

## **9. CEILING MOUNTED DUCT TYPE PACKAGED AIR-CONDITIONER**

**( Split system, Air to air )  
heat pump type**

**FDUR208HEN-SA**

**258HEN-SA**

**308HEN-SB**

**308HES-SB**

**408HES-SB**

**508HES-SB**

**FDUR308HEN-A**

**308HES-A**

**408HES-A**

**508HES-A**

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## 9.1 GENERAL INFORMATION

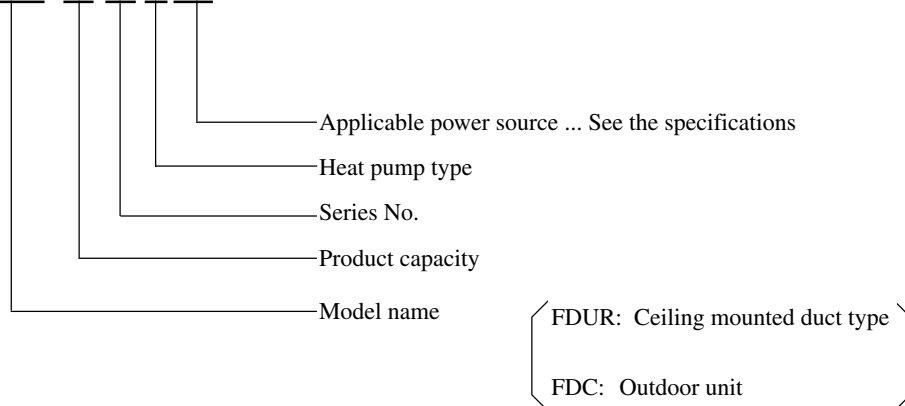
### 9.1.1 Specific features

- (1) Less refrigerant charge amount due to use of double phase refrigerant flow system. The total refrigerant charge amount has been reduced by more than 50%.
- (2) The indoor outdoor interconnection signal wiring has been done away with. The microcomputer chip is installed in the indoor unit. There is no need for the unit to communicate between the outdoor and indoor units so the unit is more resistant to electromagnetic noise thus the incidence of microcomputer malfunction has been reduced. The compressor in the outdoor unit has its own self protection function, that reacts according to abnormal high pressure and excessive high temperature.
- (3) There are only five power lines between the outdoor and indoor unit, As no signal wire is used there is no need to separate the power line from the signal line. One cable with 6 wires encased in one sheath is enough for conducting the wiring work between the outdoor unit and the indoor unit. This contributes to simpler wiring work in the field.
- (4) All models have service valves protruding from the outdoor unit for faster flare connection work in the field.
- (5) The position of the suction port can be changed.

The suction from the lower inlet is available by replacing the duct connecting section (at the side face) and the lower plate. (They are changed on site.)

### 9.1.2 How to read the model name

Example: **FDUR 30 8 H EN-SB**



## 9.2 SELECTION DATA

### 9.2.1 Specifications

#### Model FDUR208HEN-SA

Item		Model	FDUR208HEN-SA	
			FDUR208-A	FDC208HEN3A
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	5000	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	5400	
<b>Power source</b>			1 Phase, 220/240V, 50Hz	
<b>Operation data<sup>(3)</sup></b>	Cooling input	kW	2.09/2.21	
	Running current (Cooling)	A	9.8/9.8	
	Power factor (Cooling)	%	97/94	
	Heating input	kW	1.82/1.87	
	Running current (Heating)	A	8.5/8.2	
	Power factor (Heating)	%	97/95	
	Inrush current (L.R.A)	A	44	
	Noise level	dB(A)	Hi: 40 Lo: 36	52
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	295 × 850 × 650	690 × 880 × 290
<b>Net weight</b>		kg	39	49
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			–	RM5523GNE4 × 1
Motor	kW		–	1.7
Starting method			–	Line starting
<b>Heat exchanger</b>			Louver fins & inner grooved tubing	Slitted fins & bare tubing
Refrigerant control			Capillary tube	
<b>Refrigerant</b>			R22	
<b>Quantity</b>	kg		–	0.98 [Pre-charged up to the piping length of 0m]
<b>Refrigerant oil</b>	ℓ		–	0.7 (BARREL FREEZE 32SAM)
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
<b>Air handling equipment</b>				
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 1
Motor	W		90 × 1	55 × 1
Starting method			Line starting	Line starting
<b>Air flow (Standard)</b>	CMM		Hi:17 Lo:13.5	56
<b>Available static pressure</b>	Pa		Standard: 50, Max: 85	–
<b>Fresh air intake</b>				
Air filter, Q'ty			Polypropylene net ×1 (washable)	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater	W		–	20 (Crank case heater)
<b>Operation control</b>				
Operation switch			Wired remote control switch (Optional : RCD-H-E)	– (Indoor unit side)
Room temperature control			Thermostat by electronics	–
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
<b>Installation data</b>		mm		
<b>Refrigerant piping size</b>		(in)	Liquid line: φ6.35 (1/4") Gas line: φ15.88 (5/8")	
<b>Connecting method</b>			Flare piping	
<b>Drain hose</b>			(Connectable with VP25)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Suction grille	–

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating		20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard. ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 220/240V 50Hz.

## Model FDUR258HEN-SA

Item		Model	FDUR258HEN-SA	
			FDUR258-A	FDC258HEN3A
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	5700	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	6100	
<b>Power source</b>			1 Phase, 220/240V, 50Hz	
Operation data <sup>(3)</sup>	Cooling input	kW	2.35/2.50	
	Running current (Cooling)	A	10.8/10.8	
	Power factor (Cooling)	%	99/96	
	Heating input	kW	1.85/1.99	
	Running current (Heating)	A	8.6/8.7	
	Power factor (Heating)	%	98/95	
	Inrush current (L.R.A)	A	51	
	Noise level	dB(A)	Hi: 41 Lo: 37	52
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	295 × 850 × 650	845 × 880 × 340
<b>Net weight</b>		kg	40	55
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			–	RM5526GNE4 × 1
Motor		kW	–	1.9
Starting method			–	Line starting
<b>Heat exchanger</b>			Louver fins & inner grooved tubing	Slitted fins & bare tubing
Refrigerant control			Capillary tube	
<b>Refrigerant</b>			R22	
<b>Quantity</b>		kg	–	1.1 [Pre-charged up to the piping length of 5m]
<b>Refrigerant oil</b>		ℓ	–	0.7 (BARREL FREEZE 32SAM)
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
<b>Air handling equipment</b>				
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 1
Motor		W	130 × 1	55 × 1
Starting method			Line starting	Line starting
<b>Air flow (Standard)</b>		CMM	Hi:21 Lo:17	56
<b>Available static pressure</b>		Pa	Standard: 50, Max: 85	–
<b>Fresh air intake</b>			–	–
Air filter, Q'ty			Polypropylene net ×1(washable)	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
<b>Operation control</b>				
Operation switch			Wired remote control switch (Optional : RCD-H-E)	– (Indoor unit side)
Room temperature control			Thermostat by electronics	–
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
<b>Installation data</b>				
<b>Refrigerant piping size</b>		mm (in)	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
<b>Connecting method</b>			Flare piping	
<b>Drain hose</b>			(Connectable with VP25)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Suction grille	–

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating		20°C	12°C	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard. ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 220/240V 50Hz.

## Model FDUR308HEN-SB

Item		Model	FDUR308HEN-SB	
			FDUR308-A	FDC308HEN3B
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	7100	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	7800	
<b>Power source</b>			1 Phase, 220/240V, 50Hz	
<b>Operation data<sup>(3)</sup></b>	Cooling input	kW	3.40/3.70	
	Running current (Cooling)	A	16.0/16.5	
	Power factor (Cooling)	%	97/93	
	Heating input	kW	2.80/3.00	
	Running current (Heating)	A	13.0/13.8	
	Power factor (Heating)	%	98/91	
	Inrush current (L.R.A)	A	95	
	Noise level	dB(A)	Hi: 41 Lo: 37	52
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	295 × 850 × 650	
<b>Net weight</b>		kg	40	
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			GT-A5534EN41 × 1	
Motor		kW	2.5	
Starting method			Line starting	
<b>Heat exchanger</b>			Louver fines & inner grooved tubing	
Refrigerant control			Slitted fins & bare tubing	
<b>Refrigerant</b>			Capillary tube	
<b>Quantity</b>		kg	R22	
<b>Refrigerant oil</b>		ℓ	1.4 [Pre-charged up to the piping length of 5m]	
Defrost control			1.45 (BARREL FREEZE 32SAM)	
High pressure control			MC controlled de-icer	
<b>Air handling equipment</b>			High pressure switch	
Fan type & Q'ty			Multiblade centrifugal fan × 2	
Motor		W	Propeller fan × 1	
Starting method			230 × 1	
<b>Air flow (Standard)</b>		CMM	55 × 1	
<b>Available static pressure</b>		Pa	Line starting	
Fresh air intake			Hi: 25 Lo: 20	
Air filter, Q'ty			Standard: 50, Max: 130	
Shock & vibration absorber			-	
Electric heater		W	Polypropylene net × 1 (washable)	
<b>Operation control</b>			Rubber sleeve (for fan motor)	
Operation switch			Rubber mount (for compressor)	
Room temperature control			33(Crank case heater)	
<b>Safety equipment</b>			Wired remote control switch	
Internal thermostat for fan motor.			(Optional: RCD-H-E)	
Frost protection thermostat.			- (Indoor unit side)	
<b>Installation data</b>		mm	Thermostat by electronics	
<b>Refrigerant piping size</b>		(in)	-	
<b>Connecting method</b>			Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
<b>Drain hose</b>			Flare piping	
Insulation for piping			(Connectable with VP25)	
Accessories			Necessary (both Liquid & Gas lines)	
Optional parts			Mounting kit. Drain hose	
			Suction grille	

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating		20°C	-	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 220/240V 50Hz.

**Model FDUR308HES-SB**

Item		Model	FDUR308HES-SB	
			FDUR308-A	FDC308HES3B
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	7100	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	7800	
<b>Power source</b>			3 Phase, 380/415V 50Hz	
<b>Operation data<sup>(2)</sup></b>	Cooling input	kW	3.35/3.50	
	Running current (Cooling)	A	6.5/6.9	
	Power factor (Cooling)	%	78/71	
	Heating input	kW	3.00/3.15	
	Running current (Heating)	A	6.0/6.2	
	Power factor (Heating)	%	76/71	
	Inrush current (L.R.A)	A	45	
	Noise level	dB(A)	Hi: 41 Lo: 37	52
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	295 × 850 × 650	845 × 880 × 340
<b>Net weight</b>		kg	40	74
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			-	GT-A5534ES41 × 1
Motor		kW	-	2.5
Starting method			-	Line starting
<b>Heat exchanger</b>			Louver fins & inner grooved tubing	Slitted fins & bare tubing
Refrigerant control			Capillary tube	
<b>Refrigerant</b>			R22	
<b>Quantity</b>		kg	-	1.4 [Pre-charged up to the piping length of 5m]
<b>Refrigerant oil</b>		ℓ	-	1.45 (BARREL FREEZE 32SAM)
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
<b>Air handling equipment</b>				
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 1
Motor		W	230 × 1	55 × 1
Starting method			Line starting	Line starting
<b>Air flow (Standard)</b>		CMM	Hi: 25 Lo: 20	58
<b>Available static pressure</b>		Pa	Standard: 50, Max 130	-
Fresh air intake			-	-
Air filter, Q'ty			Polypropylene net ×1 (washable)	-
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	-	33 (Crank case heater)
<b>Operation control</b>				
Operation switch			Wired remote control switch (Optional: RCD-H-E)	- (Indoor unit side)
Room temperature control			Thermostat by electronics	-
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
<b>Installation data</b>		mm		
<b>Refrigerant piping size</b>		(in)	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
<b>Connecting method</b>			Flare piping	
<b>Drain hose</b>			(Connectable with VP25)	-
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Suction grille	-

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating	20°C	-	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 380/415V 50Hz.

**Model FDUR408HES-SB**

Item		Model	FDUR408HES-SB	
			FDUR408-A	FDC408HES3B
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	<b>10000</b>	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	<b>11200</b>	
<b>Power source</b>			<b>3 Phase, 380/415V 50Hz</b>	
<b>Operation data<sup>(3)</sup></b>	Cooling input	kW	4.76/4.85	
	Running current (Cooling)	A	8.8/9.1	
	Power factor (Cooling)	%	82/74	
	Heating input	kW	4.20/4.35	
	Running current (Heating)	A	7.9/8.7	
	Power factor (Heating)	%	81/70	
	Inrush current (L.R.A)	A	53	
	Noise level	dB(A)	Hi: 44 Lo: 40	54
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	<b>350 × 1370 × 650</b>	<b>1050 × 920 × 340</b>
<b>Net weight</b>		kg	<b>63</b>	<b>90</b>
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			–	<b>GU-A5550ES41 × 1</b>
Motor		kW	–	<b>2.8</b>
Starting method			–	Line starting
<b>Heat exchanger</b>			Louver fins & inner grooved tubing	Slitted fins & bare tubing
Refrigerant control			Capillary tube	
<b>Refrigerant</b>			<b>R22</b>	
<b>Quantity</b>		kg	–	<b>1.7 [Pre-charged up to the piping length of 5m]</b>
<b>Refrigerant oil</b>		ℓ	–	<b>1.6 (BARREL FREEZE 32SAM)</b>
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
<b>Air handling equipment</b>				
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 2
Motor		W	<b>280 × 1</b>	<b>40 × 2</b>
Starting method			Line starting	Line starting
<b>Air flow (Standard)</b>		CMM	Hi: 34 Lo: 27	<b>70</b>
<b>Available static pressure</b>		Pa	<b>Standard: 50, Max 130</b>	–
Fresh air intake			–	–
Air filter, Q'ty			Polypropylene net ×1 (washable)	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	40 (Crank case heater)
<b>Operation control</b>				
Operation switch			Wired remote control switch (Optional: RCD-H-E)	– (Indoor unit side)
Room temperature control			Thermostat by electronics	–
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
<b>Installation data</b>		mm		
<b>Refrigerant piping size</b>		(in)	<b>Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")</b>	
<b>Connecting method</b>			<b>Flare piping</b>	
<b>Drain hose</b>			(Connectable with VP25)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Suction grille	–

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating	20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 380/415V 50Hz.



## Model FDUR508HES-SB

Item		Model	FDUR508HES-SB	
			FDUR508-A	FDC508HES3B
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	<b>12500</b>	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	<b>14000</b>	
<b>Power source</b>			<b>3 Phase, 380/415V 50Hz</b>	
Operation data <sup>(3)</sup>	Cooling input	kW	5.65/5.70	
	Running current (Cooling)	A	10.0/10.5	
	Power factor (Cooling)	%	86/76	
	Heating input	kW	4.60/4.80	
	Running current (Heating)	A	8.5/9.5	
	Power factor (Heating)	%	82/70	
	Inrush current (L.R.A)	A	74	
	Noise level	dB(A)	Hi: 45 Lo: 41	55
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	<b>350 × 1370 × 650</b>	<b>1250 × 920 × 340</b>
<b>Net weight</b>		kg	<b>65</b>	<b>101</b>
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			–	<b>GU-A5570ES41 × 1</b>
Motor		kW	–	<b>3.75</b>
Starting method			–	Line starting
<b>Heat exchanger</b>			Louver fins & inner grooved tubing	Slitted fins & bare tubing
Refrigerant control			Capillary tube	
<b>Refrigerant</b>			<b>R22</b>	
<b>Quantity</b>		kg	–	<b>1.9 [Pre-charged up to the piping length of 5m]</b>
<b>Refrigerant oil</b>		ℓ	–	<b>1.6 (BARREL FREEZE 32SAM)</b>
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
<b>Air handling equipment</b>				
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 2
Motor		W	<b>460 × 1</b>	<b>65 × 2</b>
Starting method			Line starting	Line starting
<b>Air flow (Standard)</b>		CMM	<b>Hi: 42 Lo: 33.5</b>	<b>110</b>
<b>Available static pressure</b>		Pa	<b>Standard: 50, Max 130</b>	–
Fresh air intake			–	–
Air filter, Q'ty			Polypropylene net × 1 (washable)	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	40 (Crank case heater)
<b>Operation control</b>				
Operation switch			Wired remote control switch (Optional: RCD-H-E)	– (Indoor unit side)
Room temperature control			Thermostat by electronics	–
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
<b>Installation data</b>		mm		
<b>Refrigerant piping size</b>		(in)	<b>Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")</b>	
<b>Connecting method</b>			<b>Flare piping</b>	
<b>Drain hose</b>			(Connectable with VP25)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Suction grille	–

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating	20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 380/415V 50Hz.

## Model FDUR308HEN-A

Item		Model	FDUR308HEN-A	
			FDUR308-A	FDC306HEN3
<b>Nominal cooling capacity<sup>(1)</sup></b>		W	7100	
<b>Nominal heating capacity<sup>(1)</sup></b>		W	7300	
<b>Power source</b>			1 Phase, 220/240V, 50Hz	
Operation data <sup>(3)</sup>	Cooling input	kW	3.40/3.55	
	Running current (Cooling)	A	17.5/18.3	
	Power factor (Cooling)	%	88/81	
	Heating input	kW	2.90/3.15	
	Running current (Heating)	A	15.4/16.4	
	Power factor (Heating)	%	86/80	
	Inrush current (L.R.A)	A	95	
	Noise level	dB(A)	Hi: 41 Lo: 37	56
<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	295 × 850 × 650	844 × 950 × 340
<b>Net weight</b>		kg	40	69
<b>Refrigerant equipment</b>				
<b>Compressor type &amp; Q'ty</b>			-	RC5532ENE1 × 1
Motor		kW	-	2.24
Starting method			-	Line starting
<b>Heat exchanger</b>			Louver fines & inner grooved tubing	Slitted fins & bare tubing
Refrigerant control			Capillary tube	
<b>Refrigerant</b>			R22	
<b>Quantity</b>		kg	-	1.3 [Pre-charged up to the piping length of 5m]
<b>Refrigerant oil</b>		ℓ	-	1.63 (SUNISO 3GS)
Defrost control			IC controlled de-icer	
High pressure control			High pressure regulator valve	
<b>Air handling equipment</b>				
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 1
Motor		W	230 × 1	60 × 1
Starting method			Line starting	Line starting
<b>Air flow (Standard)</b>		CMM	Hi: 25 Lo: 20	54
<b>Available static pressure</b>		Pa	Standard: 50, Max: 130	-
Fresh air intake			-	-
Air filter, Q'ty			Polypropylene net ×1(washable)	-
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	-	40 (Crank case heater)
<b>Operation control</b>			Wired remote control switch	
Operation switch			(Optional: RCD-H-E)	- (Indoor unit side)
Room temperature control			Thermostat by electronics	-
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.	Internal protector for compressor. Internal thermostat for fan motor. Internal pressure relief valve for compressor.
<b>Installation data</b>		mm	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
<b>Refrigerant piping size</b>		(in)		
<b>Connecting method</b>			Flare piping	
<b>Drain hose</b>			(Connectable with VP25)	-
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Suction grille	-

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating		20°C	-	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 220/240V 50Hz.

## Model FDUR308HES-A

Item		Model		FDUR308HES-A	
				FDUR308-A	FDC306HES3
Nominal cooling capacity <sup>(1)</sup>	ISO-T1	W	7100/7700		
	ISO-T3		6000		
Nominal heating capacity <sup>(1)</sup>	ISO-T1	W	7300/7900		
			3 Phase, 380-415V 50Hz, 380V 60Hz		
Operation data <sup>(3)</sup>	ISO-T1	Cooling input	kW	3.20/3.30/3.8	
		Running current (Cooling)	A	6.6/6.7/7.8	
		Power factor (Cooling)	%	74/69/74	
		Heating input	kW	2.83/2.96/3.33	
		Running current (Heating)	A	6.17/6.33/7.37	
		Power factor (Heating)	%	70/65/69	
	ISO-T3	Cooling input	kW	4.05	
		Running current (Cooling)	A	8.3	
		Power factor (Cooling)	%	74	
		Inrush current (L.R.A)	A	43	
	Noise level	dB(A)	Hi: 41 Lo: 37		56
<b>Exterior dimensions</b>					
Height × Width × Depth		mm	295 × 850 × 650		844 × 950 × 340
<b>Net weight</b>		kg	40		69
<b>Refrigerant equipment</b>					
<b>Compressor type &amp; Q'ty</b>			-		RC5538ESE1 × 1
Motor	kW	-		2.24	
Starting method			-		Line starting
<b>Heat exchanger</b>			Louver fins & inner grooved tubing		Slitted fins & bare tubing
Refrigerant control			Capillary tube		
<b>Refrigerant</b>			R22		
<b>Quantity</b>	kg	-	1.3 [Pre-charged up to the piping length of 5m]		
<b>Refrigerant oil</b>	ℓ	-	1.63 (SUNISO 3GS)		
Defrost control			IC controlled de-icer		
High pressure control			High pressure regulator valve		
<b>Air handling equipment</b>					
Fan type & Q'ty			Multiblade centrifugal fan × 2		Propeller fan × 1
Motor	W	230 × 1		60 × 1	
Starting method			Line starting		Line starting
<b>Air flow (Standard)</b>		CMM	Hi: 25 Lo: 20		54/56
<b>Available static pressure</b>		Pa	Standard: 50, Max 130		-
Fresh air intake			-		-
Air filter, Q'ty			Polypropylene net ×1 (washable)		-
Shock & vibration absorber			Rubber sleeve (for fan motor)		Rubber mount (for compressor)
Electric heater	W	-		40 (Crank case heater)	
<b>Operation control</b>					
Operation switch			Wired remote control switch (Optional: RCD-H-E)		- (Indoor unit side)
Room temperature control			Thermostat by electronics		-
<b>Safety equipment</b>			Internal thermostat for fan motor. Frost protection thermostat.		Internal protector for compressor. Internal thermostat for fan motor. Internal pressure relief valve for compressor.
<b>Installation data</b>					
<b>Refrigerant piping size</b>		mm (in)	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")		
<b>Connecting method</b>			Flare piping		
<b>Drain hose</b>			(Connectable with VP25)		-
Insulation for piping			Necessary (both Liquid & Gas lines)		
Accessories			Mounting kit. Drain hose		
Optional parts			Suction grille		-

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating	20°C	-	7°C	6°C	
Cooling	29°C	19°C	46°C	24°C	ISO-T3, SASO

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 380V 50Hz/415V 50Hz/380V 60Hz.

**Model FDUR408HES-A**

Item		Model		FDUR408HES-A	
				FDUR408-A	FDC406HES3
<b>Nominal cooling capacity<sup>(1)</sup></b>	ISO-T1	W	<b>10200/11300</b>		
	ISO-T3		<b>9900</b>		
<b>Nominal heating capacity<sup>(1)</sup></b>	ISO-T1	W	<b>10500/11600</b>		
<b>Power source</b>		<b>3 Phase, 380-415V 50Hz, 380V 60Hz</b>			
<b>Operation data<sup>(3)</sup></b>	<b>ISO-T1</b>	Cooling input	kW	3.96/4.00/4.88	
		Running current (Cooling)	A	8.3/8.5/9.5	
		Power factor (Cooling)	%	72/65/78	
		Heating input	kW	3.66/3.75/4.40	
		Running current (Heating)	A	7.6/8.4/9.1	
		Power factor (Heating)	%	73/62/73	
	<b>ISO-T3</b>	Cooling input	kW	5.48	
		Running current (Cooling)	A	10.3	
		Power factor (Cooling)	%	81	
		Inrush current (L.R.A)	A	45	
	Noise level	dB(A)	Hi: 44 Lo: 40		57
<b>Exterior dimensions</b>					
<b>Height × Width × Depth</b>		<b>mm</b>	<b>350 × 1370 × 650</b>		
<b>Net weight</b>		<b>kg</b>	<b>63</b>		
<b>Refrigerant equipment</b>					
<b>Compressor type &amp; Q'ty</b>			<b>RC5547ESE1 × 1</b>		
Motor		kW	-		
Starting method			-		
<b>Heat exchanger</b>			Louver fins & inner grooved tubing		
Refrigerant control			Capillary tube		
<b>Refrigerant</b>			<b>R22</b>		
<b>Quantity</b>		<b>kg</b>	-	<b>1.6 [Pre-charged up to the piping length of 5m]</b>	
<b>Refrigerant oil</b>		ℓ	-	<b>1.63 (SUNISO 3GS)</b>	
Defrost control			IC controlled de-icer		
High pressure control			High pressure regulator valve		
<b>Air handling equipment</b>					
Fan type & Q'ty			Multiblade centrifugal fan × 2		
Motor		W	<b>280 × 1</b>		
Starting method			Line starting		
<b>Air flow (Standard)</b>		<b>CMM</b>	<b>Hi: 34 Lo: 27</b>		
<b>Available static pressure</b>		Pa	<b>Standard: 50, Max 130</b>		
Fresh air intake			-		
Air filter, Q'ty			Polypropylene net ×1(washable)		
Shock & vibration absorber			Rubber sleeve (for fan motor)		
Electric heater		W	-		
<b>Operation control</b>			Wired remote control switch		
Operation switch			(Optional: RCD-H-E)		
Room temperature control			Thermostat by electronics		
<b>Safety equipment</b>			Internal thermostat for fan motor.		
			Frost protection thermostat.		
<b>Installation data</b>					
<b>Refrigerant piping size</b>		<b>mm (in)</b>	<b>Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")</b>		
<b>Connecting method</b>			<b>Flare piping</b>		
<b>Drain hose</b>			(Connectable with VP25)		
Insulation for piping			Necessary (both Liquid & Gas lines)		
Accessories			Mounting kit. Drain hose		
Optional parts			Suction grille		

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating	20°C	-	7°C	6°C	
Cooling	29°C	19°C	46°C	24°C	ISO-T3, SASO

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 380V 50Hz/415V 50Hz/380V 60Hz.

## Model FDUR508HES-A

Item		Model		FDUR508HES-A	
				FDUR508-A	FDC506HES3
Nominal cooling capacity <sup>(1)</sup>	ISO-T1	W	12500/14000		
	ISO-T3		11900		
Nominal heating capacity <sup>(1)</sup>	ISO-T1	W	12800/14400		
Power source		3 Phase, 380-415V 50Hz, 380V 60Hz			
Operation data <sup>(3)</sup>	ISO-T1	Cooling input	kW	5.58/5.80/6.70	
		Running current (Cooling)	A	11.5/12.2/12.8	
		Power factor (Cooling)	%	74/66/80	
		Heating input	kW	4.40/4.75/5.45	
		Running current (Heating)	A	9.0/10.3/10.5	
		Power factor (Heating)	%	74/64/79	
	ISO-T3	Cooling input	kW	7.40	
		Running current (Cooling)	A	13.8	
		Power factor (Cooling)	%	81	
		Inrush current (L.R.A)	A	68	
	Noise level	dB(A)	Hi: 45 Lo: 41		59
Exterior dimensions		mm			
Height × Width × Depth		350 × 1370 × 650		1250 × 950 × 340	
Net weight		kg		65 91	
Refrigerant equipment				RC5563ESE2 × 1	
Compressor type & Q'ty		-		3.73	
Motor		kW	-		3.73
Starting method		-		Line starting	
Heat exchanger		Louver fins & inner grooved tubing		Slitted fins & bare tubing	
Refrigerant control		Capillary tube			
Refrigerant		R22			
Quantity		kg	-	2.3 [Pre-charged up to the piping length of 5m]	
Refrigerant oil		ℓ	-	2.07 (SUNISO 3GS)	
Defrost control		IC controlled de-icer			
High pressure control		High pressure regulator valve			
Air handling equipment				Multiblade centrifugal fan × 2 Propeller fan × 2	
Fan type & Q'ty				Multiblade centrifugal fan × 2 Propeller fan × 2	
Motor		W	460 × 1		60 × 2
Starting method		Line starting		Line starting	
Air flow (Standard)		CMM	Hi: 42 Lo: 33.5		100/110
Available static pressure		Pa	Standard: 50, Max 130		-
Fresh air intake				-	
Air filter, Q'ty		Polypropylene net ×1 (washable)		-	
Shock & vibration absorber		Rubber sleeve (for fan motor)		Rubber mount (for compressor)	
Electric heater		W	-		40 (Crank case heater)
Operation control				Wired remote control switch	
Operation switch		(Optional: RCD-H-E)		- (Indoor unit side)	
Room temperature control		Thermostat by electronics		-	
Safety equipment		Internal thermostat for fan motor. Frost protection thermostat.		Internal protector for compressor. Internal thermostat for fan motor. Internal pressure relief valve for compressor.	
Installation data		mm		Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")	
Refrigerant piping size		(in)		Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")	
Connecting method		Flare piping			
Drain hose		(Connectable with VP25)		-	
Insulation for piping		Necessary (both Liquid & Gas lines)			
Accessories		Mounting kit. Drain hose			
Optional parts		Suction grille		-	

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS B8616
Heating	20°C	-	7°C	6°C	
Cooling	29°C	19°C	46°C	24°C	ISO-T3, SASO

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 380V 50Hz/415V 50Hz/380V 60Hz.

## 9.2.2 Range of usage & limitations

### Models FDUR208~508 (FDC208~508)

Item	Models	
	FDUR208, 258 (FDC208, 258 model)	FDUR308~508 (FDC308~508 model)
Indoor return air temperature (Upper, lower limits)	Refer to the selection chart	
Outdoor air temperature (Upper, lower limits)		
Indoor unit atmosphere (behind ceiling) temperature and humidity	Dew point temperature: 28°C or less, relative humidity: 80% or less	
Refrigerant line (one way) length	Max. 30m	Max. 50m
Vertical height difference between outdoor unit and indoor unit	Max. 20m (Outdoor unit is higher) Max. 15m (Outdoor unit is lower)	Max. 30m (Outdoor unit is higher) Max. 15m (Outdoor unit is lower)
Power source voltage	Rating $\pm$ 10%	
Voltage at starting	Min. 85% of rating	
Frequency of ON-OFF cycle	Max. 10 times/h	
ON and OFF interval	Max. 3 minutes	

### Models FDUR308~508 (FDC306~506)

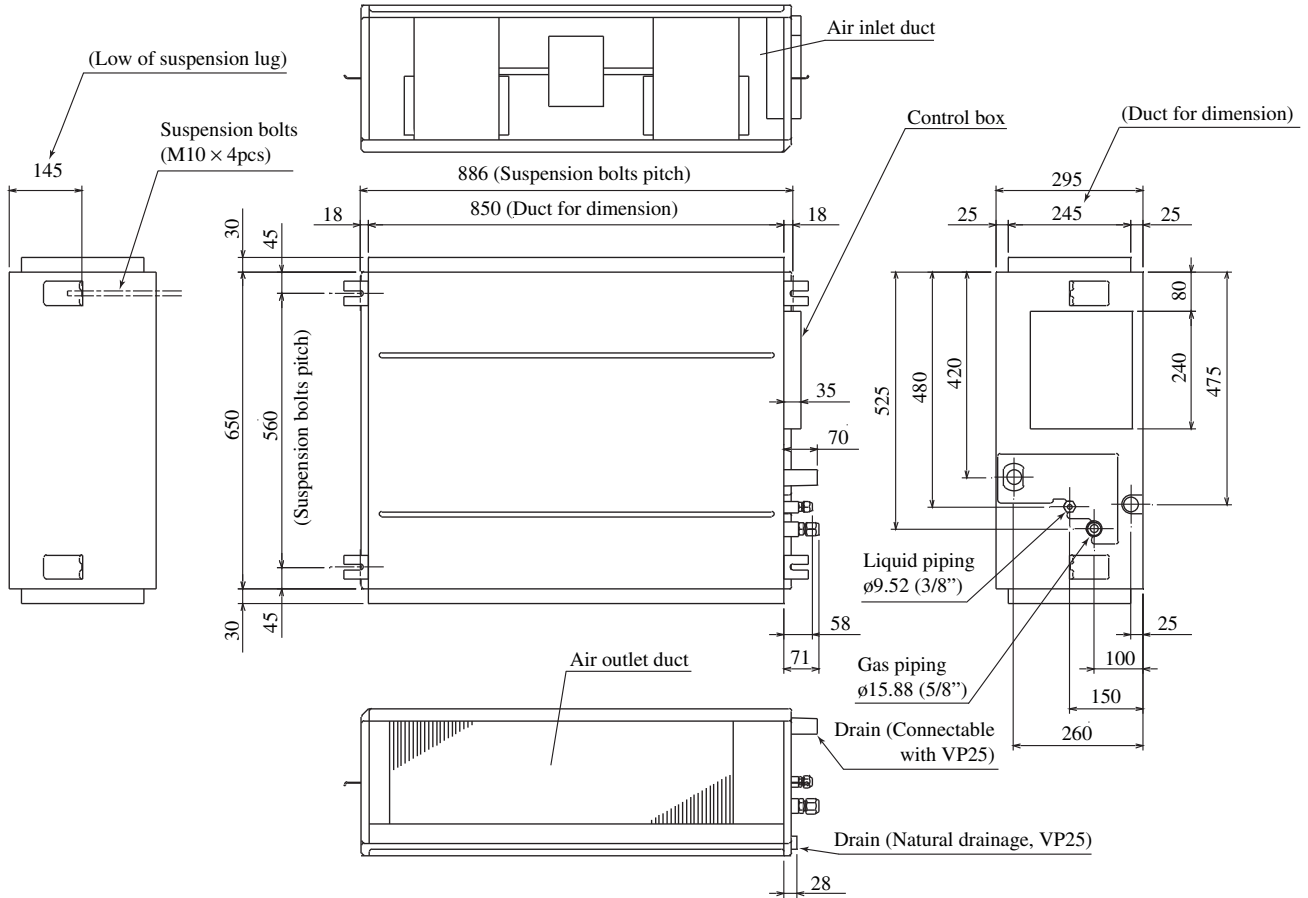
Item	Models	
	FDUR308~508 (FDC306~506 model)	
Indoor return air temperature (Upper, lower limits)	Refer to the selection chart	
Outdoor air temperature (Upper, lower limits)		
Indoor unit atmosphere (behind ceiling) temperature and humidity	Dew point temperature: 28°C or less, relative humidity: 80% or less	
Refrigerant line (one way) length	Max. 30m	
Vertical height difference between outdoor unit and indoor unit	Max. 15m	
Power source voltage	Rating $\pm$ 10%	
Voltage at starting	Min. 85% of rating	
Frequency of ON-OFF cycle	Max. 10 times/h	
ON and OFF interval	Max. 3 minutes	

## 9.2.3 Exterior dimensions

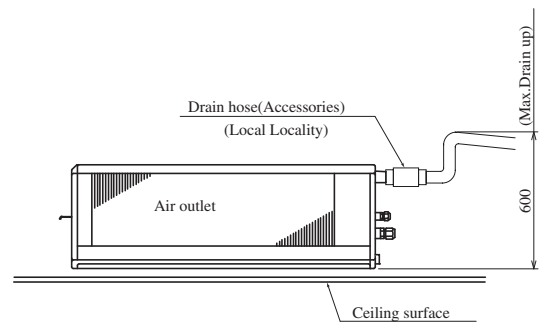
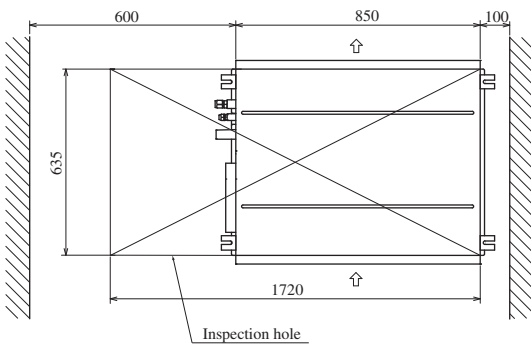
### (1) Indoor unit

Models FDUR208-A, 258-A, 308-A

Unit : mm

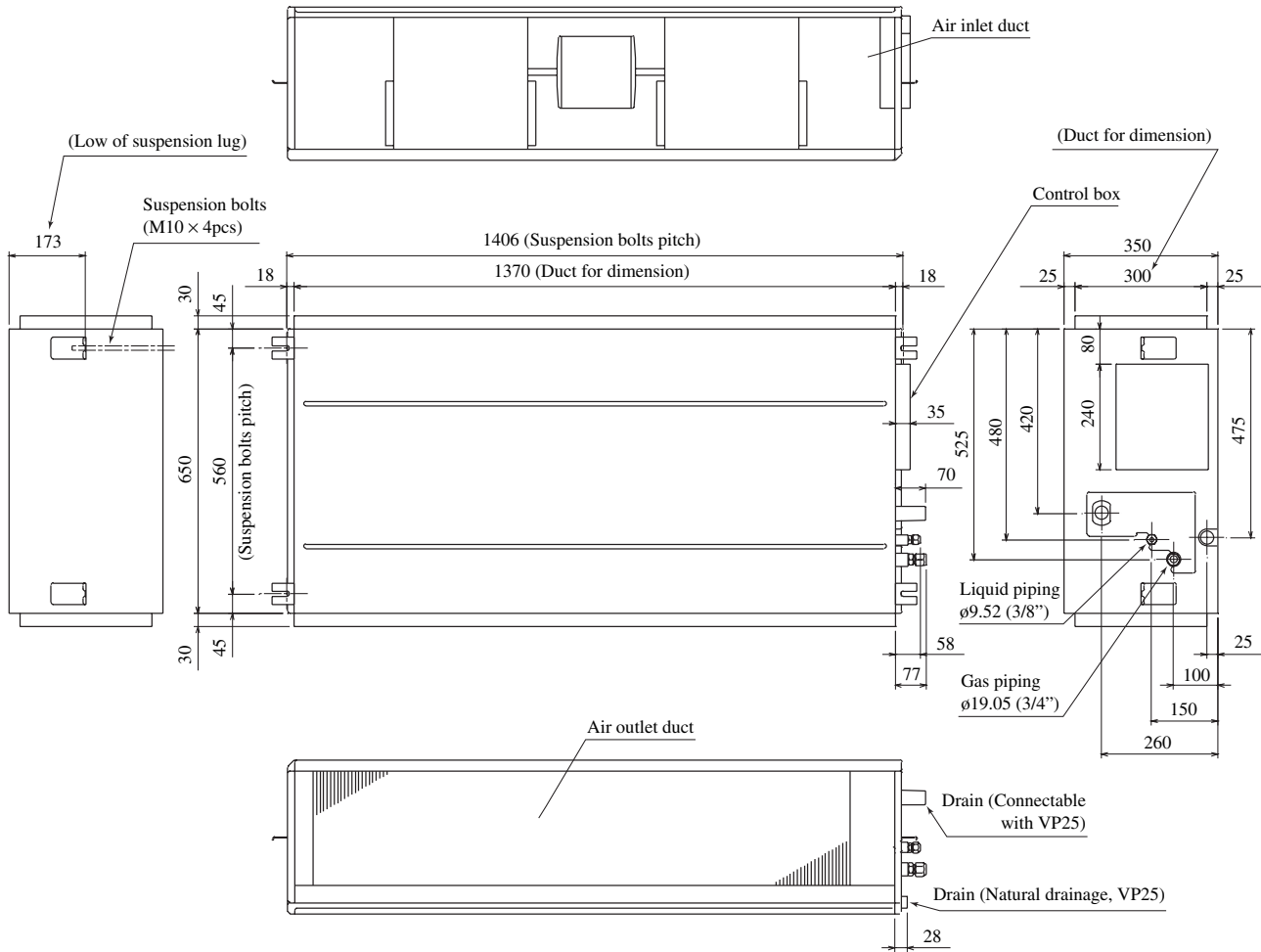


### Space for installation and service

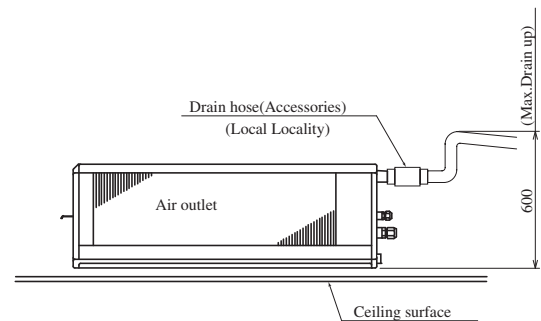
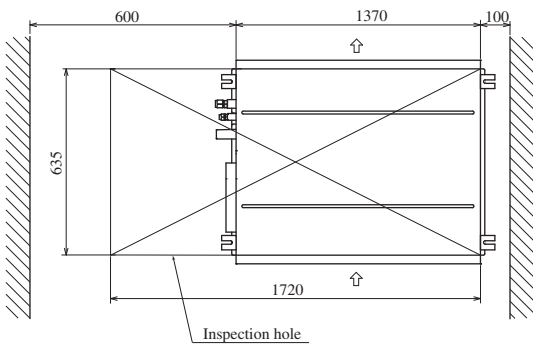


