MITSUBISHI ELECTRIC

AIR TO WATER HEAT PUMP

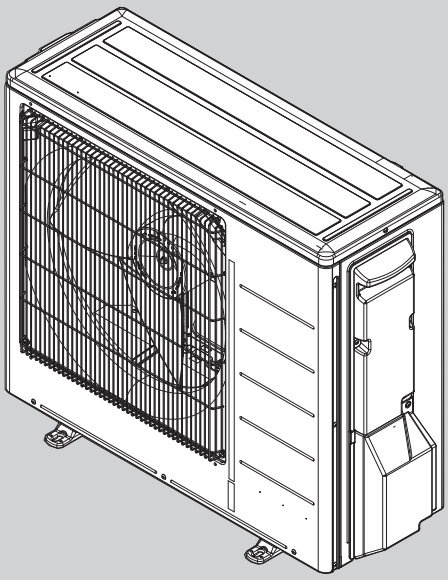
No.GHH15010

SERVICE MANUAL R744

Outdoor Unit
[Model Name]

QUHZ-W40VA

Notes:
- This manual describes service data of outdoor unit only.
- RoHS compliant products have <G> mark on the spec name plate.



Outdoor Unit

CONTENTS

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.

2 SPECIFICATIONS

2-1. SPECIFICATIONS

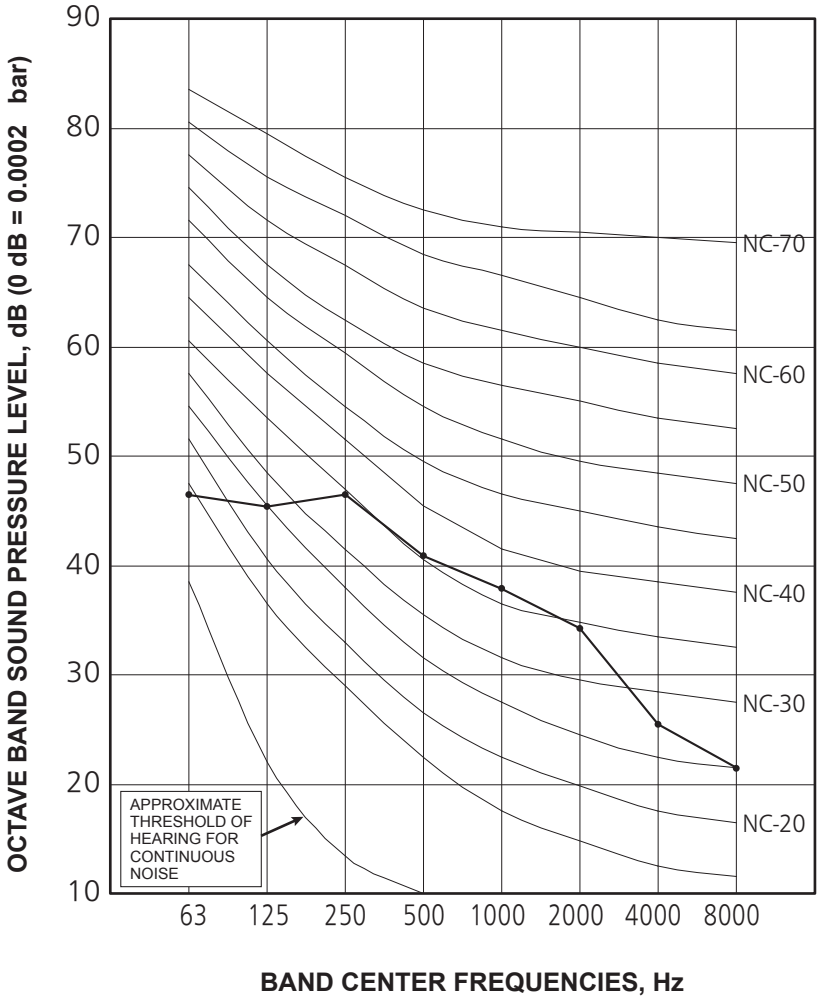
Power supply (Phase,Voltage,Frequency)			1ø,230V,50Hz
Nominal water flow rate(Heating mode)		L/min	5.7
Heating (A7/W35/Δ10)	Capacity	kW	4
	COP		4.65
	Power input	kW	0.86
Heating (A2/W35/Δ10)	Capacity	kW	4
	COP		3.2
	Power input	kW	1.25
Nominal water flow rate(DHW mode)		L/min	1.4
DHW (A7/W65/Δ50)	Capacity	kW	5
	COP		3.7
	Power input	kW	1.35

Outdoor unit specifications			
Service ref.			QUHZ-W40VA
Running current	Heating(A7/W35)	A	4.7
	DHW(A7/W65)	A	6.8
Power factor	Heating(A7/W35)	%	80
	DHW(A7/W65)	%	85
Max.current		A	12
Outer casing			Galvanized plate
External finish			Munsell 2.5Y 7/1
Refrigerant control			Liner expansion valve
Compressor			Hermetic single rotaly
	Model		KXB045FJK
	Motor output	kW	1.3
	Start type		Inverter
	Protection devices		HP switch Discharge thermo
	Oil(Model)	L	0.47 (PAG)
Heat exchanger	Air		Plate fin coil
	Water		Twisted & spiral Gas cooler
Fan	Fan(drive)×No.		Propeller fan ×1
	Fan motor output	kW	0.050
	Air flow	m^3/min	34
		(CFM)	1,200
Defrost method			Hot gas
Noise level(SPL/PWL)	Heating(A7/W55)	dB	43/53
Dimensions	Width	mm(in)	809+70 (31‐7/8+2‐3/4)
	Depth	mm(in)	300+20 (11‐13/16+13/16)
	Height	mm(in)	715 (28‐1/8)
Weight		kg(lb)	57 (125.7)
Refrigerant			R744
	Quantity	kg(lb)	1.15 (2.54)
Guaranteed operating range (Outdoor)	Heating	℃	-15 to +35
	DHW	℃	-15 to +35
Outlet water temp. (Max)	Heating	℃	+60
	DHW	℃	+72
Nominal return water temperature range	Heating	℃	+9 to +55
	DHW	℃	+9 to +55
Water flow rate range (Heating)		L/min	3 to 8

Nominal operating condition	
Heating(A7/W35/Δ10)	
Outside air temperature(Dry-bulb)	+7℃
Outside air temperature(Wet-bulb)	+6℃
Water temperature(inlet/outlet)	+25/+35℃
Heating(A2/W35/Δ10)	
Outside air temperature(Dry-bulb)	+2℃
Outside air temperature(Wet-bulb)	+1℃
Water temperature(inlet/outlet)	+25/+35℃
DHW(A7/W65/Δ50)	
Outside air temperature(Dry-bulb)	+7℃
Outside air temperature(Wet-bulb)	+6℃
Water temperature(inlet/outlet)	+15/+65℃

3 DATA

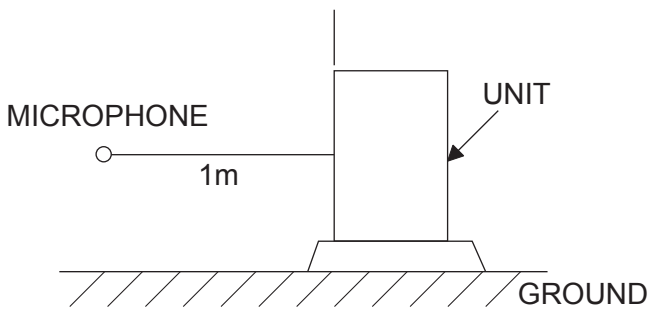
3-1. NOISE CRITERION CURVES



NOTCH	SPL(dB)	LINE
HEATING	43	

A7/W55

FORM NAME	BAND CENTER FREQUENCIES, Hz								OA	
	63	125	250	500	1000	2000	4000	8000		
QUHZ-W40VA	46.4	45.3	46.4	40.9	35.6	33.0	25.5	21.4	43	[dB]



3-2. STANDARD OPERATION DATA

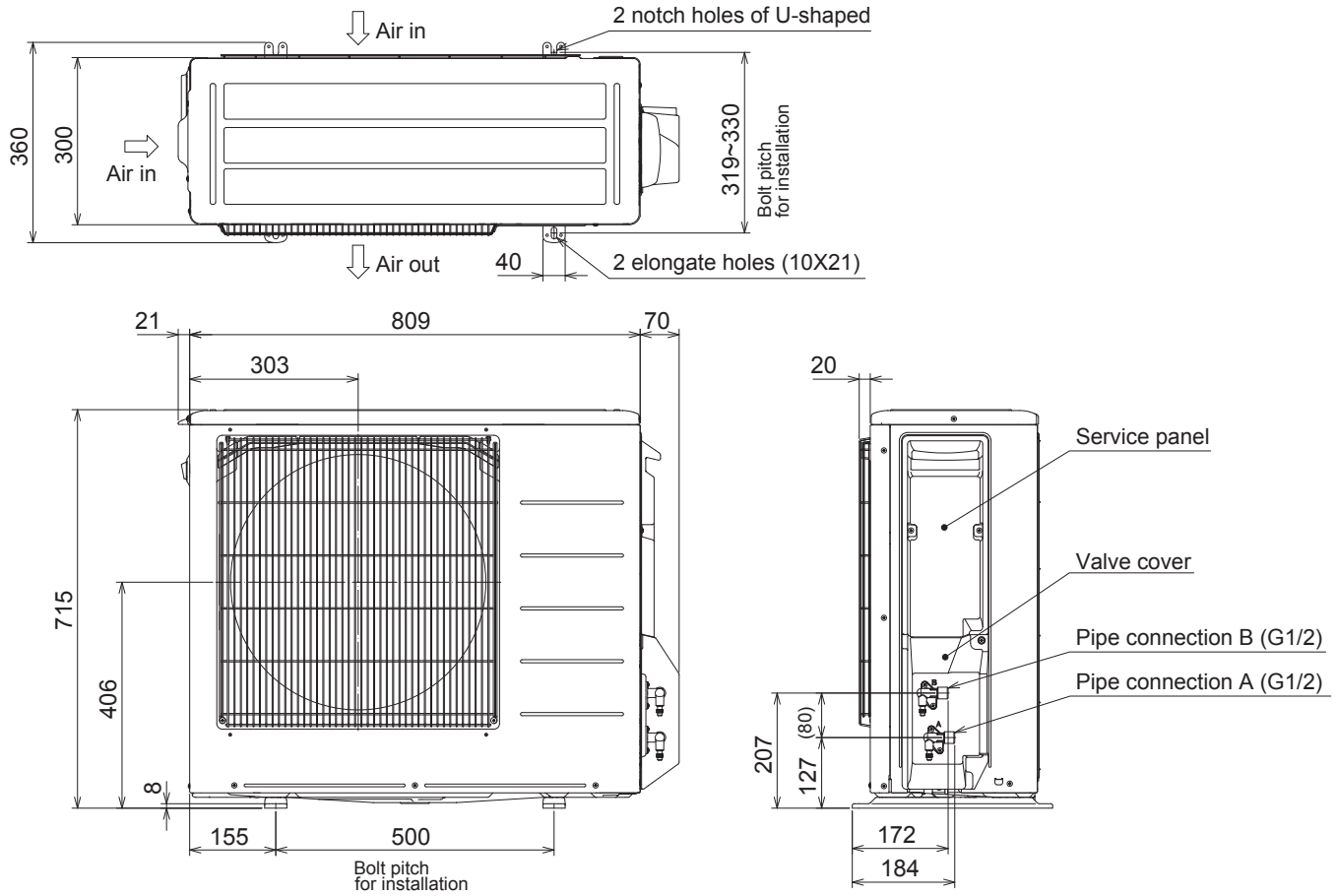
Mode				Heating (A7/W35)	DHW (A7/W65)
Total	Capacity		kW	4.00	5.00
	Input		kW	0.86	1.35
Electrical circuit	Outdoor unit			QUHZ-W40VA	
	Phase, Hz			1 Φ , 50Hz	
	Voltage		V	230	230
	Current		A	4.7	6.8
Refrigerant circuit	Discharge pressure		MPa	7.4	9.7
	Discharge temperature		ºC	70	100
Water conditions	Flow volume		L/min	5.7	1.4
	Outlet water temperature		ºC	35	65
Outdoor conditions	Intake air temperature	D.B.	ºC	7	7
		W.B.	ºC	6	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

