MITSUBISHI ELECTRIC

AIR-COOLED HEAT PUMP TYPE
PACKAGED AIR CONDITIONERS

CE
2000

FILE COPY

TECHNICAL & SERVICE MANUAL

<Outdoor unit>

Models

PUH-8YE, PUH-10YE

(Single and Twin/Triple)

Mr.SLIM

For use with the R22

Contents

1 SAFETY PRECAUTIONS

1. Before installation and electric work

▶ **Before installing the unit, make sure you read all the "Safety precautions".**
▶ **The "Safety precautions" provide very important points regarding safety. Make sure you follow them.**

Symbols used in the text

⚠ **Warning:**
Describes precautions that should be observed to prevent danger of injury or death to the user.

⚠ **Caution:**
Describes precautions that should be observed to prevent damage to the unit.

Symbols used in the illustrations

⃠ : Indicates an action that must be avoided.
❗ : Indicates that important instructions must be followed.
● : Indicates a part which must be grounded.
⚠ : Beware of electric shock. (This symbol is displayed on the main unit label.) <Color: yellow>

⚠ **Warning:**
Carefully read the labels affixed to the main unit.

⚠ **Warning:**
- **Use the specified cables for wiring. Make the connections securely so that the outside force of the cable is not applied to the terminals.**
  - Inadequate connection and fastening may generate heat and cause a fire.
- **Do not touch the heat exchanger fins.**
  - Improper handling may result in injury.
- **If refrigerant gas leaks during installation work, ventilate the room.**
  - If the refrigerant gas comes into contact with a flame, poisonous gases will be released.
- **Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations"and the instructions given in this manual and always use a special circuit.**
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result.
- **Securely install the outdoor unit terminal cover (panel).**
  - If the terminal cover (panel) is not installed properly, dust or water may enter the outdoor unit and fire or electric shock may result.
- **When installing and moving the air conditioner to another site, do not charge the it with a refrigerant different from the refrigerant (R407C or R22) specified on the unit.**
  - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- **When moving and reinstalling the air conditioner, consult the dealer or an authorized technician.**
  - If the air conditioner is installed improperly, water leakage, electric shock, or fire may result.
- **Do not reconstruct or change the settings of the protection devices.**
  - If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by Mitsubishi Electric are used, fire or explosion may result.

2. Precautions for devices that use R407C refrigerant

⚠ **Caution:**
- **Do not use the existing refrigerant piping.**
  - The old refrigerant and refrigerator oil in the existing piping contains a large amount of chlorine which may cause the refrigerator oil of the new unit to deteriorate.
- **Use refrigerant piping made of phosphorus deoxidized copper and copper alloy seamless pipes and tubes. In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminant.**
  - Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.
- **Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing. (Store elbows and other joints in a plastic bag.)**
  - If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor trouble may result.

- **Use ester oil, ether oil or alkylbenzene (small amount) as the refrigerator oil to coat flares and flange connections.**
  - The refrigerator oil will degrade if it is mixed with a large amount of mineral oil.
- **Use liquid refrigerant to fill the system.**
  - If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.
- **Do not use a refrigerant other than R407C.**
  - If another refrigerant (R22, etc.) is used, the chlorine in the refrigerant may cause the refrigerator oil to deteriorate.
- **Use a vacuum pump with a reverse flow check valve.**
  - The vacuum pump oil may flow back into the refrigerant cycle and cause the refrigerator oil to deteriorate.
- **Do not use the following tools that are used with conventional refrigerants. (Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, refrigerant recovery equipment)**
  - If the conventional refrigerant and refrigerator oil are mixed in the R407C, the refrigerant may deteriorated.
  - If water is mixed in the R407C, the refrigerator oil may deteriorate.
  - Since R407C does not contain any chlorine, gas leak detectors for conventional refrigerants will not react to it.
- **Do not use a charging cylinder.**
  - Using a charging cylinder may cause the refrigerant to deteriorate.
- **Be especially careful when managing the tools.**
  - If dust, dirt, or water gets in the refrigerant cycle, the refrigerant may deteriorate.

3. Electrical work

⚠ **Caution:**

- **Ground the unit.**
  - Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground lines. Improper grounding may result in electric shock.
- **The reverse phase of L lines (L_1, L_2, L_3) can be detected (Error cord: F8), but the reverse phase of L lines and N line can be not be detected.**
  - The some electric parts should be damaged when power is supplied under the miss wiring.
- **Use power line cables of sufficient current carrying capacity and rating.**
  - Cables that are too small may leak, generate heat, and cause a fire.
- **Use only a circuit breaker and fuse of the specified capacity.**
  - A fuse or circuit breaker of a larger capacity or a steel or copper wire may result in a general unit failure or fire.
- **Do not wash the air conditioner units.**
  - Washing them may cause an electric shock.

4. Before starting the test run

⚠ **Caution:**

- **Turn on the power at least 12 hours before starting operation.**
  - Starting operation immediately after turning on the main power switch can result in severe damage to internal parts. Keep the power switch turned on during the operational season.
- **Do not touch the switches with wet fingers.**
  - Touching a switch with wet fingers can cause electric shock.
- **Do not touch the refrigerant pipes during and immediately after operation.**
  - During and immediately after operation, the refrigerant pipes are may be hot and may be cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. Your hands may suffer burns or frostbite if you touch the refrigerant pipes.
- **Do not operate the air conditioner with the panels and guards removed.**
  - Rotating, hot, or high-voltage parts can cause injuries.
- **Do not turn off the power immediately after stopping operation.**
  - Always wait at least five minutes before turning off the power. Otherwise, water leakage and trouble may occur.

Note:

1. **The total capacity of connected indoor unit models represents the total sum of the figures expressed in the indoor model name.**
2. **Combinations in which the total capacity of the connected indoor units exceeds the capacity of the outdoor unit will reduce the capacity of each indoor unit below the rated capacity during simultaneous operation. Therefore, if circumstances allows, combine indoor units within the capacity of the outdoor unit.**

2 SPECIFICATIONS

Specifications of air-source heat pump type packaged air conditioner (Outdoor unit)			
Model name	**PUH-8YE**	Quantity	

			Cooling	Heating
Capacity		kcal/h	18,000	19,000
		kW	20.9	22.1
Power source			3N~ 380/400/415 V 50 Hz	
Power input		kW	7.62	7.17
Current		A	13.5/13.6/13.7	12.3/12.4/12.5
Fan	Type x Quantity		Propeller fan × 1	
	Airflow rate	m^3/min	185	
	Motor output	kW	0.38	
Compressor	Type		Hermetic	
	Motor output	kW	5.5	
	Crankcase heater	kW	0.05 (240 V)	
Refrigerant/Lubricant			R22/MS32(N-1)	
External finish			Steel plate paintingwith polyester powder (MUNSELL 5Y8/1 or similar)	
External dimension		mm	1,715(H) × 990(W) × 840(L)	
Protection device	High pressure protection	MPa	2.94	
	Compressor/Fan		Overcurrent protection/Thermal switch	
Refrigerant piping diameter	Liquid/Gas	mm	ø12.7 Flare / ø25.4 Flange	
Indoor unit			PEH-8YD	
Noise level		dB (A)	56	
Net weight		kg	205	
Operating temperature range			Indoor: 15 °CWB~24 °CWB Outdoor: –5 °CDB~46 °CDB	Indoor: 15°CDB~27 °CDB Outdoor: –12 °CWB~15.5 °CWB

Notes:

1. Cooling/Heating capacity indicates the maximum value at operation under the following condition.
   Cooling Indoor: 27 °CDB/19 °CWB Outdoor: 35 °CDB
   Heating Indoor: 20 °CDB Outdoor: 7 °CDB/6 °CWB
   Pipe length: 7.5 m Height difference: 0 m
2. Works not included: Installation/Foundation work, Electrical connection work, Duct work, Insulation work, Power source switch, and other items not specified in this specifications.

Specifications of air-source heat pump type packaged air conditioner (Outdoor unit)			
Model name	**PUH-10YE**	Quantity	

			Cooling	Heating
Capacity		kcal/h	22,400	24,400
		kW	26.0	28.4
Power source			3N~ 380/400/415 V 50 Hz	
Power input		kW	9.47	8.30
Current		A	16.8/16.9/17.0	14.8/14.9/15.0
Fan	Type x Quantity		Propeller fan × 1	
	Airflow rate	m^3/min	185	
	Motor output	kW	0.38	
Compressor	Type		Hermetic	
	Motor output	kW	7.5	
	Crankcase heater	kW	0.06 (240 V)	
Refrigerant/Lubricant			R22/MS-32(N-1)	
External finish			Steel plate painting with polyester powder (MUNSELL 5Y8/1 or similar)	
External dimension		mm	1,715(H) × 990(W) × 840(L)	
Protection device	High pressure protection	MPa	2.94	
	Compressor/Fan		Overcurrent protection/Thermal switch	
Refrigerant piping diameter Liquid/Gas		mm	ø15.88 Flare / ø28.58 Flange	
Indoor unit			PEH-10YD	
Noise level		dB (A)	57	
Net weight		kg	225	
Operating temperature range			Indoor: 15 °CWB~24 °CWB Outdoor: –5 °CDB~46 °CDB	Indoor: 15 °CDB~27 °CDB Outdoor: –12 °CWB~15.5 °CWB

Notes:

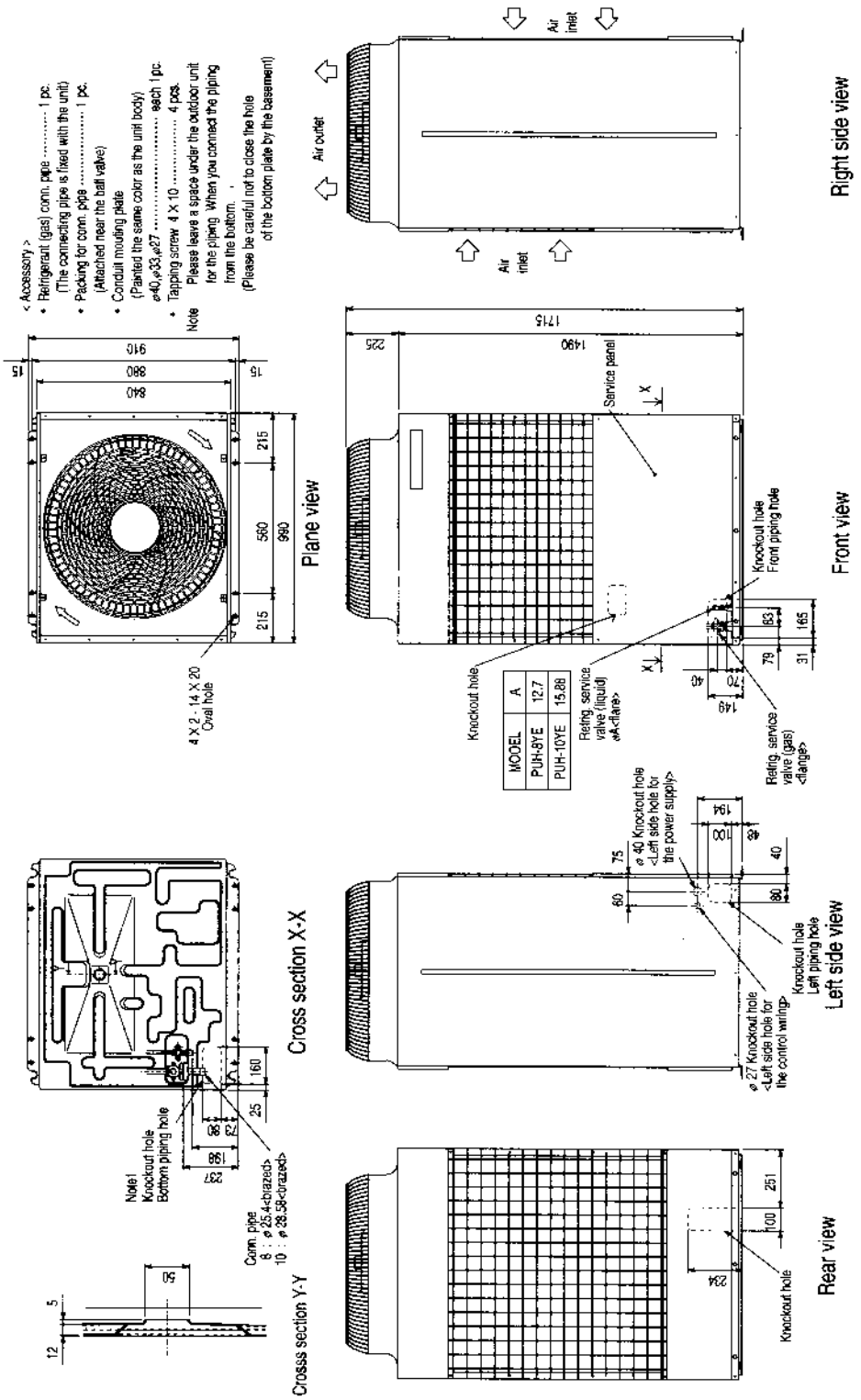
1. Cooling/Heating capacity indicates the maximum value at operation under the following condition.
   Cooling Indoor: 27 °CDB/19 °CWB Outdoor: 35 °CDB
   Heating Indoor: 20 °CDB Outdoor: 7 °CDB/6 °CWB
   Pipe length: 7.5 m Height difference: 0 m

2. Works not included: Installation/Foundation work, Electrical connection work, Duct work, Insulation work, Power source switch,and other items not specified in this specifications.