**Models FDUR408-A, 508-A**

Unit : mm



**Space for installation and service**

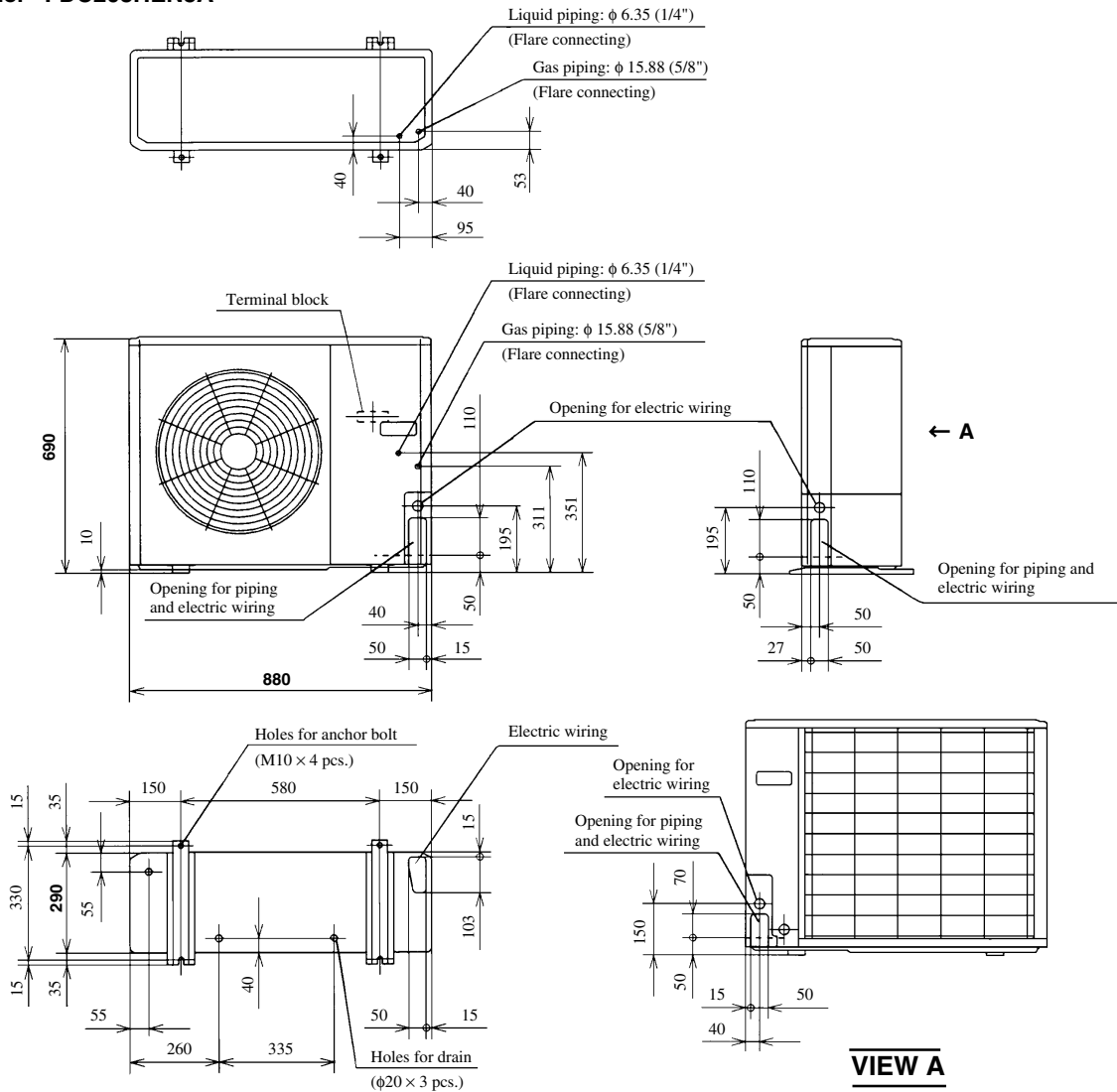




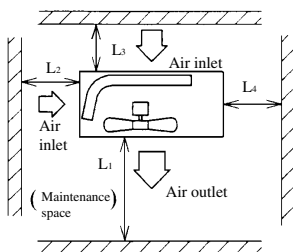


**(3) Outdoor unit**  
**Model FDC208HEN3A**

Unit: mm



**Required space for maintenance and air flow**



**Minimum allowable space to the obstacles**

Unit:mm

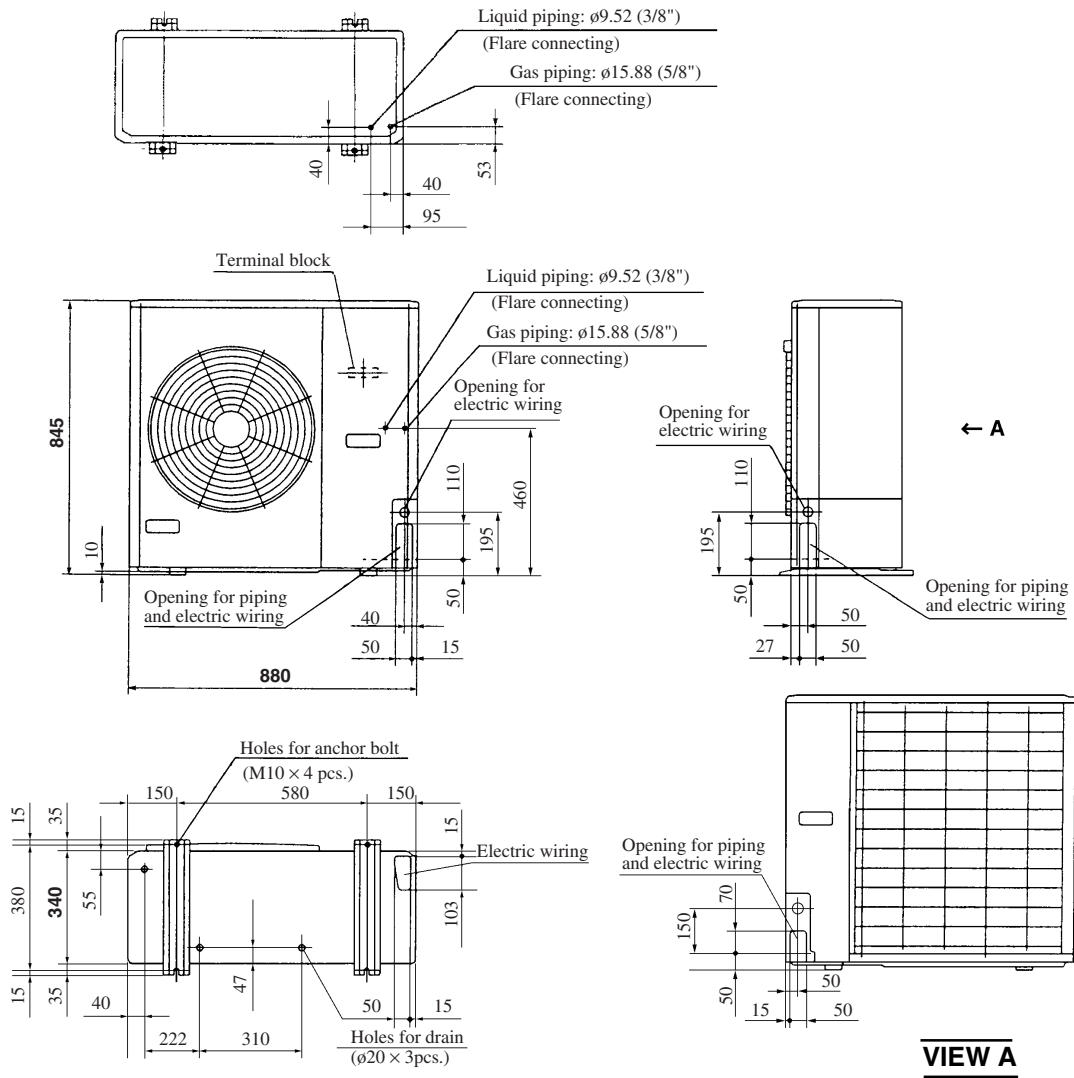
Mark	Installation type	Unit:mm		
		I	II	III
L1	Open	Open	500	
L2	300	5	Open	
L3	100	150	100	
L4	5	5	5	

**Notes**

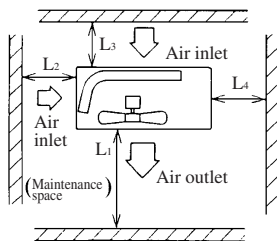
- (1) Avoid the location where four sides are entirely surrounded by walls.
- (2) Fix the unit by anchor bolts without fail. Restrict the protrusion length of anchor bolt to 15 mm and under.
- (3) When strong wind blows against the unit, direct the discharge port at a right angle to the wind direction.
- (4) Secure the space of 1 m and over at the top of unit.
- (5) Make the height of obstruction wall in front of discharge port lower than the height of unit.

Models FDC258HEN3A, 308HEN3B, 308HES3B

Unit: mm



Required space for maintenance and air flow



Minimum allowable space to the obstacles

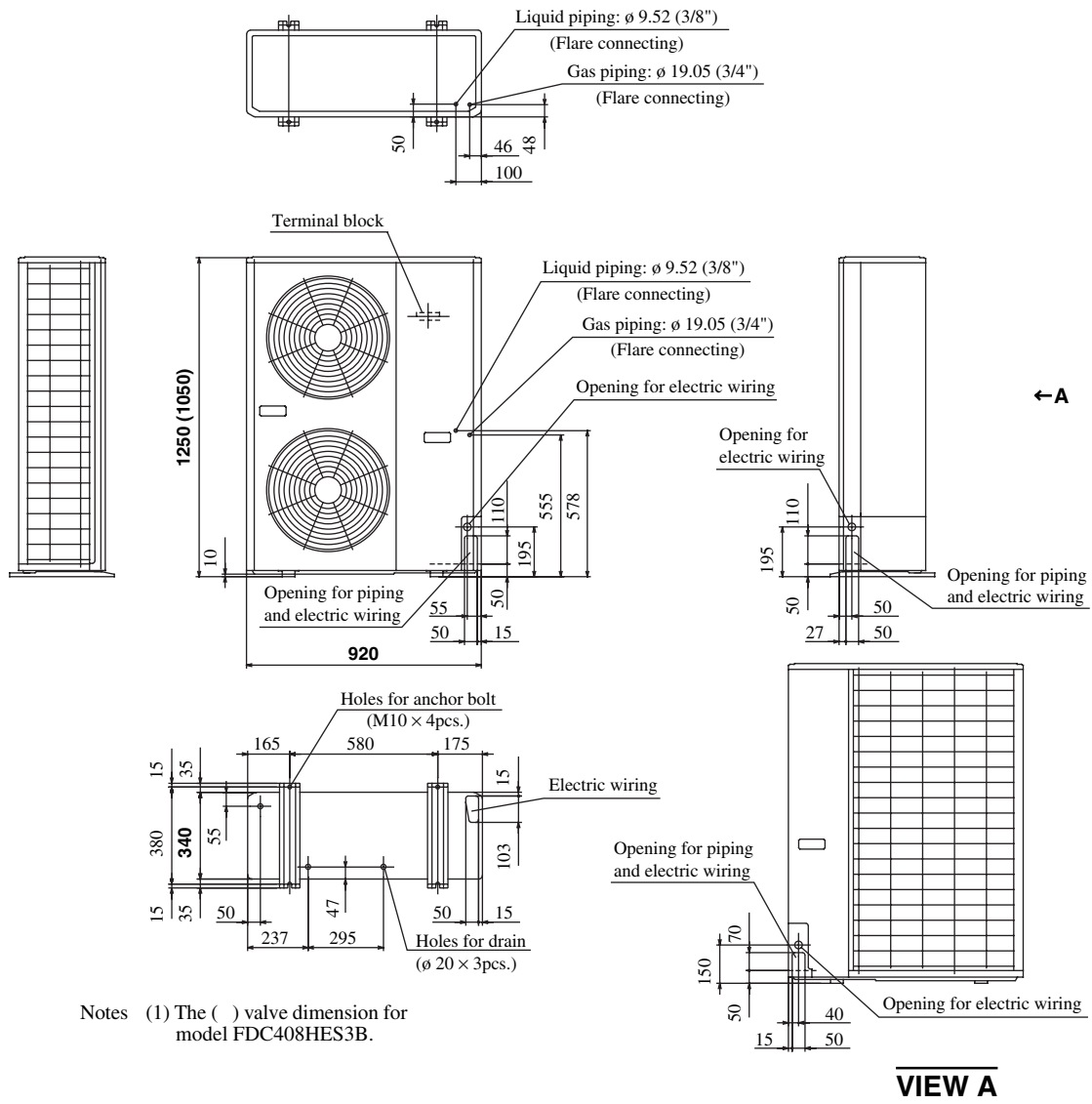
Unit:mm

Mark	Installation type	Unit:mm		
		I	II	III
L <sub>1</sub>	Open	Open	500	
L <sub>2</sub>	300	5	Open	
L <sub>3</sub>	100	150	100	
L <sub>4</sub>	5	5	5	

Notes

- (1) Avoid the location where four sides are entirely surrounded by walls.
- (2) Fix the unit by anchor bolts without fail. Restrict the protrusion length of anchor bolt to 15 mm and under.
- (3) When strong wind blows against the unit, direct the discharge port at a right angle to the wind direction.
- (4) Secure the space of 1 m and over at the top of unit.
- (5) Make the height of obstruction wall in front of discharge port lower than the height of unit.

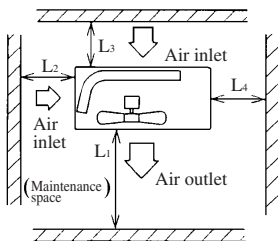
**Models FDC408HES3B, 508HES3B**



Notes (1) The ( ) valve dimension for model FDC408HES3B.

**VIEW A**

**Required space for maintenance and air flow**



**Minimum allowable space to the obstacles**

Unit:mm

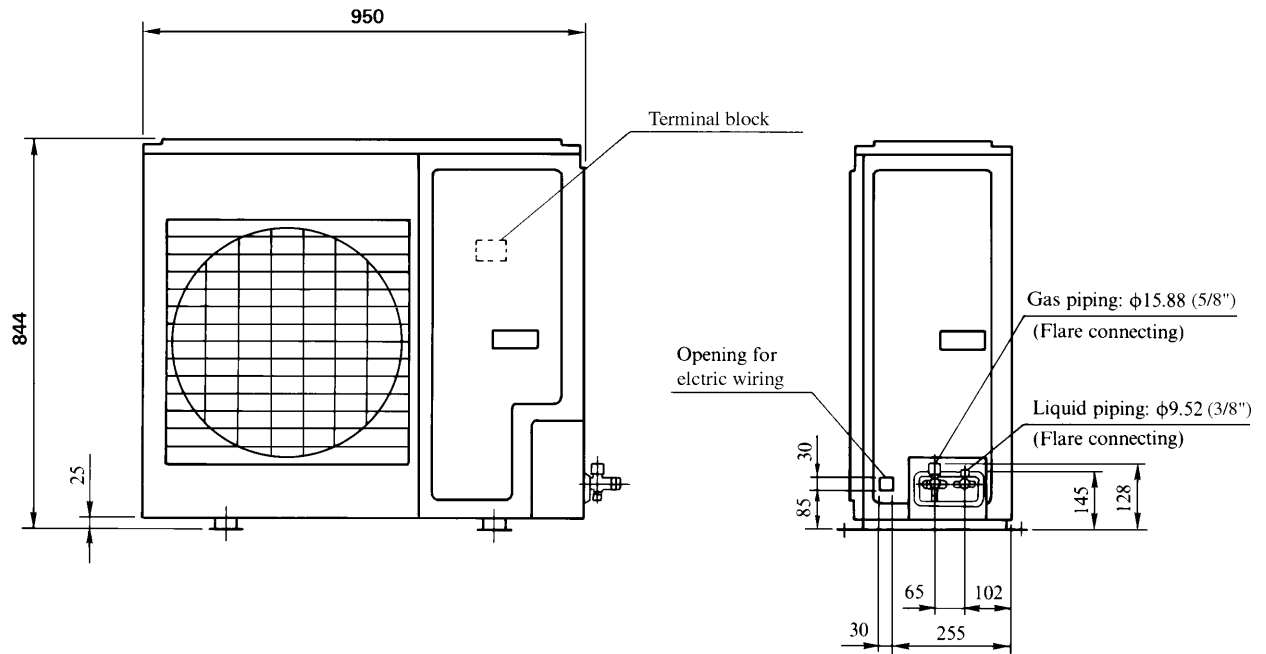
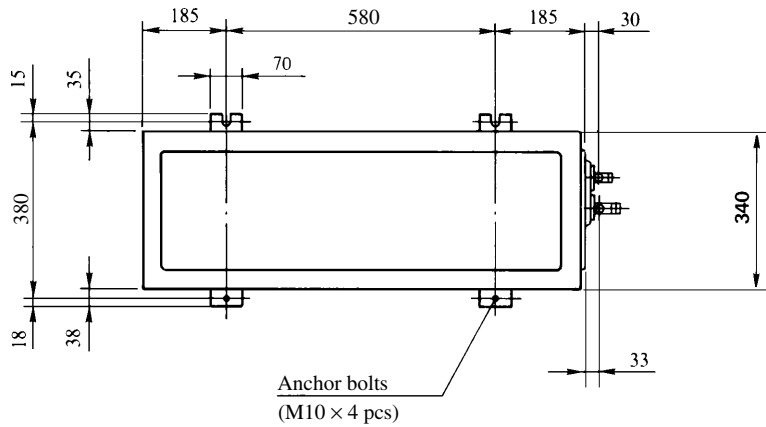
Mark	Installation type	Unit:mm		
		I	II	III
L <sub>1</sub>	Open	Open	Open	500
L <sub>2</sub>	300	5	Open	Open
L <sub>3</sub>	150	300	150	150
L <sub>4</sub>	5	5	5	5

**Notes**

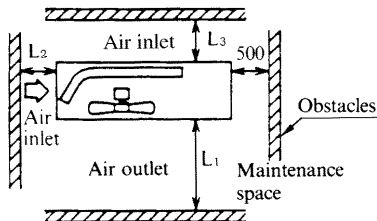
- (1) Avoid the location where four sides are entirely surrounded by walls.
- (2) Fix the unit by anchor bolts without fail. Restrict the protrusion length of anchor bolt to 15 mm and under.
- (3) When strong wind blows against the unit, direct the discharge port at a right angle to the wind direction.
- (4) Secure the space of 1 m and over at the top of unit.
- (5) Make the height of obstruction wall in front of discharge port lower than the height of unit.

**Models FDC306HEN3, 306HES3**

Unit: mm



**Required space for maintenance and air flow**



**Minimum allowable space to the obstacles**

Unit:mm

Mark	Installation type		
	I	II	III
L <sub>1</sub>	Open	Open	500
L <sub>2</sub>	300	0	Open
L <sub>3</sub>	100	150	100

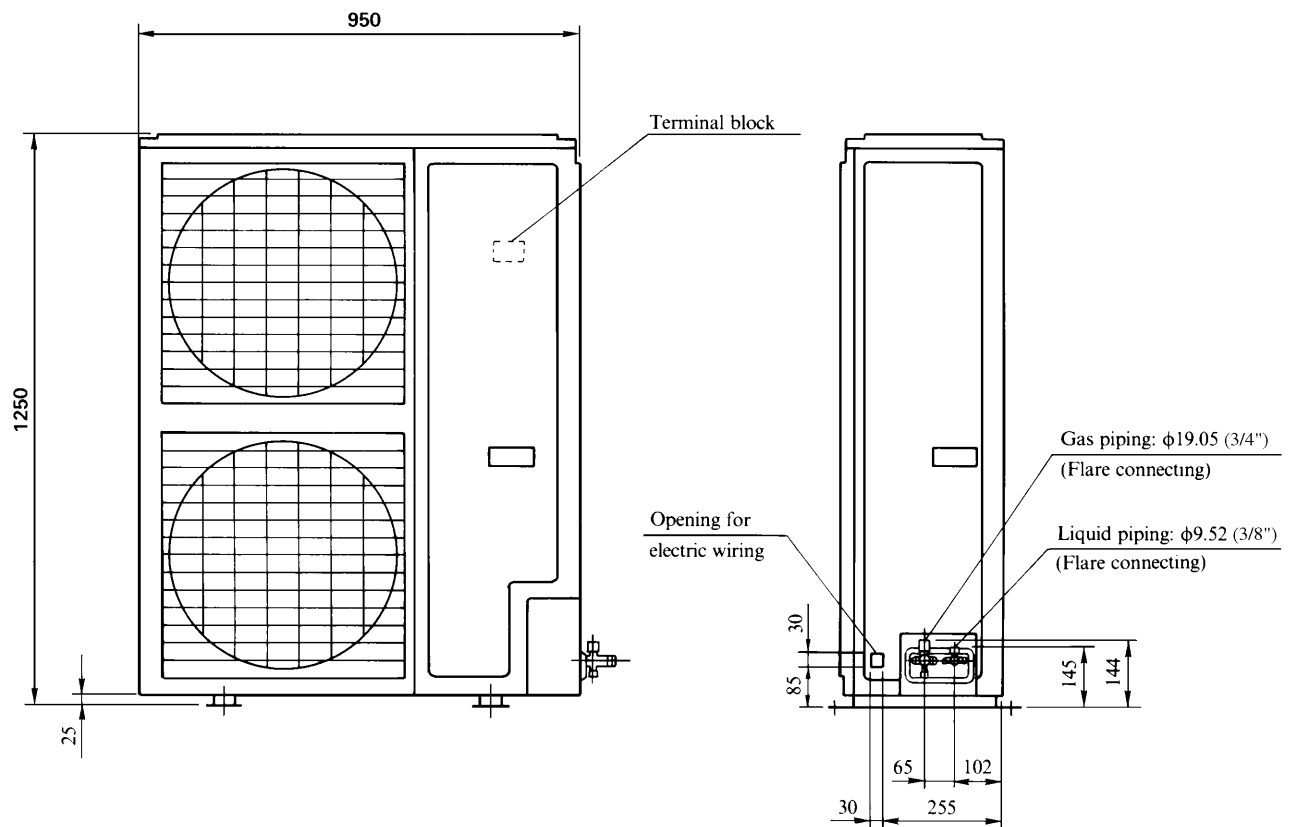
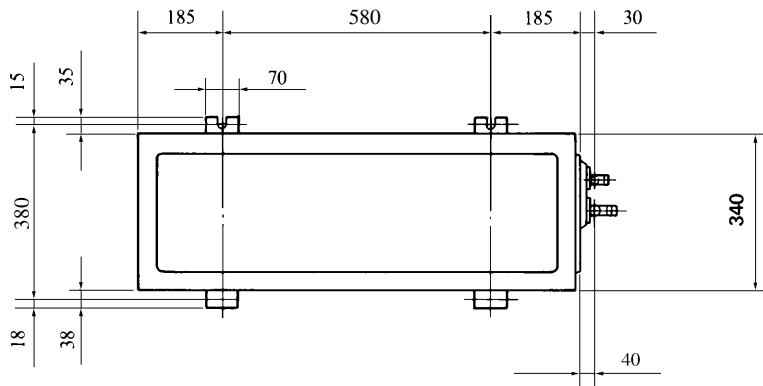
**Notes**

- (1) Fix the unit with anchor bolts.
- (2) Strong wind must not be directed to the air outlet.
- (3) Free space over the unit must be larger than 1 m.
- (4) The unit should not be surrounded by obstructions in all direction.

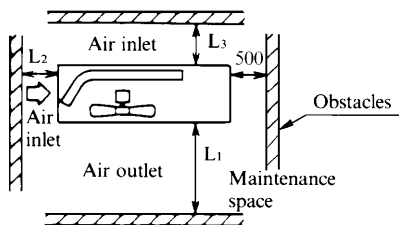
At least one direction around the unit must be free.

**Models FDC406HES3, 506HES3**

Unit: mm



**Required space for maintenance and air flow**



**Minimum allowable space to the obstacles**

Unit:mm

Mark	Installation type		
	I	II	III
L <sub>1</sub>	Open	Open	500
L <sub>2</sub>	300	0	Open
L <sub>3</sub>	150	300	150

**Notes**

- (1) Fix the unit with anchor bolts.
- (2) Strong wind must not be directed to the air outlet.
- (3) Free space over the unit must be larger than 1 m.
- (4) The unit should not be surrounded by obstructions in all direction.  
At least one direction around the unit must be free.

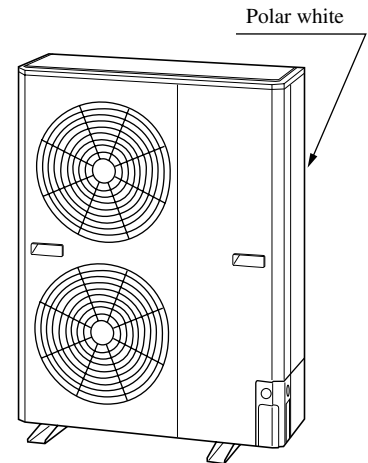
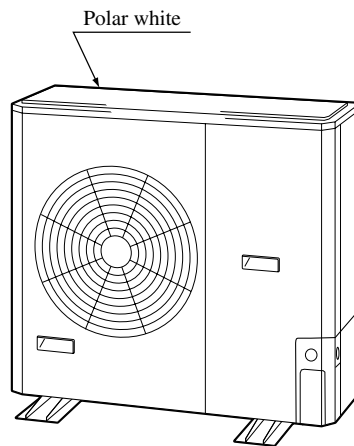
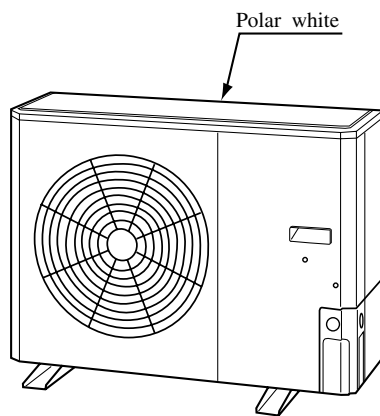
## 9.2.4 Exterior appearance

(1) Indoor unit.....Zinc steel plate

(2) Outdoor unit  
Model FDC208HEN3A

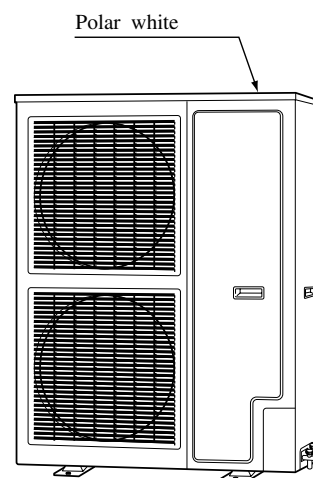
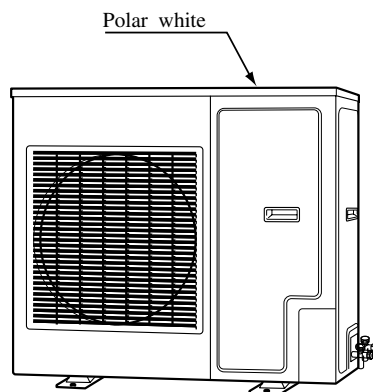
Models FDC258HEN3A, 308HEN3B,  
308HES3B