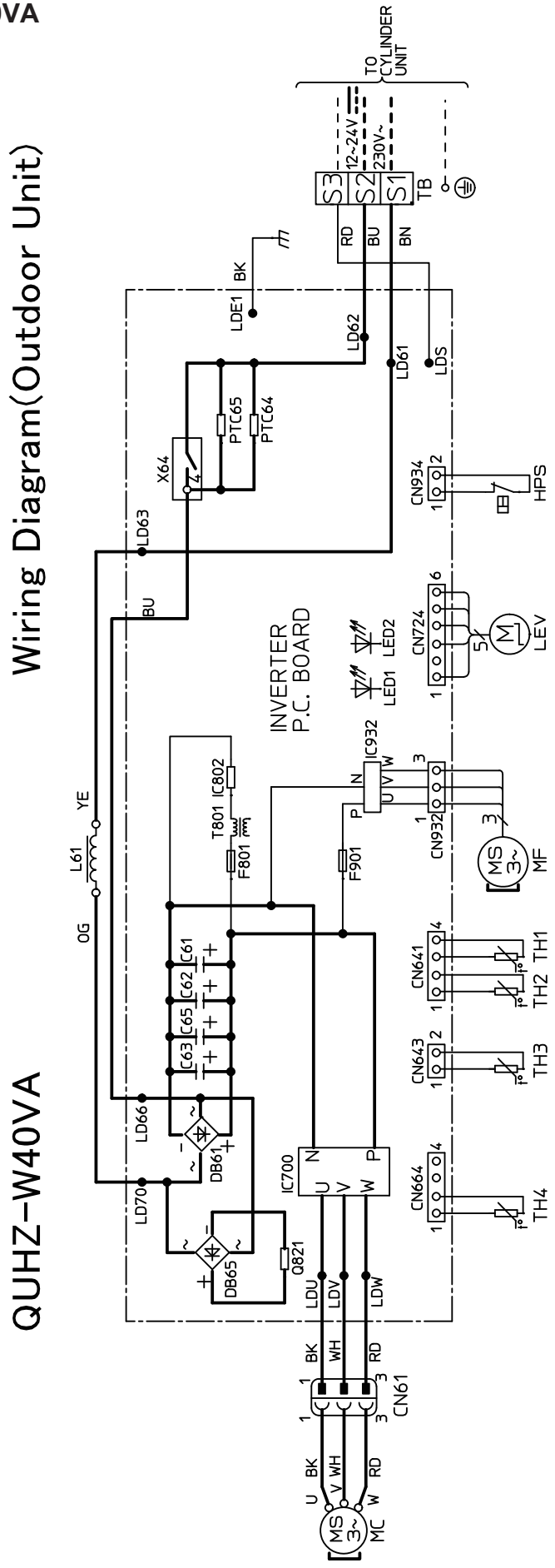
QUHZ-W40VA

Unit: mm



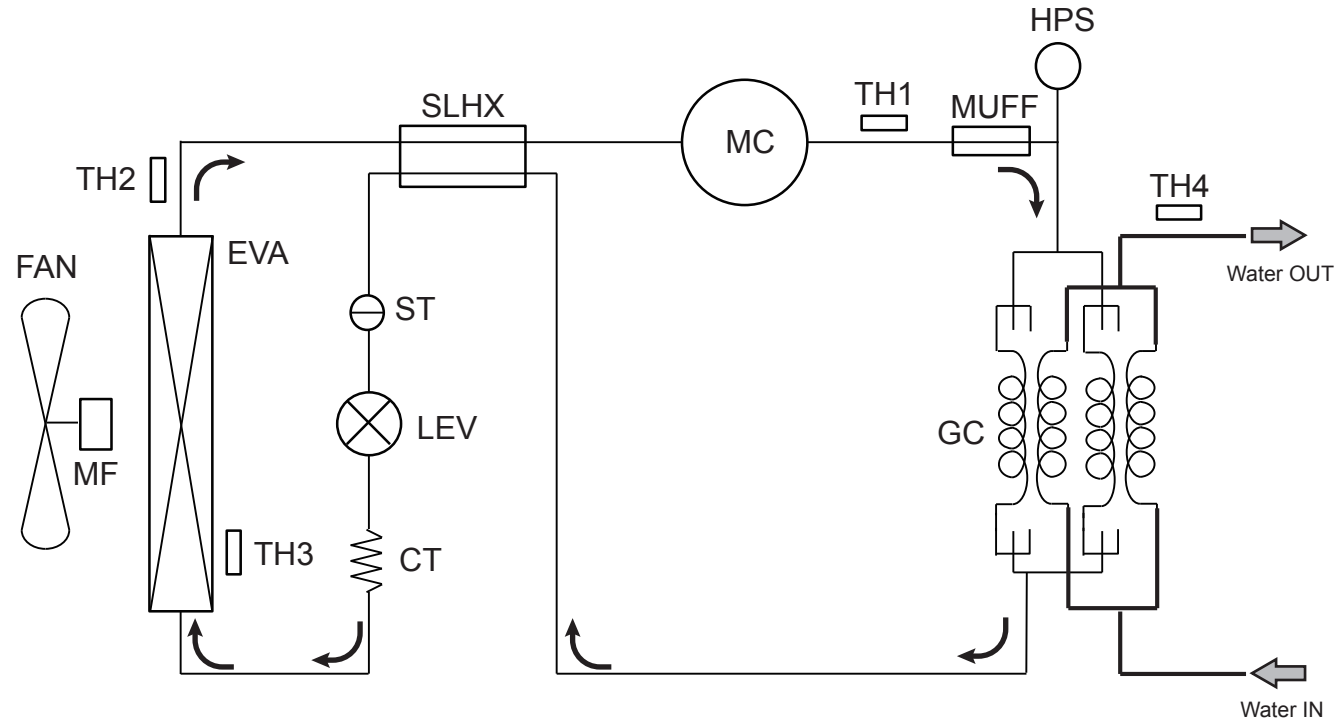
5 WIRING DIAGRAM

QUHZ-W40VA



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C61,C62, C63,C65	SMOOTHING CAPACITOR	L61	REACTOR	TH4	HOT WATER TEMP. THERMISTOR
DB61,DB65	DIODE MODULE	MC	COMPRESSOR	HPS	HIGH PRESSURE SWITCH
F801,F901	FUSE(T3.15AL250V)	MF	FAN MOTOR	TB	TERMINAL BLOCK
IC700,IC932	POWER MODULE	PTC64,PTC65	CIRCUIT PROTECTION	T801	TRANSFORMER
IC802	POWER DEVICE	TH1	DISCHARGE TEMP.THERMISTOR	X64	RELAY
Q821	SWITCHING POWER TRANSISTOR	TH2	DEFROST THERMISTOR	LED1/LED2	LED
LEV	LINEAR EXPANSION VALVE	TH3	AMBIENT TEMP. THERMISTOR		

6 REFRIGERANT SYSTEM DIAGRAM



Symbol	Part name	Detail
MC	Compressor	DC inverter single rotary compressor(Mitsubishi Electric Corporation)
HPS	High pressure switch	For protection(OFF:15MPa)
MUFF	Muffler	For noise reduction
GC	Gascooler	Heat exchanger (2pass)
SLHX	Suction line heat exchanger	
ST	Strainer	#100
LEV	Linear expansion valve	
CT	Capillary tube	
EVA	Evaporator	
TH1	Discharge temperature thermistor	For LEV Control and compressor protection
TH2	Defrost thermistor	For defrost control
TH3	Ambient temperature thermistor	For fan control and for compressor frequency control
TH4	Hot water temperature thermistor	For DHW pump control
MF	Fan motor	
FAN	Propeller Fan	

7 TROUBLESHOOTING

7-1. TROUBLESHOOTING

- When an error occurs on the cylinder unit and the outdoor unit, an error code blinks on the remote controller. The last 16 occurring errors can be recorded as the error history, and these errors can be checked on the remote control screen of the cylinder unit.
- When an error occurs on the outdoor unit and the unit stops abnormally, the LEDs on the outdoor control board blink.
- The LEDs on the outdoor control board blink while protection control is functioning temporarily while the outdoor unit is operating.
  If the LEDs on the outdoor control board light red and green, the board is normal.

The following table summarizes the service remedy procedure.
Check Unit conditions at service, Main controller display and the LEDs on the outdoor control board, then proceed to the corresponding actions to be taken for service (summary).

