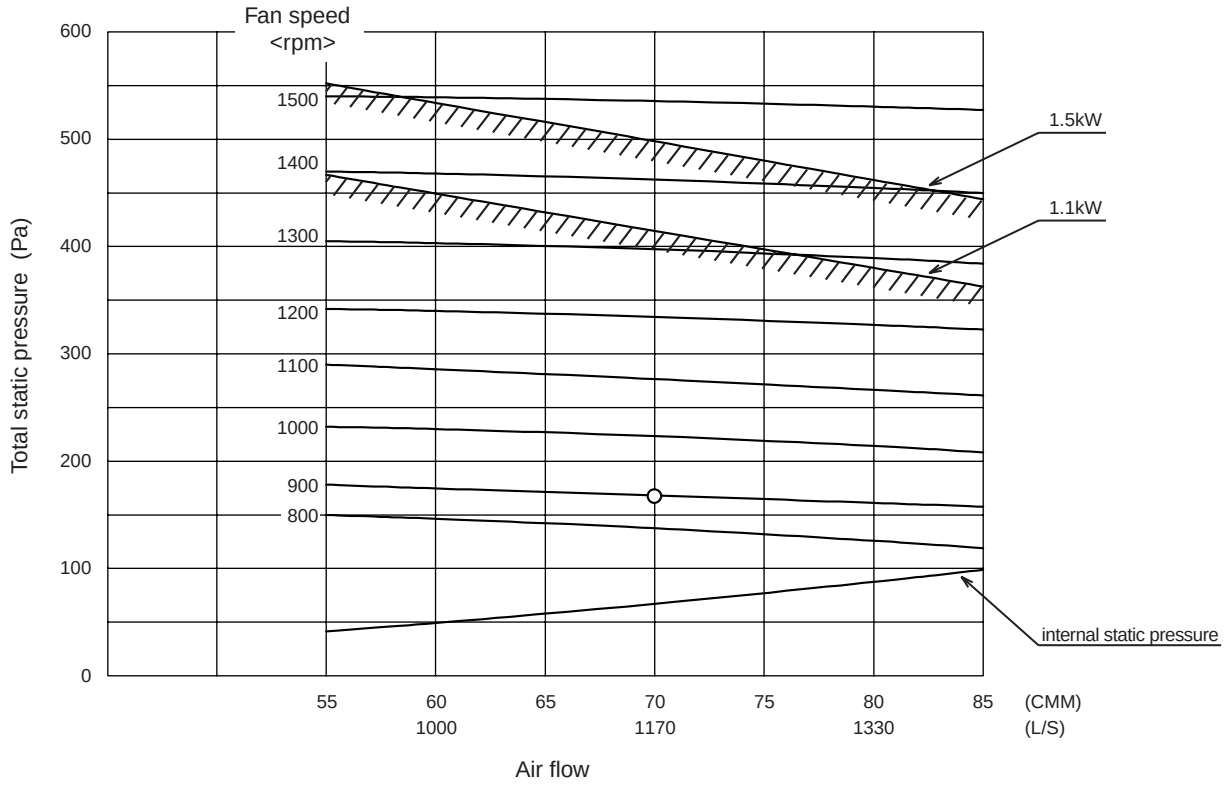
**(4) PRH-P20MYA (Airflow rate 180m³/min)**

(unit : kcal/h)

| Outdoor temp. (°C) | Indoor inlet air temperature (DB/WB°C) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 23/16 | | 25/18 | | 27/19 | | 28/20 | | 30/22 | |
| | CA | SHC | CA | SHC | CA | SHC | CA | SHC | CA | SHC |
| 20 | 45000 | 36000 | 48000 | 35700 | 49800 | 38200 | 51600 | 38100 | 54600 | 37600 |
| 25 | 43600 | 35300 | 46600 | 35100 | 48600 | 37700 | 50400 | 37600 | 53400 | 37100 |
| 30 | 42000 | 34600 | 45000 | 34500 | 47000 | 37100 | 49000 | 37100 | 52000 | 36600 |
| 35 | 40200 | 33800 | 43200 | 33700 | 44800 | 36200 | 47200 | 36400 | 50400 | 36000 |
| 40 | 38200 | 32900 | 41200 | 32900 | 43200 | 35500 | 45400 | 35700 | 48400 | 35300 |
| 43 | 36800 | 32300 | 40000 | 32400 | 42000 | 35000 | 44000 | 35100 | 47200 | 34900 |

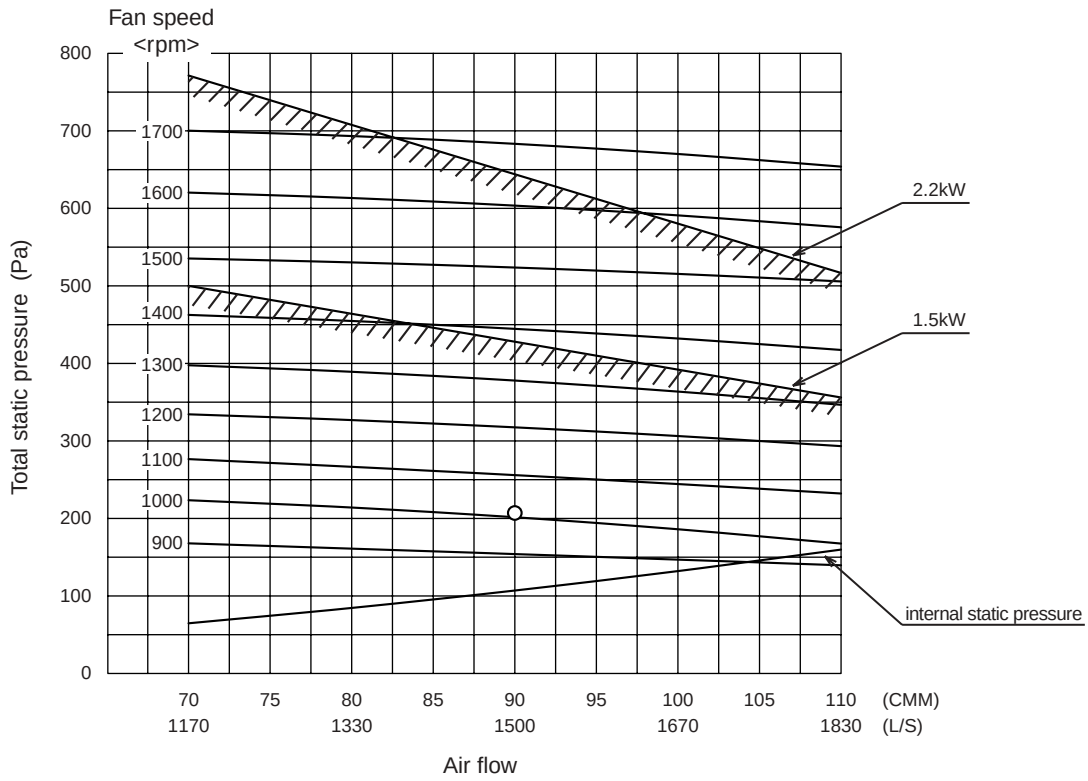
## [8] Fan Performance

### PRH-P8MYA



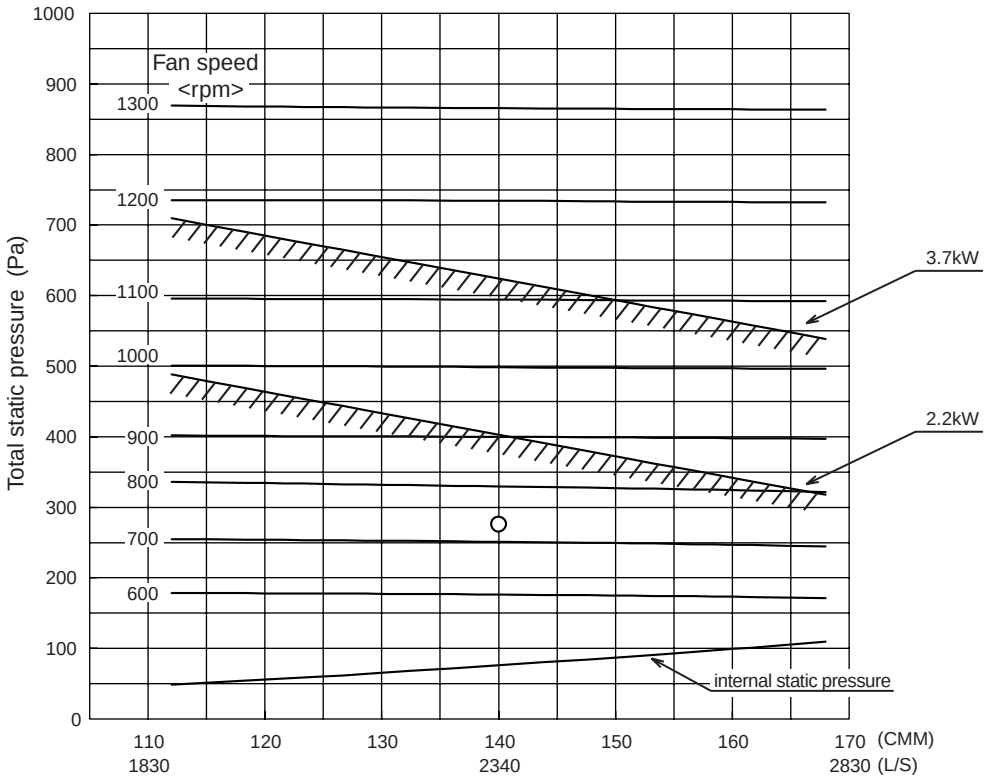

* ○: factory pre setting ESP = 100 Pa

### PRH-P10MYA



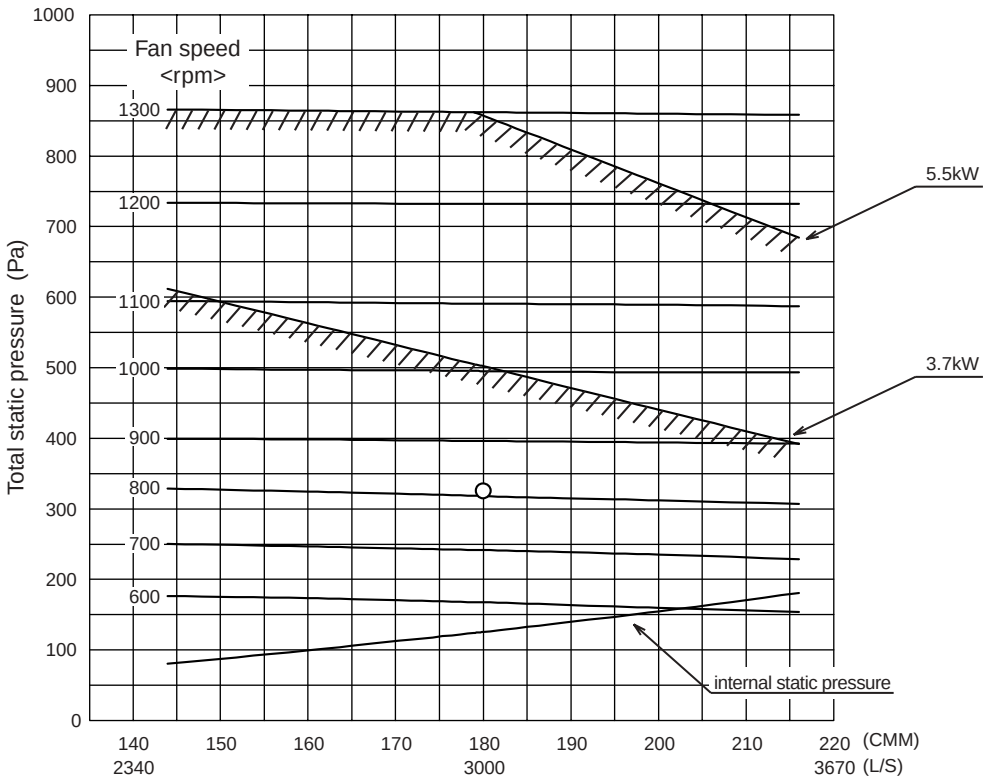

* ○: factory pre setting ESP = 100 Pa

## PRH-P16MYA




* o: factory pre setting ESP = 200 Pa

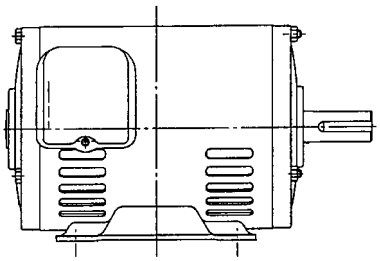
## PRH-P20MYA




* o: factory pre setting ESP = 200 Pa

## PRH-P8MYA

※ ☐ factory pre setting

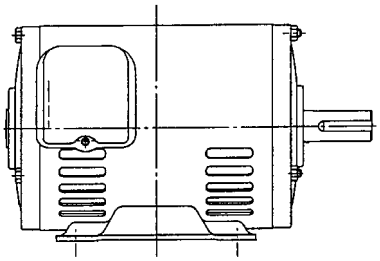


< fig. in the direction of the motor axis>

| Total SP (Pa) \ Air flow | | CMM | 55 | 60 | 70 | 80 | 85 |
|---|---|---|---|---|---|---|---|
| | | L/S | 920 | 1000 | 1170 | 1330 | 1420 |
| 150 | Fan speed | rpm | 788 | 788 | 898 | 898 | 898 |
| | Pulley size (Motor side) | mm | 101.6 | 101.6 | 114.3 | 114.3 | 114.3 |
| | | inch | 4 | 4 | 4.5 | 4.5 | 4.5 |
| | Pulley size (Fan side) | mm | 177.8 | 177.8 | 177.8 | 177.8 | 177.8 |
| | | inch | 7 | 7 | 7 | 7 | 7 |
| | Belt size | inch | B57(red) | B57(red) | B58(red) | B58(red) | B58(red) |
| | Motor (poles) | kW | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 250 | Fan speed | rpm | 1059 | 1059 | 1059 | 1059 | 1059 |
| | Pulley size (Motor side) | mm | 114.3 | 114.3 | 114.3 | 114.3 | 114.3 |
| | | inch | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| | Pulley size (Fan side) | mm | 152.4 | 152.4 | 152.4 | 152.4 | 152.4 |
| | | inch | 6 | 6 | 6 | 6 | 6 |
| | Belt size | inch | B56(red) | B56(red) | B56(red) | B56(red) | B56(red) |
| | Motor (poles) | kW | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 350 | Fan speed | rpm | 1190 | 1190 | 1190 | 1291 | 1291 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 114.3 | 114.3 |
| | | inch | 5 | 5 | 5 | 4.5 | 4.5 |
| | Pulley size (Fan side) | mm | 152.4 | 152.4 | 152.4 | 127 | 127 |
| | | inch | 6 | 6 | 6 | 5 | 5 |
| | Belt size | inch | B57(red) | B57(red) | B57(red) | B55(red) | B55(red) |
| | Motor (poles) | kW | 1.1 | 1.1 | 1.1 | 1.5 | 1.5 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 450 | Fan speed | rpm | 1450 | 1450 | 1450 | 1450 | |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | |
| | | inch | 5 | 5 | 5 | 5 | |
| | Pulley size (Fan side) | mm | 127 | 127 | 127 | 127 | |
| | | inch | 5 | 5 | 5 | 5 | |
| | Belt size | inch | B55(red) | B55(red) | B55(red) | B55(red) | |
| | Motor (poles) | kW | 1.5 | 1.5 | 1.5 | 1.5 | |
| | | – | 4 | 4 | 4 | 4 | |

## PRH-P10MYA

※ ☐ factory pre setting

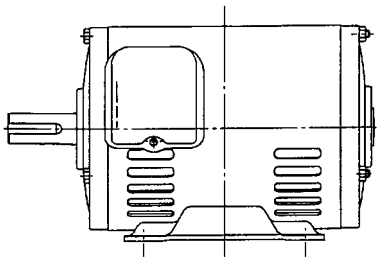


< fig. in the direction of the motor axis>

| Total SP (Pa) \ Air flow | | CMM | 70 | 80 | 90 | 100 | 110 |
|---|---|---|---|---|---|---|---|
| | | L/S | 1170 | 1330 | 1500 | 1670 | 1830 |
| 200 | Fan speed | rpm | 1008 | 1008 | 1008 | 1008 | 1008 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 177.8 | 177.8 | 177.8 | 177.8 | 177.8 |
| | | inch | 7 | 7 | 7 | 7 | 7 |
| | Belt size | inch | B58(red) | B58(red) | B58(red) | B58(red) | B58(red) |
| | Motor (poles) | kW | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 300 | Fan speed | rpm | 1133 | 1190 | 1190 | 1190 | 1190 |
| | Pulley size (Motor side) | mm | 101.6 | 127 | 127 | 127 | 127 |
| | | inch | 4 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 127 | 152.4 | 152.4 | 152.4 | 152.4 |
| | | inch | 5 | 6 | 6 | 6 | 6 |
| | Belt size | inch | B54(red) | B57(red) | B57(red) | B57(red) | B57(red) |
| | Motor (poles) | kW | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 400 | Fan speed | rpm | 1307 | 1320 | 1320 | 1320 | 1320 |
| | Pulley size (Motor side) | mm | 127 | 139.7 | 139.7 | 139.7 | 139.7 |
| | | inch | 5 | 5.5 | 5.5 | 5.5 | 5.5 |
| | Pulley size (Fan side) | mm | 139.7 | 152.4 | 152.4 | 152.4 | 152.4 |
| | | inch | 5.5 | 6 | 6 | 6 | 6 |
| | Belt size | inch | B56(red) | B58(red) | B58(red) | B58(red) | B58(red) |
| | Motor (poles) | kW | 1.5 | 1.5 | 1.5 | 2.2 | 2.2 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 500 | Fan speed | rpm | 1450 | 1450 | 1450 | 1450 | 1450 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Belt size | inch | B55(red) | B55(red) | B55(red) | B55(red) | B55(red) |
| | Motor (poles) | kW | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 600 | Fan speed | rpm | 1609 | 1609 | 1609 | | |
| | Pulley size (Motor side) | mm | 139.7 | 139.7 | 139.7 | | |
| | | inch | 5.5 | 5.5 | 5.5 | | |
| | Pulley size (Fan side) | mm | 127 | 127 | 127 | | |
| | | inch | 5 | 5 | 5 | | |
| | Belt size | inch | B56(red) | B56(red) | B56(red) | | |
| | Motor (poles) | kW | 2.2 | 2.2 | 2.2 | | |
| | | – | 4 | 4 | 4 | | |

## PRH-P16MYA

※ ▭ factory pre setting

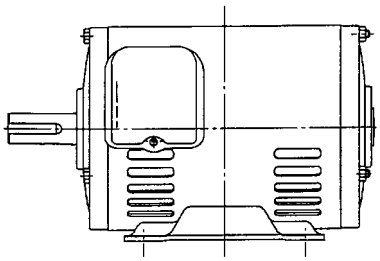


< fig. in the direction of the motor axis>

| Total SP (Pa) \ Air flow | | CMM | 112 | 120 | 140 | 160 | 168 |
|---|---|---|---|---|---|---|---|
| | | L/S | 1870 | 2000 | 2330 | 2670 | 2800 |
| 250 | Fan speed | rpm | 692 | 692 | 692 | 692 | 692 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 254 | 254 | 254 | 254 | 254 |
| | | inch | 10 | 10 | 10 | 10 | 10 |
| | Belt size | inch | B46(red) | B46(red) | B46(red) | B46(red) | B46(red) |
| | Motor (poles) | kW | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 350 | Fan speed | rpm | 844 | 844 | 844 | 844 | 844 |
| | Pulley size (Motor side) | mm | 152.4 | 152.4 | 152.4 | 152.4 | 152.4 |
| | | inch | 6 | 6 | 6 | 6 | 6 |
| | Pulley size (Fan side) | mm | 254 | 254 | 254 | 254 | 254 |
| | | inch | 10 | 10 | 10 | 10 | 10 |
| | Belt size | inch | B48(red) | B48(red) | B48(red) | B48(red) | B48(red) |
| | Motor (poles) | kW | 2.2 | 2.2 | 2.2 | 2.2 | 3.7 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 450 | Fan speed | rpm | 875 | 875 | 875 | 875 | 875 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 203.2 | 203.2 | 203.2 | 203.2 | 203.2 |
| | | inch | 8 | 8 | 8 | 8 | 8 |
| | Belt size | inch | B43(red) | B43(red) | B43(red) | B43(red) | B43(red) |
| | Motor (poles) | kW | 2.2 | 2.2 | 2.2 | 3.7 | 3.7 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 550 | Fan speed | rpm | 1067 | 1067 | 1067 | 1067 | 1067 |
| | Pulley size (Motor side) | mm | 152.4 | 152.4 | 152.4 | 152.4 | 152.4 |
| | | inch | 6 | 6 | 6 | 6 | 6 |
| | Pulley size (Fan side) | mm | 203.2 | 203.2 | 203.2 | 203.2 | 203.2 |
| | | inch | 8 | 8 | 8 | 8 | 8 |
| | Belt size | inch | B44(red) | B44(red) | B44(red) | B44(red) | B44(red) |
| | Motor (poles) | kW | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 650 | Fan speed | rpm | 1119 | 1119 | | | |
| | Pulley size (Motor side) | mm | 139.7 | 139.7 | | | |
| | | inch | 5.5 | 5.5 | | | |
| | Pulley size (Fan side) | mm | 177.8 | 177.8 | | | |
| | | inch | 7 | 7 | | | |
| | Belt size | inch | B42(red) | B42(red) | | | |
| | Motor (poles) | kW | 3.7 | 3.7 | | | |
| | | – | 4 | 4 | | | |

## PRH-P20MYA

※ ▭ factory pre setting

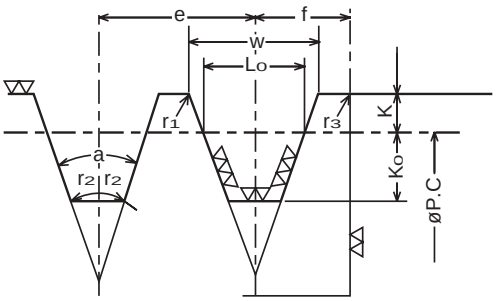


< fig. in the direction of the motor axis>

| Total SP (Pa) \ Air flow | | CMM | 144 | 160 | 180 | 200 | 216 |
|---|---|---|---|---|---|---|---|
| | | L/S | 2400 | 2670 | 3000 | 3330 | 3600 |
| 300 | Fan speed | rpm | 799 | 799 | 799 | 799 | 799 |
| | Pulley size (Motor side) | mm | 88.9 | 88.9 | 88.9 | 88.9 | 88.9 |
| | | inch | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| | Pulley size (Fan side) | mm | 152.4 | 152.4 | 152.4 | 152.4 | 152.4 |
| | | inch | 6 | 6 | 6 | 6 | 6 |
| | Belt size | inch | B37(red) | B37(red) | B37(red) | B37(red) | B37(red) |
| | Motor (poles) | kW | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 400 | Fan speed | rpm | 875 | 875 | 875 | 875 | 875 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 203.2 | 203.2 | 203.2 | 203.2 | 203.2 |
| | | inch | 8 | 8 | 8 | 8 | 8 |
| | Belt size | inch | B43(red) | B43(red) | B43(red) | B43(red) | B43(red) |
| | Motor (poles) | kW | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 500 | Fan speed | rpm | 1008 | 1008 | 1008 | 1008 | 1008 |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | 127 |
| | | inch | 5 | 5 | 5 | 5 | 5 |
| | Pulley size (Fan side) | mm | 177.8 | 177.8 | 177.8 | 177.8 | 177.8 |
| | | inch | 7 | 7 | 7 | 7 | 7 |
| | Belt size | inch | B41(red) | B41(red) | B41(red) | B41(red) | B41(red) |
| | Motor (poles) | kW | 3.7 | 3.7 | 5.5 | 5.5 | 5.5 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 600 | Fan speed | rpm | 1119 | 1119 | 1119 | 1119 | 1119 |
| | Pulley size (Motor side) | mm | 139.7 | 139.7 | 139.7 | 139.7 | 139.7 |
| | | inch | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| | Pulley size (Fan side) | mm | 177.8 | 177.8 | 177.8 | 177.8 | 177.8 |
| | | inch | 7 | 7 | 7 | 7 | 7 |
| | Belt size | inch | B42(red) | B42(red) | B42(red) | B42(red) | B42(red) |
| | Motor (poles) | kW | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| | | – | 4 | 4 | 4 | 4 | 4 |
| 700 | Fan speed | rpm | 1190 | 1190 | 1190 | 1190 | |
| | Pulley size (Motor side) | mm | 127 | 127 | 127 | 127 | |
| | | inch | 5 | 5 | 5 | 5 | |
| | Pulley size (Fan side) | mm | 152.4 | 152.4 | 152.4 | 152.4 | |
| | | inch | 6 | 6 | 6 | 6 | |
| | Belt size | inch | B40(red) | B40(red) | B40(red) | B40(red) | |
| | Motor (poles) | kW | 5.5 | 5.5 | 5.5 | 5.5 | |
| | | – | 4 | 4 | 4 | 4 | |

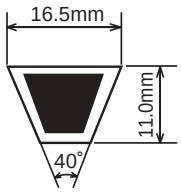
## Pulley outside dimensions are shown below: (Unit : mm)

(1) Shape of belt groove



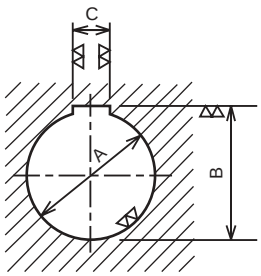

| Shape of V-belt | Nominal Dia. øP.C | a (°) | W | Lo | K | Ko | e | f | r1 | r2 | r3 | V-belt thickness (Reference) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | Over 125 Under 160 | 34 | 15.86 | 12.5 | 5.5 | 9.5 | 19.0 | 12.5 | 0.2~0.5 | 0.5~1.0 | 1~2 | 11 |
| | Over 160 Under 200 | 36 | 16.07 | | | | | | | | | |
| | Over 200 | 38 | 16.29 | | | | | | | | | |