Models FDC408HES3B, 508HES3B



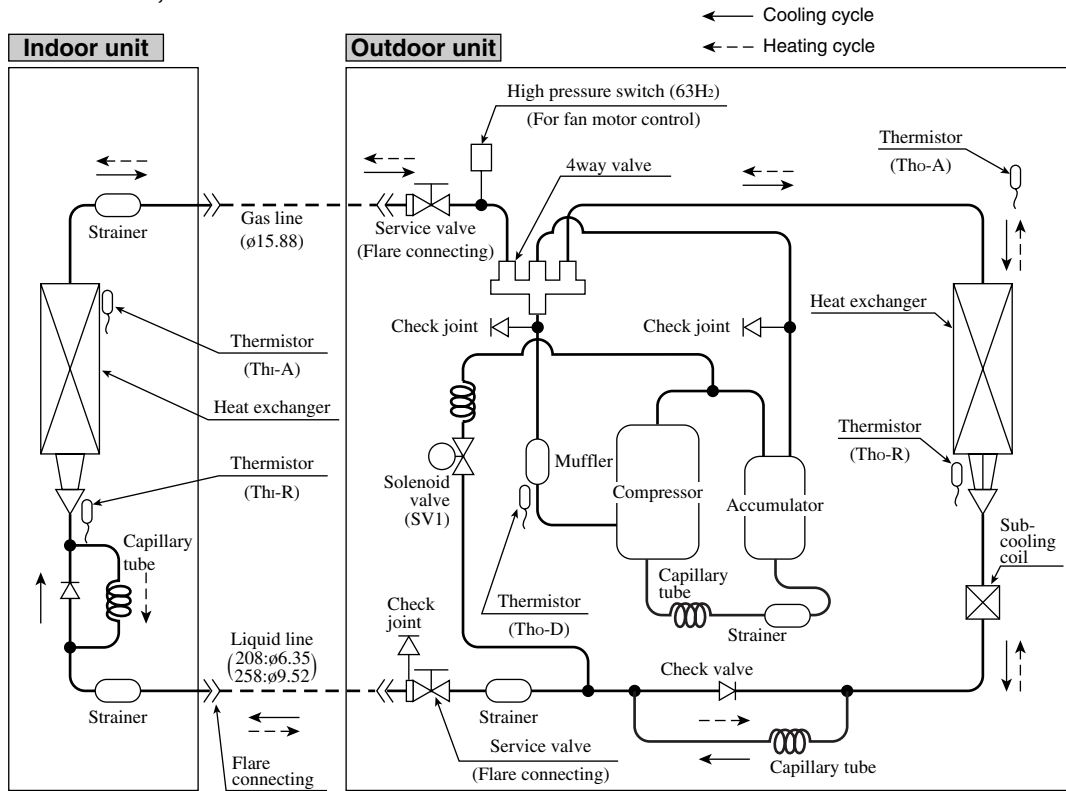
Models FDC306HEN3, 306HES3

Models FDC406HES3, 506HES3

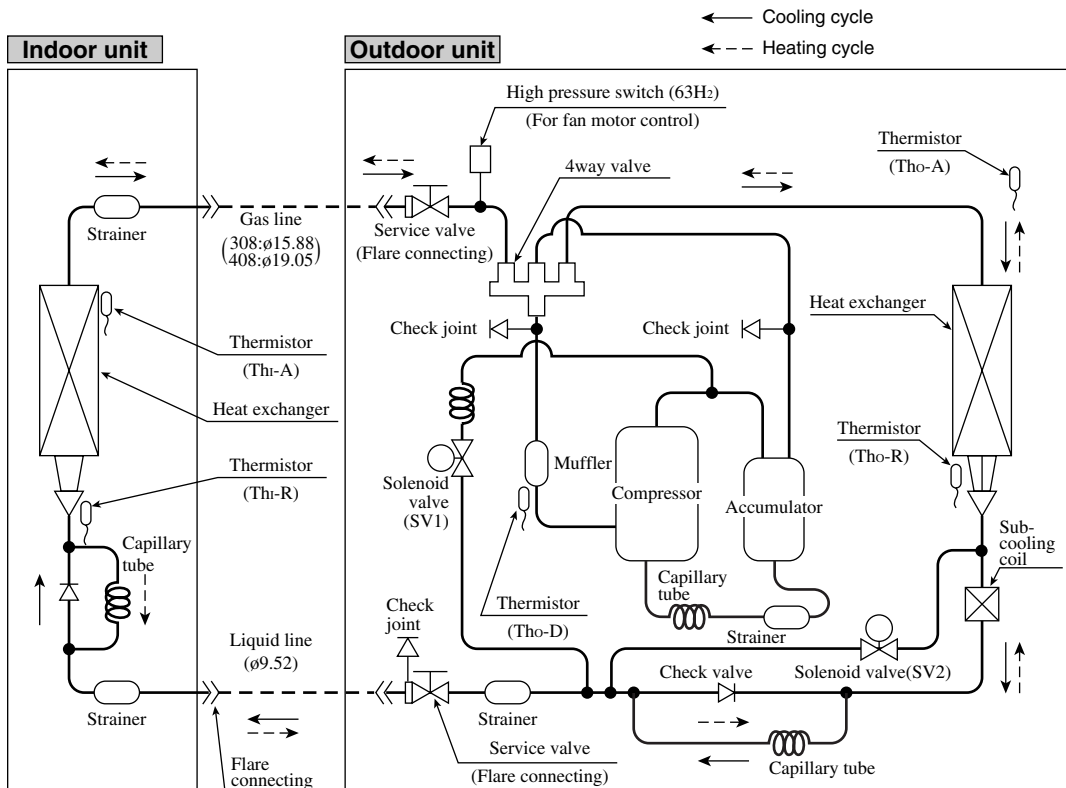


## 9.2.5 Piping system

Models FDUR208HEN-SA, 258HEN-SA

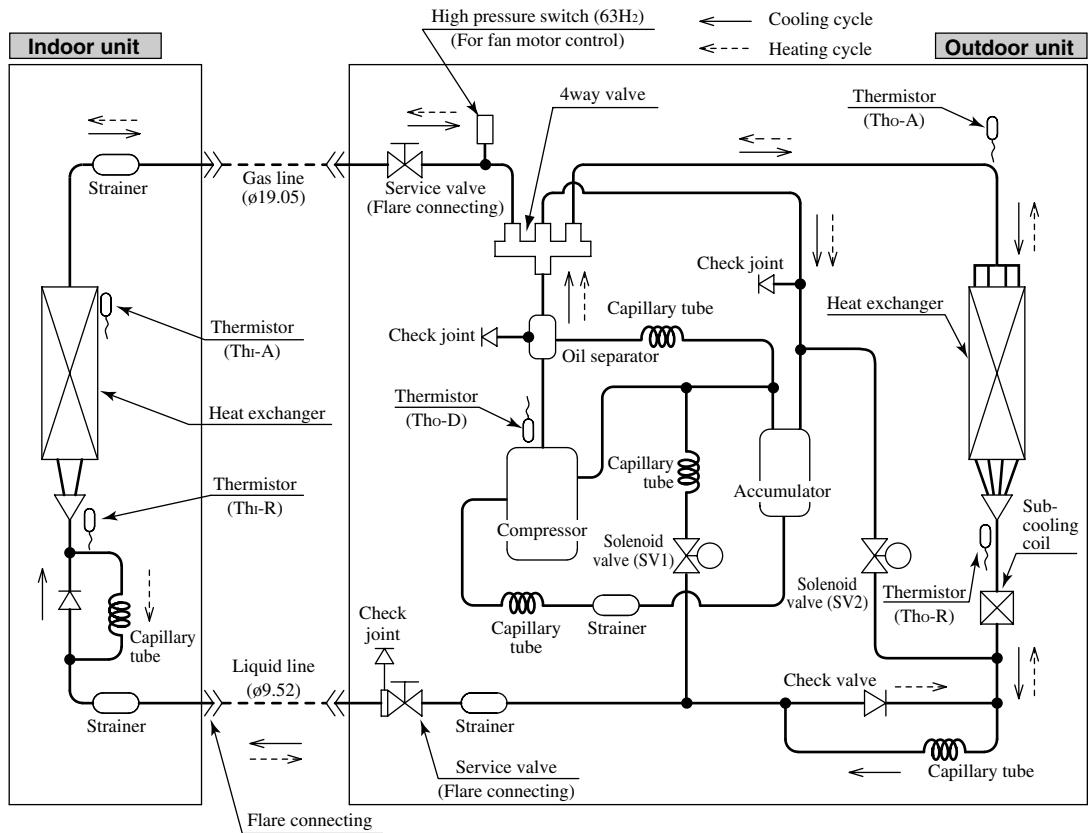


Models FDUR308HEN-SB, 308HES-SB, 408HES-SB

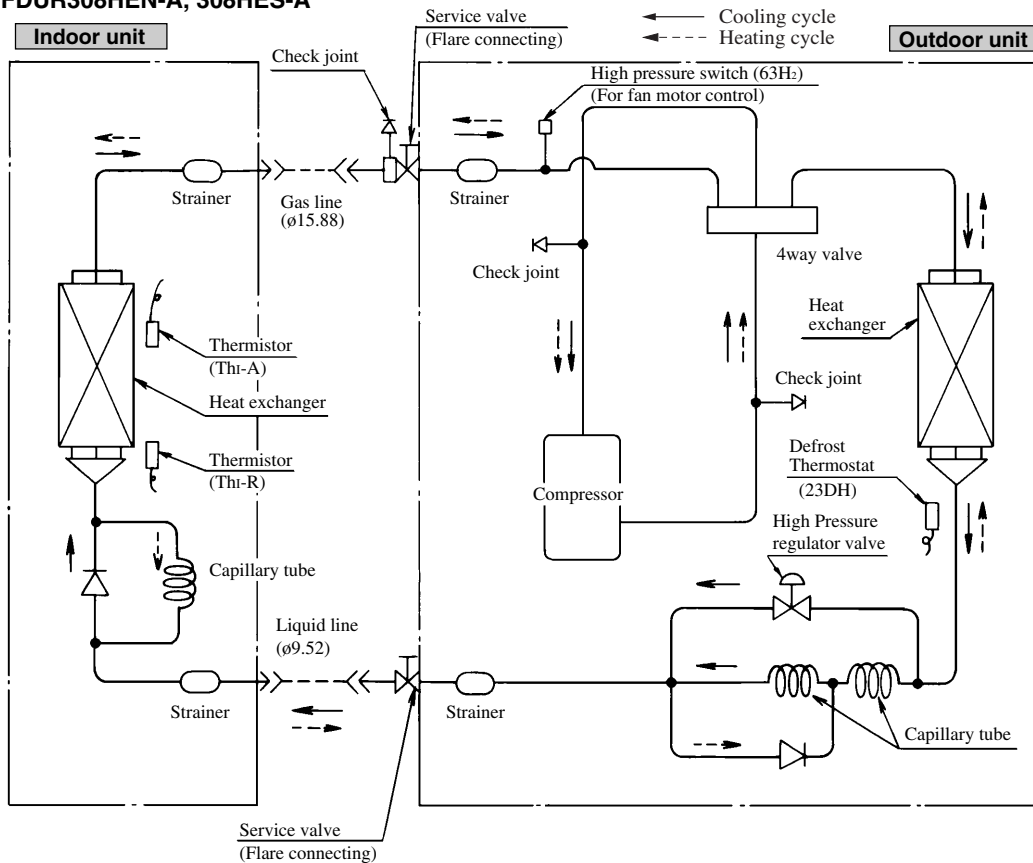




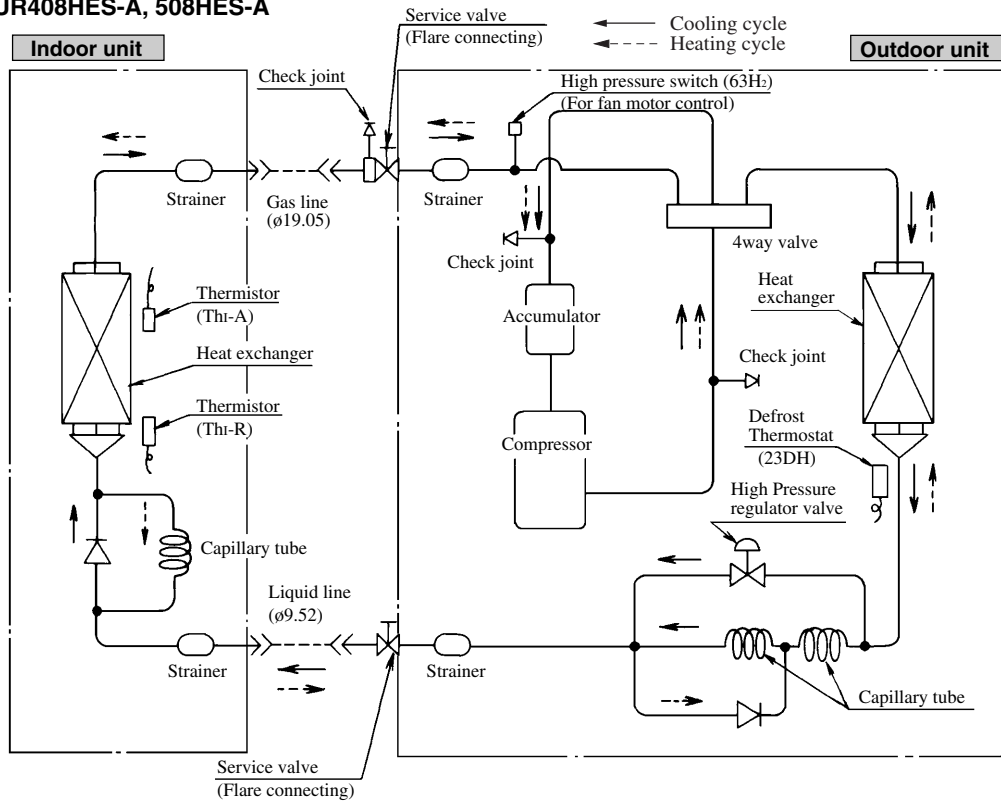
**Model FDUR508HES-SB**



**Models FDUR308HEN-A, 308HES-A**



Models FDUR408HES-A, 508HES-A



Preset point of the protective devices

Parts name	Mark	Equipped unit	FDUR208~508 (FDC208~508)	FDUR308~508 (FDC306~506)
Thermistor (for protection over-loading in heating)	Thi-R	Indoor unit		OFF 68°C ON 61°C
Thermistor (for frost prevention)				OFF 2.5°C ON 10°C
Thermistor (for detecting discharge pipe temp.)	Tho-D	Outdoor unit	OFF 135°C ON 90°C	—
Thermistor (for detecting heat exchange temp.)	Tho-R	Outdoor unit	OFF 70°C ON 60°C	—
Defrost thermostat	23DH <sub>2</sub>	Outdoor unit	—	OFF 12°C
	23DH <sub>1</sub>			ON -6°C
High pressure switch (for controlling FM <sub>0</sub> )	63H <sub>2</sub>	Outdoor unit	OFF 2.50MPa ON 2.06MPa	OFF 2.50MPa ON 1.86MPa

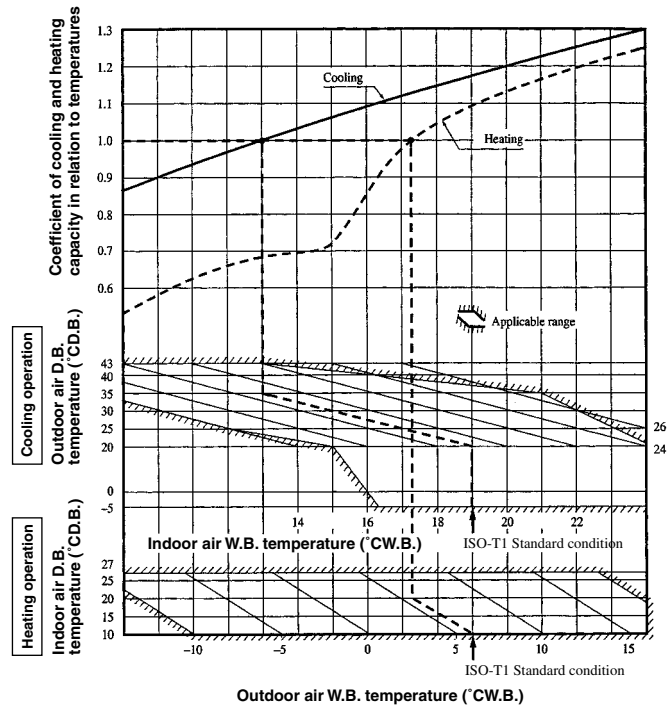
## 9.2.6 Selection chart

Correct the cooling and heating capacity in accordance with the conditions as follows. The net cooling and heating capacity can be obtained in the following way.

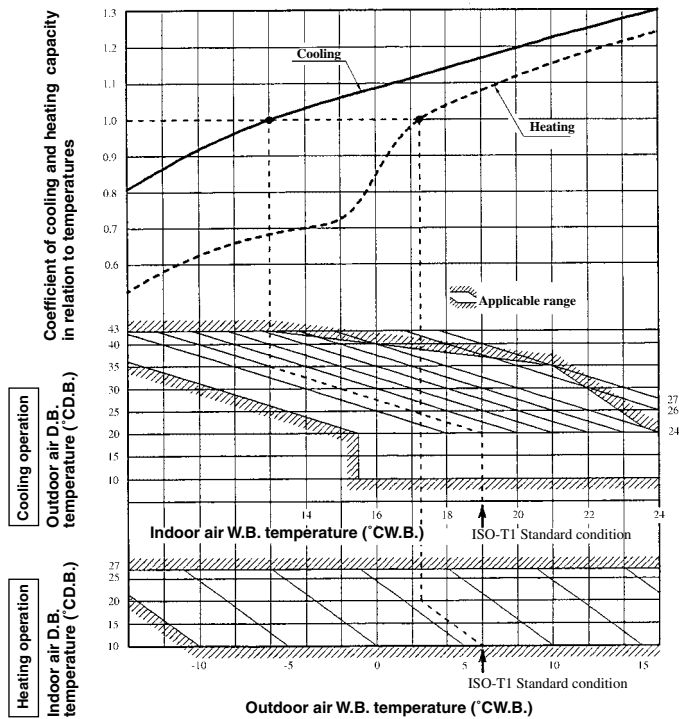
**Net capacity = Capacity shown on specification × Correction factors as follows.**

### (1) Coefficient of cooling and heating capacity in relation to temperatures

#### (a) FDC208~508



#### (b) FDC306HEN3



(c) FDC306HES3~506HES3

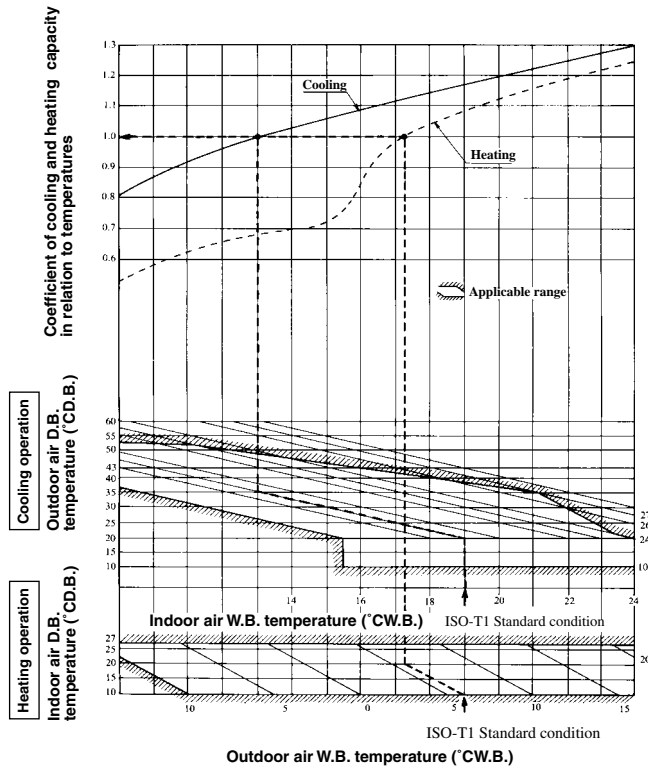


Table of bypass factor

Model		FDUR208	FDUR258	FDUR308	FDUR408	FDUR508
Air flow	Hi	0.111	0.053	0.069	0.106	0.050
	Lo	0.083	0.037	0.049	0.079	0.034

- (2) Correction of cooling and heating capacity in relation to air flow rate control (fan speed)  
 Coefficient: 1.00 at High, 0.95 at Low

### (3) Correction of cooling and heating capacity in relation to one way length of refrigerant piping

It is necessary to correct the cooling and heating capacity in relation to the one way equivalent piping length between the indoor and outdoor units.

50/60Hz

Equivalent piping length <sup>(1)</sup> m		7.5	10	15	20	25	30	35	40	45	50	55
Heating		1.0	1.0	1.0	1.0	1.0	0.998	0.998	0.993	0.993	0.988	0.988
Cooling	FDUR208	1.0	0.998	0.998	0.993	0.988	0.988	0.983	—	—	—	—
	FDUR258	1.0	0.998	0.993	0.988	0.983	0.978	0.973	—	—	—	—
	FDUR308 (FDC308)	1.0	0.995	0.985	0.975	0.965	0.955	0.945	0.935	0.925	0.915	0.905
	FDUR408 (FDC408)	1.0	0.998	0.99	0.985	0.975	0.97	0.96	0.955	0.945	0.94	0.93
	FDUR508 (FDC508)	1.0	0.995	0.98	0.97	0.955	0.945	0.93	0.92	0.905	0.895	0.88
	FDUR308 (FDC306)	1.0	0.995	0.985 /0.98	0.975 /0.97	0.965 /0.955	0.955 /0.945	0.945 /0.93	—	—	—	—
	FDUR408 (FDC406)	1.0	0.998 /0.995	0.99 /0.985	0.985 /0.975	0.975 /0.965	0.97 /0.955	0.96 /0.945	—	—	—	—
	FDUR508 (FDC506)	1.0	0.995 /0.99	0.98 /0.975	0.97 /0.96	0.955 /0.945	0.945 /0.93	0.93 /0.915	—	—	—	—

Note (1) Equivalent piping length can be obtained by calculating as follows.

208, 258, 308 series [φ15.88(5/8")]: Equivalent piping length = Real piping length + (0.10 × Number of bends in piping)

408, 508, series [φ19.05(3/4")]: Equivalent piping length = Real piping length + (0.15 × Number of bends in piping)

[Equivalent piping length < Limitation length of piping + 5m]

(4) When the outdoor unit is located at a lower height than the indoor unit in cooling operation and when the outdoor unit is located at a higher height than the indoor unit in heating operation, the following values should be subtracted from the values in the above table.

Height difference between the indoor unit and outdoor unit in the vertical height difference	5m	10m	15m	20m	25m	30m
Adjustment coefficient	0.01	0.02	0.03	0.04	0.05	0.06

#### Piping length limitations

Item	Model	FDUR208, 258 (FDC208, 258)	FDUR308~508 (FDC308~508)	FDUR308~508 (FDC306~506)
Max. one way piping length		30m	50m	30m
Max. vertical height difference		Outdoor unit is higher 20m Outdoor unit is lower 15m	Outdoor unit is higher 30m Outdoor unit is lower 15m	15m

Note (1) Values in the table indicate the one way piping length between the indoor and outdoor units.

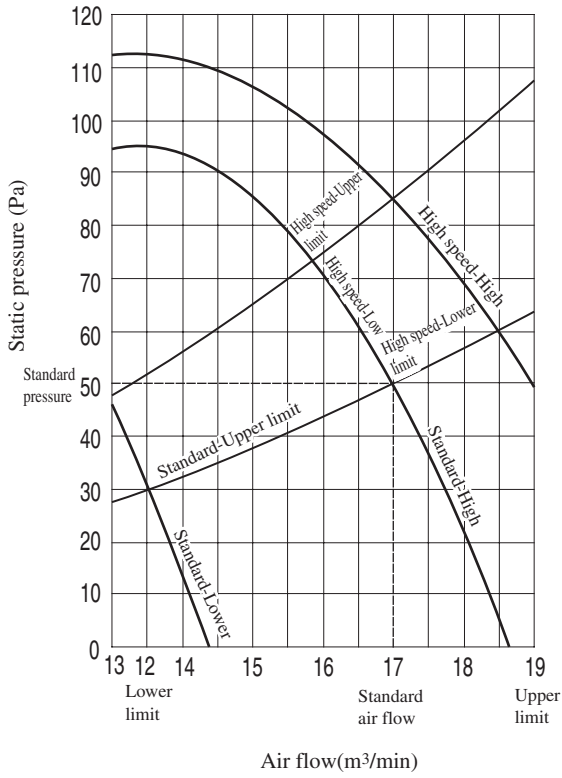
#### How to obtain the cooling and heating capacity

Example : The net cooling capacity of the model FDUR308HEN-SB with the air flow "High", the piping length of 15m, the outdoor unit located 5m lower than the indoor unit, indoor wet-bulb temperature at 19.0 °C and outdoor dry-bulb temperature 35 °C is

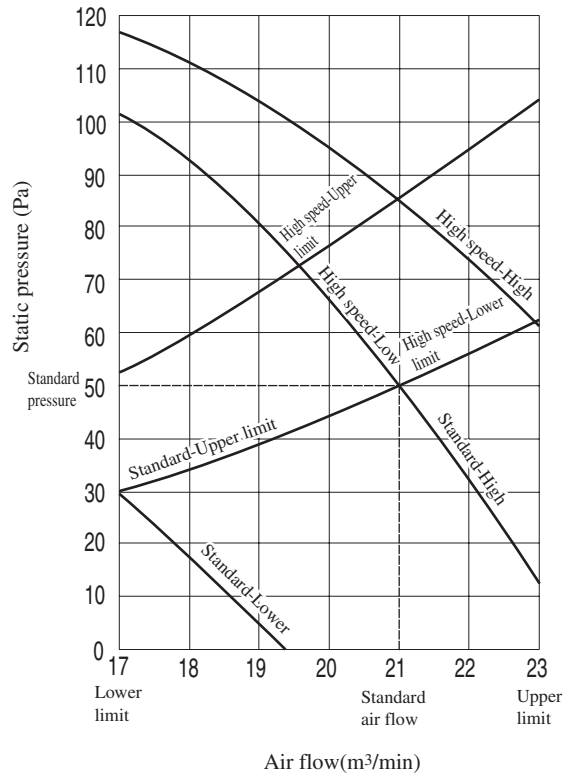
$$\text{Net cooling capacity} = \underset{\substack{\uparrow \\ \text{FDUR308HEN-SB}}}{7100} \times \underset{\substack{\uparrow \\ \text{Air flow "High"}}}{1.00} \times \underset{\substack{\uparrow \\ \text{Length 15m.} \\ \text{Height difference 5 m}}}{(0.985 - 0.01)} \times \underset{\substack{\uparrow \\ \text{Factor by air} \\ \text{temperatures}}}{1.0} = 6923 \text{ w}$$

## 9.2.7 Characteristics of fan

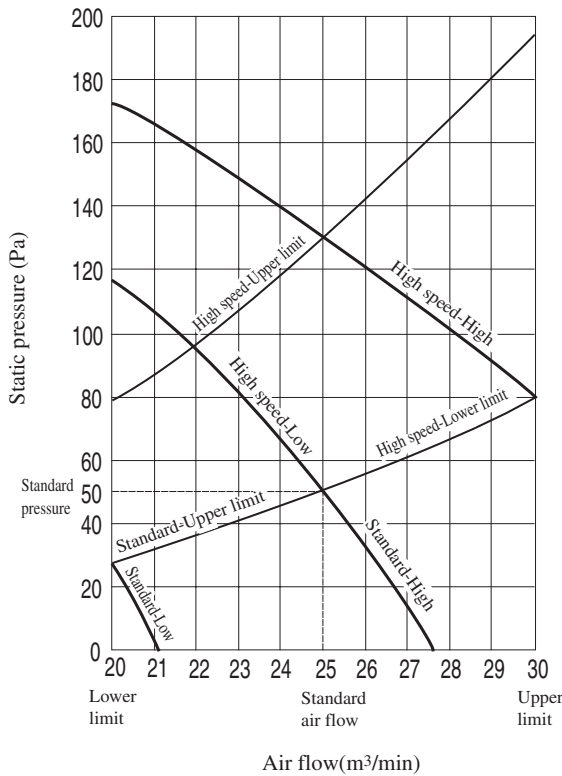
**Model FDUR208-A**



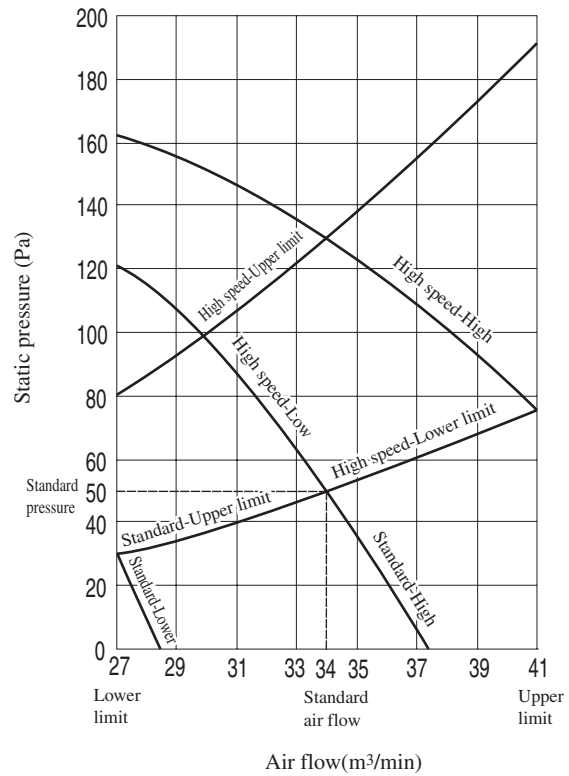
**Model FDUR258-A**



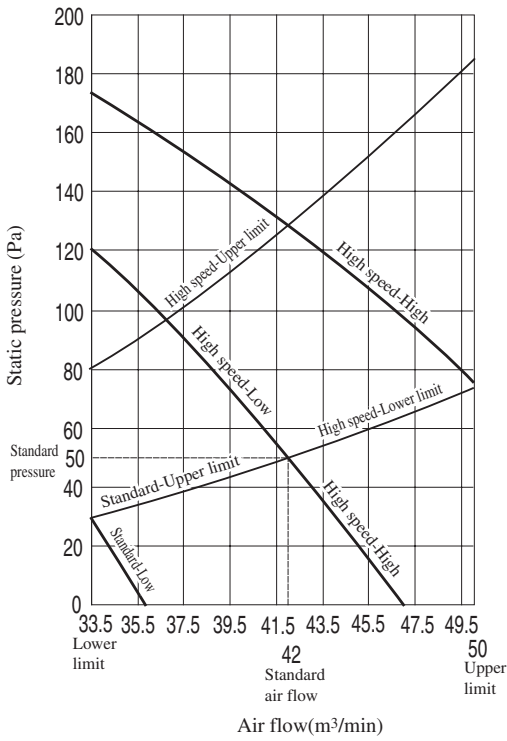
**Model FDUR308-A**



**Model FDUR408-A**



**Model FDUR508-A**



**9.2.8 Noise level**

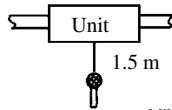
Notes (1) The data are based on the following conditions.

- Ambient air temperature:
  - Indoor unit 27°C DB, 19°C WB.
  - Outdoor unit 35°C DB.

**Indoor unit**

Measured based on JIS B 8616

Mike position as below



Mike (center & low points)

**Outdoor unit**

Measured based on JIS B 8616

Mike position: at highest noise level  
in position as below

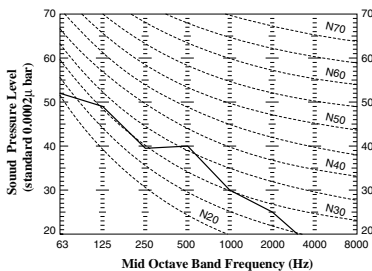
- Distance from front side 1 m
- Height 1 m

- (2) The data in the chart are measured in an anechoic room.
- (3) The noise levels measured in the field are usually higher than the data because of reflection.

**(1) Indoor unit**

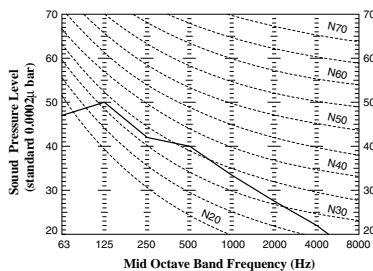
**Model FDUR208-A**

Noise level 40 dB (A) at HIGH  
36 dB (A) at LOW



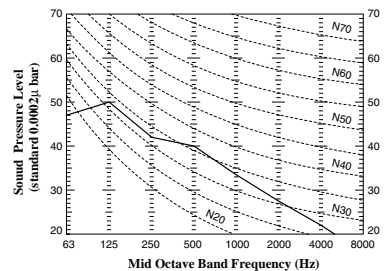
**Model FDUR258-A**

Noise level 41 dB (A) at HIGH  
37 dB (A) at LOW



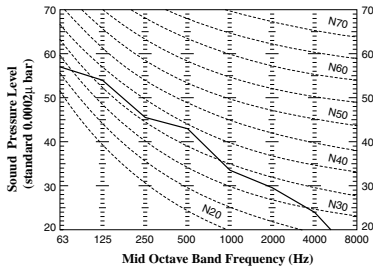
**Model FDUR308-A**

Noise level 41 dB (A) at HIGH  
37 dB (A) at LOW



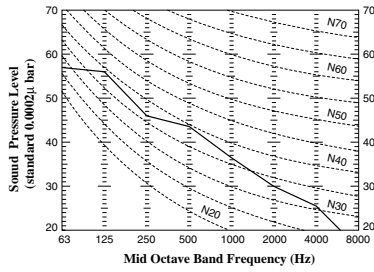
**Model FDUR408-A**

Noise level 44 dB (A) at HIGH  
40 dB (A) at LOW



**Model FDUR508-A**

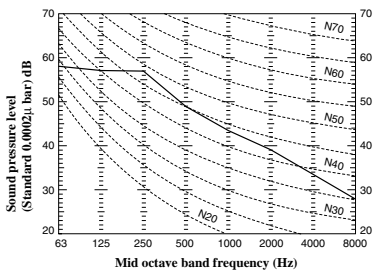
Noise level 45 dB (A) at HIGH  
41 dB (A) at LOW



**(2) Outdoor unit**

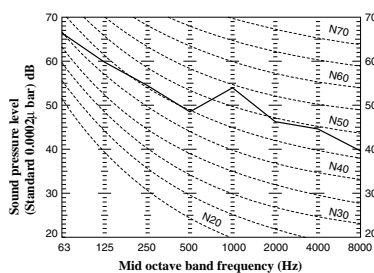
**Model FDC208HEN3A**

Noise level 52 dB (A)



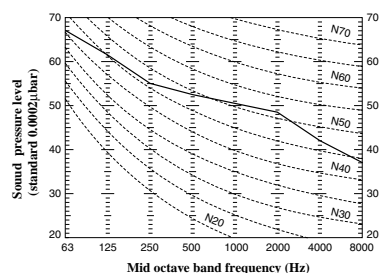
**Model FDC258HEN3A**

Noise level 52 dB (A)



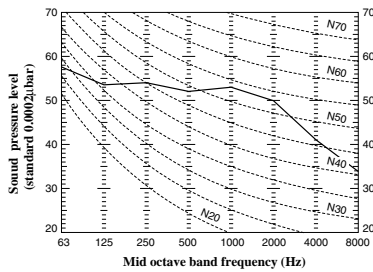
**Models FDC308HEN3B, 308HES3B**

Noise level 52 dB (A)



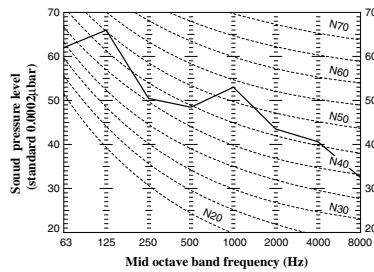
**Model FDC306HEN3**

Noise level 56 dB (A)



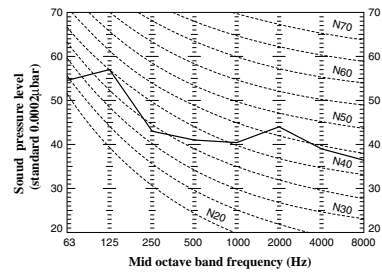
**Model FDC306HES3**

Noise level 56 dB (A)



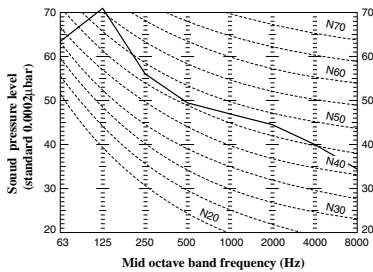
**Model FDC408HES3B**

Noise level 54 dB (A)



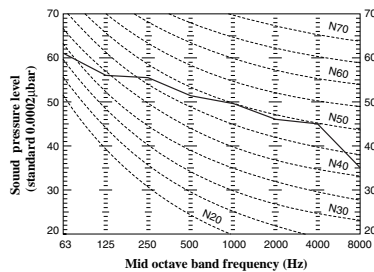
**Model FDC406HES3**

Noise level 57 dB (A)



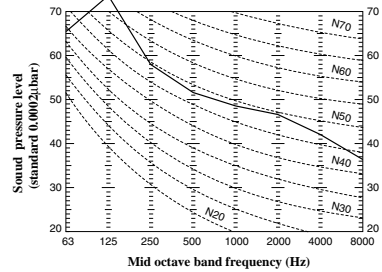
**Model FDC508HES3B**

Noise level 55 dB (A)



**Model FDC506HES3**

Noise level 59 dB (A)



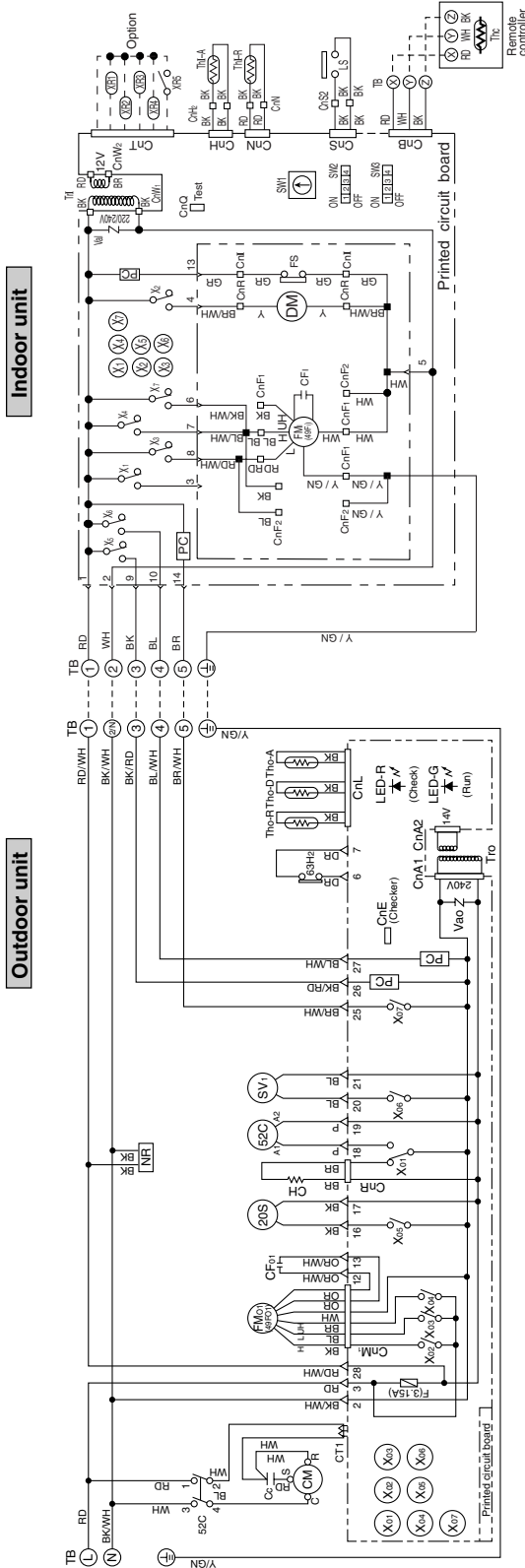


# 9.3 ELECTRICAL DATA

## 9.3.1 Electrical wiring

Models FDUR208HEN-SA, 258HEN-SA

Power source  
1 Phase 220/240V 50Hz



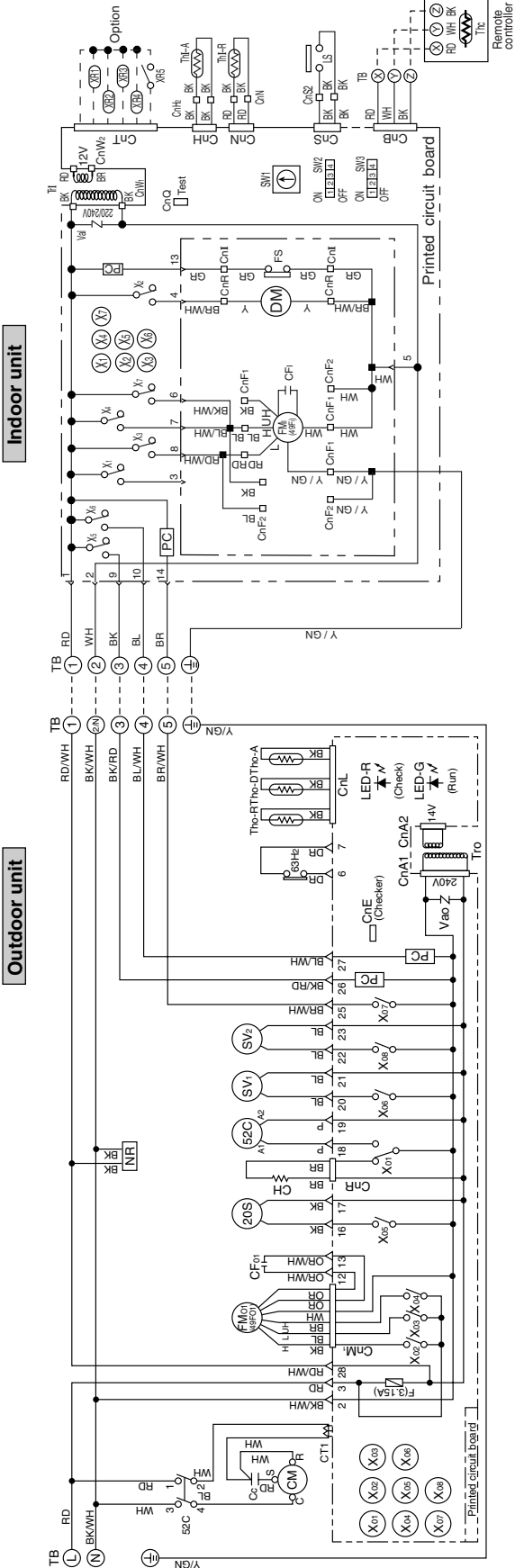
### Meaning of marks

Mark	Parts name	Mark	Parts name
CC	Capacitor for CM	Th-R	Thermistor
CF1	Capacitor for FM1	Th-A	Thermistor
CF2	Capacitor for FM2	Th-D	Thermistor
CH	Crankcase heater	Th-O	Thermistor
CM	Compressor motor	Tri	Transformer (Indoor unit)
CnA ~ W	Connector (□ mark)	TrO	Transformer (Outdoor unit)
CT1	Current sensor	Val	Valve
F	Fuse	Vao	4-way valve solenoid
FM1	Fan motor (Indoor unit)	20S	Internal thermostat for FM1
FM2	Fan motor (Outdoor unit)	49F1	Internal thermostat for FM2
NR	Surge suppressor	49F2	Magnetic contactor for CM
PC	Photo coupler	52C	Auxiliary relay
SV1	Solenoid coil (for control)	X11-7	High pressure switch (for control)
SW1	Switch (Address set)	X01-8	Terminal (F)
SW2, 3	Changeover switch	63H2	Connector
TB	Terminal block (○ mark)	△	Indication lamp (Green)
DM	Drain motor	LED-G	Indication lamp (Red)
FS	Float switch	LED-R	
Thc	Thermistor		
Th-A	Thermistor		

### Color mark

Mark	Color	Mark	Color
BK	Black	Y	Yellow
BL	Blue	BK/RD	Black/Red
BR	Brown	BK/WH	Black/White
GR	Gray	BL/WH	Blue/White
OR	Orange	BR/WH	Brown/White
P	Pink	OR/WH	Orange/White
RD	Red	RD/WH	Red/White
WH	White	Y/GN	Yellow/Green

Power source  
1 Phase 220/240V 50Hz



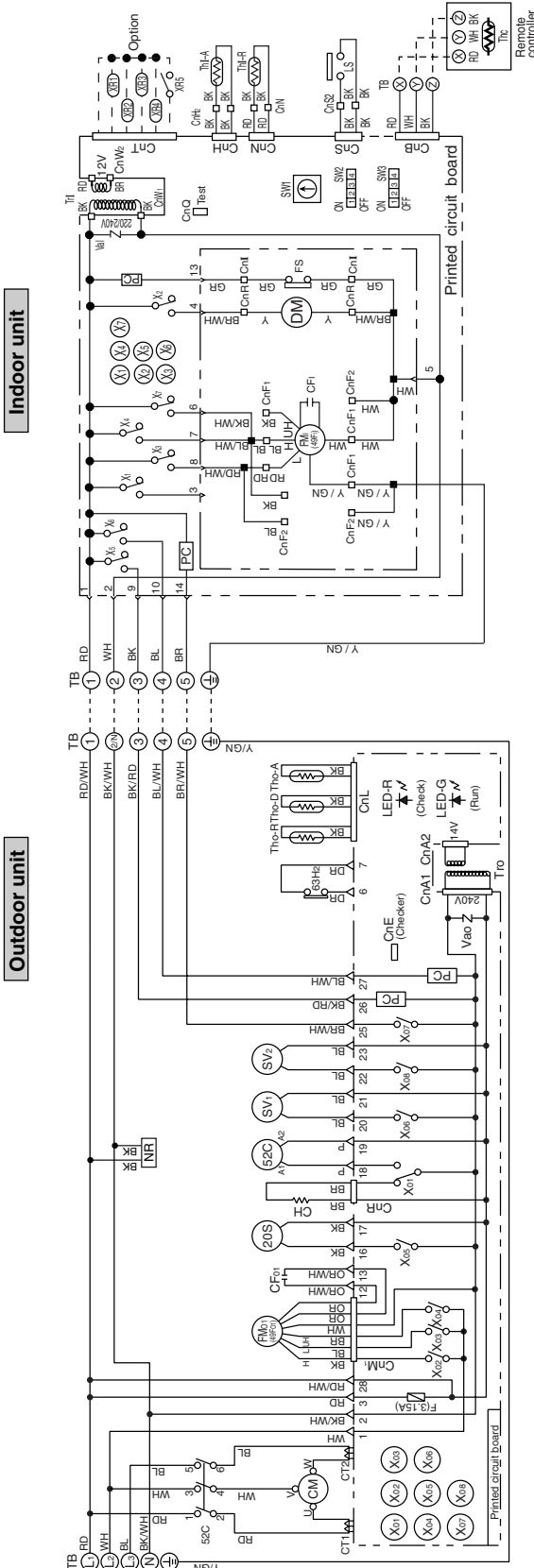
Meaning of marks

Mark	Parts name	Mark	Parts name
CC	Capacitor for CM	Th-R	Thermistor
CF1	Capacitor for FM1	Tho-A	Thermistor
CF0	Capacitor for FM0	Tho-D	Thermistor
CH	Crankcase heater	Tho-R	Thermistor
CM	Compressor motor	Tri	Transformer (Indoor unit)
CnA ~ W	Connector (□ mark)	Tr0	Transformer (Outdoor unit)
CT1	Current sensor	Val	Valve
F	Fuse	Vao	Variator
FM1	Fan motor (Indoor unit)	20S	4-way valve solenoid
FM0	Fan motor (Outdoor unit)	49F1	Internal thermostat for FM1
NR	Surge suppressor	49F0	Internal thermostat for FM0
PC	Photo coupler	52C	Magnetic contactor for CM
SV1,2	Solenoid coil (for control)	X11-7	Auxiliary relay
SW1	Switch (Address set)	X01-8	Auxiliary relay
SW2, 3	Changeover switch	63H2	High pressure switch (for control)
DM	Drain motor	▽	Terminal (F)
TB	Terminal block (○ mark)	□	Connector
FS	Float switch	LED-G	Indication lamp (Green)
Thc	Thermistor	LED-R	Indication lamp (Red)
Thr-A	Thermistor		