Unit conditions at service	Check code	Check the LEDs on the outdoor control board.	Actions to be taken for service (summary)
The trouble is reoccurring.	Displayed	Blinking -> Error display	Judge the trouble location according to 7-3, and perform the required action.
	Not displayed	Blinking -> Error display	Judge the trouble location according to 7-3, and perform the required action.
		Lit -> Normal display Off -> Error display	Judge the trouble location according to 7-3, and perform the required action.
The trouble is not reoccurring.	Logged		(1) Probable causes are temporary such as actuation of the coolant circuit protection interlock, defective wiring connections and noise. Check the symptoms again. Check the installation environment, wiring, piping, and weather conditions when the problem occurred.
			(2) Judge the trouble location according to 7-3, and perform the required action.
			(3) If no symptoms are apparent, run the unit again. Continuing running the unit for a while. and then check the LED indications on the outdoor control board while the outdoor unit is running.
			(4) No abnormality in electric parts and control boards, etc.
	Not logged		(1) Check for abnormal symptoms again.
			(2) Perform troubleshooting to identify the cause of the problem.
			(3) If no symptoms are apparent, run the unit again. Continuing running the unit for a while. and then check the LED indications on the outdoor control board while the outdoor unit is running.
			(4) No abnormality in electric parts and control boards, etc.

7-2. CHECK POINT UNDER TEST RUN

- After installing the outdoor unit, check again for any water leakage from pipes, incorrect electrical wiring (reversed polarities) and defective contacts.
- Using a 500 V ohmmeter, measure the insulation resistance across the ground of the outdoor unit and the power supply terminals (S1, S2, S3) to check that the resistance is 1.0 MΩ or more.
- Read the Instruction Manual before operation. (In particular, Safety Precautions)

7-3. SELF-DIAGNOSIS ACTION TABLE

Outdoor unit emergency stop

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
E6 or None	Out	Out	*< Caution > Pay attention to electric shock since the condensers [C61/C62/C63/C65] are sometimes high voltage (300 V or more). *The LEDs (red, green) light when the condenser is normal.	(1) Power is not being supplied to the outdoor unit a) Earth leakage circuit breaker of the cylinder unit is turned off b) Defective power line not connected or terminal contact c) Power transmission line not connected or defective terminal contact (2) Power is not being supplied to the outdoor inverter p.c. board a) Loose terminal block (TB) power terminal [S1/S2/S3] b) Loose reactor (L61) terminal c) Loose relay (X64) terminal (3) Defective outdoor inverter p.c. board	(1) Check the following items a) Earth leakage circuit breaker b) Power line connections c) Power transmission line connections (2) Check the following items a) Terminal block (TB) power terminal [S1/S2/S3] connections b) Reactor (L61) connections c) Relay (X64) connections (3) Replace the outdoor inverter p.c. board
	3 times	Lit	Excessive ambient temperature ●Detection method: THERMO_ASSY AMB (TH3) detects 50°C or higher	(1) Environment is outside the possible operating temperature of the outdoor unit (2) Defective THERMO_ASSY AMB (TH3)	(1) Improve the installation environment (2) Replace the THERMO_ASSY AMB (TH3)
	2 times	Out	Overcurrent abnormality ●Detection method: Overcurrent detected by secondary current	(1) Defective outdoor inverter p.c. board (2) Overcurrent due to LEV malfunction a) Loose LEV coil b) Loose connector [CN724] c) LEV coil disconnection d) LEV unit malfunction (3) Compressor malfunction (locked, out-of-phase, phase interruption) (4) Power waveform distortion, noise	(1) Replace outdoor inverter p.c. board (2) Check the LEV coil. (See "9-4. HOW TO CHECK THE PARTS.") a) Install the LEV coil b) Connect the connector c) Replace the LEV coil d) Replace the outdoor unit (3) Replace the outdoor unit (4) Check to see if the power waveform is normal
	4 times	Out	Disconnection of Outdoor inverter p.c. board temp. thermistor ●Detection method: Disconnection or short circuit detected ●Disconnection: Disconnection continued for 1 second from 1 minute onwards after start of compressor operation ●Short circuit: Short circuit continued for 1 second at all times ●Connector: None Board mounting	(1) Defective board temperature thermistor on outdoor inverter p.c. board (2) Defective microcomputer on outdoor inverter p.c. board	(1)(2) Replace outdoor inverter p.c. board
	6 times	Out	Primary current abnormality ●Detection method: Defective primary current sensor detected for 1 second	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
E6 or None	5 times	5 times	Short circuit or disconnection of hot water temp. thermistor（TH4） ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 1 second 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 1 second at all times ●Connector: CN664	(1) Defective connector (CN664) connection (2) Defective (TH4) a) Thermistor (TH4) disconnection b) Thermistor (TH4) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN664) (2) Check the resistance value and temperature of thermistor (TH4). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH4) b) Replace thermistor (TH4) (3) Replace the outdoor inverter p.c. board
	8 times	8 times	Short circuit or disconnection of discharge temp. thermistor(TH1) ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 1 second 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 1 second at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH1) a) Thermistor (TH1) disconnection b) Thermistor (TH1) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH1). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH1) b) Replace thermistor (TH1) (3) Replace the outdoor inverter p.c. board
	9 times	9 times	Short circuit or disconnection of defrost temp. thermistor(TH2） ●Detection method: Disconnection or short circuit detected ●Disconnection: -47°C or less continued for 1 second at start of compressor operation ●Short circuit: 153°C or more continued for 1 second at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH2) a) Thermistor (TH2) disconnection b) Thermistor (TH2) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH2). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH2) b) Replace thermistor (TH2) (3) Replace the outdoor inverter p.c. board
	10 times	10 times	Short circuit or disconnection of ambient temp. thermistor(TH3) ●Detection method: Disconnection or short circuit detected ●Disconnection: -44°C or less detected for 1 second at start of compressor operation ●Short circuit: 153°C or less continued for 1 second at all times ●Connector: CN643	(1) Defective connector (CN643) connection (2) Defective (TH3) a) Thermistor (TH3) disconnection b) Thermistor (TH3) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN643) (2) Check the resistance value and temperature of the thermistor (TH3). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH3) b) Replace thermistor (TH3) (3) Replace the outdoor inverter p.c. board
	Lit	6 times	Abnormality of DC voltage ●Detection method: Detection of bus voltage abnormality	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
	Lit	7 times	Overheat of Inverter p.c. board temperature ●Detection method: Board temperature thermistor at 80°C or more detected for 1 second	(1) Defective fan motor (2) Defective outdoor inverter p.c. board	(1) Defective fan motor (2) Replace outdoor inverter p.c. board

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
E6 or None	Lit	8 times	Abnormality of compressor phase current ●Detection method: Detection of compressor current abnormality	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
	Lit	9 times	Fan cutoff ●Detection method: Detection of fan motor abnormality	(1) Obstacle contacting propeller fan (2) Defective fan motor a) Fan motor wiring disconnection b) Fan motor locked (3) Defective outdoor inverter p.c. board	(1) Remove obstacle (2) Replace fan motor (See "9-4. HOW TO CHECK THE PARTS.") (3) Replace outdoor inverter p.c. board
U1	4 times	4 times	Excessive high pressure ●Detection method: Operation(*) of high pressure switch (HPS) detected. *Operating pressure: 15 MPa, contact type: N.C., connector: CN934 ●Error cancellation method: This error is canceled by turning the earth leakage circuit breaker of the Cylinder Unit to "OFF". To restart the outdoor inverter, first check that the LEDs (red/green) of the outdoor inverter P.C. board are out, (this takes approx. 1 minute), turn the earth leakage circuit breaker to "ON" again.	(1) Water is not being circulated in the outdoor unit water circuit a) Cylinder unit not filled with water b) Air trapped in water pipes c) Water leakage, crushing or blockage of water pipes d) Isolating valve in water pipes closed e) Pump valve in cylinder unit closed f) Water pipe freezing g) Outdoor unit gas cooler blockage (2) Pump1 in the cylinder unit not operating a) Defective pump1 b) Defective cylinder unit board (3) Defective LEV control caused by erroneous detection of discharge temperature a) Discharge temperature thermistor (TH1) loose from discharge pipe b) Defective discharge temperature thermistor (TH1) (4) Defective LEV coil a) Loose LEV coil b) Loose connector [CN724] c) LEV coil disconnection (5) High pressure switch malfunction or erroneous detection a) Loose connector [CN934], defective contact b) Loose high pressure switch terminal, defective contact c) Lead wire disconnection (6) Defective outdoor inverter p.c. board (7) Defective coolant circuit parts a) Defective high pressure switch b) Defective LEV	Check the following items. To cancel this error, turn the earth leakage circuit breaker of the Cylinder Unit to "OFF" and then back "ON" again. (1) Check the water circuit, and correct any abnormal locations a) Fill with water b) Bleed air c) Correct or replace the water piping d) Repair the isolating valve e) Repair the pump valve f) Melt frozen sections g) Replace the outdoor unit (2) Check pump1 in the cylinder unit. a) Replace pump1 b) Replace cylinder unit board (3) Check the discharge temperature thermistor a) Install the discharge temperature thermistor (TH1) to the discharge piping b) Measure the resistance value of the discharge temperature thermistor (TH1). (See "9-4. HOW TO CHECK THE PARTS.") Replace the discharge temperature thermistor (4) Check the LEV level. (See "9-4. HOW TO CHECK THE PARTS.") a) Install LEV coil b) Connect connector (CN724) c) Replace LEV coil (5) Check high pressure switch, and repair malfunctions a) Connect connector (CN934) b) Repair connections c) Replace lead wire (6) Replace outdoor inverter p.c. board (7) Replace outdoor unit