3 EXTERNAL DIMENSIONS

- **Models PUH-8YE/10YE**

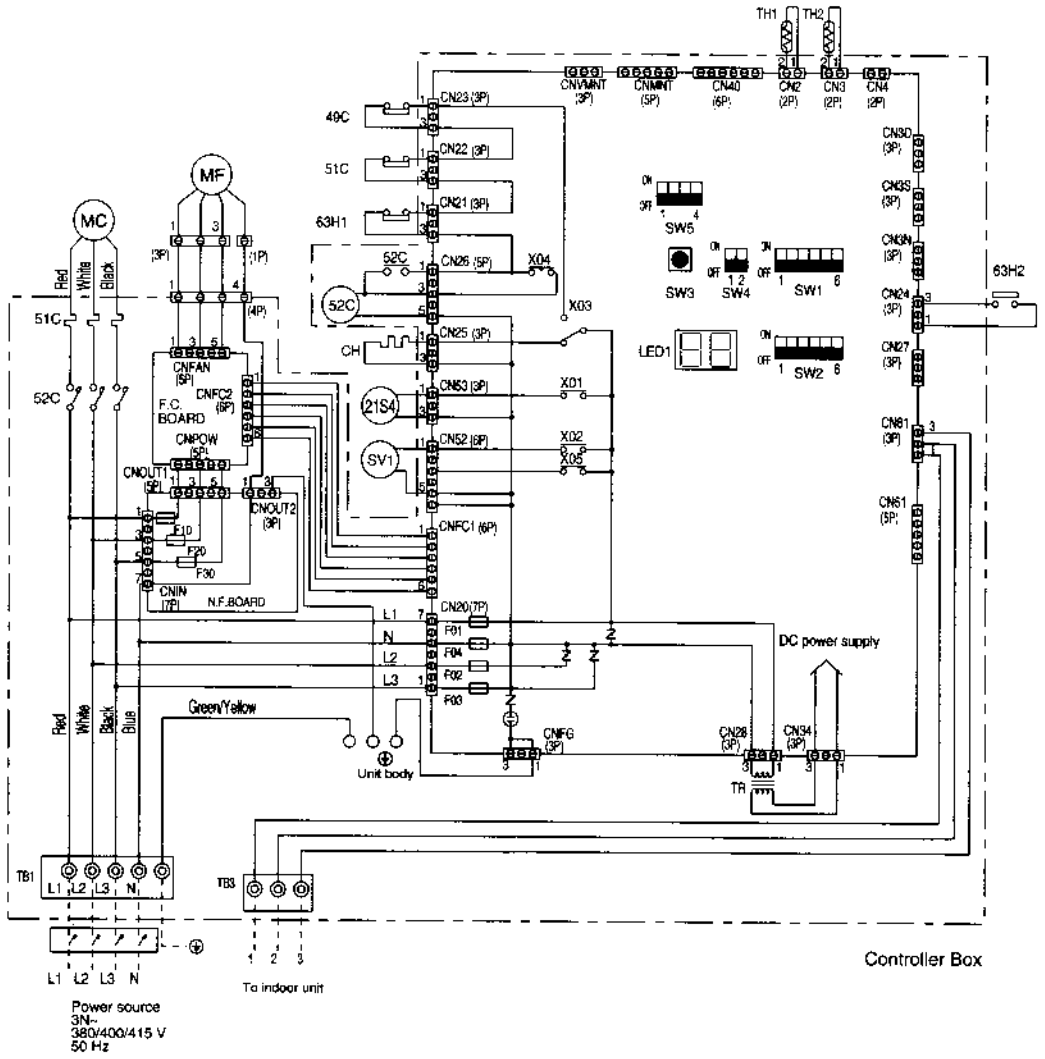
Unit: mm



[4] ELECTRICAL WIRING DIAGRAM

[1] Outdoor Unit

- **Models PUH-8YE/10YE**



NOTE SW5-4 IS OFF IN CASE OF PUH-8YE.
SW5-4 IS ON IN CASE OF PUH-10YE.

PUH-8YE PUH-10YE

Symbol Explanation

Symbol	Name	
F01~F04	FUSE (6.3A 250VAC CLASS F)	
F10~F30	FUSE (6.3A 250VAC CLASS F)	
51C	OVER CURRENT RELAY	
52C	MAGNETIC CONTACTOR (COMPRESSOR)	
63H1	PRESSURE SWITCH (HIGH PRESSURE)	
63H2	PRESSURE SWITCH (FOR CONTROL)	
TR	TRANSFORMER	
MC	ELECTRIC MOTOR OF COMPRESSOR	
MF	FAN MOTOR (HEAT EXCHANGER)	
CH	CRANK CASE HEATER (COMPRESSOR)	
X01~X05	RELAY	
SW1~5	SWITCH	
21S4	4-WAY VALVE	
SV1	SORENOID VALVE	
TH1	THERMISTOR	LIQUID TEMP
TH2		DISCHARGE TEMP
TB1	POWER SOURCE TERMINAL BLOCK	
TB3	INDOOR/OUTDOOR CONNECTION TERMINAL BLOCK	
49C	THERMAL SWITCH (COMPRESSOR)	
⏚	EARTH TERMINAL	

Note:

1. Be sure to apply earth work to the unit. (Use the earth terminal of TB1.)

[2] Skelton of Indoor/Outdoor Connection

(1) Multiple systems combination chart

	PUH-8YE	PUH-10YE
Indoor units	PEH-8YD	PEH-10YD
	PLH-1.6, 2, 2.5KK(H)B	PLH-2, 2.5KK(H)B
	PLH-3AK(H), PLH-4AK(H)S	PLH-3AK(H), PLH-4, 5AK(H)S
	PKH-1.6, 2, 2.5, 3FK(H)A, PKH-4FK(H)SA	PKH-2, 2.5, 3FK(H)A, PKH-4FK(H)SA
	PCH-2, 2.5, 3GK(H)A, PCH-4GK(H)SA	PCH-2, 2.5, 3GK(H)A, PCH-4, 5GK(H)SA
	PEH-2.5, 3, EKHA, PEH-4EKHSA	PEH-2.5, 3EKHA, PEH-4, 5EKHSA
	PEHD-1.6, 2, 2.5, 3EK(H)A, PEHD-4EK(H)SA	PEHD-2, 2.5, 3EK(H)A, PEHD-4, 5EK(H)SA

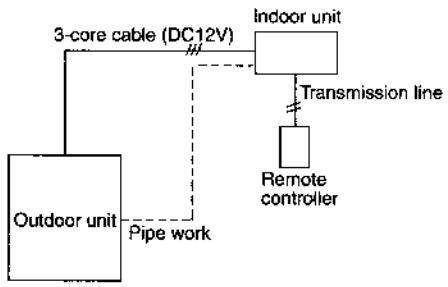
Systems	Single	Twin		Triple		Single	Twin		Triple	
	Model	Ratio	Model	Ratio	Model	Model	Ratio	Model	Ratio	Model
	8	50:50	4+4	33:33:33	2.5+2.5+2.5	10	50:50	5+5	33:33:33	3+3+3
				25:25:50	2+2+4				25:25:50	2.5+2.5+5
				20:40:40	1.6+3+3				20:40:40	2+4+4

(2) Multiple-distributor pipes (option)

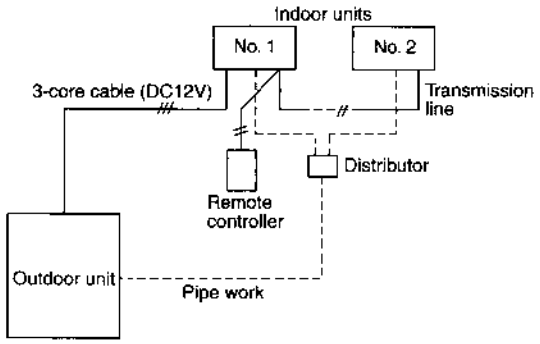
	Twin	Triple		
Ratio of indoor units	50:50	33:33:33	25:25:50	20:40:40
Multiple-distributor	SDD-50WJ-E	SDT-111J-E	SDT-112J-E	SDT-122J-E

(3) System

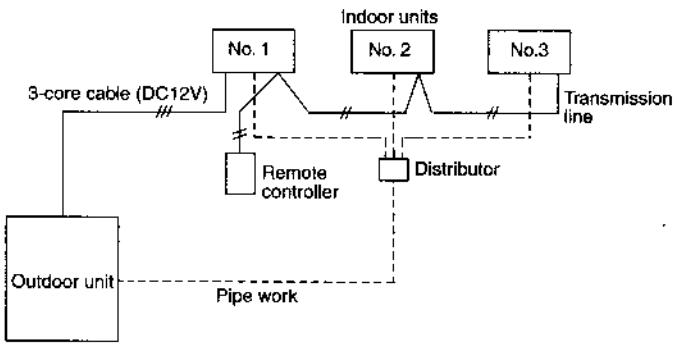
Single



Twin



Triple



[5] Technical Data of PUH-8YE/10YE to Meet LVD

[1] Standard Operation Data

① PUH-8YE

Operating condition				Cooling			Heating		
Operating condition	Voltage		V	380	400	415	380	400	415
	Power source frequency		Hz	50	50	50	50	50	50
	Indoor air condition (DB/WB)		°C	27/19	27/19	27/19	20/–	20/–	20/–
	Outdoor air condition (DB/WB)		°C	35/-	35/–	35/–	7/6	7/6	7/6
	Piping length		m	7.5	7.5	7.5	7.5	7.5	7.5
	Refrigerant charge		kg	7.4	7.4	7.4	7.4	7.4	7.4
Electrical characteristics	Outdoor unit	Current	A	13.5	13.6	13.7	12.3	12.4	12.5
		Input	kW	7.62	7.62	7.62	6.91	6.91	6.91
		Compressor current	A	12.4	12.5	12.6	11.2	11.3	11.4
		Fan current	A	1.1	1.1	1.1	1.1	1.1	1.1
	Indoor unit	Current	A	1.12	1.12	1.12	1.12	1.12	1.12
		Input	kW	0.65	0.65	0.65	0.65	0.65	0.65
Refrigerant circuit	Discharge pressure		MPa	1.99	1.99	1.99	1.59	1.59	1.59
	Suction pressure		MPa	0.49	0.49	0.49	0.35	0.35	0.35
	Discharge refrigerant temperature		°C	85	85	85	75	75	75
	Suction refrigerant temperature		°C	7	7	7	–2	–2	–2
	Liquid pipe temperature (at piping sensor)		°C	46	46	46	5	5	5
	Compressor shell bottom temperature		°C	50	50	50	35	35	35

Note: The values listed above indicate that when connected with the indoor unit PEH-8YD as representative data.

