MITSUBISHI ELECTRIC

AIR TO WATER HEAT PUMP

April 2019

No. OCH562
REVISED EDITION-D

SERVICE MANUAL R410A

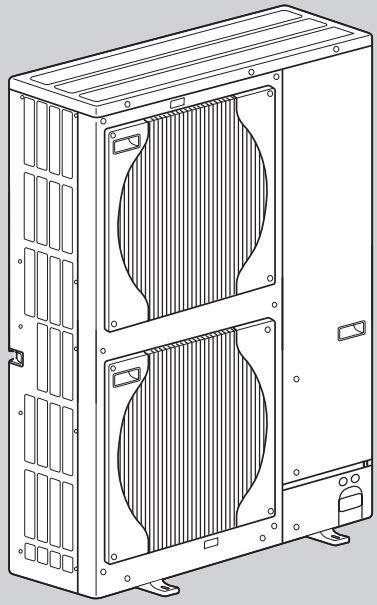
Outdoor unit

[Model Name]	[Service Ref.]
PUHZ-W112VHA	PUHZ-W112VHA
	PUHZ-W112VHAR1
	PUHZ-W112VHAR2
	PUHZ-W112VHAR3
Salt proof model	
PUHZ-W112VHA-BS	PUHZ-W112VHA-BS
	PUHZ-W112VHAR1-BS
	PUHZ-W112VHAR2-BS
	PUHZ-W112VHAR3-BS

Revision:
- Added PUHZ-W112VHAR3 and PUHZ-W112VHAR3-BS in REVISED EDITION-D.
- Some descriptions have been modified.

- OCH562 REVISED EDITION-C is void.

Note:
- This manual describes service data of outdoor unit only.



CONTENTS

PARTS CATALOG (OCB562)

TECHNICAL CHANGES

Service ref. have been changed as follows.

PUHZ-W112VHAR2 → PUHZ-W112VHAR3
PUHZ-W112VHAR2-BS → PUHZ-W112VHAR3-BS
1. Plate heat exchanger has been changed.

PUHZ-W112VHAR1 → PUHZ-W112VHAR2
PUHZ-W112VHAR1-BS → PUHZ-W112VHAR2-BS
1. Compressor oil has been added.
2. The installation direction of LEV-B assy has been changed to reduce high frequency noise.
3. Outdoor controller board has been changed.

PUHZ-W112VHA → PUHZ-W112VHAR1
PUHZ-W112VHA-BS → PUHZ-W112VHAR1-BS
1. A compliance with ErP directive Lot 1 has been authorized.
2. Outdoor controller board has been changed.
3. Outdoor power circuit board has been changed.

1 SAFETY PRECAUTION

1-1. ALWAYS OBSERVE FOR SAFETY

Before obtaining access to terminal, all supply circuits must be disconnected.

Preparation before the repair service.

- Prepare the proper tools.
- Prepare the proper protectors.
- Provide adequate ventilation.
- After stopping the operation of the air conditioner, turn off the power-supply breaker.
- Discharge the condenser before the work involving the electric parts.

Precautions during the repair service.

- Do not perform the work involving the electric parts with wet hands.
- Do not pour water into the electric parts.
- Do not touch the refrigerant.
- Do not touch the hot or cold areas in the refrigerating cycle.
- When the repair or the inspection of the circuit needs to be done without turning off the power, exercise great caution not to touch the live parts.

1-2. CAUTIONS RELATED TO NEW REFRIGERANT

Cautions for units utilizing refrigerant R410A

Do not use refrigerant other than R410A.

If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil, etc.

Use the following tools specifically designed for use with R410A refrigerant.

The following tools are necessary to use R410A refrigerant.

Tools for R410A	
Gauge manifold	Vacuum pump adaptor
Charge hose	Electronic refrigerant charging scale
Gas leak detector	Torque wrench

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Do not use a charging cylinder.

If a charging cylinder is used, the composition of refrigerant will change and the efficiency will be lowered.

Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

Charge refrigerant from liquid phase of gas cylinder.

If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

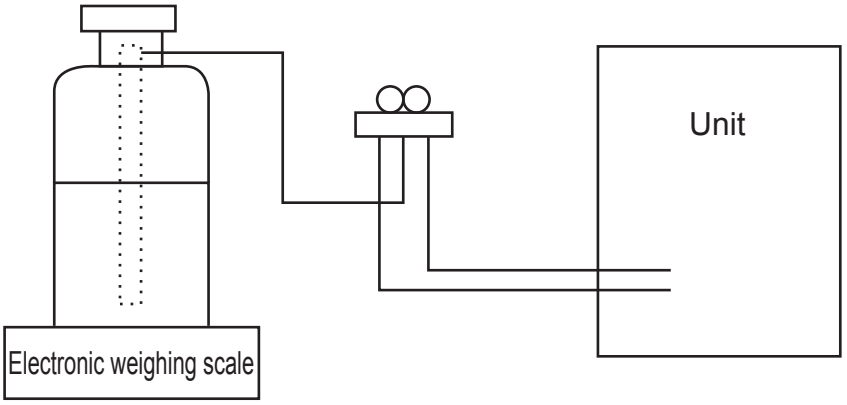
[1] Cautions for service

(1) Perform service after recovering the refrigerant left in the unit completely.
(2) Do not release refrigerant in the air.
(3) After completing service, charge the cycle with specified amount of refrigerant.

[2] Additional refrigerant charge

When charging directly from cylinder

· Check that cylinder for R410A on the market is a syphon type.
· Charging should be performed with the cylinder of syphon stood vertically. (Refrigerant is charged from liquid phase.)



[3] Service tools

Use the below service tools as exclusive tools for R410A refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	· Only for R410A
		· Use the existing fitting specifications. (UNF1/2)
		· Use high-tension side pressure of 5.3 MPa·G or over.
②	Charge hose	· Only for R410A
		· Use pressure performance of 5.09 MPa·G or over.
③	Electronic weighing scale	—
④	Gas leak detector	· Use the detector for R134a, R407C or R410A.
⑤	Adaptor for reverse flow check	· Attach on vacuum pump.
⑥	Refrigerant charge base	—
⑦	Refrigerant cylinder	· Only for R410A · Top of cylinder (Pink) · Cylinder with syphon
⑧	Refrigerant recovery equipment	—

1-3. CAUTIONS FOR REFRIGERANT PIPING WORK

Tools for R410A (The following table shows whether conventional tools can be used or not.)

Tools and materials	Use	R410A tools	Can R22 tools be used?	Can R407C tools be used?
Gauge manifold	Air purge, refrigerant charge and operation check	Tool exclusive for R410A	×	×
Charge hose		Tool exclusive for R410A	×	×
Gas leak detector	Gas leak check	Tool for HFC refrigerant	×	○
Refrigerant recovery equipment	Refrigerant recovery	Tool exclusive for R410A	×	×
Refrigerant cylinder	Refrigerant charge	Tool exclusive for R410A	×	×
Safety charger	Prevent compressor malfunction when charging refrigerant by spraying liquid refrigerant	Tool exclusive for R410A	×	×
Charge valve	Prevent gas from blowing out when detaching charge hose	Tool exclusive for R410A	×	×
Vacuum pump	Vacuum drying and air purge	Tools for other refrigerants can be used if equipped with adapter for reverse flow check	Δ(Usable if equipped with adapter for reverse flow)	Δ(Usable if equipped with adapter for reverse flow)
Bender	Bend the pipes	Tools for other refrigerants can be used	○	○
Pipe cutter	Cut the pipes	Tools for other refrigerants can be used	○	○
Welder and nitrogen gas cylinder	Weld the pipes	Tools for other refrigerants can be used	○	○
Refrigerant charging scale	Refrigerant charge	Tools for other refrigerants can be used	○	○
Vacuum gauge or thermistor vacuum gauge and vacuum valve	Check the degree of vacuum. (Vacuum valve prevents back flow of oil and refrigerant to thermistor vacuum gauge)	Tools for other refrigerants can be used	○	○
Charging cylinder	Refrigerant charge	Tool exclusive for R410A	×	-

×: Prepare a new tool. (Use the new tool as the tool exclusive for R410A.)
Δ: Tools for other refrigerants can be used under certain conditions.
○: Tools for other refrigerants can be used.

1-4. PRECAUTIONS FOR SALT PROOF TYPE "-BS" MODEL

Although "-BS" model has been designed to be resistant to salt damage, observe the following precautions to maintain the performance of the unit.

1. Avoid installing the unit in a location where it will be exposed directly to seawater or sea breeze.
2. If the cover panel may become covered with salt, be sure to install the unit in a location where the salt will be washed away by rainwater. (If a sunshade is installed, rainwater may not clean the panel.)
3. To ensure that water does not collect in the base of the outdoor unit, make sure that the base is level, not at angle. Water collecting in the base of the outdoor unit could cause rust.
4. If the unit is installed in a coastal area, clean the unit with water regularly to remove any salt build-up.
5. If the unit is damaged during installation or maintenance, be sure to repair it.
6. Be sure to check the condition of the unit regularly.
7. Be sure to install the unit in a location with good drainage.

2 SPECIFICATIONS

2-1. SPECIFICATIONS

PUHZ-W112VHA PUHZ-W112VHAR1 PUHZ-W112VHAR2
PUHZ-W112VHA-BS PUHZ-W112VHAR1-BS PUHZ-W112VHAR2-BS

Power supply (Phase, Voltage, Frequency)			1ø, 230 V, 50 Hz
Nominal water flow rate (Heating mode)		L/min	32.1
Heating (A7/W35)	Capacity	kW	11.20
	COP		4.47
	Power input	kW	2.51
Heating (A2/W35)	Capacity	kW	11.20
	COP		3.34
	Power input	kW	3.35
Pressure difference (water circuit)		kPa	6.3
Heating pump input (based on EN14511)		kW	0.01
Nominal water flow rate (Cooling mode)		L/min	28.7
Cooling (A35/W7)	Capacity	kW	10.00
	EER (COP)		2.80
	Power input	kW	3.57
Cooling (A35/W18)	Capacity	kW	10.00
	EER (COP)		4.50
	Power input	kW	2.22
Pressure difference (water circuit)		kPa	5
Cooling pump input (based on EN14511)		kW	0.01

Nominal operating condition	
Heating(A7/W35)	
Outside air temperature (Dry-bulb)	+ 7℃
Outside air temperature (Wet-bulb)	+ 6℃
Water temperature (inlet/outlet)	+30/+35℃
Heating(A2/W35)	
Outside air temperature (Dry-bulb)	+ 2℃
Outside air temperature (Wet-bulb)	+ 1℃
Water temperature (inlet/outlet)	—/+35℃
Cooling(A35/W7)	
Outside air temperature (Dry-bulb)	+35℃
Outside air temperature (Wet-bulb)	+ 24℃
Water temperature (inlet/outlet)	+12/+7℃
Cooling(A35/W18)	
Outside air temperature (Dry-bulb)	+35℃
Outside air temperature (Wet-bulb)	+ 24℃
Water temperature (inlet/outlet)	+23/+18℃

Note: "COP" and "Power input" in the above table are values that contains the "pump input (based on EN 14511) ".

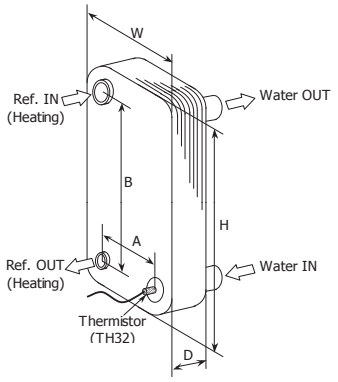
Outdoor unit specifications			
Model name			**PUHZ-W112VHA(R1/R2) PUHZ-W112VHA(R1/R2)-BS**
Running current	Heating(A7/W35)	A	11.1
	Cooling(A35/W7)	A	15.8
Power factor	Heating(A7/W35)	%	98
	Cooling(A35/W7)	%	98
Max. current		A	29.5
Breaker size		A	32
Outer casing			Galvanized plate
External finish			Munsell 3Y 7.8/1.1
Refrigerant control			Linear expansion valve
Compressor			Hermetic scroll
	Model		ANB33FNMMT
	Motor output	kW	2.5
	Start type		Inverter
	Protection devices		HP switch/LP switch Discharge thermo Comp. surface thermo Overcurrent detection
	Oil (Model)	L	0.9 (FV50S) *1
Crankcase heater		W	-
Heat exchanger	Air		Plate fin coil
	Water		Plate heat exchanger
Fan	Fan(drive)×No.		Propeller fan × 2
	Fan motor output	kW	0.074 x 2
	Airflow	m^3/min	100
		(CFM)	(3,530)
Defrost method			Reverse cycle *2
Noise level (SPL)	Heating	dB	53 *3 *4
	Cooling	dB	53 *3
Dimensions	Width	mm (in)	1020 (40-3/16)
	Depth	mm (in)	330 +30(*5)(13+1-3/16)
	Height	mm (in)	1350 (53-1/8)
Weight		kg (lb)	133 (294)
Refrigerant			R410A
	Quantity	kg (lb)	4.0 (8.8)
Guaranteed operating range (Outdoor)	Heating	℃	−20(*6) to +21
	Cooling	℃	−5(*7) to +46
Outlet water temp. (Max in heating, Min in cooling)	Heating	℃	+60
	Cooling	℃	+5
Return water temperature range	Heating	℃	+5(*8) to +59
	Cooling	℃	+8 to +28
Water flow rate range		L/min	14.4 to 32.1

Plate heat exchanger

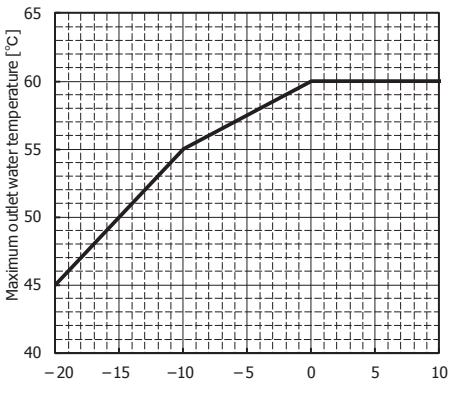
MITSUBISHI
MWA2-46LM

A: 50 mm
B: 466 mm

W: 108 mm
H: 522 mm
D: 132 mm
46 plates



Maximum outlet water temperature



*1 The amount of oil for PUHZ-W112VHAR2/R3(-BS) is 1.4L.
*2 Hot gas with 4-way valve
*3 at distance of 1m from outdoor unit
*4 A weighted sound power level in accordance with ISO9614-1 for EN14511 testing is 69dBA.
*5 grill
*6 Lower limit of use is −5 ℃ for EN14511 testing purposes.
*7 With the optional air outlet guide, min operation temperature will be −15 ℃.
*8 Lowest entering temperature is 12 ℃ for EN14511 testing purposes.

PUHZ-W112VHAR3 PUHZ-W112VHAR3-BS

Power supply (Phase, Voltage, Frequency)			1ø , 230 V, 50 Hz
Nominal water flow rate (Heating mode)		L/min	32.1
Heating (A7/W35)	Capacity	kW	11.20
	COP		4.47
	Power input	kW	2.51
Heating (A2/W35)	Capacity	kW	11.20
	COP		3.34
	Power input	kW	3.35
Pressure difference (water circuit)		kPa	6
Heating pump input (based on EN14511)		kW	0.01
Nominal water flow rate (Cooling mode)		L/min	28.7
Cooling (A35/W7)	Capacity	kW	10.00
	EER (COP)		2.80
	Power input	kW	3.57
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Pressure difference (water circuit)		kPa	5
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Nominal operating condition	
Heating(A7/W35)	
Outside air temperature (Dry-bulb)	+ 7℃
Outside air temperature (Wet-bulb)	+ 6℃
Water temperature (inlet/outlet)	+30/+35℃
Heating(A2/W35)	
Outside air temperature (Dry-bulb)	+ 2℃
Outside air temperature (Wet-bulb)	+ 1℃
Water temperature (inlet/outlet)	−/+35℃
Cooling(A35/W7)	
Outside air temperature (Dry-bulb)	+35℃
Outside air temperature (Wet-bulb)	+ 24℃
Water temperature (inlet/outlet)	+12/+7℃
Cooling(A35/W18)	
Outside air temperature (Dry-bulb)	+35℃
Outside air temperature (Wet-bulb)	+ 24℃
Water temperature (inlet/outlet)	+23/+18℃

Note: "COP" and "Power input" in the above table are values that contains the "pump input (based on EN 14511) ".

Outdoor unit specifications			
Model name			**PUHZ-W112VHAR3 PUHZ-W112VHAR3-BS**
Running current	Heating(A7/W35)	A	11.1
	Cooling(A35/W7)	A	15.8
Power factor	Heating(A7/W35)	%	98
	Cooling(A35/W7)	%	98
Max. current		A	29.5
Breaker size		A	32
Outer casing			Galvanized plate
External finish			Munsell 3Y 7.8/1.1
Refrigerant control			Linear expansion valve
Compressor			Hermetic scroll
	Model		ANB33FNMMT
	Motor output	kW	2.5
	Start type		Inverter
	Protection devices		HP switch/LP switch Discharge thermo Comp. surface thermo Overcurrent detection
	Oil (Model)	L	0.9 (FV50S) *1
Crankcase heater		W	-
Heat exchanger	Air		Plate fin coil
	Water		Plate heat exchanger
Fan	Fan(drive)×No.		Propeller fan × 2
	Fan motor output	kW	0.074 x 2
	Airflow	m^3/min	100
		(CFM)	(3,530)
Defrost method			Reverse cycle *2
Noise level (SPL)	Heating	dB	53 *3 *4
	Cooling	dB	53 *3
Dimensions	Width	mm (in)	1020 (40-3/16)
	Depth	mm (in)	330 +30(*5)(13+1-3/16)
	Height	mm (in)	1350 (53-1/8)
Weight		kg (lb)	133 (294)
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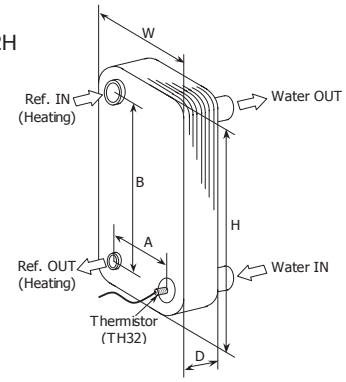
Return water temperature range	Heating	℃	+5(*8) to +59
	Cooling	℃	+8 to +28
Water flow rate range		L/min	14.4 to 32.1

Plate heat exchanger

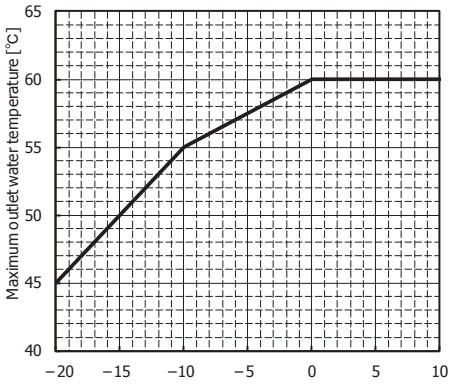
ALFA LAVAL
ACH-70X-52H

A: 50 mm
B: 466 mm

W: 111 mm
H: 526 mm
D: 130.6 mm
52 plates



Maximum outlet water temperature



*1 The amount of oil for PUHZ-W112VHAR2/R3(-BS) is 1.4L.
*2 Hot gas with 4-way valve
*3 at distance of 1m from outdoor unit
*4 A weighted sound power level in accordance with ISO9614-1 for EN14511 testing is 69dBA.
*5 grill
*6 Lower limit of use is −5 ℃ for EN14511 testing purposes.
*7 With the optional air outlet guide, min operation temperature will be −15 ℃.
*8 Lowest entering temperature is 12 ℃ for EN14511 testing purposes.

2-2. AVAILABLE RANGE (WATER FLOW RATE, RETURN WATER TEMP.)

Note: If using the unit out of the available range, the parts of unit might be damaged.