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
U2	1 times	Lit	Overheat discharge temperature ●Detection method: THERMO_ASSY DIS detects 130°C or higher	(1) Water is not being circulated in the outdoor unit water circuit a) Cylinder unit not filled with water b) Air trapped in water pipes c) Water leakage, crushing or blockage of water pipes d) Isolating valve in water pipes closed e) Pump valve in cylinder unit closed f) Water pipe freezing g) Outdoor unit gas cooler blockage	(1) Check the water circuit, and correct any abnormal locations a) Fill with water b) Bleed air c) Correct or replace the water piping d) Repair the isolating valve e) Repair the pump valve f) Melt frozen sections g) Replace the outdoor unit
				(2) Pump1 in the cylinder unit not operating a) Defective pump1 b) Defective cylinder unit board	(2) Check pump1 in the cylinder unit. a) Replace pump1 b) Replace cylinder unit board
				(3) Erroneous detection caused by defective discharge temperature thermistor (TH1)	(3) Measure the resistance value of the discharge temperature thermistor (TH1). (See "9-4. HOW TO CHECK THE PARTS.") Replace the discharge temperature thermistor (TH1)
				(4) Defective LEV coil a) Loose LEV coil b) Loose connector (CN724) c) LEV coil disconnection	(4) Check LEV coil. (See "9-4. HOW TO CHECK THE PARTS.") a) Install LEV coil b) Connect connector (CN724) c) Replace LEV coil
				(5) Defective coolant circuit part a) Defective LEV b) Insufficient coolant caused by coolant leakage	(5) Replace outdoor unit
	6 times	Lit	Refrigerant zero abnormality ●Detection method: Detected by secondary current value at startup operation	(1) Refrigerant leakage on refrigerant circuit a) Evaporator breakage b) Evaporator corrosion c) Refrigerant piping damage d) Refrigerant piping corrosion e) Gas cooler damage f) Gas cooler corrosion (2) Defective compressor compression	(1)-(2) Replace outdoor unit
U3	8 times	8 times	Short circuit or disconnection of discharge temp.thermistor (TH1) ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 2 minutes 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 2 minutes at all times ●Connector: CN641	(1) Defective connector (CN641) connection	(1) Connect connector (CN641)
				(2) Defective (TH1) a) Thermistor (TH1) disconnection b) Thermistor (TH1) short circuit	(2) Check the resistance value and temperature of the thermistor (TH1). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH1) b) Replace thermistor (TH1)
				(3) Defective outdoor inverter p.c. board	(3) Replace the outdoor inverter p.c. board

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
U4	9 times	9 times	Short circuit or disconnection of defrost temp. thermistor (TH2) ●Detection method: Disconnection or short circuit detected ●Disconnection: -47°C or less continued for 2 minutes at start of compressor operation ●Short circuit: 153°C or more continued for 2 minutes at all times ●Connector: CN641	(1) Defective connector (CN641) connection (2) Defective (TH2) a) Thermistor (TH2) disconnection b) Thermistor (TH2) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN641) (2) Check the resistance value and temperature of the thermistor (TH2). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH2) b) Replace thermistor (TH2) (3) Replace the outdoor inverter p.c. board
	10 times	10 times	Short circuit or disconnection of ambient temp. thermistor (TH3) ●Detection method: Disconnection or short circuit detected ●Disconnection: -44°C or less detected for 2 minutes at start of compressor operation ●Short circuit: 153°C or less continued for 2 minutes at all times ●Connector: CN643	(1) Defective connector (CN643) connection (2) Defective (TH3) a) Thermistor (TH3) disconnection b) Thermistor (TH3) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN643) (2) Check the resistance value and temperature of the thermistor (TH3). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH3) b) Replace thermistor (TH3) (3) Replace the outdoor inverter p.c. board
	4 times	Out	Disconnection of Outdoor inverter p.c. board temp. thermistor ●Detection method: Disconnection or short circuit detected ●Disconnection: Disconnection continued for 2 minutes from 1 minute onwards after start of compressor operation ●Short circuit: Short circuit continued for 2 minutes at all times ●Connector: None Board mounting	(1) Defective board temperature thermistor	(1) Replace the outdoor inverter p.c. board
	5 times	5 times	Short circuit or disconnection of hot water temp. thermistor (TH4) ●Detection method: Disconnection or short circuit detected ●Disconnection: -5°C or less continued for 2 minutes 10 minutes onwards after start of compressor operation ●Short circuit: 295°C or less continued for 2 minutes at all times ●Connector: CN664	(1) Defective connector (CN664) connection (2) Defective (TH4) a) Thermistor (TH4) disconnection b) Thermistor (TH4) short circuit (3) Defective outdoor inverter p.c. board	(1) Connect connector (CN664) (2) Check the resistance value and temperature of thermistor (TH4). (See "9-4. HOW TO CHECK THE PARTS.") a) Replace thermistor (TH4) b) Replace thermistor (TH4) (3) Replace the outdoor inverter p.c. board

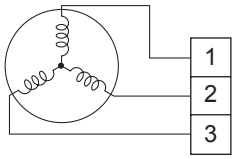
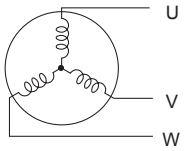
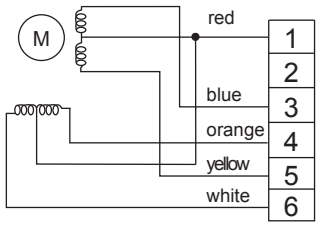
Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
UP	2 times	Out	Overcurrent abnormality ●Detection method: Overcurrent detected by secondary current	(1) Defective compressor lead wire relay connector connection a) Defective compressor relay connector connection b) Defective compressor terminal connection	(1) Check the continuity of the compressor and lead wires. a) Connect compressor relay connector* b) Connect compressor terminal* (*Before correcting the problem, turn the circuit breaker off.)
				(2) Defective outdoor inverter p.c. board a) Defective Q821 b) Defective IC700 c) Defective overcurrent detection circuit	(2) Replace outdoor inverter p.c. board
				(3) Defective LEV coil a) Loose LEV coil b) Loose connector [CN724] c) LEV coil disconnection	(3) Check LEV coil (See "9-4. HOW TO CHECK THE PARTS.") a) Install LEV coil b) Connect connector (CN724) c) Replace LEV coil
				(4) Defective LEV unit a) LEV locked b) Blocked with foreign matter	(4)-(5) Replace outdoor unit
				(5) Defective compressor a) Compressor motor coil short circuit, disconnection b) Compressor locked	
				(6) Power waveform distortion, noise	(6) Check to see if the power waveform is normal
		Out	Service mode end display ●Detection method: Service mode* continued for 20 minutes *The service mode is entered when the outdoor unit is run with the compressor relay connector [CN61] disconnected. This mode is used when measuring the compressor drive voltage of the outdoor inverter p.c. board.	(1) Compressor relay connector disconnected	(1) Turn the earth leakage circuit breaker of the Cylinder Unit to "OFF" before connecting the compressor relay connector of the outdoor unit.
				(2) Defective outdoor inverter p.c. board	(2) Replace the outdoor inverter p.c. board
	6 times	Out	Abnormality of circuit to detect AC current ●Detection method: Defective primary current detection sensor detected continuously for 2 minutes	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
EC	2 times	2 times	Start time exceeded ●Detection method: Inability to receive communication detected on outdoor unit microcomputer	(1) Defective power transmission line connection	(1) Correct power transmission line connection
				(2) Defective outdoor inverter p.c. board	(2) Replace outdoor inverter p.c. board
				(3) Defective cylinder unit control board	(3) Defective cylinder unit control board
				(4) Noise	(4) Move power signal line away from noise source

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
E6/E7/ E8/E9	2 times	2 times	Communication abnormality between cylinder unit and outdoor unit ●Detection method: Reception malfunction detected on cylinder unit microcomputer and outdoor unit microcomputer	(1) Defective power transmission line between cylinder unit and outdoor unit a) Not connected b) Disconnection c) Defective contact (2) Defective cylinder unit board (3) Defective outdoor inverter p.c. board	(1) Check the power transmission line between cylinder unit and outdoor unit a) Connect power transmission line b) Replace power transmission line c) Correct power transmission line connection (2) Replace cylinder unit board (3) Replace outdoor inverter p.c. board
FC	Continuous blinking	Continuous blinking	Abnormality in outdoor unit control system ●Detection method: Detected on outdoor unit microcomputer	(1) Defective outdoor inverter p.c. board	(1) Replace the outdoor inverter p.c. board
Fd	11 times	11 times	Detection of abnormal AC voltage ●Detection method: Input voltage to outdoor unit 70 V or less *When the earth leakage circuit breaker of the Cylinder Unit is turned to "OFF", the LEDs (red, green) on the outdoor inverter p.c. board go out. This, however, takes about 1 minute. While the LEDs on the outdoor inverter p.c. board are lit, do not turn the earth leakage circuit breaker back on. Doing so might cause this abnormality to be detected again.	(1) Low power supply voltage a) Inappropriate power supply used b) Defective power transmission line c) Defective power transmission line connection (2) Erroneous operation of earth leakage circuit breaker* (3) Defective outdoor inverter p.c. board	(1) Check the power supply voltage a) Use a power supply having the appropriate voltage b) Replace the power transmission line c) Correct the power transmission line connection (2) Perform a reset (3) Replace the outdoor inverter p.c. board

Outdoor unit emergency stop

Check Code	Check LED		Abnormal point and detection method	Case	Judgment and action
	LED2 RED	LED1 GREEN			
E6 or None	Lit	1 times	Discharge temperature high temperature protection operation in progress	–	–
	Lit	3 times	Ambient air protection operation in progress	–	–
	Lit	5 times	Primary current protection in operation (compressor speed reduced)	–	–
	Lit	6 times	Primary current protection in operation (compressor speed does not increase)	–	–
	Lit	7 times	Secondary stall control in progress	–	–
	Lit	8 times	Fan protection stopped (Compressor does not stop)	Propeller fan drive obstruction a) Strong winds outside	– (automatic recovery performed)
	Lit	10 times	PAM control stop in progress	(1) Transient power supply waveform distortion, noise (2) Persistent power supply waveform distortion, noise (3) Defective outdoor inverter p.c. board	(1) - (automatic recovery performed) (2) Check power supply waveform (3) Replace outdoor inverter p.c. board
	Lit	11 times	Primary voltage detection error protection	(1) Transient power supply waveform distortion, noise (2) Persistent power supply waveform distortion, noise (3) Defective outdoor inverter p.c. board	(1) - (automatic recovery performed) (2) Check to see if the power waveform is normal (3) Replace outdoor inverter p.c. board
	Lit	12 times	Service mode* *The service mode is entered when the outdoor unit is run with the compressor relay connector disconnected.	(1) Compressor relay connector disconnected (2) Defective outdoor inverter p.c. board	(1) Turn the earth leakage circuit breaker of the Cylinder Unit to "OFF" before connecting the compressor relay connector of the outdoor unit. (2) Replace the outdoor inverter p.c. board

7-4. HOW TO CHECK THE PARTS

<table>
<tr><th>Parts name</th><th>Check points</th></tr>
<tr><td>TH1 : Discharge temp.
TH2 : Defrost temp.
TH3 : Ambient temp.
TH4 : Hot water temp.</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>TH1
TH4</td><td>150 to 362 kΩ</td><td>Open or short</td></tr>
<tr><td>TH2
TH3</td><td>7.5 to 21 kΩ</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Fan motor (MF)
 
</td><td>Measure the resistance between the contacts of CN932 with a tester.
(At the ambient temperature of 20°C)
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>37.0 ± 1.33 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.
(At the ambient temperature of 20°C)
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>12.8 ± 0.07 Ω</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Linear expansion valve
(LEV)
 