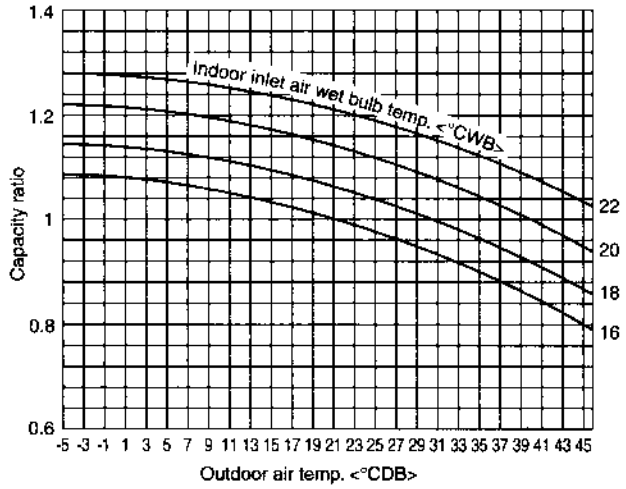
② PUH-10YE

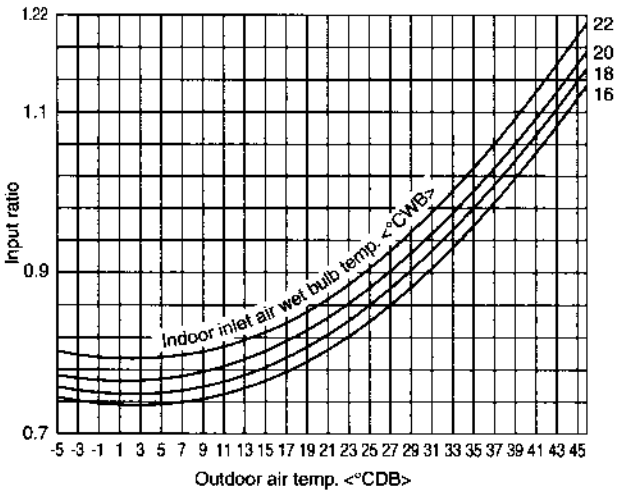
Operating condition				Cooling			Heating		
Operating condition	Voltage		V	380	400	415	380	400	415
	Power source frequency		Hz	50	50	50	50	50	50
	Indoor air condition (DB/WB)		°C	27/19	27/19	27/19	20/–	20/–	20/–
	Outdoor air condition (DB/WB)		°C	35/-	35/–	35/–	7/6	7/6	7/6
	Piping length		m	7.5	7.5	7.5	7.5	7.5	7.5
	Refrigerant charge		kg	7.6	7.6	7.6	7.6	7.6	7.6
Electrical characteristics	Outdoor unit	Current	A	16.8	16.9	17.0	14.8	14.9	15.0
		Input	kW	9.47	9.47	9.47	8.30	8.30	8.30
		Compressor current	A	15.7	15.8	15.9	13.7	13.8	13.9
		Fan current	A	1.1	1.1	1.1	1.1	1.1	1.1
	Indoor unit	Current	A	1.64	1.64	1.64	1.64	1.64	1.64
		Input	kW	0.94	0.94	0.94	0.94	0.94	0.94
Refrigerant circuit	Discharge pressure		MPa	2.03	2.03	2.03	1.57	1.57	1.57
	Suction pressure		MPa	0.48	0.48	0.48	0.34	0.34	0.34
	Discharge refrigerant temperature		°C	95	95	95	80	80	80
	Suction refrigerant temperature		°C	8	8	8	–2	–2	–2
	Liquid pipe temperature (at piping sensor)		°C	47	47	47	6	6	6
	Compressor shell bottom temperature		°C	60	60	60	40	40	40

Note: The values listed above indicate that when connected with the indoor unit PEH-10YD as representative data.

[2] Cooling Capacity Curves

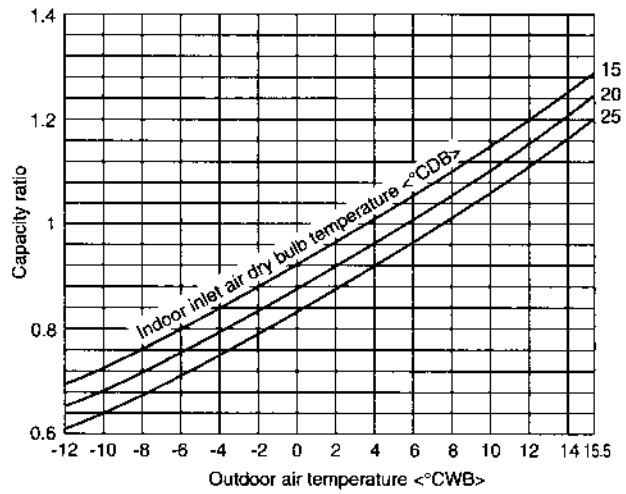
- PUH-8YE/10YE

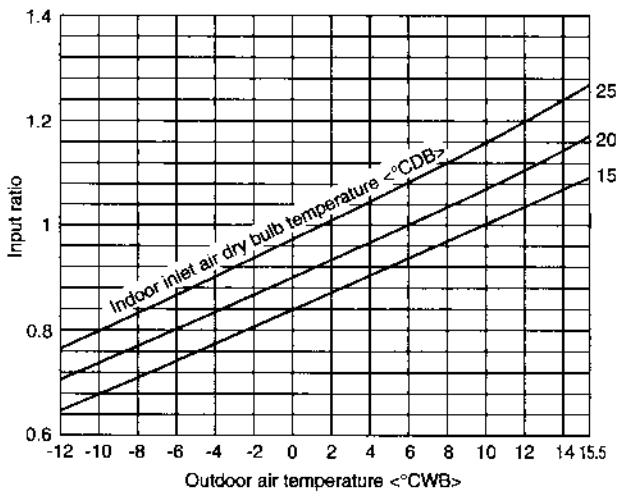




[3] Heating Capacity Curves

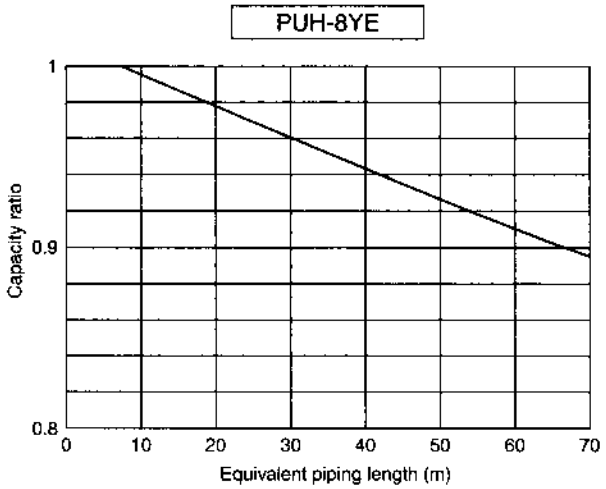
- PUH-8YE/10YE

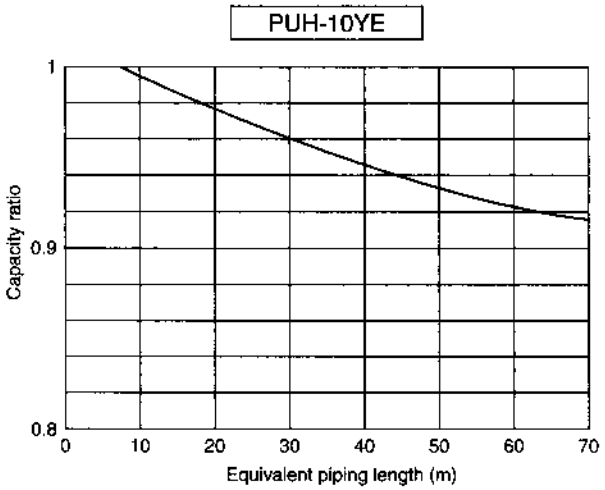




[4] Capacity Reduction Ratio due to Changes in Piping Length

(1) Cooling capacity





(2) Heating capacity

Model name	Equivalent piping length		
	- 30 m	30 - 50 m	50 - 70 m
PUH-8YE	1.0	0.995	0.99
PUH-10YE			

(3) Calculation formula of equivalent piping length

PUH-8YE	Equivalent piping length (m) = Actual piping length (m) + (0.47 × Number of bend)
PUH-10YE	Equivalent piping length (m) = Actual piping length (m) + (0.5 × Number of bend)

(4) Reduction ratio by frosting

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

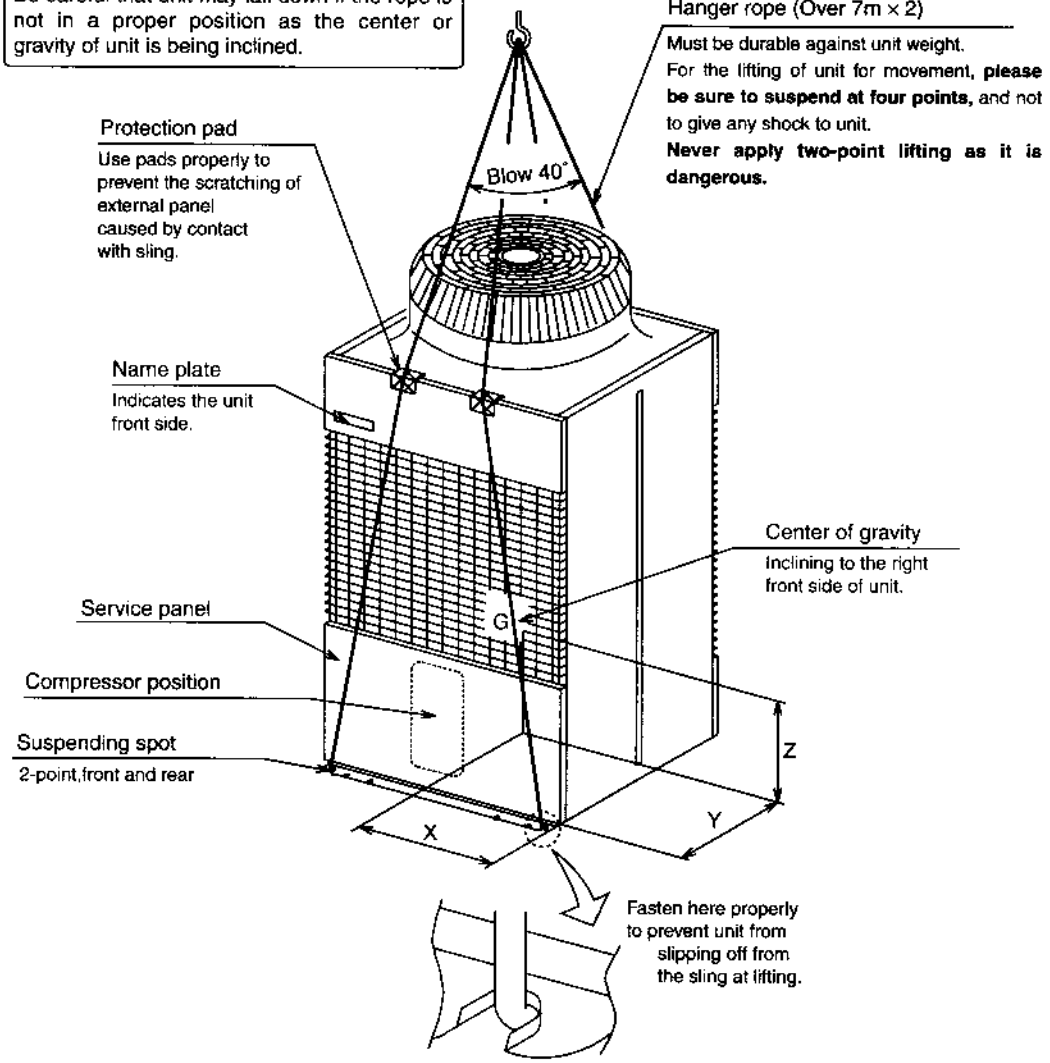
[5] Center of Gravity (Outdoor unit)

(1) Caution for Lifting

⚠ Warning

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

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



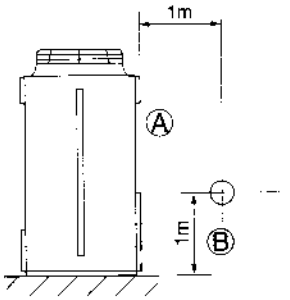
Item / Model name	Center of gravity (mm)			Net weight (kg)
	X	Y	Z	
PUH-8YE	330	350	490	205
PUH-10YE	300	330	510	225

[6] NC Curve (Outdoor unit)