Color mark

Mark	Color	Mark	Color
BK	Black	Y	Yellow
BL	Blue	BK/RD	Black/Red
BR	Brown	BK/WH	Black/White
GR	Gray	BL/WH	Blue/White
OR	Orange	BR/WH	Brown/White
P	Pink	OR/WH	Orange/White
RD	Red	RD/WH	Red/White
WH	White	Y/GN	Yellow/Green

Power source  
3 Phase 380/415V 50Hz



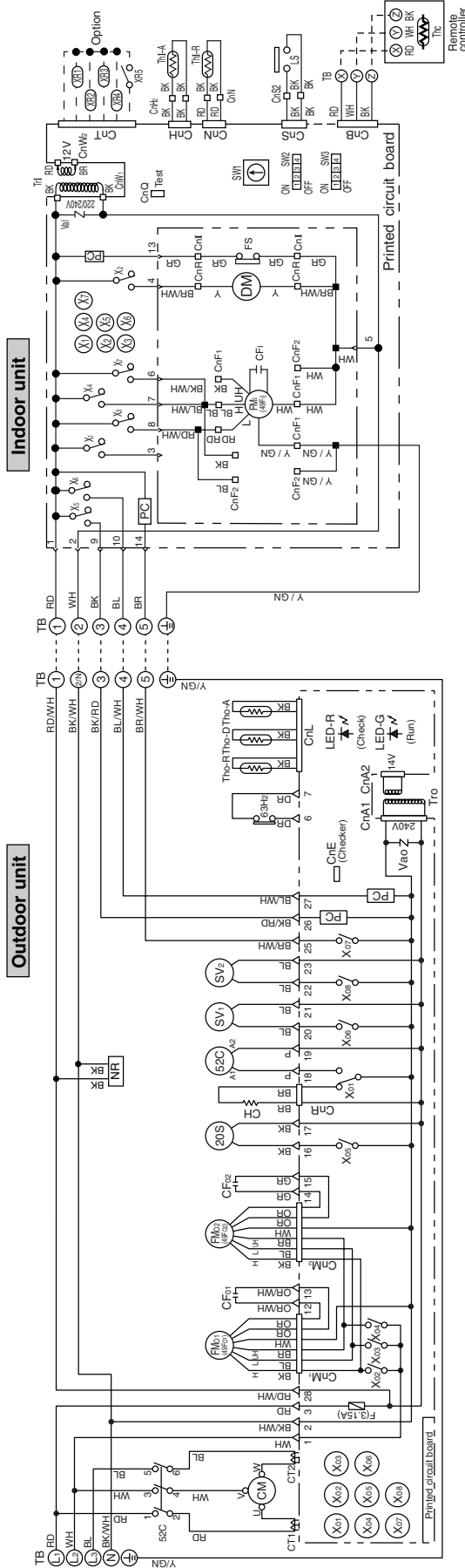
Meaning of marks

Mark	Parts name	Mark	Parts name
CF1	Capacitor for FMI	Th-R	Thermistor
CFo1	Capacitor for FMo	Tho-A	Thermistor
CH	Crankcase heater	Tho-D	Thermistor
CM	Compressor motor	Tho-R	Thermistor
CnA ~ Z	Connector (□ mark)	Tr	Transformer (Indoor unit)
CT <sub>1,2</sub>	Current sensor	TrO	Transformer (Outdoor unit)
F	Fuse	Val	Valve
FMI	Fan motor (Indoor unit)	Vao	Varistor
FMo1	Fan motor (Outdoor unit)	20S	4-way valve solenoid
NR	Surge suppressor	49FI	Internal thermostat for FMI
DM	Drain motor	49Fo1	Internal thermostat for FMo
FS	Float switch	52C	Magnetic contactor for CM
PC	Photo coupler	X1 ~ 7	Auxiliary relay
SV <sub>1,2</sub>	Solenoid coil (for control)	Xo1-08	Auxiliary relay
SW1	Switch (Address set)	63Hz	High pressure switch (for control)
SW2, 3	Changeover switch	Terminal (F)	Terminal (F)
Tb	Terminal block (□ mark)	LED-G	Indication lamp (Green)
Thec	Thermistor	LED-R	Indication lamp (Red)
Thi-A	Thermistor		

Color mark

Mark	Color	Mark	Color
BK	Black	Y	Yellow
BL	Blue	BK/RD	Black/Red
BR	Brown	BK/WH	Black/White
GR	Gray	BL/WH	Blue/White
OR	Orange	BR/WH	Brown/White
P	Pink	OR/WH	Orange/White
RD	Red	RD/WH	Red/White
WH	White	Y/GN	Yellow/Green

**Power source**  
3 Phase 380/415V 50Hz



**Meaning of marks**

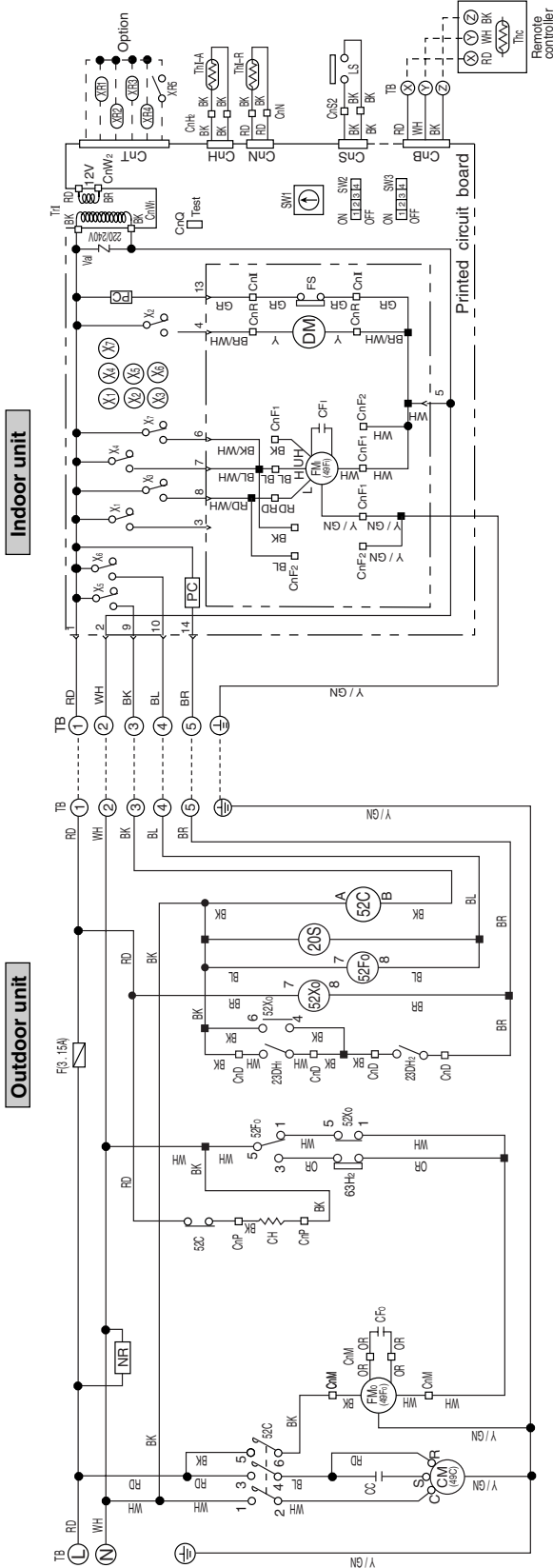
Mark	Parts name	Mark	Parts name
CF1	Capacitor for FMI	Th-R	Thermistor
CF01,2	Capacitor for FMO	Tho-A	Thermistor
CH	Crankcase heater	Tho-R	Thermistor
CM	Compressor motor	Tr1	Transformer (Indoor unit)
CnA ~ Z	Connector (□ mark)	Tr0	Transformer (Outdoor unit)
CT1,2	Current sensor	Val	Valve
F	Fuse	Vao	Variator
FM1	Fan motor (Indoor unit)	20S	4-way valve solenoid
FM01,2	Fan motor (Outdoor unit)	49F1	Internal thermostat for FM1
NR	Surge suppressor	49F01,2	Internal thermostat for FMO
DM	Drain motor	52C	Magnetic contactor for CM
FS	Float switch	X1-7	Auxiliary relay
PC	Photo coupler	X01-08	Auxiliary relay
SV1,2	Solenoid coil (for control)	63H2	High pressure switch (for control)
SW1	Switch (Address set)	▽	Terminal (F)
SW2,3	Changeover switch	□	Connector
TB	Terminal block (○ mark)	LED-G	Indication lamp (Green)
Thc	Thermistor	LED-R	Indication lamp (Red)
Th-A	Thermistor		

**Color mark**

Mark	Color	Mark	Color
BK	Black	Y	Yellow
BL	Blue	BK/RD	Black/Red
BR	Brown	BL/WH	Blue/White
GR	Gray	BR/WH	Brown/White
OR	Orange	OR/WH	Orange/White
P	Pink	RD/WH	Red/White
RD	Red	Y/GN	Yellow/Green
WH	White		

Model FDUR308HEN-A

Power source  
1 Phase 220/240V 50Hz



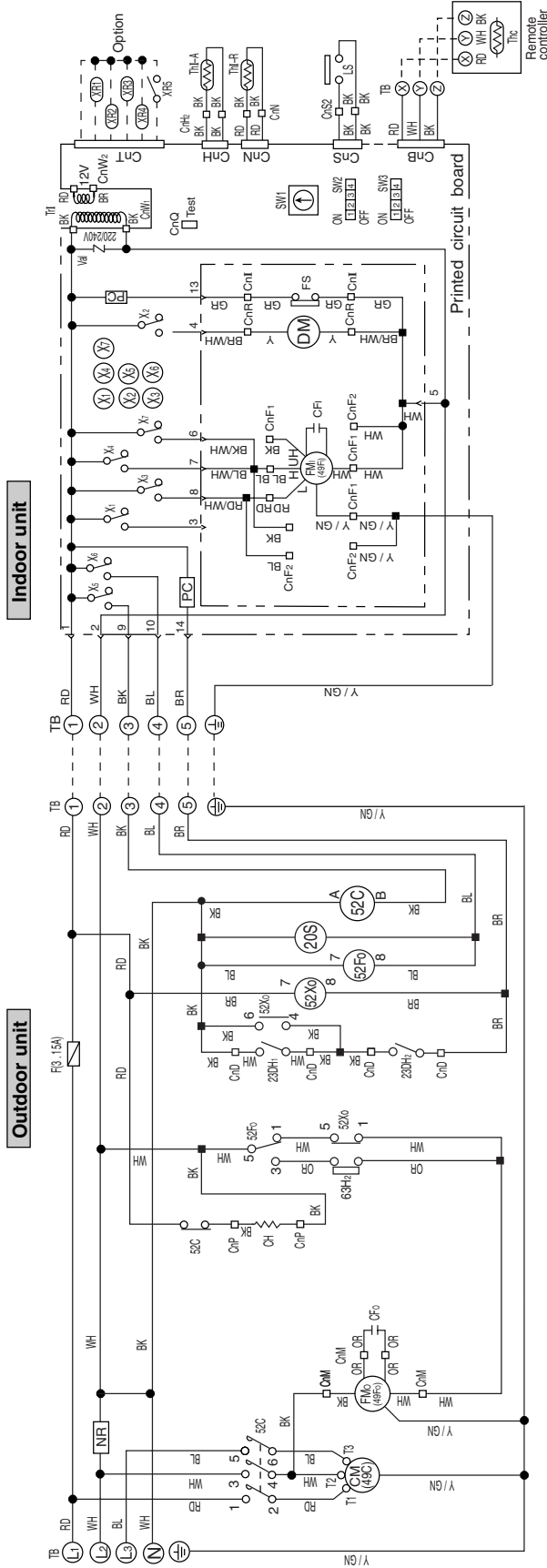
Meaning of marks

Mark	Parts name	Mark	Parts name
CC	Capacitor for CM	Th-A	Thermistor
CF1	Capacitor for FM1	Th-R	Thermistor
CFo	Capacitor for FMo	Tr	Transformer
CH	Crankcase heater	Val	Valve
CM	Compressor motor	20S	4-way valve solenoid
CnA ~ W	Connector (□ mark)	23DH	Thermostat (deicer)
DM	Drain motor	49C	Internal thermostat for CM
F	Fuse	49F1	Internal thermostat for FM1
FMI	Fan motor (Indoor unit)	49Fo	Internal thermostat for FMo
FMo	Fan motor (Outdoor unit)	52C	Magnetic contactor for CM
FS	Float switch	52Fo	Relay for FMo
NR	Surge suppressor	X1-7	Relay for fan control
PC	Photo coupler	SW1	Auxiliary relay
SW1	Switch (Address set)	SW2, 3	High pressure switch (for control)
SW2, 3	Changeover switch	TB	Terminal block (○ mark)
TB	Terminal block (○ mark)	Thc	Thermistor
Thc	Thermistor		

Color mark

Mark	Color	Mark	Color
BK	Black	BK/RD	Black/Red
BL	Blue	BK/WH	Black/White
BR	Brown	BL/WH	Blue/White
GR	Gray	BR/WH	Brown/White
OR	Orange	OR/WH	Orange/White
RD	Red	RD/WH	Red/White
WH	White	Y/GRN	Yellow/Green
Y	Yellow		

Power Source  
3 Phase 380-415V 50Hz / 380V 60Hz



Meaning of marks

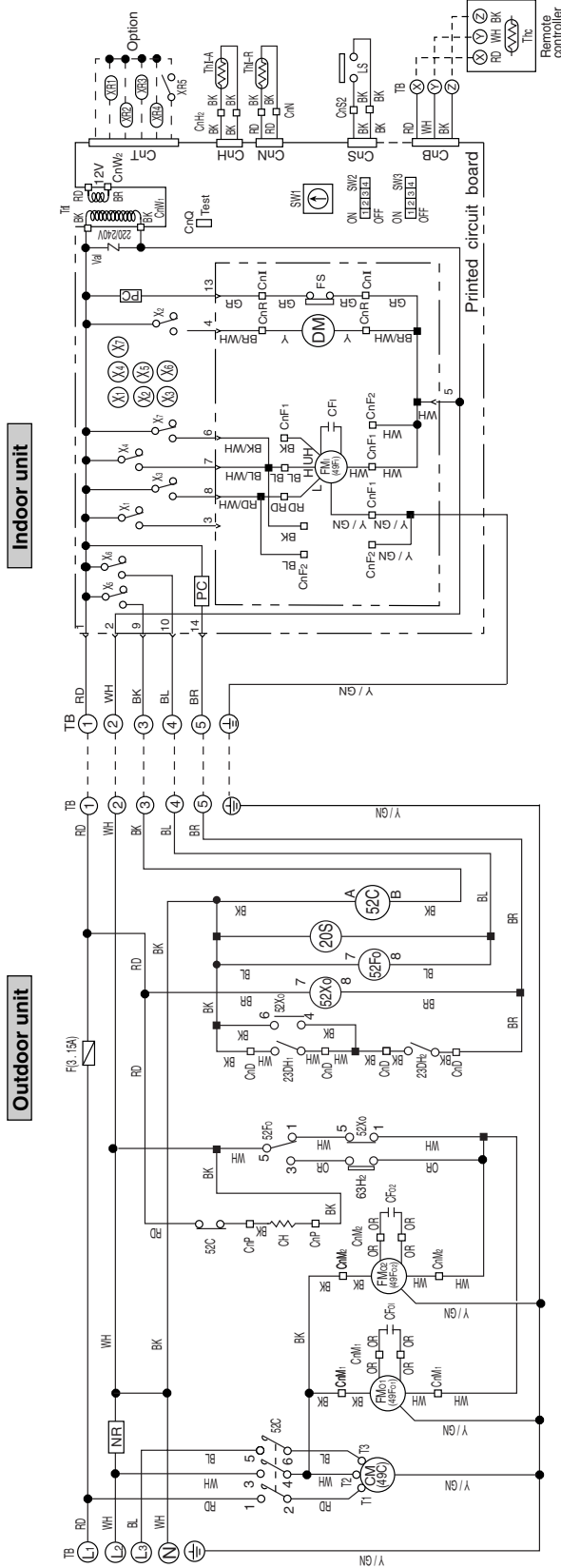
Mark	Parts name	Mark	Parts name
CF1	Capacitor for FMi	Th-A	Thermistor
CFo	Capacitor for FMo	Th-R	Thermistor
CH	Crankcase heater	Trl	Transformer
CM	Compressor motor	Val	Valvistor
CnA ~ W	Connector (□ mark)	20S	4-way valve solenoid
DM	Drain motor	23DH	Thermostat (deicer)
F	Fuse	49C	Internal thermostat for CM
FMi	Fan motor (Indoor unit)	49Fi	Internal thermostat for FMi
FMo	Fan motor (Outdoor unit)	49Fo	Internal thermostat for FMo
FS	Float switch	52C	Magnetic contactor for CM
NR	Surge suppressor	52Fo	Relay for FMo
PC	Photo coupler	52Xo	Relay for fan control
SW1	Switch (Address set)	X1-7	Auxiliary relay
SW2, 3	Changeover switch	63Hz	High pressure switch (for control)
TB	Terminal block (○ mark)	◁	Terminal (F)
Thc	Thermistor	■	Connector

Color mark

Mark	Color	Mark	Color
BK	Black	BK/RD	Black/Red
BL	Blue	BK/WH	Black/White
BR	Brown	BL/WH	Blue/White
GR	Gray	BR/WH	Brown/White
OR	Orange	OR/WH	Orange/White
RD	Red	RD/WH	Red/White
WH	White	Y/GN	Yellow/Green
Y	Yellow		

Models **FDUR408HES-A, 508HES-A**

**Power Source**  
3 Phase 380~415V 50Hz / 380V 60Hz



**Meaning of marks**

Mark	Parts name	Mark	Parts name
CF1	Capacitor for FMI	Th-A	Thermistor
CF01,2	Capacitor for FMO	Th-R	Thermistor
CH	Crankcase heater	Tr	Transformer
CM	Compressor motor	Val	Valve
CnA ~ W	Connector (C mark)	20S	4-way valve solenoid
DM	Drain motor	23DH	Thermostat (deicer)
F	Fuse	49C	Internal thermostat for CM
FMI	Fan motor (Indoor unit)	49F1	Internal thermostat for FMI
FM01,2	Fan motor (Outdoor unit)	49F01,2	Internal thermostat for FMO
FS	Float switch	52C	Magnetic contactor for CM
NR	Surge suppressor	52Fo	Relay for FMO
PC	Photo coupler	52Xo	Relay for fan control
SW1	Switch (Address set)	X1~7	Auxiliary relay
SW2, 3	Changeover switch	63H2	High pressure switch (for control)
TB	Terminal block (O mark)	◁	Terminal (F)
Thc	Thermistor	■	Connector

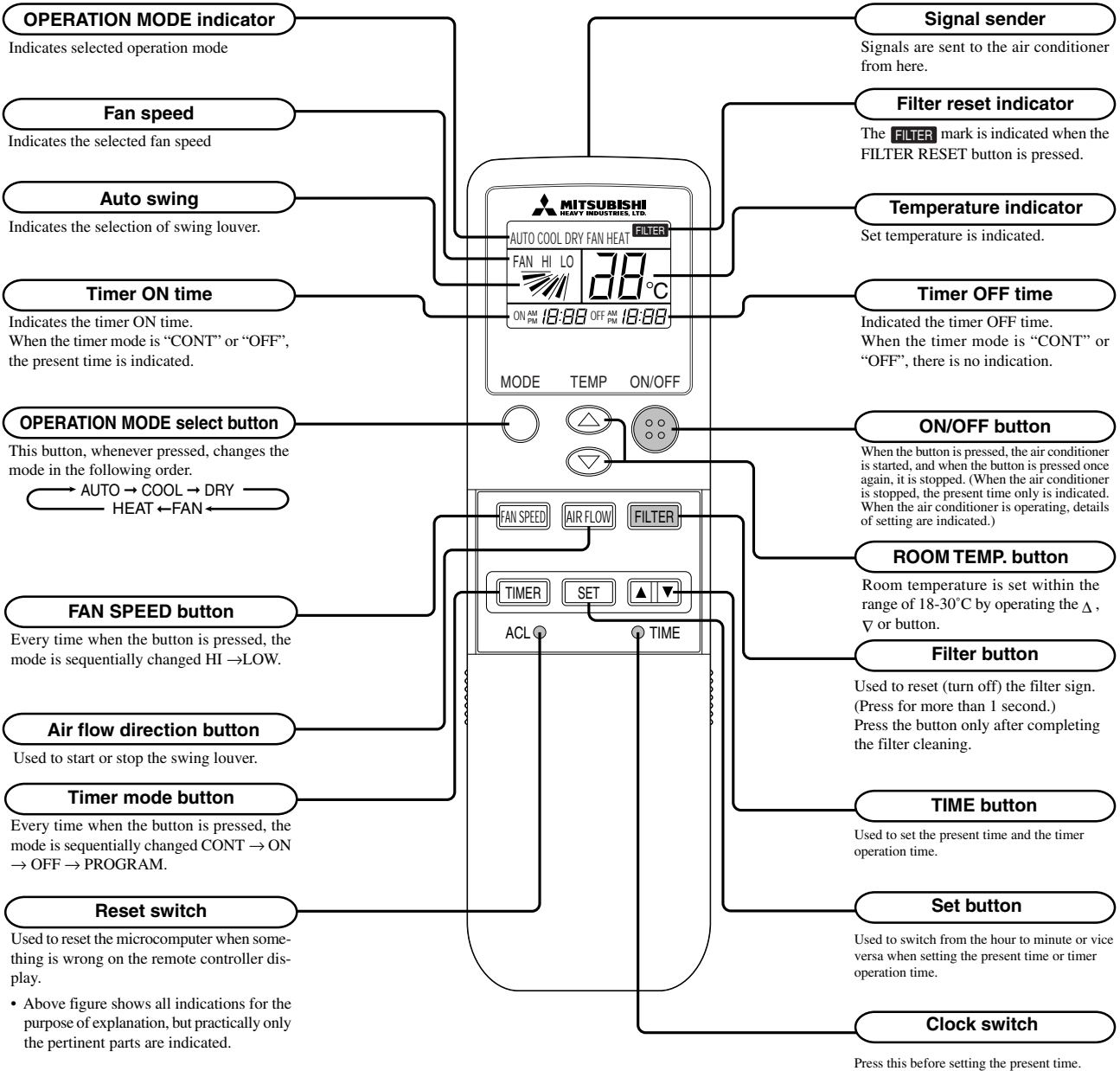
**Color mark**

Mark	Color	Mark	Color
BK	Black	BK/RD	Black/Red
BL	Blue	BK/WH	Black/White
BR	Brown	BL/WH	Blue/White
GR	Gray	BR/WH	Brown/White
OR	Orange	OR/WH	Orange/White
RD	Red	RD/WH	Red/White
WH	White	Y/GR	Yellow/Green
Y	Yellow		

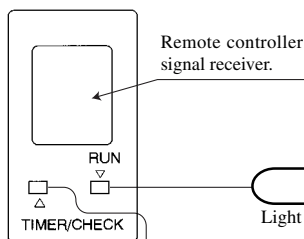
# 9.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

## (1) Wireless remote controller Models FDTN, FDEN, FDKN series

### (a) Remote controller



### (b) Indoor unit indicators Model FDTN series



**RUN LAMP (GREEN)**

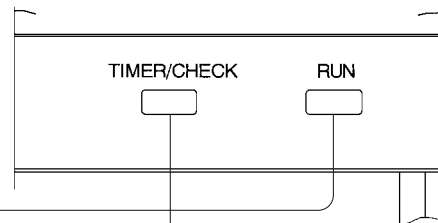
Light up : Air conditioner is operating.

**TIMER/CHECK (YELLOW)**

Light up : Timer mode operating.

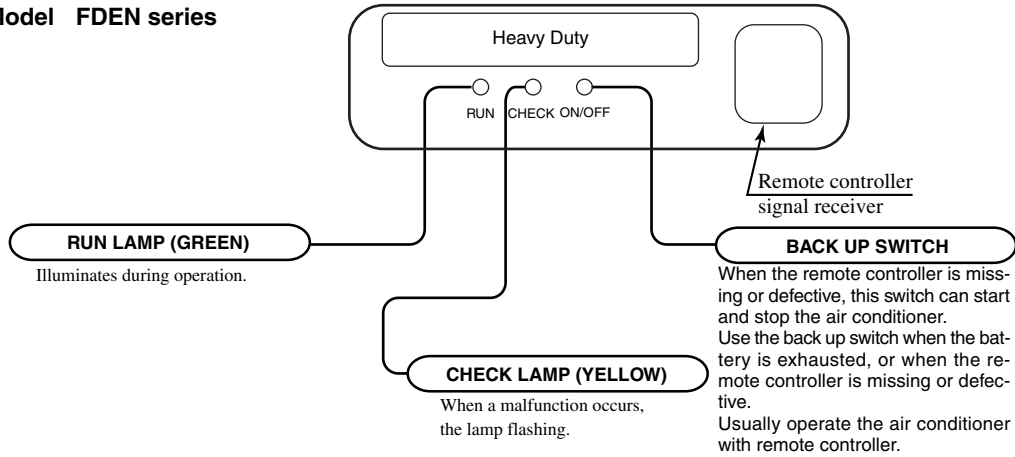
Flashing : When some error occurs.

### Model FDKN series





**Model FDEN series**



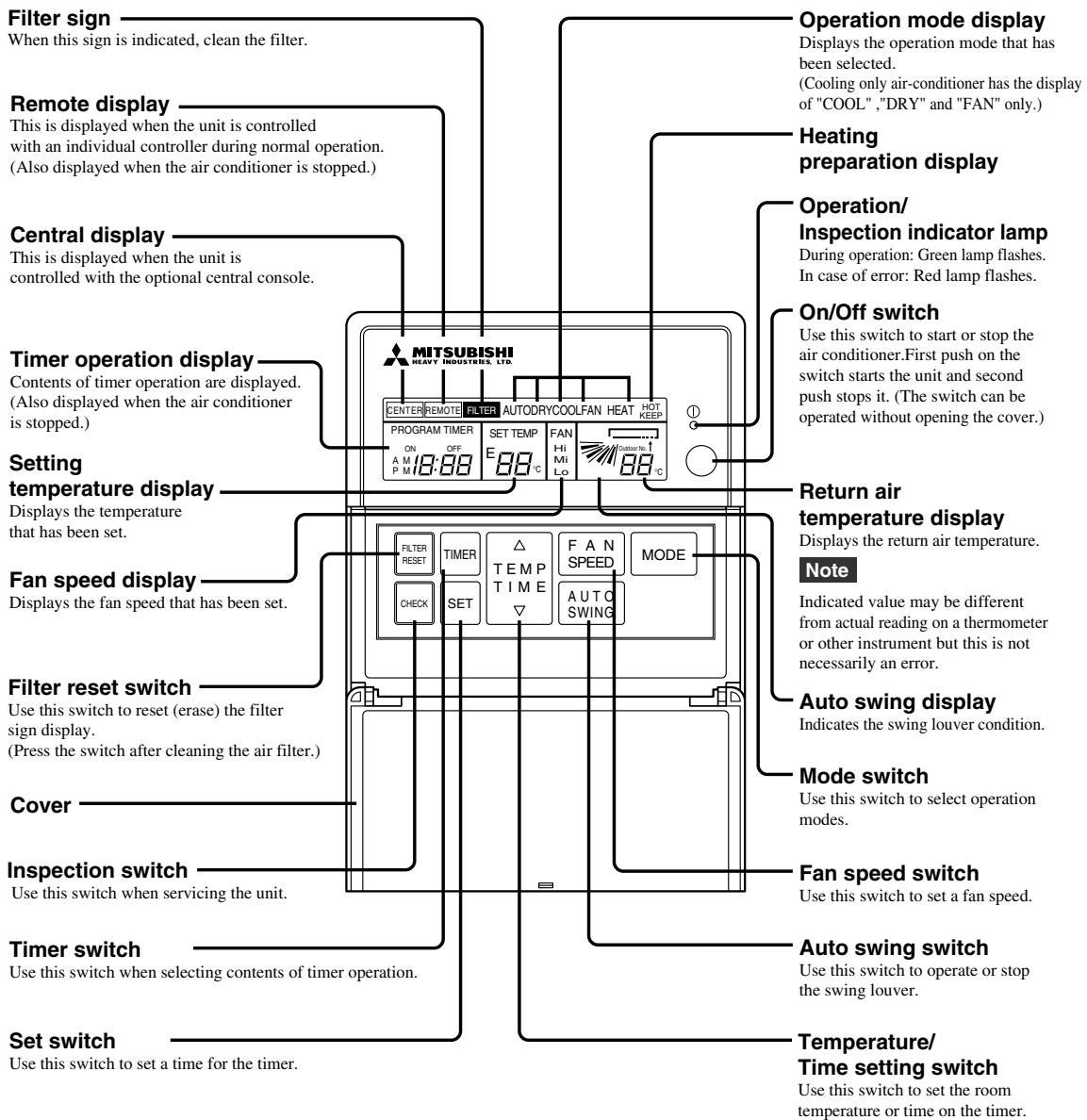
**(2) Wired remote controller**

**Models FDT, FDR, FDU, FDUM, FDUR, FDFL series**

FDR, FDU, FDUM, FDUR and FDFL series are not provided with AUTO SWING switch.

Panel shown below will appear if you open the cover. All contents of display on the LCD are indicated simultaneously for the purpose of explanation.

Pull the knob on the cover to this side to open it downward.



**(3) Control switch**

**Model FDF series**

The liquid crystal display area indicates the full contents of display for explanation.

**Filter sign**

When this display is indicated, clean the air filter.

**Remote display**

This display is indicated when the unit is controlled by the normal individual operation control. (The indication remains intact while the air-conditioner is stopped, too.)

**Center display**

- This display is indicated when the unit is controlled by the center console that is sold separately.
- Indicator lamp lights when the switch operation is fixed.

**Timer operation display**

This display indicates the content of timer operation. (The indication remains intact while the air-conditioner is stopped, too.)

**Setting temperature display**  
This display indicates the setting temperature.

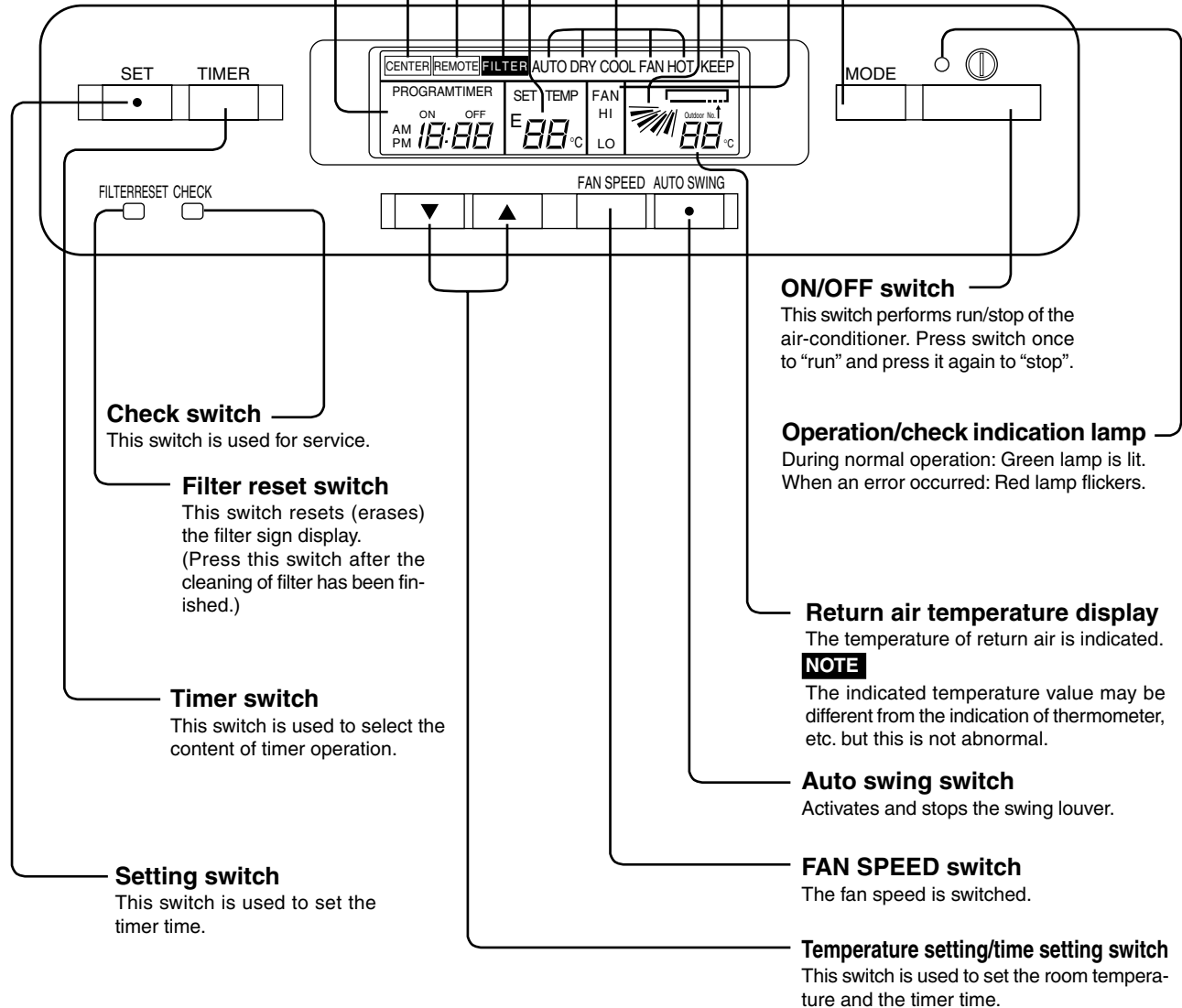
**Operation mode display**  
The selected operation mode is indicated.

**The swing louver control**  
It is displayed as shown during swing louver control.

**Preparation of heating (HOT KEEP) display**

**FAN SPEED display**  
The fan speed set is displayed.

**Mode switch**  
This switch makes selection of the operation mode.



**Check switch**  
This switch is used for service.

**Filter reset switch**  
This switch resets (erases) the filter sign display. (Press this switch after the cleaning of filter has been finished.)

**Timer switch**  
This switch is used to select the content of timer operation.

**Setting switch**  
This switch is used to set the timer time.

**ON/OFF switch**  
This switch performs run/stop of the air-conditioner. Press switch once to "run" and press it again to "stop".

**Operation/check indication lamp**  
During normal operation: Green lamp is lit. When an error occurred: Red lamp flickers.

**Return air temperature display**  
The temperature of return air is indicated.

**NOTE**  
The indicated temperature value may be different from the indication of thermometer, etc. but this is not abnormal.

**Auto swing switch**  
Activates and stops the swing louver.

**FAN SPEED switch**  
The fan speed is switched.

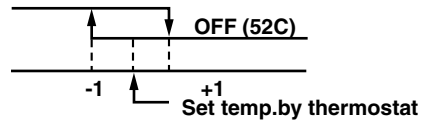
**Temperature setting/time setting switch**  
This switch is used to set the room temperature and the timer time.

### (3) Outline of microcomputer control function

#### (a) Operation control function by the indoor controller

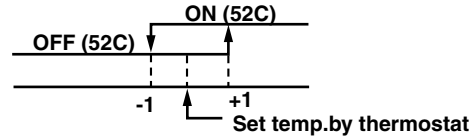
##### 1) Room temperature control (Differential of thermostat)

Heating operation



Temperature difference between thermostat set temp. and return air temp. (Detected by  $Th_{I-A}$ )

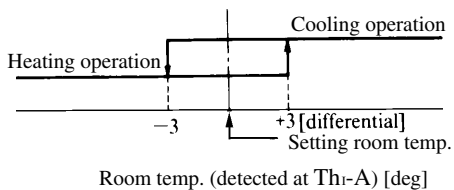
Cooling operation



Temperature difference between thermostat set temp. and return air temp. (Detected by  $Th_{I-A}$ )

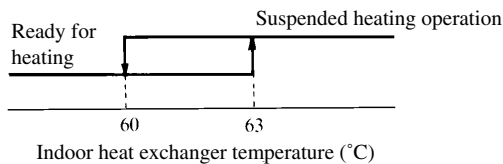
##### 2) Automatic operation (Only heat pump type)

If the Auto mode is selected on the remote control device, the selection of cooling or heating can be made automatically depending on the room temperature (and the temperature of indoor heat exchanger). (When the switching between the cooling and the heating is made within 3 minutes, the compressor will not operate for 3 minutes.) This will make much easier the switching of cooling/heating at the change of season and can be adapted to the unmanned operation at bank cash dispenser.



Notes (1) During the automatic switching of cooling/heating the room temperature is controlled based on the setting of room temperature.

(2) If the temperature of indoor heat exchanger rises beyond  $63^{\circ}\text{C}$  during the heating operation, it is switched automatically to the cooling operation. For an hour after this switching, the heating operation is suspended regardless of the temperature as shown at left.