</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>red - blue</td><td>red - orange</td><td>red - yellow</td><td>red - white</td><td rowspan="2">Open or short</td></tr>
<tr><td colspan="4">46 ± 4 Ω</td></tr>
</table></td></tr>
<tr><td>High pressure switch
(HPS)</td><td>Disconnect the connector then measure the resistance with a tester.
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>Short</td><td>Open</td></tr>
</table></td></tr>
</table>

7-5. HOW TO CHECK THE COMPONENTS

<Thermistor feature chart>

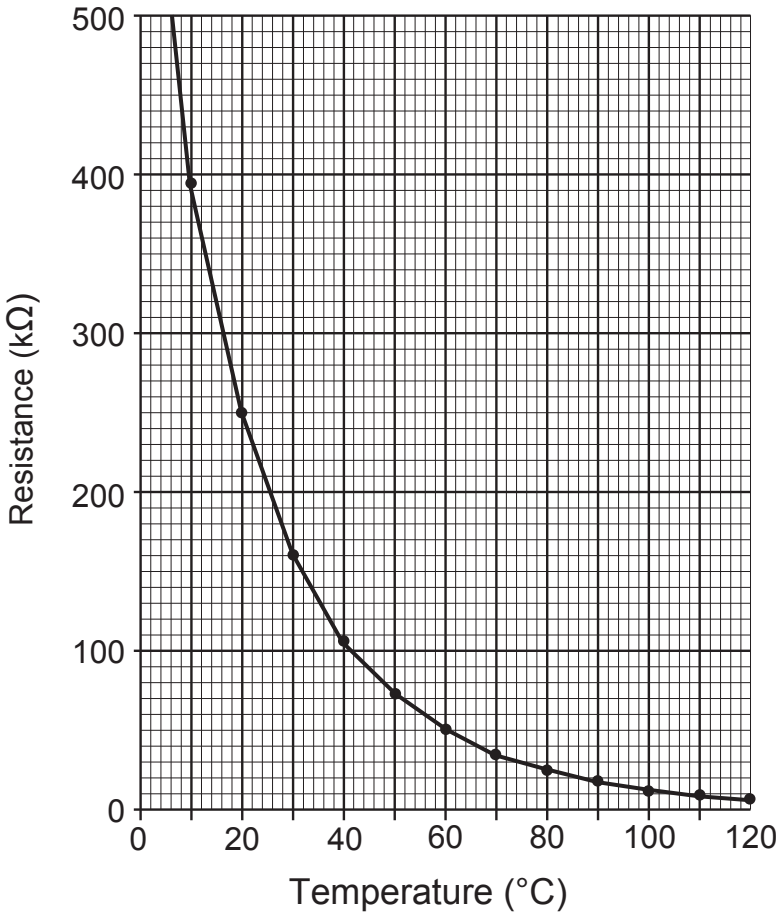
High temperature thermistors

- Thermistor <Discharge> (TH1)
- Thermistor <Hot water> (TH4)

Thermistor R100 = 13.36 kΩ ± 2%
B constant = 4014 ± 2%

$R_t = 13.36\exp\{4014(\frac{1}{273+t} - \frac{1}{373})\}$

20°C	250 kΩ	70°C	35 kΩ
30°C	161 kΩ	80°C	25 kΩ
40°C	107 kΩ	90°C	18 kΩ
50°C	72 kΩ	100°C	13 kΩ
60°C	50 kΩ	110°C	9.9 kΩ



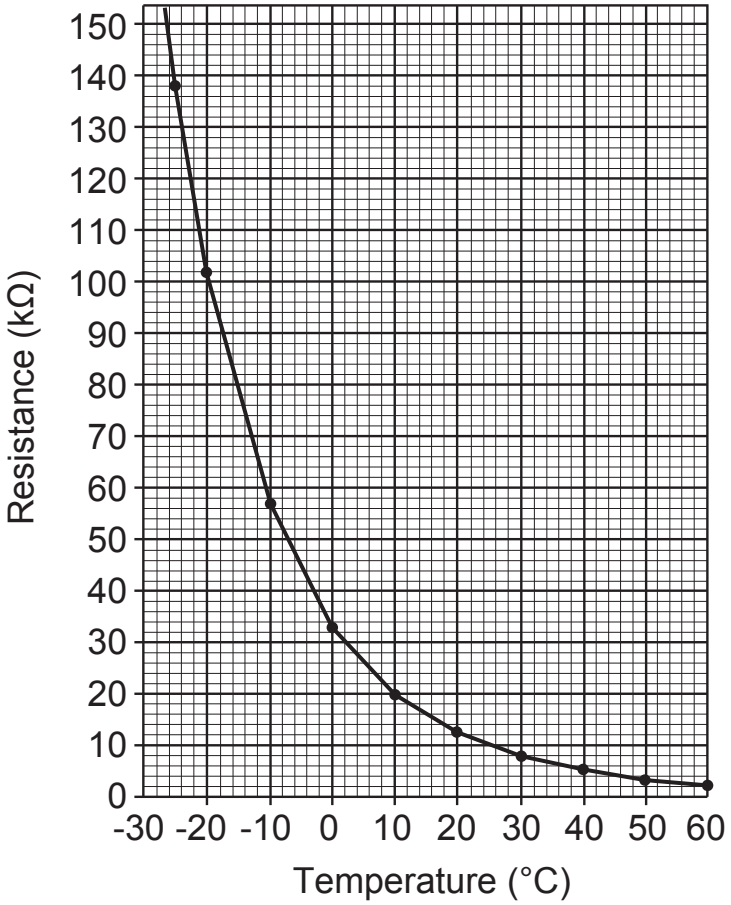
Low temperature thermistors

- Thermistor <Defrost> (TH2)

Thermistor R0 = 33.18 kΩ ± 2%
B constant = 3900 ± 3%

$R_t = 33.18\exp\{3900(\frac{1}{273+t} - \frac{1}{273})\}$

0°C	33 kΩ
10°C	20 kΩ
20°C	13 kΩ
25°C	10 kΩ
30°C	8.0 kΩ
40°C	5.3 kΩ



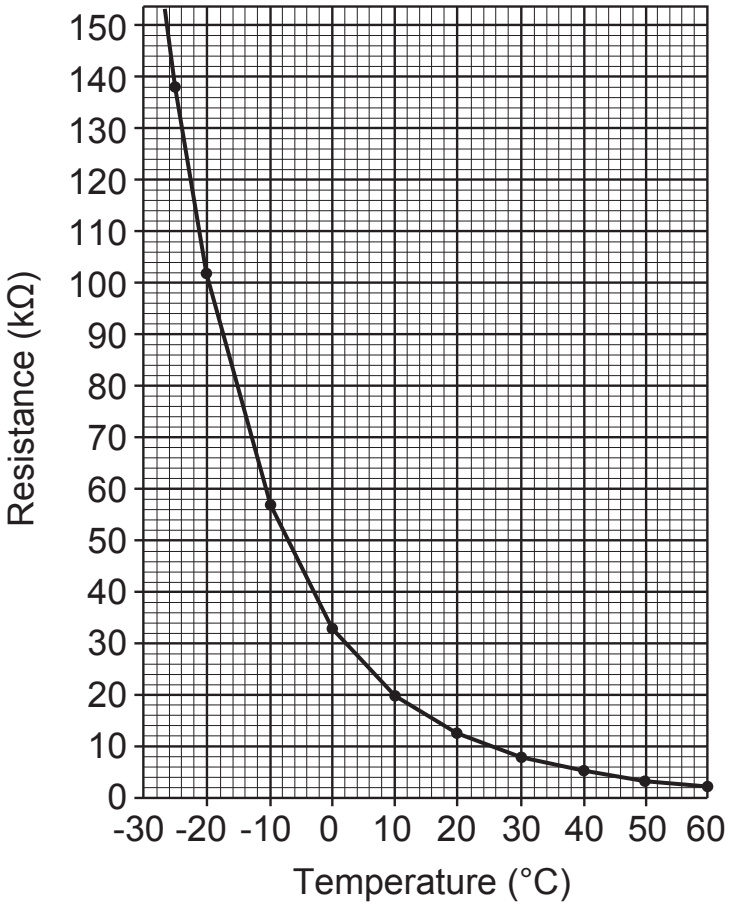
Low temperature thermistors

• Thermistor <Ambient> (TH3)

Thermistor R0 = 33.18 kΩ ± 2%
B constant = 3873 ± 2%

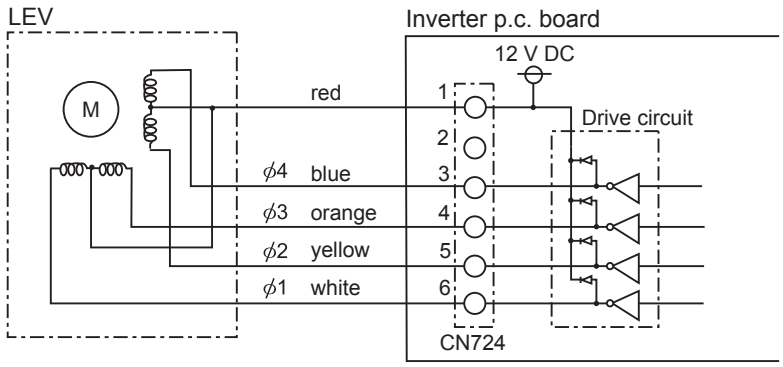
$R_t = 33.18\exp\{3873(\frac{1}{273+t} - \frac{1}{273})\}$