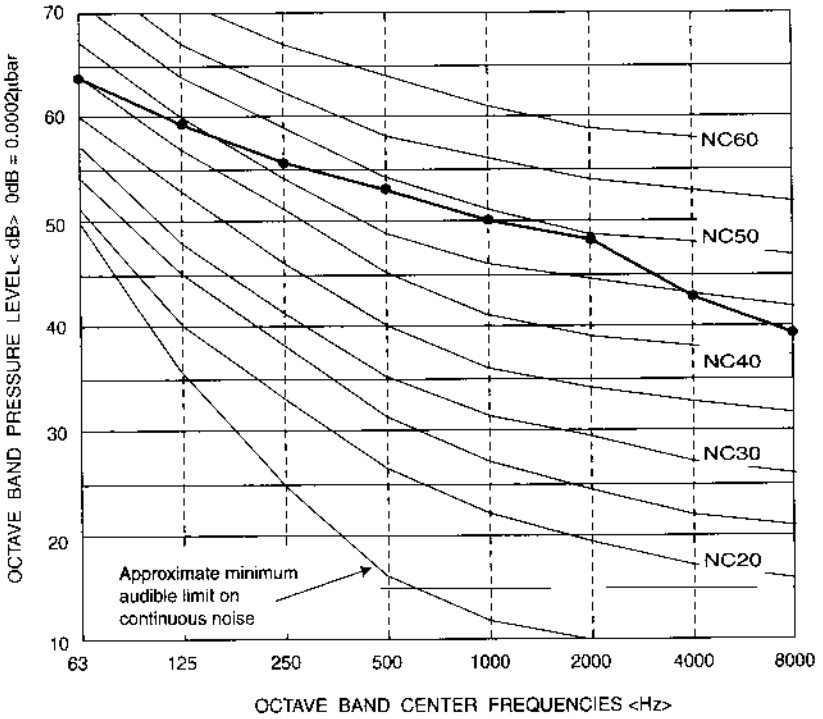
(1) Octave Band Analysis

① PUH-8YE

Measurement condition



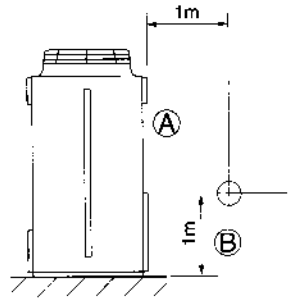
Sound pressure level in anechoic room
56 dB (A)



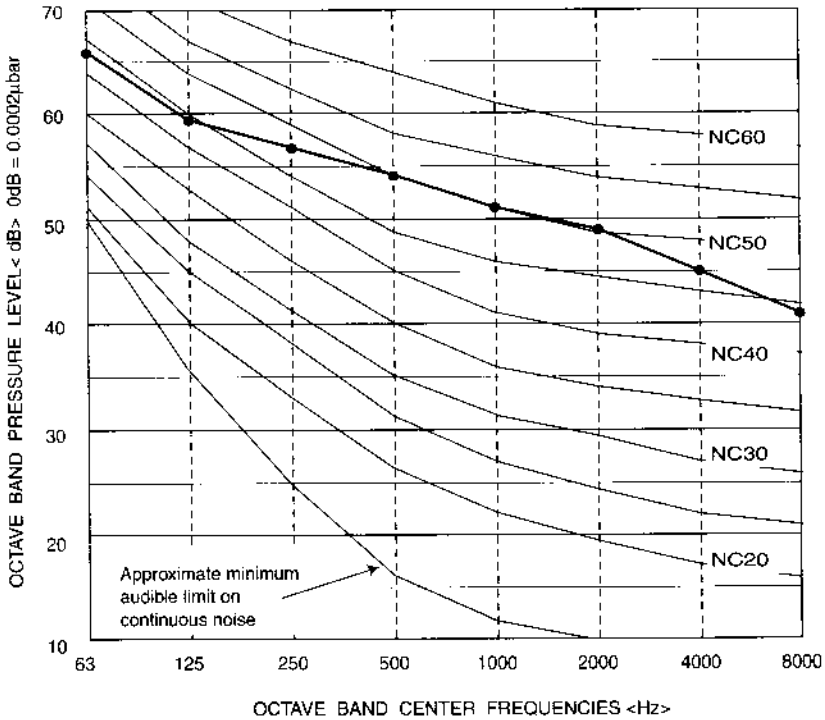
Note: The measuring point is 1m from the bottom of the unit (1m from the front of the unit)

② PUH-10YE

Measurement condition



Sound pressure level in anechoic room
57 dB (A)

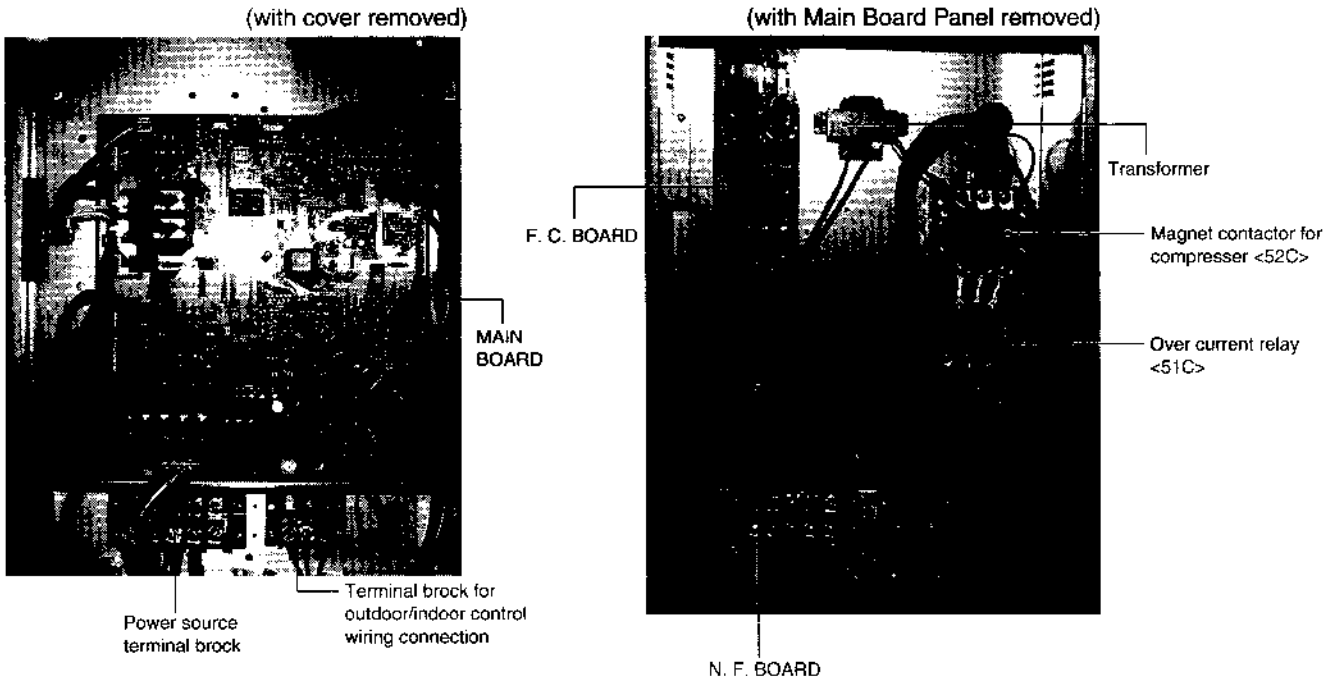


Note: The measuring point is 1m from the bottom of the unit (1m from the front of the unit)

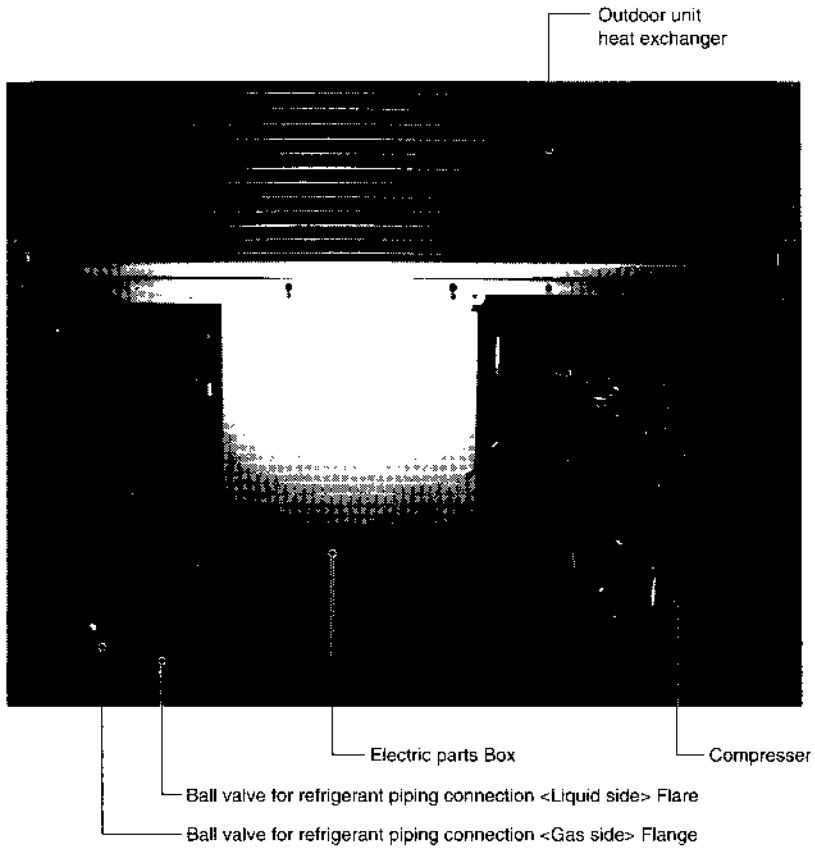
[6] SERVICE DATA

[1] Appearance of Equipment

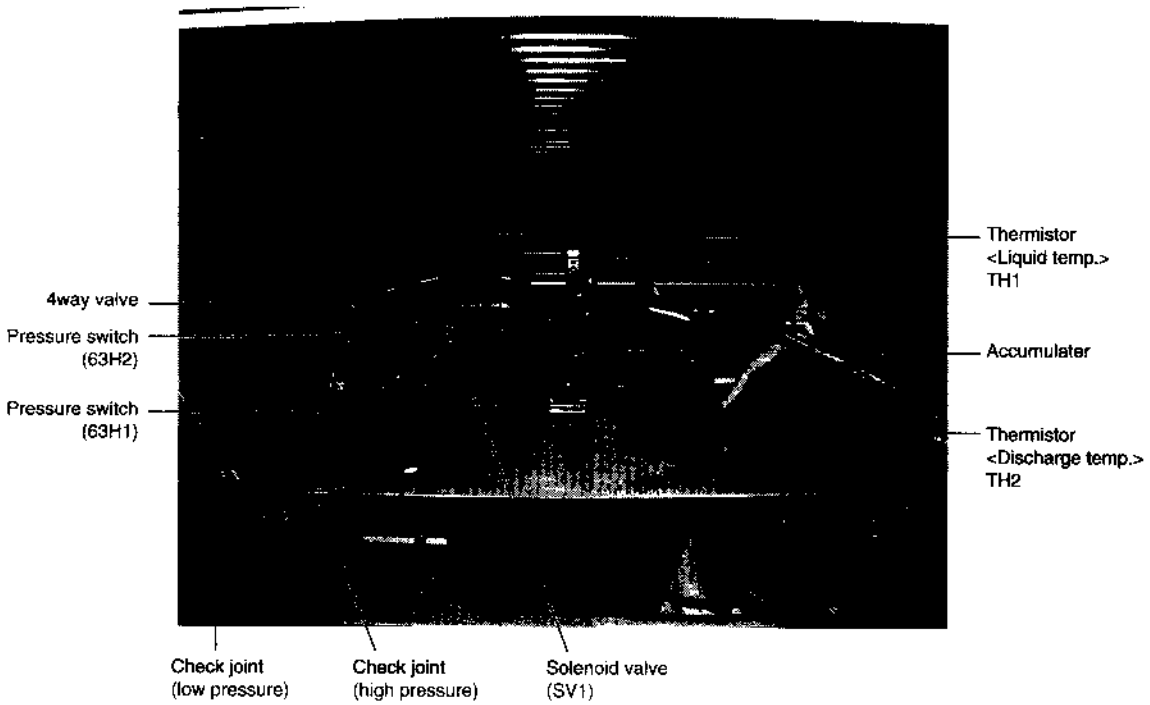
- **PUH-8YE/10YE Detail of Electrical Parts Box**