Sectional plan of V-belt




B type

(2) Shape of motor pulley boss




| MOTOR CAPACITY (kW) | A | B | C |
|---|---|---|---|
| 1.1, 1.5 | $\phi 24^{+0.028}_{+0.007}$ | $27^{+0.128}_{+0.007}$ | $8^{+0.018}_{-0.018}$ |
| 2.2, 3.7 | $\phi 28^{+0.028}_{+0.007}$ | $31^{+0.128}_{+0.007}$ | $8^{+0.028}_{-0.013}$ |
| 5.5 | $\phi 38^{+0.028}_{+0.007}$ | $41^{+0.128}_{+0.009}$ | $10^{+0.028}_{-0.013}$ |

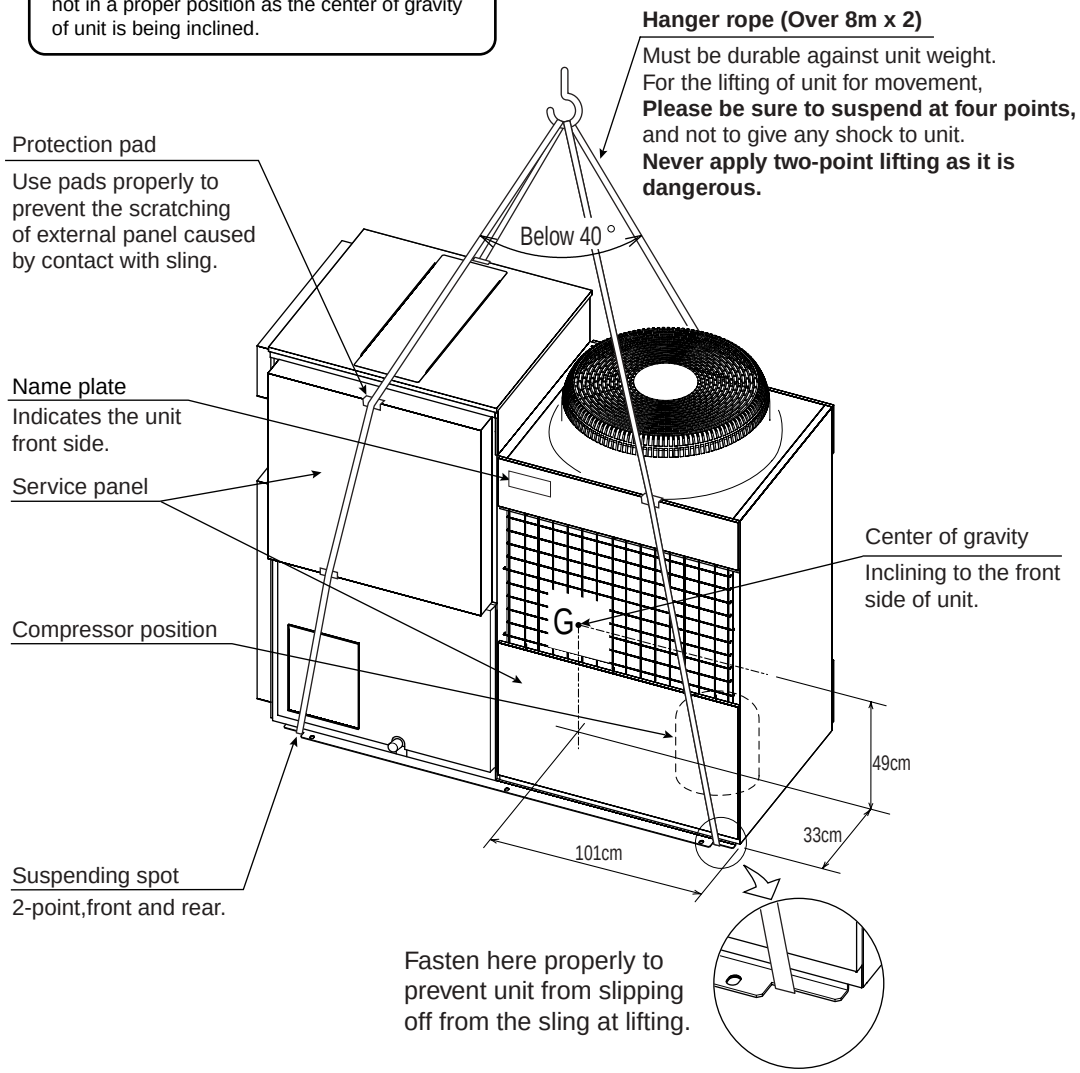
## [9] Center of Gravity

### (1) Caution for Lifting

**⚠ Warning**

Lift unit slowly by suspending rope uniformly so that the rope will not slip off or unit will not incline seriously.

Be careful that unit may fall down if the rope is not in a proper position as the center of gravity of unit is being inclined.




| Item / Model name | Net weight (kg) |
|---|---|
| PRH-P8MYA | 407 |
| PRH-P10MYA | 412 |

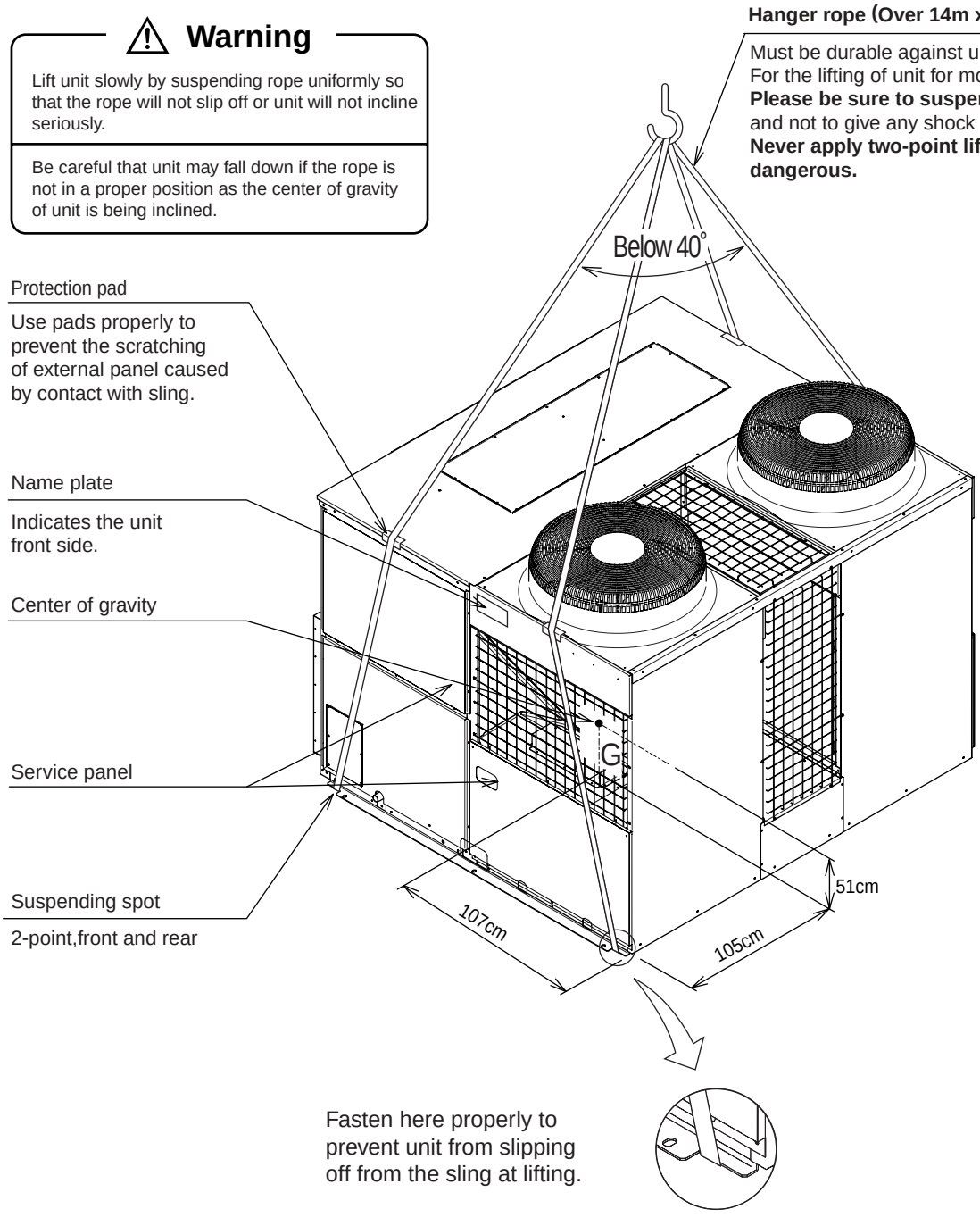
## ⚠ Warning

Lift unit slowly by suspending rope uniformly so that the rope will not slip off or unit will not incline seriously.

Be careful that unit may fall down if the rope is not in a proper position as the center of gravity of unit is being inclined.

**Hanger rope (Over 14m x 2)**

Must be durable against unit weight.
For the lifting of unit for movement,
**Please be sure to suspend at four points,**
and not to give any shock to unit.
**Never apply two-point lifting as it is dangerous.**




Fasten here properly to prevent unit from slipping off from the sling at lifting.

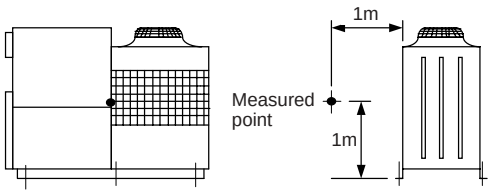


| Item / Model name | Net weight (kg) |
|---|---|
| PRH-P16MYA | 857 |
| PRH-P20MYA | 872 |

## [10] NC Curve

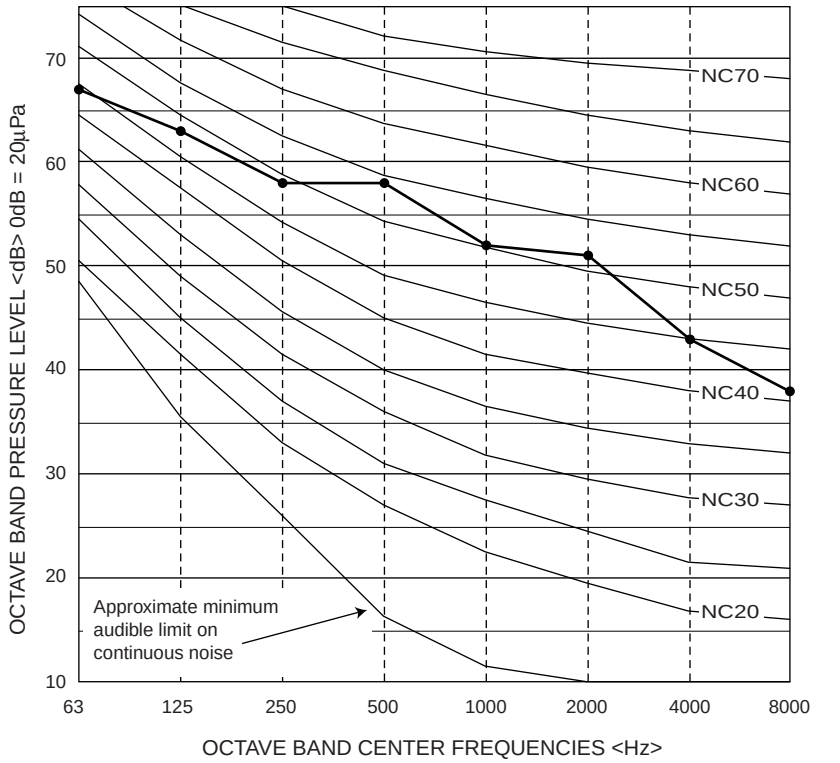
### PRH-P8MYA

Measurement condition



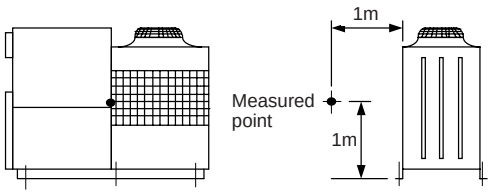

| 63Hz | 125Hz | 250Hz | 500Hz | 1000Hz | 2000Hz | 4000Hz | 8000Hz | A characteristics |
|---|---|---|---|---|---|---|---|---|
| 67 | 63 | 58 | 58 | 52 | 51 | 43 | 38 | 59 |

(dB)



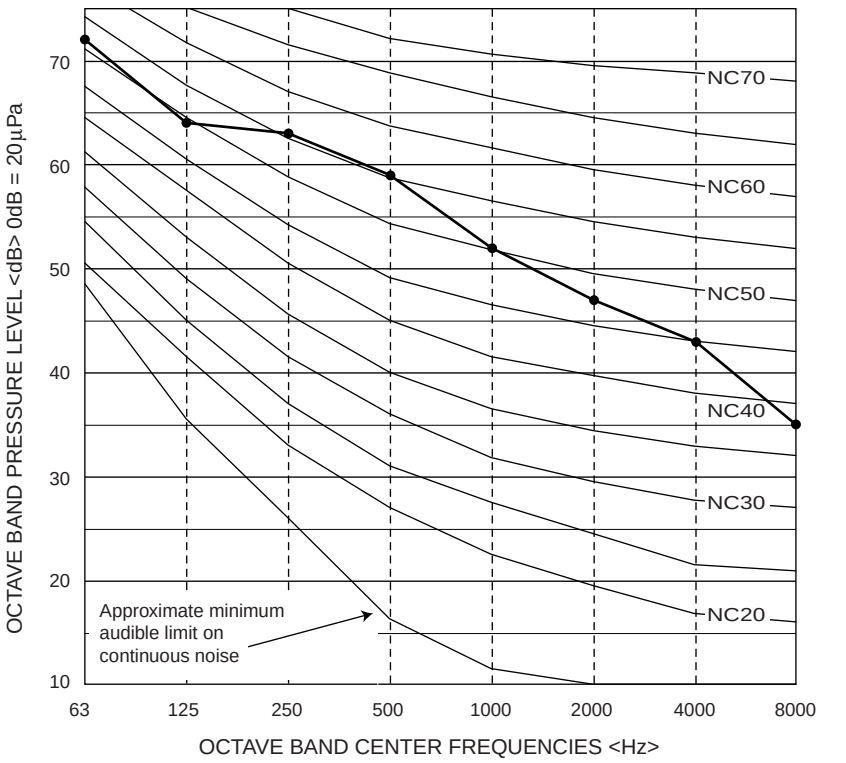

### PRH-P10MYA

Measurement condition



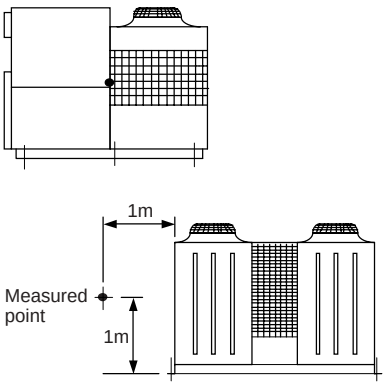

| 63Hz | 125Hz | 250Hz | 500Hz | 1000Hz | 2000Hz | 4000Hz | 8000Hz | A characteristics |
|---|---|---|---|---|---|---|---|---|
| 72 | 64 | 63 | 59 | 52 | 47 | 43 | 35 | 60 |

(dB)



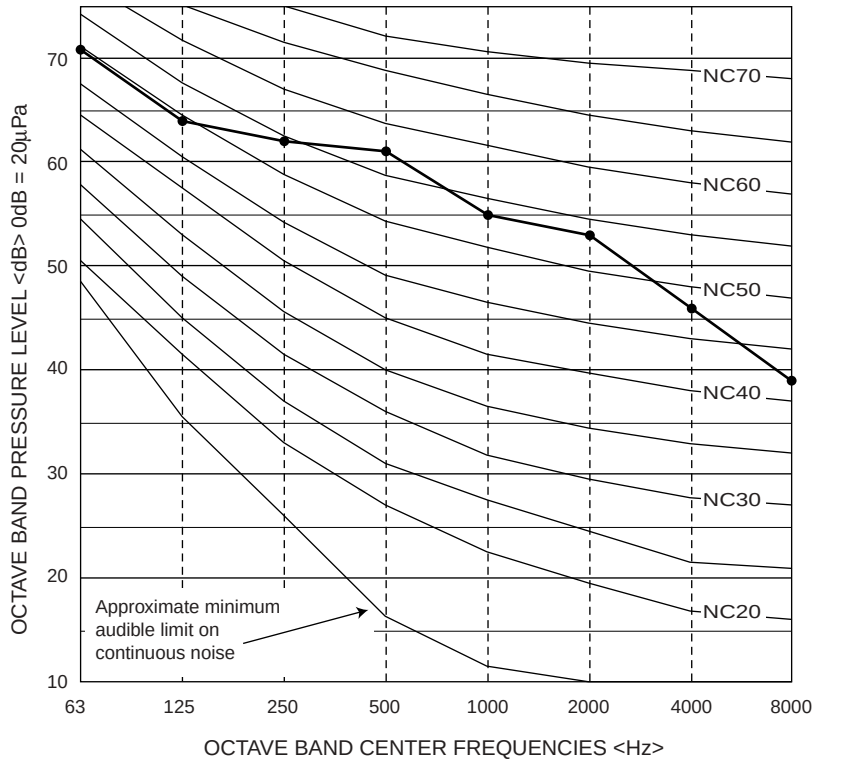
## PRH-P16MYA

Measurement condition



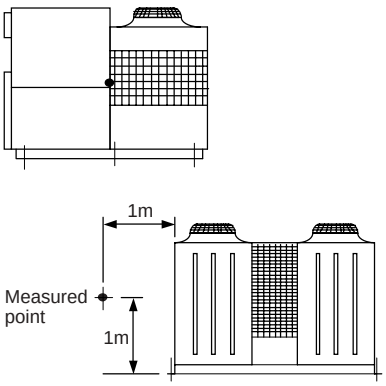

| 63Hz | 125Hz | 250Hz | 500Hz | 1000Hz | 2000Hz | 4000Hz | 8000Hz | A characteristics |
|---|---|---|---|---|---|---|---|---|
| 71 | 64 | 62 | 61 | 55 | 53 | 46 | 39 | 62 |

(dB)



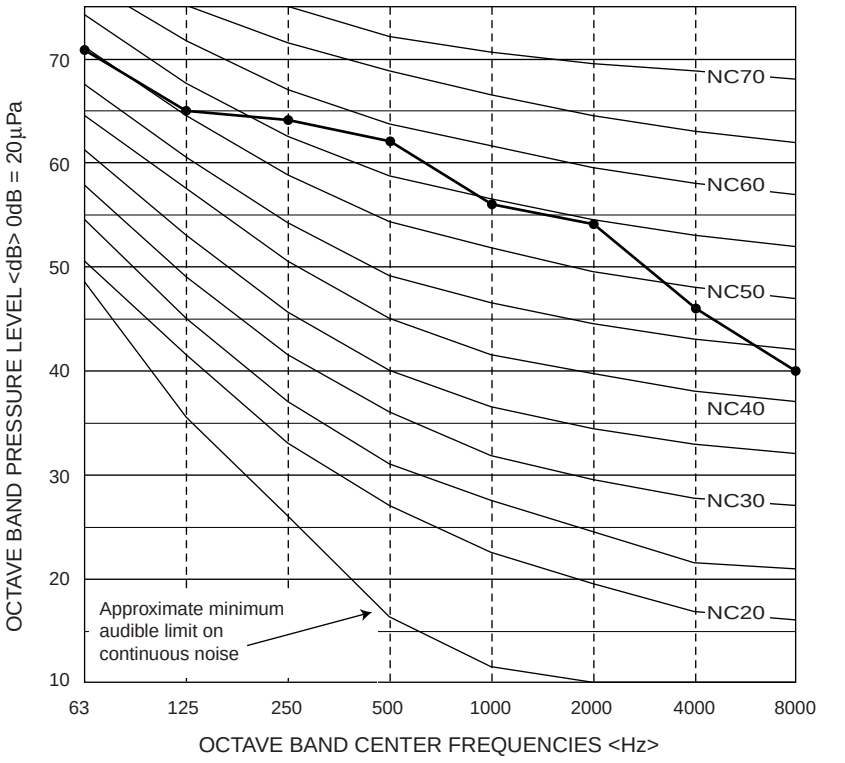

## PRH-P20MYA

Measurement condition




| 63Hz | 125Hz | 250Hz | 500Hz | 1000Hz | 2000Hz | 4000Hz | 8000Hz | A characteristics |
|---|---|---|---|---|---|---|---|---|
| 71 | 65 | 64 | 62 | 56 | 54 | 46 | 40 | 63 |

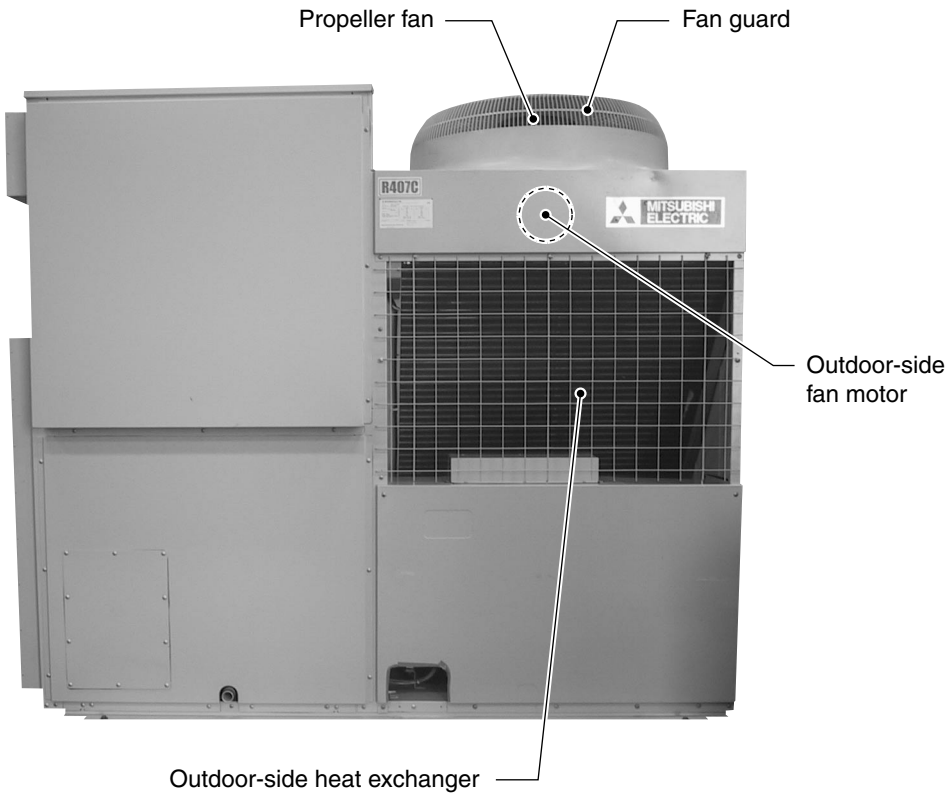
(dB)



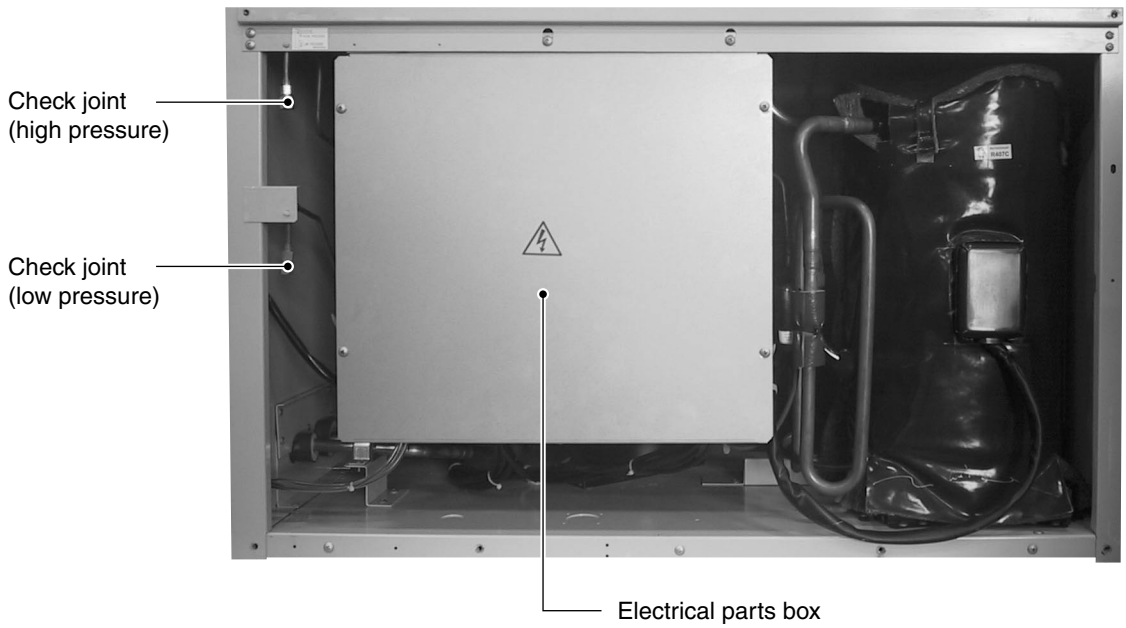
# 11 SERVICE DATA

## [1] Appearance of Equipment

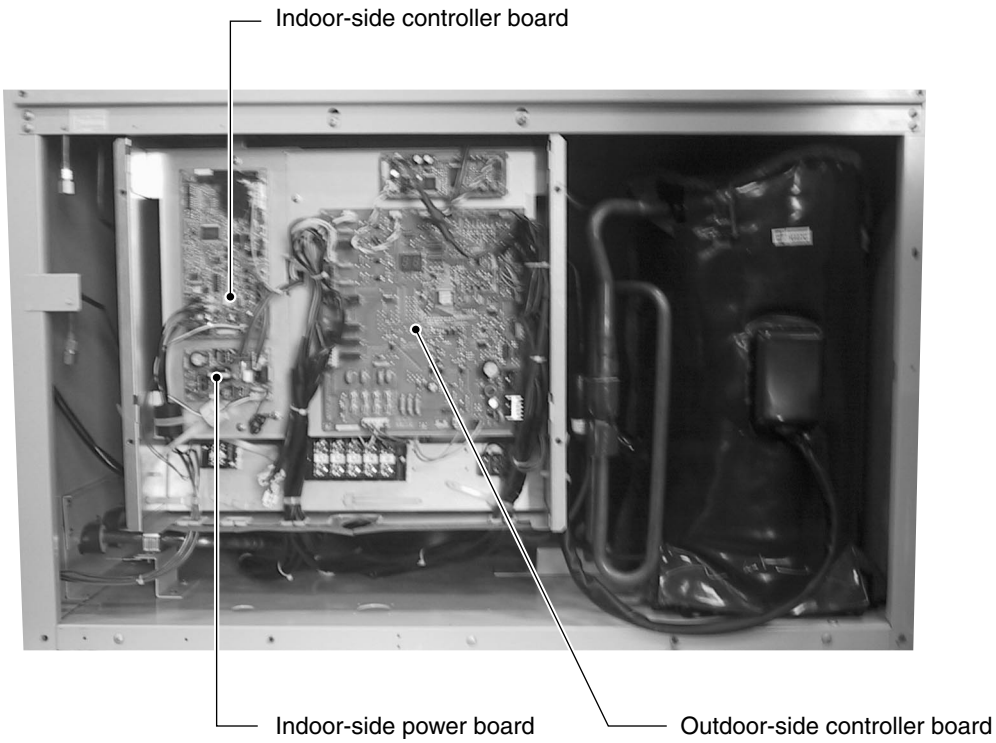
- **PRH-P8MYA/P10MYA/P16MYA/P20MYA unit**