0°C	33 kΩ
10°C	20 kΩ
20°C	13 kΩ
25°C	10 kΩ
30°C	8.0 kΩ
40°C	5.4 kΩ



Linear expansion valve

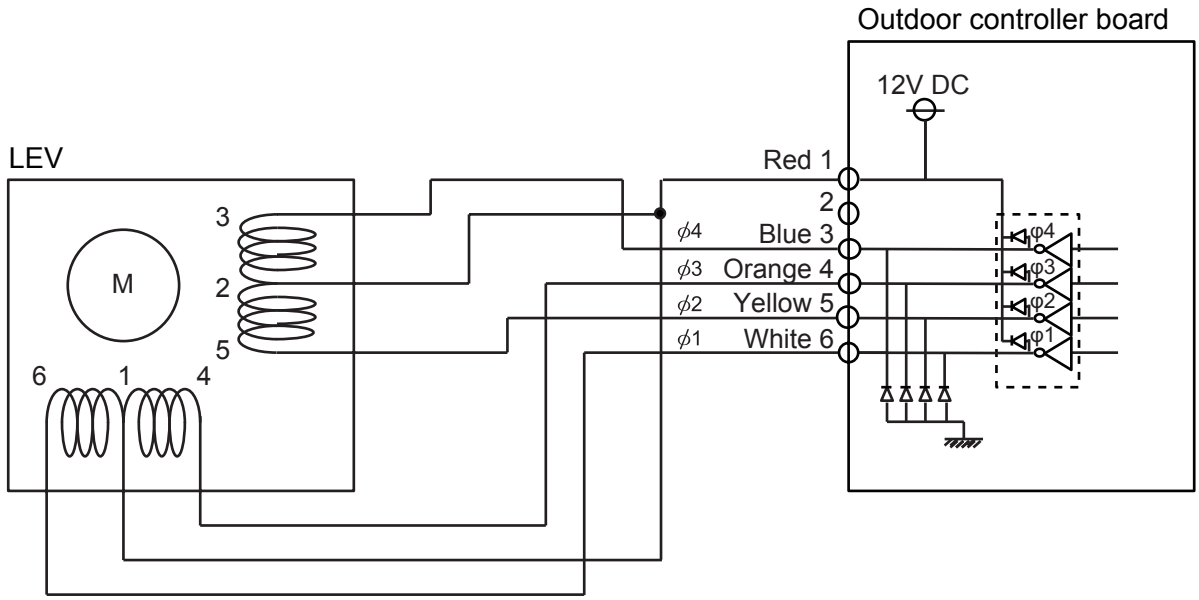
< Connection between the inverter p.c. board and the expansion valve >



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>



When the switch is turned on ,550 pulse closing valve signal will be sent till it goes to
A point in order to define the valve position. (The pulse signal is being sent for about 20 seconds.)

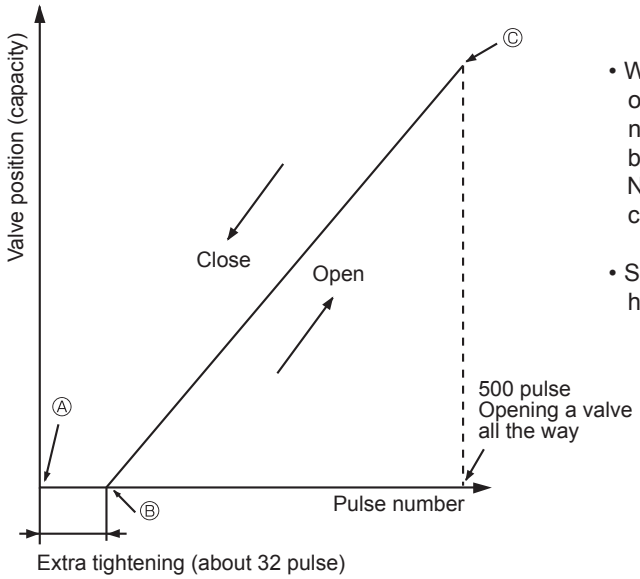
<Output pulse signal and the valve operation>

Output (Phase)	Output							
	1	2	3	4	5	6	7	8
ϕ1	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
ϕ2	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
ϕ3	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
ϕ4	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

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

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

(2) Linear expansion valve operation



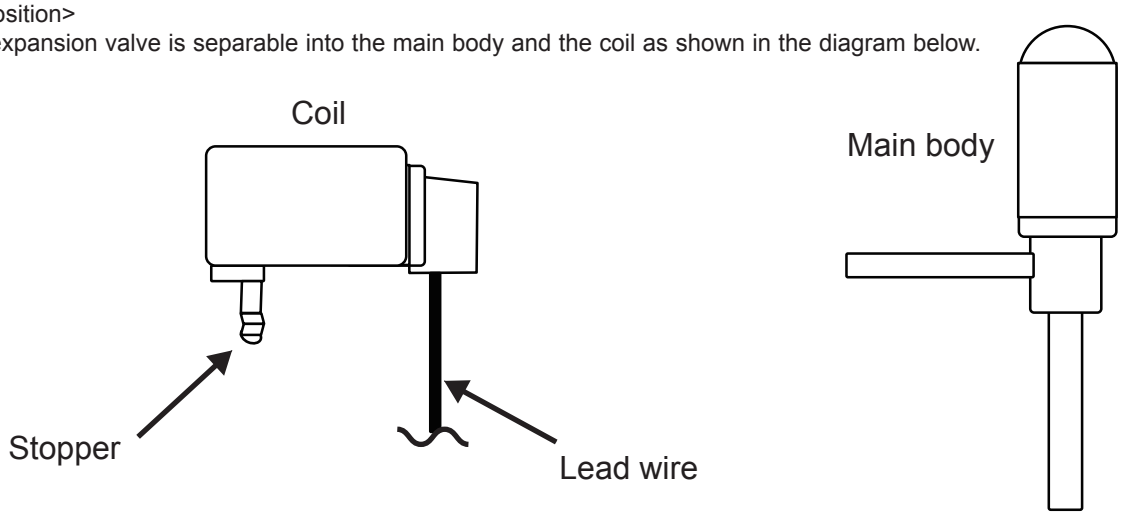
• When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valve: however, when the pulse number moves from Ⓑ to Ⓐ or when the valve is locked, sound can be heard.
No sound is heard when the pulse number moves from Ⓑ to Ⓐ in case coil is burnt out or motor is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

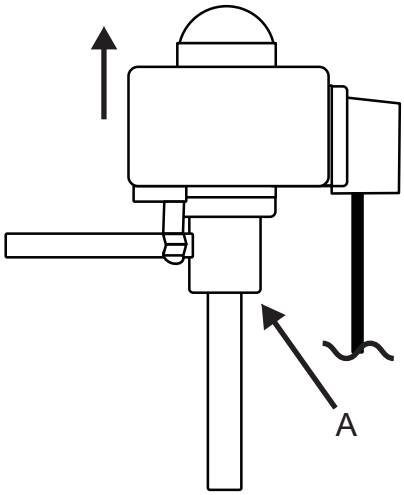
Linear expansion valve is separable into the main body and the coil as shown in the diagram below.



<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.

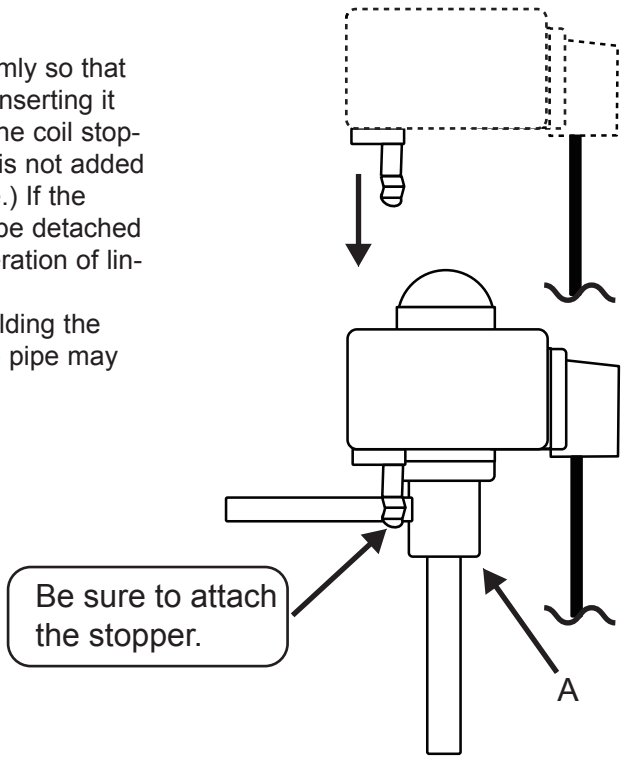
Be sure to detach the coil holding main body firmly. Otherwise pipes can bend due to pressure.



<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.

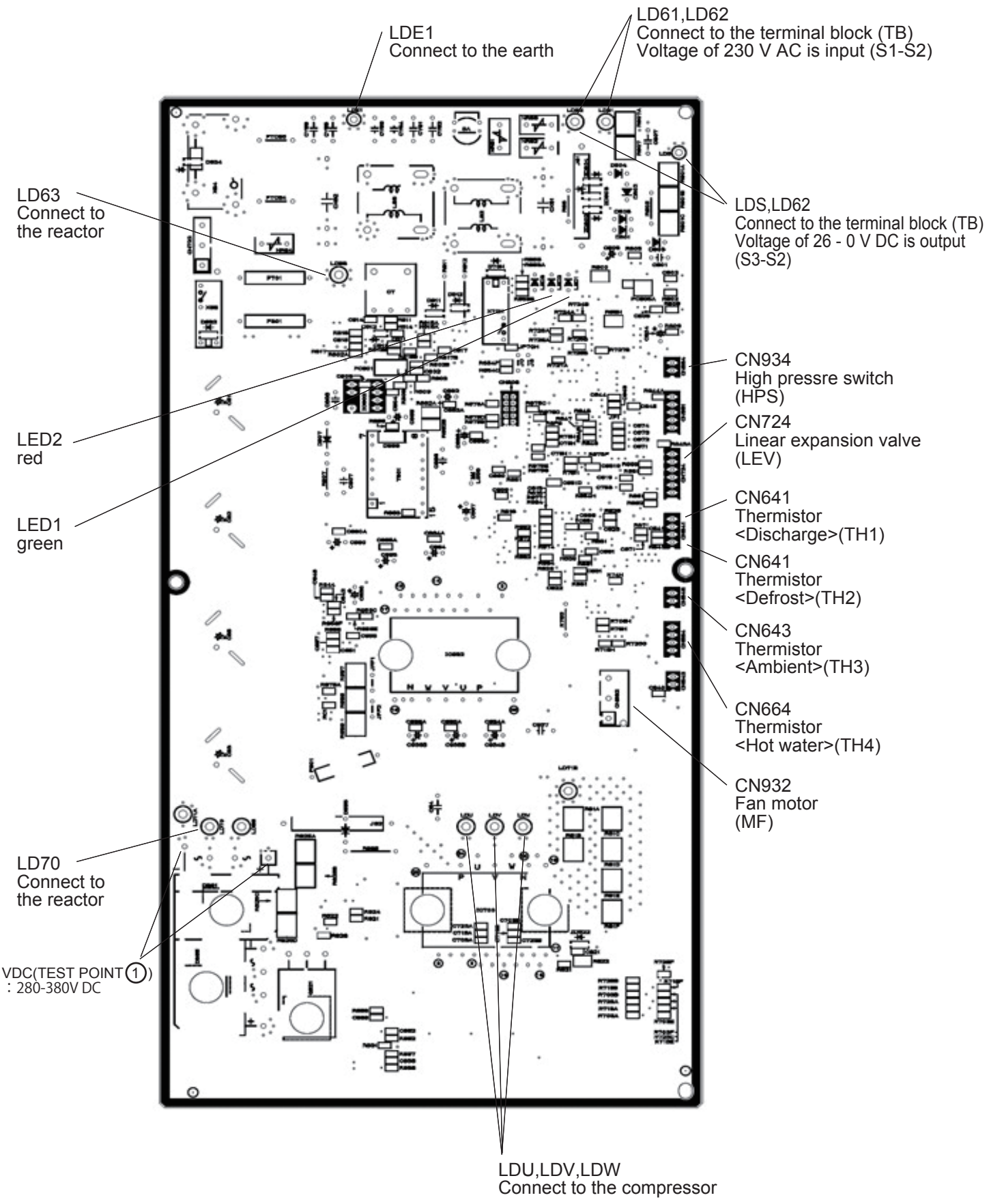
To prevent piping stress, be sure to attach the coil holding the main body of linear expansion valve firmly. Otherwise pipe may break.