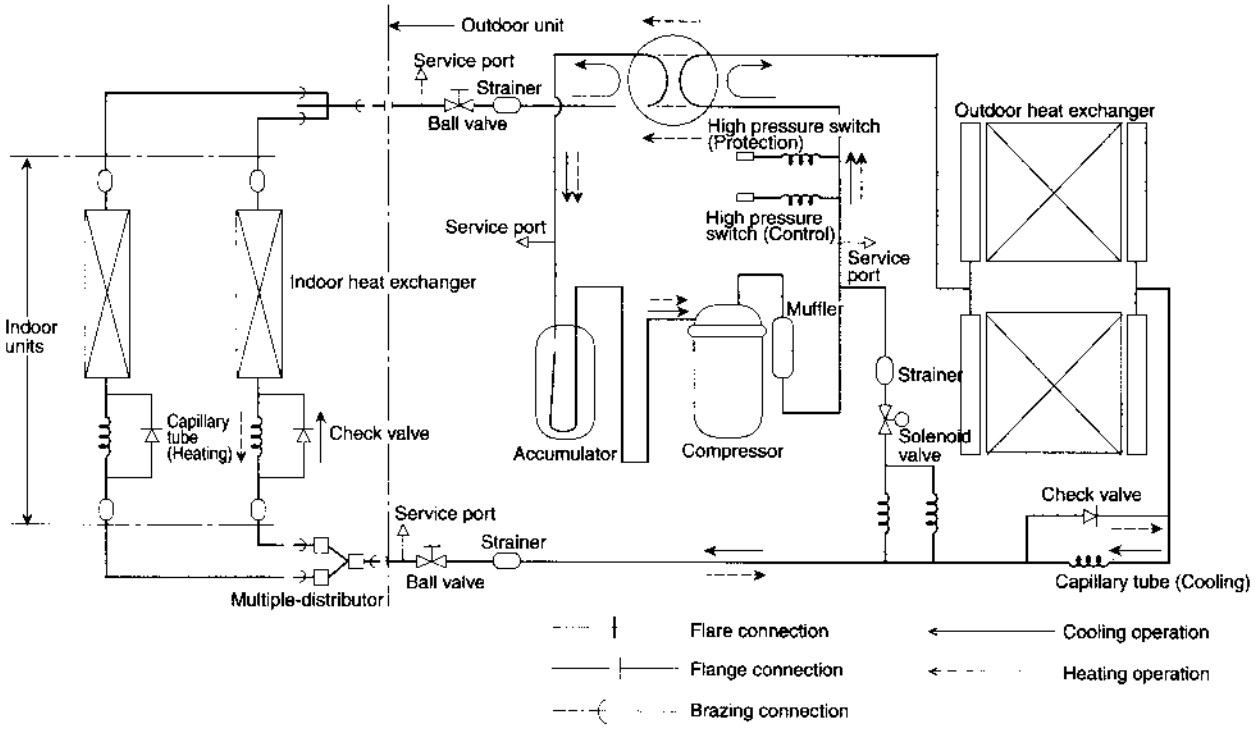
- **PUH-8YE/10YE (with cover removed)**



- **PUH-8YE/10YE (Detail of machine room)**



[2] Refrigerant Circuit

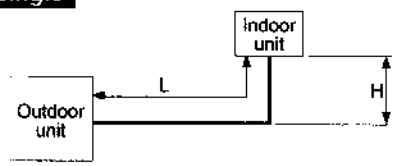


[3] Limitation of Refrigerant Piping Length

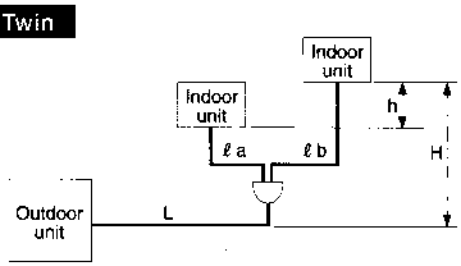
	Pipe length			Difference in height		Amount of bends
	Furthest pipe length	Total pipe length	Difference of indoor to inddor	Outdoor~Indoor	Indoor~Indoor	
Single	L : Max. 50 m	–	–	H : Max 40 m	–	Max. 15
Tiwn	L+ℓa : Max. 50 m L+ℓb : Max. 50 m	L+ℓa+ℓb : Max. 70 m	|ℓa - ℓb| : Max. 8 m	H : Max. 40 m	h : Max. 1 m	Max. 15 (Note: 1)
Triple	L+ℓa : Max. 50 m L+ℓb : Max. 50 m L+ℓc : Max. 50 m	L+ℓa+ℓb+ℓc : Max. 70 m	|ℓa - ℓb| : Max. 8 m |ℓa - ℓc| : Max. 8 m |ℓb - ℓc| : Max. 8 m	H : Max. 40 m	h : Max. 1 m	Max. 15 (Note: 1)

Note: 1. The number of bend shall be within 8 points between (L+ℓa) (L+ℓb) (L+ℓc).

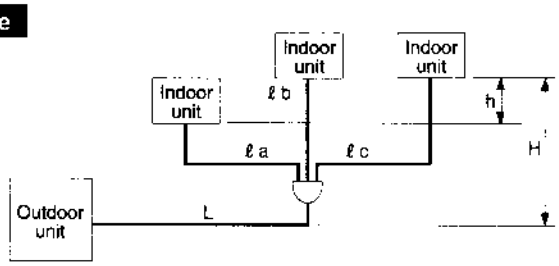
Single



Twin



Triple



[4] Refrigerant Piping

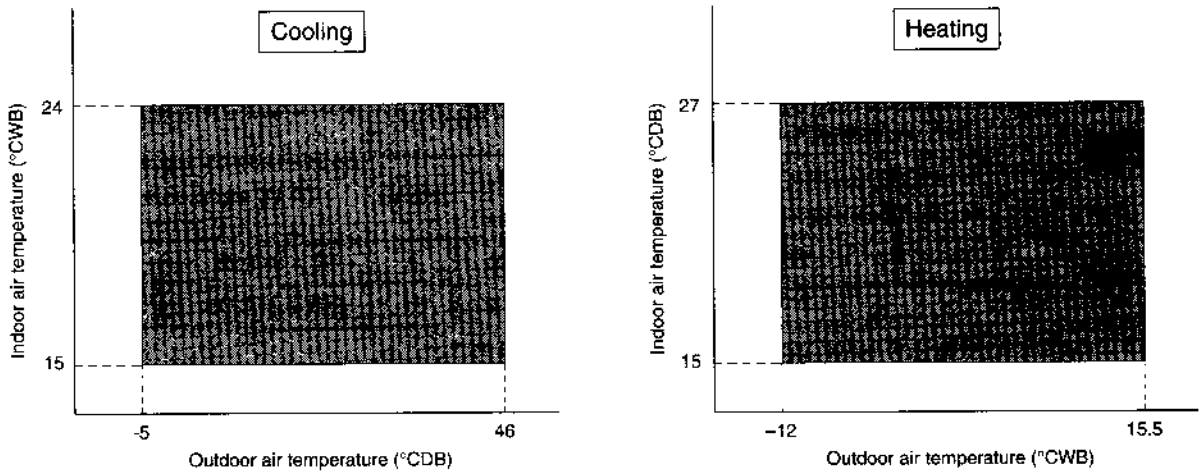
Model		Gas pipe	Liquid pipe
Outdoor unit	PUH-8YE	ø25.4	ø 12.7
	PUH-10YE	ø 28.58	ø 15.88
Indoor unit	1.6, 2, 2.5, 3	ø 15.88	ø9.52
	4, 5	ø19.05	ø 9.52
	8	ø 25.4	ø 12.7
	10	ø28.58	ø 15.88

[5] Refrigerant Charge

Model	Amount of infusion of coolant at ex-factory	Additional refrigerant charge
PUH-8YE	R22 6.5 kg	0.05 × L + 0.026 × (ℓ a + ℓ b + ℓ c + ℓ d) + 0.5 × amount of indoor units. (kg)
PUH-10YE	R22 6.5 kg	0.08 × L + 0.026 × (ℓ a + ℓ b + ℓ c + ℓ d) + 0.5 × amount of indoor units. (kg)

L: Main section actual length ℓ a + ℓ b + ℓ c + ℓ d: Join section actual length
The value of calculation result at the second decimal place must be rounded up to the first decimal place.
(e.g. 2.22 kg must be rounded up to 2.3 kg)

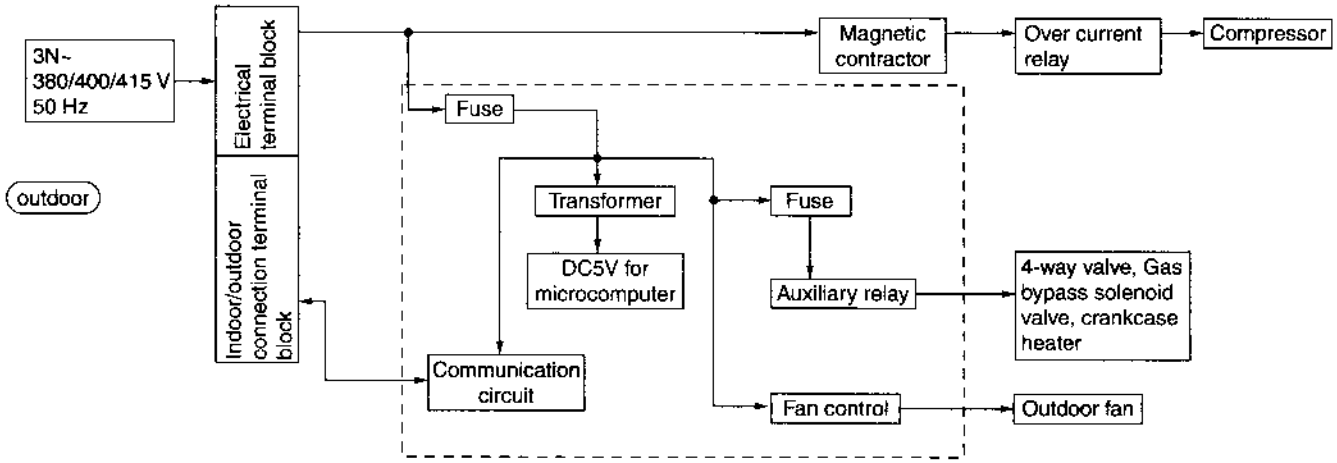
[6] Operation Rage



7 CONTROL

[1] Composition of Control

① Function block diagram



[2] Control specifications

(1) Protection functions

1) The main protection devices for the outdoor unit are:
   ① High pressure protection (63H1)
   ② Compressor overcurrent protection (51C)
   ③ Inner thermostat (49C, compressor)
   ④ Liquid temp thermistor trouble (TH1)
   ⑤ Discharge temperature protection (TH2 ≧ 135 °C)
   ⑥ Discharge temp thermistor trouble (TH2)
2) When tripping of a detection device is sensed, the check mode is entered and the compressor is stopped. (After 3 minutes, the compressor restarts.) Thereafter, the compressor is stopped when the specified number of check modes or greater is sensed within the check time.

Protection functions	Operation value	Detection condition	Number of check modes	Check time
① High pressure protection (63H1)	2.94 MPa	Compressor operating	0	–
② Compressor overcurrent protection (51C)	8YE: 22 A 10YE: 27 A	Compressor operating	1 time	30 minutes
③ Inner thermostat (49C, compressor)	105 ± 5 °C	Compressor operating	1 time	30 minutes
④ Liquid temp thermistor trouble (TH1)	Less than –39 °C or greater than 88 °C	Compressor operating except for 10 minutes at end of defrosting, 7 minutes while compressor starting	1 time	30 minutes
⑤ Discharge temperature protection (TH2 ≧ 135 °C)	Greater than 135 °C	Compressor operating	2 times	30 minutes
⑥ Discharge temp thermistor trouble (TH2)	Less than 0 °C or greater than 216 °C	Compressor operating except for 10 minutes at end of defrosting, 5 minutes while compressor starting	1 time	30 minutes

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

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

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

(3) Fan control

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

1) Control at cooling
   ① When the compressor stops, the fan stops (fan output = 0 %).
   ② When the power is turned on, or when the compressor is restated after it has been stopped for 30 minutes or longer, the piping temperature (TH1) determines the fan output.
   When TH ≧ 25 °C Fan output = 100 %
   When TH < 25 °C Fan output = 60 %
   ③ When the compressor is restarted within 30 minutes after it has been stopped, the fan step before the compressor was stopped is selected. However, when the fan output was under 30% when the fan was stopped, 30 % is selected.
   ④ When the mode was changed from heating to cooling, the fan step conforms to item ②.
   ⑤ Two minutes after the fan is started, the fan step (number of units) is controlled every 30 seconds based on the piping temperature (TH1).
   ⑥ When TH1 reaches 50 °C or higher, or when the control high pressure switch (63H2) tripped, the fan output becomes 100 %.
   ⑦ Fan output while the compressor is operating is within the 20 % to 100 % range.
   • FAN step
   The following expression determines the next fan step count nj+1:
   nj+1 = nj+Δnj nj: Current fan step, Δnj: Displacement step amount
   nj control
   • If nj+1 ≧ 100 % nj+1 = 100 %
   • If nj+1 ≦ 20 % nj+1 = 20 %
   • If TH1 ≧ 50 °C or 63H2 is "OFF" nj+1 = 100 %

FAN Δnj

Outputs are all %.