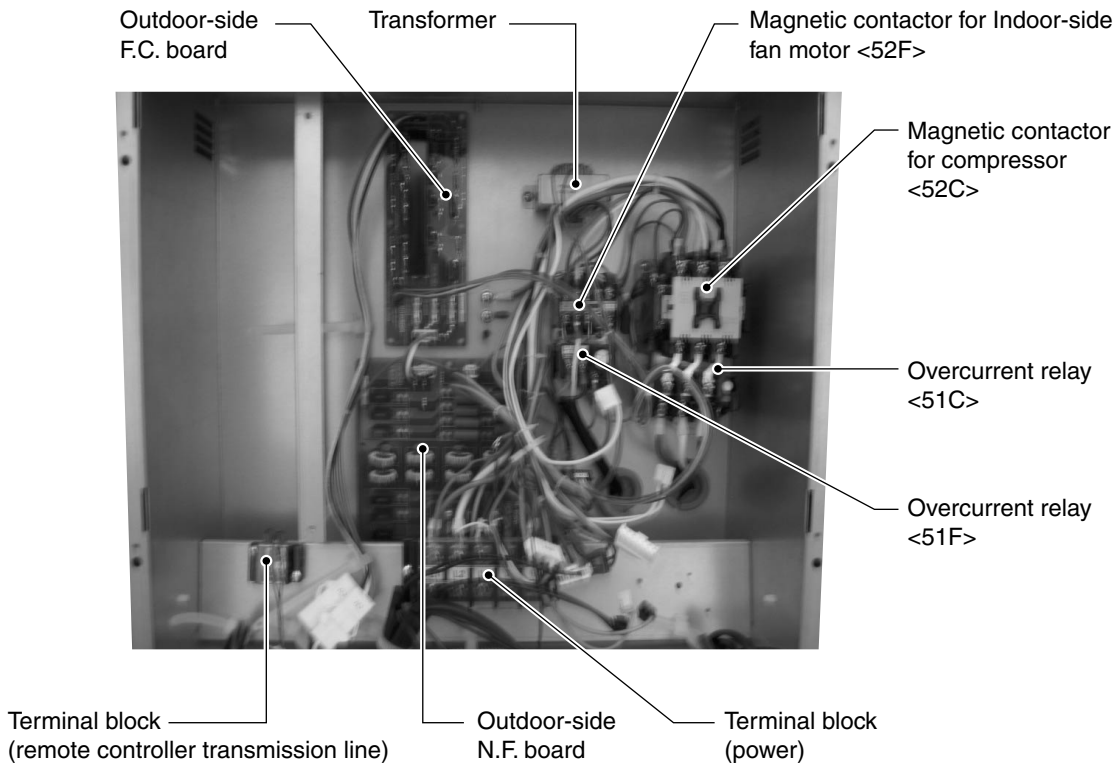

- **PRH-P8MYA/P10MYA/P16MYA/P20MYA (with cover removed)**



• **PRH-P8MYA/P10MYA/P16MYA/P20MYA (with cover removed)**

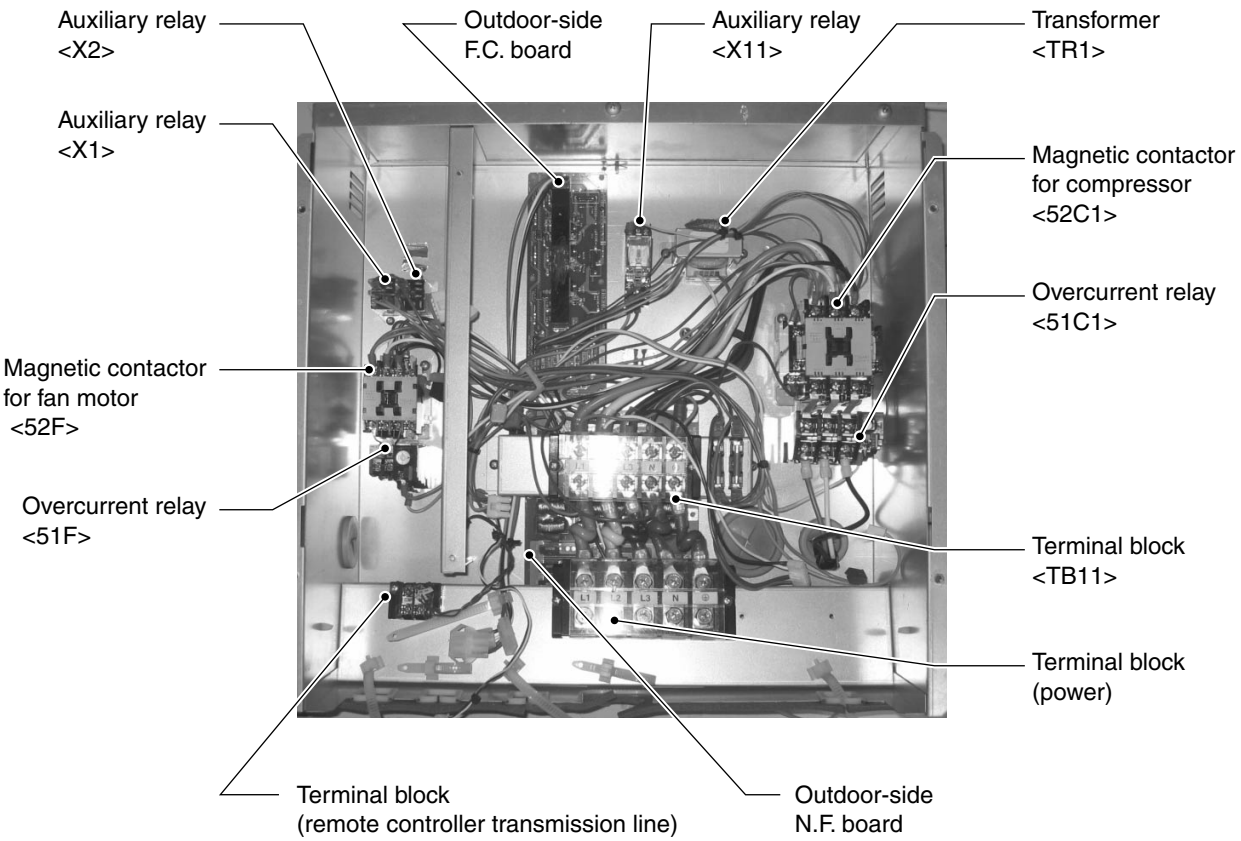



• **PRH-P8MYA/P10MYA (with Main Board Panel removed)**



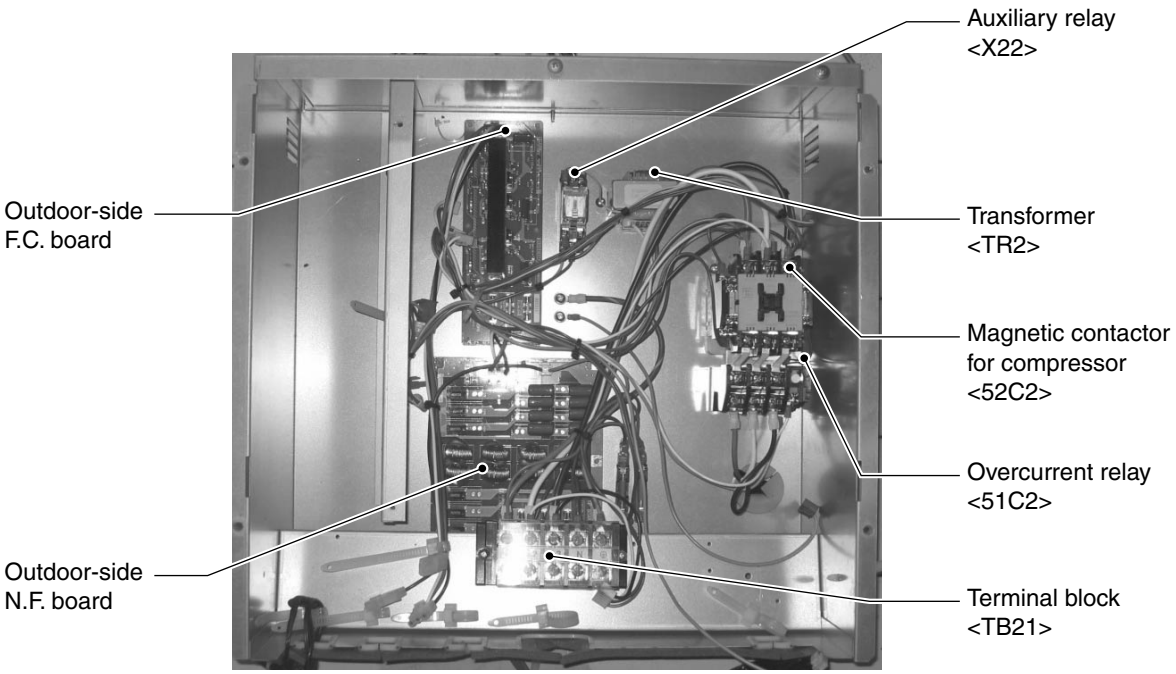
• **PRH-P16MYA/P20MYA (with Main Board Panel removed)**

**No.1 side**

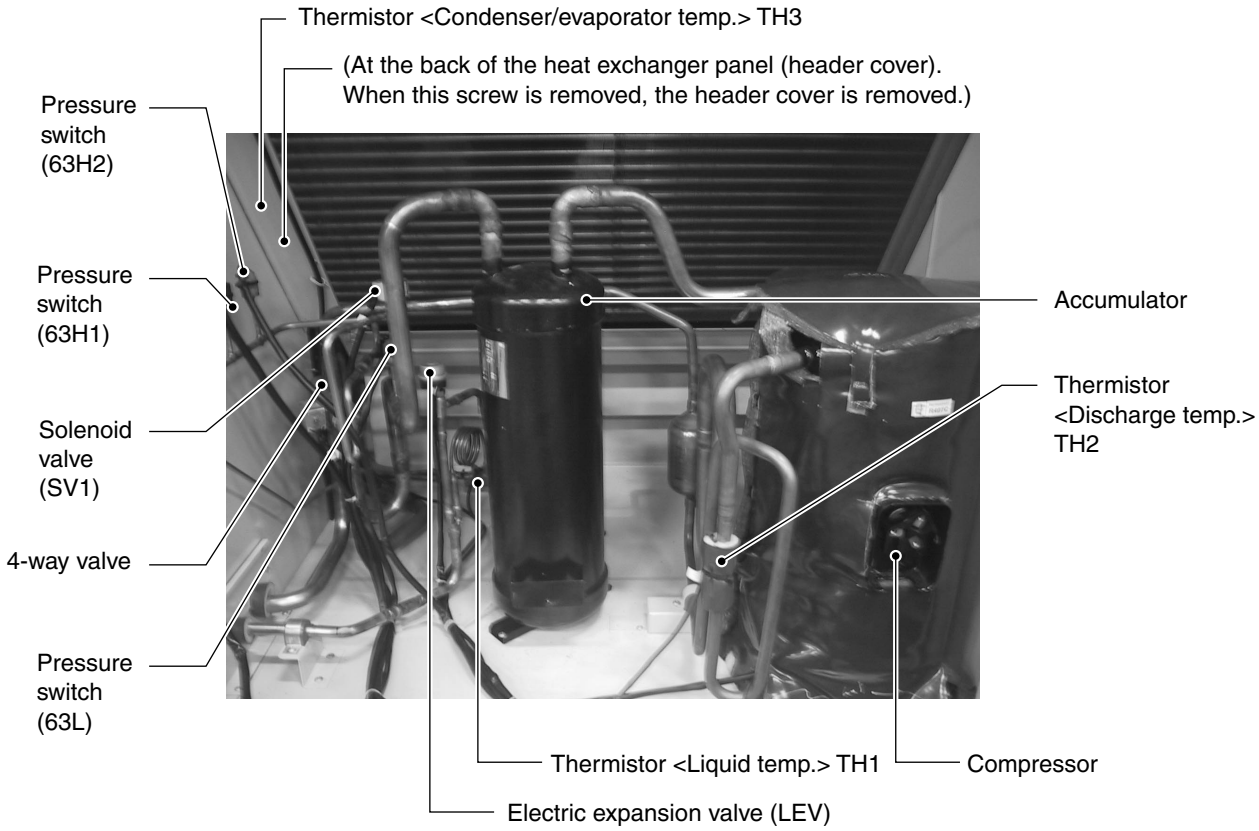



• **PRH-P16MYA/P20MYA (with Main Board Panel removed)**

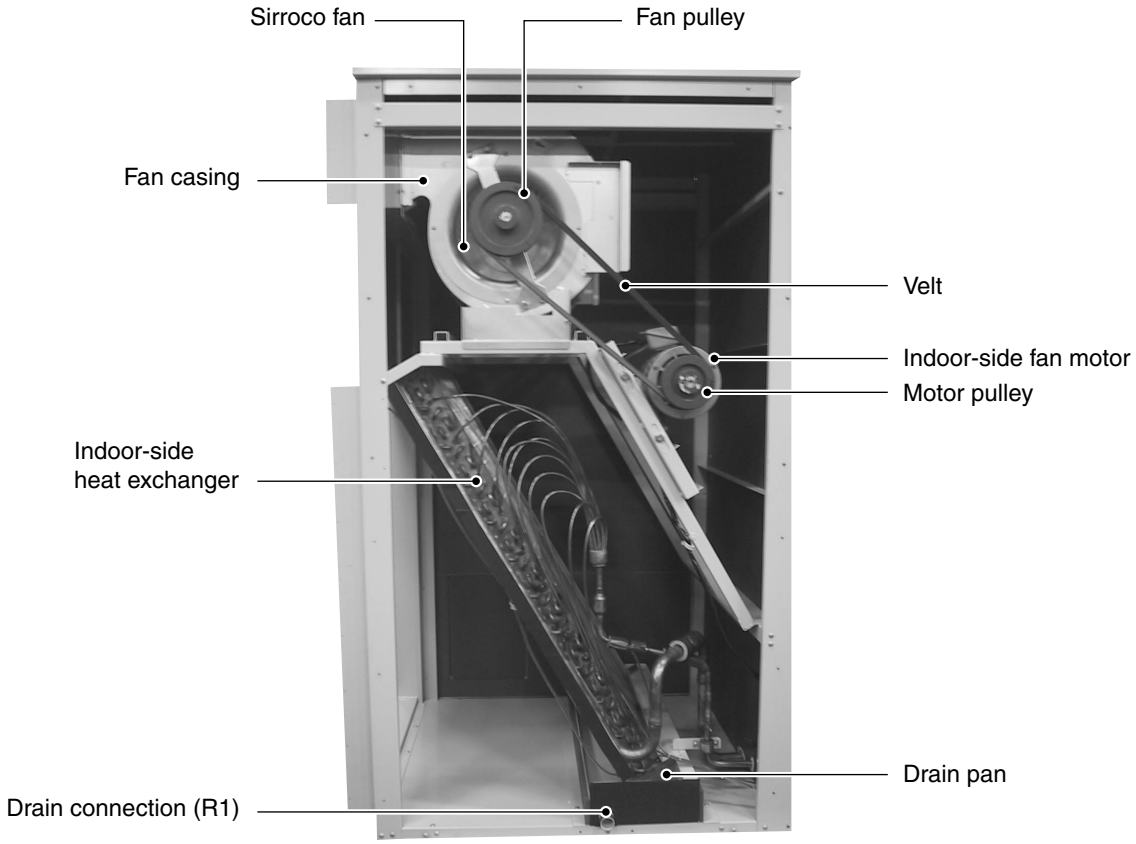
**No.2 side**



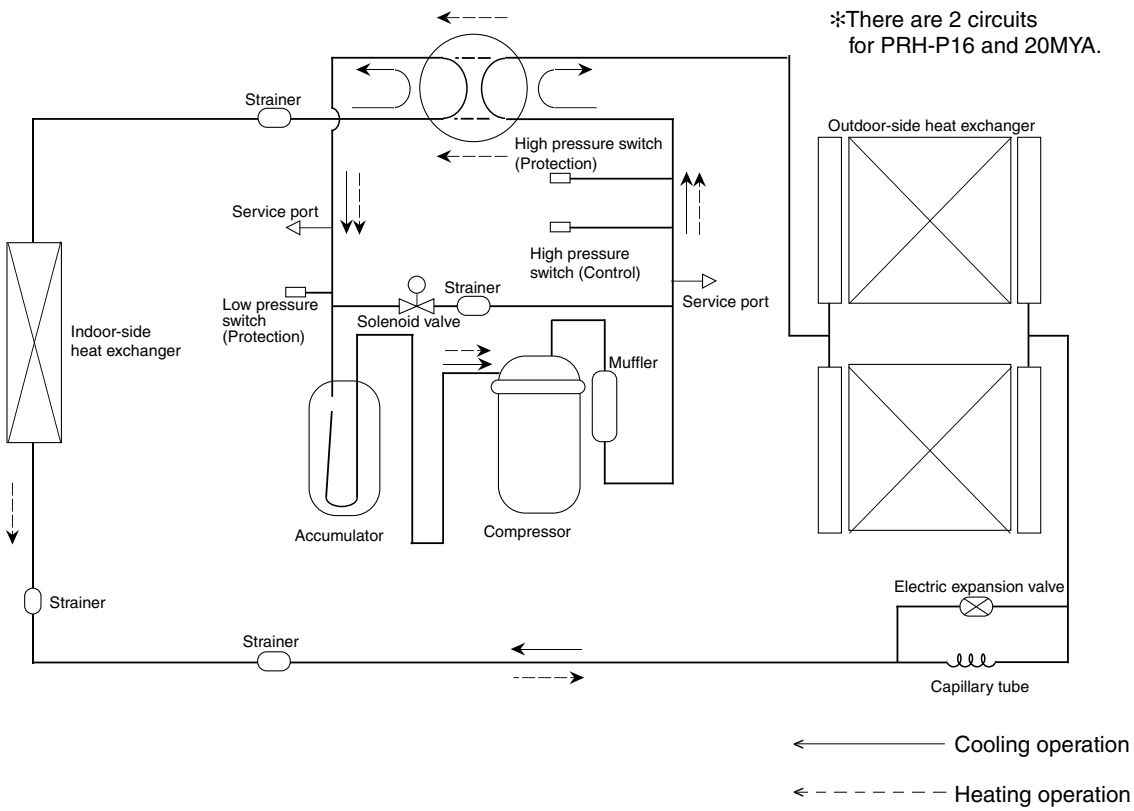
• **PRH-P8MYA/P10MYA/P16MYA/P20MYA (Detail of outdoor-side machine room)**




• **PRH-P8MYA/P10MYA/P16MYA/P20MYA (Detail of indoor-side machine room)**



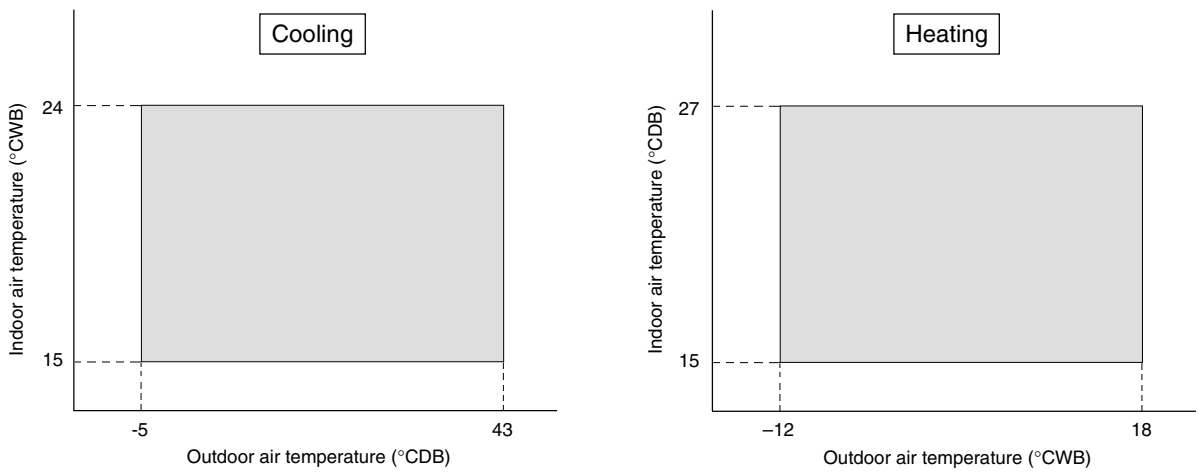
## [2] Refrigerant Circuit




## [3] Refrigerant Charge

| Model | Amount of infusion of coolant at ex-factory |
|---|---|
| PRH-P8MYA | R407C 7.7 kg |
| PRH-P10MYA | R407C 8.2 kg |
| PRH-P16MYA | R407C 7.7 kg x 2 |
| PRH-P20MYA | R407C 8.2 kg x 2 |

## [4] Operation Range



## [5] Safety & Control Devices

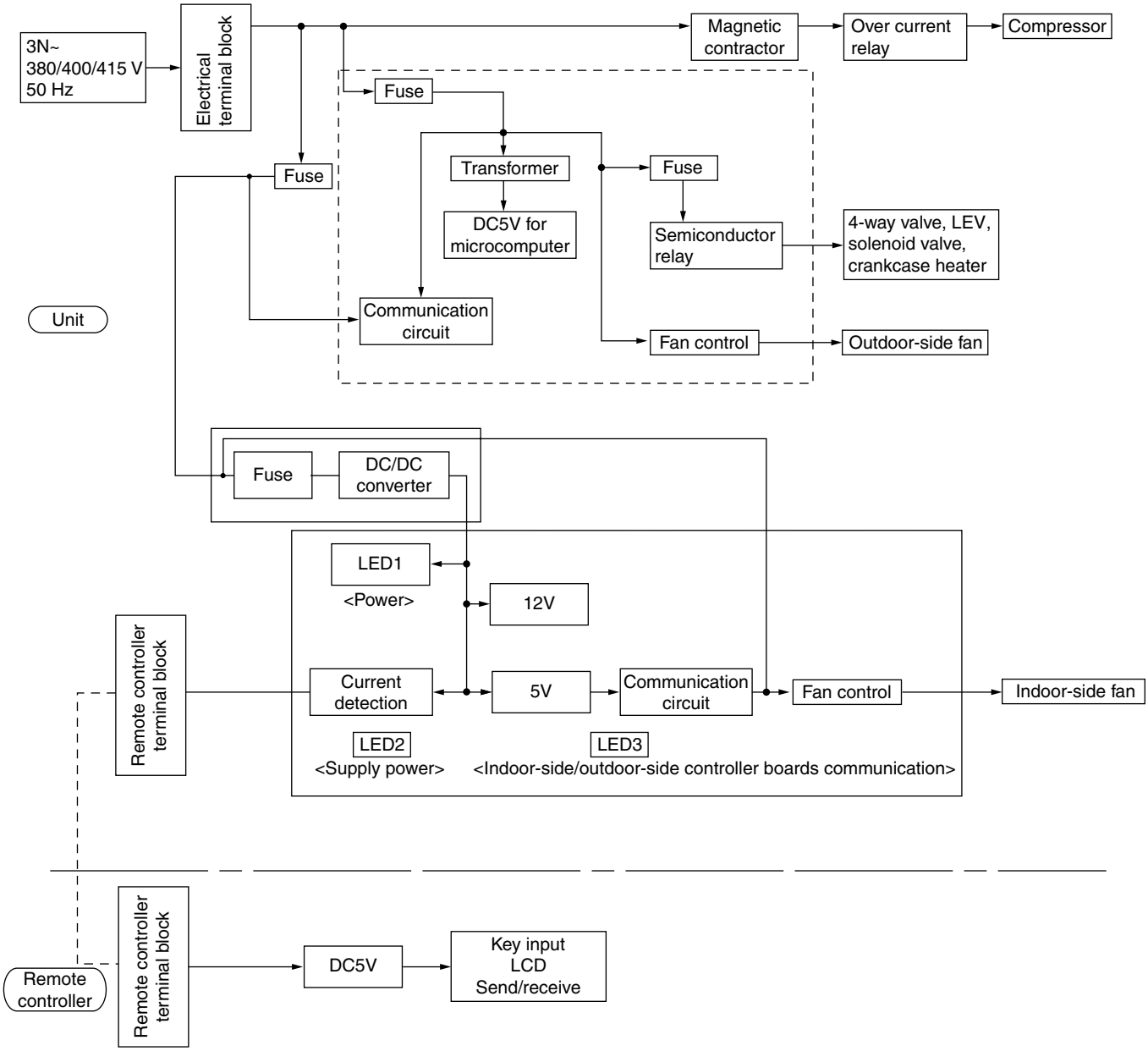
| ITEM | | PRH-P8MYA | PRH-P10MYA | PRH-P16MYA | PRH-P20MYA |
|---|---|---|---|---|---|
| Compressor over current relay | 51C | 22A | 27A | 22A | 27A |
| High pressure switch | 63H1 | 3.3MPa OFF | | | |
| Indoor-side fan motor over current relay | 51F | 2.8A | 3.6A | 5.0A | 7.5A |
| Outdoor-side fan motor internal thermostat | 49F | 135 ˚C OFF | | | |
| Fuse (Outdoor-side controller board)<br>(N.F. board)<br>(F.C. board) | F | 6.3A | | | |
| Fuse | F1, F2 | 15A | | | |
| Fuse (Indoor-side power board) | F1 | 4A | | | |

# 12 CONTROL

## [1] Composition of Control

### 1. Function block diagram

∗1: For each refrigerant circuit



## [2] Control specifications

### (1) Protection functions

1) The main protection devices for the unit are:
   a) High pressure protection (63H1)
   b) Compressor overcurrent protection (51C)
   c) Liquid temp thermistor trouble (TH1)
   d) Discharge temperature protection (TH2 ≥118 °C)
   e) Discharge temp thermistor trouble (TH2)
   f) Condenser/evaporater temp thermistor trouble (TH3)
   g) Low pressure protection (63L)
   h) Inlet temp thermistor trouble (TH4)
   i) Liquid temp thermistor trouble (TH5)
   j) Condenser/evaporater temp thermistor trouble (TH6)

2) When tripping of a detection device is sensed, the check mode is entered and the compressor is stopped. (After 3 minutes, the compressor restarts.) Thereafter, the compressor is stopped when the specified number of check modes or greater is sensed within the check time.

| Protection functions | Operation value | Detection condition | Number of check modes | Check time |
|---|---|---|---|---|
| a) High pressure protection (63H1) | 3.3 MPa | Compressor operating | 0 | – |
| b) Compressor overcurrent protection (51C) | P8MYA: 22 A<br>P10MYA: 27 A | Compressor operating | 1 time | 30 minutes |
| c) Liquid temp thermistor trouble (TH1) | Less than –39 °C or greater than 88 °C | Compressor operating except for 10 minutes at end of defrosting and 7 minutes while compressor starting | 2 times | 30 minutes |
| d) Discharge temperature protection (TH2 ≧ 118 °C) | Greater than 118 °C | Compressor operating | 2 times | 30 minutes |
| e) Discharge temp thermistor trouble (TH2) | Less than 0 °C or greater than 216 °C | Compressor operating except for 10 minutes at end of defrosting and 5 minutes while compressor starting | 2 times | 30 minutes |
| f) Condenser/evaporater temp thermistor trouble (TH3) | Less than –39 °C or greater than 88 °C | Compressor operating except for 10 minutes at end of defrosting and 7 minutes while compressor starting | 2 times | 30 minutes |
| g) Low pressure protection (63L) | 0 MPa | Compressor operating except for defrosting, 10 minutes at end of defrosting | 4 times | 30 minutes |
| h) Inlet temp thermistor trouble (TH4) | Less than –40 °C or greater than 90 °C | Cooling, heating operating | 1 time | 3 minutes |
| i) Liquid temp thermistor trouble (TH5) | Less than –40 °C or greater than 90 °C | Cooling, heating operating | 1 time | 3 minutes |
| j) Condenser/evaporater temp thermistor trouble (TH6) | Less than –40 °C or greater than 90 °C | Cooling, heating operating | 1 time | 3 minutes |

3) Check mode is released by stopping operation, changing the operation mode, or check mode time up. A check mode is also released by stopping of operation by remote controller.
4) Detected check mode history (newest) and abnormality history (last 2 times) are memorized and are displayed on the segment by circuit board DIP switch setting.
   The operation mode when the newest abnormality was generated, the thermistor temperature (TH1,2,3), and the thermostat ON time can also be displayed.