7-6. TEST POINT DIAGRAM

<CAUTION> TEST POINT ① is high voltage.

INVERTER P.C BOARD



8 DISASSEMBLY PROCEDURE

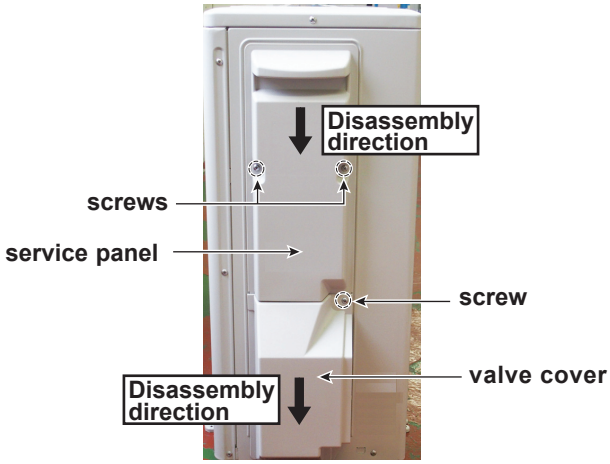
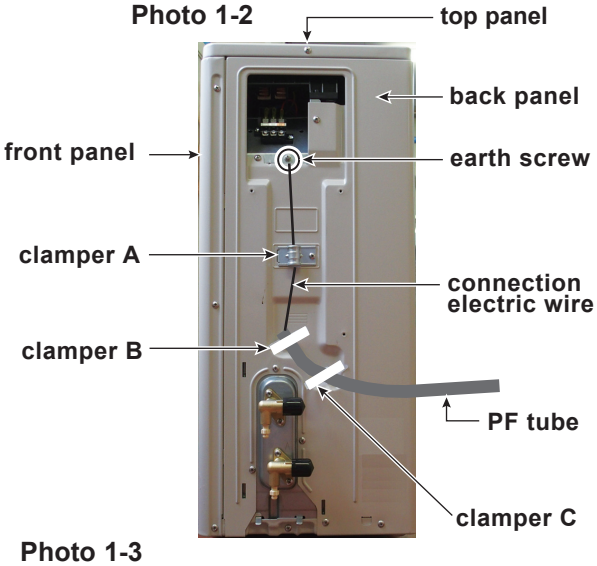
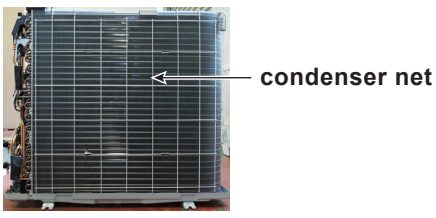
QUHZ-W40VA

[CAUTION]

1. **Before replacing heat pump unit parts, be sure to turn the circuit breaker off.**
2. **Before starting work, be sure to touch a metal part such as the legs of the hot water tank unit to discharge electric charge from the body.**
3. **Turn the earth leakage circuit breaker of the hot water tank off to discharge electric charge from the condenser in the product, and then wait at least five minutes before starting work.**
4. **In procedures described from here on, piping and wiring are not connected.**

1. How to remove the valve cover and service panel and top panel and front panel and back panel and condenser net

※ **Take care not to get burned or injured by hot pipes, hot water heat exchanger or other hot parts.**

DISASSEMBLY PROCEDURE	PHOTOS
(1) Remove the screw from the valve cover, and remove the valve cover by pulling down in the direction of the arrow. (Photo 1-1) (2) Remove the two screws from the service panel, and remove the service panel by pulling down in the direction of the arrow.	**Photo 1-1** 
(3) Remove clamper A. (Photo 1-2) (4) Remove clampers B and C, and disconnect the PF pipe. (5) Remove the earth screw, and disconnect the connection electric wire. (6) Remove the three screws from the top panel, and remove the top panel. (7) Remove the ten screws from the front panel, and remove the front panel. (8) Remove the ten screws from the back panel, and remove the back panel. (9) Remove the condenser net. (Photo 1-3)	**Photo 1-2**  **Photo 1-3** 

QUHZ-W40VA

2. How to remove the inverter control board (INV P.B ASSY)

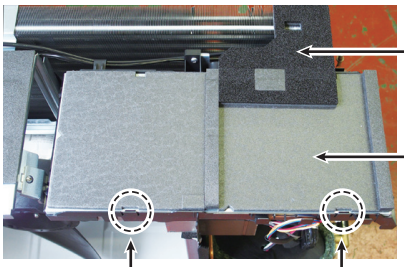
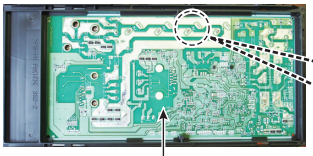
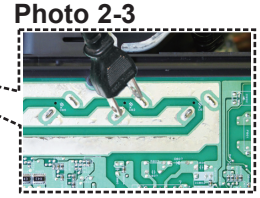
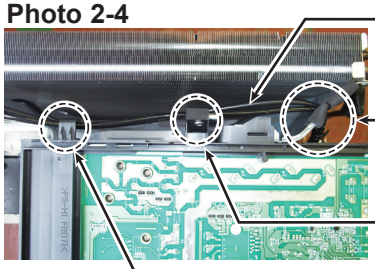
DISASSEMBLY PROCEDURE	PHOTOS
(1) Referring to 1., remove the valve cover, service panel, top panel, front panel, and condenser net.	
(2) Remove the insulator and the two claws to remove the inverter control board cover. (Photo 2-1) (CAUTION) The main circuit (electrolytic condenser) of the inverter control board sometimes remains charged for a while after the circuit breaker is turned off. So, bring the side that is inserted into the power outlet of the soldering iron (approx. 40 W) into contact with the main circuit voltage measurement/discharge points as shown in the figure to completely discharge (to 10 VDC or less) the condenser . Note, however, that electronic control type soldering irons cannot be used for discharging work. (Photo 2-2,2-3)	Photo 2-1  Photo 2-2  Photo 2-3 
(3) Disconnect the lead wire for fan motor from hook A and clamper B, and remove screws C, D and E. Disconnect all connectors and leads from the board, and remove the inverter control board together with the board cover. (Photo 2-4,2-5,2-6)	Photo 2-4 

Photo 2-5

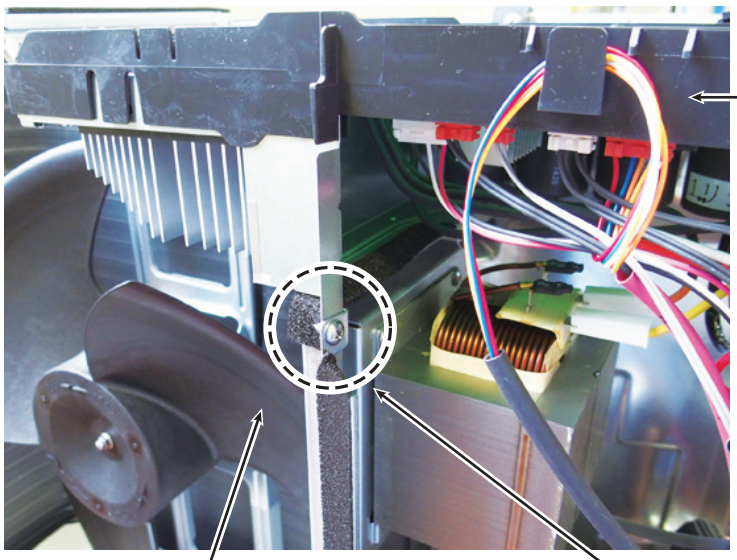
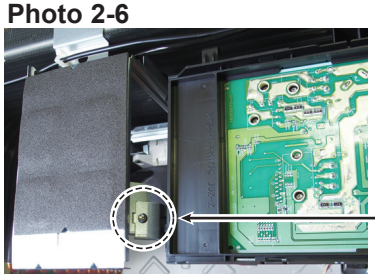
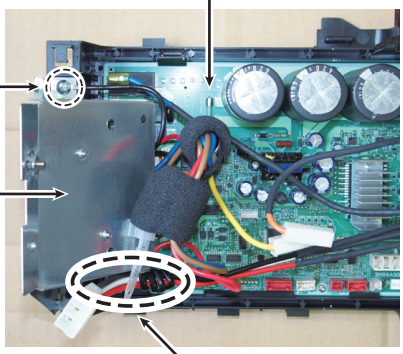
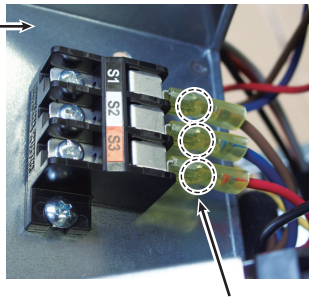
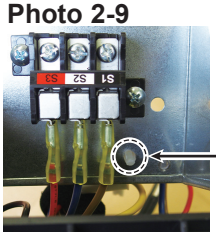
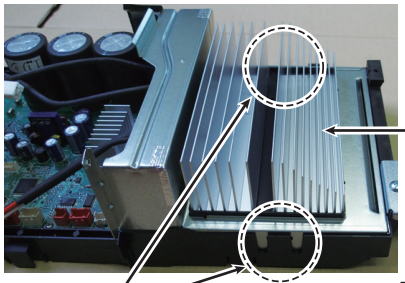
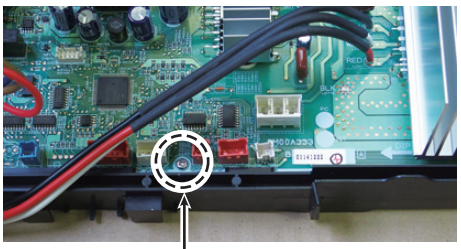
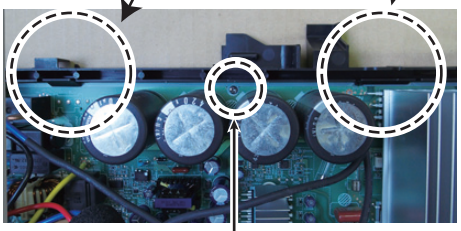
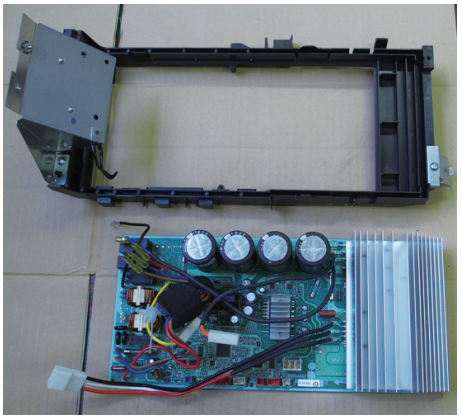