<Heating>

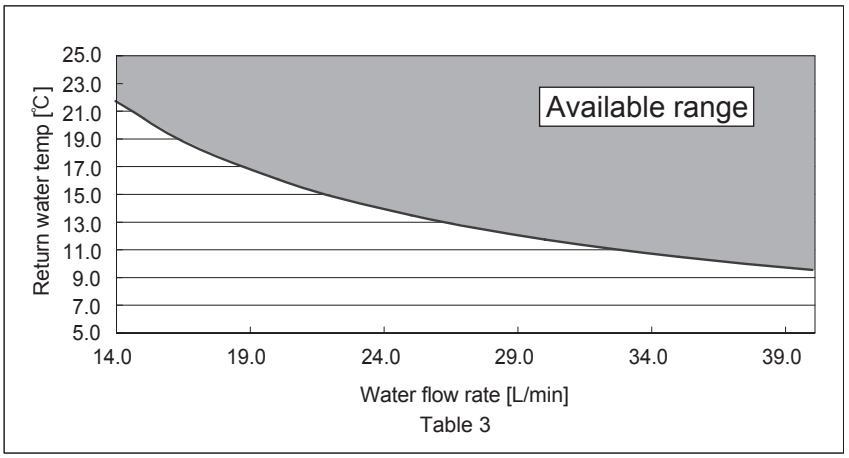


Table 3

<Applicable Model>
- PUHZ-W112VHA
- PUHZ-W112VHA-BS
- PUHZ-W112VHAR1
- PUHZ-W112VHAR1-BS
- PUHZ-W112VHAR2
- PUHZ-W112VHAR2-BS
- PUHZ-W112VHAR3
- PUHZ-W112VHAR3-BS

<Cooling>

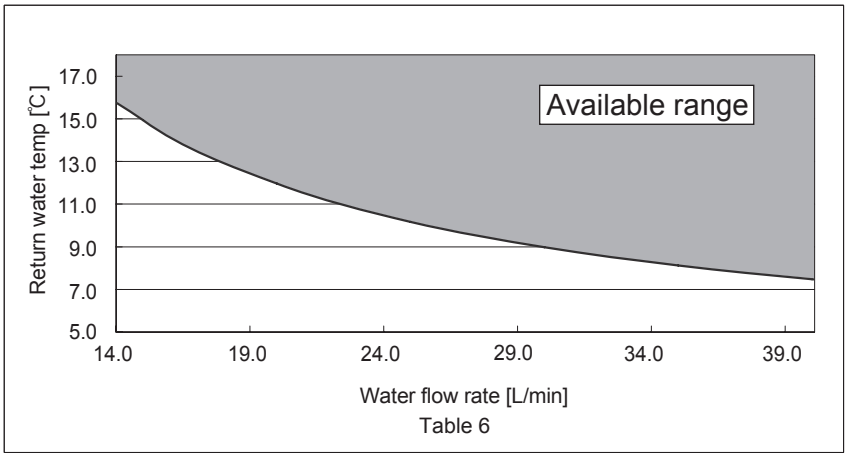


Table 6

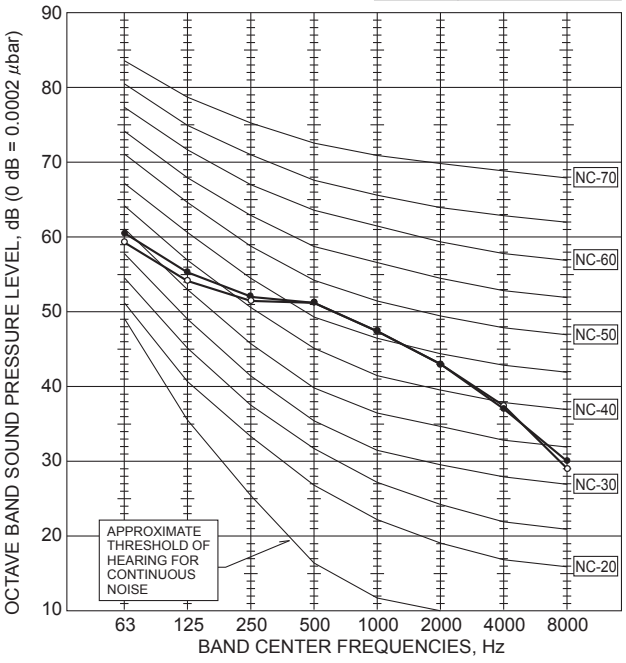
<Applicable Model>
- PUHZ-W112VHA
- PUHZ-W112VHA-BS
- PUHZ-W112VHAR1
- PUHZ-W112VHAR1-BS
- PUHZ-W112VHAR2
- PUHZ-W112VHAR2-BS
- PUHZ-W112VHAR3
- PUHZ-W112VHAR3-BS

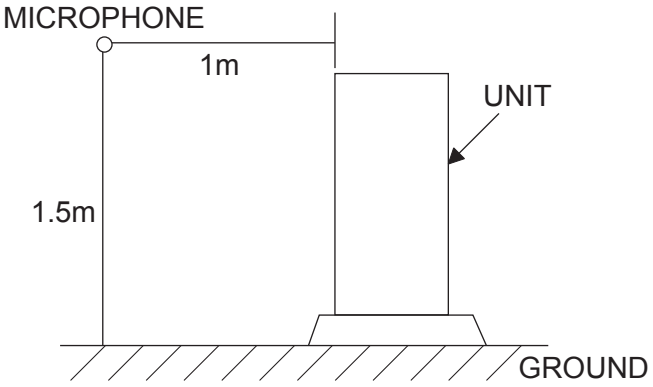
3 DATA

3-1. NOISE CRITERION CURVES

PUHZ-W112VHA
PUHZ-W112VHA-BS
PUHZ-W112VHAR1
PUHZ-W112VHAR1-BS
PUHZ-W112VHAR2
PUHZ-W112VHAR2-BS
PUHZ-W112VHAR3
PUHZ-W112VHAR3-BS

MODE	SPL(dB)	LINE
COOLING	53	○—○
HEATING	53	●—●





3-2. STANDARD OPERATION DATA

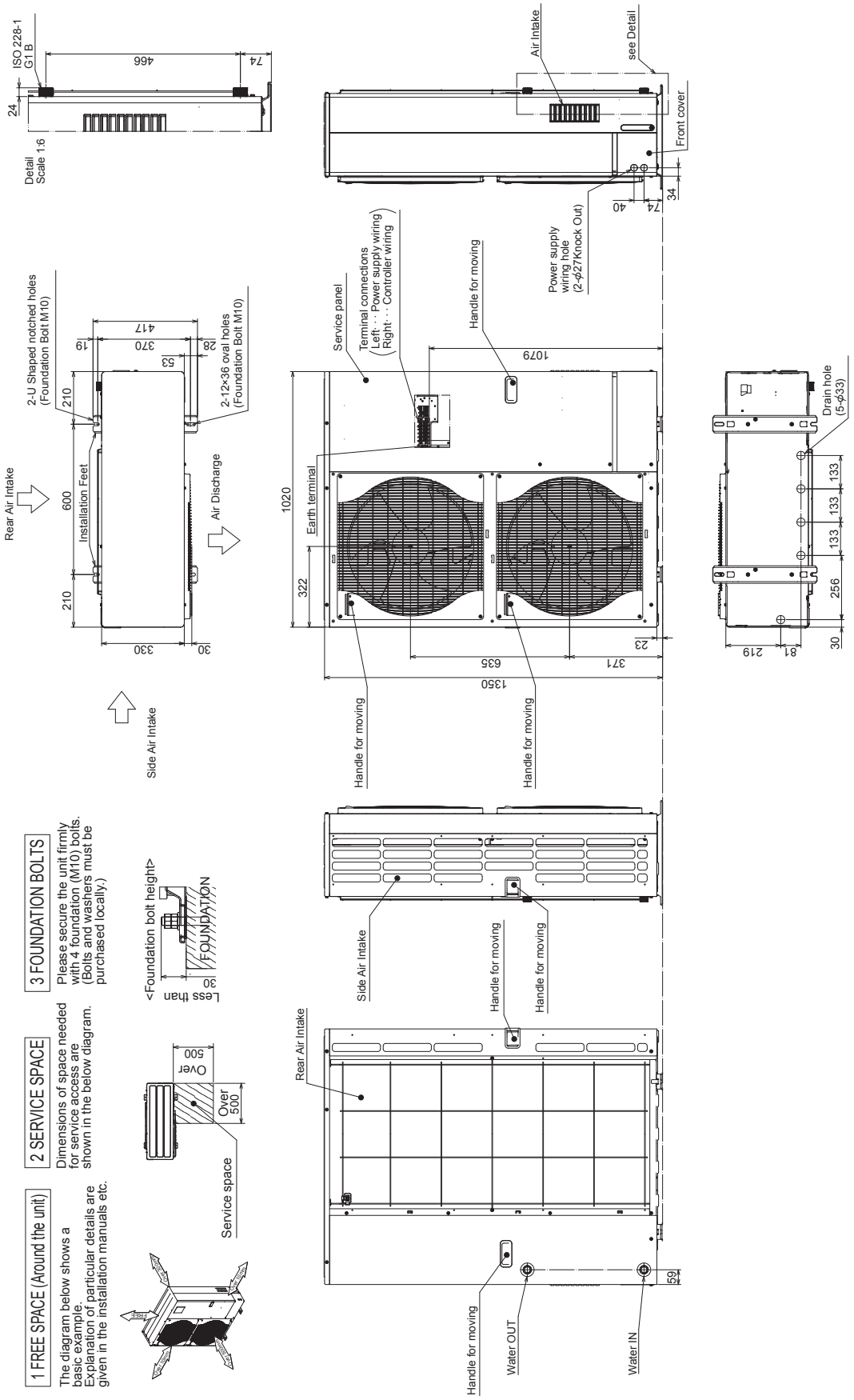
Mode				Cooling (A35/W7)	Heating (A7/W35)
Total	Capacity		W	10,000	11,200
	Input		kW	3.57	2.51
Electrical circuit	Outdoor unit			PUHZ-W112VHA	
	Phase, Hz			1, 50	
	Voltage		V	230	
	Current		A	15.8	11.1
Refrigerant circuit	Discharge pressure		MPa	2.63	2.08
	Suction pressure		MPa	0.83	0.67
	Discharge temperature		ºC	69	60
	Condensing temperature		ºC	45	36
	Suction temperature		ºC	9	6
Water conditions	Flow volume		L/min	28.7	32.1
	Outlet water temperature		ºC	7	35
Outdoor conditions	Intake air temperature	D.B.	ºC	35	7
		W.B.	ºC	24	6

The unit of pressure has been changed to MPa based on international SI system.
The conversion factor is: 1 (MPa) = 10.2 (kgf/cm^2)

4 OUTLINES AND DIMENSIONS

PUHZ-W112VHA
PUHZ-W112VHA-BS
PUHZ-W112VHAR1
PUHZ-W112VHAR1-BS
PUHZ-W112VHAR2
PUHZ-W112VHAR2-BS
PUHZ-W112VHAR3
PUHZ-W112VHAR3-BS

Unit: mm



5 WIRING DIAGRAM

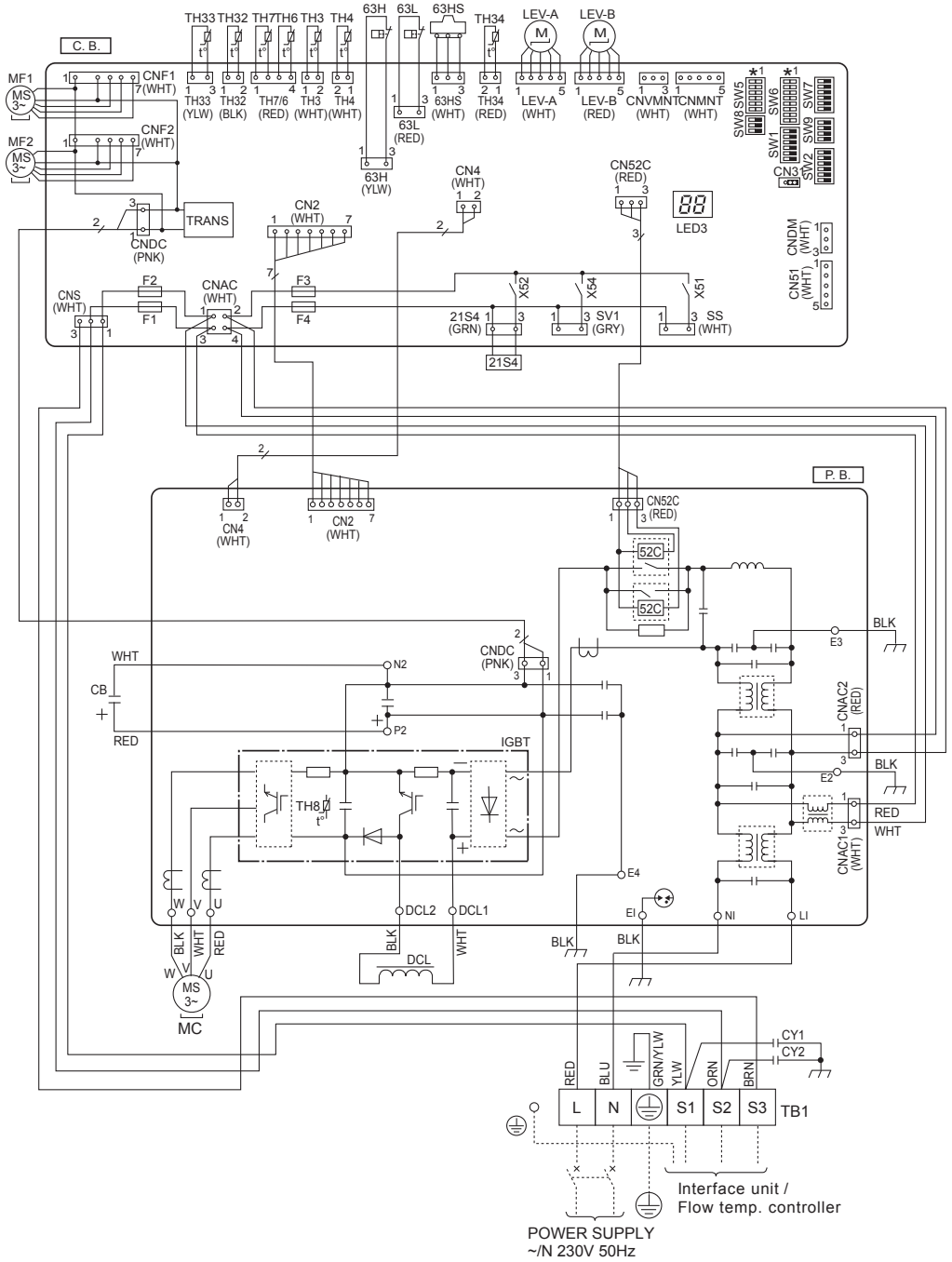
PUHZ-W112VHA
PUHZ-W112VHA-BS

SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block <Power Supply, Indoor/Outdoor>	NI	Connection Terminal <N-Phase>
MC	Motor for Compressor	DCL1, DCL2	Connection Terminal <Reactor>
MF1, MF2	Fan Motor	IGBT	Power Module
21S4	Solenoid Valve (Four-Way Valve)	EI, E2, E3, E4	Connection Terminal <Ground>
63H	High Pressure Switch	C. B.	Controller Circuit Board
63L	Low Pressure Switch	SW1	Switch <Manual Defrost, Defect History, Record Reset, Function Switch>
63HS	High Pressure Sensor	SW2	Switch <Function Switch>
TH3	Thermistor <Liquid>	SW5	Switch <Function Switch, Model Select>
TH4	Thermistor <Discharge>	SW6	Switch <Model Select>
TH6	Thermistor <Plate HEX Liquid>	SW7	Switch <Function Switch>
TH7	Thermistor <Ambient>	SW8	Switch <Function Switch>
TH8	Thermistor(internal) <Heat Sink>	SW9	Switch <Function Switch>
TH32	Thermistor <Inlet Water>	CN31	Connector <Emergency Operation>
TH33	Thermistor <Suction>	CN51	Connector <Connection for Option>
TH34	Thermistor <Comp. Surface>	SS	Connector <Connection for Option>
LEV-A, LEV-B	Linear Expansion Valve	SV1	Connector <Connection for Option>
DCL	Reactor	CNDM	Connector <Connection for Option>
CB	Main Smoothing Capacitor	LED3	LED <Operation/Inspection Indicators>
CY1, CY2	Capacitor	F1, F2, F3, F4	Fuse <T6.3AL250V>
P. B.	Power Circuit Board	X51, X52, X54	Relay
U, V, W	Connection Terminal <U/V/W-Phase>		
LI	Connection Terminal <L-Phase>		

∗1 MODEL SELECT
The black square (■)indicates a switch position.

MODEL	SW6	SW5-6 ∗2
112V	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6

∗2. SW5 -1 to 5 : Function Switch



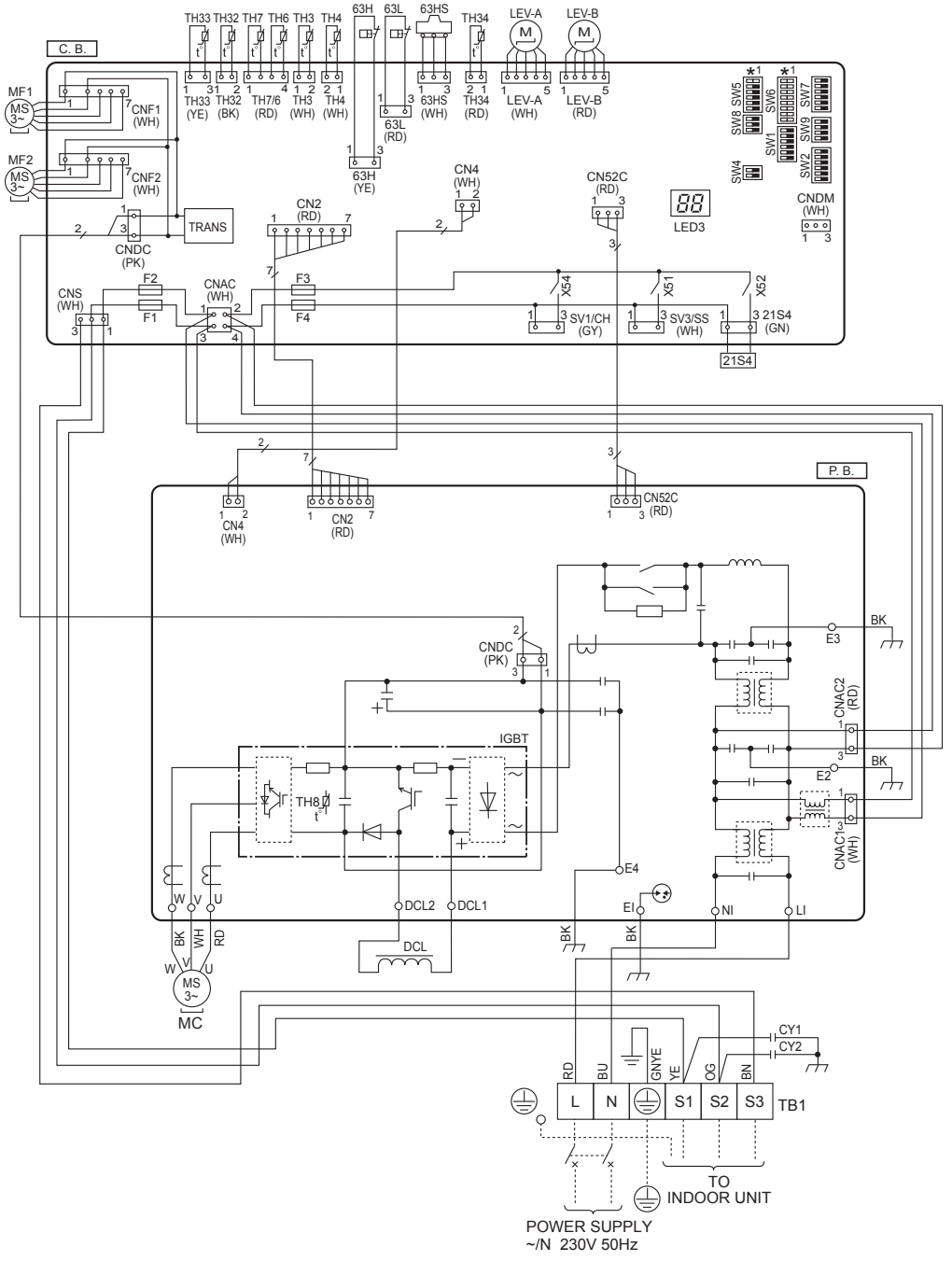
PUHZ-W112VHAR1 PUHZ-W112VHAR2 PUHZ-W112VHAR3
PUHZ-W112VHAR1-BS PUHZ-W112VHAR2-BS PUHZ-W112VHAR3-BS

SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block<Power Supply, Indoor/Outdoor>	CY1, CY2	Capacitor
MC	Motor for Compressor	P. B.	Power Circuit Board
MF1, MF2	Fan Motor	C. B.	Controller Circuit Board
21S4	Solenoid Valve(4-Way Valve)	SW1	Switch<Manual Defrost, Defect History Record Reset, Function Switch>
63H	High Pressure Switch		
63L	Low Pressure Switch	SW2	Switch<Function Switch>
63HS	High Pressure Sensor	SW4	Switch<Function Switch>
TH3	Thermistor<Liquid>	SW5	Switch<Function Switch, Model Select>
TH4	Thermistor<Discharge>	SW6	Switch<Model Select>
TH6	Thermistor<Plate HEX Liquid>	SW7	Switch<Function Switch>
TH7	Thermistor<Ambient>	SW8	Switch<Function Switch>
TH8	Thermistor internal<Heat Sink>	SW9	Switch<Function Switch>
TH32	Thermistor<Inlet Water>	SV1/CH	Connector<Connection for Option>
TH33	Thermistor<Suction>	SV3/SS	Connector<Connection for Option>
TH34	Thermistor<Comp. Surface>	CNDM	Connector <Connection for Option>
LEV-A, LEV-B	Linear Expansion Valve	F1, F2	Fuse<T10AL250V>
DCL	Reactor	F3, F4	Fuse<T6.3AL250V>

*1 MODEL SELECT
The black square(■) indicates a switch position.

MODEL	SW6	SW5-6 *2
112V	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6

*2 SW5 -1 to 5 : Function Switch



6 WIRING SPECIFICATIONS

FIELD ELECTRICAL WIRING (power wiring specifications)

Outdoor unit model			112V
Outdoor unit power supply			~/N (single), 50 Hz, 230 V
Outdoor unit Circuit Breaker capacity		*1	32A
Wiring Wire No. × size (mm²)	Outdoor unit power supply, earth		3 × Min 6
	Interface unit/Flow temp. controller-Outdoor unit	*2	3 × 1.5 (polar)
	Interface unit/Flow temp. controller-Outdoor unit earth	*2	1 × Min 1.5
	Remote controller-Interface unit/Flow temp. controller		2 × 0.3 (Non-polar)
Circuit rating	Outdoor unit L-N (single) Outdoor unit L1-N, L2-N, L3-N (3phase)	*3	230 V AC
	Interface unit/Flow temp. controller-Outdoor unit S1-S2	*3	230 V AC
	Interface unit/Flow temp. controller-Outdoor unit S2-S3	*3	24 V DC
	Remote controller-Interface unit/Flow temp. controller	*3	12 V DC

*1 A breaker with at least 3.0 mm contact separation in each pole shall be provided. Use earth leakage breaker (NV).
Make sure that the current leakage breaker is one compatible with higher harmonics.
Always use a current leakage breaker that is compatible with higher harmonics as this unit is equipped with an inverter.
The use of an inadequate breaker can cause the incorrect operation of inverter.

*2 Maximum 80 m

*3 The figures are NOT always against the ground.
S3 terminal has 24 V DC against S2 terminal. However between S3 and S1, these terminals are NOT electrically insulated by the transformer or other device.

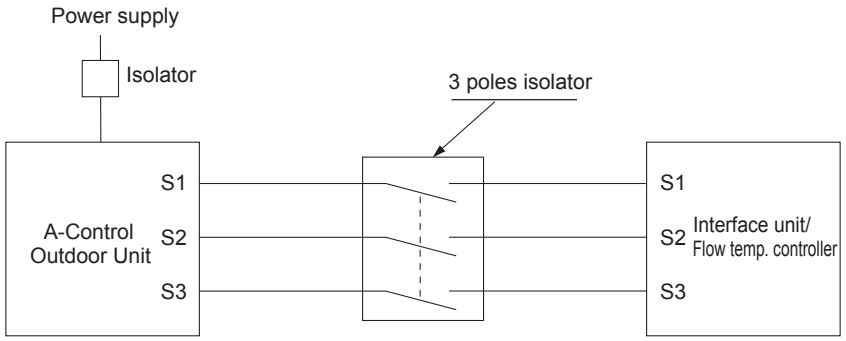
⚠ **Caution: Be sure to install N-line. Without N-line, it could cause damage to the unit.**

Notes: 1. Wiring size must comply with the applicable local and national codes.

2. Power supply cables and the cables between Controller and Outdoor unit shall not be lighter than polychloroprene sheathed flexible cables. (Design 60245 IEC 57)

3. Be sure to connect the cables between Controller and Outdoor unit directly to the units (no intermediate connections are allowed).
Intermediate connections may result in communication errors. If water enters at the intermediate connection point, it may cause insufficient insulation to ground or a poor electrical contact .
(If an intermediate connection is necessary, be sure to take measures to prevent water from entering the cables.)