##### 3) Control parts operation during cooling and heating

Function	Cooling		Fan	Heating				Dry	
	Thermostat ON	Thermostat OFF		Thermostat ON	Thermostat OFF	Defrost	HOT START	Thermostat ON	Thermostat OFF
Compressor	○	×	×	○	×	○	○	○	×
4-way valve	×	×	×	○	×	×	○	×	×
Outdoor fan	○	×	×	○	×	×	○	○	×
Indoor fan	○		○	○/×				○	
Louver motor					○/×				
Condensate motor	○	×(2min. ON)	×(2min. ON)	×(2min. ON)				○	×(2min. ON)

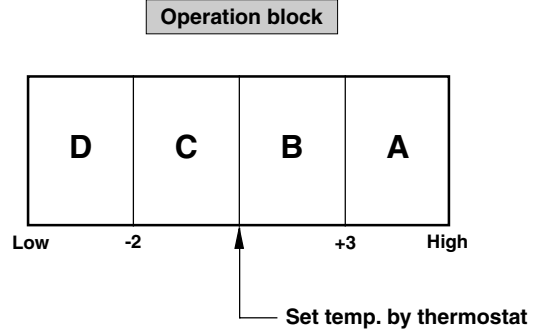
Note(1) ○ :ON

× :OFF

○/× :According to control other than temperature control.

4) **Dehumidifying operation (“THERMAL DRY”)**

The compressor, the indoor fan motor and the outdoor fan motor are operated intermittently under thermistor (Thr-A) control according to the appropriate operation block, to provide cooling operation for the dehumidifying.



**Pattern of operation**

CM, FM<sub>o</sub>: ON (stippled pattern)    FM<sub>i</sub>: ON (hatched pattern)

Operation block	Thermal drying starting (for 8 or 16 minutes after operation started)	Normal thermal dry operation (after completion of thermal drying)
<b>A</b>	(16 minutes)	(8 minutes) Continuous cooling operation (FM:Lo)
<b>B</b>	<ul style="list-style-type: none"> <li>Cooling operation (Thermostat ON)</li> <li>Indoor fan operating with the setting air flow.</li> <li>When the thermostat is turned off, the indoor fan operates for 30 seconds with the Lo operation in the wind blowing mode and then stops.</li> </ul>	(8 minutes) 
<b>C</b>	(8 minutes) 	(8 minutes) 
<b>D</b>		(8 minutes) All stoppage

Notes (1) **Operation block A B : Normal cooling operation for 16 minutes after operation is started.**

Operation stops by thermostat when the set temperature is reached.

After 16 minutes, normal thermal drying operation starts.

**Operation block C D : Operation as above is performed for 8 minutes.**

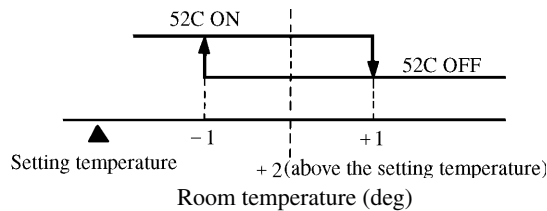
After 8 minutes, normal thermal drying operation starts.

(2) **In normal operation, the temperature is checked at 8 minute intervals** after normal thermal drying operation is started, **to determine which operation block is to be selected.**

**Operation block A** thermal drying is carried out if the thermostat set temperature is constant.

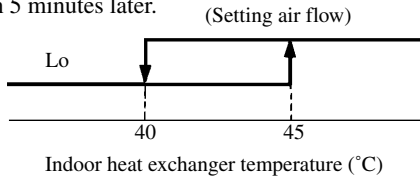
5) **Hot spurt (Only heat pump type)**

In the hot spurt mode, the control is conducted at the level +2 higher than the setting temperature at the start of heating operation. The hot spurt is canceled either after the initial thermostat OFF, when the indoor heat exchanger temperature reaches 61°C or 60 minutes after the start of the mode.



**6) FM control with the heating thermostat turned off (For cold draft prevention) (Only heat pump type)**

In order to prevent a cold draft while the heating thermostat is turned off, the indoor blower is controlled in response to the temperature of the indoor heat exchanger as illustrated below. It should be noted that if SW3-4 on the indoor PCB is turned off, the indoor blower will stop so far as the temperature of the indoor heat exchanger is lower than 40°C. It will be turned to the Lo operation 5 minutes later.



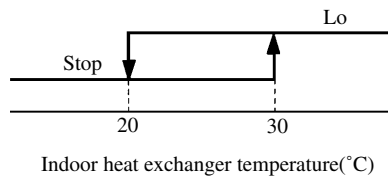
Note (1) After the thermostat is reset, it returns to the hot start control.

**7) Hot start (Cold draft prevention during heating) (Only heat pump type)**

- 1) If the indoor heat exchanger temperature is lower than 30°C when the heating operation has started, the following indoor blower control is performed.
  - (1) In case of the thermostat off condition: Lo operation
  - (2) In case of the thermostat on condition : Stop
  - (3) If the indoor heat exchanger temperature exceeds 30°C or 7 minutes after the beginning of hot start, the hot start terminates and it returns to the setting airflow of the blower.
- 2) If the indoor heat exchanger temperature is lower than 30°C when the unit is heating under the thermo-ON condition, the indoor fan operates in the Lo mode. As the temperature rises higher than 30 °C or 7 minutes after the beginning of hot start, the hot start terminates and it returns to the setting air flow.

**8) Indoor fan control during defrost operation (Only heat pump type)**

- 1) The indoor fan operation is changed from the setting airflow to the Lo operation 40 seconds before the start of defrost operation (when the defrost thermostat is turned ON) and stops if the indoor heat exchanger temperature drops below 20°C.
- 2) After the stop as described in 1)-above, the control will be conducted as illustrated below depending on the indoor heat exchanger temperature.



- 3) If the indoor heat exchanger temperature rises beyond 30°C of 7 minutes after the end of defrosting, the indoor fan control related to the defrosting is completed.

**9) Condensate pump motor (DM) control (Only FDTN, FDT, FDR, FDUM, FDUR, models)**

During the cooling or Dehumidifying operation, the condensate pump motor (DM) is synchronized with the start of compressor operation. If the operation is switched from the operation stop, error stop, thermostat stop and the cooling of defrosting operation to the fan or heating operation, the drain motor continues to operate for 2 minutes after the switching.

Overflow detection by means of the float switch is always on regardless of the operation mode. If an overflow occurs (or the float switch is not connected or the wire is broken), the operation is interrupted as the error stop and the drain motor is operated until the state of float switch is normalized.

**10) Defrost control (FDC 6 series only)**

Defrost operation is precisely controlled with the defrost thermostat (23DH1, 2) and a timer.

a) Defrost starting conditions

Defrost operation will start only when all of following conditions are met.

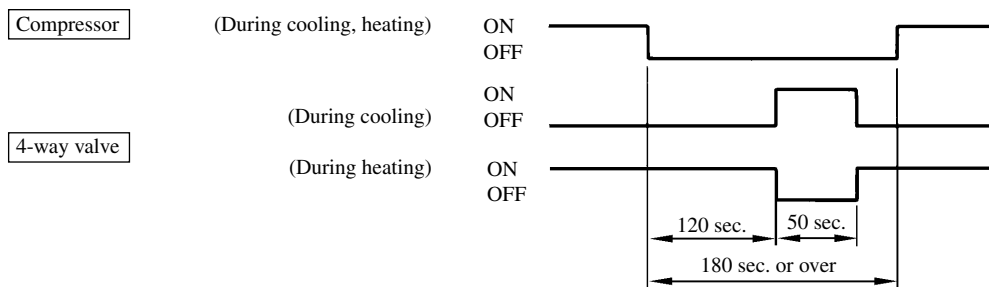
- 1) When the compressor operation time accumulated after the start of heating operation exceeds 30 minutes.
- 2) When the compressor operation time accumulated after the end of defrost operation exceeds 45 minutes.
- 3) When the defrost thermostat (23DH1) is turned ON (-6°C)

b) Defrost terminating condition

If the defrost thermostat (23DH2) is turned OFF (12°C) or 12 minutes after the start of defrost operation, the defrost operation is canceled and it returns to the heating operation.

**11) 4-way valve control (1 phase models only)**

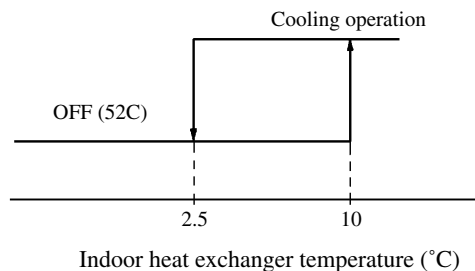
In order to maintain the pressure balance after the stop of compressor during cooling, dehumidifying and heating operation. the 4-way valve is controlled repeatedly as illustrated below.



**12) Frost prevention during cooling (For indoor heat exchanger)**

In order to prevent the frosting during cooling operation, the temperature of indoor unit heat exchanger (detected by Thi-R) is checked 9 min, after the compressor operation start and the unit operation.

This cycle is not operated for 9 min. after the resetting of this frost prevention mechanism.



**13) Compressor inching prevention control**

a) Compressor 3 minutes delay control

The compressor will remain in stop state for three minutes. When the compressor is stopped by thermostat, ON/OFF switch, and/or by occurrence of trouble.

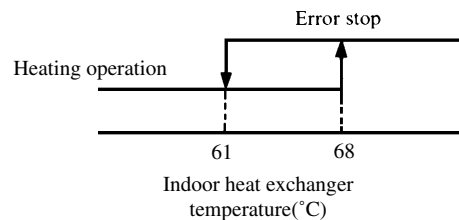
b) Compressor 3 minutes forced operation control

Compressor cannot be stopped for 3 minutes after it started. However, it will be stopped immediately when the thermostat is turned off due to the operation stop initiated by the ON/OFF switch or the change of operation mode.

Note (1) Both the error control and the protective control take priority over this control.

**14) Overload protection during heating (Only heat pump type)**

If an overload condition has been detected by the indoor heat exchanger temperature and it has continued for more than 2 seconds during heating, the compressor is stopped. The compressor is started after a delay of 3 minutes and, if the overload condition is detected again within 60 minutes after the initial detection, the compressor is stopped with the error stop.



**15) Automatic restart control**

If there is interruption of power while the unit is operating, the unit operates after power restoration under the same condition as prior to the power interruption. However the compressor will only be able to start three minutes after the power restoration. Furthermore, if the timer was operating prior to the power interruption, the unit remains stopped even after the restoration of service.

Note (1) Becomes invalid if the dip switch SW3-1 on the indoor PC board is at OFF (SW3-1 is set at ON when unit is shipped from the factory).

**16) Thermistor disconnection detection control**

a) Detection of indoor return air thermistor disconnection

- If there is detection of a disconnection on the return air thermistor in 10 seconds after turning the power ON, the compressor is stopped. If there is a second disconnection on the return air thermistor detected within 60 minutes, there is emergency stop.

Note (1) If the first disconnection on the return air thermistor is detected for a period of 6 continuous minutes, there is emergency stop. If there is no detection of a second disconnection on the return air thermistor within 60 minutes, the first detection becomes invalid.

b) Detection of heat exchanger thermistor disconnection

- If a disconnection is detected on the heat exchanger thermistor in 20 seconds after the compressor has been operating for 2 minutes, the compressor is stopped. If a second disconnection on the heat exchanger thermistor line is detected within 60 minutes, there is emergency stop.

Note (1) If the first disconnection on the heat exchanger thermistor is detected for a period 6 continuous minutes, there is emergency stop.

If there is no detection of second disconnection on the heat exchanger thermistor within 60 minutes, the first detection becomes invalid.

**17) Drain detection (Only FDTN, FDT, FDR, FDUM, FDUR models)**

- a) If there is detection of a drain abnormality during cooling operation, the drain pump goes ON for 5 minutes and the compressor which had been running comes to a stop.  
Overflow detection is carried out at all times with the float switch regardless of operational mode. If an overflow is generated (or if the float switch is not yet connected or has been disconnected), there is emergency stop [(while the Check lamp (yellow) blinks 4 times), (E9 is displayed)] the drain motor operates until reset of the float switch.
- b) If a drain abnormality is detected during cooling operation, there is emergency stop [(while the Check lamp (yellow) blinks 4 times), (E9 is displayed)] to stop the compressor, and the drain pump is operated with the drain motor until reset of the float switch.
- c) If a drain abnormality is detected during a stop state or fan operation, there is forced operation of the drain pump for 5 minutes. After 5 minutes have elapsed, the drain motor stops if the float switch is reset. Otherwise, there is emergency stop [(while the Check lamp (yellow) blinks 4 times), (E9 is displayed)] and the drain motor operates until the float switch is reset.
- d) If the float switch is not connected or if there is a disconnection, there is emergency stop.

**18) Low voltage guard control**

If the power source voltage remains at a value of 80% of rating or less for 3 continuous minutes during operation of the compressor, the compressor stops (52C OFF). Furthermore, if the power source voltage remains at a figure of 15% of rating or greater after 3 minutes have elapsed since stopping the compressor, there is restarting of the compressor (52C ON). Moreover, during stoppage of the compressor, the Run lamp (green) blinks 2 times.

Note (1) When starting the compressor for the first time after turning the operational switch ON, there is starting regardless of the power source voltage. Furthermore, if dip switch SW 3-2 on the internal substrate is OFF, this becomes invalid. (Switch SW 3-2 is set to ON upon shipment from the factory).

**19) Refrigerant shortage error**

When 52C is ON when operating in cooling (including automatic cooling), if heat exchanger sensor temperature for the indoor unit (Th1 -R) does not drop to 25 °C or less for 40 minutes 5 minutes or more after the start of operation, an abnormal stop due to insufficient refrigerant is performed.

**20) External control (remote display)/control of input signal**

● **External control (remote display) output**

**Following output connectors (CNT) are provided on the control circuit board of indoor unit.**

- Operation output: Power to engage DC 12V relay (provided by the customer) is outputted during operation.
- Heating output: Power to engage DC 12V relay (provided by the customer) is outputted during the heating operation.
- Compressor ON output: Power to engage DC 12V relay (provided by the customer) is outputted while the compressor is operating.
- Error output: When any error occurs, the power to engage DC 12V relay (provided by the customer) is outputted.

● **Control of input signal**

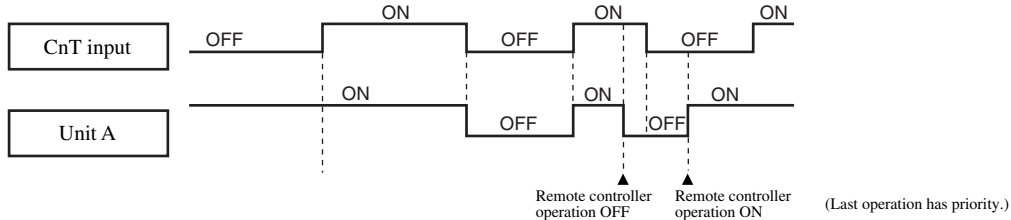
(Make sure to connect the standard remote control unit. Control of input signal is not available without the standard remote control unit.)

Control of input signal (switch input, timer input) connectors (CNT) are provided on the control circuit board of the indoor unit.

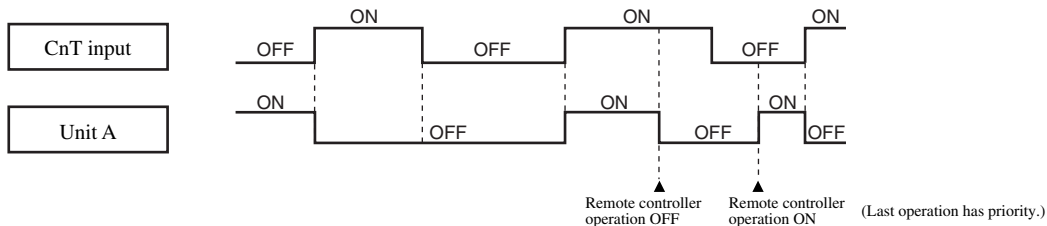
However, when the operation of air conditioner is under the Center Mode, the remote control by CrT is invalid.



- At shipping from factory [FDTN, FDEN, FDKN models : J3 (SW5-3), FDT, FDR, FDU, FDUM, FDF, FDFL models : J5 (SW5-2) ] on PCB OFF]
  - Input signal to CnT OFF → ON [Edge input] ... Air conditioner ON
  - Input signal to CnT ON → OFF [Edge input] ... Air conditioner OFF



- When J3 (SW5-3) [FDTN, FDEN, FDKN models] or J5 (SW5-2) [FDT, FDR, FDU, FDUM, FDF, FDFL models] on the PCB of indoor unit is turned on at the field.  
Input signal to CnT becomes Valid at OFF Æ ON only and the motion of air conditioner [ON/OFF] is inverted.



## 21) Auto Swing Control (Excepted FDR, FDU, FDUM, FDF, FDFL models)

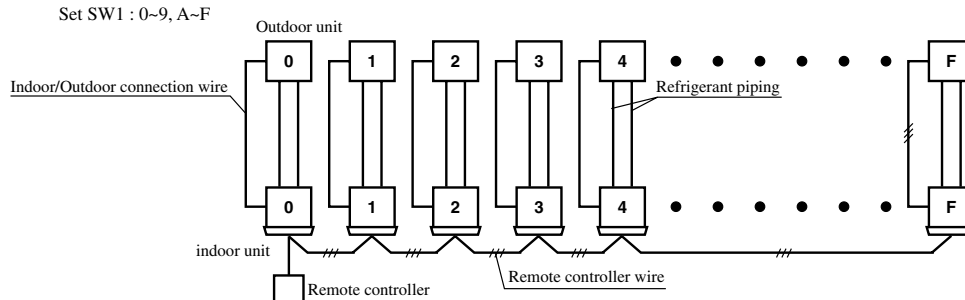
- Have a louver motor to move the louvers up and down for the so called “auto swing” function.
- The louver auto swing starts when the AUTO SWING key is pressed once and stops when the AUTO SWING key is pressed again. The louver position is displayed on the LCD on the remote controller. During auto swing, the position displayed on the LCD changes, but the positions of the louvers and the display are not coordinated. (The louvers swing 3 - 4 times per minute but the display changes once per second.)
- **Stopping the louvers**  
When the AUTO SWING key is pressed to stop the louver movement, the LCD louver-position display stops and the louvers stop when they come to the position displayed on the LCD. There are four louver stop position on the LCD. (When jumper wire J7 [FDTN, FDEN models] or J3 [FDT model] on the indoor unit printed circuit board is cut, the louvers stop immediately at the AUTO SWING key is pressed to stop them and the LCD display changes to show this position. (Excepted FDKN model)
- **Movement of louver when the power supply to the controller controlling 4 positions of the louver is switched on. (Only FDT model)**  
When power supply is switched on, the louver will automatically swing about 2 times (without operating remote controller). This is an action for the microcomputer to confirm the louver position in order to input the cycle of the louver motor (LM) to the microcomputer with the limit switch (LS) pushing the louver motor (LM). If the LS action is not input to the microcomputer, the louver will stop within 1 minute after the power supply is switched on and will not move from then on.
- **Keeping the louvers horizontal during heating (Only heat pump type)**  
While HOT KEEP is displayed (during hot start operation or when the thermostat has turned off during heating operation), the louvers stay in the horizontal position to prevent cold drafts, independent of the setting of the AUTO SWING key (auto swing or stop). The louver position display of LCD displays continuously the original position before this control operation.  
When the HOT KEEP display goes out, both the louvers and the LCD display return to their previous position.  
(However, after the power supply to the unit is switched on, the louvers swing two times as a check of the power source frequency, regardless of the settings of the ON / OFF or AUTO SWING keys).

**22) Using 1 remote controller to control multiple units (indoor units - up to 16 units) (Only FDT, FDR, FDU, FDUM, FDUR FDFL models)**

**a) Function**

A single remote control switch can be used for group control of multiple units (indoor units - up to 16 units). All units in the group that have had the remote control switch set at [Operating Mode] can be turned on and off in order of the unit number. This functions independently of the thermostat and protection functions of each unit.

Notes (1) The unit number is set by a switch (SW1) on the circuit board for the indoor unit.



(2) If unit number is not important, random can be used. However, setting in order from 0, 1, 2, to F will ensure setting without error.

**b) Display to remote controller**

- (i) **Return air temperature, by remote or center and heating preparation:** Displays for the youngest unit for the remote mode (center mode if there is no remote mode) of the units in operation.
- (ii) **Inspection and filter sign:** Displays either to the first corresponding unit.

**c) Confirmation of connected units**

Each push of the inspection switch on the remote control displays the units connected in sequential order from the youngest unit.

**d) Error**

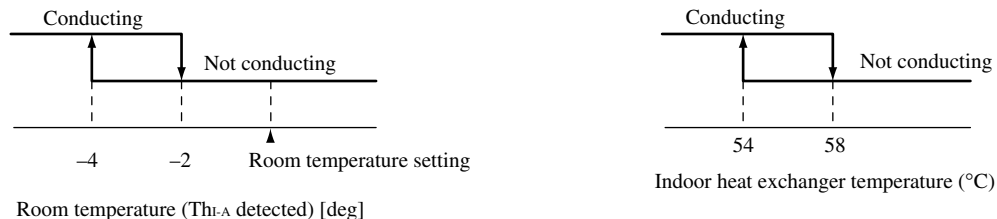
- (i) If an error occurs (protection device activation) with some of the units in the group, those units will have an error stop, but the properly operating units will continue operation.
- (ii) **Wiring outline**

Route the wire connecting each of the indoor and outdoor units as it would be for each unit. Use the terminal block (X, Y, Z) for the remote control for the group controller and use a jumper wire among each of the rooms.

**23) Auxiliary Electric Heater (Only FDF model)**

(1) This control is enabled when an auxiliary heater is used. As shown in the drawing below, since the ON/OFF control is performed by the temperature of the thermostat and the air heat exchanger (both of them conduct electricity during electrical conditions), control with high responsiveness to the load is performed.

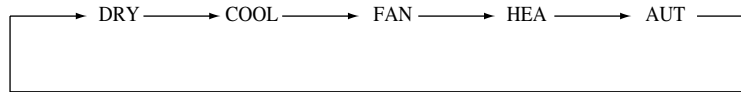
Note that there is no conductivity when the fan for the indoor unit is stopped (including hot start), when the compressor is stopped and when the defroster is operating.



(2) When the heater changes from conducting to not conducting, even when the indoor fan (FM1) has been stopped (operation stop by the operating switch or abnormal stop) the indoor fan will operate at low speed for 40 seconds before shutting off to remove surplus heat from the heater.

**(b) Operation control function by the wired remote controller**

**(i) The following is the sequence of operation for the remote controller operation mode switch.**



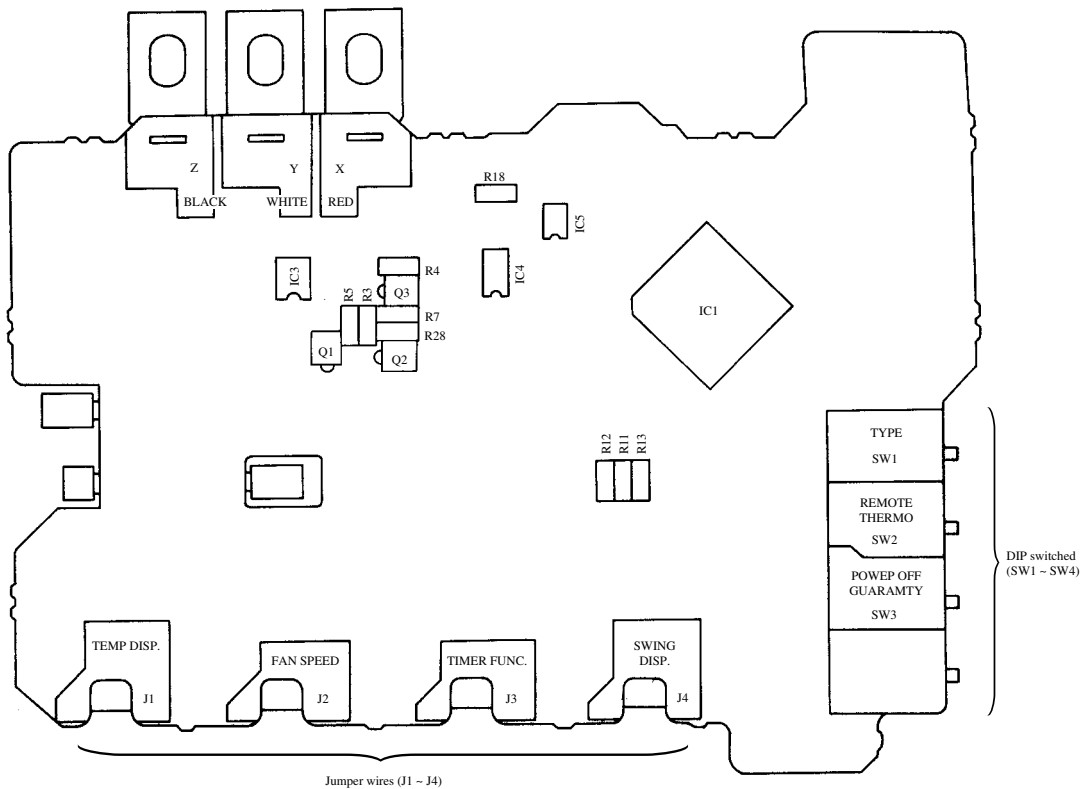
**(ii) CPU reset**

This functions when the " inspection " and " filter reset switch " on the remote controller are pushed simultaneously. It operates in the same manner as the power reset.

**(iii) Power outage compensation function.**

- This is enabled by setting dip switch SW3 on the remote control circuit board to ON.
- It records the normally used remote control modes. Once power has been restored, it restarts operation by using the contents of the memory. Note that the stop positions for auto swing and the timer mode are cancelled.

**Parts layout on the remote controller PCB**



• Function of DIP switched

Switch		Function
SW1	ON	Cooling only type
	OFF	Heat pump type
SW2	ON	Remote control sensor - Enabled
	OFF	Remote control sensor - Disabled
SW3	ON	Power outage compensation - ON
	OFF	Power outage compensation - OFF

• Function of Jumper wires

Switch		Function
J1	Wich	Inlet temperature display - Enabled
	None <sup>(1)</sup>	Inlet temperature display - Disabled
J2	Wich	Fan display - 3 speeds
	None <sup>(1)</sup>	Fan display - 2 speeds
J3	Wich	Timer function - Enabled (Normal)
	None <sup>(1)</sup>	Timer function - Disabled
J4	Wich	Auto swing display - ON
	None <sup>(1)</sup>	Auto swing display - OFF

Note (1) 'None' means that jumper wire is not provided on the PCB or the connection ic cut.

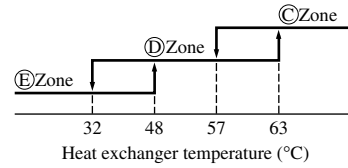
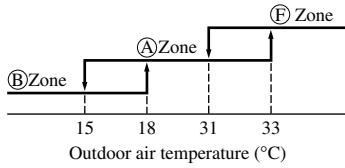
(c) Operation control function by the outdoor controller (Only FDC208~508, FDCP308~508, FDC808)

1) Control for outdoor unit fan

a) Cooling Operation

The speed of the fan for the outdoor unit is controlled by the temperature of the heat exchanger (Tho-R detection) and the outdoor air temperature (Tho-A).

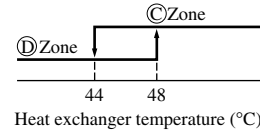
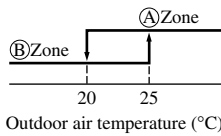
Models FDC208~508, FDC308~508



Description of control for fan for outdoor unit

Model		FDC208~308, FDCP308		FDC(P)408, 508	
Fan motor		FM <sub>0</sub>		FM <sub>01</sub> (Up)	FM <sub>02</sub> (Lo)
Zone	A Zone	C Zone	UHi	UHi	UHi
		D Zone	Hi	Hi	Hi
		E Zone	Hi	Hi	Hi
	B Zone	C Zone	UHi	UHi	UHi
		D Zone	Hi	Hi	Hi
		E Zone	Lo	Lo	Lo
E Zone		UHi	UHi	UHi	

Model FDC808



Description of control for fan for outdoor unit

Fan motor		FM <sub>01</sub> (Left)	FM <sub>02</sub> (Right)
Zone	A Zone	Hi	Hi
	B Zone	C Zone	OFF
		D Zone	Lo

b) Heating Operation

① Stop control for outdoor fan

When the high pressure switch (63H<sub>2</sub>) operates, the fan for the outdoor unit is stopped to control the high pressure switch.

63H<sub>2</sub> settings

Models FDC208~508

2.5 OFF/2.06 ON (MPa)

Model FDC808

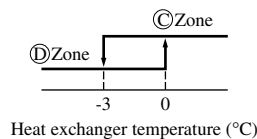
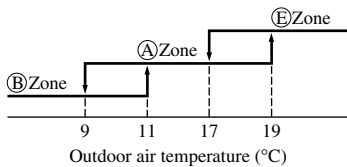
2.41 OFF/1.86 ON (MPa)

Model FDCP308~508

2.79 OFF/2.26 ON (MPa)

② Tap control for outdoor fan

When the high pressure switch (63H<sub>2</sub>) is closed, the outdoor fan is controlled by the detected heat of the outdoor heat exchanger thermistor (Tho-R) and the detected heat of the outdoor air temperature thermistor (Tho-A).



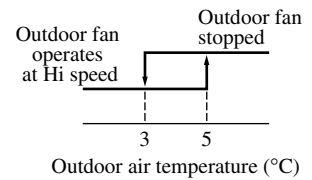
Description of control for fan for outdoor unit

Model		FDC208~308, FDCP308		FDC(P)408, 508		FDC808	
Fan motor		FM <sub>0</sub>		FM <sub>01</sub> (Up)	FM <sub>02</sub> (Lo)	FM <sub>01</sub> (Left)	FM <sub>02</sub> (Right)
Zone	A Zone	C Zone	Hi	Hi	Hi	Hi	OFF
		D Zone	UHi	UHi	UHi	Hi	Hi
	B Zone		UHi	UHi	UHi	Hi	Hi
	E Zone	C Zone	Lo	Lo	Lo	Hi	OFF
		D Zone	Hi	Hi	Hi	Hi	Hi

Note (1) When the fan for the outdoor unit is started when the outdoor air temperature is more than 12 °C, it will operate at high speed for 3 seconds and then switch to low speed. After operating a low speed for 4 minutes, it will be transferred to controlled speed.

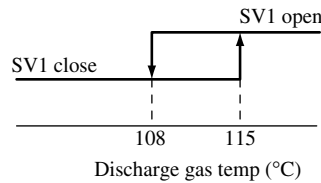
**2) Control of fan for outdoor unit for de-icing**

If DIP switch SW5-2 on the printed circuit board for the outdoor unit is set to on, the fan on the outdoor unit which has been stopped will operate for 10 seconds at Hi speed every 10 minutes when the outdoor air temperature is 3 °C or less.



**3) Discharge temperature control during cooling/heating (Only case of FDC208~508, FDCP308~508)**

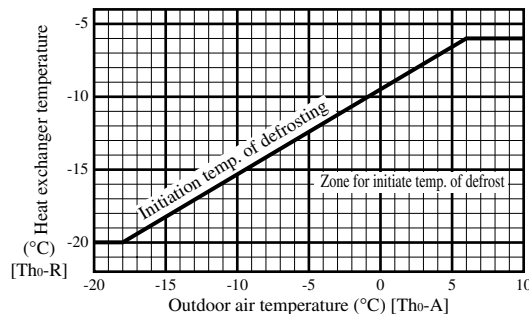
As the discharge gas temperature (detected with Tho-D) rises during cooling/heating operation, the liquid bypass solenoid valve (SV1) are opened so that the abnormal rise of discharge gas temperature is prevented.



**4) Defrost control (Only heat pump type)**

Defrost operation will start when the temperature of the heat exchanger for the outdoor unit (Tho-R detection) and the outdoor air temperature (Tho-A detection) enter the start of defrost range shown in the figure below.

**Initiation temp. of defrosting (Detected by Tho-R, Tho-A)**



Note (1) If DIP switch SW5-1 on the printed circuit board for the outdoor unit is set to on, defrost operation will begin when temperature of the heat exchanger for the outdoor unit reaches -7 °C.

**a) Defrost Operation**

Switching of the control of the 4-way valve during defrost operation can be performed by enabling/disabling the jumper wire (J17) on the printed circuit board for the outdoor unit.

- (i) J17 None (4-way valve ON during heating operation)

Defrost operation is performed with the compressor on, the fan for the outdoor unit off and the 4-way valve off.

- (ii) J17 With (4-way valve OFF during heating operation)

Defrost operation is performed with the compressor on, the fan for the outdoor unit off and the 4-way valve on.

**b) Defrost finished**

- (i) Once defrost operation has started, it will finish after the cumulative operating time of the compressor has reached 12 minutes (factory setting: SW5-1 OFF).

Note (1) This time will become 14 minutes if the DIP switch (SW5-1) on the printed circuit board on the outdoor unit is set to on.

- (ii) Switching of the defrost recovery time can be performed by enabling/disabling the jumper wire (J18) on the printed circuit board for the outdoor unit.

J18 (SW6-2) With: 14 °C, J18 (SW6-2) None: 18 °C

5) **Compressor protecting function (Microcomputer and phase protection relay)**

**a) Overcurrent control**

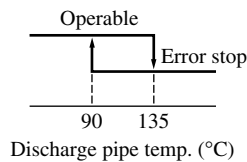
- (i) When a 52C secondary L<sub>1</sub>-phase continues for 0.5 seconds and when it is more than the set value (detection at current sensor CT), the compressor is stopped. The compressor is restarted after a 3-minute delay if the detection current is less than 1.5 to 2A. If this condition is re-detected 5 times within 60 minutes of the first occurrence, an abnormal stop of the unit is performed.
- (ii) If 60 minutes passes and the detected current after the first to the fourth stoppage is not less than 1.5~2A, an abnormal stop of the unit is performed.

**b) Open-phase protection**

When a 52C secondary detection current continues for 4 seconds when the compressor is on and when it is less than 1.5 to 2 A, it is determined to be a open-phase of the 52C secondary N-phase, and the compressor is stopped. The compressor is restarted after a 3-minute delay and if this condition is re-detected within 60 minutes of the first occurrence, an abnormal stop of the unit is performed.

**c) Detection of abnormal discharge temperature (Only case of FDC208~508, FDCP308~508)**

- (i) When an abnormally high temperature is detected at the discharge pipe of the compressor (Tho-D detection), the compressor is stopped. The compressor is restarted after a 3-minute delay and if this condition is re-detected 5 times within 60 minutes of the first occurrence, an abnormal stop of the unit is performed.

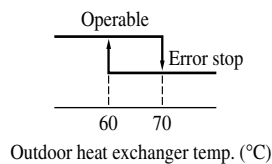


- (ii) If 60 minutes passes and the detected temperature after the first to the fourth stoppage is not less than 90 °C, an abnormal stop of the unit is performed.

Note (1) Once an abnormal discharge temperature has occurred, restarting cannot be performed for 45 minutes. [Detection temperature less than 3 °C]. (In failure mode, resetting cannot be performed by remote control.)  
Operation is possible after 45 minutes. (Cleared by resetting power source.)

**d) Cooling overload protection**

State of overload during cooling operation is detected (with Tho-R) based on the temperature of outdoor heat exchanger and the unit operation is stopped / Immediate reset after repair



**e) Thermistor [Discharge piping (Only case of FDC208~508, FDCP308~508), Heat exchanger and outdoor air thermistor] disconnected wire**

- (i) If there is a disconnected wire or if there is a big difference in performance characteristics, an abnormal stop of the unit is performed. ⇨ Restore after repairing.

**6) Abnormal high-pressure protection (Only case of FDCP308~508, FDC808)**

- a) If the pressure rises and 63H<sub>1</sub> is operated (opened), the compressor is stopped. After a 3-minute delay, the compressor is restarted. An abnormal stop is performed when 63H<sub>1</sub> is opened 5 times within 60 minutes of the first operation. ⇨ Restore after repairing.
- b) An abnormal stop is performed at the first occurrence if 63H<sub>1</sub> remains open after 60 minutes have passed from the first time the compressor was stopped.

Note (1) Once 63H<sub>1</sub> has been restored after an abnormal stop, the unit can be restarted using the remote control.

**7) Compressor motor protection (Only case of FDC808)**

The same detection control as 63H<sub>1</sub> will be performed when the internal thermostat 49C operates due to a rise in the windings of the compressor motor. The setting values of the internal thermostat 49C are 90 °C open and 73 °C close.

**8) Control of the closing and opening of the service valve (Only heat pump type)**

- a) When the compressor is ON for the first time after turning on the power, the heating operation starts regardless of any setting.
- b) If the 63H<sub>2</sub> turns OFF(open) within 10 seconds after the compressor is ON, the power will turn off as abnormal stop.
- c) To recover from the abnormal stop, turn on the power again after the 63H<sub>2</sub> is ON(closed).
- d) If the 63H<sub>2</sub> doesn't turn OFF(open) within 10 seconds after the compressor is ON, the operation immediately changes to the "set mode" to start normal operation.

**9) Test run**

- a) For a test run, it is possible to use the dip switches SW5-3 and SW5-4 on the printed circuit board in the outdoor unit.

SW5-3	ON	SW5-4	OFF	Test run for cooling
			ON	Test run for heating
	OFF	Normal		

- b) Test run time is 30 minutes. Protective devices are effectively controlled.

## 9.5 APPLICATION DATA

# SAFETY PRECAUTIONS

- Please read these “Safety Precautions” first then accurately execute the installation work.
- Though the precautionary points indicated herein are divided under two headings, **⚠WARNING** and **⚠CAUTION**, those points which are related to the strong possibility of an installation done in error resulting in death or serious injury are listed in the **⚠WARNING** section. However, there is also a possibility of serious consequences in relationship to the points listed in the **⚠CAUTION** section as well.

In either case, important safety related information is indicated, so by all means, properly observe all that is mentioned.

- After completing the installation, along with confirming that no abnormalities were seen from the operation tests, please explain operating methods as well as maintenance methods to the user (customer) of this equipment, based on the owner’s manual.

Moreover, ask the customer to keep this sheet together with the owner’s manual.