**(2) Compressor, 4-way valve, and crankcase heater control**

1) Determines the operation mode and operates the compressor based on the indoor/outdoor communication or M-NET communication data.
2) Compressor control has a function which prevents the compressor from restarting within 3 minutes.
3) The 4-way valve is always ON during heating (except during defrosting). In other modes, it is OFF. However, when the operation mode was changed from heating to stop, the 4-way valve is turned off 10 minutes after the compressor was stopped.
4) While the compressor is stopped, the crankcase heater remains ON. (OFF while the compressor is operating.)
5) When the operation mode is changed while the compressor is operating, the compressor stops and 3 minutes later restarts in the new mode.

**(3) Fan control**

Controls the fan speed based on the piping temperature (TH1) to perform cooling at low outdoor temperatures and heating at high outdoor temperatures.

1) Control at cooling
   a) When the compressor stops, the fan stops (fan output=0%).
   b) When the power is turned on, or when the compressor is restated after it has been stopped for 30 minutes or longer, the piping temperature ( TH1) determines the fan output.
      When TH ≤ 25˚C  Fan output = 100 %
      When TH < 25˚C  Fan output = 60 %
   c) When the compressor is restarted within 30 minutes after it has been stopped, the fan step before the compressor was stopped is selected. However, when the fan output was under 30% when the fan was stopped, 30% is selected.
   d) When the mode was changed from heating to cooling, the fan step conforms to item 2.
   e) Two minutes after the fan is started, the fan step (number of units) is controlled every 30 seconds based on the piping temperature (TH1).
   f) When TH1 reaches 50˚C or higher, or when the control high pressure switch (63H2) tripped, the fan output becomes 100%.
   g) Fan output while the compressor is operating is within the 20% to 100% range.
      • FAN step
      The following expression determines the next fan step count nj+1:
      nj + 1 = nj + Δnj  nj: Current fan step, Δnj: Displacement step amount
      nj control
      • If nj + 1 ≥ 100%  nj + 1 = 100%
      • If nj + 1 ≥ 20%  nj + 1 = 20%
      • If TH1 ≥ 50 °C or 63H2 is "OFF"  nj + 1=100%

FAN Δnj  Outputs are all %.

| Target condensation temperature 31 °C | | 20 ˚C Condensation temperature TH1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | t > 49 °C | t = 49 ≀ t > 46 | t = 46 ≀ t > 43 | t = 43 ≀ t > 40 | t = 40 ≀ t > 36 | t = 36 ≀ t > 33 | t = 33 ≀ t > 29 | t = 29 ≀ t > 26 | t = 26 ≀ t > 23 | t = 23 ≀ t > 20 | t≤ 20 ˚C |
| Current output | 20 ≤ nj < 50 | 5 | 3 | 2 | 2 | 2 | 2 | 0 | –2 | –2 | –3 | –5 |
| | 50 ≤ nj ≤ 100 | 10 | 4 | 3 | 2 | 2 | 2 | 0 | –2 | –2 | –4 | –10 |

* In the night mode, the maximum value of nj is 80%. (When TH1 < 50˚C)

2) Control at heating

a) When the compressor is stopped and during defrosting, the fan is stopped.

b) When the power is turned on, or when the compressor is restarted after being stopped for 30 minutes or longer, the piping temperature (TH1) determines the fan step.

TH1 > 8˚C Fan output = 60%

TH1 ≤ 8˚C Fan output = 100%

c) When the compressor is restarted within 30 minutes, the fan step is the step before the compressor was stopped.

d) When the mode is changed from cooling to heating, the fan step conforms to item b).

e) When returning from defrosting, the fan step is the step before defrosting.

f) Two minutes after the fan was restarted, the fan step is controlled every 30 seconds based on the piping temperature (TH1).

g) When TH1 is –5˚C or lower, the fan output is made 100%.

• FAN step

The following expression determines the next fan step count nj + 1:

nj + 1 = nj + Δnj nj: Current fan step, Δnj: Displacement step amount

nj control

• If nj + 1 ≤ 100% nj + 1 = 100%

• If nj + 1 ≤ 20% nj + 1 = 20%

• If TH1 < –5 °C nj + 1=100%

FAN Δnj Outputs are all %.

| Target evaporation temperature 10 °C | | Evaporation temperature TH1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T > 19 °C | T = 19 ≀ T > 17 | T = 17 ≀ T > 15 | T = 15 ≀ T > 13 | T = 13 ≀ T > 11 | T = 11 ≀ T > 8 | T = 8 ≀ T > 6 | T = 6 ≀ T > 4 | T = 4 ≀ T > 2 | T = 2 ≀ T > 0 | T≤ 0˚C |
| Current output | 20 ≤ nj + 1 ≤ 100 | –10 | –4 | –3 | –2 | –2 | 0 | 2 | 2 | 3 | 4 | 10 |

**(4) Defrosting control**

1) When the following conditions are satisfied, defrosting starts:

a) When the integrated compressor operation time has exceeded $T_1$ (initial setting 50 minutes) and the piping temperature (TH1) is below –10˚C

b) When the integrated compressor ˚C

Piping differential temperature $\Delta TH1 = \underline{TH10} - \underline{TH1}$

TH1: Current piping temperature

TH10: Piping temperature 10 minutes after starting or 10 minutes after returning from defrosting

2) The defrosting prohibit time $T_1$ is set as following based on the defrosting time $T_2$:

| | |
|---|---|
| $T_2 \leq 3$ (minutes) | $T_1$ 60 (minutes) |
| $3 < T_2 < 15$ | 40 |
| $T_2 = 15$ | 30 |

Note: $T_1$ is reset at the end of defrosting, or by cooling ON command.

Note: When the compressor was stopped during defrosting, $T_1$ = 20 minutes is set to recognize the stop as defrosting end.

3) During defrosting, all the outdoor fans are stopped and the bypass solenoid valve (SV1) is turned ON and the 4-way valve (21S4) is turned OFF.

4) When the following conditions are satisfied, defrosting ends:

a) $T_2 \leq 2$ mins TH1 ≤ 30°C

b) $2 < T_2 < 15$ minutes TH1 ≤ 8°C continuous 2 minutes

c) $T_2$ =15 minutes

5) When the fan and 4-way valve (21S4) are turned ON at the end of defrosting, the heating mode is reset. Two minutes after defrosting reset, the bypass solenoid valve (SV1) turns OFF.

**(5) Bypass solenoid valve control (SV1)**

1) Control at cooling
   a) While the compressor is stopped, the solenoid valve is OFF.
   b) When the power is turned on, or when the compressor is restarted after it has been stopped for 30 minutes or longer, if the liquid temperature (TH1) is 25˚C or higher then the solenoid valve turns ON for 2 minutes.
   c) When the power is turned on, or when the compressor restarted after it has been stopped for 30 minutes or longer, the solenoid valve turns ON for 5 minutes if the liquid temperature (TH1) is staying below 25˚C.
   d) The item b) or c) is applied to the mode change from heating to cooling.
   e) When the previous operation mode is cooling and the compressor restarted within 30 minutes after it's stopping by the tripping of 63H2, the solenoid valve turns ON for 2 minutes.
2) Control at heating
   a) While the compressor is stopped, the solenoid valve is OFF.
   b) When the power is turned on, or when the compressor restarted after it has been stopped for 30 minutes or longer, the solenoid valve turns ON for 2 minutes if the liquid temperature (TH1) is staying above 8˚C.
   c) When the power is turned on, or when the compressor restarted after it has been stopped for 30 minutes or longer, the solenoid valve turns ON for 5 minutes if the liquid temperature (TH1) is staying below 8˚C.
   d) The item b) or c) is applied to the mode change from cooling to heating.
   e) When the control pressure switch (63H2) trips, the solenoid valve turns ON.
   f) If 63H2 resets 15 minutes after tripping, the solenoid valve turns OFF.
   g) During defrosting, the solenoid valve turns ON.
   h) When the previous operation mode is heating and the compressor restarted within 30 minutes after it's stopping by the tripping of 63H2, the solenoid valve turns ON for 2 minutes.
   i) When the previous operation mode is heating, and the compressor restarted within 30 minutes after the tripping of 63L, the solenoid valve turns ON for 2 minutes.

**(6) Electronic expansion valve (LEV)**

1) Initial processing after power turned on
   After the power is turned on, full close processing is performed as initial drive processing.
   a) A 2200 pulses down is output from power on.
   b) At the end of 2200 pulse down output, 60 pulses up is output.
   c) Sixty pulses up output ends initial processing. At this point, the valves are fully closed.
2) Control contents

| | LEV output opening angle | Opening angle control range |
|---|---|---|
| At compressor starting | Initial opening angle | Approx. 1000 to 2000 pulses |
| At compressor stopping | 1000 pulses | – |
| At defrosting | 2000 pulses (full close) | – |
| Normal | See next item | 1000 to 1500 pulses |

3) Normal LEV control
   a) The operation frequency when the compressor is started (including after defrosting reset) determines the standard opening angle.
   b) After a) above, sub cool (SC) shown below controls the LEV opening angle.
      <Definition of SC>
      Cooling: SC = TH3 (outdoor-side refrigerant circuit)-TH1 (outdoor-side refrigerant circuit)
      Heating: SC = TH5 (indoor-side refrigerant circuit)-TH2 (indoor-side refrigerant circuit)
      <LEV control>
      LEV is controlled so that SC is equal to SCm.
      SC < SCm: LEV opening angle is made smaller
      SC > SCm: LEV opening angle is made larger
      SC = SCm: LEV opening angle remains unchanged
      SCm = 5~15 (SCm is different with Indoor-side.)
4) Transient LEV control
   a) When the outlet temperature (outdoor-side TH2) rises
      When the outlet temperature (outdoor-side TH2) exceeds 115 °C, the LEV opening angle is made larger.

**(7) Service functions**

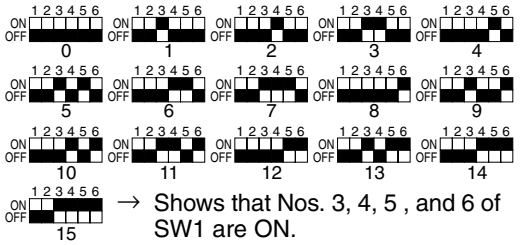
1) Abnormality history clear
   a) When DIP SW1-2 is turned ON while the compressor is operating or stopped, the abnormality history is cleared.

## [3] Function of switches and connectors (outdoor-side)

### (1) Function of switches

1) Function of switches

(Normal mode)

| Kind of switch | Switch | Pole | Function | Normal mode<br>SW3 = Unrelated<br>Operation by switch operation<br>ON | <br><br>OFF | Switch effective timing |
|---|---|---|---|---|---|---|
| DIP SW | SW1<br>CN33<br>When open<br>(Normal) | 1 | None | – | – | – |
| | | 2 | Abnormality history clear | Clear | Normal | Running or stopped |
| | | 3<br>4<br>5<br>6 | Refrigerant system address setting |  | | When power turned on |
| | SW2 | 1<br>2<br>3<br>4<br>5<br>6 | Self diagnosis | See pages 47 to 52. | | Running or stopped |
| Tact SW | SW3 | | Mode input register | Register | Normal | stopped |
| DIP SW | SW4 | 1 | Trial run | Operate | Stop | stopped*1 |
| | | 2 | Trial run mode switching | Heat | Cool | stopped |
| DIP SW | SW5 | 1 | Inlet temp. re-reading | Do | Do not | – |
| | | 2 | 3-phase power source detection | Do not | Do | When power turned on |
| | | 3 | Cooling only switching | Cooling only | Heat pump | When power turned on |
| | | 4 | Model setting | PRH-P10MYA<br>PRH-P20MYA | PRH-P8MYA<br>PRH-P16MYA | |

2) Switch functions at set mode change

| Kind of switch | Switch | Pole | Function | Set input mode<br>CN33 = short SW3 = ON*2<br>Operation by switch operation<br>ON | <br><br>OFF | Switch effective timing |
|---|---|---|---|---|---|---|
| DIP SW | SW1<br>When CN33 shorted<br>(mode switching) | 1<br>2 | None | – | – | – |
| | | 3 | Night mode | Night mode | Normal mode | stopped |
| | | 4 | Defrosting end switching | 12 °C continuous 2 minutes | 8 °C continuous 2 minutes | stopped |
| | | 5 | Defrosting prohibit time switching | Fixed | Training | stopped |
| | | 6 | None | – | – | – |

Remarks

*1 Trial run performs trail run processing by input change while stopped. (For details, see the trail run section)

*2 Mode input is entered by SW3 OFF→ON change (___↑). Press and hold down SW3 for about 2 seconds. The set mode can be registered according to the outdoor unit setting information on page 37.

Note: After changing the mode by CN33 shorting (mode switching), return to the normal mode by opening CN33.

3) Connector function assignment

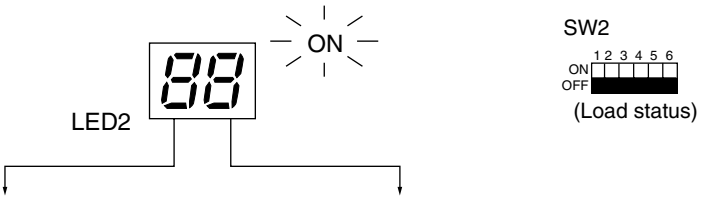
| Type | Connector | Function | Operation by open/short<br>short | <br>open | Switch effective timing |
|---|---|---|---|---|---|
| Connector | CN31 | Emergency operation | Start | Normal | At initialization |
| | CN32 | Function test | Function mode | Normal | At initialization |
| | CN33 | DIP switch mode switching | Mode switching | Normal | stopped |

<Outdoor-side unit operation monitoring function>

The operation status and check code contents can be ascertained by means of the 2-digit number and symbol on digital display light emitting diode LED2 by operating DIP switch SW2.

<Description of operation of digital display light emitting diode (LED2)>

- When ON (normal operation): Displays the operation mode.




[Tens digit: Operation mode]

| Display | Operation mode |
|---|---|
| O | stopped |
| C | Cooling/Dry |
| H | Heating |
| d | Defrost |

[Units digit: Relay output]

| Display | Compressor | 4-way valve | Bypass solenoid valve |
|---|---|---|---|
| 0 | – | – | – |
| 1 | – | – | ON |
| 2 | – | ON | – |
| 3 | – | ON | ON |
| 4 | ON | – | – |
| 5 | ON | – | ON |
| 6 | ON | ON | – |
| 7 | ON | ON | ON |

- When blinking (Operation stopped by tripping protection device): Displays the check mode

| Display | Check unit |
|---|---|
| 0 | Outdoor-side unit |
| 1 | Indoor-side unit |

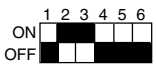
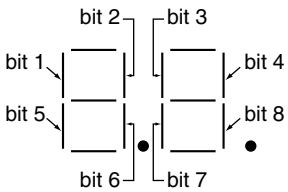
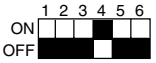
| Display | Check contents (at power on) |
|---|---|
| E8 | Indoor-side/outdoor-side communication receive abnormal (outdoor-side unit) |
| E9 | Indoor-side/outdoor-side communication send abnormal (outdoor-side unit) |
| EA | Indoor-side/outdoor-side connection erroneous wiring |
| Eb | Indoor-side/outdoor-side connection erroneous wiring (indoor-side unit power failure, disconnection) |
| Ed | Serial communication abnormal (M-NET) |
| E0-E7 | Communication other than outdoor-side unit abnormal |
| F8 | Input circuit faulty |

- PRH-P8MYA/P10MYA/P16MYA/P20MYA

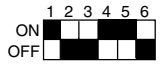
| Display | Check contents (operating) |
|---|---|
| U2 | Compressor discharge temperature abnormal, CN23 short-circuit connector unplugged |
| U3 | Compressor discharge temp thermistor (TH2) open/short |
| U4 | Liquid temp thermistor (TH1), Condenser/evaporater temp thermistor (TH3) open/short |
| U6 | Compressor overcurrent protection trip (51C trip) |
| UE | High pressure protection (63H1 trip) |
| UL | Low pressure protection (63L trip) |
| P1-P9 | Indoor-side unit abnormal |
| A0-A8 | M-NET communication abnormal |

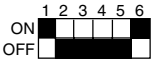
Self diagnosis by SW2

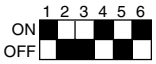
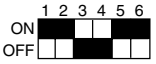
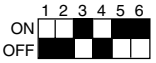
- PRH-P8MYA/P10MYA/P16MYA/P20MYA

| SW2 setting | Display contents | Description of display | Unit |
|---|---|---|---|
|  | Outdoor-side unit liquid temperature (TH1)<br>–39 - 88 | –39 - 88<br>(When 0 °C or lower, "–"and temperature are displayed alternately.)<br><Example> When –10,<br>every other second<br>– □ ←→ 10 | °C |
|  | Outdoor-side unit discharge temperature (TH2)<br>0 - 216 | 0 - 216<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 115,<br>every other second<br>1 □ ←→ 15 | °C |
|  | FAN output<br>0 - 100 | 0 - 100<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 100,<br>every other second<br>1 □ ←→ 00 | % |
|  | Number of compressor ON/OFF<br>0 - 999 | 0 - 999<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 425,<br>every other second<br>4 □ ←→ 25 | 100 times |
|  | Compressor integrated operation time<br>0 - 999 | 0 - 999<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 245,<br>every other second<br>2 □ ←→ 45 | 10 hours |
|  | Current check mode code 1 | Check mode segment display method<br>Segment and bit correspondence<br>  | Check mode 1 display method<br>bit 1 ..... Compressor discharge temperature abnormal<br>bit 2 ..... Compressor discharge temp thermistor abnormal (TH2)<br>bit 3 ..... CN23 short-circuit connector unplugged<br>bit 5 ..... Liquid temp thermistor abnormal (TH1) |
|  | Current check mode code 2 | | Check mode 2 display method<br>bit 1 ..... Overcurrent trip (Comp)<br>bit 2 ..... Low pressure protection |
|  | LEV opening angle (/5)<br>0 - 400 | 0 - 400<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 200 ,<br>every other second<br>2 □ ←→ 00 | 5 pulses |

| SW2 setting | Display contents | Description of display | Unit |
|---|---|---|---|
|  | Newest check code<br>Newest outdoor unit abnormality<br>Check display | When no check mode,“00”<br><Example> When piping thermistor abnormal U4 | Code display |
|  | Operation mode when abnormality occurred | Operation mode when abnormally stopped<br><Example> Comp. only ON at cooling operation C4 | Code display |
|  | Liquid temperature (TH1) when abnormality occurred<br>– 39 - 88 | –39 - 88<br>(When 0 °C or lower, “–” and temperature are displayed alternately.)<br><Example> When –15,<br>every other second<br>– □ ←→ 15 | °C |
|  | COMP discharge temperature (TH2) when abnormality occurred<br>0 - 216 | 0 - 216<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 130,<br>every other second<br>1 □ ←→ 30 | °C |
|  | Check code history (1) (newest)<br>Abnormal unit No. and check code inverted display | When no abnormality history<br>“0”, “←→”, “–” | Code display |
|  | Check code history (2) (One before newest)<br>Abnormal unit No. and check code inverted display | When no abnormality history<br>“0”, “←→”, “–” | Code display |
|  | Current thermostat ON time<br>0 - 999 | 0 - 999<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 245,<br>every other second<br>2 □ ←→ 45 | Minutes |
|  | Number of indoor units connected<br>0 - 4 | 0 - 4 | Units |

<table>
<tr><th>SW2 setting</th><th>Display contents</th><th>Description of display</th><th>Unit</th></tr>
<tr><td> 
</td><td>Outdoor-side unit set information 1</td><td>Outdoor-side unit capacity is displayed as function code.
<table>
<tr><th>Model name</th><th>function code</th></tr>
<tr><td>PRH-P8MYA</td><td>20</td></tr>
<tr><td>PRH-P10MYA</td><td>25</td></tr>
<tr><td>PRH-P16MYA</td><td>20 + 20</td></tr>
<tr><td>PRH-P20MYA</td><td>25 + 25</td></tr>
</table></td><td>Code display</td></tr>
<tr><td> 
</td><td>Outdoor-side unit set information 2</td><td>
<table>
<tr><th></th><th>Outdoor-side unit set information 1</th><th colspan="2">Function setting (display valves)</th></tr>
<tr><td rowspan="3">Tens digit</td><td>3-phase power source detection</td><td>Do (1)</td><td>Do not (0)</td></tr>
<tr><td>Cooling only switching</td><td>Cooling only (2)</td><td>H/P (0)</td></tr>
<tr><td rowspan="3">Units digit</td><td>Night mode</td><td>Night mode (1)</td><td>Normal mode (0)</td></tr>
<tr><td>Defrosting end time</td><td>12 °C continuous 2 minutes (2)</td><td>8 °C continuous 2 minutes (0)</td></tr>
<tr><td>Defrosting prohibit time</td><td>Fixed (4)</td><td>Training (0)</td></tr>
</table>
Set information display values are added and displayed at each position.</td><td>Code display</td></tr>
<tr><td> 
</td><td>Indoor-side unit piping temperature (TH5)<br>Indoor 1<br>–40 - 90</td><td>–40 - 90<br>(When 0 °C or lower, “–”and temperature are displayed alternately.)<br>When there are no indoor-side unit, “00” is displayed.</td><td>°C</td></tr>
<tr><td> 
</td><td>Indoor-side unit intake temperature (TH4)<br>8 - 39.5</td><td>8 - 39.5<br>When there are no indoor-side unit, “00” is displayed.</td><td>°C</td></tr>
<tr><td> 
</td><td>Indoor<br>set temperature<br>17 - 30</td><td>17 - 30<br>When there are no indoor-side unit, “00” is displayed.</td><td>°C</td></tr>
</table>

| SW2 setting | Display contents | Description of display | Unit |
|---|---|---|---|
|  | Indoor-side control status | Control mode display system<br>  <br>Indoor-side<br>Display: 0 Ordinary; 1 Hot adjustment; 2 Defrosting; 3 —; 4 Heater ON; 5 Freeze prevention; 6 Surge prevention; 7 Compressor OFF | – |
|  | Outdoor-side unit condenser/evaporater temperature (TH3)<br>–39 - 88 | –39 - 88<br>(When 0 °C or lower, "–"and temperature are displayed alternately.)<br><Example> When –10,<br>every other second<br>– □ ←→ –10 | °C |
|  | Outdoor-side control status | Control mode display system<br>  <br>Outdoor-side<br>Display: 0 Ordinary; 1 Hot adjustment; 2 Defrosting; 3 —; 4 Heater ON; 5 Freeze prevention; 6 Surge prevention; 7 Compressor OFF | – |
|  | Discharge super heat SHd<br>0 - 216<br>Cooling: Outdoor-side TH2 – Outdoor-side TH3<br>Heating: Outdoor-side TH2 – Indoor-side TH6 | 0 - 216<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 150,<br>every other second<br>1 □ ←→ 50 | °C |
|  | Sub cool Sc<br>0 - 130<br>Cooling: Outdoor-side TH3 – Outdoor-side TH1<br>Heating: Indoor-side TH6 – Indoor-side TH5 | 0 - 130<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 100,<br>every other second<br>1 □ ←→ 00 | °C |
|  | Target sub cool step N<br>1 - 5 | 1 - 5 | – |

| SW2 setting | Display contents | Description of display | Unit |
|---|---|---|---|
|  | Communication demand capacity<br>0 - 255 | 0 - 255<br>When communication demand not set: 100%<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 100,<br>every other second<br>1 □ ←→ 100 | % |
|  | Abnormal thermistor display<br>1 - 3, – | 1 - 3, –<br>1: Outdoor-side liquid temp thermistor (TH1)<br>2: Outdoor-side discharge temp thermistor (TH2)<br>3: Outdoor-side condenser/evaporater temp thermistor (TH3)<br>–: No abnormal thermistor | – |
|  | Outdoor-side fan output at abnormal stop<br>0 - 100 | 0 - 100<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 100,<br>every other second<br>– □ ←→ 00 | % |
|  | LEV opening angle (/5) at abnormal stop<br>0 - 400 | 0 - 400<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 200,<br>every other second<br>2 □ ←→ 00 | 5 pulses |
|  | Outdoor-side condenser/evaporater temperature at abnormal stop<br>–39 - 88 | –39 - 88<br>(When 0 °C or lower, "–"and temperature are displayed alternately.)<br><Example> When –10,<br>every other second<br>– □ ←→ –10 | °C |
|  | Discharge super heat (SHd) at abnormal stop<br>0 - 216<br>Cooling: Outdoor-side TH2 – Outdoor-side TH3<br>Heating: Outdoor-side TH2 – Indoor-side TH6 | 0 - 216<br>(When 100 °C or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 150,<br>every other second<br>– □ ←→ 50 | °C |
|  | Sub cool (Sc) at abnormal stop<br>0 - 130<br>Cooling: Outdoor-side TH3<br>Heating: – Outdoor-side TH1 Indoor-side TH6 – Indoor-side TH5 | 0 - 130<br>(When 100 °C or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 100,<br>every other second<br>1□ ←→ 00 | °C |

| SW2 setting | Display contents | Description of display | Unit |
|---|---|---|---|
|  | Thermostat ON time up to abnormal stop<br>0 - 999 | 0 - 999<br>(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)<br><Example> When 245,<br>every other second<br>2 □ ←→ 45 | Minutes |
|  | LEV regular control count n<br>1 - 5 | 1 - 5 | – |
|  | Indoor-side unit condenser/evaporater temp temperature (TH6)<br>–40 - 90 | –40 - 90<br>(When 0 ˚C or lower, "–"and temperature are displayed alternately.)<br>When there are no indoor-side controller board, "00" is displayed. | ˚C |