4. Install an earth line longer than power cables.



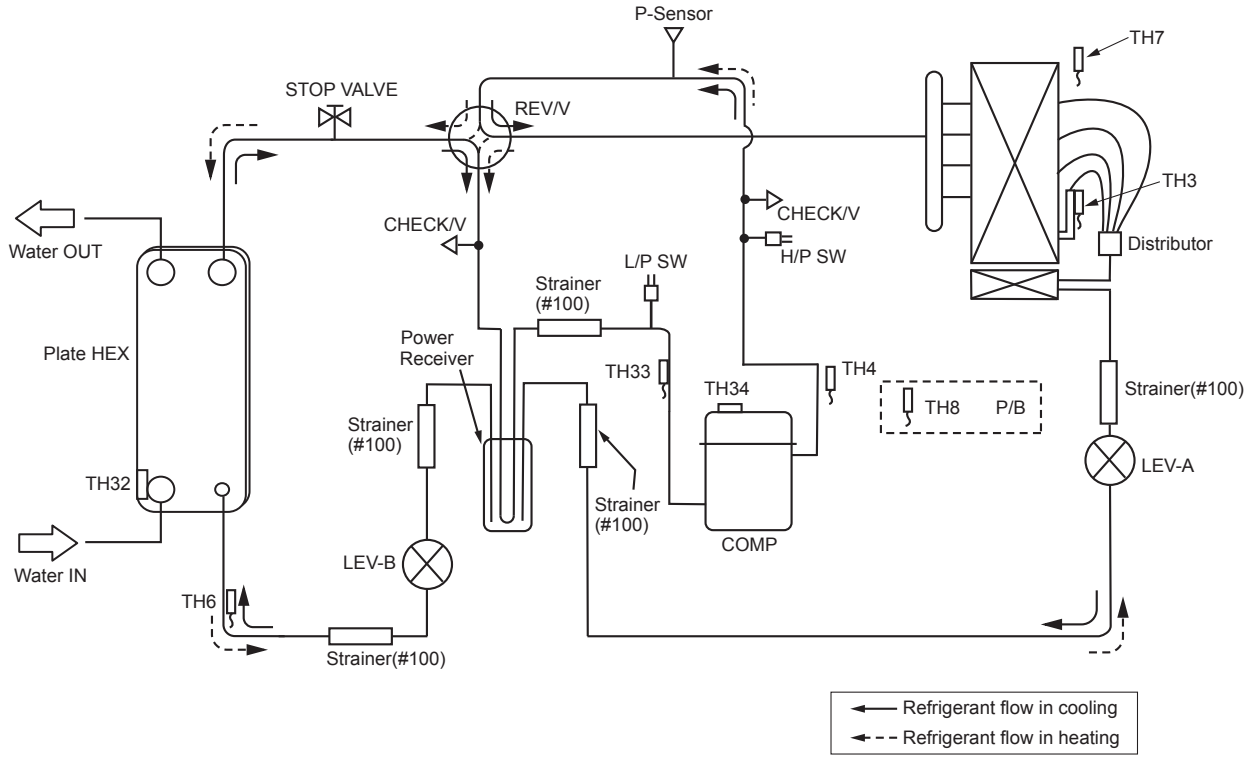
⚠ **Warning:**

In case of A-control wiring, there is high voltage potential on the S3 terminal caused by electrical circuit design that has no electrical insulation between power line and communication signal line. Therefore, please turn off the main power supply when servicing.
And do not touch the S1, S2, S3 terminals when the power is energized. If isolator should be used between Interface unit/ Flow temp. controller and outdoor unit, please use 3-pole type.

Never splice the power cable or the Interface unit/Flow temp. controllrer - outdoor unit connection cable, otherwise it may result in smoke emission, a fire or communication failure.

7 REFRIGERANT SYSTEM DIAGRAM

PUHZ-W112VHA **PUHZ-W112VHAR2**
PUHZ-W112VHA-BS **PUHZ-W112VHAR2-BS**
PUHZ-W112VHAR1 **PUHZ-W112VHAR3**
PUHZ-W112VHAR1-BS **PUHZ-W112VHAR3-BS**



Symbol	Part name	Detail
COMP	Compressor	DC inverter scroll compressor (Mitsubishi Electric Corporation)
H/P SW	High pressure switch (63H)	For protection (OFF: 4.15MPa)
L/P SW	Low pressure switch (63L)	For protection (OFF: −0.03MPa)
Plate HEX	Plate Heat Exchanger	MWA2-46LM (MITSUBISHI)*1/ACH-70X-52H(ALFA LAVAL)*2
REV/V	Reversing (4-way) valve (21S4)	Change the refrigerant circuit (Heating/Cooling) and for Defrosting
STOP VALVE	Stop valve	For refrigerant charge
CHECK/V	Check valve	High pressure/Low pressure/For production test use
P-Sensor	Pressure sensor (63HS)	For calculation of the condensing temperature from high pressure
P/B	Power board	Inverter power board
LEV-A	Linear expansion valve-A	Heating: Secondary LEV Cooling: Primary LEV
LEV-B	Linear expansion valve-B	Heating: Primary LEV Cooling: Secondary LEV
TH33	Suction temperature thermistor	For LEV control
TH32	Inlet water temperature thermistor	For freeze protection and for compressor frequency control
TH3	Liquid temperature thermistor	Heating: Evaporating temperature Cooling: Sub cool liquid temperature
TH4	Discharge temperature thermistor	For LEV control and for compressor protection
TH6	Plate HEX liquid temperature thermistor	Heating: Sub cool liquid temperature Cooling: Evaporating temperature
TH7	Ambient temperature thermistor	For fan control and for compressor frequency control
TH8	Heat sink temperature thermistor	For power board protection
TH34	Comp. surface temperature thermistor	For compressor protection
Power Receiver	Power Receiver	For accumulation of refrigerant

*1: PUHZ-W112VHA(-BS), PUHZ-W112VHAR1(-BS), PUHZ-W112VHAR2(-BS)
*2: PUHZ-W112VHAR3(-BS)

8 TROUBLESHOOTING

8-1. TROUBLESHOOTING

<Check code displayed by self-diagnosis and actions to be taken for service (summary)>

Present and past check codes are logged, and they can be displayed on the wired remote controller and control board of outdoor unit. Actions to be taken for service, which depends on whether or not the trouble is reoccurring in the field, are summarized in the table below. Check the contents below before investigating details.

Unit conditions at service	Check code	Actions to be taken for service (summary)
The trouble is reoccurring.	Displayed	Judge the problem and take a corrective action according to “8-3. SELF-DIAGNOSIS ACTION TABLE”.
	Not displayed	Conduct troubleshooting and ascertain the cause of the trouble.
The trouble is not reoccurring.	Logged	①Consider the temporary defects such as the work of protection devices in the refrigerant circuit including compressor, poor connection of wiring, noise, etc. Re-check the symptom, and check the installation environment, refrigerant amount, weather when the trouble occurred, matters related to wiring, etc. ②Reset check code logs and restart the unit after finishing service. ③There is no abnormality in electrical component, controller board, etc.
	Not logged	①Re-check the abnormal symptom. ②Conduct troubleshooting and ascertain the cause of the trouble. ③Continue to operate unit for the time being if the cause is not ascertained. ④There is no abnormality concerning of parts such as electrical component, controller board, etc.

8-2. CHECK POINT UNDER TEST RUN

Before test run

- After installation of outdoor units, piping work and electric wiring work, re-check that there is no water leakage, loosened connections and incorrect polarity.
- Measure impedance between the ground and the power supply terminal block (L, N) on the outdoor unit by 500 V Megger and check that it is 1.0 MΩ or over.
- Turn on power supply 12 hours before test run in order to protect compressor.
- Make sure to read operation manual before test run. (Especially items to secure safety.)

8-3. SELF-DIAGNOSIS ACTION TABLE

<Abnormalities detected when the power is turned on>

Check Code	Abnormal point and detection method	Cause	Judgment and action
None	—	① No voltage is supplied to terminal block (TB1) of outdoor unit. a) Power supply breaker is turned off. b) Contact failure or disconnection of power supply terminal c) Open phase (L or N phase)	① Check following items. a) Power supply breaker b) Connection of power supply terminal block (TB1) c) Connection of power supply terminal block (TB1)
		② Electric power is not charged to power supply terminal of outdoor power circuit board. a) Contact failure of power supply terminal b) Open phase on the outdoor power circuit board Disconnection of connector LI, NI	② Check following items. a) Connection of power supply terminal block (TB1) b) Connection of terminal on outdoor power circuit board Check connection of the connector LI or NI. Refer to "8-6. TEST POINT DIAGRAM".
		③ Electric power is not supplied to outdoor controller circuit board. a) Disconnection of connector (CNDC)	③ Check connection of the connector CNDC on the outdoor controller circuit board. Check connection of the connector CNDC on the outdoor power circuit board. Refer to "8-6. TEST POINT DIAGRAM".
		④ Disconnection of reactor (DCL)	④ Check connection of reactor. (DCL) Check connection of "DCL1" and "DCL2" on the outdoor power circuit board.
		⑤ Defective outdoor power circuit board	⑤ Replace outdoor power circuit board.
		⑥ Defective outdoor controller circuit board	⑥ Replace outdoor controller circuit board. (When items above are checked but the units cannot be repaired.)
F3	**63L connector open** Abnormal if 63L connector circuit is open for 3 minutes continuously from being switched on. 63L: Low pressure switch	① Disconnection or contact failure of 63L connector on outdoor controller circuit board ② Disconnection or contact failure of 63L ③ 63L is working due to refrigerant leakage or defective parts. ④ Defective outdoor controller circuit board	① Check connection of 63L connector on outdoor controller circuit board. Refer to "8-6. TEST POINT DIAGRAM". ② Check the 63L side of connecting wire. ③ Check refrigerant pressure. Charge additional refrigerant. Check continuity of 63L. Replace low pressure switch if it is defective. ④ Replace outdoor controller circuit board.
F5	**63H connector open** Abnormal if 63H connector circuit is open for 3 minutes continuously from being switched on. 63H: High pressure switch	① Disconnection or contact failure of 63H connector on outdoor controller circuit board ② Disconnection or contact failure of 63H ③ 63H is working due to defective parts. ④ Defective outdoor controller circuit board	① Check connection of 63H connector on outdoor controller circuit board. Refer to "8-6. TEST POINT DIAGRAM". ② Check the 63H side of connecting wire. ③ Check for continuity of 63H. Replace high pressure switch if it is defective. ④ Replace outdoor controller circuit board.
F9	**2 connector open** Abnormal if both 63H and 63L connector circuits are open for 3 minutes continuously from being switched on. 63H: High pressure switch 63L: Low pressure switch	① Disconnection or contact failure of connector (63H,63L) on outdoor controller circuit board. ② Disconnection or contact failure of 63H, 63L ③ 63H and 63L are working due to defective parts. ④ Defective outdoor controller board	① Check connection of connector (63H,63L) on outdoor controller circuit board. Refer to "8-6. TEST POINT DIAGRAM". ② Check the 63H and 63L side of connecting wire. ③ Check continuity of 63H and 63L. Replace the pressure switch if it is defective. ④ Replace outdoor controller circuit board.

Check Code	Abnormal point and detection method	Cause	Judgment and action
EA	**Miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire** 1. Outdoor controller circuit board can automatically check the number of connected Interface unit/Flow temp. controller. Abnormal if the number cannot be checked automatically due to miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire and etc. after power is turned on for 4 minutes. 2. Abnormal if outdoor controller circuit board recognizes excessive number of Interface unit/Flow temp. controller.	① Contact failure or miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire ② Diameter or length of Interface unit/Flow temp. controller-outdoor unit connecting wire is out of specified capacity. ③ Excessive number of Interface unit/Flow temp. controller is connected to 1 outdoor unit. (2 units or more) ④ Defective transmitting receiving circuit of outdoor controller circuit board ⑤ Defective transmitting receiving circuit of Interface/ Flow temp. controller board ⑥ Noise has entered into power supply or Interface/Flow temp. controller-outdoor unit connecting wire.	① Check disconnection or looseness or polarity of Interface unit/Flow temp. controller-outdoor unit connecting wire of Interface unit/Flow temp. controller and outdoor units. ② Check diameter and length of Interface unit/ Flow temp. controller-outdoor unit connecting wire. Total wiring length: 80 m (Including wiring connecting each Interface unit/Flow temp. controller unit and between Interface unit/Flow temp. controller and outdoor unit) Also check if the connection order of flat cable is S1, S2, S3. ③ Check the number of Interface unit/Flow temp. controller that is connected to 1 outdoor unit. (If EA is detected.) ④–⑤ Turn the power off once, and on again to check. Replace outdoor controller circuit board or Interface/Flow temp. controller board if abnormality occurs again. ⑥ Check transmission path, and remove the cause. Note: The descriptions above, ①–⑥, are for EA, Eb and EC.
Eb	**Miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire (converse wiring or disconnection)** Outdoor controller circuit board can automatically set the unit number of Interface unit/Flow temp. controller. Abnormal if the Interface unit/Flow temp. controller number cannot be set within 4 minutes after power on because of miswiring (converse wiring or disconnection) of Interface unit/Flow temp. controller-outdoor unit connecting wire.	① Contact failure or miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire ② Diameter or length of Interface unit/Flow temp. controller-outdoor unit connecting wire is out of specified capacity. ④ Defective transmitting receiving circuit of outdoor controller circuit board ⑤ Defective transmitting receiving circuit of Interface/ Flow temp. controller board ⑥ Noise has entered into power supply or Interface unit/Flow temp. controller-outdoor unit connecting wire.	
EC	**Startup time over** The unit cannot finish startup process within 4 minutes after power on.	① Contact failure of Interface unit /Flow temp. controller-outdoor unit connecting wire ② Diameter or length of Interface unit/Flow temp. controller-outdoor unit connecting wire is out of specified capacity. ③ Noise has entered into power supply or Interface unit/Flow temp. controller-outdoor unit connecting wire.	

<Abnormalities detected while unit is operating>

Check Code	Abnormal point and detection method	Cause	Judgment and action
U1	**High pressure (High pressure switch 63H operated)** Abnormal if high pressure switch 63H operated (*) during compressor operation. *4.15 MPa 63H: High pressure switch	① Decreased water flow ② Clogged filter of water pipe ③ Dirt of plate heat exchanger ④ Locked water pump ⑤ Malfunction of water pump ⑥ Clogged or broken pipe ⑦ Locked outdoor fan motor ⑧ Malfunction of outdoor fan motor ⑨ Short cycle of outdoor unit ⑩ Dirt of outdoor heat exchanger ⑪ Decreased airflow caused by defective inspection of outside temperature thermistor (It detects lower temperature than actual temperature.) ⑫ Disconnection or contact failure of connector (63H) on outdoor controller board ⑬ Disconnection or contact failure of 63H connection ⑭ Defective outdoor controller board ⑮ Defective operation of linear expansion valve ⑯ Malfunction of fan driving circuit	①–⑤ Check water circuit and repair the defect. ⑥ Check piping and repair the defect. ⑦–⑩ Check outdoor unit and repair the defect. ⑪ Check the detected temperature of outside temperature thermistor on LED display. (SW2: Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".) ⑫–⑭ Turn the power off and check F5 is displayed when the power is turned on again. When F5 is displayed, refer to “Judgment and action” for F5. ⑮ Check linear expansion valve. Refer to "8-5.HOW TO CHECK THE COMPONENTS". ⑯ Replace outdoor controller board.
U2	**High discharging temperature** Abnormal if discharge temperature thermistor (TH4) exceeds 125℃ or 110℃ continuously for 5 minutes. Abnormal if during defrosting discharge temperature thermistor (TH4) exceeds 110℃ continuously for 30 minutes. **High comp. surface temperature** Abnormal if comp. surface temperature (TH34) exceeds 170℃. In the case of high comp. surface temperature error, compressor does not restart unless the thermistor (TH34) becomes less than 95℃.	① Overheated compressor operation caused by insufficient refrigerant ② Defective thermistor ③ Defective outdoor controller board ④ Defective operation of linear expansion valve ⑤ In the case of the unit does not restart: Detection temp. of thermistor (TH34) ≧ 95℃	① Check intake super heat. Check leakage of refrigerant. Charge additional refrigerant. ②③ Turn the power off and check if U3 is displayed when the power is turned ON again. When U3 is displayed, refer to “Judgment and action” for U3. ④ Check linear expansion valve. Refer to "8-5. HOW TO CHECK THE COMPONENTS".
U3	**Open/short circuit of discharge temperature thermistor (TH4)/comp. surface thermistor (TH34)** Abnormal if open (3℃ or less) or short (217℃ or more) is detected during compressor operation. (Open (3℃ or less) detection is inoperative for 10 minutes of compressor starting process and for 10 minutes after or during defrosting.)	① Disconnection or contact failure of connector (TH4/TH34) on the outdoor controller circuit board ② Defective thermistor ③ Defective outdoor controller circuit board	① Check connection of connector (TH4/TH34) on the outdoor controller circuit board. Check the lead wire for thermistor (TH4/TH34). Refer to "8-6. TEST POINT DIAGRAM". ② Check resistance value of thermistor (TH4/TH34) or temperature on LED display. (Thermistor/TH4/TH34: Refer to "8-5.HOW TO CHECK THE COMPONENTS".) (SW2: Refer to"8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".) ③ Replace outdoor controller board.

Check Code	Abnormal point and detection method	Cause	Judgment and action
U4	**Open/short of outdoor unit thermistors (TH3, TH32, TH33, TH6, TH7, and TH8)** Abnormal if open or short is detected during compressor operation. Open detection of thermistors TH3, TH32 and TH6 is not detected for 10 seconds to 10 minutes after compressor starting and 10 minutes after and during defrosting. Note: Check which unit has abnormality in its thermistor by switching the mode of SW2. (Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".) Heat sink thermistor (TH8) is in the power module.	① Disconnection or contact failure of connectors (Outdoor controller circuit board: TH3, TH32, TH33, TH6/TH7; Outdoor power circuit board: CN3) ② Defective thermistor ③ Defective outdoor controller circuit board	① Check connection of connector (TH3, TH32, TH33, TH6/TH7) on the outdoor controller circuit board. Check connection of connector (CN3) on the outdoor power circuit board. Check the lead wire for thermistor (TH3, TH32, TH33, TH6, TH7, TH8). Refer to "8-6. TEST POINT DIAGRAM". ② Check resistance value of thermistor (TH3, TH32, TH33, TH6, TH7, TH8) or check temperature on LED display. (Thermistor/TH3, TH32, TH33, TH6, TH7, TH8: Refer to "8-5.HOW TO CHECK THE COMPONENTS.") (SW2: Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".) ③ Replace outdoor controller circuit board.
U5	**Temperature of heat sink** Abnormal if heat sink thermistor (TH8) detects 94°C.	① The outdoor fan motor is locked. ② Failure of outdoor fan motor ③ Airflow path is clogged. ④ Ambient temperature is high. ⑤ Defective thermistor ⑥ Defective input circuit of outdoor power circuit board ⑦ Failure of outdoor fan drive circuit	①② Check outdoor fan. ③ Check airflow path for cooling. ④ Check if there is something which causes temperature rise around outdoor unit. (Upper limit of ambient temperature is 46℃.) Turn off power, and on again to check if U5 is displayed within 30 minutes. If U4 is displayed instead of U5, refer to check code U4. ⑤ Check resistance value of thermistor (TH8) or temperature by microcomputer. (Thermistor/TH8: Refer to "8-5.HOW TO CHECK THE COMPONENTS".) (SW2: Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".) ⑥ Replace outdoor power circuit board. ⑦ Replace outdoor controller circuit board.
U6	**Power module** Check abnormality by driving power module in case overcurrent is detected. (UF or UP error condition)	① Defective outdoor power circuit board ② Decrease of power supply voltage ③ Loosens, disconnection or reverse of compressor wiring connection ④ Defective compressor	① Replace outdoor power circuit board. ② Check facility of power supply. ③ Correct the wiring (U·V·W phase) to compressor. Refer to "8-6. TEST POINT DIAGRAM (Outdoor power circuit board)". ④ Check compressor referring to "8-4.HOW TO CHECK THE PARTS".
U7	**Too low superheat due to low discharge temperature** Abnormal if discharge superheat is continuously detected −15℃ or less for 3 minutes even though linear expansion valve has minimum open pulse after compressor starts operating for 10 minutes.	① Disconnection or loose connection of discharge temperature thermistor (TH4) ② Defective holder of discharge temperature thermistor ③ Disconnection or loose connection of linear expansion valve's coil ④ Disconnection or loose connection of linear expansion valve's connector ⑤ Defective linear expansion valve	①② Check the installation conditions of discharge temperature thermistor (TH4). ③ Check the coil of linear expansion valve. Refer to "8-5.HOW TO CHECK THE COMPONENTS". ④ Check the connection or contact of LEV-A and LEV-B on outdoor controller circuit board. ⑤ Check linear expansion valve. Refer to "8-4.HOW TO CHECK THE PARTS".
U8	**Outdoor fan motor** Abnormal if rotational frequency of the fan motor is not detected during DC fan motor operation. Fan motor rotational frequency is abnormal if; • 100 rpm or below detected continuously for 15 seconds at 20℃ or more outside air temperature • 50 rpm or below or 1500 rpm or more detected continuously for 1 minute.	① Failure in the operation of the DC fan motor ② Failure in the outdoor circuit controller board	① Check or replace the DC fan motor. ② Check the voltage of the outdoor circuit controller board during operation. ③ Replace the outdoor circuit controller board. (When the failure is still indicated even after performing the remedy ① above.)

Thermistors		Open detection	Short detection
Symbol	Name		
TH3	Thermistor <Liquid temperature>	−40°C or below	90°C or above
TH32	Thermistor <Inlet water temperature>	−40°C or below	102°C or above
TH33	Thermistor <Suction pipe temperature>	−40°C or below	90°C or above
TH6	Thermistor <Plate HEX liquid temperature>	−40°C or below	90°C or above
TH7	Thermistor <Ambient temperature>	−40°C or below	90°C or above
TH8	Internal thermistor	−35°C or below	170°C or above

Check Code	Abnormal point and detection method		Cause	Judgment and action
U9 (4220)	Detailed codes	To find out the details about U9 error, turn ON SW2-1, 2-2, 2-3, 2-4, 2-5 and 2-6 when U9 error occurs. To find out the detail history (latest) about U9 error, turn ON SW2-1, 2-2 and 2-6. Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".		
	01	**Overvoltage error** • Increase in DC bus voltage to 400 V	① Abnormal increase in power source voltage ② Disconnection of compressor wiring ③ Defective outdoor power circuit board ④ Compressor has a ground fault.	① Check the field facility for the power supply. ② Correct the wiring (U·V·W phase) to compressor. Refer to "8-6. TEST POINT DIAGRAM (Outdoor power circuit board)". ③ Replace outdoor power circuit board. ④ Check compressor for electrical insulation. Replace compressor.
	02	**Undervoltage error** • Instantaneous decrease in DC bus voltage to 200 V	① Decrease in power source voltage, instantaneous stop. ② Disconnection or loose connection of CN52C on the outdoor power circuit board/ controller circuit board ③ Defective converter drive circuit in outdoor power circuit board ④ Defective 52C drive circuit in outdoor power circuit board ⑤ Disconnection or loose connection of main smoothing capacitor CB (only W112HA) ⑥ Disconnection or loose connection of CN2 on the outdoor power circuit board/controller circuit board ⑦ Power circuit failure on DC supply for 18 V DC output on outdoor controller circuit board	① Check the field facility for the power supply. ② Check CN52C wiring. ③ Replace outdoor power circuit board. ④ Replace outdoor power circuit board. ⑤ Check CB wiring. ⑥ Check CN2 wiring. ⑦ Replace outdoor controller circuit board.
	04	**Input current sensor error/ L1-phase open error** • Decrease in input current through outdoor unit to 0.1A only if operation frequency is more than or equal to 40 Hz or compressor current is more than or equal to 6A.	① Defective input current detection circuit in outdoor power circuit board ②Defective outdoor controller circuit board	① Replace outdoor power circuit board. ② Replace outdoor controller circuit board.
	08	**Abnormal power synchronous signal** • No input of power synchronous signal to power circuit board • Power synchronous signal of 44 Hz or less, or 65 Hz or more is detected on power circuit board.	① Distortion of power source voltage, noise superimposition. ② Disconnection or loose connection of earth wiring ③ Disconnection or loose connection of CN2 on the outdoor power circuit board / controller circuit board ④ Defective power synchronous signal circuit in outdoor controller circuit board ⑤ Defective power synchronous signal circuit in outdoor power circuit board	① Check the field facility for the power supply. ② Check earth wiring. ③ Check CN2 wiring. ④ Replace outdoor controller circuit board. ⑤ Replace outdoor power circuit board.
	10	**PFC error (Overvoltage/ Undervoltage/Overcurrent)** • PFC detected any of the following: a) Increase of DC bus voltage to 420 V. b) Decrease in PFC control voltage to 12 V DC or lower c) Increase in input current to 50A peak (For models equipped with single-phase PFC only)	Not applicable for W112VHA models.	Check for the switch settings for Model Select on the outdoor controller circuit board.
	20	**PFC/IGBT error (Undervoltage)** • When Compressor is running, DC bus voltage stays at 310 V or lower for consecutive 10 seconds	① Incorrect switch settings on the outdoor controller circuit board for model select ② Defective outdoor power circuit board ③ Defective outdoor controller circuit board	① Correction of a model select ② Replace outdoor power circuit board. ③ Replace outdoor controller circuit board.