### **⚠WARNING**

- This system should be applied to places of office, restaurant, residence and the like. Application to inferior environment such as engineering shop could cause equipment malfunction.
- Please entrust installation to either the company which sold you the equipment or to a professional contractor. Defects from improper installations can be the cause of water leakage, electric shocks and fires.
- Execute the installation accurately, based on following the installation manual. Again, improper installations can result in water leakage, electric shocks and fires.
- When a large air-conditioning system is installed to a small room, it is necessary to have a prior planned countermeasure for the rare case of a refrigerant leakage, to prevent the exceeding of threshold concentration. In regards to preparing this countermeasure, consult with the company from which you purchased the equipment, and make the installation accordingly. In the rare event that a refrigerant leakage and exceeding of threshold concentration does occur, there is the danger of a resultant oxygen deficiency accident.
- For installation, confirm that the installation site can sufficiently support heavy weight. When strength is insufficient, injury can result from a falling of the unit.
- Execute the prescribed installation construction to prepare for earthquakes and the strong winds of typhoons and hurricanes, etc. Improper installations can result in accidents due to a violent falling over of the unit.
- For electrical work, please see that a licensed electrician executes the work while following the safety standards related to electrical equipment, and local regulations as well as the installation instructions, and that only exclusive use circuits are used.  
Insufficient power source circuit capacity and defective installment execution can be the cause of electric shocks and fires.
- Accurately connect wiring using the proper cable, and insure that the external force of the cable is not conducted to the terminal connection part, through properly securing it. Improper connection or securing can result in heat generation or fire.
- Take care that wiring does not rise upward, and accurately install the lid/service panel. Its improper installation can also result in heat generation or fire.
- When setting up or moving the location of the air-conditioner, do not mix air etc. or anything other than the designated refrigerant within the refrigeration cycle.  
Rupture and injury caused by abnormal high pressure can result from such mixing.
- Always use accessory parts and authorized parts for installation construction. Using parts not authorized by this company can result in water leakage, electric shock, fire and refrigerant leakage.

### **⚠CAUTION**

- Execute proper grounding. Do not connect the ground wire to a gas pipe, water pipe, lightning rod or a telephone ground wire. Improper placement of ground wires can result in electric shock.
- The installation of an earth leakage breaker is necessary depending on the established location of the unit. Not installing an earth leakage breaker may result in electric shock.
- Do not install the unit where there is a concern about leakage of combustible gas.  
The rare event of leaked gas collecting around the unit could result in an outbreak of fire.
- For the drain pipe, follow the installation manual to insure that it allows proper drainage and thermally insulate it to prevent condensation. Inadequate plumbing can result in water leakage and water damage to interior items.



## 9.5.1 Installation of indoor unit

### ⚠NOTICE

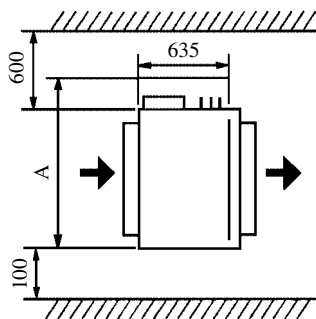
**All Wiring of this installation must comply with NATIONAL, STATE AND LOCAL REGULATIONS.** These instructions do not cover all variations for every kind of installation circumstance. Should further information be desired or should particular problems occur, the matter should be referred to Mitsubishi Heavy Industries, Ltd. through your local distributor.

### ⚠WARNING

**BE SURE TO READ THESE INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE SERIOUS INJURY OR DEATH, EQUIPMENT MALFUNCTION AND/OR PROPERTY DAMAGE.**

### (1) Selection of installation location

- (a) Avoid installation and use at those places listed below.
- 1) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).  
Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
  - 2) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains. Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
  - 3) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.
- (b) Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user,.
- 1) Places where chilled or heated air circulates freely. When the installation height exceeds 3m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
  - 2) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
  - 3) Places free from air disturbances to the return air port and supply hole of the indoor unit, places where the fire alarm may not malfunction to short circuit.
  - 4) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.  
(When installing at a place under a high humidity environment, pay sufficient attention to prevention of dewing such as thermally insulating the unit properly.)
- (c) Check if the selected place for installation is rigid enough to stand the weight of these units.  
Otherwise, apply reinforcement using boards and beams before starting the installation work.

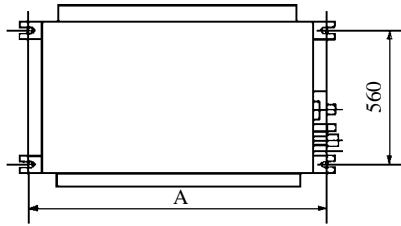


Unit : mm

Models	Mark	A
FDUR208, 258, 308		1200
FDUR408, 508		1720

## (2) Suspension

Be sure to observe the finished length of the suspension bolts given below.

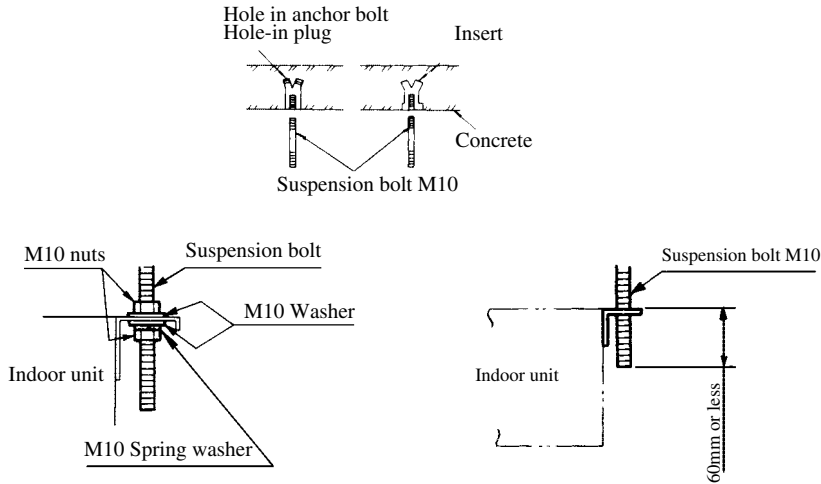


Unit : mm

Models	Mark	A
FDUR208, 258, 308		886
FDUR408, 508		1406

### (a) Fixing the suspension bolt (customer ordered parts M10)

Securely fix the suspension bolt as illustrated below or in another way.



## (3) Installation of indoor unit

### Packing hardware

Two pieces of packing hardware are used.

Discard them after unpacking.

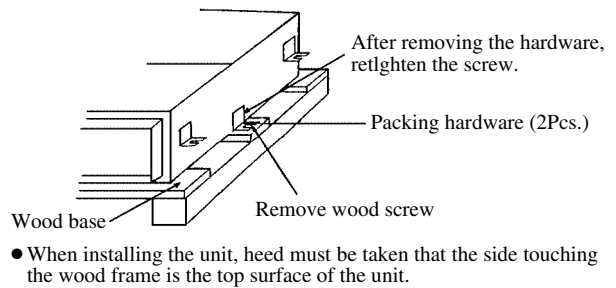
- Fix the indoor unit to the hanger bolts.

If required, it is possible to suspend the unit to the beam, etc.

Directly by use of the bolts without using the hanger bolts.

Note

When the dimensions of indoor unit and ceiling holes does not match, it can be adjusted with the slot holes of hanging bracket.

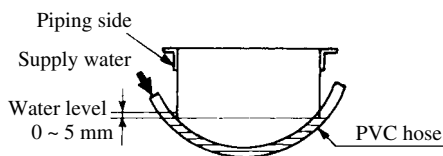


- When installing the unit, heed must be taken that the side touching the wood frame is the top surface of the unit.

### (a) Adjusting the unit's levelness

1) Adjust the out-levelness using a level vial or by the following method.

- Make adjustment so that the relation between the lower surface of the unit proper and water level in the hose becomes given below.



Bring the piping side slightly lower

2) Unless the levelness is adjusted properly, the malfunction of the float switch will occur.

**(b) Tap selection on blower unit.**

Taps of on blower unit are set at the standard selection at the shipping from factory. Where the static pressure is raised by changing the connection of connectors provided at the flank of control box as shown below.

Standard tap(at shipping)				High speed tap			
Yellow/Green	Motor side	Connector white	White	Yellow/Green	Control box side	Connector white	Red
Red				Red			
Blue				Blue			
Black				Black			
White				White			

Models	Static Pressure	
	Standard tap	High tap
FDUR208,258	50	85
FDUR308,408,508	50	130

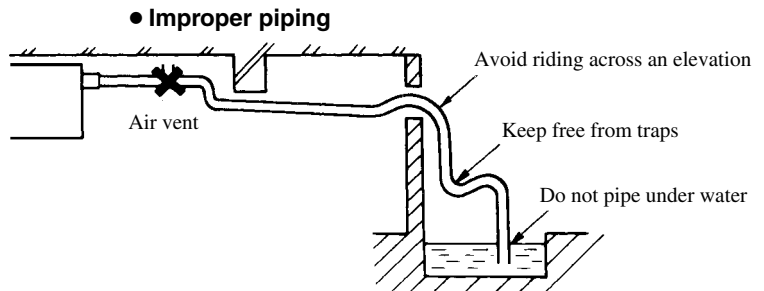
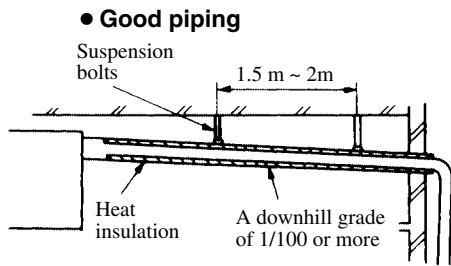
Unit : Pa

**CAUTION**

- Taps should not be used under static pressure outside the unit mentioned above. Dew condensation may occur with the unit and wet the ceiling or furniture.
- Do not use under static pressure outside the unit of 50Pa or less. Water drops may be blown from the diffuser outlet of the unit and wet the ceiling or furniture.

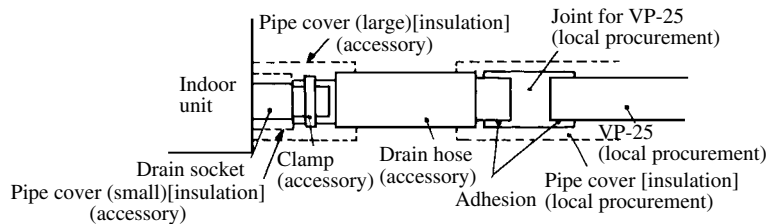
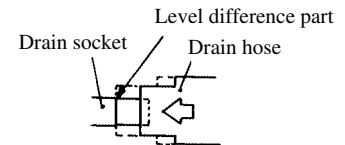
**(4) Drain piping**

(a) Drain piping should always be in a downhill grade (1/50-1/100) and avoid riding across an elevation or making traps.

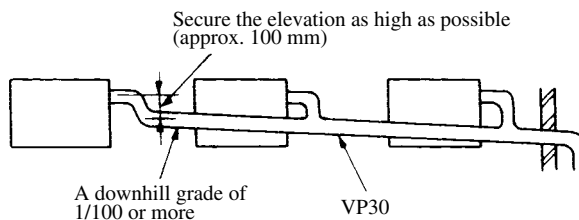


(b) When connecting the drain pipe to the unit, pay sufficient attention not to apply excess force to the piping on the unit side. Also, fix the piping at a point as close as possible to the unit.

(c) For drain pipe, use hard PVC general purpose pipe VP-25 which can be purchased locally. When connecting, insert a PVC pipe end securely into the drain socket before tightening securely using the attached drain hose and clamp. Adhesive must not be used connection of the drain socket and drain hose ( accessory).

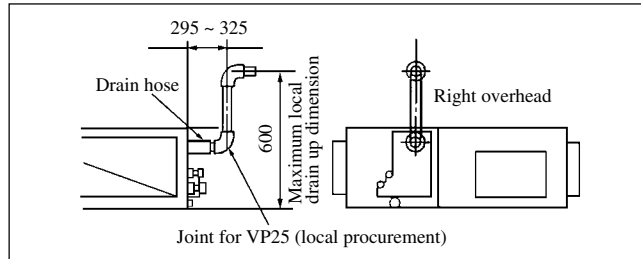


(d) When constructing drain piping for several units, position the common pipe about 100 mm below the drain outlet of each unit as shown in the sketch below. Use VP-30 or thicker pipe for this purpose.



- (e) Be sure to provide heat insulation to hard PVC pipes of indoor placement.
- (f) Do not ever provide an air vent.

- (g) The height of the drain head may be elevated up to a point 600 mm from the bottom of unit and, when an obstacle exists in the ceiling space, elevate the piping to avoid the obstacle using an elbow or corresponding gadget. When doing this, if the stretch for the needed height is too high, the back-flow quantity of drain at the time of interruption of the operation gets too much and it may cause overflow at the drain pan. Therefore, make the height of the drain pipe withing the distance given in the drawing below.



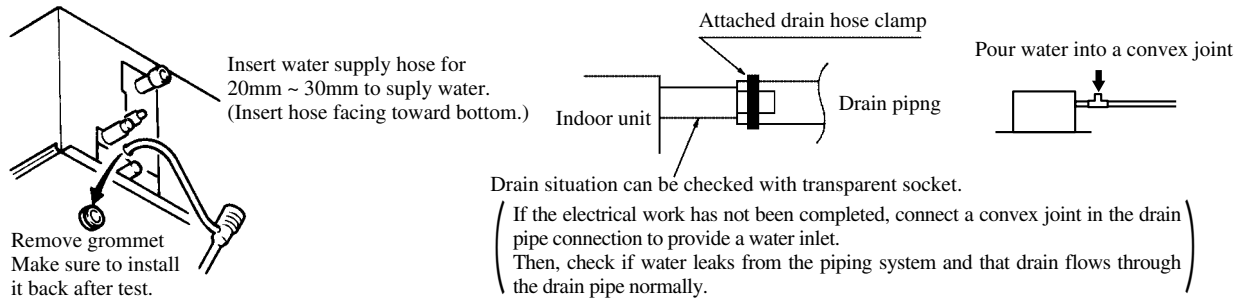
- (h) Avoid positioning the drain piping outlet at a place where generation of odor may stimulated. Do not lead the drain piping direct into a sewer from where sulfur gas may generate.

(i) Drainage test

- 1) Conduct a drainage test after completion of the electrical work.
- 2) During the trial, make sure that drain flows properly through the piping and that no water leaks from connections.
- 3) In case of a new building, conduct the test before it is furnished with the ceiling.
- 4) Be sure to conduct this test even when the unit is installed in the heating season.

**Procedures**

- ① Supply about 1000 cc of water to the unit through ghe air outlet by using a feed water pump.
- ② Check the drain while cooling operation.

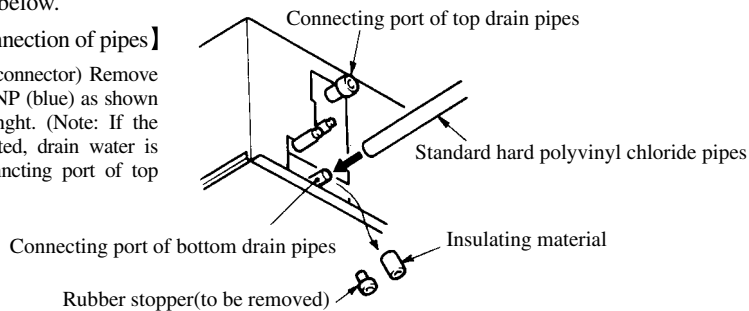


(j) Outline of bottom drain piping work

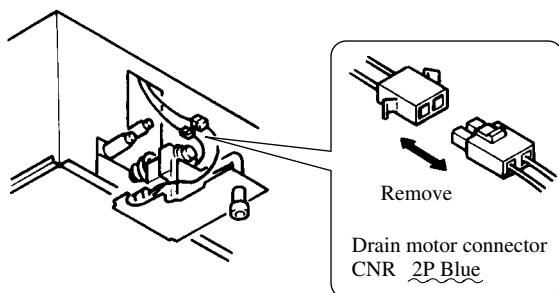
- 1) If the bottom drain piping can be done with a descending gradient (1/50-1/100), it is possible to connect the pipes as shown in the drawing below.

**【Connection of pipes】**

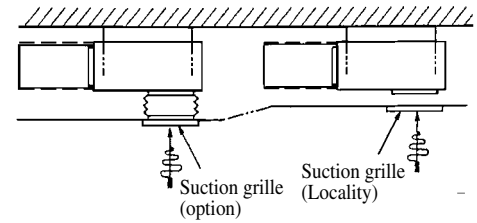
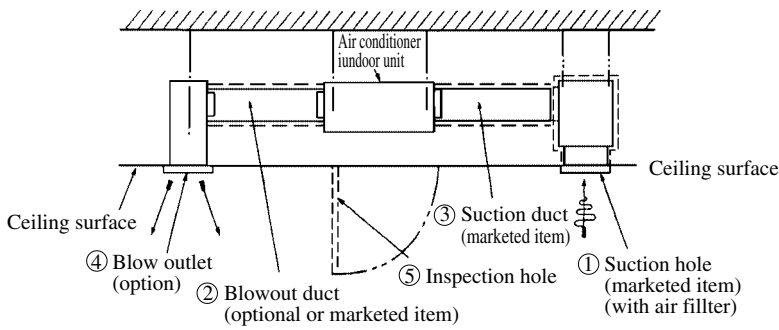
(Removing drain motor connector) Remove drain motor connector CNP (blue) as shown in the drawing on the right. (Note: If the connector is left connected, drain water is discharged from the connecting port of top pipes, causing leakage.)



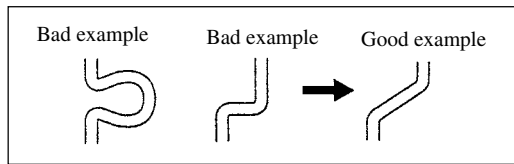
- 2) Do not use acetone-based adhesives to connect to the drain socket.



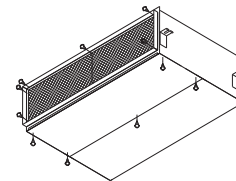
## (5) Duct work



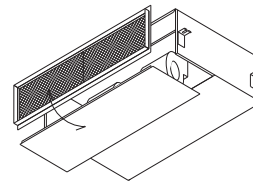
- (a) A corrugated board (for preventing sputtering) is attached to the main body of the air conditioner (on the outlet port). Do not remove it until connecting the duct.
  - 1) An air filter is provided on the main body of the air conditioner (on the inlet port). Remove it when connecting the duct on the inlet port.
- (b) Blowout duct
  - 1) Reduce the length of duct as much as possible.
  - 2) Reduce the number of bends as much as possible.
  - 3) (Corner R should be as larger as possible.)



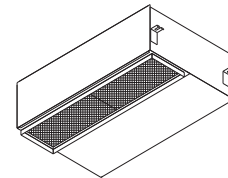
- 4) Conduct the duct installation work before finishing the ceiling.
- (c) Inlet port
  - 1) When shipped, the inlet port lies on the back.
  - 2) When connecting the duct to the inlet port, remove the air filter fitted to the inlet port.
  - 3) When placing the inlet port to carry out suction from the bottom side, use the following procedure to replace the suction duct joint and the bottom plate.
- (d) Make sure to insulate the duct to prevent dewing on it.
- (e) Location and form of blow outlet should be selected so that air from the outlet will be distributed all over the room, and equipped with a device to control air volume.
- (f) Make sure provide an inspection hole on the ceiling. It is indispensable to service electric equipment, motor, functional components and cleaning of heat exchanger.



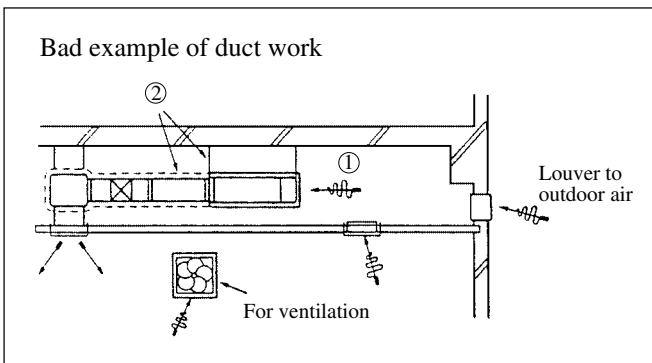
- Remove the screws which fasten the bottom plate and the duct joint on the inlet port side of the unit.



- Replace the removed bottom plate and duct joint



- Fit the duct joint with a screw, fit the bottom plate.



(g) If a duct is not provided at the suction side but it is substituted with the space over the ceiling, humidity in the space will increase by the influence of capacity of ventilation fan, strength of wind blowing against the out door air louver, weather (rainy day) and others.

1) Moisture in air is likely to condense over the external plates of the unit and to drip on the ceiling.

Unit should be operated under the conditions as listed in the above table and within the limitation of wind volume.

When the building is a concrete structure, especially immediately after the construction, humidity tends to rise even if the space over the ceiling is not substituted in place of a duct.

In such occasion, it is necessary to insulate the entire unit with glass wool (25mm). (Use a wire net or equivalent to hold the glass wool in place.)

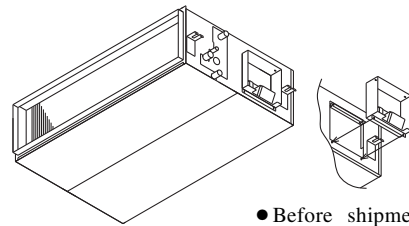
2) It may run out the allowable limit of unit operation (Example: When outdoor air temperature is 35°C DB, suction air temperature is 27°C WB) and it could result in such troubles as compressor overload, etc..

3) There is a possibility that the blow air volume may exceed the allowable range of operation due to the capacity of ventilation fan or strength of wind blowing against external air louver so that drainage from be heat exchanger may fail to reach the drain pan but leak outside (e. g. drip on to the ceiling) with consequential water leakage in the room.

**(6) Control box (Only case of FDUR408-A, 508-A)**

- During bottom side suction, the orientation of the control box can be changed to allow the control box to be maintained from the inlet port.

(a) Remove the bottom plate (on the inlet port side), and all wiring connectors from the control box.



- Before shipment from the plant, arrangements are made to enable maintenance from the sides of the unit.

(b) Remove the three screws that fasten the cabinet inside the control box.

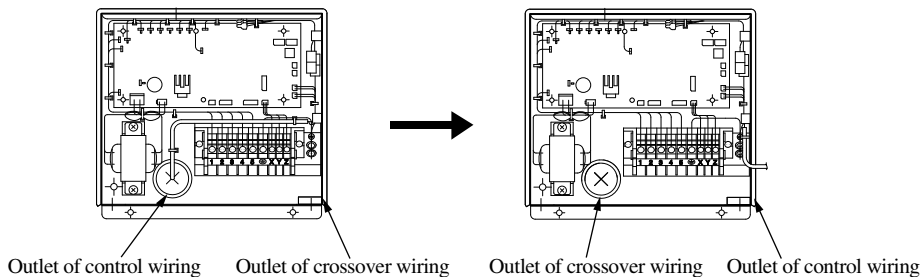
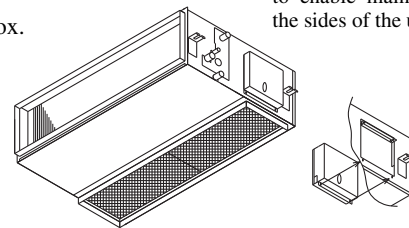
(c) Pull the control box toward the outside of the unit.

(d) Change the ejection of the wiring inside the control box.

(e) Fit the control box from the inside of the unit.

(f) Fit the three screws that fasten the cabinet.

(g) Correctly connect all wiring connectors.



## 9.5.2 Installation of remote controller (Optional parts)

### (1) Selection of installation location

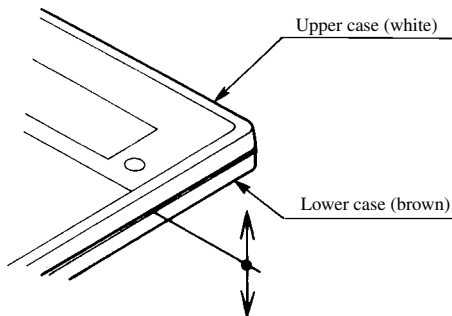
**Following locations should be avoided:**

- Where exposed to direct sunlight
- Near the heat source
- Highly humid area or where splashed with water
- Uneven installation surface

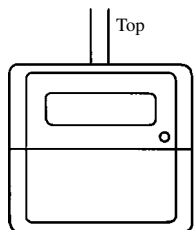
### (2) Selection of installation location

#### (i) Exposed installation

- Remove the remote controller case.
  - Insert finger nails between the upper (white) and lower (brown) cases and pry them to open.

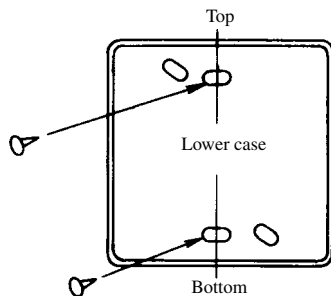


- Remote controller cords can be taken out upward only as shown below.



(Cord take-out direction)

- Cut the remote controller lower case off at the top and thin section with a nipper, knife or other and remove burrs from the cut with a file or other.
- Secure the remote controller lower case on the wall with 2 pieces of wood-screws.

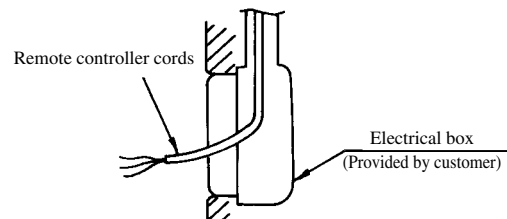


- Connect the remote controller cords with the terminal block. Make sure to align the terminal numbers on the indoor unit and the remote controller. Polarities are specified on the terminal block so that the unit will not be operated if the cords are connected improperly. Terminals: (X) red wire, (Y) white wire, (Z) black wire

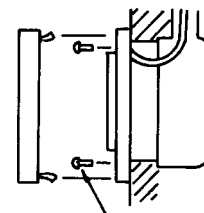
- Set necessary functions in accordance with the model of indoor unit.
- Couple the upper case with the lower case as they were.
- Secure the remote controller cords on the wall or other using cord clamps.

#### (ii) Exposed installation

- Have a Electrical box and remote controller cords (use shielding wires or twisted pair wires for extension) embedded in the wall in advance.



- Remove the upper case from the remote controller.
- Secure the remote controller body on the Electrical box with 2 pieces of M4 round head screw (provided by customer).
- Connect remote controller cords with the remote controller. (Refer to the section regarding the exposed installation.)
- Couple the upper case with the lower case as it was to finish up the installation.



M4 round head screw x 2 pieces  
(Provided by customer)

#### Cautions for extension of remote controller cords

- Make sure to use shielding wires only.
- All models: 0.3 mm<sup>2</sup> x 3 core wires [MVVS3C, products of Keihan Cables]

Note (1) When the extension distance exceeds 100 m, change the wire size as follows:

- 100 ~ 200 m ... 0.50 mm<sup>2</sup> x 3 core wires
- ~ 300 m ... 0.75 mm<sup>2</sup> x 3 core wires
- ~ 400 m ... 1.25 mm<sup>2</sup> x 3 core wires
- ~ 600 m ... 2.00 mm<sup>2</sup> x 3 core wires

- Make sure to ground one side only of the shielding wire.

## 9.5.3 Installation of outdoor unit

### ⚠ WARNING

BE SURE TO READ THESE INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE SERIOUS INJURY OR DEATH, EQUIPMENT MALFUNCTION AND/OR PROPERTY DAMAGE.

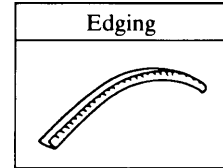
Models FDC208~508, FDCP308~508, FDC808

#### (1) Installation

##### (a) Accessories

Confirm accessories shown below are attached in the bag with this installation manual.

- 1) "Edging" for protection of electric wires from opening edge.



##### (b) Selection of installation location

Select the installation location after obtaining the approval of customer.

- 1) The place where the foundation can bear the weight of Outdoor unit.
- 2) The place where there is no concern about leakage of combustible gas.
- 3) The place where it is not stuffy.
- 4) The place where free from thermal radiation of other thermal source.
- 5) The place where flow of drain is allowed.
- 6) The place where noise and hot air blast do not trouble neighboring houses.
- 7) The place where there is no obstruction of wind at the intake air port and discharge air port.
- 8) When the unit is installed at the particular location as shown below, corrosion or failure may be caused. Please consult the dealer from which you purchased the air-conditioner.
  - a) The place where corrosive gas is generated (hot spring, etc.).
  - b) The place where wind containing salt blows (seaside area).
  - c) The place where enveloped by oil mist.
  - d) The place where there is a machine that radiates electromagnetic wave.

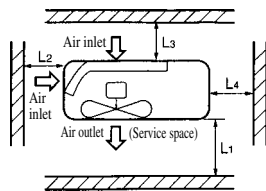
#### Request

- Restrict the height of obstruction wall in front of the discharge air port to the height of unit or less.
- Do not enclose around the unit by the obstruction. Secure the top space for 1 m or more.
- When installing the units side by side in series, secure a space of 10 mm between units.
- When installing the unit where there is a concern about the short circuit, attach the guide louver in front of discharge air port to prevent the short circuit.
- When installing plural units in a group, secure sufficient intake space to prevent the short circuit.
- When installing the unit where it is covered by snow, provide appropriate snow break means.
- When installing the unit where it is subject to strong wind, execute wind-breaking work.

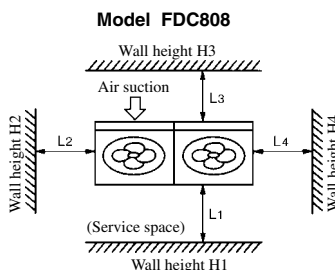
##### (c) The minimum space for installation

Select the space considering the direction of refrigerant piping.

Models FDC208~508, FDCP308~508



		Unit : mm								
Installation example	Distance	FDC208, 258			FDC(P)308			FDC(P)408, 508		
		I	II	III	I	II	III	I	II	III
L1		Open space	Open space	500	Open space	Open space	500	Open space	Open space	500
L2		300	5	Open space	300	5	Open space	300	5	Open space
L3		100	150	100	100	150	100	150	300	150
L4		5	5	5	5	5	5	5	5	5



		Unit: mm		
Dimensions	Installation example	I	II	III
		L1	Open	Open
L2		0	0	0
L3		300	300	300
L4		Open	500	0
H1		-	-	1000 or less
H2		No limit	No limit	No limit
H3		No limit	No limit	700 or less
H4		-	No limit	No limit

#### Note (1)

If the wall height H1 and H3 in installation example III exceed the limit, make L1 and L3 as follow.

$$L1 = H1 - 500$$

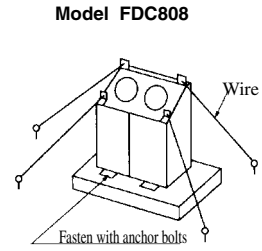
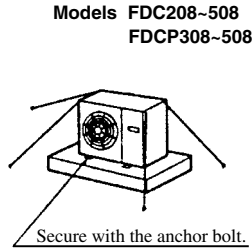
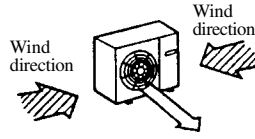
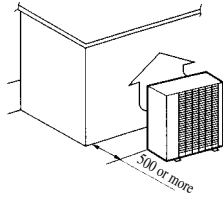
$$L3 = 300 + (H3 - 700) / 2$$

However, if L3 is larger than 600, there is no limit on wall height H3.



**(d) Location where strong wind blows against the unit**

- 1) Install the unit directing the discharge air port to the wall.   
 (Only case of FDC208~508 FDCP308~508)
- 2) Install the unit directing the discharge air port at a right angle to the wind direction.
- 3) Where the foundation is not stable, secure the unit with wire, etc.



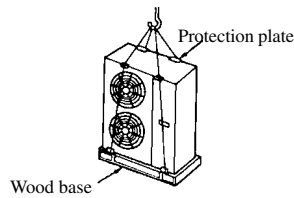
**(2) Carry-in and installation of unit**

Pay sufficient attention to the carry-in and moving work of the unit, and always execute work by two persons or more.

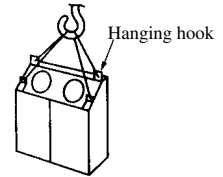
**(a) Carry-in**

- 1) When carrying-in the unit, carry it in as packed condition to the installation site as near as possible.
- 2) If you are compelled to carry-in the unit unpacked condition, lift the unit by the rope using a nylon sling or applying protection plates so that the unit is not marred.

Models FDC208~508  
FDCP308~508



Model FDC808

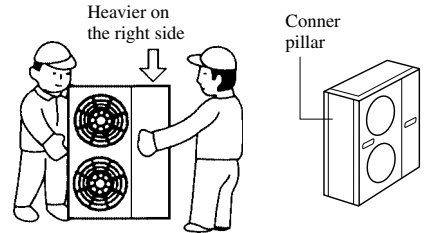


**CAUTION**

• Rope the unit taking the discrepancy of center of gravity into consideration.

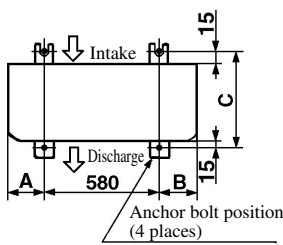
**(b) Moving**

- 1) The unit is heavier on the right side looking from the front of unit (discharge air port side). Therefore, sufficient caution is required for the person who carries the right side of unit. The person who carries the left side must hold the handle of front panel and the corner pillar with both hands.



**(c) Bolt securing position**

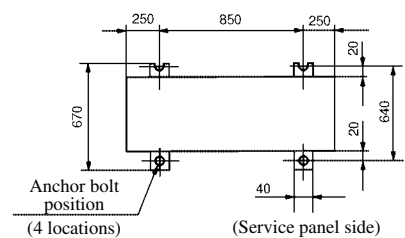
Models FDC208~508  
FDCP308~508



Unit : mm

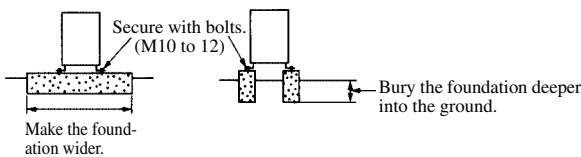
Model	Item	A	B	C
FDC208		150	150	330
FDC258, FDC(P)308		150	150	380
FDC(P)408, 508		165	175	380

Model FDC808

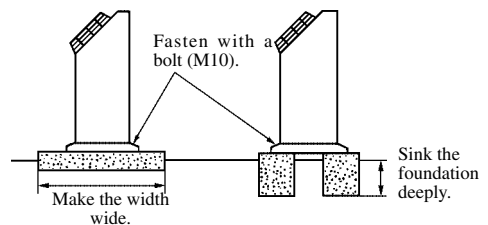


- 1) To install the unit, secure the legs of unit by below mentioned bolts without fail.

Models FDC208~508  
FDCP308~508



Model FDC808

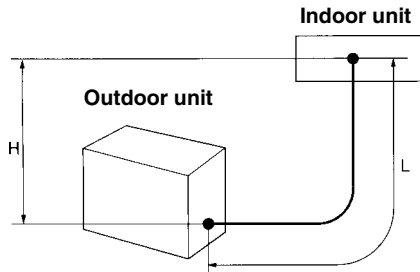


- 2) Limit the protrusion height of front side anchor bolts to 15 mm at the maximum.
- 3) Install the unit firmly so that it does not fall by earthquake and strong wind.
- 4) Make the concrete foundation by referring the above illustration.
- 5) Install the unit in level. (The height difference between right and left is within 30 mm.)

### (3) Refrigerant piping work

Select the piping specification to fit the specification of Indoor unit and installation location.

#### (a) Decision of piping specification



#### Piping specification

Unit : mm

Outdoor unit model	Gas pipe	Liquid pipe
FDC208	φ 15.88 × t1.0	φ 6.35 × t0.8
FDC258, FDC(P)308	φ 15.88 × t1.0	φ 9.52 × t0.8
FDC408, 508	φ 19.05 × t1.0	φ 9.52 × t0.8
FDCP408,508	φ 19.05 × t1.0	φ 9.52 × t0.8
FDC808	φ 25.4 × t1.0	φ 12.7 × t0.8

#### Maximum one way length

FDC208, 258 : L=30 m or less

FDC(P)308~808 : L=50 m or less

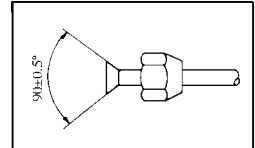
#### Height difference

- When the position of outdoor unit is higher than that of the indoor unit, keep the difference H=30 m or less (FDC208, 258 : H=20 m or less.).
- When the position of outdoor unit is lower than that of the indoor unit, keep the difference H=15 m or less.

#### (b) Piping work

##### Request

- Use the pipe made of following material. Moreover, it is very convenient for you to use the separately sold piping kit.  
Material: Phosphor deoxidized seamless copper tube.
- In the case of this unit, condensation water is also generated on the liquid piping. Insulate both of the liquid piping and gas piping perfectly.
- In the case of heat pump type unit, the maximum temperature of the gas piping reaches approx. 120°C, therefore use the insulation material which has sufficient heat resistance.
- When bending the pipe, bend it with large radius as much as possible. Do not bend the same portion of pipe repeatedly.
- Do not let dust, chips or water enter the pipe while pipe working.
- The flared connection for refrigerant piping is required. Flare the pipe after inserting the flared nut into the pipe.
- Tighten the flared connection firmly using 2 of spanners. Comply with the following value for tightening torque of the flared nut.

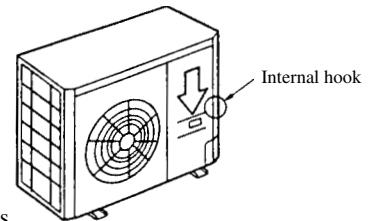


φ 6.35: 14 to 18 (N·m), φ 9.52: 34 to 42 (N·m), φ 15.88: 68 to 82 (N·m), φ 19.05: 100 to 120 (N·m),

- In the case of brazing connection, perform brazing while flowing nitrogen gas in the pipe to prevent generation of oxide film inside the pipe without fail.

##### 1) How to remove the service panel

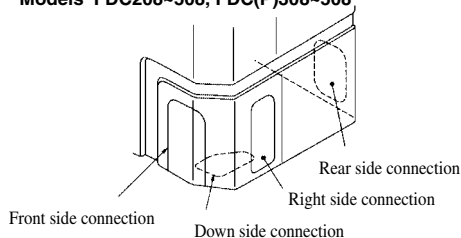
Remove screws on the service panel, pull down the panel toward the arrow direction, and then remove the panel toward you.