Photo 2-6



DISASSEMBLY PROCEDURE	PHOTOS
(4) Remove the earth screw, clamper and three terminals. Press the clamper claw using long-nose pliers to remove the class from the rear side. (Photo 2-7,2-8,2-9) (CAUTION) To remove the lead wire connected to the service panel, draw out the lead wire while pressing in the protrusion on the terminal.	Photo 2-7  Photo 2-8  Photo 2-9 
(5) Remove the two claws, and remove the radiator fin support upwards. (Photo 2-10,2-11)	Photo 2-10  Photo 2-11  After removal of the radiator fin support

DISASSEMBLY PROCEDURE	PHOTOS
(6) Remove the two screws and two claws, then remove the inverter control board by sliding it in the direction of the arrow, and replace it with a new inverter control board. (Photo 2-12,2-13,2-14)	**Photo 2-12**  screw **Photo 2-13** Claw  screw Disassembly direction **Photo 2-14**  After removal of the inverter control board

QUHZ-W40VA

3. How to remove the thermo assy

DISASSEMBLY PROCEDURE

(1) Referring to 1., remove the valve cover, service panel, top panel, front panel, back panel, and condenser net.

(2) Remove THERMO ASSY W OUT from the clip, disconnect connector CN664 from the inverter control board, and remove THERMO ASSY W OUT. (Photo 3-1)

(3) Remove the lead wire for THERMO ASSY AMB from the two clampers, and then open out the holder. Disconnect connector CN643 from the inverter control board, and remove THERMO ASSY AMB. (Photo 3-2,3-3,3-4,3-5)

(4) Remove THERMO ASSY DEF from the clip, disconnect connector CN641 from the inverter control board, and remove THERMO ASSY DEF. (Photo 3-6)

(5) Remove THERMO ASSY DIS from the clip, disconnect connector CN641 from the inverter control board, and remove THERMO ASSY DIS. (Photo 3-7)

(CAUTION)
1. When removing the thermistors, do not tug the lead wires.
2. Before installing the thermistors, first check the electrical wiring diagram attached to the top panel.
3. Install terminals at their original positions.
4. THERMO ASSY DEF and THERMO ASSY DIS are sub-assemblies.

PHOTOS

Photo 3-1

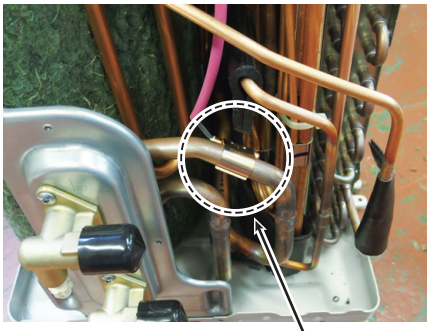


Photo 3-2

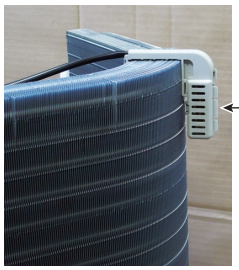


Photo 3-3

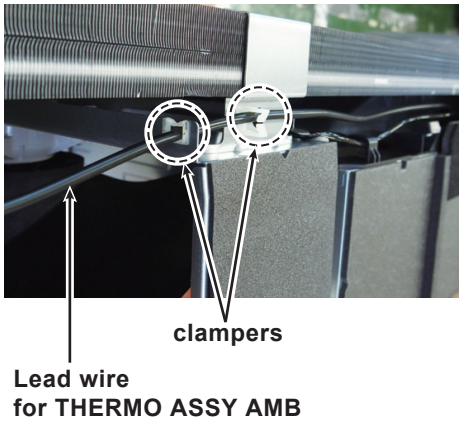


Photo 3-4

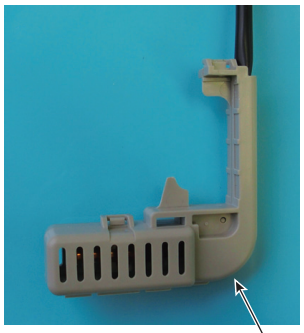


Photo 3-5

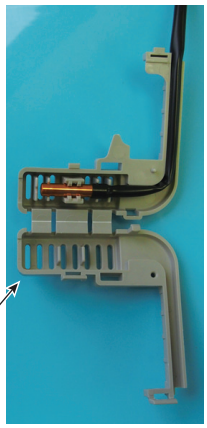


Photo 3-6

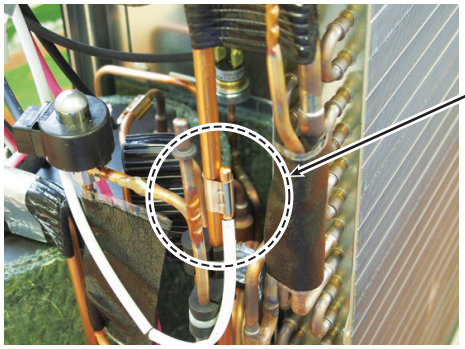
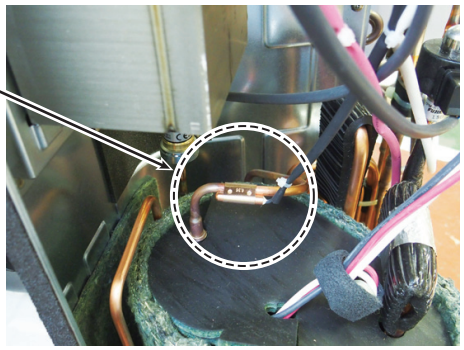
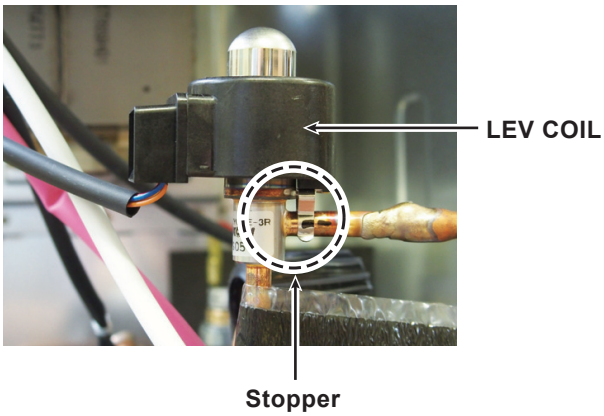


Photo 3-7



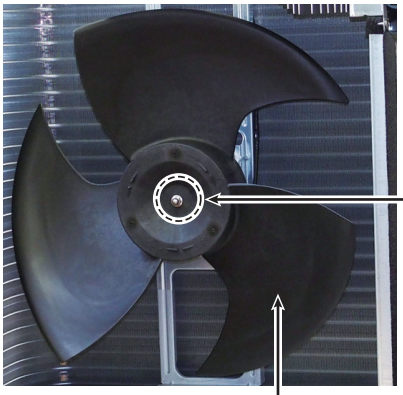
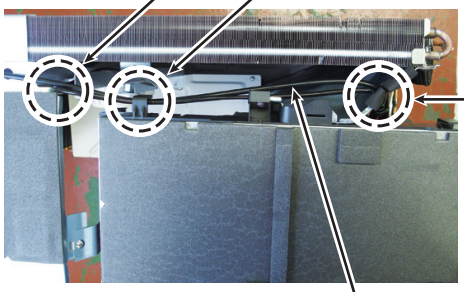
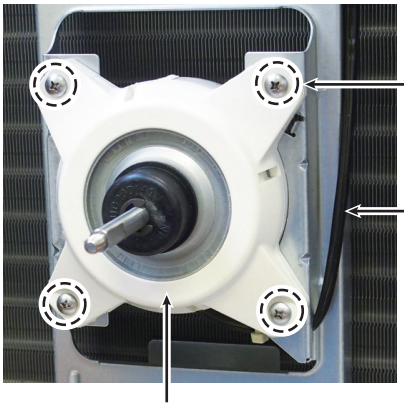
QUHZ-W40VA

4. How to remove the lev coil

DISASSEMBLY PROCEDURE	PHOTOS
(1) Referring to 1., remove the valve cover, service panel, top panel, front panel, and back panel. (2) Remove LEV COIL upwards from the electronic expansion valve, disconnect connector CN724 from the inverter control board, and remove LEV COIL. (Photo 4-1) (CAUTION) When installing a new LEV COIL, be sure to insert the stopper into the pipe while paying attention to its orientation.	**Photo 4-1** 

QUHZ-W40VA

5. How to remove the fan motor

DISASSEMBLY PROCEDURE	PHOTOS
(1) Referring to 1., remove the top panel and front panel. (2) Disconnect connector CN932 of the lead wire for fan motor from the inverter control board.	
(3) Remove the nut (right-handed screw) and then the PROPELLER FAN. (Photo 5-1)	**Photo 5-1** 
(4) Remove the lead wire for fan motor from hooks A and B and clamper C, the four screws from the fan motor, and fan motor. (Photo 5-2,5-3) (CAUTION) When installing the fan motor, install so that the draw out part of the lead wire is facing downwards. (Photo 5-3)	**Photo 5-2**  **Photo 5-3** 

MITSUBISHI ELECTRIC CORPORATION

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

Distributed in Dec. 2015 No. GHH15010
Made in Japan

New publication, effective Dec. 2015
Specifications are subject to change without notice.