Check Code	Abnormal point and detection method	Cause	Judgment and action
Ud	**Overheat protection** Abnormal if outdoor pipe thermistor (TH3) detects 70℃ or more or condensing temperature of pressure sensor (63HS) detects 70℃ or more during compressor operation.	① Defective outdoor fan (fan motor) or short cycle of outdoor unit during cooling operation ② Defective outdoor pipe thermistor (TH3) ③ Defective outdoor controller board ④ Defective pressure sensor	① Check outdoor unit air passage. ②③ Turn the power off and on again to check the check code. If U4 is displayed, follow the U4 processing direction. ④ Check pressure by microcomputer. (Pressure sensor/63HS) (SW2: Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".)
UF	**Compressor overcurrent interruption (When compressor locked)** Abnormal if overcurrent of DC bus or compressor is detected within 30 seconds after compressor starts operating.	① Decrease of power supply voltage ② Looseness, disconnection or converse of compressor wiring connection ③ Defective compressor ④ Defective outdoor power board ⑤ Decreased water flow ⑥ Clogged filter of water pipe ⑦ Clogged plate heat exchanger ⑧ Locked water pump ⑨ Malfunction of water pump	① Check facility of power supply. ② Correct the wiring (U·V·W phase) to compressor. Refer to "8-6. TEST POINT DIAGRAM (Outdoor power circuit board)" . ③ Check compressor. Refer to "8-4.HOW TO CHECK THE PARTS". ④ Replace outdoor power circuit board. ⑤–⑨ Check water circuit and repair the defect.
UH	**Current sensor error or input current error** ·Abnormal if current sensor detects −1.0 A to 1.0 A during compressor operation. (This error is ignored during test run.) ·Abnormal if 38 A of input current is detected or 34 A or more of input current is detected for 10 seconds continuously.	① Disconnection of compressor wiring ② Defective circuit of current sensor on outdoor power circuit board ③ Decrease of power supply voltage ④ Leakage or shortage of refrigerant	① Correct the wiring (U·V·W phase) to compressor. Refer to "8-6. TEST POINT DIAGRAM (Outdoor power circuit board)". ② Replace outdoor power circuit board. ③ Check the facility of power supply. ④ Check leakage of refrigerant.
UL	**Low pressure (63L operated)** Abnormal if 63L is operated (under −0.03 MPa) during compressor operation. 63L: Low pressure switch	① Stop valve of outdoor unit is closed during operation. ② Disconnection or loose connection of connector (63L) on outdoor controller board ③ Disconnection or loose connection of 63L ④ Defective outdoor controller board ⑤ Leakage or shortage of refrigerant ⑥ Malfunction of linear expansion valve	① Check stop valve. ②–④ Turn the power off and on again to check if F3 is displayed on restarting. If F3 is displayed, follow the F3 processing direction. ⑤ Correct to proper amount of refrigerant. ⑥ Check linear expansion valve. Refer to "8-5.HOW TO CHECK THE COMPONENTS".
UP	**Compressor overcurrent interruption** Abnormal if overcurrent DC bus or compressor is detected after compressor starts operating for 30 seconds.	① Decrease of power supply voltage ② Looseness, disconnection or converse of compressor wiring connection ③ Defective fan of outdoor units ④ Short cycle of indoor/outdoor units ⑤ Defective input circuit of outdoor controller board ⑥ Defective compressor ⑦ Decreased water flow ⑧ Clogged filter of water pipe ⑨ Clogged plate heat exchanger ⑩ Locked water pump ⑪ Malfunction of water pump	① Check facility of power supply. ② Correct the wiring (U·V·W phase) to compressor. Refer to "8-6. TEST POINT DIAGRAM (Outdoor power circuit board)". ③ Check outdoor fan. ④ Solve short cycle. ⑤ Replace outdoor controller circuit board. ⑥ Check compressor. Refer to "8-4.HOW TO CHECK THE PARTS". Note: Before the replacement of the outdoor controller circuit board, disconnect the wiring to compressor from the outdoor power circuit board and check the output voltage among phases, U, V, W, during test run. No defect on board if voltage among phases (U-V, V-W and W-U) is same. Make sure to perform the voltage check with same performing frequency. ⑦–⑪ Check water circuit and repair the defect.

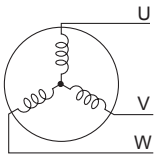
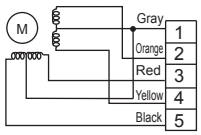
Check Code	Abnormal point and detection method	Cause	Judgment and action
E0 or E	**Remote controller transmission error (E0)/signal receiving error (E4)** ① Abnormal if main or sub remote controller cannot receive any transmission normally from Interface unit/Flow temp. controller of refrigerant address "0" for 3 minutes. (Check code: E0) ② Abnormal if sub-remote controller could not receive any signal for 2 minutes. (Check code: E0) ① Abnormal if Interface/Flow temp. controller board cannot receive any data normally from remote controller board or from other Interface/Flow temp. controller board for 3 minutes. (Check code: E4) ② Interface/Flow temp. controller board cannot receive any signal from remote controller for 2 minutes. (Check code: E4)	① Contact failure at transmission wire of remote controller ② All remote controllers are set as "sub" remote controller. In this case, E0 is displayed on remote controller, and E4 is displayed at LED (LED1, LED2) on the outdoor controller circuit board. ③ Miswiring of remote controller ④ Defective transmitting receiving circuit of remote controller ⑤ Noise has entered into the transmission wire of remote controller.	① Check disconnection or looseness of Interface unit/Flow temp. controller unit or transmission wire of remote controller. ② Set one of the remote controllers "main", if there is no problem with the action above. ③ Check wiring of remote controller. • Total wiring length: max. 500 m (Do not use cable × 3 or more.) • The number of connecting remote controller: Refer to the indoor units service manual. If the cause of trouble is not in ①–③ above, ④ Diagnose remote controllers. a) When "RC OK" is displayed, remote controllers have no problem. Turn the power off, and on again to check. If abnormality occurs again, replace Interface/Flow temp. controller board. b) When "RC NG" is displayed, replace remote controller. c) When "RC E3" or "ERC 00-66" is displayed, noise may be causing abnormality.
E1 or E2	**Remote controller control board** ① Abnormal if data cannot be read normally from the nonvolatile memory of the remote controller control board.(Check code: E1) ② Abnormal if the clock function of remote controller cannot be operated normally. (Check code: E2)	① Defective remote controller	① Replace remote controller.
E3 or E5	**Remote controller transmission error (E3)/signal receiving error (E5)** ① Abnormal if remote controller could not find blank of transmission path for 6 seconds and could not transmit. (Check code: E3) ② When remote controller receives the transmitted data same time and compares these data. Abnormal if the data is judged to be different for 30 continuous times. (Check code: E3) ① Abnormal if Interface/Flow temp. controller board could not find blank of transmission path. (Check code: E5) ② When Interface/Flow temp. controller receives the transmitted data same time and compares these data. Abnormal if the data is judged to be different for 30 continuous times. (Check code: E5)	① 2 remote controllers are set as "main." (In case of 2 remote controllers) Note that some models can only connect 1 remote controller. For more detail, refer to the indoor unit's service manual. ② Defective transmitting receiving circuit of remote controller ③ Defective transmitting receiving circuit of Interface/Flow temp. controller board ④ Noise has entered into transmission wire of remote controller.	① Set a remote controller to main, and the other to sub. ②–④ Diagnose remote controller. a) When "RC OK" is displayed, remote controllers have no problem. Turn the power off, and on again to check. When becoming abnormal again, replace indoor controller board. b) When "RC NG" is displayed, replace remote controller. c) When "RC E3" or "ERC 00-66" is displayed, noise may be causing abnormality.
E6	**Interface unit/Flow temp. controller-outdoor unit communication error (Signal receiving error)** ① Abnormal if Interface/Flow temp. controller board cannot receive any signal normally for 6 minutes after turning the power on. ② Abnormal if Interface/Flow temp. controller board cannot receive any signal normally for 3 minutes.	① Contact failure, short circuit or, miswiring (converse wiring) of Interface unit/Flow temp. controller-outdoor unit connecting wire ② Defective transmitting receiving circuit of Interface/Flow temp. controller board ③ Defective transmitting receiving circuit of Interface/Flow temp. controller board ④ Noise has entered into Interface unit/Flow temp. controller-outdoor unit connecting wire.	Note: Check LED display on the outdoor control circuit board. (Connect A-control service tool, PAC-SK52ST.) ①Check disconnection or looseness of Interface unit/Flow temp. controller-outdoor unit connecting wire of Interface unit/Flow temp. controller or outdoor unit. ②–④ Turn the power off, and on again to check. If abnormality occurs again, replace Interface/Flow temp. controller board or outdoor controller circuit board.
E8	**Interface unit/Flow temp. controller-outdoor unit communication error (Signal receiving error)** **(Outdoor unit)** (1) Abnormal if outdoor controller circuit board could not receive anything normally for 3 minutes.	① Contact failure of Interface unit/Flow temp. controller-outdoor unit connecting wire ② Defective communication circuit of outdoor controller circuit board ③ Defective communication circuit of Interface/Flow temp. controller board ④ Noise has entered into Interface unit/Flow temp. controller-outdoor unit connecting wire.	① Check disconnection or looseness of Interface unit/Flow temp. controller-outdoor unit connecting wire of Interface unit/Flow temp. controller or outdoor unit. ②–④ Turn the power off, and on again to check. Replace Interface/Flow temp. controller board or outdoor controller circuit board if abnormality is displayed again.

Check Code	Abnormal point and detection method	Cause	Judgment and action
E9	**Interface unit/Flow temp. controller-outdoor unit communication error (Transmitting error) (Outdoor unit)** (1) Abnormal if "0" receiving is detected 30 times continuously though outdoor controller circuit board has transmitted "1". (2) Abnormal if outdoor controller circuit board could not find blank of transmission path for 3 minutes.	① Interface unit/Flow temp. controller-outdoor unit connecting wire has contact failure. ② Defective communication circuit of outdoor controller circuit board ③ Noise has entered power supply. ④ Noise has entered Interface unit/Flow temp. controller-outdoor unit connecting wire.	① Check disconnection or looseness of Interface unit/Flow temp. controller-outdoor unit connecting wire. ②–④ Turn the power off, and on again to check. Replace outdoor controller circuit board if abnormality is displayed again.
EF	**Non defined check code** This code is displayed when non defined check code is received.	① Noise has entered transmission wire of remote controller. ② Noise has entered Interface unit/Flow temp. controller-outdoor unit connecting wire.	①② Turn the power off, and on again to check. Replace Interface/Flow temp. controller board or outdoor controller circuit board if abnormality is displayed again.
Ed	**Serial communication error** Abnormal if serial communication between outdoor controller circuit board and outdoor power circuit board is defective.	① Wire disconnection or contact failure of connector CN2 between the outdoor controller circuit board and the outdoor power circuit board ② Wire disconnection or contact failure of connector CN4 between the outdoor controller circuit board and the outdoor power circuit board ③ Defective communication circuit of outdoor power circuit board ④ Defective communication circuit of outdoor controller circuit board for outdoor power circuit board	①② Check connection of each connector CN2 and CN4 between the outdoor controller circuit board and the outdoor power circuit board. ③ Replace outdoor power circuit board. ④ Replace outdoor controller circuit board.
P6	**Freezing/overheating protection is working** (1) Freezing protection <Cooling mode> Abnormal if plate heat exchanger pipe temperature (TH6) stays at −5℃ or lower for 10 seconds or abnormal if plate heat exchanger pipe thermistor (TH6) stays at −2℃ or lower and compressor operation frequency is minimum for 5 minutes after compressor starts operating for 6 minutes. <Heating mode> Abnormal if inlet water temperature thermistor (TH32) is 15℃ or lower, and the following condition (1 or 2) are detected. 1. 1 minute has passed since defrosting operation started and plate heat exchanger pipe temperature thermistor (TH6) stays at −6℃ or lower for continuously 30 seconds. 2. During defrosting operation and plate heat exchanger pipe temperature thermistor (TH6) stays at −16℃ or lower for continuously 10 seconds.	(1) Freezing protection <Cooling mode> ① Reduced water flow · Clogged filter · Leakage of water ② Low temperature · Low-load · Inlet water is too cold. ③ Defective water pump ④ Defective outdoor fan control ⑤ Overcharge of refrigerant ⑥ Defective refrigerant circuit (clogs) ⑦ Malfunction of linear expansion valve <Heating mode> ① Reduced water flow · Clogged filter · Leakage of water ② Low temperature · Low-load · Inlet water is cold. ③ Defective water pump ④ Leakage or shortage of refrigerant ⑤ Malfunction of linear expansion valve	(1) Freezing protection <Cooling mode> ①② Check water piping. ③ Check water pump. ④ Check outdoor fan motor. ⑤–⑦ Check operating condition of refrigerant circuit. ⑦ Check linear expansion valve. <Heating mode> ①② Check water piping. ③ Check water pump. ④ Correct to proper amount of refrigerant. ⑤ Check linear expansion valve. Refer to "8-5. HOW TO CHECK THE COMPONENTS".

Check Code	Abnormal point and detection method	Cause	Judgment and action
P8	**Pipe temperature** Abnormal if the following conditions are detected for continuously 3 minutes after compressor starts operating for 10 minutes. 1. Cooling mode T_{63HS}-TH7 ≦ 2℃ and TH3-TH7 ≦ 4℃ or T_{63HS}-TH3 < 0℃ and TH32-TH6 ≦ 0℃ and Compressor operation frequency is 61Hz or more. 2. Heating mode T_{63HS}-TH32 ≦ 2℃ and TH6-TH32 ≦ 1℃ and TH7-TH3 ≦ 1℃ and Compressor operation frequency is 61Hz or more. T_{63HS}: Condensing temperature of pressure sensor (63HS) Thermistor TH3: Liquid temperature TH32: Inlet water temperature TH6: Plate HEX Liquid temperature TH7: Ambient temperature	① Leakage or shortage of refrigerant ② Malfunction of linear expansion valve ③ Refrigerant circuit is clogged with foreign objects. Note: Clogging occurs in the parts which become below freezing point when water enters in refrigerant circuit. ④ Disconnection of thermistor holder	① Check intake superheat. Check leakage of refrigerant. ② Check linear expansion valve. ③ After recovering refrigerant, remove water from entire refrigerant circuit under vacuum more than 1 hour. ④ Check temperature display on outdoor controller circuit board. Temperature display is indicated by setting SW2 of outdoor controller circuit board. Check the holder of thermistor.
UE	**Abnormal pressure of pressure sensor (63HS)** Abnormal if pressure sensor (63HS) detects 0.1 MPa or less. Detection is inoperative for 3 minutes after compressor starting and 3 minutes after and during defrosting.	① Disconnection or contact failure of connector (63HS) on the outdoor controller circuit board ② Defective pressure sensor ③ Defective outdoor controller circuit board	① Check connection of connector (63HS) on the outdoor controller circuit board. Check breaking of the lead wire for thermistor (63HS). ② Check pressure by microprocessor. (Pressure sensor/ 63HS) (SW2: Refer to "8-7.OUTDOOR UNIT OPERATION MONITOR FUNCTION".) ③ Replace outdoor controller board.
PE	**Inlet water temperature** Abnormal if the following conditions are detected for continuously 10 seconds. 1. Cooling mode During compressor operation TH32 < 3℃ 2. Heating mode (exclude defrosting) During compressor operation TH32 < −10℃ 3. Defrosting mode During compressor operation TH32 < 0℃ Thermistor TH32: Inlet water temperature	① Reduced water flow · Clogged filter · Leak of water ② Low temperature · Low-load · Low temperature inlet water ③ Defective water pump ④ Leakage or shortage of refrigerant	①② Check water piping. ③ Check water pump. ④ Check intake superheat. Check leakage of refrigerant.

8-4. HOW TO CHECK THE PARTS

PUHZ-W112VHA **PUHZ-W112VHAR2**
PUHZ-W112VHA-BS **PUHZ-W112VHAR2-BS**
PUHZ-W112VHAR1 **PUHZ-W112VHAR3**
PUHZ-W112VHAR1-BS **PUHZ-W112VHAR3-BS**

<table>
<tr><th>Parts name</th><th>Checkpoints</th></tr>
<tr><td>Thermistor (TH3) <Liquid>
Thermistor (TH4) <Discharge>
Thermistor (TH6) <Plate Hex liquid>
Thermistor (TH7) <Ambient>
Thermistor (TH8) <Heat sink>
Thermistor (TH32) <Inlet water>
Thermistor (TH33) <Suction>
Thermistor (TH34) <Comp. surface></td><td>Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature of 10 to 30°C)
<table><tr><th></th><th>Normal</th><th>Abnormal</th></tr><tr><td>TH4
TH34</td><td>160 to 410 kΩ</td><td rowspan="4">Open or short</td></tr><tr><td>TH3
TH6
TH7
TH33</td><td>4.3 to 9.6 kΩ</td></tr><tr><td>TH32</td><td>4.4 to 9.8 kΩ</td></tr><tr><td>TH8</td><td>39 to 105 kΩ</td></tr></table></td></tr>
<tr><td>Fan motor (MF1)</td><td>Refer to the next page.</td></tr>
<tr><td>Solenoid valve coil
<4-way valve>
(21S4)</td><td>Measure the resistance between the terminals with a tester.
(At the ambient temperature of 20°C)
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>1435 ± 150 Ω</td><td>Open or short</td></tr></table></td></tr>
<tr><td>Compressor
(MC)
 
</td><td>Measure the resistance between the terminals with a tester.
(Winding temperature 20°C)
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>0.188 Ω</td><td>Open or short</td></tr></table></td></tr>
<tr><td>Linear expansion valve
(LEV-A) (LEV-B)
 
</td><td>Disconnect the connector then measure the resistance with a tester.
(Winding temperature 20°C)
<table><tr><th colspan="4">Normal</th><th>Abnormal</th></tr><tr><td>Gray - Black</td><td>Gray - Red</td><td>Gray - Yellow</td><td>Gray - Orange</td><td rowspan="2">Open or short</td></tr><tr><td colspan="4">46 ± 3Ω</td></tr></table></td></tr>
</table>

Check method of DC fan motor (fan motor/outdoor multi controller circuit board)

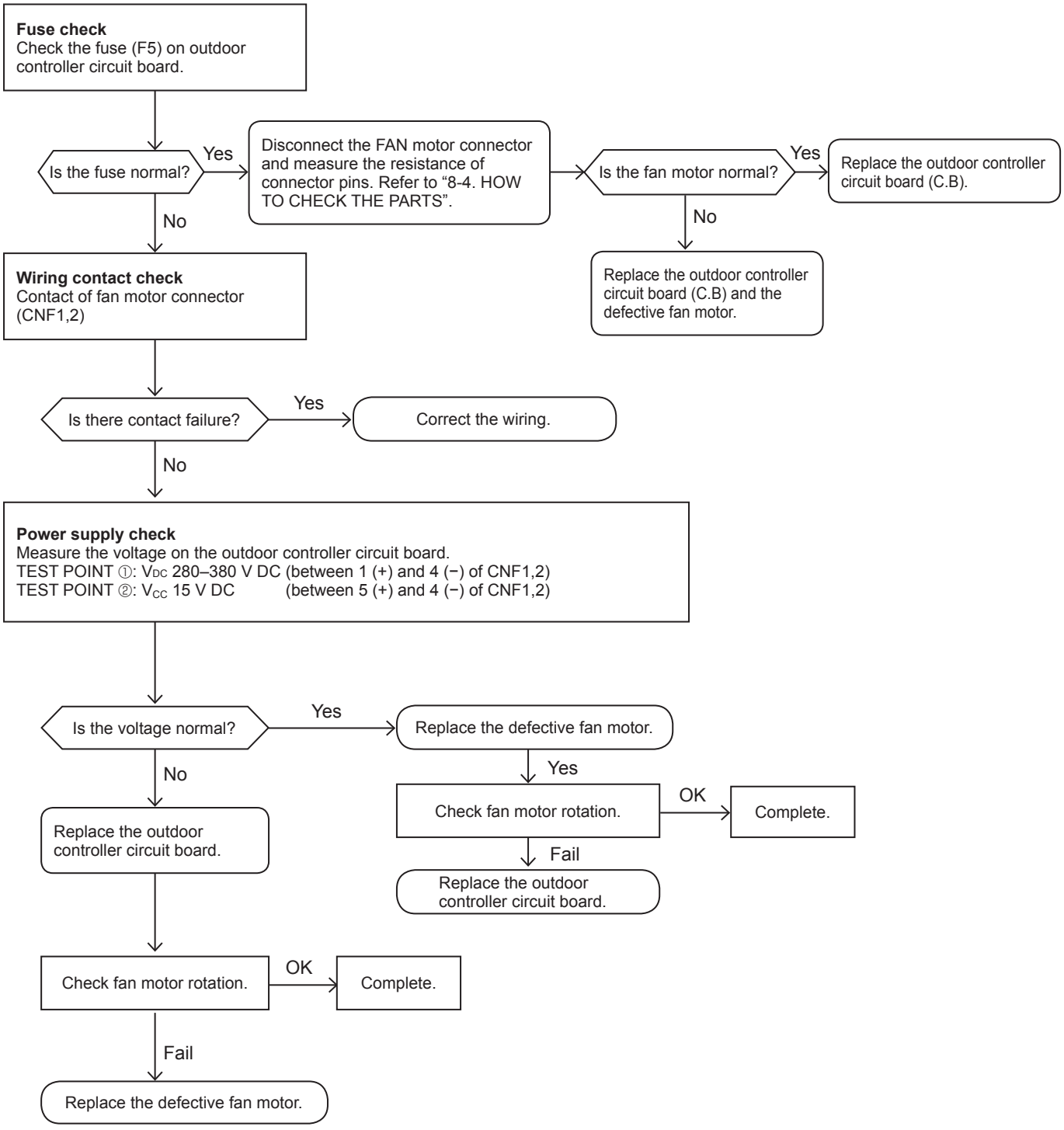
① Notes

· High voltage is applied to the connector (CNF1, 2) for the fan motor. Pay attention to the service.