Target condensation temperature 31 °C		Condensation temperature TH1										
		t > 49 °C	t = 49 ≀ t > 46	t = 46 ≀ t > 43	t = 43 ≀ t > 40	t = 40 ≀ t > 36	t = 36 ≀ t > 33	t = 33 ≀ t > 29	t = 29 ≀ t > 26	t = 26 ≀ t > 23	t = 23 ≀ t > 20	t ≦ 20 °C
Current output	20 ≦ nj < 50	5	3	2	2	2	1	0	−1	−2	−3	−5
	50 ≦ nj ≦ 100	10	4	3	2	2	1	0	−1	−2	−4	−10

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

2) Control at heating

① When the compressor is stopped and during defrosting, the fan is stopped.

② When the power is turned on, or when the compressor is restarted after being stopped for 30 minutes or longer, the piping temperature (TH1) determines the fan step.

TH1 > 8 °C Fan output = 60 %

TH1 ≦ 8 °C Fan output = 100 %

③ When the compressor is restarted within 30 minutes, the fan step is the step before the compressor was stopped.

④ When the mode is changed from cooling to heating, the fan step conforms to item ②.

⑤ When returning from defrosting, the fan step is the step before defrosting.

⑥ Two minutes after the fan was restarted, the fan step is controlled every 30 seconds based on the piping temperature (TH1).

⑦ When TH1 is –5 °C or lower, the fan output is made 100 %.

• FAN step

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

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

nj control

• If nj+1 ≧ 100 % nj+1 = 100 %

• If nj+1 ≦ 20 % nj+1 = 20 %

• If TH1 < –5 °C nj+1 = 100 %

FAN Δnj Outputs are all %.

Target evaporation temperature 12 °C		Evaporation temperature TH1										
		T > 19 °C	T = 19 ≀ T > 17	T = 17 ≀ T > 15	T = 15 ≀ T > 13	T = 13 ≀ T > 11	T = 11 ≀ T > 8	T = 8 ≀ T > 6	T = 6 ≀ T > 4	T = 4 ≀ T > 2	T = 2 ≀ T > 0	T ≦ 0 °C
Current output	20 ≦ nj + 1 ≦ 100	–10	–4	–2	–1	0	1	2	2	3	4	10

(4) Defrosting control

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

① When the integrated compressor operation time has exceeded T_1 (initial setting 50 minutes) and the piping temperature (TH1) is below –2 °C

② When the integrated compressor operation time has exceeded 30 minutes and the piping differential temperature is ΔTH1 ≧ 8, TH1 ≦ –2 °C

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

TH1: Current piping temperature

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

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

$T_2 \leqq 3$ (minutes)	T_1 120 (minutes)
$3 < T_2 \leqq 7$	80
$7 < T_2 \leqq 10$	60
$10 < T_2 < 15$	40
$T_2 = 15$	30

Note: T1 is reset at the end of defrosting, or by cooling ON command.

Note: When the compressor was stopped during defrosting, T1 = 30 minutes is set to recognize the stop as defrosting end.

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

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

① $T_2 \leqq 2$ mins TH1 ≧ 40 °C

② $2 < T_2 < 15$ minutes TH1 ≧ 8 °C continuous 2 minutes

③ $T_2 = 15$ minutes

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

(5) Bypass solenoid valve control (SV1)

1) Control at cooling
   ① While the compressor is stopped, the solenoid valve is OFF.
   ② When the power is turned on, or when the compressor is restarted after it has been stopped for 30 minutes or longer, if the Liquid temperature (TH1) is 25 °C or higher then the solenoid valve turns ON for 2 minutes.
   ③ When the mode is changed from heating to cooling, solenoid valve operation conforms to item ②.
2) Control at heating
   ① While the compressor is stopped, the solenoid valve is OFF.
   ② When the power is turned on, or the compressor is restarted after it has been stopped for 30 minutes or longer, the solenoid valve turns ON for 2 minutes.
   ③ When the mode is changed from cooling to heating, the solenoid valve turns ON for 2 minutes at starting.
   ④ When the control pressure switch (63H2) trips, the solenoid valve turns ON.
   ⑤ If 63H2 resets 15 minutes after tripping, the solenoid valve turns OFF.
   ⑥ During defrosting, the solenoid valve turns ON.

(6) Service functions

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

[3] Function of switches and connectors (outdoor unit)

(1) Function of switches

1) Function of switches

(Normal mode)

Kind of switch	Switch	Pole	Function	Normal mode SW3 = Unrelated Operation by switch operation ON	 OFF	Switch effective timing
DIP SW	SW1 (CN33 When open (Normal))	1	None	–	–	–
		2	Abnormality history clear	Clear	Normal	Running or stopped
		3	None	–		–
		4				
		5				
		6				
	SW2	1	Self diagnosis	See pages 22 to 24.		Running or stopped
		2				
		3				
		4				
		5				
		6				
Tact SW	SW3		Mode input register	Register	Normal	stopped
DIP SW	SW4	1	–	–	–	–
		2	–	–	–	–
DIP SW	SW5	1	None	–		–
		2	3-phase power source detection	Do not	Do	When power turned on
		3	Cooling only switching	Cooling only	Heat pump	When power turned on
		4	Model setting	PUH-10YE	PUH-8YE	

2) Switch functions at set mode change

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

Remarks

*1 Mode input is entered by SW3 OFF→ON change (___↑). Press and hold down SW3 for about 2 seconds. The set mode can be registered according to the outdoor unit setting information on page 24.

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

3) Connector function assignment

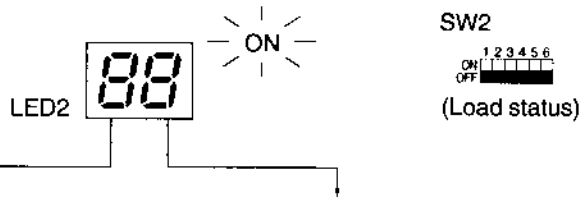
Type	Connector	Function	Operation by open/short short	 open	Switch effective timing
Connector	CN31	None	–	–	–
	CN32	Function test	Function mode	Normal	At initialization
	CN33	DIP switch mode switching	Mode switching	Normal	stopped

<Outdoor unit operation monitoring function>

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

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

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



[Tens digit: Operation mode]

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

[Units digit: Relay output]

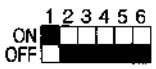
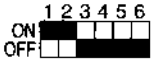
Display	Compressor	4-way valve	Bypass solenoid valve
0	–	–	–
1	–	–	ON
2	–	ON	–
3	–	ON	ON
4	ON	–	–
5	ON	–	ON
6	ON	ON	–
7	ON	ON	ON

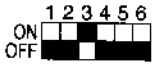
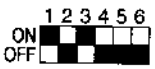
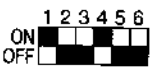
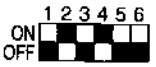
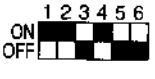
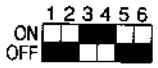
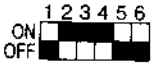
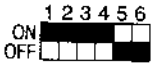
- When blinking (Operation stopped by tripping protection device): Displays the check mode
- PUH-8YE/10YE

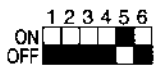
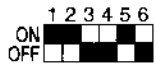
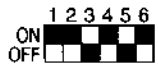
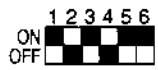
Display	Check contents (operating)
U2	49C trip, Compressor discharge temperature abnormal
U3	Compressor discharge temp thermistor (TH2) open/short
U4	Liquid temp thermistor (TH1) open/short
U6	Compressor overcurrent protection trip (51C trip)
UE	High pressure protection (63H1 trip)

Self diagnosis by SW2

- PUH-8YE/10YE

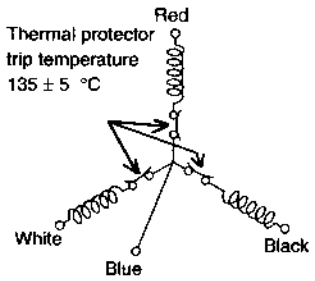
SW2 setting	Display contents	Description of display	Unit
	Liquid temperature (TH1) –39 - 88	–39 - 88 (When 0 °C or lower, "–"and temperature are displayed alternately.) <Example> When –10, every other second –□ ←→ 10	°C
	Discharge temperature 0 - 216	0 - 216 (When 100 °C or higher, 100s digit and 10s and units digits are displayed alternately.) <Example> When 115, every other second 1□ ←→ 15	°C
	FAN output 0 - 100	0 - 100 (When 100 or higher, 100s digit and 10s and units digits are displayed alternately.) <Example> When 100, every other second 1□ ←→ 00	%

SW2 setting	Display contents	Description of display	Unit
	Number of compressor ON/OFF 0 - 999	0 - 999 (When 100 or higher, 100s digit and 10s and units digits are displayed alternately.) <Example> When 425, every other second 4 □ ←→ 25	100 times
	Compressor integrated operation time 0 - 999	0 - 999 (When 100 or higher, 100s digit and 10s and units digits are displayed alternately.) <Example> When 245, every other second 2 □ ←→ 45	10 hours
	Newest check code Newest outdoor unit abnormality Check display	When no check mode,"00" <Example> When piping thermistor abnormal U4	Code display
	Operation mode when abnormality occurred	Operation mode when abnormally stopped <Example> Comp only ON at cooling operation C4	Code display
	Liquid temperature (TH1) when abnormality occurred – 39 - 88	–39 - 88 (When 0 °C or lower, "–" and temperature are displayed alternately.) <Example> When –15, every other second – □ ←→ 15	°C
	COMP discharge temperature (TH2) when abnormality occurred 0 - 216	0 - 216 (When 100 or higher, 100s digit and 10s and units digits are displayed alternately.) <Example> When 130, every other second 1 □ ←→ 30	°C
	Check code history (1) (newest) Abnormal unit No. and check code inverted display	When no abnormality history "0", "←→", "–"	Code display
	Check code history (2) (One before newest) Abnormal unit No. and check code inverted display	When no abnormality history "0", "←→", "–"	Code display

<table>
<tr><th>SW2 setting</th><th>Display contents</th><th>Description of display</th><th>Unit</th></tr>
<tr><td> 
</td><td>Current thermostat ON time
0 - 999</td><td>0 - 999
(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)
<Example> When 245,
every other second
2 □ ←→ 45</td><td>Minutes</td></tr>
<tr><td> 
</td><td>Outdoor unit set information 1</td><td>Outdoor unit capacity is displayed as function code.
<table><tr><th>Model name</th><th>function code</th></tr><tr><td>PUH-8YE</td><td>20</td></tr><tr><td>PUH-10YE</td><td>25</td></tr></table></td><td>Code display</td></tr>
<tr><td> 
</td><td>Outdoor unit set information 2</td><td><table><tr><th></th><th>Outdoor unit set information 1</th><th colspan="4">Function setting (display values)</th></tr><tr><td rowspan="3">Tens digit</td><td>3-phase power source detection</td><td>Do</td><td>(1)</td><td>Do not</td><td>(0)</td></tr><tr><td>Cooling only switching</td><td>Cooling only</td><td>(2)</td><td>H/P</td><td>(0)</td></tr><tr><td>Night mode</td><td>Night mode</td><td>(1)</td><td>Normal mode</td><td>(0)</td></tr><tr><td rowspan="2">Units digit</td><td>Defrosting end time</td><td>12 °C continuous 2 minutes</td><td>(2)</td><td>8 °C continuous 2 minutes</td><td>(0)</td></tr><tr><td>Defrosting prohibit time</td><td>Fixed</td><td>(4)</td><td>Training</td><td>(0)</td></tr></table>Set information display values are added and displayed at each position.</td><td>Code display</td></tr>
<tr><td> 
</td><td>FAN output at abnormal stop
0 - 100</td><td>0 - 100
(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)
<Example> When 100,
every other second
1 □ ←→ 00</td><td>%</td></tr>
<tr><td> 
</td><td>Thermostat ON time until abnormal stop
0 - 999</td><td>0 - 999
(When 100 or higher, 100s digit and 10s and units digits are displayed alternately.)
<Example> When 245,
every other second
2 □ ←→ 45</td><td>Minutes</td></tr>
</table>