## [4] Function of switch on indoor-side controller board

### (1) DIP SW1 for model Selection (DIP SW1 has been set at factory)

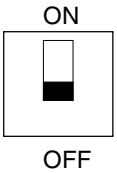

PRH-P8MYA/P10MYA/P16MYA/P20MYA: SW1-1, -3, -4 ON, SW1-2, -5 OFF

### (2) DIP SW2 for Capacity Setting (DIP SW2 has been set at factory)


PRH-P8MYA/16MYA : SW2-1, -2, -3 and, -4 OFF


PRH-P10MYA/20MYA: SW2-1 ON, SW2-2, -3, and, -4 OFF

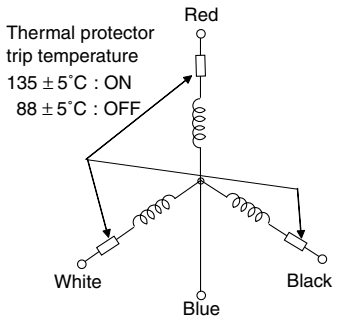
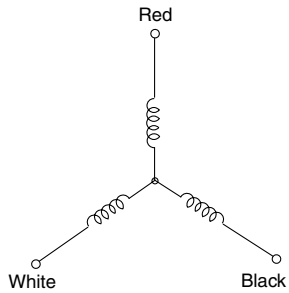
### (3) DIP SWE for Emergency Operation




When SWE is turned ON, FAN turns ON. Setting of emergency operation other than SWE is performed at the outdoor-side controller board.

## [5] Simple parts check method

• PRH-P8MYA/P10MYA/P16MYA/P20MYA

<table>
<tr><th>Part name</th><th>Judgment instructions</th></tr>
<tr><td>Thermistor (TH1)<br><Outdoor-side liquid temperature detection><br>Thermistor (TH2)<br><Discharge temperature detection><br>Thermistor (TH3)<br><Outdoor-side condenser/ evaporater temperature detection><br>Thermistor (TH4)<br><Indoor-side intake temperature><br>Thermistor (TH5)<br><Indoor-side unit piping temperature><br>Thermistor (TH6)<br><Indoor-side unit condenser/ evaporater temperature></td><td>Disconnect the connector and measure the resistance value with a multimeter. (Ambient temperature 10 ˚C to 30 ˚C)<br><table><tr><th></th><th>Normal</th><th>Abnormal</th></tr><tr><td>TH1, 3, 4, 5, 6</td><td>4.3 kΩ~9.6 kΩ</td><td rowspan="2">Open or short</td></tr><tr><td>TH2</td><td>160 kΩ~410 kΩ</td></tr></table>(Based on thermistor characteristic table (next page))</td></tr>
<tr><td>Outdoor-side fan motor<br>  </td><td>Measure the resistance value across the terminals with a multimeter. (Winding temperature 20 ˚C)<br><table><tr><th>Motor lead wire</th><th>Normal</th><th>Abnormal</th></tr><tr><td>Between 2 phases</td><td>45.5 Ω</td><td>Open or short</td></tr></table></td></tr>
<tr><td>Indoor-side fan motor<br>  </td><td>Measure the resistance value across the terminals with a multimeter. (Winding temperature 20 ˚C)<br><table><tr><th rowspan="2">Motor lead wire</th><th colspan="4">Normal</th></tr><tr><th>PRH-P8MYA</th><th>PRH-P10MYA</th><th>PRH-P16MYA</th><th>PRH-P20MYA</th></tr><tr><td>Between 2 phases</td><td>13.2 Ω</td><td>10.2 Ω</td><td>6.4 Ω</td><td>3.4 Ω</td></tr></table><br><table><tr><th rowspan="2">Motor lead wire</th><th>Abnormal</th></tr><tr><th>PRH-P8, 10, 16, 20MYA</th></tr><tr><td>Between 2 phases</td><td>Open or short</td></tr></table></td></tr>
<tr><td>Compressor</td><td>Measure the resistance value across the terminals with a multimeter. (Winding temperature 20 ˚C)<br><table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>PRH-P8, 16MYA</td><td rowspan="2">Open or short</td></tr><tr><td>Each phase 1.574 Ω</td></tr><tr><td>PRH-P10, 20MYA</td><td rowspan="2">Open or short</td></tr><tr><td>Each phase 1.263 Ω</td></tr></table></td></tr>
</table>

## [6] Reference Data

<Thermistor characteristic table>

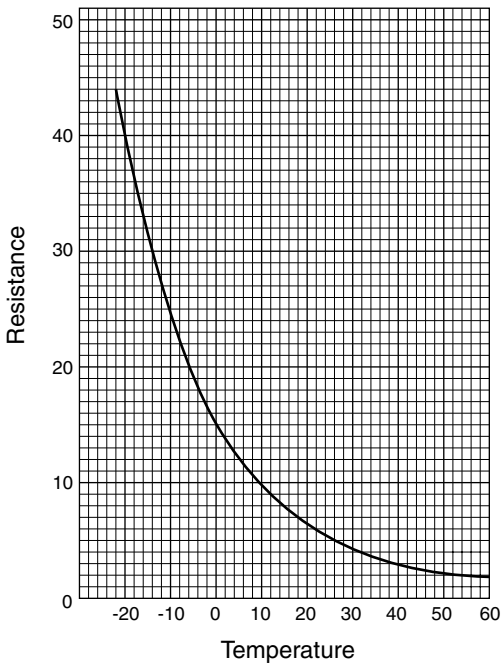
Low temperature thermistor

Thermistor <Liquid temperature detection> (TH1, 5)
Thermistor <Condenser/evaporater temperature detection> (TH3, 6)
Thermistor <Indoor-side intake temperature (TH4)
Thermistor Ro = 15 kΩ ± 3 %
B constant = 3,460 kΩ ± 2 %

$$Rt = 15 \exp \{3{,}460 \left(\frac{1}{273 + t} - \frac{1}{273}\right)\}$$

0 °C: 15 kΩ
10 °C: 9.7 kΩ
20 °C: 6.4 kΩ
25 °C: 5.3 kΩ
30 °C: 4.3 kΩ
40 °C: 3.1 kΩ

<Low temperature thermistor>



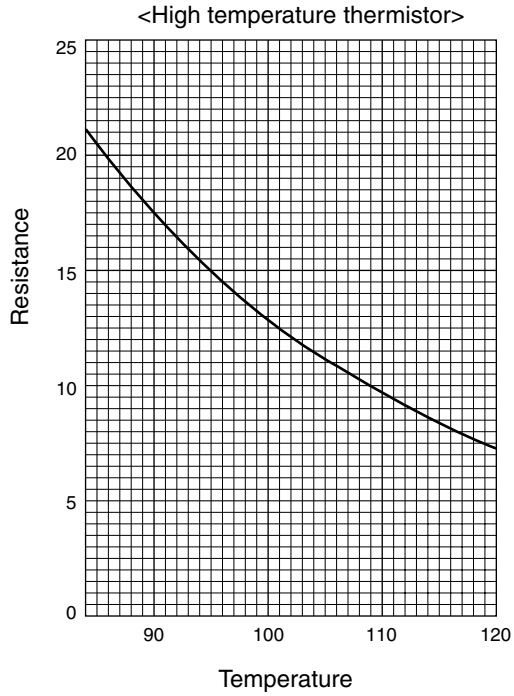

High temperature thermistor  Thermistor <Discharge temperature detection> (TH2)

Thermistor (Discharge temperature detection) (TH2)
Thermistor R120 = 7.465 kΩ ± 2 %
B constant = 4,057 kΩ ± 2 %

$$Rt = 7.465 \exp \{4{,}057 \left(\frac{1}{273 + t} - \frac{1}{393}\right)\}$$

20 °C: 250 kΩ  70 °C: 34 kΩ
30 °C: 160 kΩ  80 °C: 24 kΩ
40 °C: 104 kΩ  90 °C: 17.5 kΩ
50 °C: 70 kΩ  100 °C: 13.0 kΩ
60 °C: 48 kΩ  110 °C: 9.8 kΩ

<High temperature thermistor>



## [7] Troubleshooting of each part

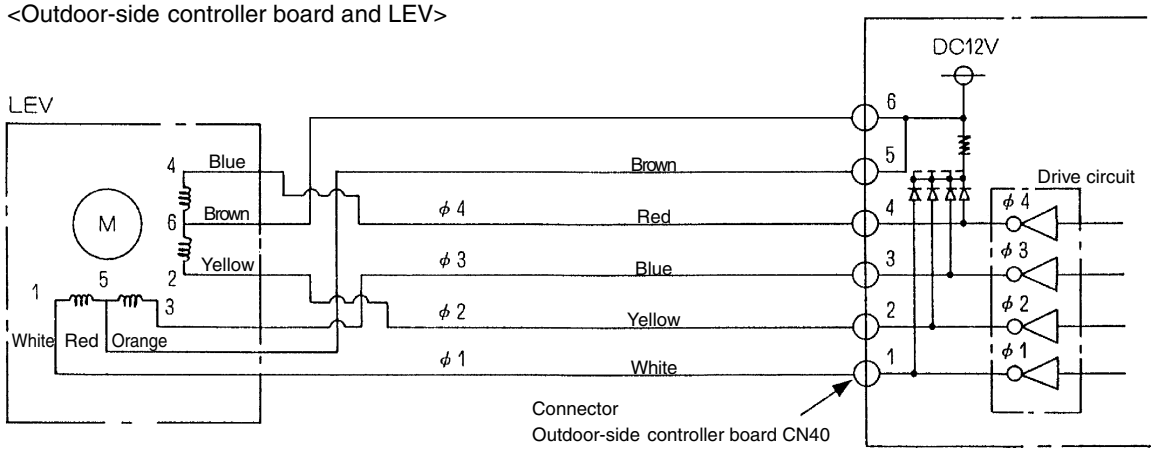
### (1) LEV

1) Overview of LEV operation

LEV (electronic expansion valve) receives pulse signals from the outdoor-side controller board and drives a valve by means of a servomotor.

The valve opening angle changes in proportion to the number of pulses.

<Outdoor-side controller board and LEV>




| Output (phase) No. | Output state | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| ø1 | ON | OFF | OFF | ON |
| ø2 | ON | ON | OFF | OFF |
| ø3 | OFF | ON | ON | OFF |
| ø4 | OFF | OFF | ON | ON |

<Pulse signal output and valve operation>

The output pulses change in the following order:

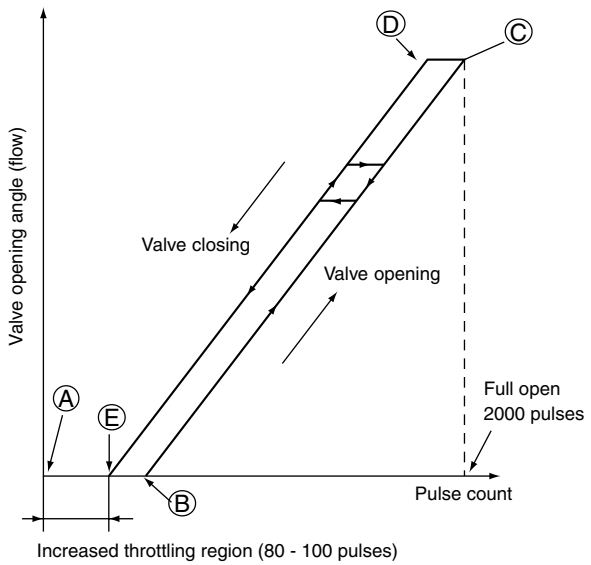
Valve closing 1 → 2 → 3 → 4 → 1

Valve opening 4 → 3 → 2 → 1 → 4

*1. When the LEV opening angle is not changed, all output phases turn OFF.

2. When the output misses a phase or remains ON, the motor cannot rotate smoothly and makes a clacking sound and vibrates.

LEV opening and closing operations

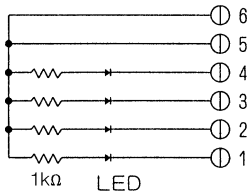



* When the power is turned on, to register the valve position, a 2200 pulses valve close signal is output and is always set to point Ⓐ .

If the valve moves smoothly, the LEV will not generate a sound or vibration, but at Ⓔ → Ⓐ and when the valve is locked, a sound louder than the sound generated by missing phase, etc. will be generated.

* Generation of sound can be checked by placing the tip of a screwdriver against the valve and your ear against the handle.

2) Judgment method and probable trouble mode

| Trouble mode | Judgment method | Remedy |
|---|---|---|
| Microcomputer drive circuit faulty | (1) Disconnect the outdoor-side controller board connector, and connect the check LED shown below.<br>  <br>When the mains power is turned on, a pulse signal is output for 10 seconds.<br>If the LED remains OFF or ON, the drive circuit is abnormal. | When drive circuit is faulty, replace outdoor-side controller board. |
| LEV mechanism locked | (1) When the LEV is in the locked state and driven, the motor races. At this time, a soft clicking sound is generated. When this sound is generated both when closing and when opening, the mechanism is abnormal. | Replace LEV |
| LEV motor coil open or shorted | Measure the resistance between the coils (red-white, red-orange, brown-yellow, brown-blue) with a multimeter.<br>If 150 Ω ±10%, the coil is normal. | Replace LEV coil |
| Connector connection incorrect, or contact faulty | (1) Visually check for loose connector terminals and check the color of the lead wires.<br>(2) Disconnect the outdoor-side controller board connector and check the continuity with a multimeter. | Check continuity of faulty point |

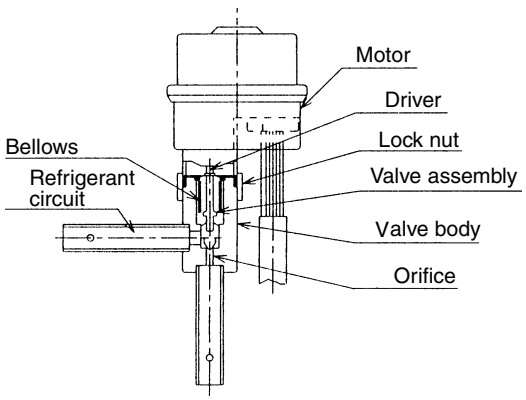
3) Electronic expansion valve motor replacement instructions

1. Description of construction

1.1 A lock nut connects the motor to the valve body.

1.2 The motor consists of a motor rotating section, rotation transmission gear section, and a driver which converts rotation to linear motion.

1.3 The valve body consists of a valve assembly, which moves up and down, and an orifice.
A bellows at the top of the valve body block isolates the refrigerant circuit from the atmosphere side.
Therefore, the motor is not exposed to the refrigerant.




2. Principle of operation

2.1 Pulses output from the outdoor-side controller board are sequentially supplied to four coils and the motor is rotated.
The motor can be rotated in either clockwise or counterclockwise by changing the order in which the pulses are supplied.

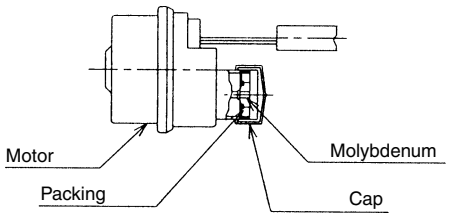
2.2 The gear section reduces the motor speed to 1/30 and supplies the motor rotation to the motor output shaft.

2.3 The motor output shaft is threaded and is used as a driver.

2.4 The up and down motion of the end of the driver moves the valve assembly of the valve body up and down and controls the flow by changing the distance between the orifice and the bottom end of the valve.

3. Work precautions

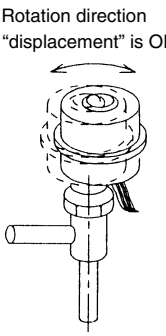
3.1 Do not apply abnormal force to the motor.
3.2 Do not use a motor that has been dropped.
3.3 Do not remove the cap until immediately before starting work.
3.4 Do not wipe off the molybdenum.
3.5 Do not remove the packing.
3.6 Do not coat the lock nut with a substance other than the specified lock tight, grease, etc.




4. Replacement instructions

4.1 Stop the air conditioner from the remote controller. After confirming that the air conditioner has stopped, turn off the unit power.
4.2 Get two wrenches. Hold the flat part of the body with one wrench and loosen the lock nut with the other wrench. The lock nut loosens when turned counterclockwise as viewed from the motor.
Always use two wrenches.
Do not hold the motor with one hand and try to loosen the lock nut with only one wrench.
4.3 When the lock nut is turned several turns, it will disengage from the threads and the motor can be removed.
4.4 Get the replacement motor. The replacement motor is limited to a motor whose driver end position has been set at the factory for replacement use. (The driver end of factory set parts does not stick out.)
Use of a motor whose driver end position is not set is related to erroneous valve flow control or no operation.
4.5 During replacement work, be sure that dirt, foreign matter, or water does not enter the part where the motor and valve body separate.
(Since the part exposed by separation corresponds to the mechanical part of the valve.) Do not damage the connecting part with the tools. After removing the motor, 1 blow out the body bellows section with $N_2$ gas, etc. to remove the water clinging to the inside and 2 after fan stop processing of the pertinent unit in the motor removed state, dry the bellows section by performing the cooling operation for 30 minutes.
4.6 Remove the cap of the replacement motor and butt the bottom of the motor against the top of the valve body and hold it so that both are aligned and connect the motor to the valve body with the lock nut. Coat the entire periphery of the threaded part with screw lock. Be sure that the screw lock does not enter the interior.
If a defect occurs during replacement work, do not use the motor, instead use a new replacement motor.
4.7 After tightening the lock nut 2 to 3 turns by hand, hold the flat part of the body with one wrench and tighten to the prescribed torque with a torque wrench. Tighten to a torque of 15N·m (150kgf·cm) (Control value 15 ±1N·m (150 ± 10 kgf·cm))
If tightened too tight, the flare nut may break during use.
4.8 When tightening the lock nut, hold the motor with your hand, etc. so that strong rotation torque and bending load are not applied.
4.9 The difference of the relative positions of the motor and body after assembly has no affect on the valve control and open/close mechanism.
Do not try to forcefully position the motor and valve body to correct “displacement” after tightening of the lock nut due to the difference in the positional relationship between the motor and valve body before and after assembly.

Fixing with the clip may be impossible due to motor section deformation, but fixing of the piping is sufficient and fixing by clip is unnecessary.




4.10 Connect the connector. At this time, be sure not to pull the lead wires forcefully. Also, firmly insert the connector up to the lock and check that it cannot not be easily disconnected.
4.11 Turn on the unit power and operate the air conditioner from the remote controller and confirm that there are no abnormalities.

## [8] Emergency operation

1) When the following check displays occur at the outdoor-side controller board, or when the wired remote controller or indoor-side controller board microcomputer fails, if there are no other defects, emergency operation is possible by shorting the connector (CN31) on the outdoor-side controller board.

• Abnormalities that allow emergency operation

| Display | Check contents |
|---|---|
| U4 | Liquid temp thermistor (TH1) open or shorted<br>Condenser/evaporater temp thermistor (TH3) open or shorted |
| E8 | Indoor-side/Outdoor -side communication receive abnormal (outdoor-side unit) |
| E9 | Indoor-side/Outdoor -side communication send abnormal (outdoor-side unit) |
| E0 - E7 | Communication other than outdoor-side unit abnormal |

2) Check items and precautions when performing emergency operation

a) In addition to the abnormalities above, check the outdoor-side unit for any abnormalities. (When there is an abnormality other than the above, emergency operation is impossible.)

b) Check the operating range. (For U4 display)
Since the outdoor-side fan always operates at full speed at emergency operation, do not operate the air conditioner outside the range shown below.

| | Operation range (outdoor-side unit intake temperature) |
|---|---|
| Cooling | greater than 20 °C |
| Heating | less than 10 °C |

Operation outside this range may cause compressor trouble.

c) When performing emergency operation, set the outdoor-side controller board after setting the emergency operation switch (SWE) on the indoor-side controller board. For the indoor emergency operation method, refer to the indoor unit wiring diagram.

d) A power failure causes emergency operation to become continuous operation. ON/OFF, temperature adjustment and other operations cannot be performed from the remote controller.

e) Since cool air is discharged from the indoor-side unit, when the outdoor-side unit starts the defrosting operation during heating emergency operation, do not operate the air conditioner for a long time.

f) You can perform cooling emergency operation up to 10 hours. The indoor-side unit heat exchanger may freeze.

g) At the end of emergency operation, always return the switch settings, etc. to their original state.

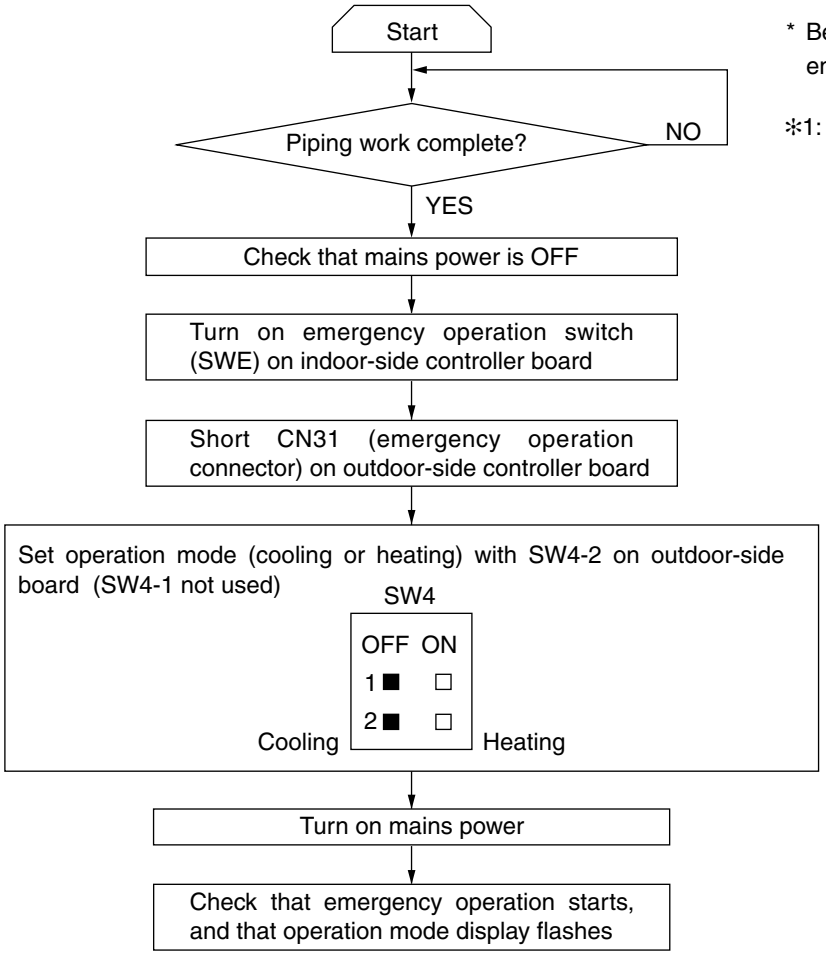
3) Emergency operation contents

a) The operation mode operates according to the contents set (cooling or heating) by SW4-2.

b) The fan operation condition is always 100% operation.

c) The operation mode display flashes every other second.

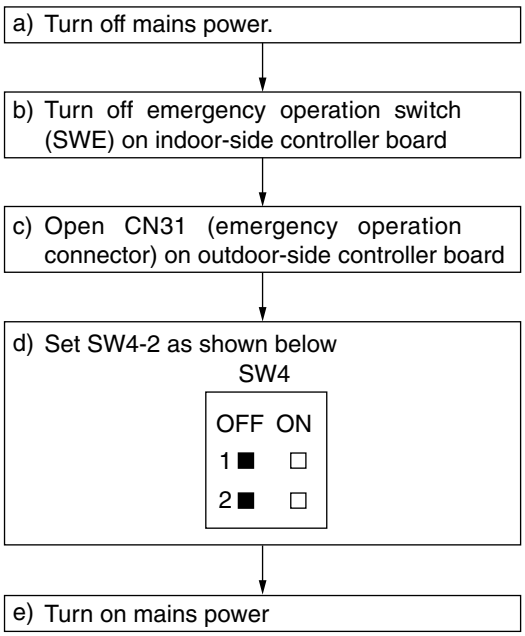
4) Emergency operation method




* Before starting, recheck that the trouble allows emergency operation.