· Do not pull out the connector (CNF1, 2) for the motor with the power supply on.
(It may damage the outdoor controller circuit board and fan motor.)

② Self check

Symptom: The outdoor fan cannot rotate.



8-5. HOW TO CHECK THE COMPONENTS

<Thermistor feature chart>

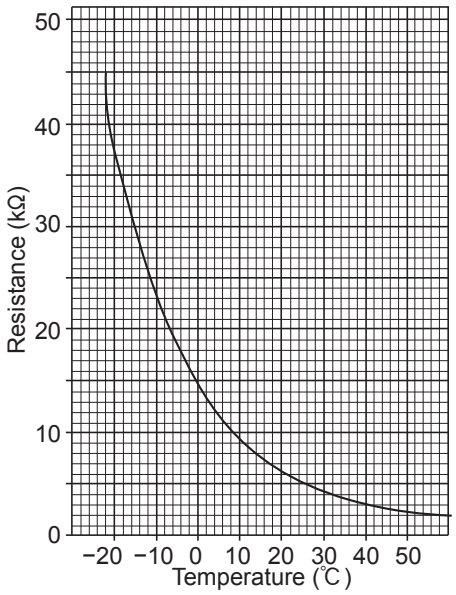
Low temperature thermistors

- Thermistor <Liquid> (TH3)
- Thermistor <Plate HEX liquid> (TH6)
- Thermistor <Ambient> (TH7)
- Thermistor <Suction> (TH33)

Thermistor R0 = 15 kΩ ± 3%
B constant = 3480 ± 2%

$$R_t = 15\exp\{3480(\frac{1}{273+t} - \frac{1}{273})\}$$

0℃	15 kΩ	30℃	4.3 kΩ
10℃	9.6 kΩ	40℃	3.0 kΩ
20℃	6.3 kΩ		
25℃	5.2 kΩ		



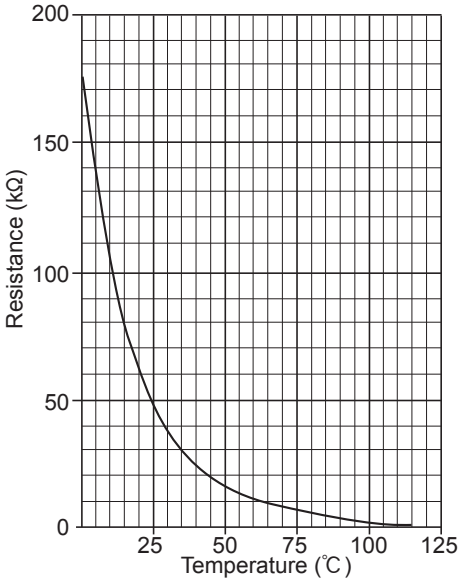
Medium temperature thermistor

- Thermistor <Heat sink> (TH8)

Thermistor R50 = 17 kΩ ± 2%
B constant = 4150 ± 3%

$$R_t = 17\exp\{4150(\frac{1}{273+t} - \frac{1}{323})\}$$

0℃	180 kΩ
25℃	50 kΩ
50℃	17 kΩ
70℃	8 kΩ
90℃	4 kΩ



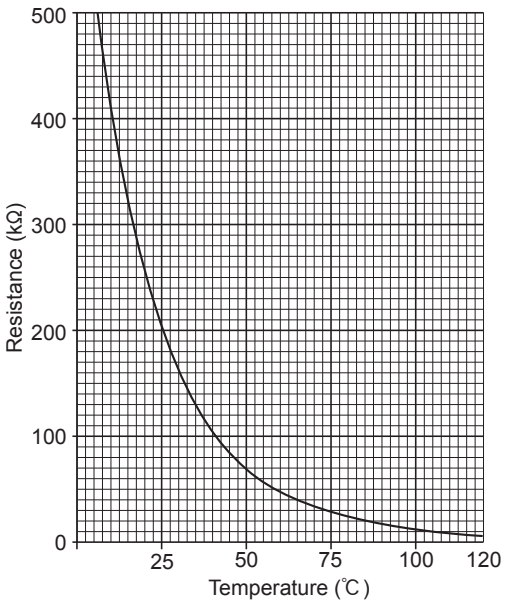
High temperature thermistors

- Thermistor <Discharge> (TH4)
- Thermistor <Comp. surface> (TH34)

Thermistor R120 = 7.465kΩ ± 2%
B constant = 4057 ± 2%

$$R_t = 7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{393})\}$$

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



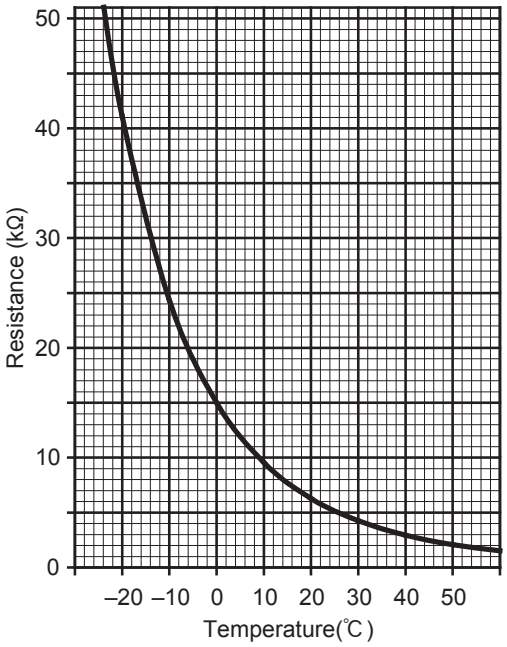
Low temperature thermistor

• Thermistor <Inlet water> (TH32)

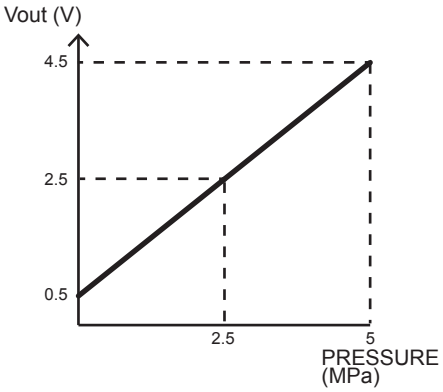
Thermistor R0 = 15 kΩ ± 2.5%
B constant = 3450 ± 2%

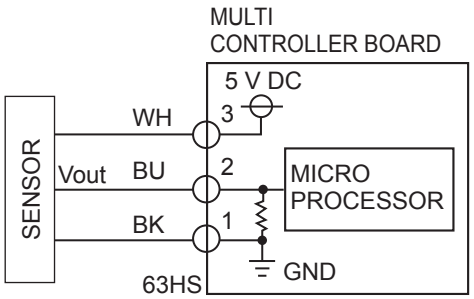
$$R_t = 15\exp\{3450(\frac{1}{273+t} - \frac{1}{273})\}$$

0℃	15 kΩ	30℃	4.3 kΩ
10℃	9.6 kΩ	40℃	3.0 kΩ
20℃	6.3 kΩ		
25℃	5.2 kΩ		



<HIGH PRESSURE SENSOR>



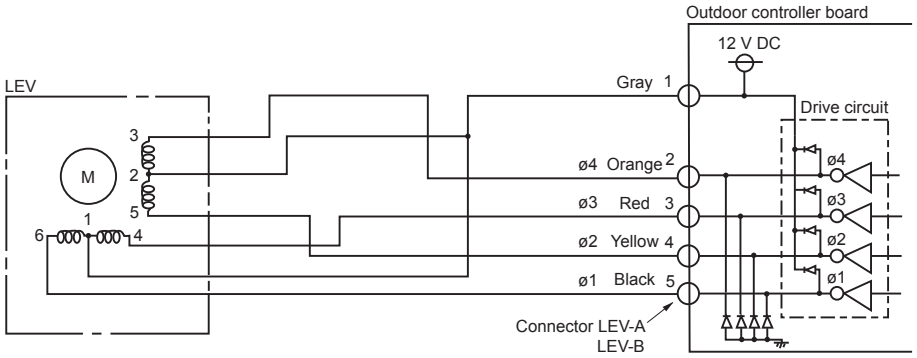


③–①: 5 V (DC)
②–①: Output Vout (DC)

Linear expansion valve

(1) Operation summary of the linear expansion valve

• Linear expansion valve opens/closes through stepping motor after receiving the pulse signal from the outdoor controller board.
• Valve position can be changed in proportion to the number of pulse signal.
<Connection between the outdoor controller board and the linear expansion valve>



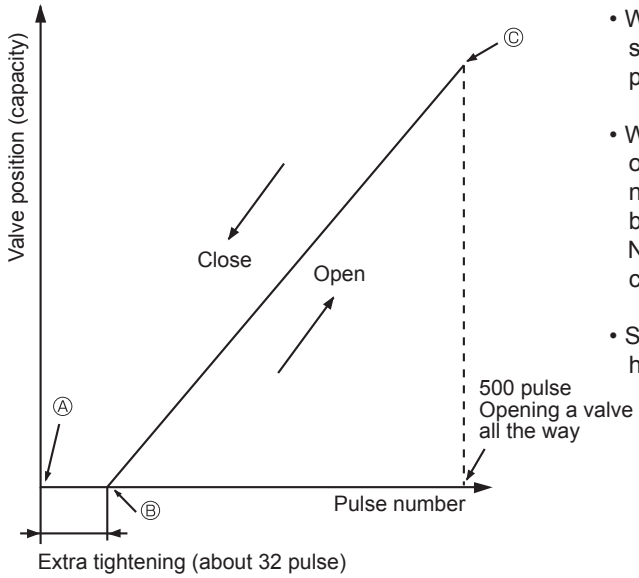
<Output pulse signal and the valve operation>

Output (Phase)	Output							
	1	2	3	4	5	6	7	8
ø1	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
ø2	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
ø3	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
ø4	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

The output pulse shifts in below order.
Opening a valve: 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8
Closing a valve: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1

• When linear expansion valve operation stops, all output phases become OFF.

(2) Linear expansion valve operation



• When the power is turned on, 700 pulse closing valve signal will be sent till it goes to Ⓐ point in order to define the valve position. (The pulse signal is being sent for about 20 seconds.)

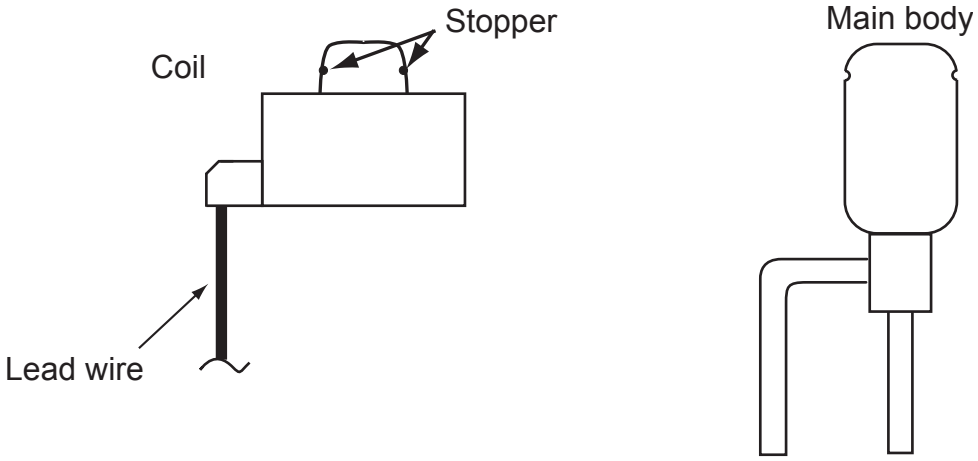
• When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valve: however, when the pulse number moves from Ⓑ to Ⓐ or when the valve is locked, sound can be heard.
No sound is heard when the pulse number moves from Ⓑ to Ⓐ in case coil is burnt out or motor is locked by open-phase.

• Sound can be detected by placing the ear against the screw driver handle while putting the screw driver to the linear expansion valve.

(3) How to attach and detach the coil of linear expansion valve

<Composition>

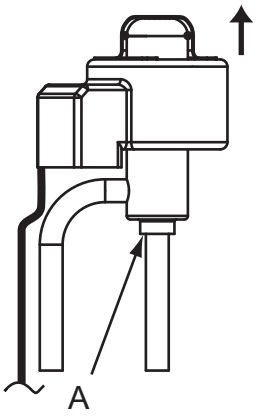
Linear expansion valve is separable into the main body and the coil as shown in the diagram below.



<How to detach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and detach the coil by pulling it upward.

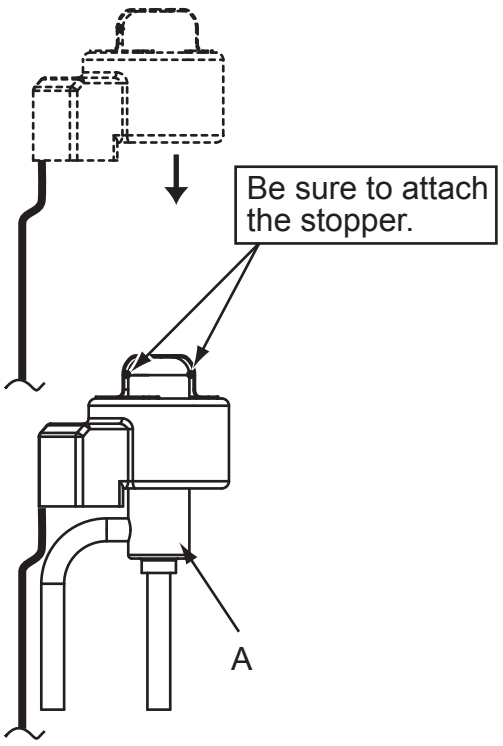
Be sure to detach the coil holding main body firmly. Otherwise pipes can bend due to stress.



<How to attach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and attach the coil by inserting it downward into the main body. Then securely attach the coil stopper to main body. (At this time, be careful that stress is not added to lead wire and main body is not wound by lead wire.) If the stopper is not firmly attached to main body, coil may be detached from the main body and that can cause defective operation of linear expansion valve.

To prevent piping stress, be sure to attach the coil holding the main body of linear expansion valve firmly. Otherwise pipe may break.

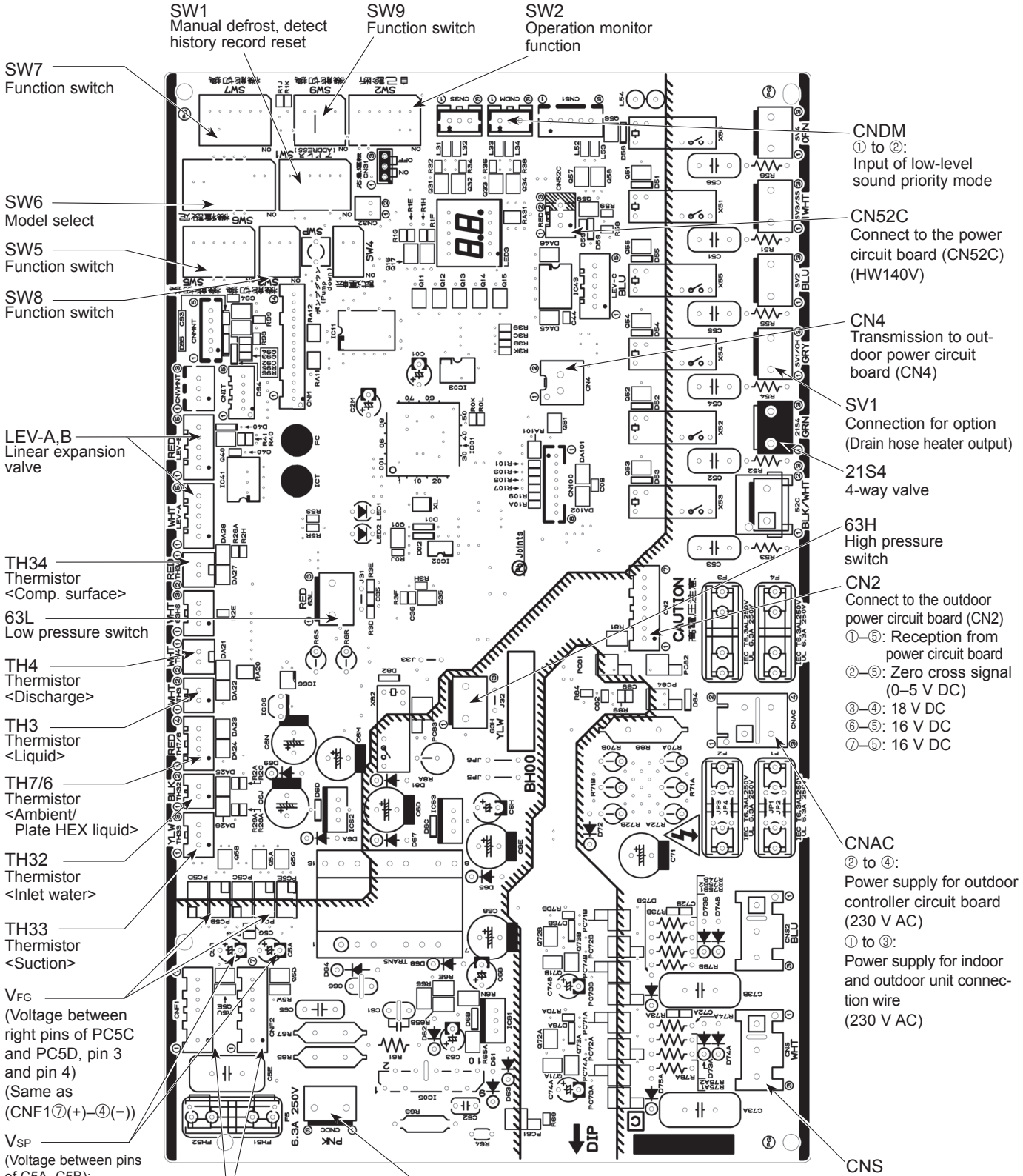


<CAUTION> TEST POINT ① is high voltage.

8-6. TEST POINT DIAGRAM

Outdoor controller circuit board

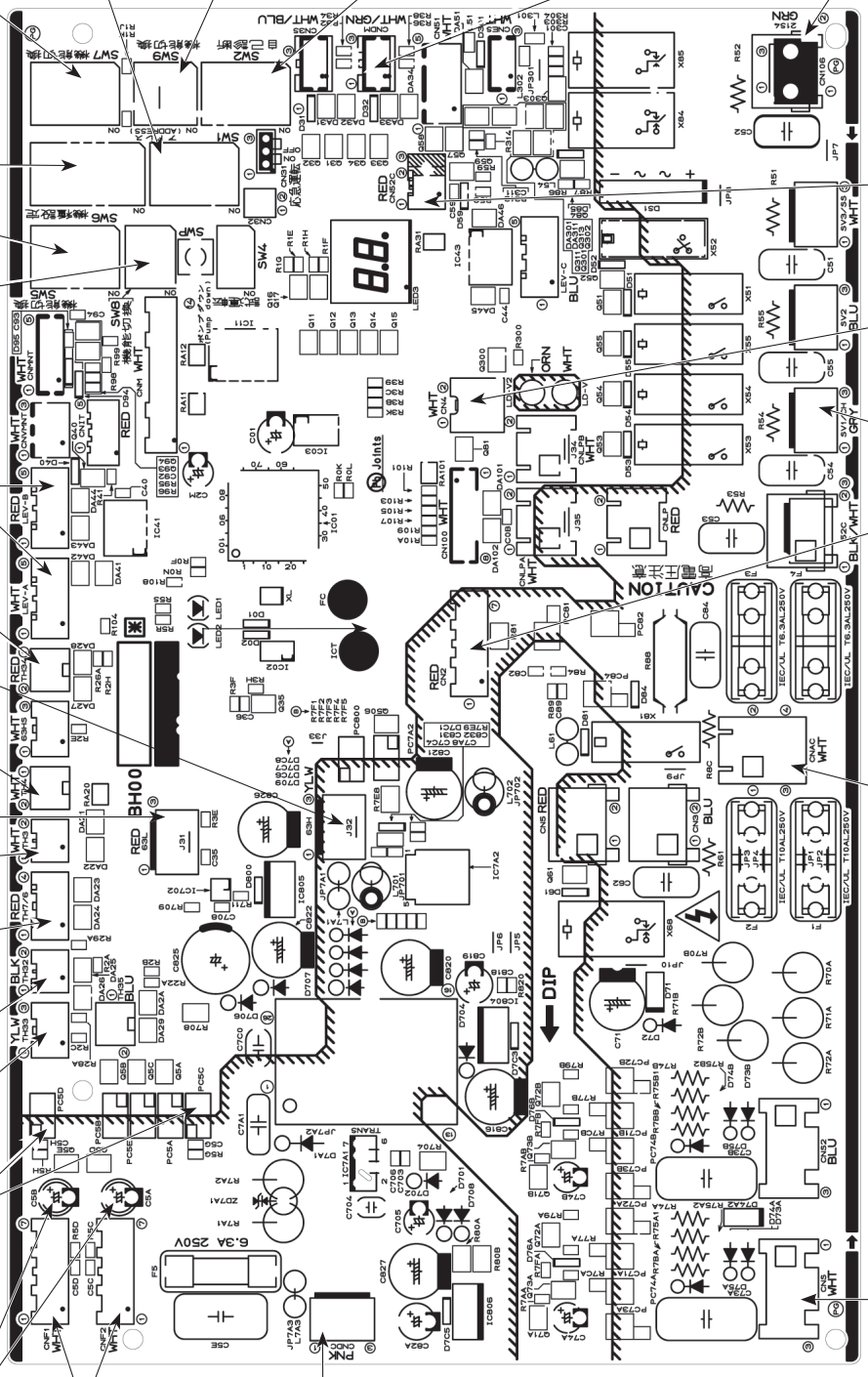
PUHZ-W112VHA PUHZ-W112VHA-BS



<CAUTION> TEST POINT ① is high voltage.

Outdoor controller circuit board

PUHZ-W112VHAR1 PUHZ-W112VHAR2 PUHZ-W112VHAR3
PUHZ-W112VHAR1-BS PUHZ-W112VHAR2-BS PUHZ-W112VHAR3-BS



Outdoor power circuit board
PUHZ-W112VHA
PUHZ-W112VHA-BS

Brief Check of POWER MODULE
If they are short-circuited, it means that they are broken.
Measure the resistance in the following points (connectors, etc.).

1. Check of POWER MODULE
 ① Check of DIODE circuit
 R - L1, S - L1, R - N1, S - N1
 ② Check of IGBT circuit
 L2 - N1
 ③ Check of INVERTER circuit
 P - U, P - V, P - W, N1 - U, N1 - V, N1 - W

Note: The marks R, S, L1, L2, P, N1, U, V and W shown in the diagram are not actually printed on the board.