[4] Simple parts check method

- PUH-8YE/10YE

<table>
<tr><th>Part name</th><th>Judgment instructions</th></tr>
<tr><td>Thermistor (TH1) <Liquid temperature detection>
Thermistor (TH2) <Discharge temperature detection></td><td>Disconnect the connector and measure the resistance value with a multimeter. (Ambient temperature 10 °C to 30 °C)
<table>
<tr><th></th><th>Normal</th><th>Abnormal</th></tr>
<tr><td>TH1</td><td>4.3 kΩ~9.6 kΩ</td><td rowspan="2">Open or short</td></tr>
<tr><td>TH2</td><td>160 kΩ~410 kΩ</td></tr>
</table>
(Based on thermistor characteristic table (next page))</td></tr>
<tr><td>Fan motor
 
</td><td>Measure the resistance value across the terminals with a multimeter. (Winding temperature 20 °C)
<table>
<tr><th>Motor lead wire</th><th>Normal</th><th>Abnormal</th></tr>
<tr><td>Between 2 phases</td><td>22.8 Ω</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Compressor</td><td>Measure the resistance value across the terminals with a multimeter. (Winding temperature 20 °C)
<table>
<tr><th>Normal</th><th>Abnormal</th></tr>
<tr><td>PUH-8YE</td><td rowspan="2">Open or short</td></tr>
<tr><td>Each phase 1.51 Ω</td></tr>
<tr><td>PUH-10YE</td><td rowspan="2">Open or short</td></tr>
<tr><td>Each phase 1.03 Ω</td></tr>
</table></td></tr>
</table>

[5] Reference Data

<Thermistor characteristic table>

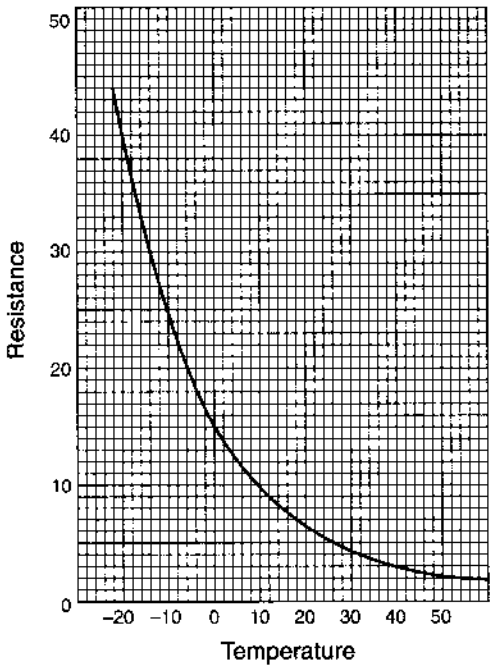
Low temperature thermistor Thermistor <Liquid temperature detection> (TH1)

Thermistor <Liquid temperature detection> (TH1)
Thermistor Ro = 15 kΩ ± 3 %
B constant = 3,460 kΩ ± 2 %

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

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

<Low temperature thermistor>



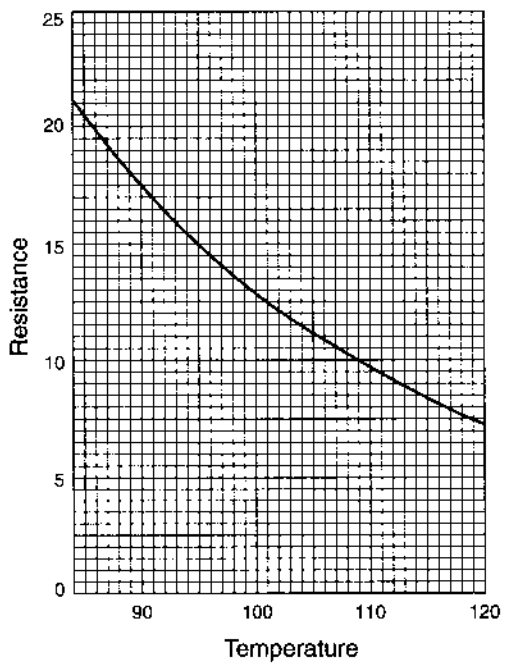
High temperature thermistor Thermistor <Discharge temperature detection> (TH2)

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

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

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

<High temperature thermistor>



[6] Self-diagnosis and troubleshooting

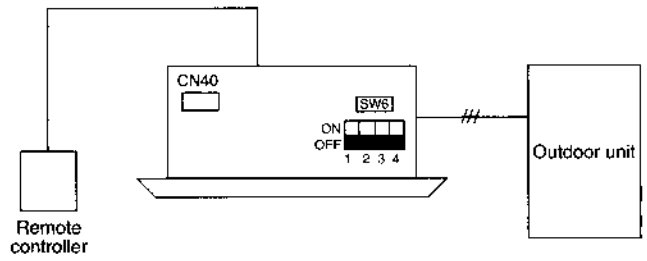
<Abnormality detected during unit operation: Outdoor unit>

(1) PUH-8YE/10YE

Outdoor unit LED display	Meaning of abnormality display and abnormality troubleshooting	Cause	Judgment method and remedy
U2	**Discharge temperature abnormal (comp)** When the discharge thermistor temperature (TH2) exceeds 135 °C while the compressor is operating, an abnormality is recognized.	① Compressor overheating due to insufficient refrigerant. ② Thermistor faulty. (TH2) ③ Outdoor controller board faulty.	① Check input super heat. Check for refrigerant leakage and check piping length. Charge with additional refrigerant. ②③ Turn off power and restart operation and check if "U3" is displayed within 8 minutes. When "U3" is displayed, carry out "U3" processing. (Do not replace board at "U2" display only.)
	49C trip When connector (49C) opens while the compressor is operating, an abnormality is recognized. 49C Inner thermostat (Comp) 105 ± 5 °C	① Compressor overheating operation due to insufficient refrigerant. ② Connector (49C) on indoor controller board dislodged or contact faulty. ③ 49C disconnected, or contact faulty. ④ RST not connected properly. ⑤ Missing phase. ⑥ Outdoor controller board faulty.	① Check intake super heating. Check for refrigerant leakage. Charge additional refrigerant. ②③ After checking connection, restart and check operation. ④⑤ Check power supply connections. ⑥ Replace outdoor controller board.
U3	**Discharge temp thermistor (TH2) open or shorted.** When an open (0 °C or lower) or short (216 °C or higher) is detected while the compressor is operating, an abnormality is recognized. (Detection is disabled for 5 minutes at compressor starting.)	① Connector (CN3) dislodged or connect faulty. ② Thermistor faulty. (TH2) ③ Outdoor controller board faulty.	① Check connector contact and thermistor wire. ② Check thermistor resistance value, or check temperature by microcomputer. (Check using SW2 self-diagnosis function.) See page 26. ③ Replace outdoor controller board. (Replace board after sufficiently checking ① and ②.)
U4	**Liquid temp thermistor (TH1) open or shorted.** When an open (–39 °C or lower) or short (88 °C or higher) is detected while the compressor is operating, an abnormality is recognized. (Detection is disabled for 7 minutes beginning from 10 seconds after the compressor starts and for 10 minutes after return from defrosting.)	① Connector (CN2) dislodged or contact faulty. ② Thermistor faulty. ③ Outdoor controller board faulty.	① Check connector contact and thermistor wire. ② Check thermistor resistance value or check temperature by microcomputer. (Check using SW2 self-diagnosis function.) See to page 26. ③ Replace outdoor controller board. (Replace board after sufficiently checking ① and ②)
U6	**Compressor overcurrent trip** When the current value reaches the overload set value or higher while the compressor is operating, an abnormality is recognized. PUH-8YE ..... 22 A PUH-10YE ..... 27 A	① Overload operation exceeding unit usage range limit. ② Power supply terminal voltage low. ③ Power supply missing phase. ④ Compressor motor faulty. ⑤ Compressor locked. ⑥ Connector (CN22) on outdoor controller board dislodged or contact faulty. ⑦ 51C disconnected or contact faulty.	① Check usage conditions. (Check for short cycle operation.) ② Check power supply voltage. ③ Check wiring for breaks and faulty contact. ④ Check motor winding resistance (See page 25.) ⑤ Replace compressor. ⑥⑦ After checking connections, restart and check operation.
UE	**High pressure abnormal (63H1 trip)** Detected ($2.94^{+0}_{-0.15}$ MPa) by 63H1 trip while compressor is operating. 63H1: Pressure switch (high pressure) OFF: $2.94^{+0}_{-0.15}$ (MPa) ON: 2.35 ± 0.2 (MPa)	① Started with ball valve closed. ② Connector (CN21) on outdoor controller board dislodged or contact faulty. ③ 63H1 disconnected or contact faulty. ④ Indoor filter clogged. Power reset detected during heating overload operation (Heating). ⑤ Low indoor unit air flow (heating). ⑥ Low outdoor unit air flow (cooling). ⑦ Part faulty.	① Check if ball valve is fully open. ② ③ Repair connector. ④ Check indoor filter. ⑤ Check flow duct static pressure and for faulty fan motor. ⑥ Check for faulty outdoor fan motor. ⑦ Replace pressure switch.

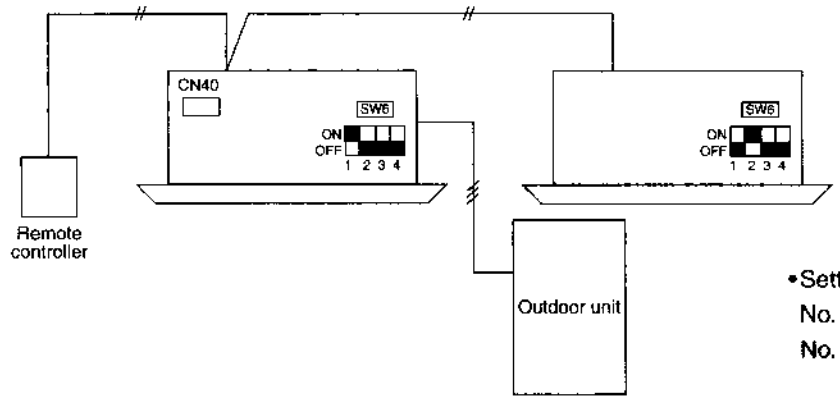
(2) Setting method of system

Single



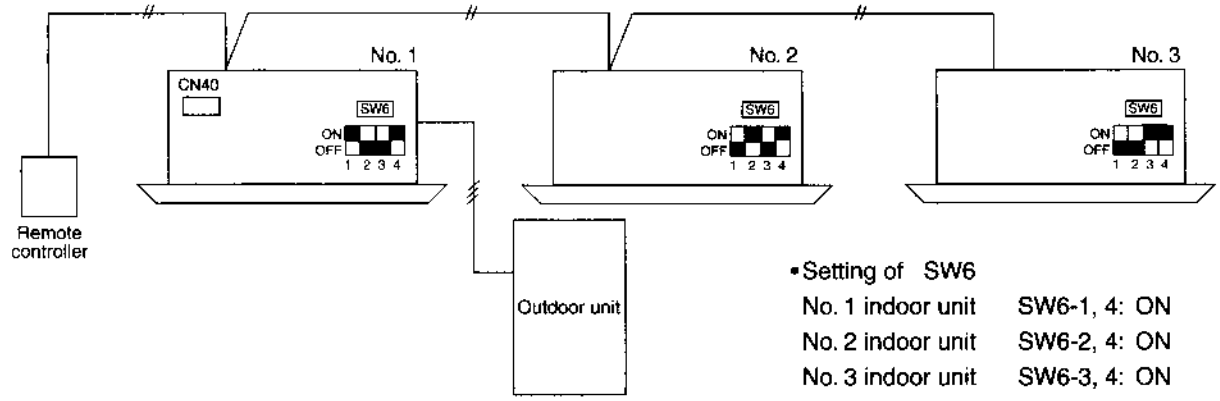
•Setting of SW6
All set to OFF (at factory shipment)

Twin



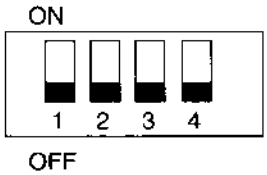
•Setting of SW6
No. 1 indoor unit SW6-1 : ON
No. 2 indoor unit SW6-2 : ON

Triple



•Setting of SW6
No. 1 indoor unit SW6-1, 4: ON
No. 2 indoor unit SW6-2, 4: ON
No. 3 indoor unit SW6-3, 4: ON

DIP SW6 for Single, Twin, Triple setting (Indoor circuit board)



	Single	Twin	Triple
SW6–1	OFF	ON: No. 1 indoor unit only	ON: No.1 indoor unit only
SW6–2	OFF	ON: No. 2 indoor unit only	ON: No. 2 indoor unit only
SW6–3	OFF	OFF	ON: No. 3 indoor unit only
SW6-4	OFF	OFF	ON

Removable of CN40

• Please remove the CN40 of No. 2 indoor unit at Twin system and remove the CN40 of No. 3 indoor unit at Triple system.