✻1: For each refrigerant circuit

5) Emergency operation release method



## [9] Self-diagnosis and troubleshooting

<Abnormality detected at power on>

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| None | | (1) Voltage not applied to unit terminal block TB1.<br>a. Power supply circuit breaker not closed.<br>b. Power supply terminals connection faulty, or disconnected.<br>c. Missing phase<br>(2) No electricity at outdoor-side controller board power supply connector.<br>a. Power supply connector contact faulty.<br>b. Terminal CN20 on outdoor-side controller board disconnected.<br>(3) Outdoor-side controller board faulty.<br>a. Blown fuse on outdoor-side controller board.<br>b. Part faulty.<br>(4) Transformer faulty | (1)a. Check power supply circuit breaker<br>b. Check power supply terminal block connections.<br>c. Check power supply terminal block connections.<br>(2)a. Check power supply connector board connections.<br>(3)a. Replace fuse.<br>b. Replace controller board. (However, when cannot be repaired even through the check above was carried out.)<br>(4) Replace transformer |
| EA | **Indoor/outdoor connection erroneous wiring**<br>1. Outdoor-side controller board automatically recognizes the number of connected indoor-side unit. However, when the number of connected indoor unit cannot be set due to erroneous indoor/outdoor connection, erroneous wiring, etc. even after 4 minutes have elapsed since the power was turned on, an abnormality is recognized. | (1) Indoor/outdoor connection wire contact faulty.<br>(2) Outdoor-side controller board send/receive circuit faulty.<br>(3) Indoor-side controller board send/receive circuit faulty.<br>(4) Noise has entered on power supply or indoor-side/outdoor-side controller board connection wire. | (1) Check if indoor/outdoor connection wire disconnected or loose. Also check polarity.<br>(2) Check by turning power off and on. If abnormality is displayed again, replace outdoor-side controller board or indoor-side controller board.<br>* LED3 of the indoor-side controller board flashes when communication is being performed. |
| Eb | **Indoor/outdoor connection erroneous wiring**<br>Outdoor-side controller board automatically sets the unit No. of the indoor unit. However, when the unit No. of the indoor-side unit cannot be set due to indoor/outdoor connection erroneous wiring even after 4 minutes has elapsed since the power was turned on, an abnormality is recognized. | (1) Indoor/outdoor connection wire contact faulty.<br>(2) Outdoor-side controller board send/receive circuit faulty.<br>(3) Indoor-side controller board send/receive circuit faulty.<br>(4) Noise has entered on power supply or indoor-side/outdoor-side controller board connection wire. | |
| EC | **Start-up time over**<br>When start-up processing does not end even through 4 minutes has elapsed since the power was turned on, an abnormality is recognized. | (1) Indoor-side/outdoor-side controller board connection wire contact faulty.<br>(2) Noise has entered on power supply or indoor-side/outdoor-side controller board connection wire. | |
| F1 | **Reverse phase detected** | (1) Power supply reverse phase connection.<br>(2) Power supply missing phase. | (1) Check power supply terminal block connections.<br>(2) Replace outdoor-side controller board (However, when cannot be repaired even though check above was carried out.) |

<Abnormality detected during unit operation: Outdoor-side unit>

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| U2 | **Discharge temperature abnormal**<br>When the discharge thermistor temperature (TH2) exceeds 118 °C while the compressor is operating, an abnormality is recognized. | (1) Compressor overheating due to insufficient refrigerant.<br>(2) Thermistor faulty. (TH2)<br>(3) Outdoor-side controller board faulty. | (1) Check input super heat.<br>Check for refrigerant leakage and check piping length.<br>Charge with additional refrigerant.<br>(2)(3)<br>Turn off power and restart operation and check if U3 is displayed within 8 minutes.<br>When U3 is displayed, carry out U3 processing.<br>(Do not replace board at U2 display only.) |
| | **49C trip (CN23 connector disconnected)**<br>When connector CN23 opens while the compressor is operating, an abnormality is recognized. | (1) Shorting connector CN23 on outdoor-side controller board dislodged or contact faulty. | (1) Repair shorting connector. |
| U3 | **Discharge temp thermistor (TH2) open or shorted.**<br>When an open (0 °C or lower) or short (216 °C or higher) is detected while the compressor is operating, an abnormality is recognized.<br>(Detection is disabled for 5 minutes at compressor starting.) | (1) Connector (CN3) dislodged or connect faulty.<br>(2) Thermistor faulty.<br>(3) Outdoor-side controller board faulty. | (1) Check connector contact and thermistor wire.<br>(2) Check thermistor resistance value, or check temperature by microcomputer. (Check using SW2 self-diagnosis function.)<br>See page 54.<br>(3) Replace outdoor-side controller board. (Replace board after sufficiently checking 1 and 2.) |
| U4 | **Liquid temp thermistor (TH1) or condenser/evaporater temp thermistor (TH3) open or shorted.**<br>When an open (–39 °C or lower) or short (88 °C or higher) is detected while the compressor is operating, an abnormality is recognized. (Detection is disabled for 7 minutes beginning from 10 seconds after the compressor starts and for 10 minutes after return from defrosting.) | (1) Connector (TH1: CN2, TH3: CN4) dislodged or contact faulty.<br>(2) Thermistor faulty.<br>(3) Outdoor-side controller board faulty. | (1) Check connector contact and thermistor wire.<br>(2) Check thermistor resistance value or check temperature by microcomputer. (Check using SW2 self-diagnosis function.)<br>See to page 54.<br>(3) Replace outdoor-side controller board. (Replace board after sufficiently checking 1 and 2) |
| U6 | **Compressor overcurrent trip**<br>When the current value reaches the overload set value or higher while the compressor is operating, an abnormality is recognized.<br>P8MYA ..... 22 A<br>P10MYA ..... 27 A<br>P16MYA ..... 22 A x 2 pcs.<br>P20MYA ..... 27 A x 2 pcs. | (1) Overload operation exceeding unit usage range limit.<br>(2) Power supply terminal voltage low.<br>(3) Power supply missing phase.<br>(4) Compressor motor faulty.<br>(5) Compressor locked.<br>(6) Connector (CN23) on outdoor-side controller board dislodged or contact faulty.<br>(7) 51C disconnected or contact faulty.<br>(8) Liquefied refrigerant gas entering and accumulating in the compressor | (1) Check usage conditions.<br>(Check for short cycle operation.)<br>(2) Check power supply voltage.<br>(3) Check wiring for breaks and faulty contact.<br>(4) Check motor winding resistance (See page 53.)<br>(5) Replace compressor.<br>(6)(7)<br>After checking connections, restart and check operation.<br>(8) Absence of energization in the crankcase heater |
| UE | **High Pressure Abnormality (63H1 operation)**<br>Considered abnormal when 63H1 goes into operation during compressor operation (3.3 $^{+0}_{-0.15}$ MPa or above)<br>**63H1:Pressure switch (High Pressure)**<br>OFF:3.3 $^{+0}_{-0.15}$ (MPa)<br>ON :2.65±0.2(MPa) | (1) Short cycle on the indoor-side<br>(2) Clogged filter on the indoor-side<br>(3) Reduced air flow on the indoor-side due to dirty fan<br>(4) Dirty heat exchanger on the indoor-side<br>(5) Fan motor lock on the indoor-side<br>(6) Fan motor malfunction on the indoor-side<br>(7) Clogged or broken pipe | (1)~(6):During heating operation<br>Check the unit on the indoor-side, and correct the problems.<br>(7) Check the piping, and correct the problems. |

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| UE | | (8) Fan motor lock on the outdoor-side<br>(9) Fan motor malfunction on the outdoor -side<br>(10) Short cycle on the outdoor-side<br>(11) Dirty heat exchanger on the outdoor -side<br>(12) Reduced air flow on the outdoor-side due to dirty fan<br>(13) Disconnected connector (63H1) on the outdoor-side controller board or contact failure<br>(14) Disconnected 63H1 or contact failure<br>(15) Controller board failure on the outdoor-side<br>(16) LEV malfunction<br>(Fully closed due to disconnected wiring)<br>(17) Defective parts<br>(18) Drop in power supply voltage<br>(19) 52C failure | (8)~(12):During cooling operation<br>Check the unit on the outdoor-side, and correct the problems.<br><br>(13)(14):Check the connectors<br>Turn off the power, and make sure F2 is displayed when the power is turned back on.<br>When F2 is displayed, follow the remedy for F2.<br>(15) Replace the controller board on the outdoor-side<br>(16) Check the LEV.<br>Refer to page 55.<br><br>(17) Replace high-pressure pressure switch<br>(18) Check the input voltage at the power supply terminal (TB1).<br>(19) Make sure 52C is operating normally. |
| UL | **Low Pressure Abnormality (63L operation)**<br>Considered abnormal when 63L goes into operation during compressor operation (0±0.02MPa or above)<br><br>**63L:Pressure switch (Low Pressure)**<br>OFF:0±0.02(MPa)<br>ON :0.06±0.04(MPa) | (1) Instantaneous vacuum state due to uneven distribution of refrigerant immediately after refrigerant charging (insufficient refrigerant in the low pressure line)<br>(2) Gas leak or insufficient gas<br>(3) Fully closed LEV due to disconnected wiring or locking<br>(4) Short cycle on the indoor-side<br>(5) Clogged filter on the indoor-side<br>(6) Reduced air flow on the indoor-side due to dirty fan<br>(7) Dirty heat exchanger on the indoor-side<br>(8) Fan motor lock on the indoor-side, motor malfunction<br>(4)~(8) Drop in low pressure due to reduced evaporation capacity during cooling<br>(9) Short cycle on the outdoor-side<br>(10) Dirty heat exchanger on the outdoor-side<br>(11) Fan motor lock, motor malfunction, or FANCON board malfunction on the outdoor-side<br>(9)~(11) Drop in low pressure due to reduced evaporation capacity during heating operation<br>(12) Disconnected connector (63L) on the outdoor-side controller board or contact failure<br>(13) Disconnected 63L or contact failure<br>(14) Defective controller board on the outdoor-side<br>(15) Defective parts | Once the low-pressure pressure error is experienced, do not restart the unit by power reset before taking the following steps (Otherwise, the compressor will be damaged.)<br>**<Trouble Assessment>**<br>Check for a clogged piping.<br>Refer to the section on troubleshooting the LEV (p.55).<br>**<Remedy>**<br>After confirming that the piping is not clogged, perform an error reset by power reset.<br>Run a 10 to 15 minutes of operation in the mode opposite to the mode in which the protection function tripped (Run a hating operation if the problem happened in the cooling mode, or vice versa.)<br>Follow the same procedure if no clogging in the piping was found.<br>(1) Restart and check the operation after performing an error reset.<br>(2) Check the refrigerant amount.<br>(3) Run a cooling or a heating operation and check the operating conditions.<br>Refer to the section on Trouble shooting the LEV.<br>(4)~(8):During cooling operation<br>Check the unit on the indoor-side, and correct the problems.<br>(9)(10):During heating operation<br>Check the unit on the indoor-side, and correct the problems.<br>(11) Check the fan on the outdoor-side<br>Refer to the section on Trouble shooting the Outdoor Unit Fan<br>(12)(13)Check the connectors<br>(14) Replace controller board on the outdoor-side<br>(15) Replace low-pressure pressure switch |

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| EO | **Remote controller communications receive abnormal (remote controller).**<br>1) When transmission from refrigerant address "0" IC is not received normally even once in 3 minutes, an abnormality is recognized.<br>2) When a slave remote controller does not receive even one signal in 2 minutes, an abnormality is recognized. | (1) Remote controller send/receive circuit faulty.<br>(2) Refrigerant address "0" indoor-side controller board send/receive circuit faulty.<br>(3) Noise entered on remote controller transmission line. | Perform remote controller diagnosis.<br>Take the following action based on the diagnosed result:<br>a) [RC OK] display<br>Remote controller normal.<br>Turn power off and on and check.<br>If "H0" remains on for 4 minutes or longer, replace indoor controller board.<br>b) [RC NG] display<br>Replace remote controller.<br>c) [RC E3] display, [ERC00-66] } Noise, etc. probable cause. |
| E3 | **Remote controller communication send abnormal (remote controller)**<br>1) When the remote controller can not confirm that the transmission circuit is idle in 6 seconds, an abnormality is recognized.<br>2) When the remote controller cannot complete 30 continuous transmissions, an abnormality is recognized. | (1) Remote controller send/receive circuit faulty.<br>(2) Noise entered on remote controller transmission line. | |
| E8 | **Indoor-outdoor communication receive abnormal (Outdoor-side unit)**<br>When the outdoor-side controller can not receive normally even once in 3 minutes, an abnormality is recognized. | (1) Indoor/outdoor connection wire contact faulty.<br>(2) Outdoor-side controller board send/receive circuit faulty.<br>(3) Indoor-side controller board send/receive circuit faulty.<br>(4) Noise entered on indoor/outdoor connection wire. | (1) Check for disconnected or loose indoor-side unit or outdoor-side unit indoor/outdoor connection wire.<br>(2)-(4)<br>Turn power off and on and check.<br>If abnormality displayed again, replace indoor controller board or outdoor-side controller board. |
| E9 | **Indoor-outdoor communication send abnormal (Outdoor-side unit)**<br>1) When the outdoor-side controller detectes reception of 30 consecutive "0" even through "1" was received, an abnormality is recognized.<br>2) When the outdoor-side controller can not confirm that the transmission circuit is idle in 3 minutes, an error is recognized. | (1) Outdoor-side controller board send/receive circuit faulty.<br>(2) Noise entered at power supply.<br>(3) Noise entered on indoor/outdoor connection wire. | (1)(2)(3)<br>Turn power off and on and check.<br>If abnormality displayed again, replace indoor controller board or outdoor-side controller board. |
| EF | **Check code undefined**<br>Displayed when an undefined check code is received. | (1) Noise entered on remote controller transmission line.<br>(2) Noise entered on indoor/outdoor connection wire. | (1)(2)<br>Turn power off and on and check.<br>If abnormality displayed again, replace indoor-side controller board or outdoor-side controller board. |

<Abnormality detected during unit operation: Indoor-side unit>

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| P1 | **Intake sensor abnormal**<br>1) If thermistor open or short is detected and the compressor enters the 3 minutes restart prevention mode and does not return to normal after 3 minutes, an abnormality is recognized.<br>(If returned, returns to normal operation.)<br>2) Always detected during cool, dry, and heat operations.<br>Short: 90 °C or higher<br>Open: –40 °C or lower | (1) Thermistor characteristics faulty.<br>(2) Connector contact faulty.<br>(Insertion faulty)<br>(3) Thermistor wiring open or contact faulty.<br>(4) Indoor-side controller board faulty. | (1)-(3)<br>Check thermistor resistance value<br>0 °C ..... 15.0 kΩ<br>10 °C ..... 9.7 kΩ<br>20 °C ..... 6.4 kΩ<br>30 °C ..... 5.3 kΩ<br>40 °C ..... 3.1 kΩ<br>Open or faulty contact can be detected by applying force (pulling, bending) to lead wire while measuring thermistor resistance.<br>(2) Check for connector faulty contact.<br>After reinserting connector, turn on power and recheck operation.<br>(4) Check remote controller room temperature display.<br>If there is a difference between actual room temperature and displayed room temperature after checking that there are no problems at (1)-(3), replace indoor-side controller board.<br>If there are no problems above, there are no abnormalities.<br>Turn power off and on and operate. |
| P2 | **Piping (liquid pipe) sensor abnormal**<br>1) If thermistor short or open is detected and the compressor enters the 3 minutes restart prevention mode and does not return to normal after 3 minutes, an abnormality is recognized.<br>(If returned, returns to normal operation.)<br>2) Always detected during cool, dry, and heat (except during defrosting) operation.<br>Short: 90 °C or higher<br>Open: –40 °C or lower | (1) Thermistor characteristics faulty.<br>(2) Connector contact faulty.<br>(Insertion faulty)<br>(3) Thermistor wiring open or contact faulty.<br>(4) Faulty refrigerant circuit, etc. has caused thermistor temperature to rise to 90 °C or higher or drop to –40 °C or lower.<br>(5) Indoor-side controller board faulty. | (1)-(3)<br>Check thermistor resistance value.<br>For characteristic, see above (P1).<br>(2) Check for connector faulty contact.<br>After reinserting connector, turn on power and recheck operation.<br>(4) Operate in trail run mode and check piping temperature with remote controller. When piping temperature is abnormally low (cooling) or high (heating), refrigerant circuit is probably faulty.<br>(5) Check test run mode piping temperature with remote controller.<br>If there is a difference between actual piping temperature and displayed piping temperature when there are no abnormalities at (1)-(4), replace indoor-side controller board. If there is no problem above, there are no abnormalities.<br>Turn on power and operate. |
| P4 | **Drain sensor abnormal**<br>1) If thermistor short or open continuously detected for 30 seconds, the compressor enters the check mode and turns off and the indoor-side fan turns off.<br>2) When another short or open is continuously detected for 30 seconds in the check mode, an abnormality is recognized.<br>(If returned, returns to normal operation.)<br>3) Always detected during cool, dry, and drain pump operation.<br>Short: 90 °C or higher<br>Open: –20 °C or lower | (1) Thermistor characteristics faulty.<br>(2) Connector contact faulty.<br>(Insertion faulty)<br>(3) Drain sensor wiring open or contact faulty.<br>(4) Indoor-side controller board faulty. | (1)-(3)<br>Check thermistor resistance value.<br>0 °C .... 6.0 kΩ<br>10 °C .... 3.9 kΩ<br>20 °C .... 2.6 kΩ<br>30 °C .... 1.8 kΩ<br>40 °C .... 1.3 kΩ<br>(2) Check connector for faulty contact.<br>After reinserting connector, turn on power and recheck operation.<br>(4) If abnormality reproduced by shorting between drain sensor connector CN31 pins 1 and 2 and operating air conditioner, replace indoor-side controller board.<br>If there are no problems above, there are no abnormalities.<br>Turn on power and operate. |

<Abnormality detected during unit operation: Indoor-side unit>

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| P5 | **Drain overflow protection operation**<br>1) When the drain sensor thermistor overheats and the temperature rise is small, the compressor enters the check mode and is turned off and the indoor-side fan is turned off.<br>2) If the state above is detected again in the check mode, drain pump abnormality is recognized.<br>3) Always detected during drain pump operation. | (1) Drain pump trouble.<br>(2) Drain faulty.<br>Drain pump clogged.<br>Drain pipe clogged.<br>(3) Water droplets on drain sensor.<br>Drain water waves created by transmission of drain water from lead wire, clogged filter, etc.<br>(4) Indoor-side controller board faulty. | (1) Check drain up mechanism.<br>(2) Check drain characteristic.<br>(3) Check drain sensor lead wire arrangement and check for filter clogging.<br>(4) If abnormality reproduced by shorting between drain sensor connector CN31 pins 1 and 2 and operating air conditioner, replace indoor-side controller board.<br>If there are no problems above, there are no abnormalities.<br>Turn on the power and operate. |
| P6 | **Freezing/excessive rise protection operation**<br>1) Freezing protection<br>When the piping temperature remains at –15 °C or lower for 3 minutes after 3 minutes have elapsed since the compressor started, the compressor enters the 6 minutes restart prohibit mode and if the piping temperature again remains at –15 °C for 3 minutes within 16 minutes after 6 minutes restarting, an abnormality is recognized.<br>2) Excessive rise protection<br>When a piping temperature rise to 70 °C or higher is detected after the compressor starts, the compressor enters the 6 minutes restart prohibit mode. If a piping temperature rise up to 70 °C or higher is detected again within 10 minutes after 6 minutes restarting, an abnormality is recognized. | <Cool and dry><br>(1) Filter is clogged (insufficient air flow).<br>(2) Air duct short cycle.<br>(3) Low load operation (low temperature) exceeding allowable range.<br>(4) Indoor-side fan motor faulty.<br>(5) Outdoor-side fan control faulty (intermediate period, winter).<br>(6) Refrigerant overcharged.<br>(7) Refrigerant circuit faulty (clogged).<br><br><Heat><br>(1) Filter clogged (insufficient air flow)<br>(2) Air duct short cycle.<br>(3) Overload operation (high temperature) exceeding allowable range.<br>(4) Indoor-side fan motor faulty.<br>(5) Outdoor-side fan control faulty (intermediate period)<br>(6) Refrigerant overcharged.<br>(7) Refrigerant circuit faulty (clogged)<br>(8) Unit bypass circuit faulty. | <Cool and dry><br>(1) Check filter for clogging.<br>(2) Remove obstruction.<br>(4) Check indoor-side fan motor operation and winding resistance.<br>(5) Check outdoor-side fan motor operation.<br>(6)(7)<br>Check refrigerant circuit operation.<br><br><Heat><br>(1) Check filter for clogging.<br>(2) Remove obstruction.<br>(4) Check indoor-side fan motor operation and winding resistance.<br>(5) Check outdoor-side fan motor operation.<br>(6)-(8)<br>Check refrigerant circuit operation. |

<Abnormality detected during unit operation: Indoor-side unit>

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| P8 | **Piping temperature abnormal**<br><Cool><br>When the piping temperature stays outside the cooling area for 1 minute after 3 minutes have elapsed since the compressor was started, the indoor-side fan operates at low speed. If the piping temperature does not return to the cooling area after 5 minutes operation at low speed, an abnormality is recognized.<br>Note 1) It takes a minimum of 9 minutes for an abnormality to be detected.<br>Note 2) At dry operation, P8 abnormality is not detected.<br><Heat><br>When the piping temperature falls outside the heating area and enters the ventilation area after compressor operation and the end of hot adjust, the indoor-side fan stops and the piping temperature does not return to the heating area within 20 minutes after 10 seconds have elapsed after it left the heating area, an abnormality is recognized.<br>Note 3) It takes a minimum of 22 minutes and a maximum of 27 minutes for an abnormality to be detected.<br>Note 4) Except during defrosting (Detected again after defrosting return.) | (1) Indoor-side intake piping thermistor temperature differential small.<br>- Insufficient refrigerant<br>- Piping thermistor holder dislodged.<br>- Refrigerant circuit faulty.<br>(2) Indoor-side intake piping thermistor detection faulty. | (1) Operate in test run mode and check piping temperature.<br>(2) Check remote controller room temperature display and piping temperature in test run mode. |
| P9 | **Piping (2-phase pipe) sensor abnormal**<br>1) If thermistor short or open is detected and the compressor enters the 3 minutes restart prevention mode and does not return to normal after 3 minutes, an abnormality is recognized.<br>(If returned, returns to normal operation.)<br>2) Always detected during cool, dry, and heat (except during defrosting) operation.<br>Short: 90 °C or higher<br>Open: –40 °C or lower | (1) Thermistor characteristics faulty.<br>(2) Connector contact faulty.<br>(Insertion faulty)<br>(3) Thermistor wiring open or contact faulty.<br>(4) Faulty refrigerant circuit, etc. has caused thermistor temperature to rise to 90 °C or higher or drop to –40 °C or lower.<br>(5) Indoor-side controller board faulty. | (1)-(3)<br>Check thermistor resistance value.<br>For characteristic, see page 41.<br>(2) Check for connector faulty contact.<br>After reinserting connector, turn on power and recheck operation.<br>(4) Operate in trail run mode and check piping temperature with remote controller. When piping temperature is abnormally low (cooling) or high (heating), refrigerant circuit is probably faulty.<br>(5) Check test run mode piping temperature with remote controller.<br>If there is a difference between actual piping temperature and displayed piping temperature when there are no abnormalities at (1)-(4), replace indoor -side controller board. If there is no problem above, there are no abnormalities.<br>Turn on power and operate. |

<Abnormality detected during unit operation: Indoor-side unit>

| Abnormality display | Meaning of abnormality display and abnormality troubleshooting | Cause | Judgment method and remedy |
|---|---|---|---|
| E4 | Remote control communication receive abnormal<br>1) When the indoor-side controller board can not receive data normally from the remote controller or another indoor-side controller board even once in 3 minutes, an abnormality is recognized.<br>2) When the indoor-side controller board can not receive signals even once in 2 minutes, an abnormality is recognized. | (1) Remote controller transmission line contact faulty.<br>(2) All remote controllers set as “slave” remote controller.<br>(3) Remote controller send/receive circuit faulty.<br>(4) Indoor-side controller board send/receive circuit faulty.<br>(5) Noise entered on remote controller transmission line. | (1) Check if the unit or remote controller transmission line disconnected or loose.<br>(2) Set one remote controller as “master”. When there are no problems at the above<br>(3) Perform remote controller diagnosis.<br>a) [RC OK] display<br>Remote controller normal.<br>Check by turning power off and on.<br>If the abnormality occurs again, replace indoor-side controller board.<br>b) [RC NG] display<br>Replace remote controller.<br>c) [RC E3] display<br>[ERC00-66] noise, etc. is probable cause. |

<Troubleshooting and repair by symptom>

| Symptom and operation when normal | Cause | Symptom judgment and remedy |
|---|---|---|
| 1. No remote controller display | (1) DC14V is not supplied to remote controller.<br>(No power O display on liquid crystal panel.)<br>(2) DC14V is supplied to remote controller but nothing is displayed.<br>- "H0" not displayed<br>- "H0" displayed | (1) Check LED2 on indoor-side controller board.<br>1) Steady light<br>Check remote controller wire open or faulty contact.<br>2) Flashing<br>Check for remote controller wire short.<br>3) Not lit<br>Check outdoor-side controller refrigerant address.<br>(2) Make the following judgment:<br>- When "H0" is not displayed, remote controller is faulty.<br>- When "H0" is displayed, see item 2. |
| 2. Remote controller displays "H0" unchanged. | (1) Remote controller displays "H0" for maximum of 2 minutes for starting after power turned on.<br>(2) Indoor-remote controller communication faulty.<br>(3) Outdoor-indoor controller boards communication faulty. | (1) Normal operation.<br>(2) Remote controller self-diagnosis.<br>(3) When outdoor-indoor controller boards cannot communicate, "H0" is displayed for a maximum 6 minutes.<br>Check LED3 on indoor-side controller board.<br>1) Does not flash<br>Check indoor/outdoor controller boards connection cable for erroneous wiring.<br>(S1 and S2 or S3 open)<br>2) Flashes<br>Indoor/outdoor contorller boards connection cable is normal. |
| 3. When remote controller operation switch pressed, operation display appears but immediately disappears. | (1) Operation switch is disabled for approximately 30 seconds after function select operation from remote controller is released. | (1) Normal operation. |
| 4. Does not beep and air conditioner does not operate even when operated with wireless remote controller.<br>(Operation display appears on wireless remote controller.) | (1) Wireless remote controller and indoor-side controller board pair number setting mismatched.<br>(2) Cause of item 1. | (1) Check pair number setting.<br>(2) Item check of item 1. |
| 5. When operated with wireless remote controller, beeps but does not operate. | (1) Air conditioner does not operate for a maximum of 2 minutes after the power is turned on.<br>(2) Set to local operation prohibit mode.<br>- Remote start/stop adapter is connected to CN32 on indoor-side controller board.<br>- Air conditioner is connected to MELANS and is set to local operation prohibit mode from centralized controller, etc.<br>(3) Cause of item 2. | (1) Normal operation.<br>(2) Normal operation.<br>(3) Item check of item 2. |
| 6. Remote controller display is normal and cooling operation is performed, but without any capacity (does not cool). | (1) Insufficient refrigerant.<br>(2) Filter clogged.<br>(3) Outdoor-side heat exchanger clogged.<br>(4) Air duct short cycle.<br>(5) LEV malfunction | (1) - When there is leakage, discharge temperature rises. Therefore, check by measuring temperature.<br>- Check for gas leakage from piping connections, etc.<br>(2) Open intake grille and check filter. Clean filter, and remove dust and dirt.<br>(3) - Since both indoor-side piping temperature and outlet pressure rise when filter clogged, judge by measuring outlet pressure.<br>- Clean heat exchanger.<br>(4) Remove obstruction.<br>(5) Check refrigerant circuit operation state. |

| Symptom and operation when normal | Cause | Symptom judgment and remedy |
|---|---|---|
| 7. Remote controller display is normal and heating operation is performed but without any capacity (does not heat). | (1) Insufficient refrigerant.<br>(2) Refrigerant piping heat insulation insufficient.<br>(3) Filter clogged.<br>(4) Indoor-side heat exchanger clogged.<br>(5) Air duct short cycle.<br>(6) LEV malfunction | (1) - Since the discharge temperature rises when there is leakage, judge by measuring the temperature.<br>- Check piping connections, etc. for gas leakage.<br>(2) Check heat insulation.<br>(3) Open intake grille and check filter.<br>Clean filter, and remove dust and dirt.<br>(4) - Since the indoor-side piping temperature and outlet pressure rise when the heat exchanger is clogged, judge by measuring the outlet pressure.<br>- Clean heat exchanger.<br>(5) Remove obstruction.<br>(6) Check refrigerant circuit operation state. |

# 13 Test run

## [1] Before test run

The test run can be carried out either from the unit or remote controller.