CN2
Connect to the outdoor controller circuit board (CN2)
①–⑤: Transmitting signal to outdoor controller circuit board (0–5 V DC)
②–⑤: Zero cross signal (0–5 V DC)
③–④: 18 V DC
⑥–⑤: 16 V DC
⑦–⑤: 16 V DC

CN4
Connect to the outdoor controller circuit board (CN4)

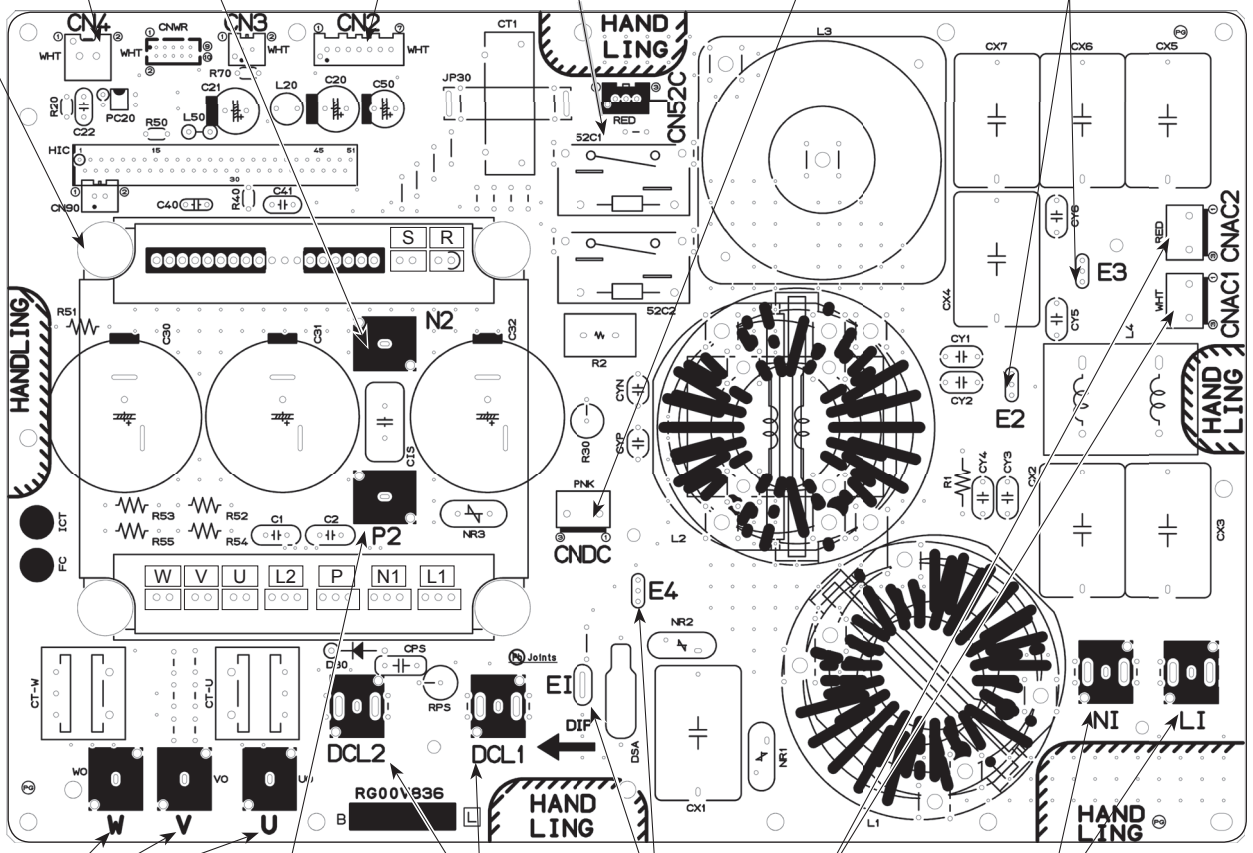
Power module

N2
Connect to the smoothing capacitor CB ⊖

CN52C
52C driving signal
Connect to the outdoor controller circuit board (CN52C)

CNDC
280–380 V DC (①+, ③−)
Connect to the outdoor controller circuit board (CNDC)

E2, E3
Connect to the earth



U/V/W
Connect to the compressor (MC) Voltage among phases: 10–180 V AC

P2
Connect to the smoothing capacitor CB ⊕

DCL1, DCL2
Connect to DCL

EI, E4
Connect to the earth

CNAC1, CNAC2
230 V AC
Connect to the outdoor controller circuit board (CNAC)

NI, LI
Voltage of 230 V AC is input (Connect to the terminal block (TB1))

Outdoor power circuit board
PUHZ-W112VHAR1
PUHZ-W112VHAR1-BS
PUHZ-W112VHAR2
PUHZ-W112VHAR2-BS
PUHZ-W112VHAR3
PUHZ-W112VHAR3-BS

Brief Check of POWER MODULE
If they are short-circuited, it means that they are broken.
Measure the resistance in the following points (connectors, etc.).

1. Check of POWER MODULE
 ① Check of DIODE circuit
 R - L1, S - L1, R - N1, S - N1
 ② Check of IGBT circuit
 L2 - N1
 ③ Check of INVERTER circuit
 P - U, P - V, P - W, N1 - U, N1 - V, N1 - W

Note: The marks R, S, L1, L2, P, N1, U, V and W shown in the diagram are not actually printed on the board.

CN4
Connect to the outdoor controller circuit board (CN4)

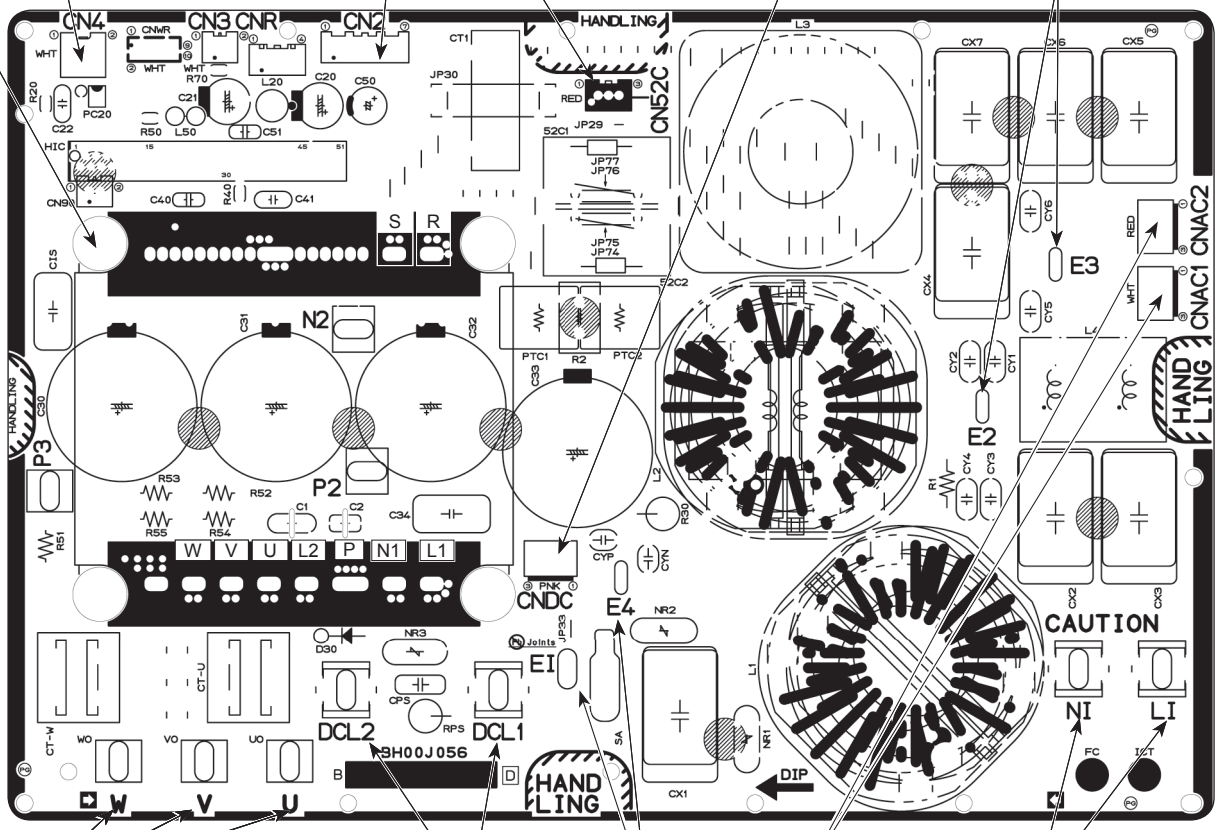
CN2
Connect to the outdoor controller circuit board (CN2)
①–⑤: Transmitting signal to outdoor controller circuit board (0–5 V DC)
②–⑤: Zero cross signal (0–5 V DC)
③–④: 18 V DC
⑥–⑤: 16 V DC
⑦–⑤: 16 V DC

Power module

CN52C
52C driving signal
Connect to the outdoor controller circuit board (CN52C)

CNDC
280–380 V DC (①+, ③−)
Connect to the outdoor controller circuit board (CNDC)

E2, E3
Connect to the earth



U/V/W
Connect to the compressor (MC) Voltage among phases: 10–180 V AC

DCL1, DCL2
Connect to DCL

EI, E4
Connect to the earth

CNAC1, CNAC2
230 V AC
Connect to the outdoor controller circuit board (CNAC)

NI, LI
Voltage of 230 V AC is input (Connect to the terminal block (TB1))

8-7. OUTDOOR UNIT OPERATION MONITOR FUNCTION

Operation indicator SW2: Indicator change of self-diagnosis

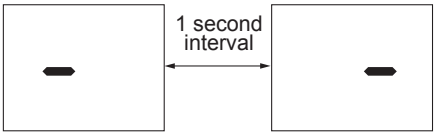
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
ON 1 2 3 4 5 6			

<Digital indicator LED3 working details>

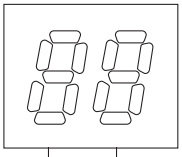
(Be sure that the 1 to 6 in the SW2 are set to OFF.)

(1) Display when the power supply is ON.
When the power supply is ON, blinking displays by turns.
Wait for 10 seconds at the longest.



(2) When the display lights (Normal operation)
① Operation mode display

LED3



(Lighting)

SW2

(Initial setting)

The tens digit: Operation mode

Display	Operation Model
O	OFF
C	COOLING
H	HEATING
d	DEFROSTING

The ones digit: Relay output

Display	Warming-up Compressor	Compressor	4-way valve	Solenoid valve
0	—	—	—	—
1	—	—	—	ON
2	—	—	ON	—
3	—	—	ON	ON
4	—	ON	—	—
5	—	ON	—	ON
6	—	ON	ON	—
7	—	ON	ON	ON
8	ON	—	—	—
A	ON	—	ON	—

② Display during error postponement
Postponement code is displayed when compressor stops due to the work of protection device.
Postponement code is displayed while error is being postponed.

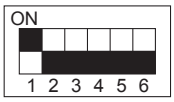
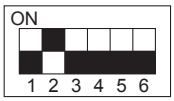
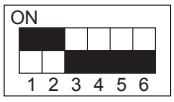
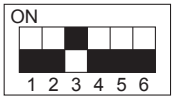
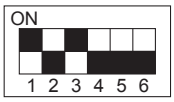
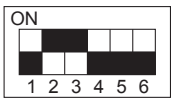
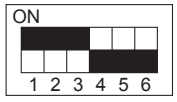
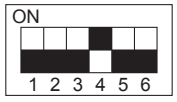
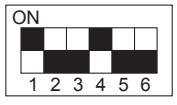
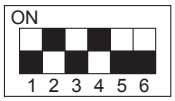
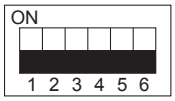
(3) When the display blinks
Inspection code is displayed when compressor stops due to the work of protection devices.

Display	Inspection unit
0	Outdoor unit

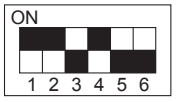
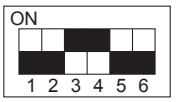
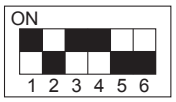
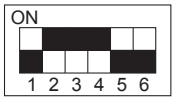
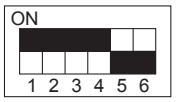
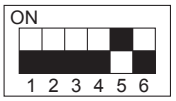
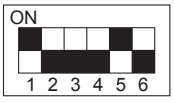
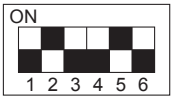
Display	Contents to be inspected (During operation)
U1	Abnormal high pressure (63H operated)
U2	Abnormal high discharging temperature, shortage of refrigerant
U3	Open/short circuit of discharging thermistor (TH4, TH34)
U4	Open/short of outdoor unit thermistors (TH3, TH32, TH6, TH7, TH8 and TH33)
U5	Abnormal temperature of heat sink
U6	Abnormality of power module
U7	Abnormality of superheat due to low discharge temperature
U8	Abnormality in outdoor fan motor
U9	Voltage fault, Input current sensor error
Ud	Overheat protection
UF	Compressor overcurrent interruption (When Comp. locked)
UH	Current sensor error
UP	Compressor overcurrent interruption
P6	Abnormality of Interface or FTC units
P8	Abnormality of pipe temperature
UE	Abnormality pressure of pressure sensor
PE	Abnormality of inlet water temperature
Ed	Serial communication error

Display	Contents to be inspected (When power is turned on)
F5	63H connector(yellow) is open.
E8	Interface unit/Flow temp. controller-outdoor communication error (Signal receiving error) (Outdoor unit)
E9	Interface unit/Flow temp. controller-outdoor communication error (Transmitting error) (Outdoor unit)
EA	Miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire, excessive number of indoor units (2 units or more)
Eb	Miswiring of Interface unit/Flow temp. controller-outdoor unit connecting wire (converse wiring or disconnection)
EC	Startup time over
E0–E7	Communication error except for outdoor unit

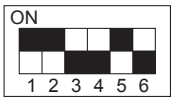
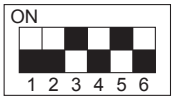
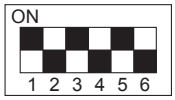
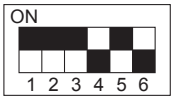
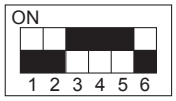
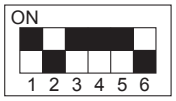
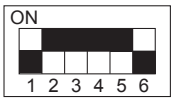
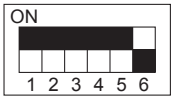
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Pipe temperature/Liquid (TH3) −40 to 90	−40 to 90 (When the coil thermistor detects 0℃ or below, "–" and temperature are displayed by turns.) (Example) When -10℃; 0.5 s 0.5 s 2 s -□ →10 →□□	℃
	Discharge temperature (TH4) 3 to 217	3 to 217 (When the discharge thermistor detects 100℃ or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105℃; 0.5 s 0.5 s 2 s □1 →05 →□□	℃
	Fan steps 0 to 10	0 to 10	Step
	Compressor ON/OFF 0 to 9999	0 to 9999 (When the number of times is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 42500 times (425 × 100 times); 0.5 s 0.5 s 2 s □4 →25 →□□	100 times
	Compressor accumulated operation hours 0 to 9999	0 to 9999 (When it is 100 hours or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 2450 hours (245 × 10 hours); 0.5 s 0.5 s 2 s □2 →45 →□□	10 hours
	Compressor running current 0 to 50	0 to 50 (Value after the decimal point will be truncated.)	A
	Compressor running frequency 0 to 255	0 to 255 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 105 Hz; 0.5 s 0.5 s 2 s □1 →05 →□□	Hz
	LEV-A opening pulse 0 to 500	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 150 pulse; 0.5 s 0.5 s 2 s □1 →50 →□□	Pulse
	Deferred error history (1)	Deferred error Blinking: being deferred Lighting: deferment is cancelled "00" is displayed in case of no deferment	Code display
	Operation mode when the error occurred	Operation mode when the unit is stopped due to an error is displayed. The displayed code is when the SW2 is set as below. (SW2) 	Code display

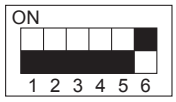
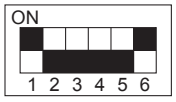
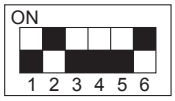
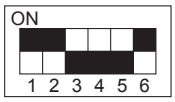
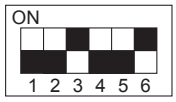
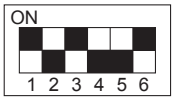
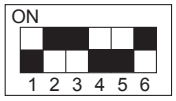
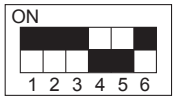
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Pipe temperature/Liquid (TH3) when error occurred −40 to 90	−40 to 90 (When the coil thermistor detects 0℃ or below, "–" and temperature are displayed by turns.) (Example) When - 15℃; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Discharge temperature (TH4) when error occurred 3 to 217	3 to 217 (When the temperature is 100℃ or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 130℃; 0.5 s 0.5 s 2 s □1 →30 →□□	℃
	Compressor current when error occurred 0 to 50	0 to 50	A
	Error history (1) (latest) Alternate display of faulty unit number and check code	When no error history, " 0 " and "– –" are displayed by turns.	Code display
	Error history (2) Alternate display of faulty unit number and check code	When no error history, " 0 " and "– –" are displayed by turns.	Code display
	Compressor operation duration 0 to 999	0 to 999 (When it is 100 minutes or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 245 minutes; 0.5 s 0.5 s 2 s □2 →45 →□□	Minute
	LEV-B opening when error occurred	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 150 pulse; 0.5 s 0.5 s 2 s □1 →50 →□□	Pulse
	Capacity settings	The outdoor capacity code is shown as below Model: PUHZ-W112 — Code: 20	Code display

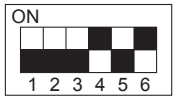
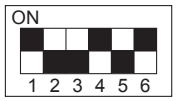
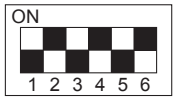
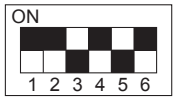
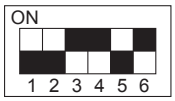
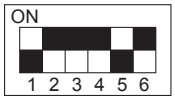
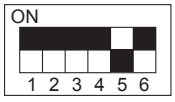
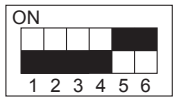
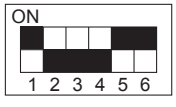
The black square (■) indicates a switch position.

<table>
<tr><th>SW2 setting</th><th>Display detail</th><th>Explanation for display</th><th>Unit</th></tr>
<tr><td>  </td><td>Outdoor unit setting information</td><td>• The tens digit (Total display for applied setting)
<table><tr><th>Setting details</th><th>Display details</th></tr><tr><td>H·P / Cooling only</td><td>0: H·P 1: Cooling only</td></tr><tr><td>Single phase / 3 phase</td><td>0: Single phase 2: 3 phase</td></tr></table>• The ones digit
<table><tr><th>Setting details</th><th>Display details</th></tr><tr><td>Defrosting switch</td><td>0: Normal 1: For high humidity</td></tr></table>(Example) When heat pump, 3 phase and defrosting (normal) are set up, “20” is displayed.</td><td>Code display</td></tr>
<tr><td>  </td><td>Plate HEX liquid pipe temperature (TH6)
−39 to 88</td><td>−39 to 88
(When the temperature is 0℃ or less, “–” and temperature are displayed by turns.)</td><td>℃</td></tr>
<tr><td>  </td><td>Condensing temperature (T_{63HS})
−39 to 88</td><td>−39 to 88
(When the temperature is 0℃ or less, “–” and temperature are displayed by turns.)</td><td>℃</td></tr>
<tr><td>  </td><td>Calculated maximum frequency
0 to 150</td><td>0 to 150
(When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns.
(Example) When 105 Hz;
0.5 s 0.5 s 2 s
□1 →05 →□□</td><td>Hz</td></tr>
<tr><td>  </td><td>Water inlet temperature (TH32)
0 to 100</td><td>0 to 100</td><td>℃</td></tr>
<tr><td>  </td><td>Ambient temperature (TH7)
−39 to 88</td><td>−39 to 88
(When the temperature is 0℃ or less, “–” and temperature are displayed by turns.)</td><td>℃</td></tr>
<tr><td>  </td><td>Outdoor heat sink temperature (TH8)
−40 to 200</td><td>−40 to 200
(When the temperature is 0℃ or less, “–” and temperature are displayed by turns.)
(When the thermistor detects 100℃ or more, hundreds digit, tens digit and ones digit are displayed by turns.)</td><td>℃</td></tr>
<tr><td>  </td><td>Discharge superheat (SHd)
0 to 255
[Cooling and Heating: SHd = TH4−T_{63HS}]</td><td>0 to 255
(When the SHd is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.)</td><td>°C</td></tr>
</table>

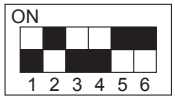
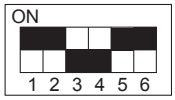
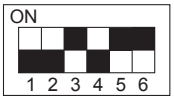
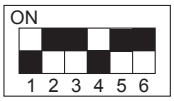
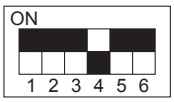
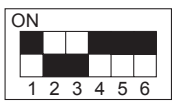
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Number of defrost cycles 0 to FFFE	0 to FFFE (in hexadecimal notation) (When more than FF in hex (255 in decimal), the number is displayed in order of 16^3's and 16^2's, and 16^1's and 16^0's places. (Example) When 5000 cycles; 0.5 s 0.5 s 2 s □9 → C4 → □□	2 cycles
	Input current of outdoor unit 0 to 500	0 to 500 (When it is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.)	0.1 A
	LEV-B opening pulse 0 to 500	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.)	Pulse
	U9 error detail history (latest)	<table><tr><th>Description</th><th>Display</th></tr><tr><td>Normal</td><td>00</td></tr><tr><td>Overvoltage error</td><td>01</td></tr><tr><td>Undervoltage error</td><td>02</td></tr><tr><td>Input current sensor error L1-phase open error</td><td>04</td></tr><tr><td>Abnormal power synchronous signal</td><td>08</td></tr><tr><td>PFC/IGBT error Undervoltage</td><td>20</td></tr></table> Display examples for multiple errors: Overvoltage (01) + Undervoltage (02) = 03 Undervoltage (02) + Power-sync signal error (08) = 0A L1 phase open error (04) + PFC/IGBT error (20) = 24	Code display
	Direct current bus voltage 150 to 400	150 to 400 (When it is 100V or more, hundreds digit, tens digit and ones digit are displayed by turns.)	V
	Capacity save 0 to 100 [When there is no setting of capacity save, "100" is displayed.]	0 to 100 (When the capacity is 100%, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 100%; 0.5 s 0.5 s 2 s □1 → 00 → □□	%
	Deferred error history (2) of outdoor unit	Deferred check code display Blinking: being deferred Lighting: deferment is cancelled "00" is displayed in case of no deferment.	Code display
	Deferred error history (3) of outdoor unit	Deferred check code display Blinking: being deferred Lighting: deferment is cancelled "00" is displayed in case of no deferment.	Code display