(3) Judgment by setting of trial run mode

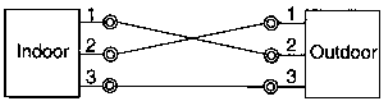
<table>
<tr><th></th><th>Symptom</th><th>Causes</th><th>Service procedures</th></tr>
<tr><td>A</td><td>The "CENTRALLY CONTROL" display does not disappear, and the switch is ineffective.</td><td>Faulty receiving circuit of remote controller, or faulty indoor transmission circuit.

Address is being set to DIP-SW17 of remote controller, or to DIP-SW2 of indoor unit.

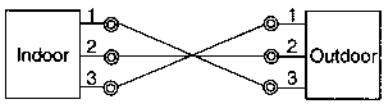
Remote controller is being connected with timer adapter.</td><td>(1) Check for the correct setting of DIP SW17 of remote controller.
(2)
a) Turn DIP SW17-7 of remote controller for services ON (acting as subordinate remote controller), and connect it to remote controller terminal bed.
b) Turn local switch ON, and check whether the display of "CENTRALLY CONTROL" has been disappeared.

• Replace the remote controller if it is disappeared.
• When it has not been disappeared, check DIP-SW2 for correct setting, and replace indoor controller if the setting is correct.</td></tr>
<tr><td>B</td><td>At turning the operation SW of remote controller on, "E0" is displayed for 2 ~ 4 seconds after operation display.</td><td>Faulty remote controller transmission/receiving circuit, or faulty indoor unit transmission/receiving circuit.</td><td>(1) Turn DIP SW17-7 of remote controller for services ON (acting as subordinate remote controller), and connect it to remote controller terminal bed.
(2) Turn local switch ON, and after 5 seconds, confirm the liquid crystal display has been distinguished. If "CENTRALLY CONTROL" is lighting, return to the item A.
(3) Turn the operation switch of subordinate remote controller, and check the display of both remote controllers after 5 seconds elapsed.

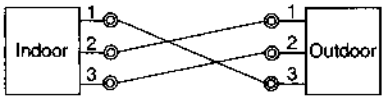
<table>
<tr><th></th><th>Remote controller</th><th>Subordinate remote controller</th><th>Faulty spot</th></tr>
<tr><td>1</td><td>Operation display</td><td>E0 display</td><td>Faulty indoor unit</td></tr>
<tr><td>2</td><td>Operation display</td><td>Operation display</td><td>Faulty remote controller</td></tr>
<tr><td>3</td><td>No display</td><td>E0 display</td><td>Faulty indoor unit/ remote controller</td></tr>
<tr><td>4</td><td>No display</td><td>Operation display</td><td>Faulty remote controller</td></tr>
</table>
</td></tr>
<tr><td>C</td><td>Turning operation switch of remote controller ON generates operation display with electronic sound, but disappears soon.</td><td>Erroneous wiring of indoor/outdoor connecting line, or reset function is being effective by overcurrent deection due to the short circuit of drain sensor.</td><td>(1) Check for the wiring connection of indoor/outdoor connecting line.

a)
 

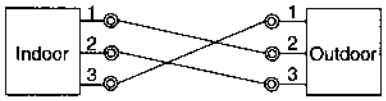
Reset by cooling trial operation and heating trial operation

b)
 

Reset at heating trial operation</td></tr>
</table>

<table>
<tr><th></th><th>Symptom</th><th>Causes</th><th>Service procedures</th></tr>
<tr><td>C</td><td></td><td></td><td>c)
 

Reset by cooling trial operation and heating trial operation

d)
 

Reset at heating trial operation

(2) Measure the resistance value between 1~3 of drain sensor connector (CN50). Normal if it is about 82 Ω.

* When both (1) and (2) are normal, replace indoor controller.</td></tr>
<tr><td rowspan="4">D</td><td rowspan="4">Turning the operation SW of remote controller ON keeps all lights being distinguished, and generates no electronic sound.</td><td>Short circuit of remote controller wiring.</td><td rowspan="4">(1) Check for remote controller terminal voltage
a) At no voltage found,
Remove the wiring of remote controller terminal, and check the voltage between wiring.
• If the voltage shows DC6V ~ DC12V, replace remote controller as it is faulty. (Short circuit inside remote controller)
• If no voltage is found, check for indoor side.
1) AC380 ~ 415V check
2) Fuse (F)
3) Transformer connector CN4T
4) Connector CN40
* When no trouble is found for the items 1) ~ 4) above, replace indoor controller.</td></tr>
<tr><td>Faulty power source circuit of indoor controller, or improper contact of CN40.</td></tr>
<tr><td>Disconnection of transformer, or improper contact of CN40</td></tr>
<tr><td>Blown fuse (F)</td></tr>
<tr><td>E</td><td>The piping temperature code of liquid crystal display does not change, or "P8" is displayed at about 10 minutes after operation start.</td><td>Local switch OFF
————</td><td>Please refer to "" on the next page.</td></tr>
</table>

(4) Check mode display and description

Display of liquid crystal	Symptom	Causes	Remedy
E0	Transmission/receiving error No reply of indoor to the signal of remote controller	• Faulty transmission line • Faulty signal transmission/receiving circuit • No existence of the unit address designated	• Conduct self-diagnosis with another remote controller. E0 display → Replace indoor microcomputer board. Display other than E0 → Replace remote controller.
P1	Inlet sensor trouble	• Faulty thermister • Improper contact of connector	• Connector check • Thermister check → No problem → Replace indoor microcomputer board.
P2	Piping sensor trouble	• Faulty thermister • Improper contact of connector	• Connector check • Thermister check → No problem → Replace indoor microcomputer board.
P3	Transmission/receiving error No reply of remote controller to the signal of indoor unit	• Improper contact of transmission line • Faulty signal transmission/receiving circuit	• Check for transmission line • Check for transmitting/receiving circuit
P4	Drain sensor trouble	• Faulty thermister • Improper contact of connector	• Connector check • Thermister check → No problem → Replace indoor microcomputer board.
P5	Tripping of drain overflow protection	• Faulty drain water lifting up mechanism • Improper mounting of drain level detecting sensor	• Not effective to PEH-YD • Improper contact of CN50 may be considered inside the indoor controller board of indoor unit. As some indoor units connected are equipped with this function in the case of twin/triple specification, confirm it with the service manual of indoor units.
P6	Tripping of frost/over heat protection device	• Short cycle of airflow route • Clogging of air filter • Faulty indoor fan	• Remove blocking matter. • Check for air filter. • Check for indoor fan.
P7	System error	• Erroneous setting of unit address (indoor) • Faulty transmission circuit of remote controller	• Check for indoor unit address • Check for transmitting/receiving circuit • Check for remote controller power source.
P8	Outdoor unit trouble	• Erroneous wiring of indoor/outdoor connecting line • Detection of reverse phase • Tripping of outdoor unit protection device • Faulty piping sensor • Faulty outdoor circuit board	• Check for wiring and outdoor circuit board. • Check outdoor unit protection device for tripping.

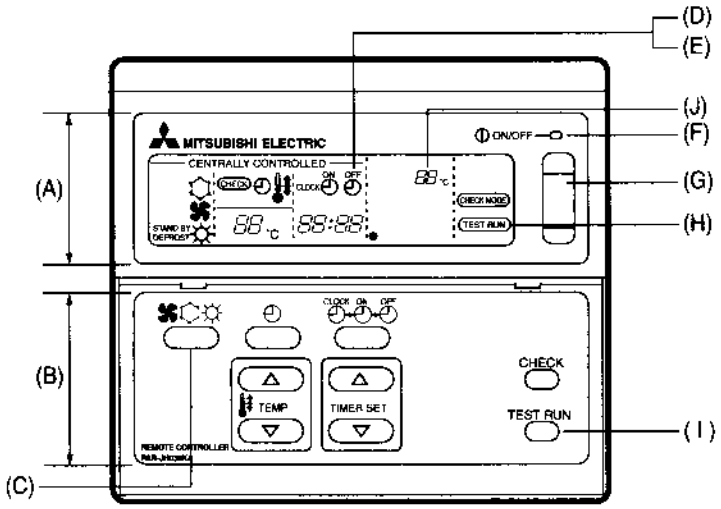
[7] TEST RUN

1. Checking before Getting Test Run

1	Check to see whether there are refrigerant leakage, and slack of power or transmission cable.
2	Confirm that 500 V megger shows 1.0 MΩ or more between power supply terminal block and ground. Do not operate in the case of 1.0 MΩ or less. Note: Never carry out megohm check over the terminal control board. Otherwise the control board would be broken.
3	Check to see whether both gas and liquid valves are fully open. Note: Be sure to tighten the caps.
4	Turn on universal power supply at least 12 hours before getting test run in order to carry current to the crankcase heater. If current-carrying hours are too short, it may result in a malfunction of the compressor.

2. Test Run Method

(A) Display panel
(B) Control panel
(C) Cooling/Heating select button (3), (4)
(D) Check code indicator (See Note 1.)
(E) Test run remaining time indicator (See note 3.)
(F) ON/OFF LED (Lights up in operation.)
(G) ON/OFF button (7)
(H) Test run indicator
(I) Test run button
(J) Room temperature display



Operation procedure

(1) Turn on universal power supply at least 12 hours before getting started.
(2) Press [TEST RUN] button twice → displaying "TEST RUN" on display panel.
(3) Press [Cooling/Heating] select button → make sure that air is blowing out.
(4) Press [Cooling/Heating] select button to change from cooling to heating operation, and vice versa → make sure that warm or cold air is blowing out.
(5) → Make sure that indoor unit fans operate normally.
(6) Make sure that interlocking devices such as ventilator operate normally if any.
(7) Press [ON/OFF] button to cancel test run → Stop operation.

Note: 1. If check code is displayed on remote controller or remote controller does not operate normally, find the cause.
2. Test run automatically stops the operation after two hours by activation of timer set to two hours.
3. During test run, test run remaining time is displayed on time display section.

A piping temperature code is displayed on the room temperature display section (J) during test run.

Note: Piping temperature codes 1 to 15 (–15 °C to 80 °C) are available. Code No. reduces during cooling and increases during heating, thus operation state of the compressor can be checked by observing the code displayed.

Code	1	2	3	4	5	6	7	8
Indoor coil temp.	–15 °C~2 °C	3 °C~10 °C	11 °C~15 °C	16 °C~20 °C	21 °C~25 °C	26 °C~30 °C	31 °C~35 °C	36 °C~40 °C
Code	9	10	11	12	13	14	15	
Indoor coil temp.	41 °C~45 °C	46 °C~50 °C	51 °C~55 °C	56 °C~60 °C	61 °C~70 °C	71 °C~80 °C	Sensor malfunction	

3. Corrective Actions in Case of Trouble During Test Run

(1) Trouble codes displayed on remote controller and feature of the trouble

Code	Trouble
P1	Intake sensor trouble, thermister trouble, contact failure
P2	Piping sensor trouble, thermister trouble, contact failure
P4	Drain sensor trouble
P5	Drain pump trouble, drain overflow protection activated
P6	Anti-freezing/overheat function activated
P7	System error, address setting error
P8	Outdoor unit trouble
E0	Transmission/reception error, contact failure, etc.
U8	Indicates no trouble so far.

(2) Troubleshooting table

Symptom	Cause
1. No display on the remote controller, and no electric sound is generated even if the switch is pressed.	(1) Check if the power is ON. Check the voltage (12VDC) at the remote controller terminal. Check the main circuit voltage. (2) Check the transmission line for short-circuit. (3) Check for blown fuse, improper contact of connector/terminal block.
2. "Centrally control" is displayed on the remote controller, and no switches are operable.	(1) Check if address is correct (indoor unit PCB, remote controller) (2) Check if your remote controller has been disabled by the centralized remote controller.
3. "E0" is displayed on the remote controller when operation is started.	(1) Check the transmission line for contact failure.
4. "P7" is displayed on the remote controller.	(1) Check if the address for the indoor unit is correct.
5. "P8" is displayed on the remote controller.	(1) Check the cables between the indoor and outdoor units for incorrect wiring. (2) Check if the protective device of the outdoor unit has been activated.

Certificate Number FM33568

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

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

Certificate Number EC97J1227

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

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

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