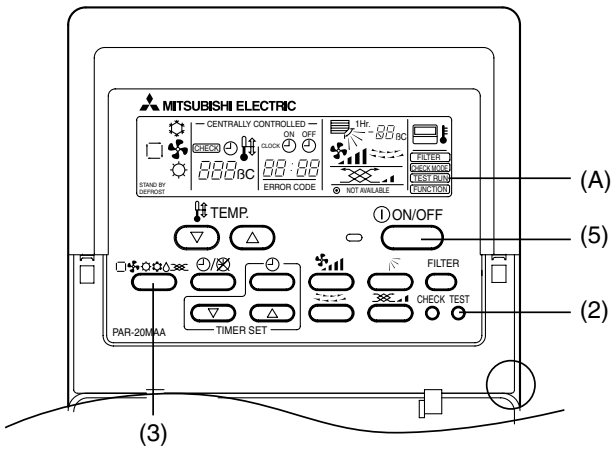
**1. Check list**

- After wiring of units are complete, check that refrigerant is not leaking, the power and control wires are not loose, and the poles are not reversed.
- Use a 500 V insulation resistance tester to make sure that the resistance between the power terminal and the ground is 1.0 MΩ or more. If it is less than 1.0 MΩ, do not operate the unit.
- Make sure there is no malfunction in the unit. (If there is a malfunction, you can diagnose it using LED1 on the outdoor-side controller board.)
- Check the electrical power phase. If the phase is reversed, the fan may rotate in the wrong direction or stop, or unusual sounds may be produced.
- Starting at least 12 hours before the test run, send current through the crankcase heater. (If the current is running for a shorter period of time, damage to the compressor could result.)
- For specific models requiring changing of settings for selection of power supply ON/OFF capability, make proper changes referring to the description for Selection of Functions through Remote Controller.

After the above checks are complete, carry out the test run as indicated in the following outline.

## [2] Test run procedures

**1. Remote controller**




**Operating procedures**

(1) Turn on the main power supply
While the room temperature display on the remote controller reads “CENTRALLY CONTROLLED”, the remote controller is disabled. Turn off the “CENTRALLY CONTROLLED” display before using the remote controller.

(2) Press “TEST RUN” button twice
(A) The “TEST RUN” indicator should light up.

(3) Press button
Cooling mode: Cool air should start to blow.
Heating mode: Warm air should start to blow (after a while).

(4) Press button
Check for correct motion of auto-vanes.

(5) Check the outdoor-side fan for correct running
The unit features automatic capacity control to provide optimum outdoor-side fan speeds. The fan keeps running at a low speed to meet the current outside air condition unless it exceeds its available maximum power. Then, in actuality, the fan may stop or run in the reverse direction depending on the outside air, which does not mean malfunction.

(6) Press the “ON/OFF” button to reset the test run in progress
- The test run will be automatically shut down after two hours in response to the AUTO STOP setting of two hours on the timer.
- During the test run, the room temperature display shows the unit indoor-side liquid piping temperatures.
- In the case of the test run, the OFF timer will activate, and the test run will automatically stop after two hours.
- The room temperature display section shows the control temperature for the units during the test run.
- Check that the units are running properly operation.
  Malfunctions may not be displayed even if the wiring is incorrect.

(*1)
After turning ON the power, the system will go into startup mode, and the remote controller operation lamp (red) and the room temperature display section’s “H0” will flash. Also, in the case of the indoor-side controller board substrata LEDs, LED 1 and LED 2 light up (when address is 0) or become dim (when address is not 0), and LED 3 flashes. In the case of the outdoor-side controller board substrata LED 1 display, [– ] and [ –] are displayed alternatively at 1-second intervals.
- If one of the above operations does not function correctly, the following causes should be considered, and if applicable, dealt with. (The following symptoms have been determined under test run mode. Note that “startup” in the chart means the *1 display above.)

| Symptoms | | Cause |
|---|---|---|
| Remote Controller Display | Outdoor Substrate LED Display | |
| Remote controller is displaying “H0”, and operation is not possible. | After “startup” display, “00” is displayed (correct operation). | • After power is turned ON, system startup lasts for about 2 mins., and “H0” is displayed (correct operation). |
| After power is turned ON, “H0” is displayed for 3 mins., then error code is displayed. | After “startup” display, error code is displayed. | • Outdoor-side unit’s safeguard installation connector is open.<br>• Negative phase and open phase of outdoor unit’s power terminal board (Single phase: L, N, ⏚/triple phase: L1, L2, L3, N, ⏚) |
| | After “startup” display, “F1” (negative phase) is displayed. | • Incorrect connection of outdoor terminal board (Single phase: L, N, ⏚/ triple phase: L1, L2, L3, N, ⏚ grounding and S1, S2, S3) |
| Power is turned ON, and “EE” or “EF” are displayed after “H0” is displayed. | After “startup” display, “00” or “EE” is displayed (“EE” is displayed when a test run is made). | • Unit construction differ |
| Display messages do not appear even when remote controller operation switch is turned ON (operation lamp does not light up). | After “startup” display, “EA” (error for number of units) or “Eb” (unit number error) is displayed. | • Wiring for the unit is not connected correctly. (Polarity is wrong for S1, S2, S3)<br>• Remote controller transmission wire short |
| | After “startup” display, “00” is displayed (correct operation). | • There is no unit for address 0 (address is something other than 0). |
| | After “startup” display, “00” is displayed (correct operation). | • Remote controller transmission wire burnout |
| Operation display appears but soon disappears even when remote controller operations are executed. | After “startup” display, “00” is displayed (correct operation). | • After cancellation of function selection, operation is not possible for about 30 secs. (correct operation). |

* Press the remote controller’s “CHECK” button twice consecutively to be able to run a self diagnosis. See the chart below for content of error code displays.

| LCD | Nonconformity Content | LCD | Nonconformity Content | LCD | Nonconformity Content |
|---|---|---|---|---|---|
| P1 | Suction sensor error | P8 | Pipe temperature error | E6 ~ EF | Signal error between indoor-side controller board and outdoor-side controller board |
| P2 | Piping (liquid pipe) sensor error | P9 | Piping (2-phase pipe) sensor error | | |
| P4 | Drain sensor error | U0 ~ UP | Unit nonconformity | - - - - | No error history |
| P5 | Drain overflow safeguard operation | F1 ~ FA | Unit nonconformity | FFFF | No relevant unit |
| P6 | Freezing/overheating safeguard operation | E0 ~ E5 | Signal error between remote controller and unit | | |

See the chart below for details of the LED displays (LED 1, 2, 3) on the indoor-side controller board.

| | |
|---|---|
| LED 1 (microcomputer power supply) | Displays the ON/OFF of power for control. Check that this is lit during normal use. |
| LED 2 (remote controller feed) | Displays the ON/OFF of feed to wired remote controller. Is only lit for the unit of outdoor-side controller board with address “00”. |
| LED 3 (indoor and outdoor signals) | Displays signal between indoor-side and outdoor-side controller boards. Check that this is flashing during normal use. |

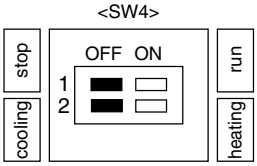
## 2. Outdoor-side controller board

(1) Check Items
- After installation of unit, and electric wiring work,check that the unit is free from leaks of refrigerant, loosened connections,and incorrect polarity.
- Check that there is no negative phase and open phase. (The F1 message for negative phase and the F2 message for open phase will flash at LED 1 on the outdoor-side controller board substrate. If this happens,rewire correctly.)
- Measure the impedance between power terminals (Single phase: L, N, ⏚/triple phase: L1, L2, L3, N,⏚) and the ground with a 500 V Megger and check that it is 1.0 M or more. Do not operate the equipment if measurement is less than 1.0 M.
- When there is no error at the unit. (If there is an error at the unit, it can be evaluated at LED 1 [digital display] of the outdoor-side controller board.)
- After checking the above, execute the test run in accordance with the following.

(2) Test run start and finish

• Operation from the outdoor-side controller board

Execute settings for test run start,finish and operation mode (cooling, heating) using the DIP switch SW 4 on the outdoor-side controller board substrate.




a) Set the operation mode (cooling, heating) using SW 4-2
b) Turn ON SW 4-1, The operation mode for SW 4-2 will be adhered to, and the test run will commence
c) Turn OFF SW 4-1 to finish the test run

• There may be a faint knocking noise emitted from the proximity of the fan during the test run. This is torque fluctuation occurring due to control of fan revolutions. There is no problem with the product.

Note:
The SW 4-2 operation mode cannot be changed during the test run. (To change test run mode, stop the equipment with SW 4-1, change the operation mode, then restart test run with SW 4-1.)
As there are 2 circuits for PRH-P16 and 20MYA, make the same setting on other outdoor-side controller boards.

• If the 2-hour timer is set,the test run will stop automatically after 2 hours.
• During the test run,the room temperature display on the indoor-side will indicate the temperature of the indoor-side piping.

(3) How to handle problems with the test run

**Error code list: details**

| Error details | Problem location | MELANS display | Remote controller display |
|---|---|---|---|
| Remote controller communication – reception error | Remote Controller | 6831,6834 | E0 |
| Remote controller communication – transmission error | Remote Controller | 6832,6833 | E3 |
| Remote controller communication – reception error | Indoor-side controller board | 6831,6834 | E4 |
| Remote controller communication – transmission error | Indoor-side controller board | 6832,6833 | E5 |
| Communication between indoor-side and outdoor-side controller boards – reception error | Indoor-side controller board | 6740,6843 | E6 |
| Communication between indoor-side and outdoor-side controller boards – transmission error | Indoor-side controller board | 6841,6842 | E7 |
| Communication between indoor-side and outdoor-side controller boards – reception error | Outdoor-side controller board | 6840,6843 | E8 |
| Communication between indoor-side and outdoor-side controller boards – transmission error | Outdoor-side controller board | 6841,6842 | E9 |
| Connection wiring error (interference, loose) | Outdoor-side controller board | 6844 | EA |
| Connection wiring error (interference, loose) | Outdoor-side controller board | 6845 | EB |
| Excessive time in use | Outdoor-side controller board | 6846 | EC |
| Serial communication error | Outdoor-side controller board | 0403 | ED |
| Serial communication error | M-NET board | 0403 | EE |
| Reverse phase, out of phase verification | Outdoor-side controller board | 4103 | F1 |
| Faulty input circuit | Outdoor-side controller board | 4115 | F8 |
| Duplicated M-NET address setting | M-NET board | 6600 | A0 |
| M-NET error in PH/W transmission | M-NET board | 6602 | A2 |
| M-NET bus busy | M-NET board | 6603 | A3 |
| M-NET communication error with P transmission | M-NET board | 6606 | A6 |
| M-NET error – no ACK | M-NET board | 6607 | A7 |
| M-NET error- no response | M-NET board | 6608 | A8 |
| Undefined error code | – | undefined | EF |
| Discharge temperature error | Outdoor-side controller board | 1102 | U2 |
| CN23 Short-circuit Connector Unplugged | Outdoor-side controller board | 1108 | U2 |
| Open/short in discharge temp thermistor | Outdoor-side controller board | 5104 | U3 |
| Open/short in liquid temp or condenser/evaporater temp thermistor | Outdoor-side controller board | 5105 | U4 |
| Compressor overcurrent interruption (51C operation) | Outdoor-side controller board | 4101 | U6 |
| High pressure error (63H1 operation) | Outdoor-side controller board | 1302 | UE |
| Low pressure error (63L operation) | Outdoor-side controller board | 1300 | UL |
| Power synchronous idle circuit error | Outdoor-side controller board | 4115 | F8 |
| Inlet sensor error | Indoor-side controller board | 5101 | P1 |
| Piping (liquid pipe) sensor error | Indoor-side controller board | 5102 | P2 |
| Drain sensor error | Indoor-side controller board | 2503 | P4 |
| Drain overflow protector operation | Indoor-side controller board | 2502 | P5 |
| Water leak error | Indoor-side controller board | 2500 | P5 |
| Freeze prevention operation | Indoor-side controller board | 1503 | P6 |
| Surge prevention operation | Indoor-side controller board | 1504 | P6 |
| Piping temperature error | Indoor-side controller board | 1110 | P8 |
| Piping (2-phase pipe) sensor error | Indoor-side controller board | 5103 | P9 |

- Depending on the position of the SW2 switch on the outdoor-side controller board, the segments light up to indicate the running condition of the unit and the particulars of the check code.

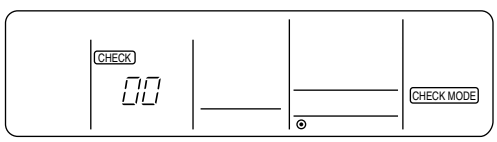
<table>
<tr><th>SW2 setting<br>123456</th><th>Item</th><th>Display contents</th></tr>
<tr><td>000000</td><td>Operation mode/relay output</td><td>tens place O: stop<br>C: cooling<br>H: heating<br>d: defrosting<br>units place 1: SV1<br>2: 21S4<br>4: 52C<br>Relay output = SV1 + 21S4 + 52C<br>Ex. During cooling mode, when 52C and SV1 are ON: C5<br>When an error occurs, the error code and error signal (*1) are displayed in alternation.</td></tr>
<tr><td>011110</td><td>Outdoor-side control condition</td><td rowspan="2">Control mode display system<br>  <br>Nothing<br>  <br>Indoor-side<br>Outdoor-side<br><table><tr><th rowspan="2">Display</th><th colspan="2">Control mode</th></tr><tr><th>Indoor-side</th><th>Outdoor-side</th></tr><tr><td>0</td><td>Ordinary</td><td>←</td></tr><tr><td>1</td><td>Hot adjustment</td><td>←</td></tr><tr><td>2</td><td>Defrosting</td><td>←</td></tr><tr><td>3</td><td>—</td><td>←</td></tr><tr><td>4</td><td>Heater ON</td><td>←</td></tr><tr><td>5</td><td>Freeze prevention</td><td>←</td></tr><tr><td>6</td><td>Surge prevention</td><td>←</td></tr><tr><td>7</td><td>Compressor OFF</td><td>←</td></tr></table></td></tr>
<tr><td>010110</td><td>Indoor-side control (IC1) condition</td></tr>
<tr><td>011100</td><td>Error code history 1</td><td rowspan="2">The error code (ex. U8, UA) and error indicator (*1) are displayed in alternation.</td></tr>
<tr><td>111100</td><td>Error code history 2</td></tr>
</table>

*1 Display system for error indicator
The indicator corresponds to the following numbers
0 ..... Outdoor-side
1 ..... Indoor-side

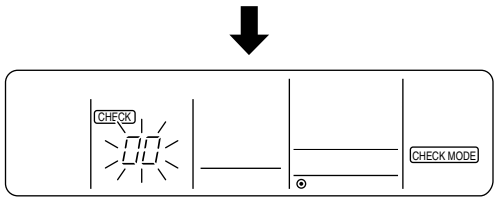
## [3] Self-diagnosis

Use the remote controller to look up the unit error history.

1.



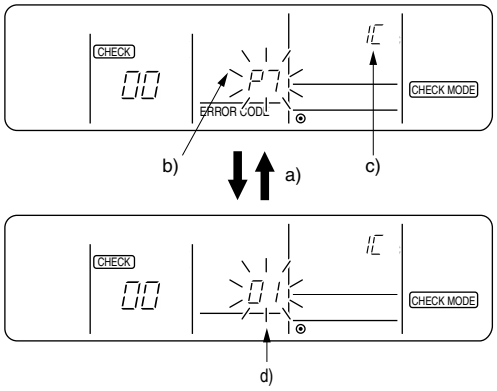

2.




**1. Change to self-diagnosis mode**
Press the CHECK button twice within three seconds to show the following

**2. Select the refrigerant address number to be self-diagnosed**
Press the △ ▽ buttons to scroll through the refrigerant address numbers (00 to 15)and select the refrigerant address number to be self-diagnosed.
After three seconds from making the change,the lit refrigerant address to be self-diagnosed will start to flash,and self-diagnosis will commence.

3. (1)



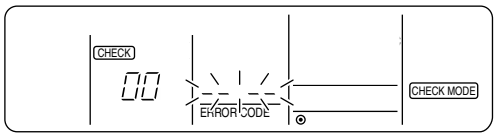

**3. Self-diagnosis result display**

See the above chart for details of error code contents.

(1) When there is an error history

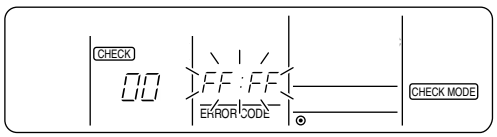
a) Alternating display
b) Error code
c) Attribute of error search
d) Unit number

(2)



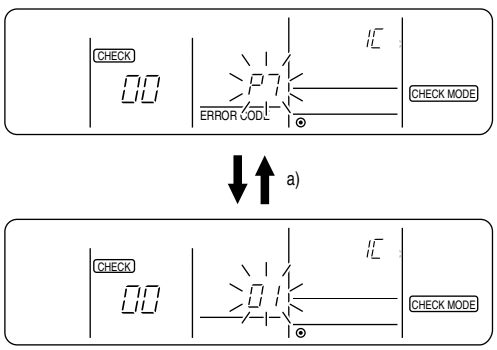

(2) When there is no error history

(3)




(3) When the address does not exist

4.




**4. Reset error history**

Display the error history at the self-diagnosis result display screen 3.

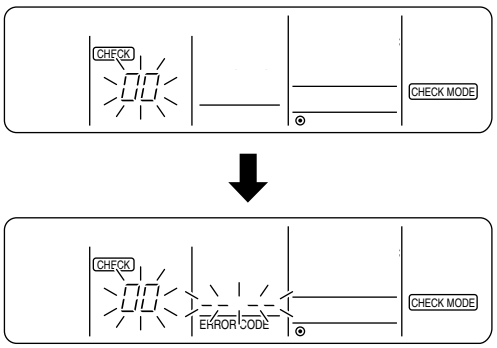
The address for self-diagnosis will flash when the CLOCK → ON → OFF button is pressed twice within three seconds.

The diagram on the left will be displayed when error history has been reset.

Note that the error content will be redisplayed if error history resetting is unsuccessful.

a) Alternating display

5.



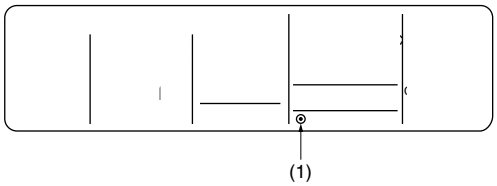

**5. Canceling self-diagnosis**

The following two methods can be used to cancel self-diagnosis. Press the CHECK button twice within three seconds to cancel self-diagnosis. The display screen will return to the status before self-diagnosis. Press the 1 ON/OFF button to cancel self-diagnosis. The unit will stop. (This operation is ineffectual when operation is prohibited.)

## [4] Remote controller diagnosis

If operation cannot be carried out from the remote controller,use this function to diagnose the remote controller.

1.

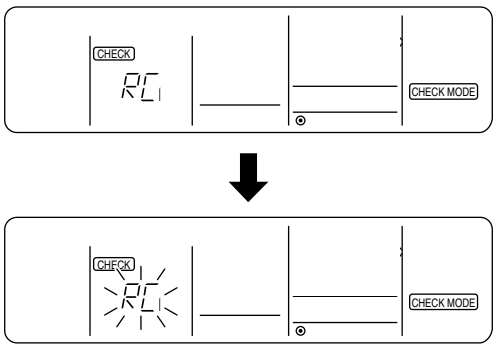



**1. First, check the electricity current marker**

If the correct voltage (DC 12V) is not displayed on the remote controller, the electric current marker will be lit. If the electricity current marker is not lit, check the remote controller wiring and the unit.

(1) Electric current marker

2.

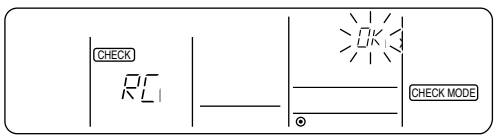



**2. Transfer to remote control mode**

Hold down the CHECK button for five seconds or more to display the diagram on the left.

Press the FILTER button to commence diagnosis of remote controller.

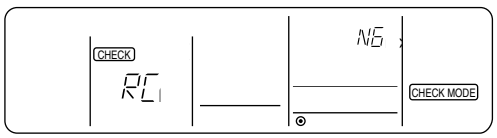
3. (1)




**3. Remote controller diagnosis results**

(1) The remote control is functioning correctly.
Check other possible causes as there are no problems with the remote controller.

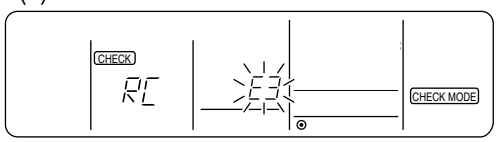
(2)




(2) The remote controller has a nonconformity.
The remote controller must be replaced.
Error display 1 (“NG”) flashes to show a nonconformity in the transmitter-receiver circuit.

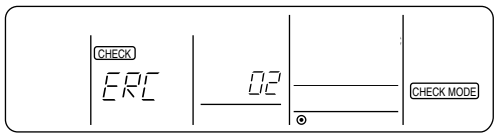
**Potential problems other than those diagnosed for the remote controller.**

(1)



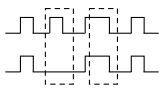

(1) Single transmission not possible if error display 2 (“E3”) flashes.
There is “noise” on the transmission line, or damage of other remote controllers for the units can be considered. Check the transmission path and other controllers.

(2)




(2) Data error has occurred when error display three shows “ERC” and number of data errors.
Number of generated data errors (maximum 66 errors).
The number of generated data errors stands for the difference in the number of bits of transmitted data from the remote controller and the actual number of bits that were transmitted along the transmission path. If this error occurs, “noise”, etc., is interfering with the transmission data. Check the transmission path.

K) When the number of data errors generated is 02



L) Remote controller transmission data

M) Transmission data at transmission path

**4. Cancel the remote controller diagnosis**

Hold down the CHECK button for five seconds or more to cancel the remote controller diagnosis. The “H0” operation lamp will flash, and the display screen will return to the status before remote controller diagnosis in approximately 30 seconds.

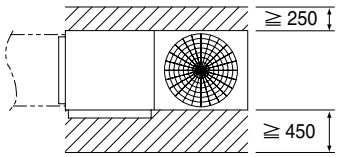
# 14 INSTALLATION

All series of air conditioners are designed for outdoor installations and are to be placed on a slab or rooftop, however if the air conditioner is to be installed in a plant room application, please contact your equipment supplier prior to installation.