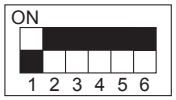
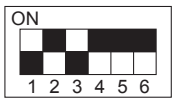
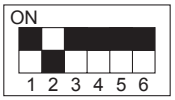
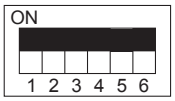
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Error history (3) (Oldest) Faulty unit number and check code are displayed alternately.	When no error history, “0” and “– –“ are displayed by turns.	Code display
	Error thermistor display [When there is no error thermistor, “–“ is displayed.]	3: Liquid pipe thermistor (TH3) 3: Water inlet temp. thermistor (TH32) 6: Plate HEX liquid pipe thermistor (TH6) 7: Ambient temp. thermistor (TH7) 8: Heat sink thermistor (TH8) 4: Discharge thermistor (TH4) 3: Suction pipe thermistor (TH33) 34: Comp. surface thermistor (TH34)	Code display
	Operation frequency when error occurred. 0 to 225	0 to 225 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105 Hz; 0.5 s 0.5 s 2 s □1 →05 →□□	Hz
	Fan step when error occurred. 0 to 10	0 to 10	Step
	LEV-A opening pulse when error occurred. 0 to 500	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 130 pulse; 0.5 s 0.5 s 2 s □1 →30 →□□	Pulse
	Plate HEX liquid pipe temperature (TH6) when error occurred. −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When –15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Condensing temperature when error occurred. −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When –15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃
	Water inlet temperature (TH32) when error occurred. 0 to 100	0 to 100	℃
	Ambient temperature (TH7) when error occurred. −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	℃

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Outdoor heat sink temperature (TH8) when error occurred. −40 to 200	−40 to 200 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.)	℃
	Discharge superheat (SHd) when error occurred. 0 to 255 [Cooling and Heating: SHd=TH4-T_{63HS}]	0 to 255 (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 150°C; 0.5 s 0.5 s 2 s □1 →50 →□□	℃
	Sub cool (SC) when error occurred. 0 to 130 [Cooling: SC = T_{63HS}-TH3 Heating: SC = T_{63HS}-TH6]	0 to 130 (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 115°C; 0.5 s 0.5 s 2 s □1 →15 →□□	℃
	Compressor operation duration before the unit stops with error 0 to 999	0 to 999 (When it is 100 minutes or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 415 minutes; 0.5 s 0.5 s 2 s □4 →15 →□□	Minute
	Maximum frequency when error occurred 0 to 150	0 to 150 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 105 Hz; 0.5 s 0.5 s 2 s □1 →05 →□□	Hz
	Requested capacity step when error occurred 0 to 7	0 to 7	Step
	Compressor frequency control status	The following code will be a help to know the operating status of unit. •Tens place (left side): Display: 1 — Input current restriction control Display: 2 — Compressor current restriction control •First digit (Total figure of the corresponding relays are displayed.) Display: 1 — Discharge temp. control (not to over rise). Display: 2 — Condensing temp. control (not to over rise). Display: 4 — Freezing protection control Display: 8 — Heat sink temp. control (not to over rise). When the following 3 points are under control; (1) Input current restriction control. (2) Condensing temp. control (not to over rise). (3) Heat sink temp. control (not to over rise). LED 	Code display

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Comp. surface temperature (TH34) 3 to 217	3 to 217 (When the temperature is 100℃ or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 130℃; 0.5 s 0.5 s 2 s □1 →30 →□□	℃
	Outdoor suction pipe temperature (TH33) −39 to 88	−39 to 88 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (Example) When –15°C; 0.5 s 0.5 s 2 s –□ →15 →□□	℃
	Requested capacity step (Q STEP) 0 to 7	0 to 7	Step
	U9 Error details (To be shown while error call is deferred.)	Description / Display Normal: 00 Overvoltage error: 01 Undervoltage error: 02 Input current sensor error / L1-phase open error: 04 Abnormal power synchronous signal: 08 PFC/IGBT error / Undervoltage: 20 Display examples for multiple errors: Overvoltage (01) + Undervoltage (02) = 03 Undervoltage (02) + Power-sync signal error (08) = 0A L1 phase open error (04) + PFC/IGBT error (20) = 24	Code display

8-8. Request code list

Certain indoor/outdoor combinations do not have the request code function; therefore, no request codes are displayed.
Refer to indoor unit service manual for how to use the controllers and request codes for indoor unit.

Request code	Request content	Description (Display range)	Unit	Remarks
0	Operation state	Refer to 8-8-1. Detail Contents in Request Code.	–	
1	Compressor-Operating current (rms)	0–50	A	
2	Compressor-Accumulated operating time	0–9999	10 hours	
3	Compressor-Number of operation times	0–9999	100 times	
4	Discharge temperature (TH4)	3–217	℃	
5	Outdoor unit -Liquid pipe 1 temperature (TH3)	−40–90	℃	
6	Water inlet temperature (TH32)	−40–101	℃	
7	Outdoor unit-Plate HEX pipe temperature (TH6)	−39–88	℃	
8	Outdoor unit-Suction pipe temperature (TH33)	−39–88	℃	
9	Outdoor unit-Outside air temperature (TH7)	−39–88	℃	
10	Outdoor unit-Heatsink temperature (TH8)	−40–200	℃	
11				
12	Discharge superheat (SHd)	0–255	℃	
13	Sub-cool (SC)	0–130	℃	
14	Condensing temperature (T_{63HS})	−39–88	℃	
15				
16	Compressor-Operating frequency	0–255	Hz	
17	Compressor-Target operating frequency	0–255	Hz	
18	Outdoor unit-Fan output step	0–10	Step	
19	Outdoor unit-Fan 1 speed (Only for air conditioners with DC fan motor)	0–9999	rpm	
20	Outdoor unit-Fan 2 speed (Only for air conditioners with DC fan motor)	0–9999	rpm	"0" is displayed if the air conditioner is a single-fan type.
21	Requested capacity step (Q STEP)	0–7	Step	
22	LEV (A) opening	0–500	Pulses	
23	LEV (B) opening	0–500	Pulses	
24				
25	Primary current	0–50	A	
26	DC bus voltage	180–370	V	
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48	Thermostat ON operating time	0–999	Minutes	
49				

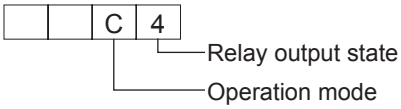
Request code	Request content	Description (Display range)	Unit	Remarks
50				
51	Outdoor unit-Control state	Refer to 8-8-1.Detail Contents in Request Code.	–	
52	Compressor-Frequency control state	Refer to 8-8-1.Detail Contents in Request Code.	–	
53	Outdoor unit-Fan control state	Refer to 8-8-1.Detail Contents in Request Code.	–	
54	Actuator output state	Refer to 8-8-1.Detail Contents in Request Code.	–	
55	Error content (U9)	Refer to 8-8-1.Detail Contents in Request Code.	–	
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70	Outdoor unit-Capacity setting display	Refer to 8-8-1.Detail Contents in Request Code.	–	
71	Outdoor unit-Setting information	Refer to 8-8-1.Detail Contents in Request Code.	–	
72				
73			–	
74			–	
75				
76			–	
77			–	
78			–	
79			–	
80			–	
81			–	
82			–	
83				
84				
85				
86				
87				
88				
89				
90	Outdoor unit-Microprocessor version information	Examples) Ver. 5.01 → "0501"	Ver.	
91	Outdoor unit-Microprocessor version information (sub No.)	Auxiliary information (displayed after version information) Examples) Ver. 5.01 A000 → "A000"	–	
92				
93				
94				
95				
96				
97				
98				
99				
100	Outdoor unit - Error postponement history 1 (latest)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
101	Outdoor unit - Error postponement history 2 (previous)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
102	Outdoor unit - Error postponement history 3 (last but one)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	

Request code	Request content	Description (Display range)	Unit	Remarks
103	Error history 1 (latest)	Displays error history. ("--" is displayed if no history is present.)	Code	
104	Error history 2 (second to last)	Displays error history. ("--" is displayed if no history is present.)	Code	
105	Error history 3 (third to last)	Displays error history. ("--" is displayed if no history is present.)	Code	
106	Abnormal thermistor display (TH3/TH6/TH7/TH8/TH32)	3: TH3, TH32 6: TH6 7: TH7 8: TH8 0: No thermistor error	Sensor number	
107	Operation mode at time of error	Displayed in the same way as request code "0".	–	
108	Compressor-Operating current at time of error	0–50	A	
109	Compressor-Accumulated operating time at time of error	0–9999	10 hours	
110	Compressor-Number of operation times at time of error	0–9999	100 times	
111	Discharge temperature at time of error	3–217	℃	
112	Outdoor unit -Liquid pipe 1 temperature (TH3) at time of error	−40–90	℃	
113	Water inlet temperature (TH32) at time of error	−40–101	℃	
114	Plate HEX liquid pipe temperature (TH6) at time of error	−39–88	℃	
115	Outdoor unit-Suction pipe temperature (TH33)	−39–88	℃	
116	Outdoor unit-Outside air temperature (TH7) at time of error	−39–88	℃	
117	Outdoor unit-Heat sink temperature (TH8) at time of error	−40–200	℃	
118	Discharge superheat (SHd) at time of error	0–255	℃	
119	Sub-cool (SC) at time of error	0–130	℃	
120	Compressor-Operating frequency at time of error	0–255	Hz	
121	Outdoor unit at time of error • Fan output step	0–10	Step	
122	Outdoor unit at time of error • Fan 1 speed (Only for air conditioners with DC fan)	0–9999	rpm	
123	Outdoor unit at time of error • Fan 2 speed (Only for air conditioners with DC fan)	0–9999	rpm	"0"is displayed if the air conditioner is a single-fan type.
124				
125	LEV (A) opening at time of error	0–500	Pulses	
126	LEV (B) opening at time of error	0–500	Pulses	
127				
128				
129	Condensing temperature (T_{63HS}) at time of error	−39–88	℃	
130	Thermostat ON time until operation stops due to error	0–999	Minutes	

8-8-1. Detail Contents in Request Code

[Operation state] (Request code: "0")

Data display



Operation mode

Display	Operation mode
0	STOP • FAN
C	COOL • DRY
H	HEAT
d	DEFROST

Relay output state

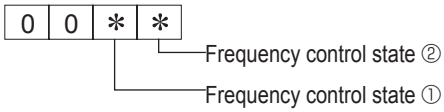
Display	Power currently supplied to compressor	Compressor	Four-way valve	Solenoid valve
0	–	–	–	–
1				ON
2			ON	
3			ON	ON
4		ON		
5		ON		ON
6		ON	ON	
7		ON	ON	ON
8	ON			
A	ON		ON	

[Outdoor unit – Control state] (Request code: "51")

Data display				State
0	0	0	0	Normal
0	0	0	1	Preparing for heat operation
0	0	0	2	Defrost

[Compressor – Frequency control state] (Request code: "52")

Data display



Frequency control state ①

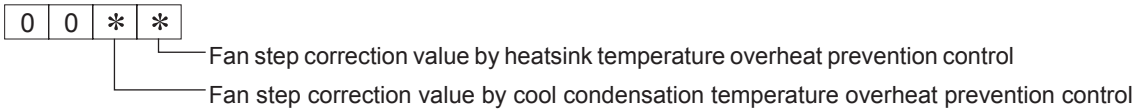
Display	Current limit control
0	No current limit
1	Primary current limit control is ON.
2	Secondary current limit control is ON.

Frequency control state ②

Display	Discharge temperature overheat prevention	Condensation temperature overheat prevention	Anti-freeze protection control	Heatsink temperature overheat prevention
0				
1	Controlled			
2		Controlled		
3	Controlled	Controlled		
4			Controlled	
5	Controlled		Controlled	
6		Controlled	Controlled	
7	Controlled	Controlled	Controlled	
8				Controlled
9	Controlled			Controlled
A		Controlled		Controlled
b	Controlled	Controlled		Controlled
C			Controlled	Controlled
d	Controlled		Controlled	Controlled
E		Controlled	Controlled	Controlled
F	Controlled	Controlled	Controlled	Controlled

[Fan control state] (Request code: "53")

Data display



Display	Correction value
− (minus)	−1
0	0
1	+1
2	+2

[Actuator output state] (Request code: "54")

Data display 0 0 * *

- Actuator output state ①
- Actuator output state ②

Actuator output state ①

Display	SV1	Four-way valve	Compressor	Compressor is warming up
0				
1	ON			
2		ON		
3	ON	ON		
4			ON	
5	ON		ON	
6		ON	ON	
7	ON	ON	ON	
8				ON
9	ON			ON
A		ON		ON
b	ON	ON		ON
C			ON	ON
d	ON		ON	ON
E		ON	ON	ON
F	ON	ON	ON	ON

Actuator output state ②

Display	52C	SV2	SS
0			
1	ON		
2		ON	
3	ON	ON	
4			ON
5	ON		ON
6		ON	ON
7	ON	ON	ON

[Error content (U9)] (Request code: "55")

Data display 0 0 * *

- Error content ①
- Error content ②

Error content ① ●: Detected

Display	Overvoltage error	Undervoltage error	L_1-phase open error	Power synchronizing signal error
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
b	●	●		●
C			●	●
d	●		●	●
E		●	●	●
F	●	●	●	●

Error content ② ●: Detected

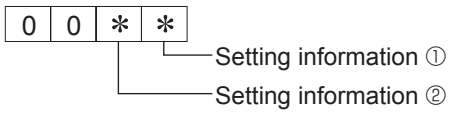
Display	Converter Fo error	PAM error
0		
1	●	
2		●
3	●	●

[Outdoor unit – Capacity setting display] (Request code: "70")

Data display	Capacity
9	35
10	50
11	60
14	71
20	100
25	125
28	140
40	200
50	250

[Outdoor unit – Setting information] (Request code: "71")

Data display



Setting information ①

Display	Defrost mode
0	Standard
1	For high humidity

Setting information ②

Display	Single-/ 3-phase	Heat pump/ cooling only
0	Single-phase	Heat pump
1		Cooling only
2	3-phase	Heat pump
3		Cooling only

Data Sheet for Air to Water Packaged type

Applicable model	PUHZ-W112VHA(-BS), PUHZ-W112VHAR1/R2/R3(-BS)

Model name: [Serial No.:]

Date:

Operation Data		SW2 setting 1	2	3	4	5	6	1: ON / 0: OFF
Inlet/Outlet water temperature								/
Outdoor Inlet/Outlet Air temperature								/
Discharge/Suction temperature								/
Discharge/Suction pressure								/
Power supply Voltage/Frequency (V / Hz)								/
Water flow Volume (L/min)								
Inlet water temp.	[TH32]	0	0	1	1	1	0	
Plate HEX liquid pipe temp.	[TH6]	0	0	1	0	1	0	
Condensing temp.	[T_{63HS}]	1	0	1	0	1	0	
Ambient temp.	[TH7]	1	0	1	1	1	0	
Compressor running frequency	(Hz)	1	1	1	0	0	0	
Fan steps	(Step)	1	1	0	0	0	0	
Liquid pipe temp.	[TH3]	1	0	0	0	0	0	
Discharge temp.	[TH4]	0	1	0	0	0	0	
LEV-A opening pulse	[LEV-A]	0	0	0	1	0	0	
LEV-B opening pulse	[LEV-B]	0	1	0	0	0	1	
Requested capacity step	[Q_{STEP}]	1	0	1	1	1	1	
Comp. surface temp.	[TH34]	0	1	1	1	1	1	
Suction temp.	[TH33]	0	1	0	1	1	1	
Heat sink temp.	[TH8]	0	1	1	1	1	0	
Discharge Super Heat	[SHd]	1	1	1	1	1	0	
Calculated max. frequency	(Hz)	1	1	1	0	1	0	
Compressor operation duration	(Min)	0	0	0	0	1	0	
Number of defrost cycle	(×2 times)	0	0	0	0	0	1	
Demand capacity	(%)	1	0	1	0	0	1	
Direct current bus line voltage	(V)	0	0	1	0	0	1	
Compressor running current	(A)	0	1	1	0	0	0	
Input current	(0.1A)	1	0	0	0	0	1	
Compressor frequency control status *		1	0	0	1	1	1	
Temperature differential code	[Δ Tj]	0	0	0	1	1	1	

Recorded operation status			SW2 setting 1	2	3	4	5	6	1: ON / 0: OFF
Operation mode when the error occurred		(Mode)	0	1	0	1	0	0	
Error history (1) [Latest]		(Code)	0	1	1	1	0	0	
Error history (2)		(Code)	1	1	1	1	0	0	
Error history (3) [Oldest]		(Code)	0	0	0	1	0	1	
Deferred error history (1)		(Code)	1	0	0	1	0	0	
Deferred error history (2)		(Code)	0	1	1	0	0	1	
Deferred error history (3)		(Code)	1	1	1	0	0	1	
when error occurred	Condensing temp.	[T_{63HS}]	1	1	1	1	0	1	
	Plate HEX liquid pipe temp.	[TH6]	0	1	1	1	0	1	
	Compressor running frequency	(Hz)	0	1	0	1	0	1	
	Fan steps	(Step)	1	1	0	1	0	1	
	Liquid pipe temp.	[TH3]	1	1	0	1	0	0	
	Discharge temp.	[TH4]	0	0	1	1	0	0	
	LEV-A opening pulse	[LEV-A]	0	0	1	1	0	1	
	LEV-B opening pulse	[LEV-B]	1	0	0	0	1	0	
	Ambient temp.	[TH7]	1	0	0	0	1	1	
	Water inlet temp.	[TH32]	0	0	0	0	1	1	
	Heat sink temp.	[TH8]	0	1	0	0	1	1	
	Calculated max. frequency	(Hz)	0	1	1	0	1	1	
	Sub Cool	[SC]	0	0	1	0	1	1	
	Compressor operation duration	(Min)	1	0	1	0	1	1	
	Requested capacity step	[Q_{STEP}]	1	1	1	0	1	1	
	Discharge Super Heat	[SHd]	1	1	0	0	1	1	
	Compressor running current	(A)	1	0	1	1	0	0	
Capacity setting		(Code)	0	1	0	0	1	0	
Compressor ON/OFF		(×100)	0	0	1	0	0	0	
Compressor accumulated operation hours		(×10hours)	1	0	1	0	0	0	
U9 error detail history (latest)		(Code)	1	1	0	0	0	1	
* Check sum		(Code)	1	1	0	1	1	1	

10s digit	1: Input current restriction control 2: Compressor current restriction control	1s digit	1: Discharge temp. control 2: Condensing temp. control	4: Freeze protection control 8: Heat sink temp. control

8-9. FUNCTION OF SWITCHES

PUHZ-W112VHA **PUHZ-W112VHAR2**
PUHZ-W112VHA-BS **PUHZ-W112VHAR2-BS**
PUHZ-W112VHAR1 **PUHZ-W112VHAR3**
PUHZ-W112VHAR1-BS **PUHZ-W112VHAR3-BS**

<table>
<tr><th colspan="2">Switch</th><th rowspan="2">Function</th><th colspan="2">Selection</th><th rowspan="2">Default setting</th><th rowspan="2">Function details</th><th rowspan="2">Effective timing</th></tr>
<tr><th>Mark</th><th>No.</th><th>ON (with)</th><th>OFF (without)</th></tr>
<tr><td rowspan="6">SW1</td><td>1</td><td>Manual defrost</td><td>ON to start</td><td>usual setting</td><td>OFF</td><td>Switch ON to manual defrost</td><td>Always*1</td></tr>
<tr><td>2</td><td>To clear error history</td><td>ON to clear</td><td>usual setting</td><td>OFF</td><td>Switch ON to clear (erase) the following:
(1)Check codes and Suspension flags in RAM
(2)Check codes and Suspension flags in EEPROM</td><td>Always</td></tr>
<tr><td>3</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td rowspan="2">Always</td></tr>
<tr><td>4</td><td>Abnormal disregard</td><td>Disregard</td><td>Normal</td><td>OFF</td><td>Check code (P8,UH): Abnormal detection disregard</td></tr>
<tr><td>5</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td>6</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td rowspan="6">SW5</td><td>1</td><td>Silent setting (FAN)</td><td>Silent setting (FAN)</td><td>usual setting</td><td>OFF</td><td>Fan speed setting in silent mode</td><td rowspan="2">Always</td></tr>
<tr><td>2</td><td>Silent setting (Hz)</td><td>Silent setting (Hz)</td><td>usual setting</td><td>OFF</td><td>Hz setting in silent mode</td></tr>
<tr><td>3</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td>4</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td>5</td><td>Defrost control selection</td><td>For high humidity</td><td>Standard</td><td>OFF</td><td>Switches to optimal defrosting operation for low-temperature and high-humidity regions.</td><td>–</td></tr>
<tr><td>6</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td rowspan="3">SW6</td><td>1-3</td><td>Model Setting</td><td colspan="2"><table><tr><td rowspan="2">Model</td><td colspan="3">SW6</td></tr><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>W</td><td>0</td><td>0</td><td>1</td></tr></table>1=ON, 0=OFF</td><td>As shown in the left table</td><td>–</td><td>–</td></tr>
<tr><td>4</td><td>Single phase / 3 phase</td><td>Do NOT use</td><td>Single phase</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td>5-8</td><td>Model Setting 2</td><td colspan="2"><table><tr><td rowspan="2">Model</td><td colspan="4">SW6</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>W112</td><td>0</td><td>1</td><td>1</td><td>0</td></tr></table>1=ON, 0=OFF</td><td>As shown in the left table</td><td>Make sure to set SW6-5 to 8 correctly</td><td>–</td></tr>
<tr><td>SW7</td><td>1-6</td><td>No function</td><td>–</td><td>–</td><td>OFF</td><td>–</td><td>–</td></tr>
<tr><td rowspan="2">SW8</td><td>1</td><td>Mode selection</td><td>Energy saving mode</td><td>Powerful mode</td><td>OFF</td><td>–</td><td>Always</td></tr>
<tr><td>2</td><td>Max. current setting</td><td colspan="2"><table><tr><td rowspan="2">Model</td><td colspan="2">Max. current</td></tr><tr><td>OFF</td><td>ON</td></tr><tr><td>W112</td><td>29.5A</td><td>23.0A</td></tr></table></td><td>OFF</td><td>–</td><td>When power supply ON</td></tr>
<tr><td></td><td>3</td><td>Separate Interface/Flow temp.controller - outdoor unit power supplies</td><td>Separate power supply</td><td>Outdoor unit power supply</td><td>OFF</td><td>Power supply connection method selection</td><td>When power supply ON</td></tr>
<tr><td>SW9</td><td>1-4</td><td>No function</td><td>–</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
</table>

<Important Note>
All these DIP switches on PUHZ-W112VHA are set as shown above.
Spare PCBs, however, will be supplied without any settings, which means that all DIP switches are switched OFF.
When servicing, please make sure to set all switches correctly, referring to the previous PCB which is removed from the unit.

*1 Manual defrost should be done as follows.
① Change the DIP SW1-1 on the outdoor controller board from OFF to ON.
② Manual defrost will start by the above operation ① if these conditions written below are satisfied.
• Heat mode setting
• 10 minutes have passed since compressor starts operating or previous manual defrost is finished.
• Pipe temperature is less than or equal to 8℃.
Manual defrost will finish if certain conditions have been satisfied.
Manual defrost can be done if above conditions have been satisfied when DIP SW1-1 is changed from OFF to ON.
After DIP SW1-1 is changed from OFF to ON, there is no problem if DIP SW1-1 is left ON or changed to OFF again.
This depends on the service conditions.