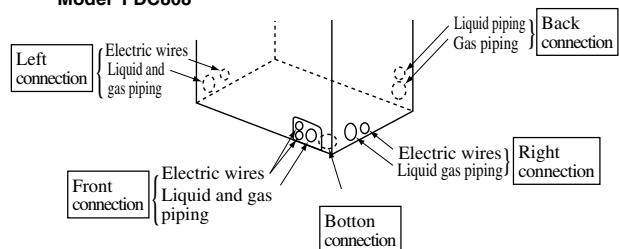
##### 2) Refrigerant pipe connection

- The piping can be taken out to the right, front, rear and down directions.
- Cut the plate at the knockout portion on the piping penetration section with necessary minimum size.
- Mount the attached edging by cutting it to the appropriate length before connecting the pipe.

Models FDC208~508, FDC(P)308~508



Model FDC808



**IMPORTANT**

- Take care so that the piping to be worked does not contact the parts contained in the unit. If it contacts the inner parts, abnormal sound or vibration may occur.

**(c) Leak test and air purge**

Perform the procedure according to the following instructions.

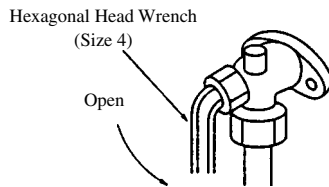
**Request**

- Perform the air purge of Indoor unit and refrigerant piping by vacuuming method without fail.

**Models FDC208~508, FDCP308~508**

**Leak test**

- 1) After tightening all flared nuts on the Indoor unit and Outdoor unit, hold the service valves (both of liquid and gas sides) of the Outdoor unit in fully closed position and perform the leak test from the charge port of service valve to confirm that there is no leakage.  
(Use nitrogen gas for leak test. Execute the test at the pressure of 3.0 MPa.)

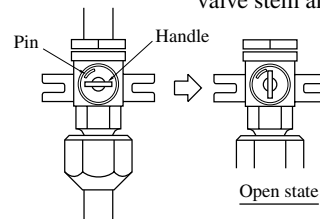


**FDC208, 258, FDC(P)308 Liquid / gas service valve**  
**FDC(P)408, 508 Liquid service valve**

**Air purge**

- 2) While holding the service valves (both of liquid and gas sides) of the Outdoor unit at fully closed position, perform vacuuming at  $-0.1$  MPa or under from the service valve charge port.

- 3) After completion of vacuuming, remove the cap nut for the valve stem and fully open the service valve (for both of liquid and gas) as shown in the right illustration. After confirming that the valve is fully open, tighten the cap nuts (for valve stem and charge port).

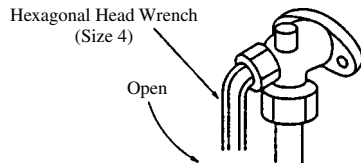


**FDC(P)408,508 Gas service valve**

**Model FDC808**

**Leak test**

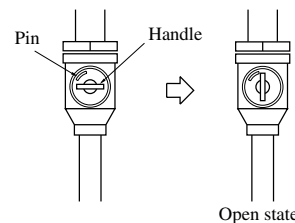
- (1) The unit's air-tightness test has been conducted but after completing the piping connections conduct an air-tightness test of the connected piping and the indoor units using the outdoor gas side service valve check joint. Be sure to conduct this test with the service valve closed.
    - ① When the pressure has been increased to 0.5 MPa stop increasing the pressure and maintain this state for at least 5 min. to check if the pressure drops.
    - ② Next, increase the pressure to 1.5 MPa and again maintain this state for at least 5 min. to check if the pressure drops.
    - ③ Then increase the pressure to 3.0 MPa and maintain this state for approx. one day to check if the pressure drops.
- Use nitrogen gas for the air-tightness check.



**Liquid service valve**

**Air purge**

- (2) While holding the service valves (both of liquid and gas sides) of the Outdoor unit at fully closed position, perform vacuuming at  $-0.1$  MPa or under from the service valve charge port.
- (3) After completion of vacuuming, remove the cap nut for the valve stem and fully open the service valve (for both of liquid and gas) as shown in the right illustration. After confirming that the valve is fully open, tighten the cap nuts (for valve stem and charge port).

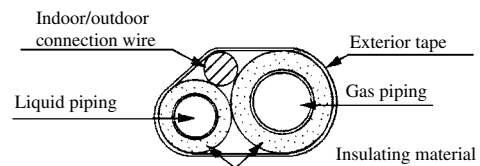


**Gas service valve**

**(d) Heat insulation for refrigerant piping**

- (i) **The gas piping and liquid piping must be insulated against heat and condensation by heat insulation material.**

- 1) Condensation can form on the gas line during cooling operation and drain off, causing leakage problems. Also, people can be burned by the high temperatures on the surface of the piping due to the flow of discharge gas during heating. To prevent this, the piping should be wrapped in insulating material.
- 2) Insulate the flare connection sections of the indoor unit with insulating material (pipe covering). (Perform this for both gas and liquid lines.)
- 3) Wrap the gas and liquid piping with insulation, making sure that no gaps can form inside. Bundle the piping and wires together and wrap with exterior tape.



※ Use a material with good heat transfer resistance qualities (120 °C or more)

**(e) Refrigerant charge**

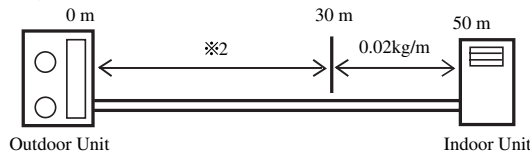
- 1) Outdoor unit is pre-charged R-22 and R407C refrigerant at a factory as shown in Table 1.
- 2) Indoor unit is pre-charged only a small amount of nitrogen gas for prevention of the air entry.
- 3) Additional charge on site is required when the pipe length is longer than that of restricted value (Which is varied with the type of Indoor unit) as shown in Table 1.

Table 1

Item Model	Factory charge amount (kg)	Additional charge amount ※1 (kg/m)		Pipe length that additional charge is not required (m)	Maximum piping length (m)
		0 ~30m	30 ~ 50m		
FDC208H	0.98	0.015	-	0 (5) *3	30
FDC258H	1.10	0.025	-	5	
FDC308H	1.40				
FDCP308H	1.75	0.035 ※2	0.02		5
FDC408H	1.70				
FDCP408H	2.21				
FDC508H	1.90				
FDCP508H	2.58	0.045	-		
FDC808H	5.33				

Note (1) \*3. The values in ( ) are when connected to FDKN Series indoor unit.

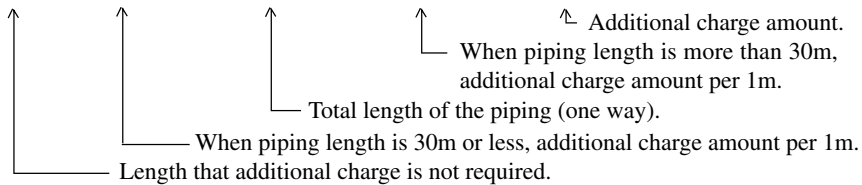
※1 Additional charge amount



- Calculate the additional charge amount according to Table 1.

Example : In the case that FDUR508HES-SB is newly installed with piping length of 40m.

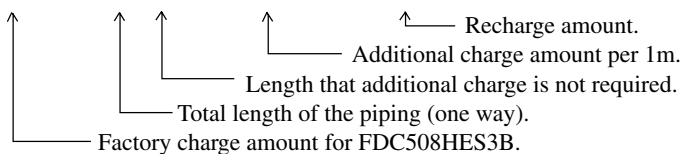
$$(30 - 5) (m) \times 0.035 (kg/m) + (40 - 30) (m) \times 0.02 (kg/m) = 1.075 (kg)$$



- In the case of recharge the refrigerant for service, calculate the proper amount of refrigerant depending on the piping length on site.

Example : In the case that FDUR508HES-SB with piping length of 15m is fully recharged in service.

$$1.9 (kg) + (15 - 5) (m) \times 0.035 (kg/m) = 2.25 (kg)$$

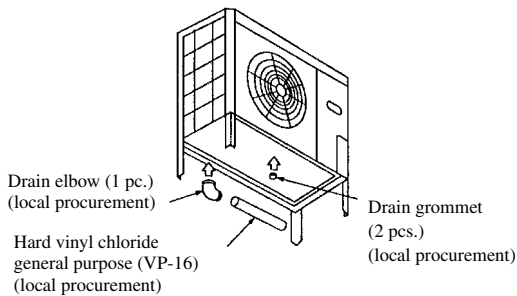


**Following precautions must be observed when the model is adapted to R407C.**

- (1) Tools and related components should be changed when handling a different kind of refrigerant in order to prevent mixing of different oils.  
Gauge manifold and charge hose, particularly, should never be used after using them for R22.
- (2) Charge cylinder should not be used. Otherwise, the refrigerant composition may change when charging R407C into the cylinder.
- (3) Refrigerant should be charged in the liquid phase from the container. Charging the refrigerant in the gaseous phase could change the refrigerant composition substantially.
- (4) Volume of refrigerant to be taken out in the liquid phase from the container should be up to 90% of necessary quantity (in weight percent) as a standard.
- (5) Refrigerant should not be replenished even if a leakage is discovered because it could change the refrigerant composition substantially.  
When a leakage is discovered, replace with new refrigerant in the specified volume. However, it could be replenished temporarily in case of an emergency.

**(4) Drain piping work**

- Execute the drain piping by using field purchased parts of pipe, elbow, and grommets, if the drainage work is needed.



- There are 3 holes (ø 20) on the bottom plate of Outdoor unit for draining condensed water.
- To guide the condensed water to the gutter it is necessary to install the unit on the flat base or blocks.
- Connect the drain elbow as shown in the illustration and close other holes with grommets.

**(5) Electrical wiring**

- This air conditioning system should be notified to supply authority before connection to power supply system.
- (a) Selection of size of power supply and interconnecting wires.

**⚠ IMPORTANT**

- Electric wiring work should be conducted only by authorized personnel.
- Use copper conductor only.
- Power source wires and Interconnecting wires shall not be lighter than polychloroprene sheathed flexible cord (design HO5RN-F IEC 57).
- Do not connect more than three wires to the terminal block.
- Use round type crimped terminal lugs with insulated grip on the end of the wires.

- Select wire sizes and circuit protection from Table 2.

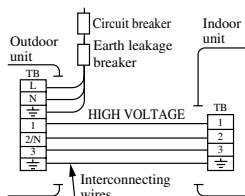
Table 2 ( This table shows 20m length wires with less than 2% voltage drop. )

Model	Item	Phase	Circuit breaker		Power source wires (minimum)	Interconnecting and grounding wires (minimum)
			Switch breaker (A)	Over-current protector rated capacity (A)		
FDC208		1	30	20	5.5mm <sup>2</sup>	ø 1.6
FDC258				30		
FDC(P)308				15		
FDC(P)308		3	50	20	5.5mm <sup>2</sup>	20mm
FDC(P)408				20		
FDC(P)508				50		
FDC808						

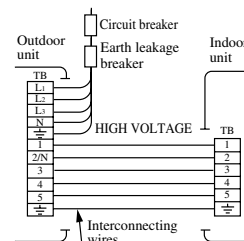
(b) Wiring connection.

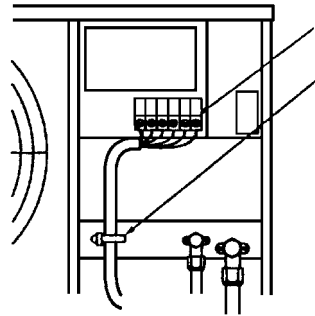
- 1) Connect the same terminal number between the Indoor unit and Outdoor unit as shown in the following diagram.
- 2) Make wiring to supply to the Outdoor unit, so that the power for the Indoor unit is supplied by ① and ② terminals.
- 3) Secure the wiring with wiring clamp so that no external force is transmitted to the connecting portion of terminal.
- 4) There is a ground (Earth) terminal in the control box.

(a) 1 phase model



(b) 3 phase model





- Power source and ground terminal block
- Wiring clamp
  - Secure the wiring so that no external force is applied to the connecting portion of terminal.
- Take out direction of wiring
  - Same as the refrigerant piping, 4 directions are allowed, which are right, front, rear and down.
- Wiring diagram
  - Wiring diagram is fixed at the backside of service panel.

## (6) Test run

### ⚠ CAUTION

THIS UNIT WILL BE STARTED INSTANTLY WITHOUT "ON" OPERATION WHEN ELECTRIC POWER IS SUPPLIED.  
BE SURE TO EXECUTE "OFF" OPERATION BEFORE ELECTRIC POWER IS DISCONNECTED FOR SERVICING.

- This unit has a function of automatic restart system after recovering power stoppage. DO NOT LEAVE OUTDOOR UNIT WITH THE SERVICE PANEL OPENED.
- When the service panel is removed, high voltage portion and high temperature areas are exposed.

### ⚠ IMPORTANT

- Check that the service valves are fully opened without fail before operation.
- Turn on the power for over 12 hours to energize the crankcase heater in advance of operation.
- Wait more than 3 minutes to restart the unit after stop.

- (a) Run the unit continuously for about 30 minutes, and check the following.
  - Suction pressure at check joint on the service valve for gas pipe.
  - Discharge pressure at check joint on the liquid pipe.
  - Temperature difference between return air and supply air for Indoor unit.
- (b) Refer to "Check Indicator Table" on wiring diagram of Outdoor unit or "User's manual" of Indoor unit for diagnosis of operation failure.

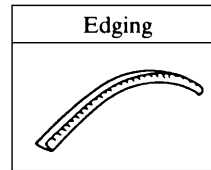
## Models FDC256~506

### (1) Installation

#### (a) Accessories

Confirm accessories shown below are attached in the bag with this installation manual.

- 1) "Edging" for protection of electric wires from opening edge.

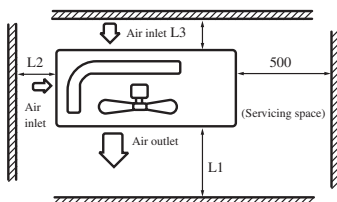


#### (b) Selection of the place of installation

Select the place of installation satisfying the following conditions and, at the same time, obtain a consent from the client or user.

- 1) Place where air circulates.  
Place free from heat radiation from other heat sources.
- 2) Place where drain water may be discharged.  
Place where noise and hot air may not disturb the neighborhood.
- 3) Place where there is not heavy snowfall in the winter time.
- 4) Place where obstacles do not exist near the inlet air port and outlet air port.
- 5) Place where the outlet port may not be exposed to a strong wind.
- 6) Place surrounded at four sides are not suitable for installation. 1m or more of overhead space is needed for the unit.
- 7) Mount guide-louvers to place where short-circuit is a possibility.
- 8) When installing several unit, secure sufficient suction space to avoid short circuiting.

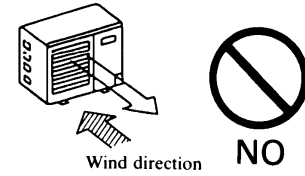
- a) Open space requirement around the unit



Unit: mm

Model	FDC256		FDC306			FDC406, 506		
	Case		I	II	III	I	II	III
L1	open	100	open	open	500	open	open	500
L2	100	open	300	0	open	300	0	open
L3	100	500	100	150	100	150	300	150

- b) Installation where the area with strong winds.  
Install the unit so that the air outlet section of the unit must not be faced toward wind direction.

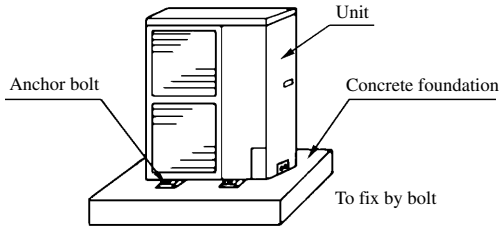


**(c) Installation of outdoor unit**

1) Installation

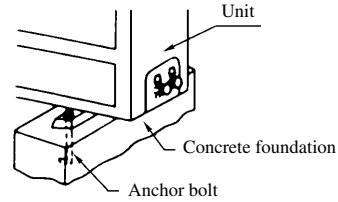
Fix the unit in a proper way according to the condition of a place where it is installed by referring to the following.

**a) Concrete foundation**



Note (1) Give enough room for the concrete foundation to fix by anchor bolts.

**b) Foundation anchor**

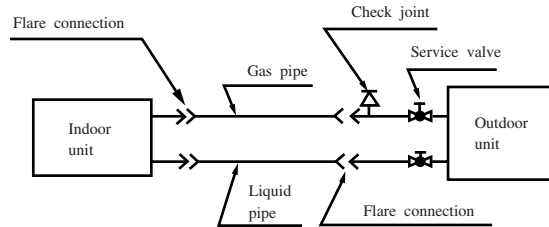


Note (1) Place the concrete foundation deep enough.

Install the unit so that the angle of indination must be less than 3 degrees.

**(2) Refrigerant piping**

(a) Outline of piping



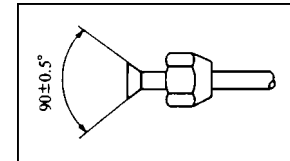
(b) Piping size

Model	FDC256, 306	FDC406, 506
Gas piping	φ15.88 × 1.0 mm	φ19.05 × 1.0 mm
Liquid piping	φ9.52 × 0.8 mm	φ9.52 × 0.8 mm

- Install the removed flared nuts to the pipes to be connected, then flare the pipes.

(c) Limitations for one way piping length and vertical height difference.

- One way piping length: Less than 30 m
- Vertical height difference: Less than 15 m



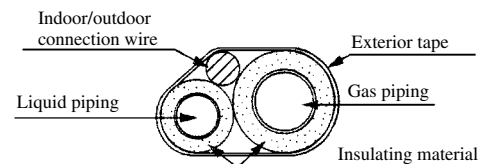
**Precautions for refrigerant piping**

- Do not twist or crush piping.
- Be sure that no dust is mixed in piping.
- Bend piping with as wide angle as possible.
- Keep insulation both gas and liquid piping.
- Check flare-connected area for gas leakage.
- Tighten the flared connection firmly using 2 of spanners. Comply with the following value for tightening torque of the flared nut.  
φ 9.52: 34 to 42 (N·m), φ 15.88: 68 to 82 (N·m), φ 19.05: 100 to 120 (N·m),

(d) Heat insulation for refrigerant piping

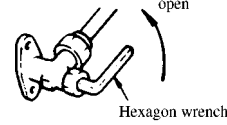
**(i) The gas piping and liquid piping must be insulated against heat and condensation by heat insulation material.**

- 1) Condensation can form on the gas line during cooling operation and drain off, causing leakage problems. Also, people can be burned by the high temperatures on the surface of the piping due to the flow of discharge gas during heating. To prevent this, the piping should be wrapped in insulating material.
- 2) Insulate the flare connection sections of the indoor unit with insulating material (pipe covering). (Perform this for both gas and liquid lines.)
- 3) Wrap the gas and liquid piping with insulation, making sure that no gaps can form inside. Bundle the piping and wires together and wrap with exterior tape.



※ Use a material with good heat transfer resistance qualities (120 °C or more)

- (e) Air purge  
Carry out the air purge of the indoor unit and refrigerant piping by vacuuming.  
Procedures.
- 1) Tighten all the flare nuts of the piping on the side of indoor and outdoor units so that there is no leakage.
  - 2) Carry out vacuuming from the service valve charge port with the service valves (both liquid and gas side) of the outdoor unit fully closed.
  - 3) After vacuuming, remove the cap nut for the valve stem, and tighten the cap nuts (cap nuts for valve stem and charge port) with service valve (both liquid and gas) fully opened.
- (f) Method of opening and closing service valve of outdoor unit
- 1) Remove the hexagonal cap nut.
  - 2) Operate the valve using a hexagonal wrench to open by left turn and to close by right turn.
  - 3) Tighten the hexagonal cap nut after the piping works.



Item	Model	FDC256,306	FDC406, 506
Hexagon wrench size	Gas side	4	6
	Liquid side	4	4

- (g) Additional charge of refrigerant

Unit : kg

Model	Item	Factory charge amount of refrigerant	Additional charge amount per meter	Length that additional charge is not required	Maximum piping length
		Outdoor unit			
FDC256H		1.25	0.025	5 m	30 m
FDC306H		1.3			
FDC406H		1.6			
FDC506H		2.3	0.035		
FDC306C		1.3			
FDC406C		1.55	0.035		
FDC506C		1.85			

- Notes (1) When the refrigerant piping length exceeds the length that additional refrigerant charge is not required, charge additional refrigerant based on the calculated amount of refrigerant per unit piping length.

**Example of additional charge amount calculation**

Calculate the additional charge amount for the model FDUR508HES-A when the piping length is 25 m.

$$\frac{(25 - 5)}{\text{Length that additional refrigerant charge is not required (m)}} \times \frac{0.035}{\text{Additional charge amount per 1 m (kg/m)}} = \frac{0.70}{\text{Additional charge amount (kg)}}$$

Labels in the diagram:  
 - 25: Total length of the piping (one way) (m)  
 - 5: Length that additional refrigerant charge is not required (m)  
 - 0.035: Additional charge amount per 1 m (kg/m)  
 - 0.70: Additional charge amount (kg)

Additional charge amount of refrigerant = 0.70 kg (Calculate the amount in any case.)

- (2) The unit is holding charge type that all of the refrigerant is charged in the outdoor unit and in the indoor unit only a small amount of gas is filled for prevention of the air entry.
- (3) In the case of FDR408 and FDU408, it is 0 m.
- (4) In the case of FDKN308, it is 10 m.

**(3) Electric wiring**

**⚠ WARNING**

**DANGER OF BODILY INJURY OR DEATH**  
 TURN OFF ELECTRIC POWER AT CIRCUIT BREAKER OR POWER SOURCE BEFORE MAKING ANY ELECTRIC CONNECTIONS.  
 GROUND CONNECTIONS MUST BE COMPLETED BEFORE MAKING LINE VOLTAGE CONNECTIONS.

- This air conditioning system should be notified to supply authority connection to power supply system.

- (a) Selection of size of power supply and interconnecting wires.

**Precautions for Electric wiring**

- Electric wiring work should be conducted only by authorized personnel.
- Do not connect more than three wires to the terminal block. Always use round type crimped terminal lugs with insulated grip on the ends of the wires.
- Use copper conductor only.
- Power source wires and interconnecting wires shall not be lighter than polychloroprene sheathed flexible cord (design H05RN-F IEC57).



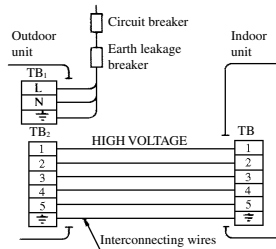
Select wire sizes and circuit protection from table below. (This table shows 20 m length wires with less than 2% voltage drop.)

Model \ Item	Phase	Circuit breaker		Power source wire size (minimum)	Interconnecting and grounding wires (minimum)
		Switch breaker (A)	Over-current Protector rated capacity (A)		
FDC256	1	30	30	5.5 mm <sup>2</sup>	φ1.6 mm
FDC306				8 mm <sup>2</sup>	
FDC306				15	
FDC406	3	20	20	φ1.6 mm	
FDC506				5.5 mm <sup>2</sup>	

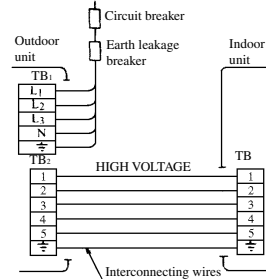
(b) Wiring connection

Make wiring to supply power to the outdoor unit, so that the power for the indoor unit is supplied by ① and ② terminals.

1) 1 phase model



2) 3 phase model



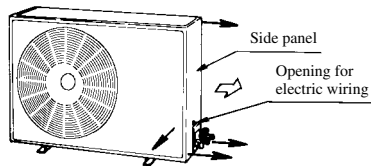
**⚠ WARNING**

DO NOT CONNECT THE NEUTRAL WIRE N TO L<sub>1</sub> (R), L<sub>2</sub> (S) OR L<sub>3</sub> (T) PHASE. INTERCONNECTING WIRES MUST BE WIRED WITH SAME SYMBOLS ON THE TERMINALS OF BOTH INDOOR AND OUTDOOR UNIT. INCORRECT WIRING CAUSE EQUIPMENT DAMAGE OR A FIRE.

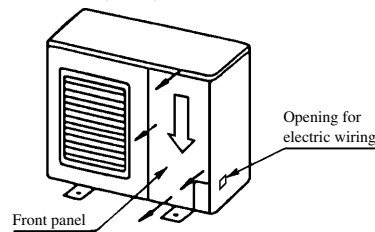
(c) Wiring procedure

- 1) Remove set screws on the side before taking off side panel (FDC256) or the front panel (FDC306, 406, 506) toward the direction shown in figure.
- 2) Connect wires to the terminal block correctly and fix the wires with a wire clamp equipped near by the terminal block.
- 3) Route the wires in a proper way and penetrate the wires through the opening for electric wiring on the side panel.

FDC256



FDC306, 406, 506



(4) Test run

**⚠ CAUTION**

THIS UNIT WILL BE STARTED INSTANTLY WITHOUT "ON" OPERATION WHEN ELECTRIC POWER IS SUPPLIED. BE SURE TO EXECUTE "OFF" OPERATION BEFORE ELECTRIC POWER IS DISCONNECTED FOR SERVICING.

- This unit has a function of automatic restart system after recovering power stoppage.

(a) Before starting test run (For all heat pump models and cooling model FDC506)

Confirm whether the power source breaker (main switch) of the unit has been turned on for over 12 hrs to energize the crankcase heater in advance of operation.

(b) Test run

Run the unit continuously for about 30 minutes, and check the following.

- Suction pressure at check joint of service valve for Gas pipe.
- Discharge pressure at check joint on the compressor discharge pipe.
- Temperature difference between return air and supply air for indoor unit.

## 9.6 MAINTENANCE DATA

### 9.6.1 Servicing

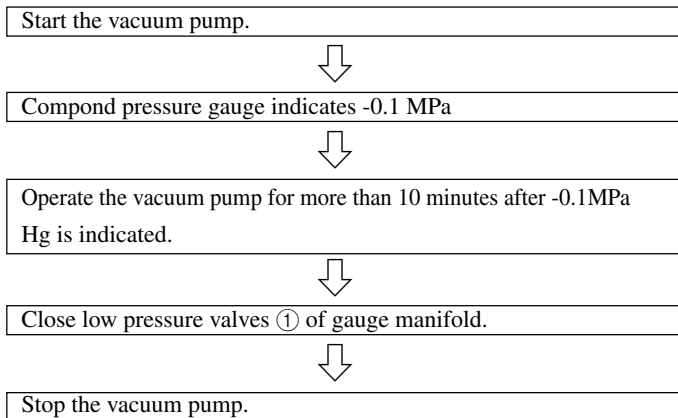
#### (1) Evacuation

The evacuation is a procedure to purge impurities, such as noncondensable gas, air, moisture from the refrigerant equipment by using a vacuum pump. Since the refrigerant R22 and R407C is very insoluble in water, even a small amount of moisture left in the refrigerant equipment will freeze, causing what is called ice clogging.

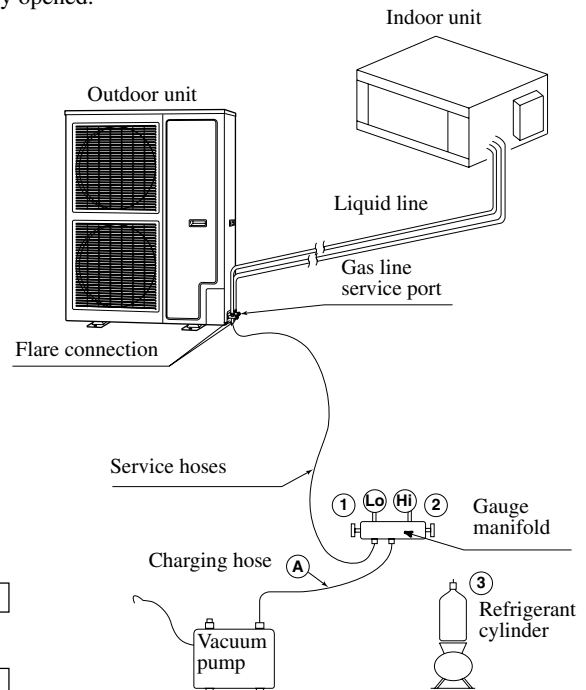
#### Evacuation procedure

Make sure that the both service valves of gas and liquid line are fully opened.

- (a) Check to ensure that there is no internal pressure in the unit. If there is an internal pressure, it should be relieved through the service port.
  - (b) Connect the charging hose of the gauge manifold to the service port of the gas piping. Close high pressure valve ② of gauge manifold.
  - (c) Connect the charging hose A to a vacuum pump.
- Repeat evacuation in the following sequence.



- Notes (1) Do not use the refrigerant pressure to expel air.  
 (2) Do not use the compressor for evacuation.  
 (3) Do not operate the compressor in a vacuum condition.



- Notes (1) Refer to the exterior-view drawing for the position of the service valve.  
 (2) When connecting of the service valve, flare connection for both the indoor and outdoor unit.

## (2) Refrigerant charging

(a) After the evacuation shown in the above, change the connection of the charge hose A to the refrigerant cylinder.

(b) Purge air from the charge hose A .

First loosen the connecting portion of the charge hose at the gauge manifold side and open valve ③ for a few seconds, and then immediately retighten it after observing that gas has blown out from loosened connecting portion.

(c) Open valves ① and ③ then gas refrigerant begins flowing from the cylinder into the unit.

When refrigerant has been charged into the unit to some extent, refrigerant flow becomes stagnant. When that happens, start the compressor in cooling cycle until the system is filled with the specified amount of gas, then close valves ① and ③ and remove the gauge manifold. Cover the service port with caps and tighten them securely.

(d) Check for gas leakage by applying a gas leak detector around the piping connection.

(e) Start the air conditioner and make sure of its operating condition.

## 9.6.2 Trouble shooting for refrigerant circuit

### (1) Judgement of operating condition by operation pressure and temperature difference

Making an accurate judgement requires a skill that is acquired only after years of experience, one trouble may lead to another trouble from a single trouble source and several other troubles may exist at the same time which comes from a undetected different trouble source.

Filtering out the trouble sources can be done easier by comparing with daily operating conditions. Some good guides are to judge the operating pressure and the temperature difference between suction air and delivery air.

Following are some pointers,

Circuit	Pressure						Trouble cause
	Indication	Too low	A little low	Normal	A little high	Too high	
High side Low side						●	1) Excessive overcharging of refrigerant 2) Mixture of non condensable gas (air etc.)
High side Low side	●					●	Ineffective compression (defective compressor)
High side Low side	●		●				1) Insufficient refrigerant in circuit 2) Clogging of strainer 3) Gas leakage 4) Clogging of air filter (in cooling) 5) Decrease in heat load (in cooling) 6) Locking of indoor fan (in cooling)
High side Low side					●	●	1) Locking of outdoor unit fan (in cooling) 2) Dirty outdoor heat exchanger (in cooling) 3) Mixture of non condensable gas (air etc.)
High side Low side					●	●	1) Too high temperature of room

## 9.6.3 Diagnosing of microcomputer circuit

### (1) Selfdiagnosis function

#### (a) Indoor unit side

##### (i) Only case of wireless remote control model.

#### Check indicator table

#### Failure mode on the indoor unit indicated by flashing Yellow LED and Green LED.

Indoor unit LED		Failure at:	Contents of the failure
Yellow	Green		
1 time flash	–	Indoor unit heat exchanger thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Indoor unit heat exchanger thermistor defective (element defective or broken wire). Defective connection of connector for thermistor.</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
2 time flashes	–	Indoor unit air return thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Indoor unit return thermistor defective (element defective or broken wire). Defective connection of connector for thermistor.</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
4 time flashes	–	Failure in drainage Float switch Indoor circuit board	<ul style="list-style-type: none"> <li>Failure with the condensate pump (DM), or open circuit or disconnection of connector with the condensate pump.</li> <li>Malfunctioning of the float switch (erroneous functioning)</li> <li>Indoor unit circuit board defective (defective float switch input circuit)</li> <li>Indoor unit circuit board defective (defective DM driving output circuit)</li> </ul>
5 time flashes	–	Installation and operating conditions Indoor unit heat exchanger thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Heating overload (temperature of heat exchanger for indoor unit abnormally high)</li> <li>Indoor unit heat exchanger thermistor defective (short circuit)?</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
6 time flashes	–	Insufficient refrigerant Indoor unit heat exchanger thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Gas leak.</li> <li>Indoor unit heat exchanger thermistor defective (short circuit).</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
–	2 time flashes	Low voltage protection	<ul style="list-style-type: none"> <li>When the power source voltage is 80% of rating or lower.</li> </ul>

Note (1) Inspection LED display has a cycle of 8 seconds (flashing time of 0.5 seconds).

##### (ii) Only case of wired remote control model.

#### Table of inspection items based on error codes

Error Code	Failure at:	Contents of the failure
E1	Operating switch wire (signal noise) Circuit board for operating switch or indoor unit	<ul style="list-style-type: none"> <li>Defective connection or broken wire for operating switch signal wire.</li> <li>Signal noise has entered the operating switch wire.</li> <li>Is the circuit board for the operating switch or the circuit board for the indoor unit is defective (communication circuit defective)?</li> </ul>
E6	Indoor unit heat exchanger thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Indoor unit heat exchanger thermistor defective (element defective or broken wire). Defective connection of connector for thermistor.</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
E7	Indoor unit air return thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Indoor unit return thermistor defective (element defective or broken wire). Defective connection of connector for thermistor.</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
E8	Installation and operating conditions Indoor unit heat exchanger thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Heating overload (temperature of heat exchanger for indoor unit abnormally high)</li> <li>Indoor unit heat exchanger thermistor defective (short circuit).</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>
E9	Failure in drainage Float switch Indoor circuit board	<ul style="list-style-type: none"> <li>Failure with the condensate pump (DM), or open circuit or disconnection of connector with the condensate pump.</li> <li>Malfunctioning of the float switch (erroneous functioning)</li> <li>Indoor unit circuit board defective (defective float switch input circuit)</li> <li>Indoor unit circuit board defective (defective DM driving output circuit)</li> </ul>
E10	Number of indoor units connected	<ul style="list-style-type: none"> <li>1 Remote controller for multiple unit control, 17 or more indoor units connected</li> </ul>
E14	Indoor unit No. setting Remote controller wiring	<ul style="list-style-type: none"> <li>No master unit corresponding to the slave unit.</li> <li>Incorrect connection or open circuit of remote controller wiring between the master unit and the slave unit.</li> </ul>
E57	Insufficient refrigerant Indoor unit heat exchanger thermistor Indoor unit circuit board	<ul style="list-style-type: none"> <li>Gas leak.</li> <li>Indoor unit heat exchanger thermistor defective (short circuit).</li> <li>Indoor unit circuit board defective (defective thermistor input circuit)?</li> </ul>

**(2) Error diagnosis procedures at the indoor unit side**

To diagnose the error, measure the voltage (AC, DC), resistance, etc. at each connector around the circuit board of indoor unit based on the inspection display or the operation state of unit (no operation of compressor or blower, no switching of 4-way valve, etc.). If any defective parts are discovered, replace with the assembly of parts as shown below.

**(a) Single-unit replacement parts for circuit board of indoor unit.** (Peripheral electric parts for circuit board.)

Indoor unit printed circuit board, thermistor (return, heat exchanger), operating switches, limit switches, transformers, fuses.

Note (1) Use normal inspection methods to determine the condition of strong electrical circuits and frozen cycle parts.

**(b) Replacement procedure of indoor unit microcomputer printed circuit board**

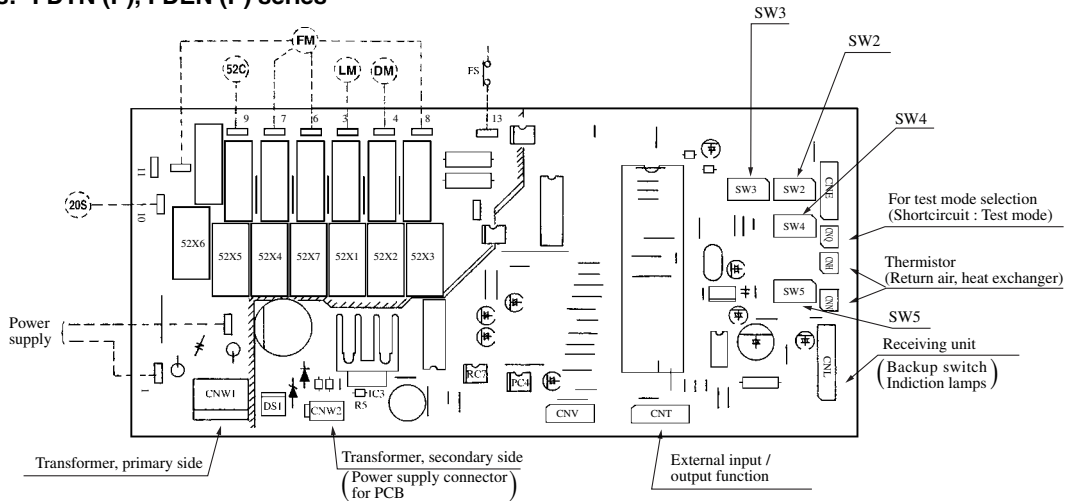
Microcomputer printed circuit board can be replaced with following procedure.

- (i) Confirm the parts numbers. (Refer to the following parts layout drawing for the location of parts number.)