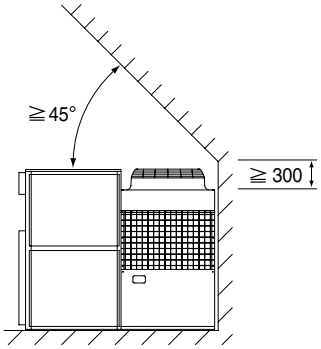
## [1] Space required around units

• Models PRH-P8MYA/P10MYA

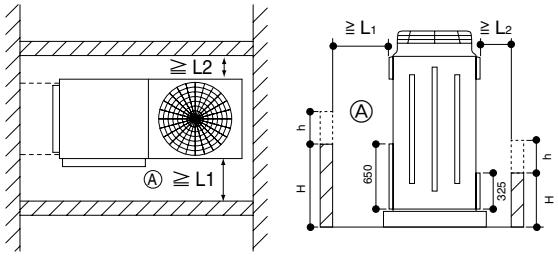
**1.** <A>



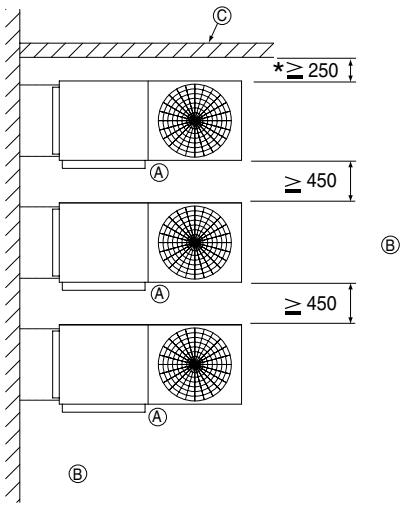

**2.** <B>




**3.** <A> <B>




**4.**




1. Basic space required
   A space of at least 250 mm is necessary at the back for inlet air. Taking servicing, etc. from the rear into account, a space of about 450 mm should be provided, the same as at the front.
2. When there is an obstruction above the unit
3. When unit is surrounded by walls

**Note:**

- **Wall heights (H) of the front and the back sides shall be within overall height of unit.**
- **If the panel height is exceeded, add the "h" dimension to $L_1$ and $L_2$.**

  $L_1$: 450 $L_2$: 250

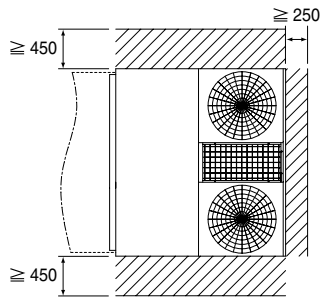
  Example: When h is 100,
  the $L_1$ dimension becomes 450 + 100 = 550 mm.

4. Continuous installation
   - Space required for collective installation and continuous installation: When installing several units, leave the space between each unit considering passage for air and people.
   - Open in the two directions.
   - In case wall height (H) exceeds overall height of unit, add "h" dimension (h = wall height <H> – overall height of unit) to * marked dimension.

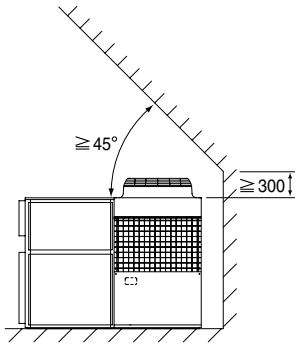
<A> Top view
<B> Side view
Ⓐ Front
Ⓑ Must be open
Ⓒ Wall height (H)
$L_1$: 450 $L_2$: 250

• Models PRH-P16MYA/P20MYA

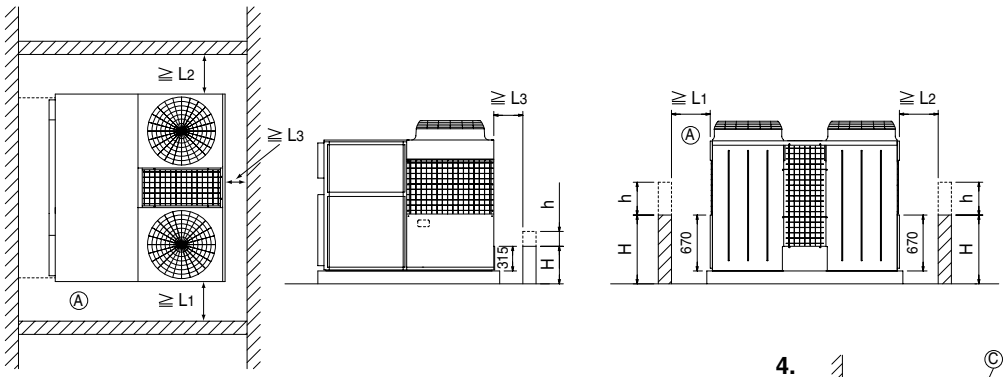
**1.** <A>



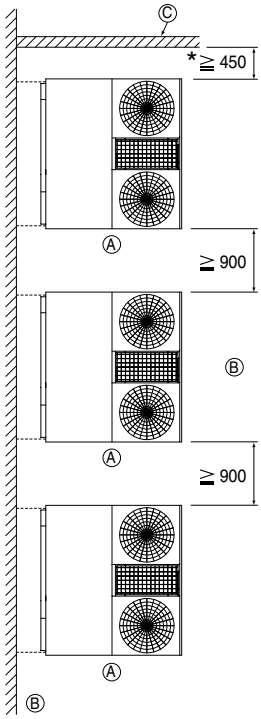

**2.** <B>




**3.** <A> <B> <C>




**4.**




1. Basic space required
   A space of at least 250 mm is necessary at the right side for inlet air. Taking servicing, etc. from the right side into account, a space of about 450 mm should be provided, the same as at the front and back.
2. When there is an obstruction above the unit
3. When unit is surrounded by walls

**Note:**

- **Wall heights (H) of the front and the back sides shall be within overall height of unit panel.**
- **If the panel height is exceeded, add the "h" dimension to $L_1$, $L_2$ and $L_3$.**

  $L_1$: 450 $L_2$: 450 $L_3$: 250

  Example: When h is 100,
  the $L_1$ dimension becomes 450 + 100 = 550 mm.

4. Continuous installation
   - Space required for continuous installation:
     When installing several units, leave the space between each unit considering passage for air and people.
   - Open in the two directions.
   - In case wall height (H) exceeds overall height of unit, add "h" dimension (h = wall height <H> – overall height of unit) to * marked dimension.

<A> Top view <B> Front view <C> Side view

Ⓐ Front

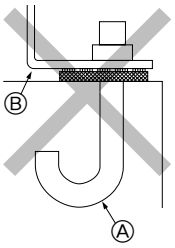
Ⓑ Must be open

Ⓒ Wall height (H)

$L_1$: 450 $L_2$: 450 $L_3$: 250

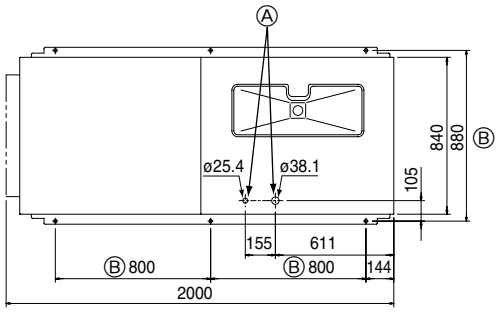
## [2] Installation of the unit

• Models PRH-P8MYA/P10MYA




Ⓐ M10 anchor bolt procured at the site.

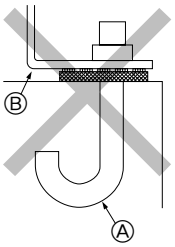
Ⓑ Corner is not seated.




Ⓐ Bottom wiring through hole

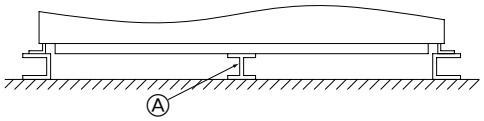
Ⓑ (bolt hole)

• Models PRH-P16MYA/P20MYA

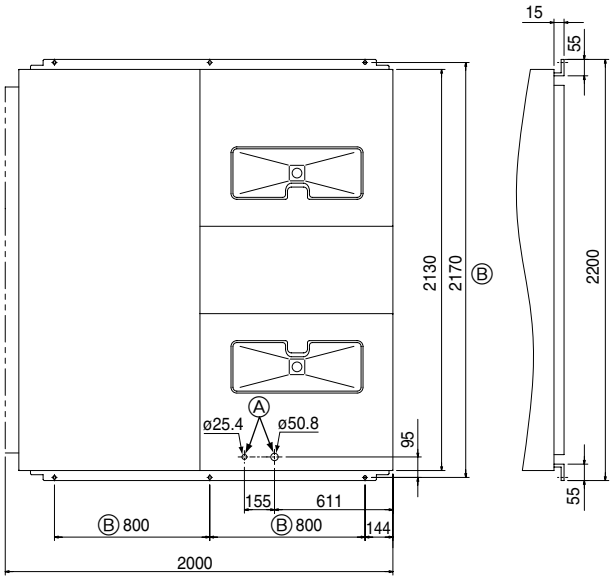



Ⓐ M10 anchor bolt procured at the site.

Ⓑ Corner is not seated.




Ⓐ Stander




Ⓐ Bottom wiring through hole

Ⓑ (bolt hole)

- Fix unit tightly with bolts so that unit will not fall down due to earthquake or gust.
- Use concrete or angle for foundation of unit.
- Vibration may be transmitted to the installation section and noise and vibration may be generated from the floor and walls, depending on the installation conditions. Therefore, provide ample vibrationproofing (cushion pads, cushion frame, etc.).
- Be sure that the corners are firmly seated. If the corners are not firmly seated, the installation feet may be bent.
- When making foundation of unit, put a stander in the middle of unit base.

**⚠Warning:**

- **Be sure to install unit in a place strong enough to withstand its weight.**
  **Any lack of strength may cause unit to fall down, resulting in a personal injury.**
- **Have installation work in order to protect against a strong wind and earthquake.**
  **Any installation deficiency may cause unit to fall down, resulting in a personal injury.**

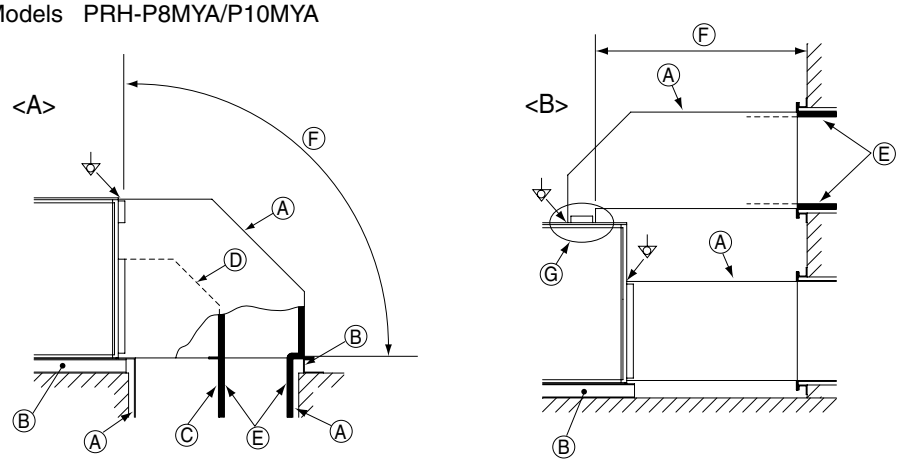
When building the foundation, give full attention to the floor strength, drain water disposal <during operation, drain water flows out of the unit>, and wiring routes.

**Down wiring precautions**

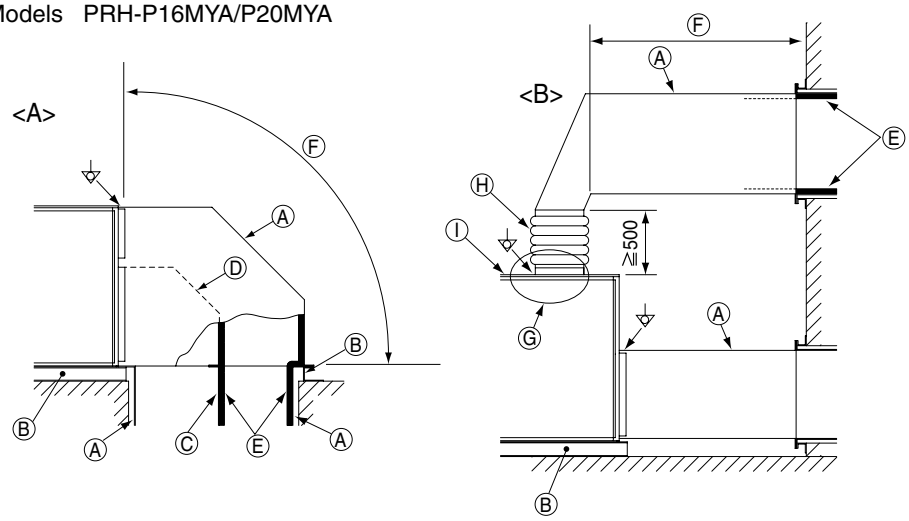
When down wiring are performed, be sure that foundation and base work does not block the base through holes.

## [3] Duct construction

• Models PRH-P8MYA/P10MYA




• Models PRH-P16MYA/P20MYA




<A> Ex. Side flow
<B> Ex. Top flow

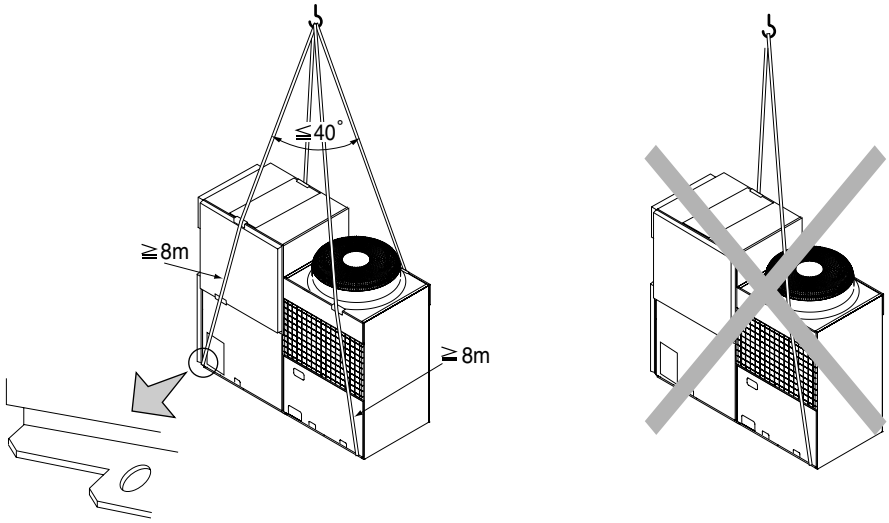
Ⓐ Duct
Ⓑ Roof curb
Ⓒ Single duct divider
Ⓓ Plenum divider
Ⓔ Insulator
Ⓕ Keep duct-work length 850 mm or more
Ⓖ Rainproof the part where the duct flange is screwed on (Top flow only).
Ⓗ Canvas duct (Keep 500mm or more for canvas duct space)
Ⓘ Top panel

1. In case of side flow unit (factory setting) is equipped with horizontal supply and return air openings. Duct connection to the unit should be made with duct flanges and secured directly to the air openings with flexible duct connectors to avoid normal noise transmission.
2. For vertical air supply, a field supply plenum should be used.
   The figure above shows the recommended method for duct connection.
3. In case of top flow unit (modified when installed) is equipped with vertical supply and horizontal return air openings. Duct connection to the unit should be made with duct flanges and securely attached to the air openings with flexible duct connectors.
4. To prevent air leakage, all duct seams should be taped.
   Ducts run in air spaces that are not air-conditioned must be insulated and provided with a vapor barrier.
   Ducts exposed to the outside must be weather proofed.
   For quiet operation, we recommend that the insulation on the supply duct be placed inside, lining the duct.
5. Where ducts from the outside enter a building, the duct openings in the building should be sealed with weather stripping to prevent rain, duct, sand, etc. from entering the building.
6. Fans will not accept any external resistance to airflow and what provision is available if ductwork is to be fitted to the external fans.
7. Correctly sized filters must be fitted and there is no provision within the unit, however the filters (field supply) may be installed in the return air.
8. Duct earth wiring must be connected to the earth point of unit (⏚mark point).

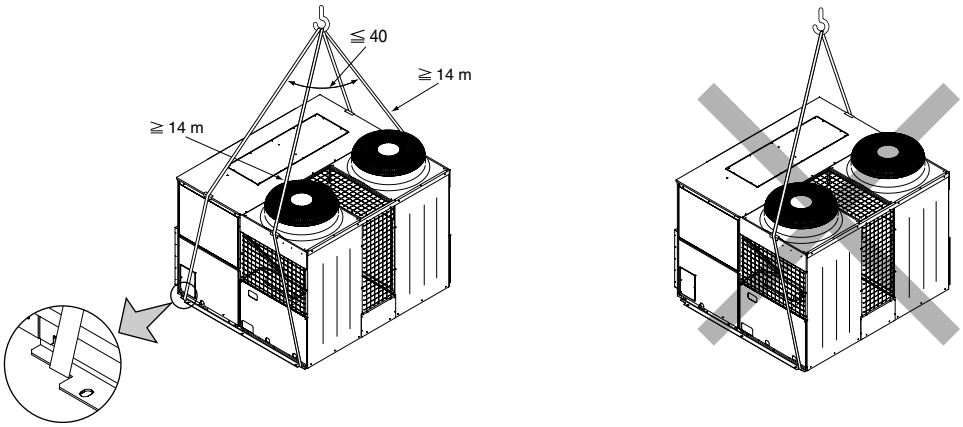
**⚠Caution:**
- **Do not step on the unit.**
  -Step on the unit may deform top panel and result in injury.
- **Outlet duct is 850 mm or more necessary to construct.**
- **To connect the air conditioner main body and the duct for potential equalization.**
- **In case of top flow unit (PRH-P16MYA/P20MYA) keep 500mm or more for canvas duct space.**

## [4] Lifting method

• Models PRH-P8MYA/P10MYA




• Models PRH-P16MYA/P20MYA

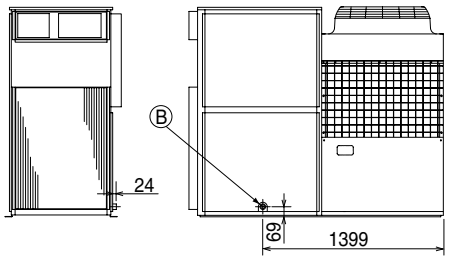



⚠**Caution:**

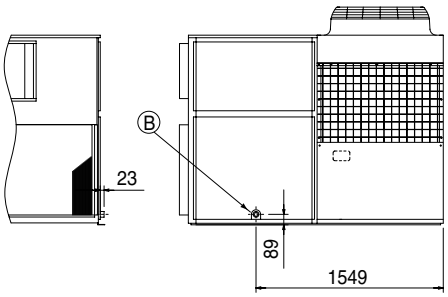
- **Be very careful to carry product.**
- Do not have only one person to carry product if it is more than 20 kg.
- PP bands are used to pack some products. Do not use them as a mean for transportation because they are dangerous.
- Do not touch heat exchanger fins with your bare hands. Otherwise you may get a cut in your hands.
- Tear plastic packaging bag and scrap it so that children cannot play with it. Otherwise plastic packaging bag may suffocate children to death.
- When carrying in outdoor unit, be sure to support it at four points. Carrying in and lifting with 3-point support may make outdoor unit unstable, resulting in a fall of it.
- **Protect the corners on the unit that come in contact with the sling with padding.**

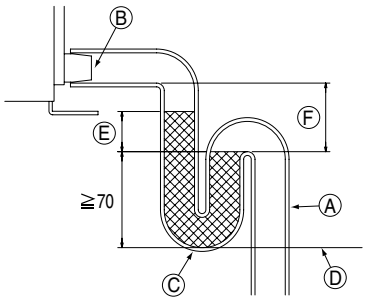
## [5] Drain piping

• Models PRH-P8MYA/P10MYA




• Models PRH-P16MYA/P20MYA



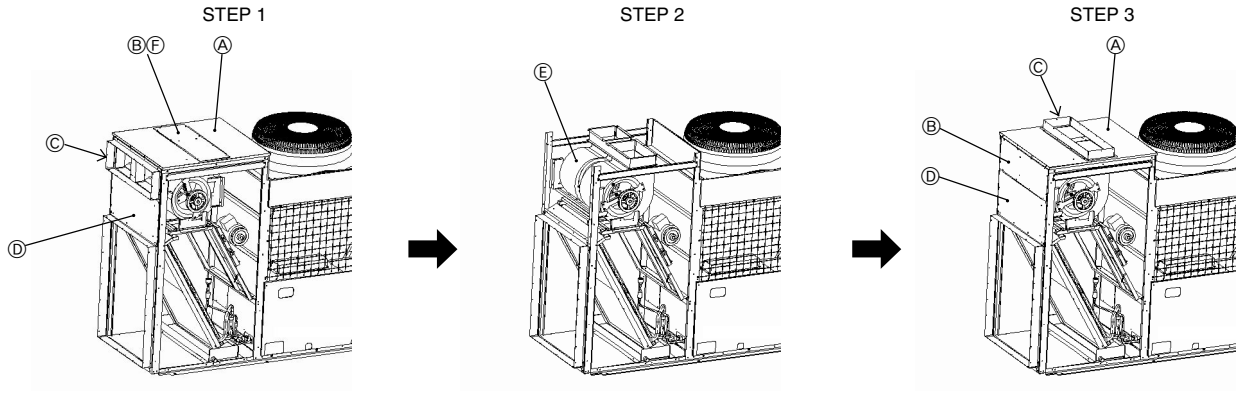




Ⓐ Drain piping
Ⓑ Socket R1
Ⓒ Drain trap
Ⓓ The drain pipe should extend below the level.
Ⓔ ≧ 2 × External static pressure
Ⓕ ≧ 2 × Ⓔ

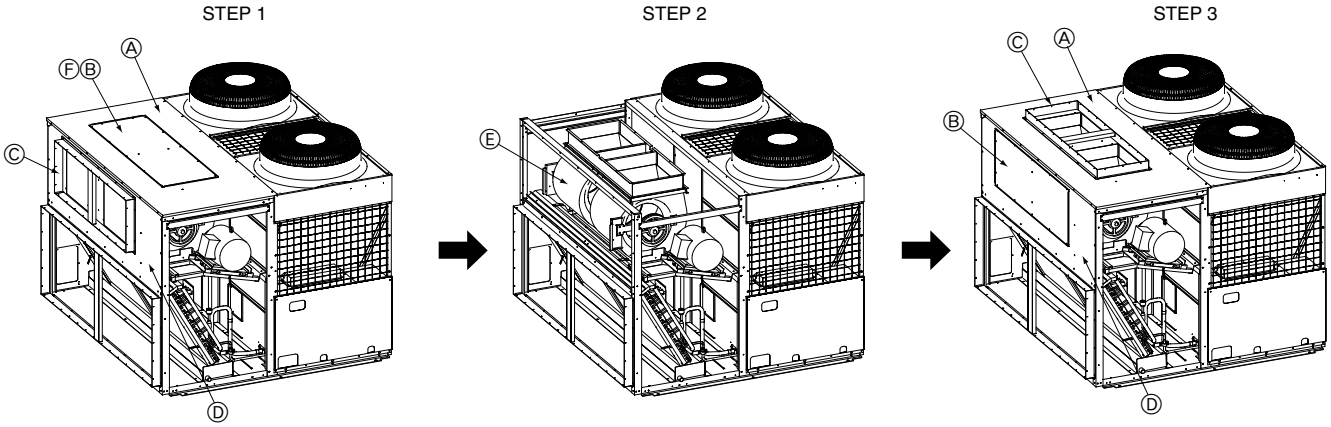
1. The condensate drain socket (R1) is provided. The drain pipe is connected to the drain socket.
2. The drain pipe must be provided with a trap on the outside of the unit and also installed at an incline for proper drainage, as shown in the figures above.
3. To prevent dew condensation and leakage, provide drain pipes with insulation.
4. Upon completion of the piping work, check that there is no leakage and that the water drains off properly.

## [6] Modification method of fan direction (From side flow to top flow)

• Models PRH-P8MYA/P10MYA




• Models PRH-P16MYA/P20MYA




Ⓐ Top panel Ⓑ Cover (outer side) Ⓒ Flange Ⓓ Panel Ⓔ Fan Ⓕ Cover (inner side) ····· 2pcs

This product can be changed from side flow to top flow in the field.
Modify if necessary as follows.

① Remove the top panel Ⓐ, cover (outer side) Ⓑ, flange Ⓒ, panel Ⓓ and cover (inner side) Ⓕ. (STEP 1)
② Modify the fan Ⓔ direction. (STEP 2)
When working with the fan Ⓔ suspended, do not rope the shaft of the fan.
③ Re-install the top panel Ⓐ, cover Ⓑ, flange Ⓒ and panel Ⓓ. (STEP 3)
*Between flange Ⓒ, top panel Ⓐ, and screw fittings should be adequately waterproofed.

**Note:**

**• In the case of top flow, the inner cover Ⓕ is not necessary.**

## [7] The putting condition of the belt

1. Set the parallel angle of the fan and the motor pulley as shown in the table and figure 1 below.
2. Set the tension of the per one belt when the flexion load is within the range as shown in the figure 1 and table 2 below at the proper flexion. (A = 0.016 × C mm)
3. Adjust the suitable tension after the belt sit properly across the pulley (after more 24-28 hours working). When the new belt is used, adjust the suitable tension about the 1.3 times of the maximum value of the flexion load.
4. Readjust the belt every 2,000 hours after the first adjustment. Exchange the belt when the belt's surroundings length has expanded by 2% including the first expansion of the belt. (about 1%) (about 8,000 hours converted working time)

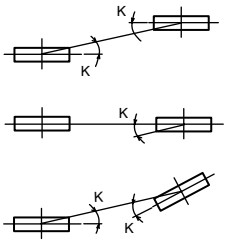



figure1 Parallel degree of pulley

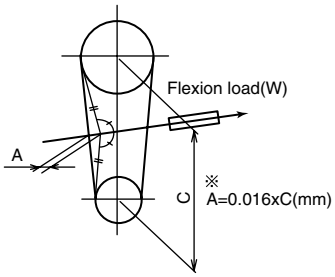



figure2 Belt tension

table 1

| parallel angle / pulley | K (″) | note |
|---|---|---|
| pulley | 10 or less | gap of 3mm every 1m |

table 2

| pulley | | Flexion load W (N) |
|---|---|---|
| type | smaller out diameter (mm) | |
| B | ～135 | 22 ～29 |
| | 136 ～160 | 27 ～34 |
| | 161 ～ | 29 ～37 |

Certificate Number FM33568

The Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of quality warranties for the production of refrigeration and air conditioning equipment.

ISO Authorization System
The ISO 9000 series is a plant authorization system relating to quality warranties as stipulated by the ISO. ISO 9001 certifies quality warranties based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.

Certificate Number EC97J1227
Registered on March 10, 1998

The Air Conditioning & Refrigeration Systems Works acquired environmental management system standard ISO 14001 certification.

The ISO 14000 series is a set of standards applying to environmental protection set by the International Standard Organization (ISO). ISO 14001 certifies the plant's environmental protection system and activities.

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