9 DISASSEMBLY PROCEDURE

PUHZ-W112VHA **PUHZ-W112VHAR2**
PUHZ-W112VHA-BS **PUHZ-W112VHAR2-BS**
PUHZ-W112VHAR1 **PUHZ-W112VHAR3**
PUHZ-W112VHAR1-BS **PUHZ-W112VHAR3-BS**

→ : Indicates the visible parts in the photos/figures.

OPERATING PROCEDURE

1. Removing the service panel and top panel

(1) Remove 3 service panel fixing screws (5 × 12) and slide the hook on the right downward to remove the service panel.
(2) Remove screws (3 for front, 3 for rear/5 × 12) of the top panel and remove it.

Note: When removing service panel and top panel at the same time, count one less screw since they share a screw.

2. Removing the fan motor (MF1, MF2)

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)
(3) Remove 5 fan grille fixing screws (5 × 12) to detach the fan grille. (See Photo 1)
(4) Remove a nut (for right handed screw of M6) to detach the propeller. (See Photo 2)
(5) Disconnect the connectors, CNF1 and CNF2 on controller circuit board in electrical parts box.
(6) Loosen the clamp for the lead wire on motor support and separator.
(7) Remove 4 fan motor fixing screws (5 × 20) to detach the fan motor. (See Photo 3)

Note: When attaching the fan motor, make sure to route the cable through the hook below the fan motor and fix firmly with the clamp. (R1, R2 and R3 model only)

3. Removing the electrical parts box

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)
(3) Disconnect the indoor/outdoor connecting wire and power supply wire from terminal block.
(4) Disconnect the connectors of CNF1, CNF2, LEV-A and LEV-B on the controller circuit board.
<Symbols on the board>
• CNF1, CNF2 : Fan motor
• LEV-A, LEV-B : LEV-A, LEV-B
Release the lead wires of LEV from a wire clip.
Disconnect the pipe-side connections of the following parts.
• Thermistor<Liquid>(TH3)
• Thermistor<Discharge>(TH4)
• Thermistor<Plate HEX liquid>(TH6)
• Thermistor<Ambient>(TH7)
• Thermistor<Inlet water>(TH32)
• Thermistor<Suction>(TH33)
• Thermistor<Comp. surface>(TH34)
• High pressure switch(63H)
• Low pressure switch(63L)
• High pressure sensor(63HS)
• 4-way valve coil(21S4)
(5) Remove the terminal cover and disconnect the compressor lead wire.
(6) Remove the sensor holder from the rear guard on back of the unit.
(7) Remove 2 electrical parts box fixing screws (4 × 10) and detach the electrical parts box by pulling it upward. The electrical parts box is fixed with 2 hooks on the left and 1 hook on the right.

PHOTOS/FIGURES

Photo 1

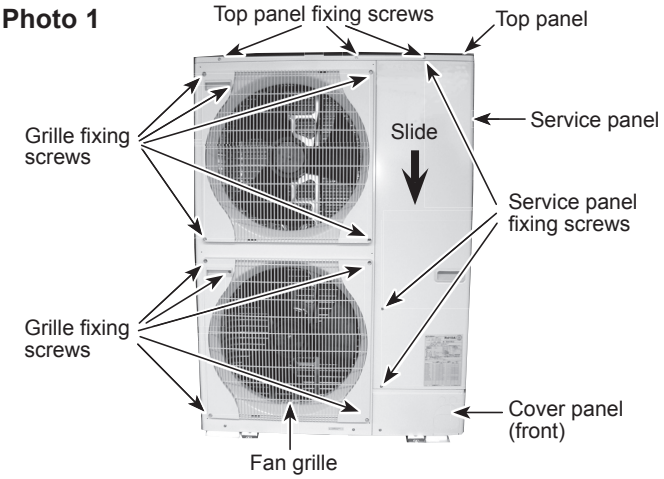


Photo 2

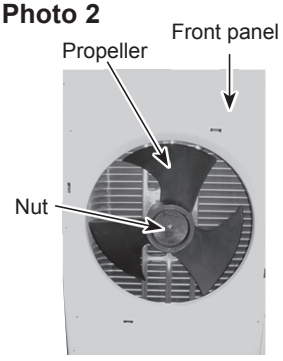


Photo 3

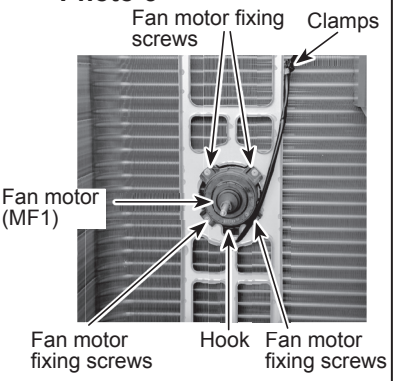
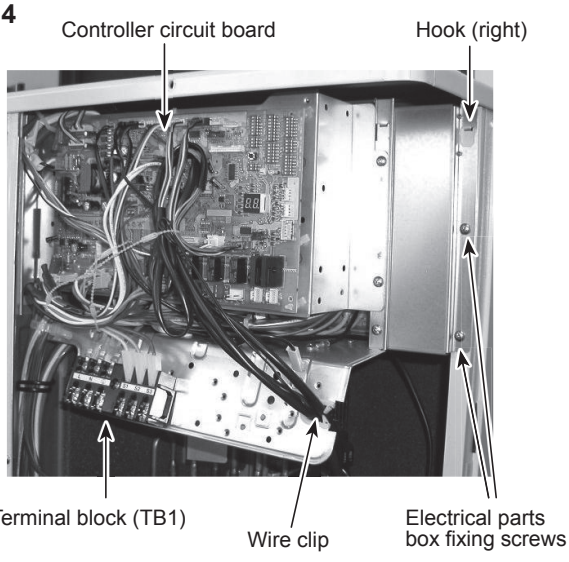


Photo 4



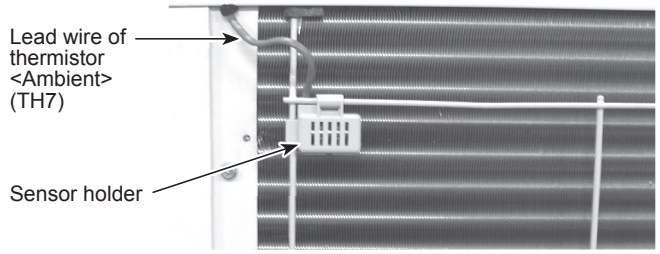
OPERATING PROCEDURE

4. Removing the thermistor <Plate HEX liquid> (TH6) and thermistor <Ambient> (TH7)

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)
(3) Disconnect the connectors, TH7/6 (red) on the controller circuit board in the electrical parts box.
(4) Loosen the 2 wire clamps on top of the electrical parts box. (TH7 only)
(5) Loosen the fastener for the lead wire on the controller circuit board in the electrical parts box.
(6) Loosen the cable strap and wire clamp for the lead wire on the bottom of electrical parts box. (TH6 only)
(7) Pull out the thermistor <Plate HEX liquid> (TH6) and thermistor <Ambient> (TH7) from the sensor holder.

Note: In case of replacing thermistor <Plate HEX liquid> (TH6) or thermistor <Ambient> (TH7), replace it together.

Photo 6



5. Removing the thermistor <Discharge> (TH4) and thermistor <Comp. surface> (TH34)

(1) Remove the service panel. (See Photo 1)
(2) Disconnect the connector TH4 (white) on the controller circuit board in the electrical parts box.
(3) Loosen the wire clamp on separator.
(4) Loosen the cable strap for the lead wire on the bottom of electrical parts box. *1
(5) Pull out the thermistor <Discharge> (TH4) from the sensor holder.

[Removing the thermistor <Comp. surface> (TH34)]

(6) Remove the top damper, then pull out the thermistor <Comp. surface> (TH34) from the holder of the compressor shell.

*1 TH3, TH4 and TH34 are fixed together with a cable tie. When exchanging TH4 and TH34, cut the cable tie bundling TH3, TH4 and TH34 to release the lead wires.

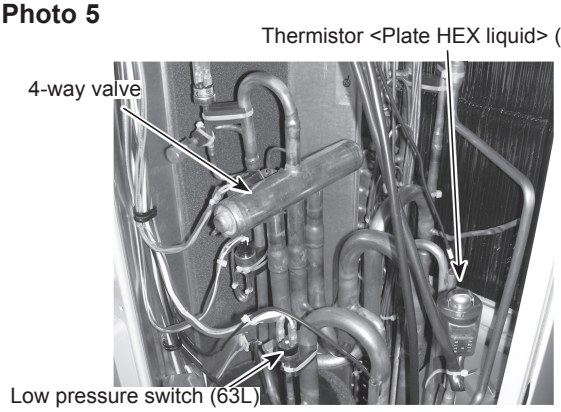
6. Removing the thermistor <Liquid> (TH3) and thermistor <Suction> (TH33)

(1) Remove the service panel. (See Photo 1)
(2) Disconnect the connectors TH3 (white) and TH33 (yellow) on the controller circuit board in the electrical parts box.
(3) Loosen the fastener for the lead wire on the controller circuit board in the electrical parts box.
(4) Loosen the cable strap for the lead wire on the bottom of electrical parts box. *1
(5) Loosen the wire clamp and wire clip on separator.
(6) Pull out the thermistor <Liquid> (TH3), <Suction> (TH33) from the sensor holder.

*1 TH3, TH4 and TH34 are fixed together with a cable tie. When exchanging TH4 and TH34, cut the cable tie bundling TH3, TH4 and TH34 to release the lead wires.

PHOTOS/FIGURES

Photo 5



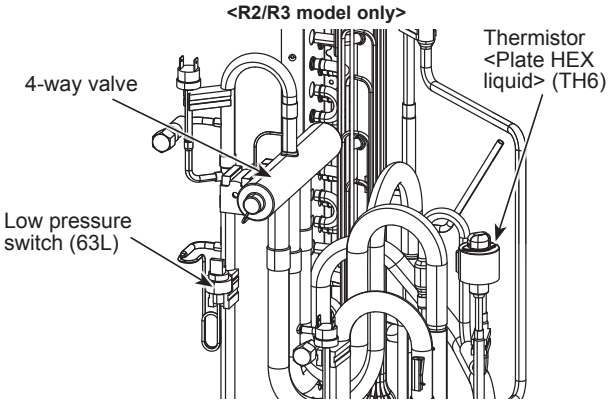


Photo 7

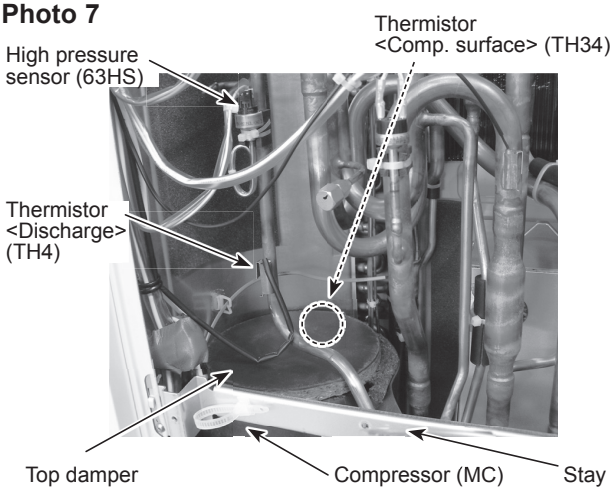
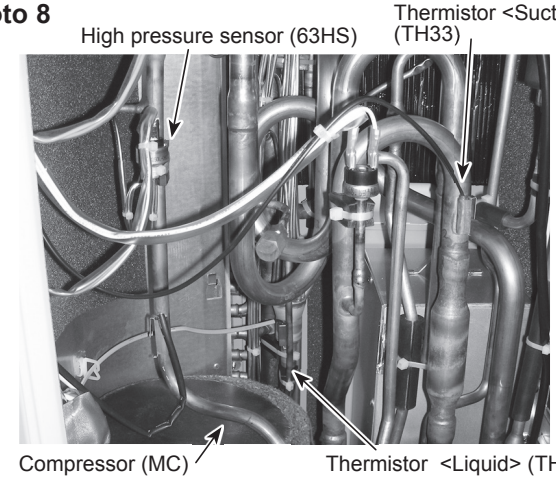


Photo 8



OPERATING PROCEDURE

7. Removing the 4-way valve coil (21S4), and linear expansion valve coil (LEV-A, LEV-B)

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)

[Removing the 4-way valve coil] (See Photo 9)

(3) Remove 4-way valve coil fixing screw (M4 × 6).
(4) Remove the 4-way valve coil by sliding the coil toward you.
(5) Disconnect the connector 21S4 (green) on the controller circuit board in the electrical parts box.
(6) Loosen the fastener, cable strap and wire clamp for the lead wire on the electrical parts box and separator.

[Removing the LEV coil] (See Photo 10)

(3) Loosen the lead wires fixed to the pipes with bands.
(4) Remove the linear expansion valve coil by sliding the coil upward.
(5) Disconnect the connectors, LEV-A (white) and LEV-B (red) on the controller circuit board in the electrical parts box.
(6) Loosen the wire clip for the lead wire on the electrical parts box.

8. Removing the 4-way valve

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)
(3) Remove the electrical parts box. (See Photo 4)
(4) Remove the cover panel (front).(See Photo 1)
(5) Remove the stay.
(6) Remove the water pipes connected to water outlet and water inlet.
(7) Remove 5 side panel (R) fixing screws (5 × 12) (4: rear of the unit/1: right side base) and remove the side panel (R).
(8) Recover refrigerant.
(9) Remove the welded part of 4-way valve.

Refer to the notes below.

9. Removing LEV

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)
(3) Remove the electrical parts box. (See Photo 4)
(4) Remove the cover panel (front). (See Photo 1)
(5) Remove the stay.
(6) Remove the water pipes connected to water outlet and water inlet.
(7) Remove the side panel (R).
(8) Remove the LEV coil.
(9) Recover refrigerant.
(10) Remove the welded part of LEV.

Refer to the notes below.

10. Removing the high pressure switch (63H) (See Photo 9) and the low pressure switch (63L)

(1) Remove the service panel. (See Photo 1)
(2) Remove the top panel. (See Photo 1)
(3) Remove the electrical parts box.
(4) Remove the cover panel (front). (See Photo 1)
(5) Remove the stay.
(6) Remove the water pipes connected to water outlet and water inlet.
(7) Remove the side panel (R).
(8) Recover refrigerant.
(9) Remove the welded part of high pressure switch and low pressure switch.

Refer to the notes on the right.•

PHOTOS/FIGURES

Photo 9

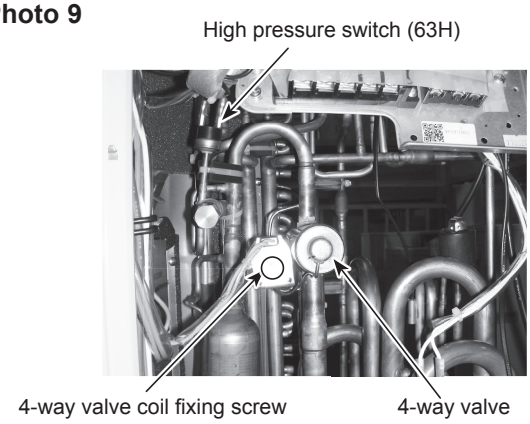


Photo 10

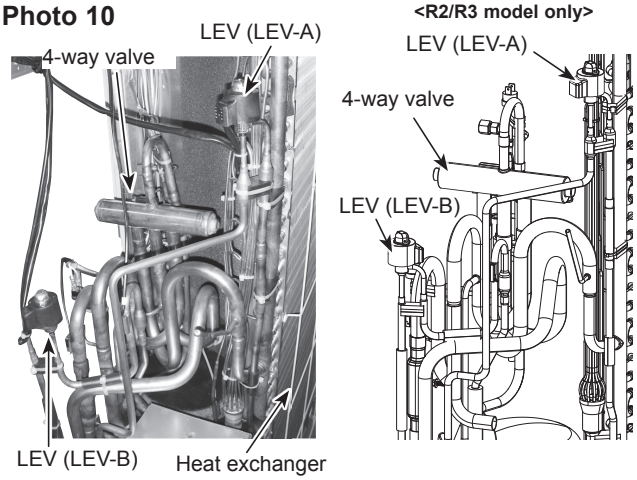
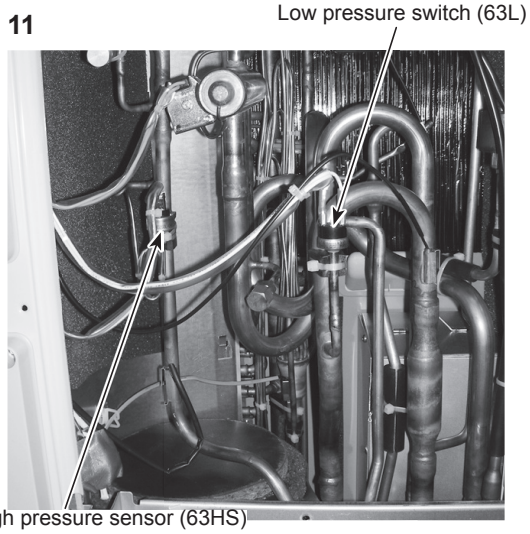
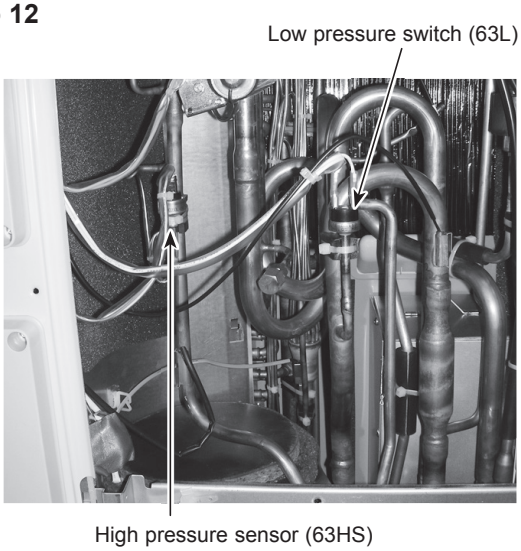
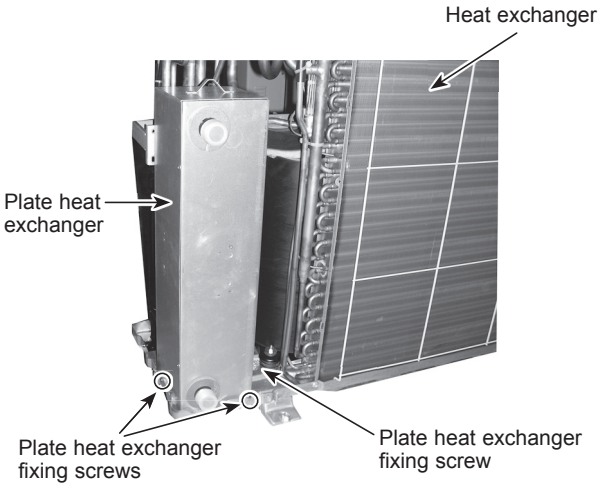


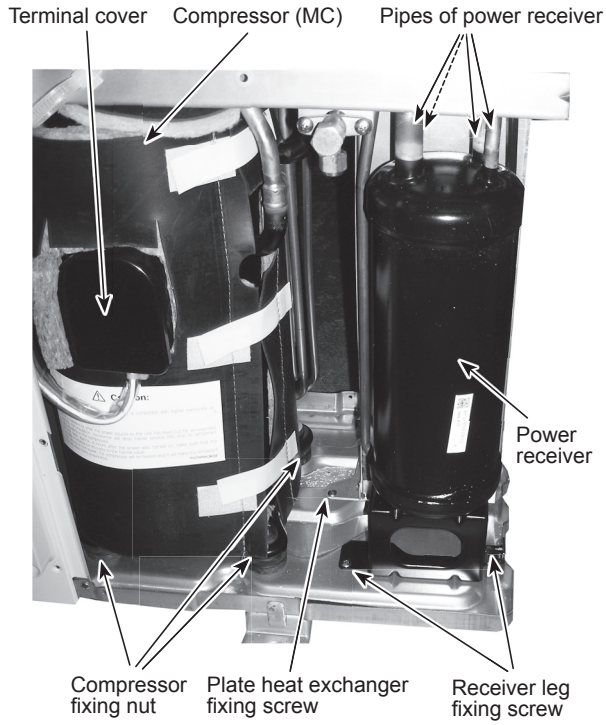
Photo 11



Notes:

1. **Recover refrigerant without spreading it in the air.**
2. **The welded part can be removed easily by removing the side panel (R).**
3. **When installing the following parts, cover it with a wet cloth to prevent it from heating, then braze the pipes so that the inside of pipes are not oxidized;**
   - **4-way valve (procedure 8), 120°C or more**
   - **LEV (procedure 9), 120°C or more**
   - **High pressure switch and low pressure switch (procedure 10), 100°C or more**

OPERATING PROCEDURE	PHOTOS/FIGURES
11. Removing high pressure sensor (63HS) (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the electrical parts box. (See Photo 4) (4) Recover refrigerant. (5) Remove the welded part of high pressure sensor. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: The welded part can be removed easily by removing the side panel (R).** **Note 3: When installing the high pressure sensor, make sure to cover it with a wet cloth to prevent it from heating (100˚C or more), then braze the pipes so that the inside of pipes are not oxidized.**	**Photo 12** 
12. Removing the plate heat exchanger (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the cover panel (front). (4) Remove the electrical parts box. (See Photo 4) (5) Remove the stay. (6) Remove the water pipes connected to water outlet and water inlet. (7) Remove the side panel (R). (8) Recover the refrigerant (9) Remove 2 welded pipes of plate heat exchanger inlet and outlet. (10) Remove 3 plate heat exchanger fixing screws (4 × 10), then remove the plate heat exchanger. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: Before removing the thermistor <Inlet water> (TH32), recover water in the plate heat exchanger.**	**Photo 13** 

OPERATING PROCEDURE	PHOTOS/FIGURES
13. Removing the compressor (MC) (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the cover panel (front). (4) Remove the electrical parts box. (See Photo 4) (5) Remove the stay. (6) Remove the water pipes connected to water outlet and water inlet. (7) Remove the side panel (R). (8) Remove 2 screws (separator side/4 × 10) and 4 screws (M/S and base side/5 × 12) to remove the front panel. (9) Remove 3 separator fixing screws (4 × 10) and remove the separator. (10) Remove the soundproof cover for compressor. (11) Remove the terminal cover and remove the compressor lead wire. (12) Recover refrigerant. (13) Remove the 3 points of the compressor fixing nut using a spanner or a adjustable wrench. (14) Remove the welded pipe of compressor inlet and outlet then remove the compressor. **Note: Recover refrigerant without spreading it in the air.**	**Photo 14** 
14. Removing the power receiver (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the cover panel (front). (4) Remove the electrical parts box. (See Photo 4) (5) Remove the stay. (6) Remove the water pipes connected to water outlet and water inlet. (7) Remove the side panel (R). (8) Recover refrigerant. (9) Remove 4 welded pipes of power receiver inlet and outlet. (10) Remove 2 receiver leg fixing screws (4 × 10). **Note: Recover refrigerant without spreading it in the air.**	

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

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