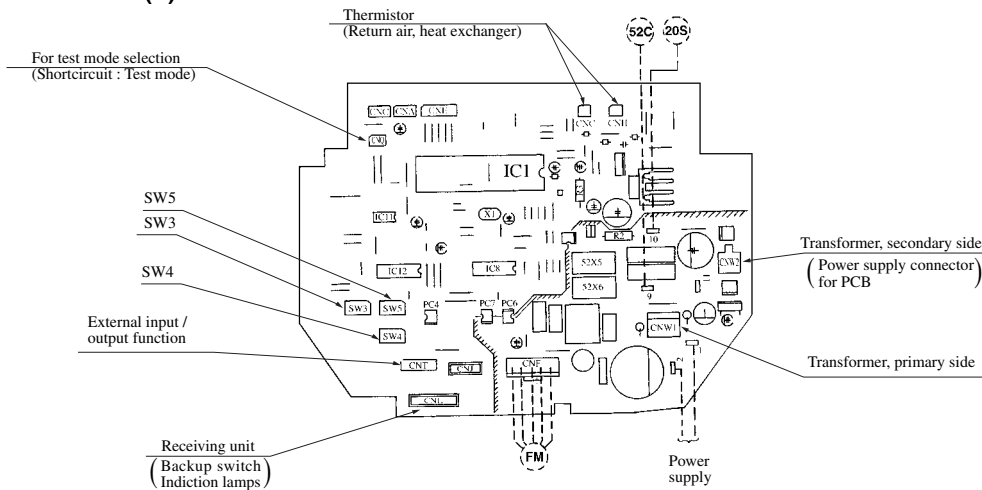
Model	Parts number	Model	Parts number
FDTN(P), FDEN(P)	PJA505A069	FDKN(P)	PHA505A008
FDL	PJA505A080Z	FDT, FDR, FDU, FDUM, FDFL	PJA505A092Z

**Parts layout on the indoor unit PCB**

**Models: FDTN (P), FDEN (P) series**



**Model: FDKN (P) series**

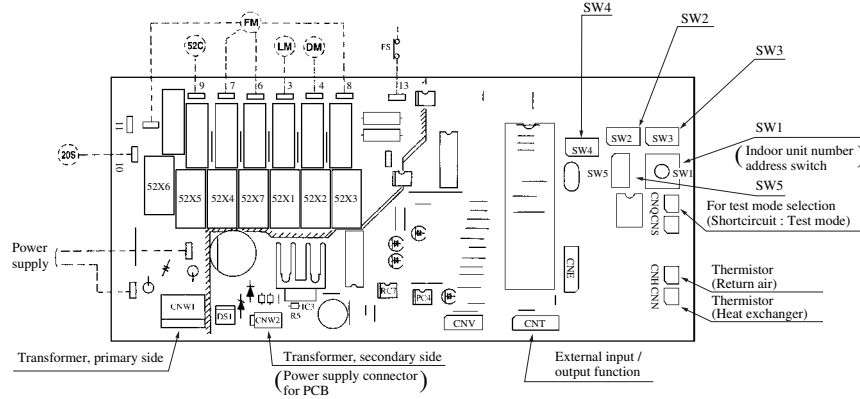


- Function of jumper wires

Name	Function	
J1(SW5-1)	With	1 Phase model
	None	3 Phase model
J2(SW5-2)	With	Cooling only type
	None	Heat pump type
J3(SW5-3)	With	Pulse input
	None	Step input
J4(SW4-1)	With	—
	None	—
J5(SW4-2)	With	Antifrost 2.5°C
	None	Antifrost 1°C
J6(SW4-3)	With	With abnormality resetting
	None	Without abnormality resetting
J7(SW4-4)	With	4 position louver control: valid
	None	4 position louver control: invalid
*1 J7(SW4-4)	With	FDKN208 type
	None	FDKN258, 308 type

Note (1) \*1 J7 (SW4-4) is for switching models on the FDKN (P) Series.

**Models: FDT, FDR, FDU, FDUM, FDUR, FDF, FDFL series**



- Function of DIP switched (SW3)

Switch	Function	
SW3-1	ON	Power off guaranteed
	OFF	No power off guaranteed
SW3-2	ON	With low-voltage detection control
	OFF	Without low-voltage detection control
SW3-3	ON	Power up mode (UHi-Lo)
	OFF	Mild mode (Hi-Lo)
SW3-4	ON	Indoor fan is Lo when heating thermostat is OFF.
	OFF	Indoor fan is OFF when heating thermostat is OFF.

- Function of DIP switched (SW3)

Switch	Function	
SW3-1	ON	Power off guaranteed
	OFF	No power off guaranteed
SW3-2	ON	With low-voltage detection control
	OFF	Without low-voltage detection control
SW3-3	ON	Power up mode (UHi-Lo)
	OFF	Mild mode (Hi-Lo)
SW3-4	ON	Indoor fan is Lo when heating thermostat is OFF.
	OFF	Indoor fan is OFF when heating thermostat is OFF.

- Function of DIP switched (SW4, 5)

Switch	Function	
SW4-1(J1)	ON	Antifrost 2.5°C
	OFF	Antifrost 1°C
SW4-2(J2)	ON	With abnormality resetting
	OFF	Without abnormality resetting
SW4-3(J3)	ON	4 position louver control: valid
	OFF	4 position louver control: invalid
SW5-1(J4)	ON	1 Phase model
	OFF	3 Phase model
SW5-2(J5)	ON	Step input
	OFF	Pulse input

- Function of DIP switched (SW2)

Switch	Function			
SW2-1	ON	SW2-2	ON	200cm
			OFF	130cm
	OFF	SW2-2	ON	160cm
			OFF	—
SW2-3	ON	SW2-4	ON	Plural setting (Slave c)
			OFF	Plural setting (Slave b)
	OFF	SW2-4	ON	Plural setting (Slave a)
			OFF	Plural setting (Master)

- Function of DIP switched (SW4, 5) (Only of FDF)

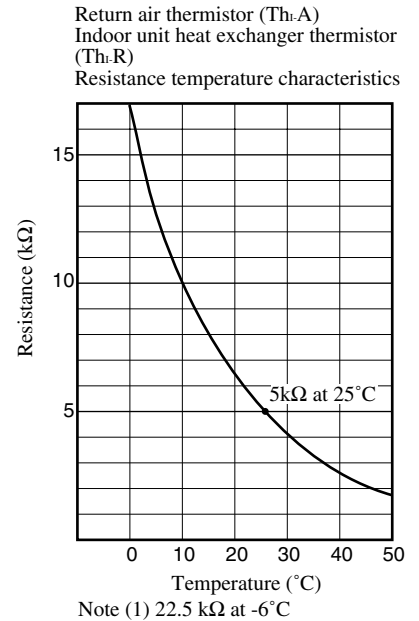
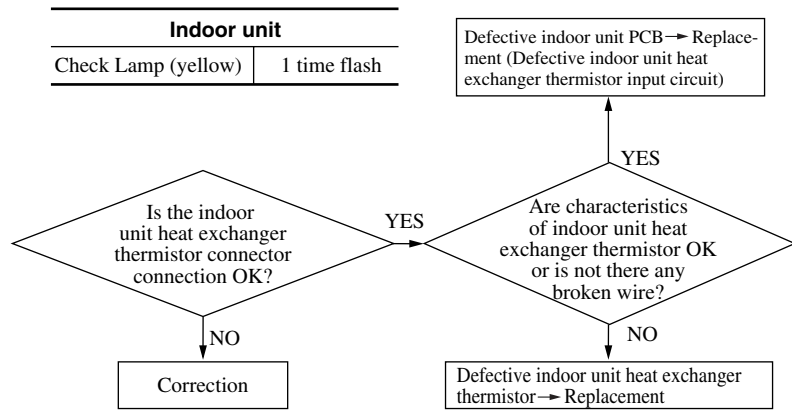
Switch	Function	
SW4-1(J4)	ON	Countermeasure for draft: invalid
	OFF	Countermeasure for draft: valid
SW4-2(J5)	ON	Antifrost 2.5°C
	OFF	Antifrost 1°C
SW4-3(J6)	ON	With abnormality resetting
	OFF	Without abnormality resetting
SW5-1(J1)	ON	1 Phase model
	OFF	3 Phase model
SW5-2(J2)	ON	Cooling
	OFF	Heating
SW5-3(J3)	ON	Step input
	OFF	Pulse input

- (ii) Please match the settings of control switching switches (SW3, SW4, SW5) to the settings they had before they were replaced. With these switches, if the printed circuit had a jumper wire before being replaced, set to jumper wire ON if there was a jumper wire and jumper OFF if there was not.
- (iii) Connect the fast-on terminals and connectors that are to the circuit board for the micro-computer.  
Connect by matching the wire color of the fast-on terminal with the color printed on the circuit board for the micro-computer.  
Note (1) When connecting to the fast-on connection for the circuit board for the micro-computer, use care so as not to excessively distort the circuit board.

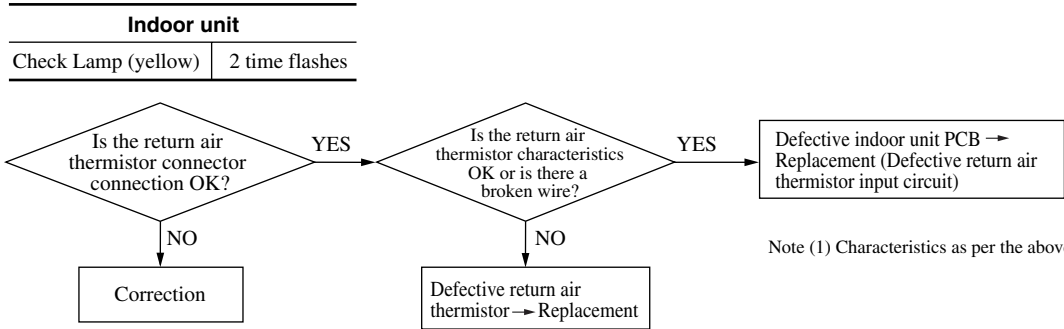
**(c) Inspection method when there are fault lamps (display lamps on indoor unit).**

**(i) Only case of wireless remote control model**

**1 Defective indoor unit heat exchanger thermistor**



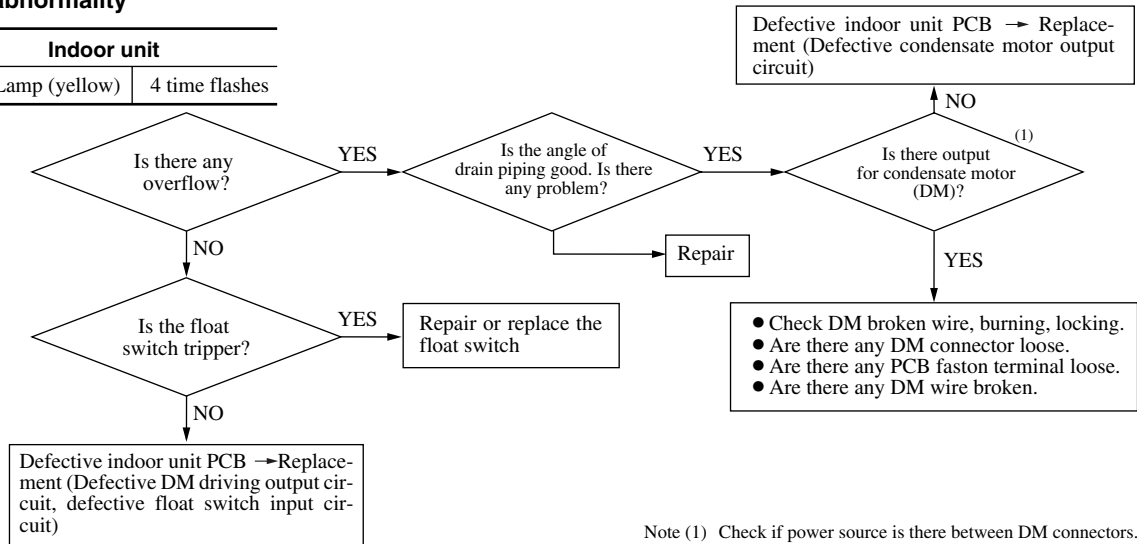
**2 Defective return air thermistor**



Note (1) Characteristics as per the above graph.

### 3 Drain abnormality

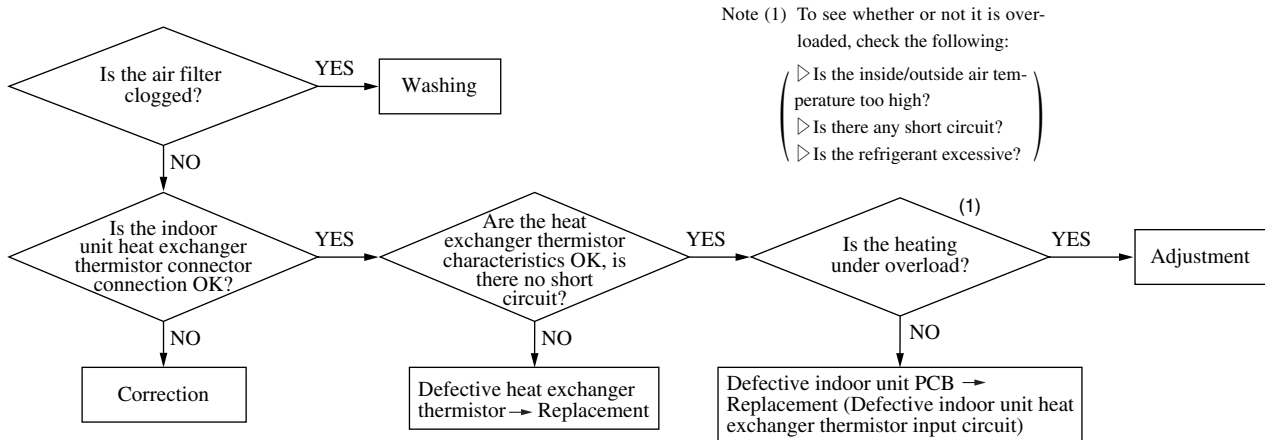
**Indoor unit**  
Check Lamp (yellow) | 4 time flashes



Note (1) Check if power source is there between DM connectors.

### 4 Heating overload

**Indoor unit**  
Check Lamp (yellow) | 5 time flashes

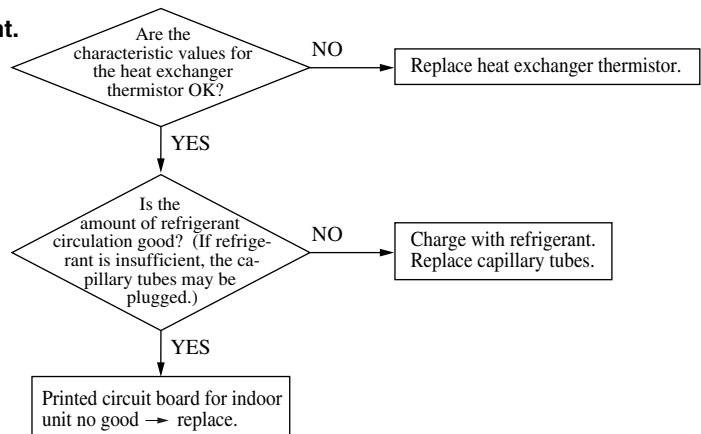


Note (1) To see whether or not it is overloaded, check the following:

- ▷ Is the inside/outside air temperature too high?
- ▷ Is there any short circuit?
- ▷ Is the refrigerant excessive?

### 5 Abnormality casued by insufficient refrigerant.

**Indoor unit**  
Check Lamp (yellow) | 6 time flashes

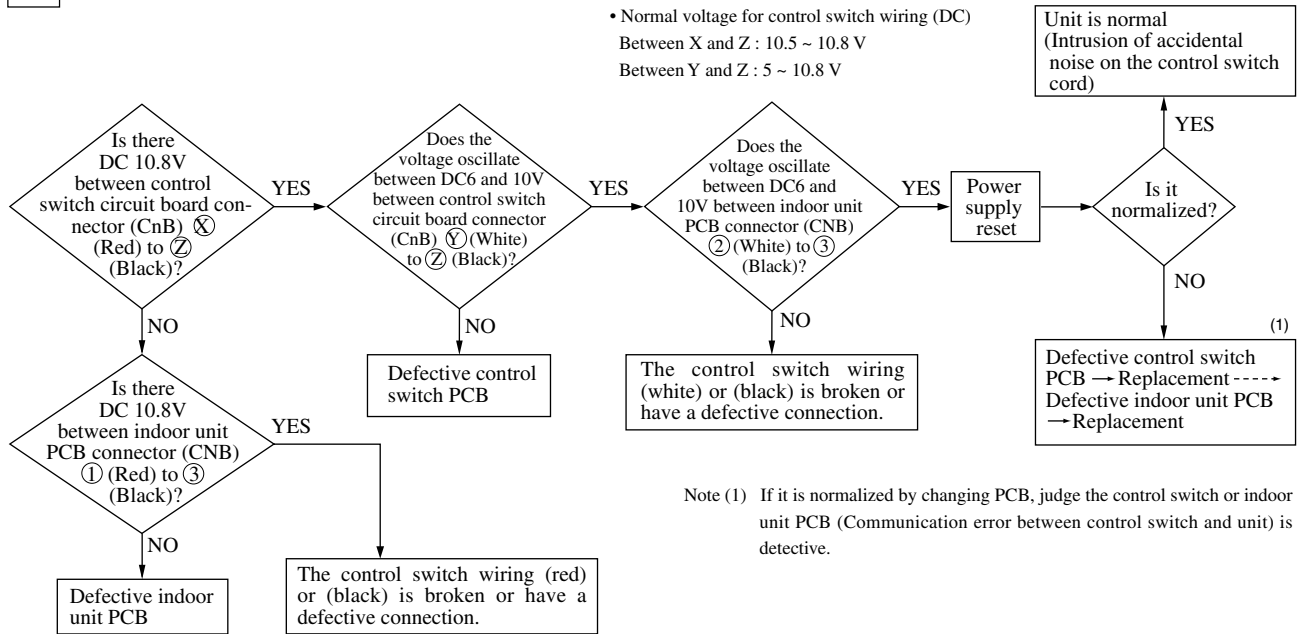


Note (1) Refer to previous page for heat exchanger thermistor temperature resistance characteristic values.

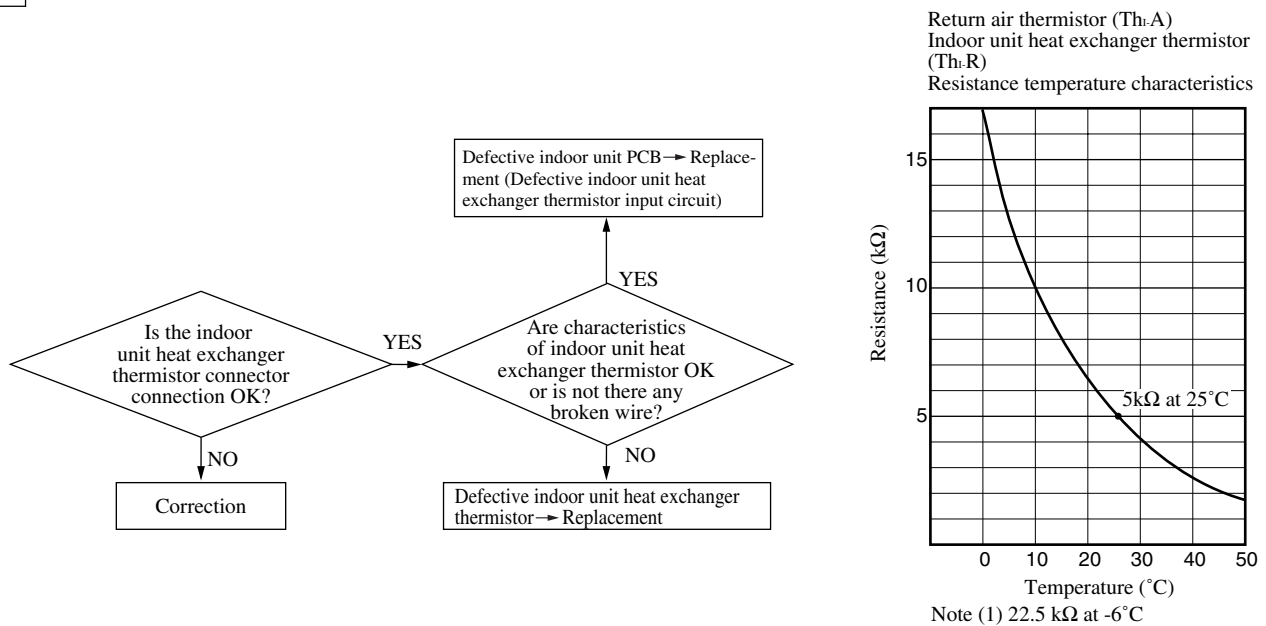


(ii) Only case of wired remote control model

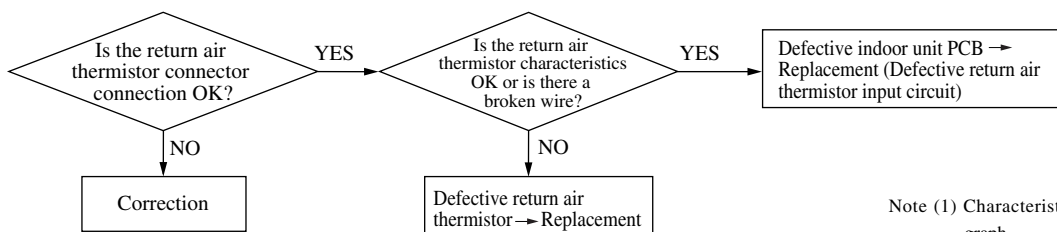
**1** Error display : **E1** [Communication error between control switch ~ Indoor unit PCB]



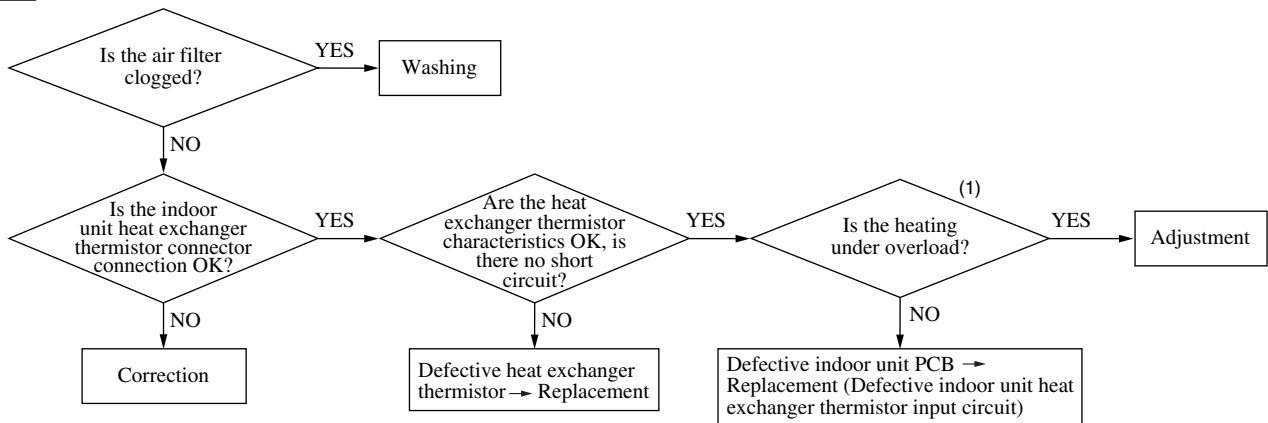
**2** Error display : **E6** [Defective indoor unit heat exchanger thermistor]



**3** Error display : **E7** [Defective return air thermistor]



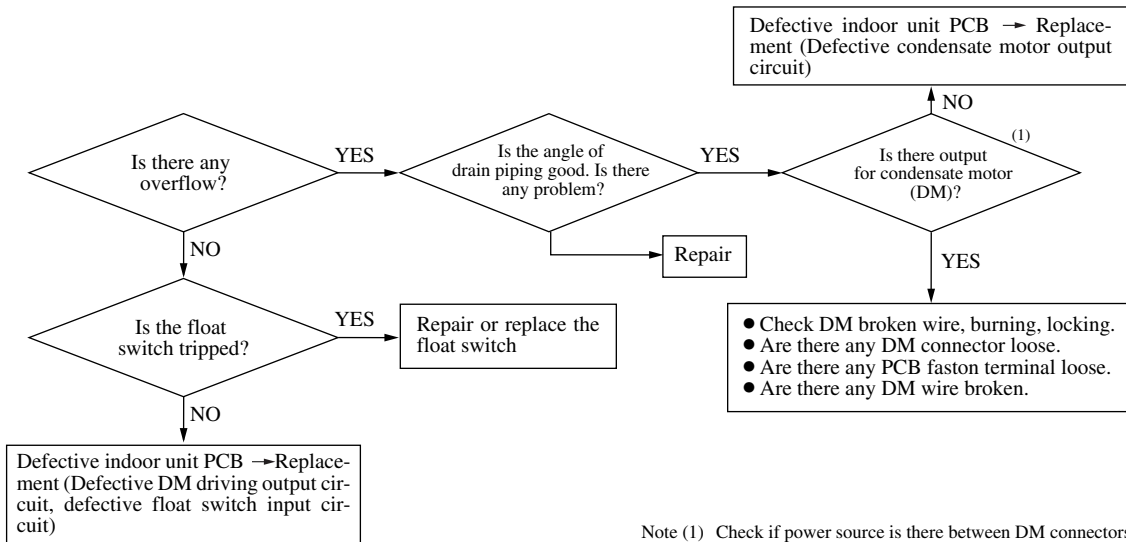
**4** Error display : **E8** [Heating overload]



Note (1) To see whether or not it is overloaded, check the following:

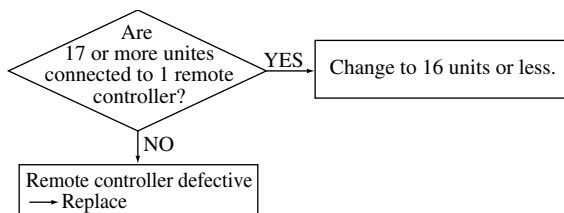
- ▶ Is the inside/outside air temperature too high?
- ▶ Is there any short circuit?
- ▶ Is the refrigerant excessive?

**5** Error display : **E9** [Failure in drainage]

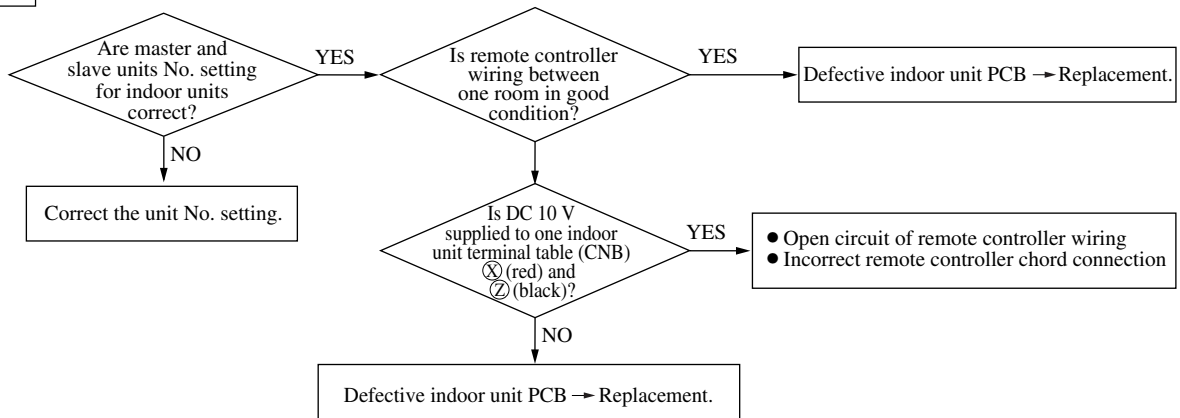


Note (1) Check if power source is there between DM connectors.

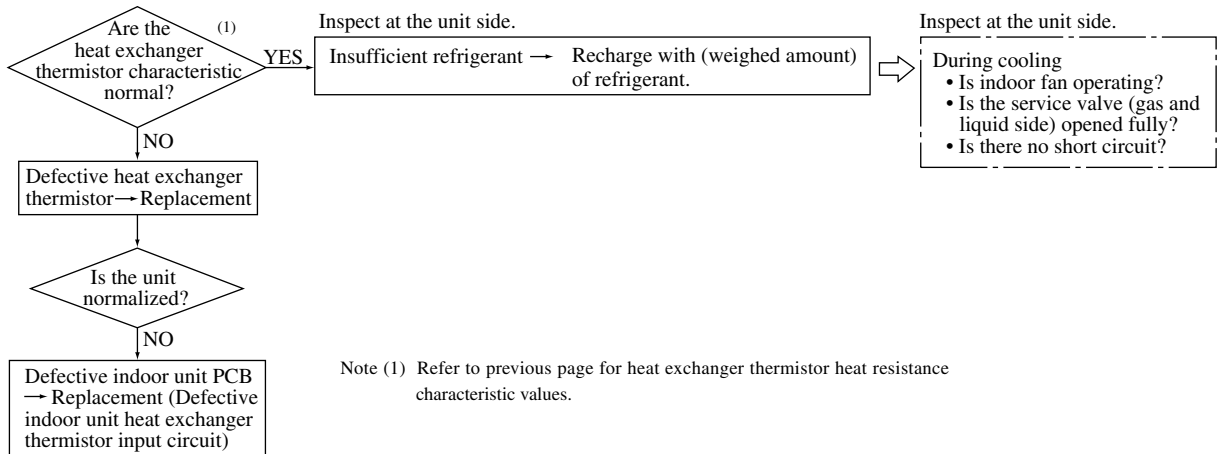
**6** Error display : **E10** [1 Remote controller for multiple unit control ⇨ Exceeding connected units (17 units or more)]



**7** **Error display : E14** [Communication is abnormal between master and slave indoor units.]



**8** **Error display : E57** [Insufficient refrigerant]



Note (1) Refer to previous page for heat exchanger thermistor heat resistance characteristic values.

**(4) Outdoor unit side (FDC208~508, FDCP308~508, FDC808)**

**Check Indicator Table**

Failure mode on the outdoor unit is indicated by flashing both Green LED (LED-G) and Red LED (LED-R) on the printed circuit board.

Outdoor unit LED		Failure at:	Contents of the failure
Green	Red		
Keeps flashing	Stays OFF	—————	Normal/Power is supplied.
Stays OFF	1 time flash	Power wiring	<ul style="list-style-type: none"> <li>The outdoor power wiring is in reversed phase.</li> <li>Open phase at L3 phase (primary side).</li> <li>Incorrect set-up of outdoor unit PCB.</li> </ul>
Stays OFF	2 time flashes	Installation or operation status	<ul style="list-style-type: none"> <li>Over current of the compressor motor.</li> <li>Open phase at L2 phase (secondary wiring of 52C) of compressor.</li> <li>Defective outdoor unit PCB.</li> </ul>
Stays OFF	3 time flashes	CM wiring	<ul style="list-style-type: none"> <li>The wiring (secondary wiring of 52C) to the compressor is open.</li> </ul>
Stays OFF	4 time flashes	Installation or operation status	<ul style="list-style-type: none"> <li>The outdoor heat exchanger temperature is too high [70°C or over].</li> </ul>
		Outdoor heat exchanger thermistor	<ul style="list-style-type: none"> <li>Failure with the outdoor heat exchanger thermistor.</li> </ul>
Stays OFF	5 time flashes	Installation or operation status	<ul style="list-style-type: none"> <li>The discharge gas temperature is too high.</li> </ul>
		Discharge gas thermistor	<ul style="list-style-type: none"> <li>Failure with the discharge gas thermistor.</li> </ul>
1 time flash	1 time flash	Outdoor heat exchanger thermistor	<ul style="list-style-type: none"> <li>Failure or open circuit with the outdoor heat exchanger thermistor or imperfect connection of the connector.</li> </ul>
1 time flash	2 time flashes	Outdoor temperature thermistor	<ul style="list-style-type: none"> <li>Failure or open circuit with the outdoor temperature thermistor or imperfect connection of the connector.</li> </ul>
1 time flash	3 time flashes	Discharge gas thermistor	<ul style="list-style-type: none"> <li>Failure with the discharge gas thermistor or imperfect connection of the connector.</li> </ul>
1 time flash	4 time flashes	Installation or operation status	<ul style="list-style-type: none"> <li>The high pressure is too high or it went up (63H1, 49C).</li> </ul>
1 time flash	5 time flashes	Failure to open the service valve	<ul style="list-style-type: none"> <li>Closing of the service valve on the liquid/gas side.</li> </ul>

“Check Indicator” is resetted when power supply is turned off once and the failure is fixed.

**(a) Procedure for diagnosing trouble for outdoor unit**

When diagnosing trouble for the outdoor unit, check the flashing and turns of the inspection indicator lamp (red LED) and fault indicator lamp (green LED) to obtain a general concept of the nature of the problem. Then inspect and perform repair.

**1) Unit replacement parts related to printed circuit board for outdoor unit.**

Micro-computer for outdoor unit, microcomputer, printed circuit board, thermistor (heat exchanger, discharge piping and outdoor air), fuses and transformer.

**2) Summary of replacement for micro-computer for outdoor unit**

a) Check the following part number

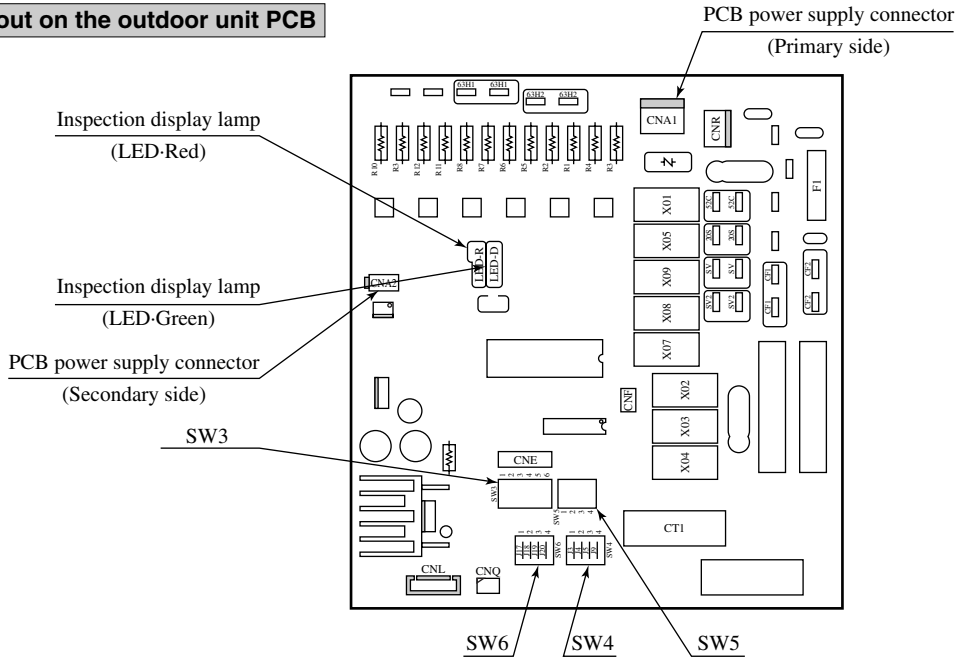
Model	Parts No.	Model	Parts No.	Model	Parts No.
<b>1 phase model</b>	PCA505A046ZN	<b>3 phase model</b>	PCA505A046ZS	<b>FDC808 model</b>	PCA505A046ZC

b) Set the overcurrent value using the overcurrent setting switch (SW3) for CM. Refer to the following table at the setting.

**• Table of switch (SW3) setting**

Model	FDC208HEN3A	FDC258HEN3A	FDC308HEN3B FDCP308HEN3B	FDC308HES3B FDCP308HES3B	FDC408HES3B FDCP408HES3B	FDC508HES3B FDCP508HES3B	FDC808HES3B
Setting value (A)	12	15	23	9	12	15	24
Table of switch setting Make ON/OFF setting for each switch No. (■ : ON, □ : OFF)							

**Parts layout on the outdoor unit PCB**



**• Function of DIP switched (SW4)**

SW4				Function	
1 (J3)		ON	1 Phase model		
		OFF	3 Phase model		
2 (J4)	ON	3 (J5)	ON	Compressor unit switching	—
			OFF		Rotary
	OFF	ON	Reciprocal		
		OFF	Scroll		
4 (J9)		ON	Spare		
		OFF			

**• Function of DIP switched (SW5)**

SW5		Function	
1	ON	Defrost Switching	Actual spot
	OFF		Ordinary
2	ON	Snow protection control	Enabled
	OFF		Disabled
3	ON	Test run Switch	Test run
	OFF		Normal
4	ON		Test run for heating
	OFF		Test run for cooling

**• Function of DIP switched (SW6)**

SW6		Function	
1 (J17)	ON	4-way valve control	Enabled
	OFF		Disabled
2 (J18)	ON	Defrost circulation temperature switching	14°C
	OFF		18°C
3 (J19)	ON	63Hz abnormal detection switching	Enabled
	OFF		Disabled
4 (J20)	ON	3 minute delay when power is turned on Switching	Enabled
	OFF		Disabled

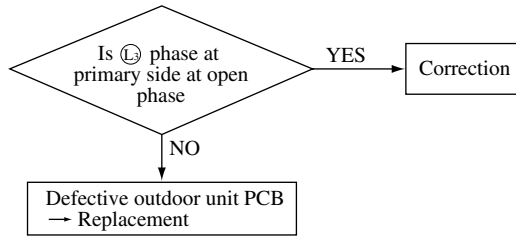
**• Function of jumper wire**

Name		Function
J21	With	Service valve open/close check control enabled.
	None	Service valve open/close check control disabled.

**(b) Inspection method when there are fault lamps (outdoor unit LED)**

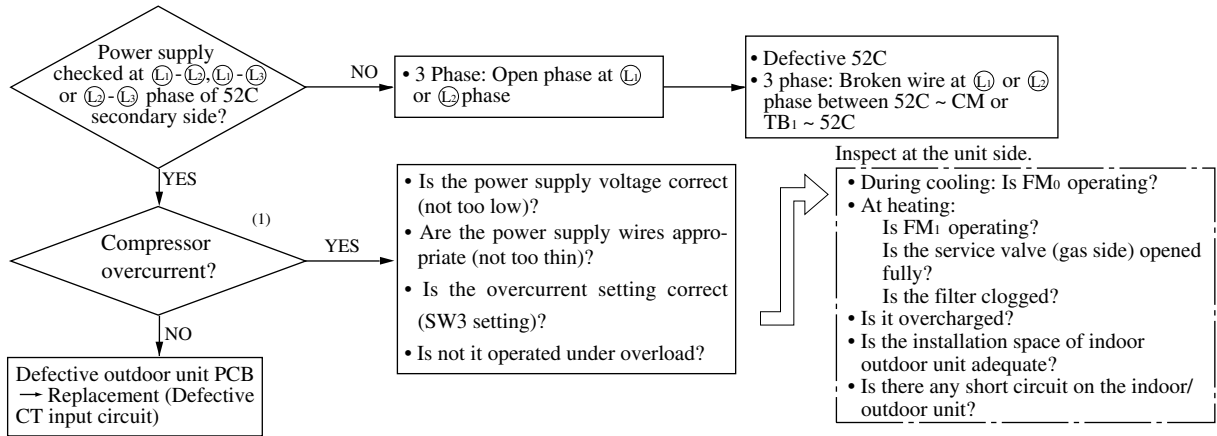
**1 Open phase at L<sub>3</sub> phase (Primary side)**

Outdoor unit	
Red LED	1 time flash
Green LED	Stays OFF



**2 Overcurrent of the compressor motor**

Outdoor unit	
Red LED	2 time flashes
Green LED	Stays OFF

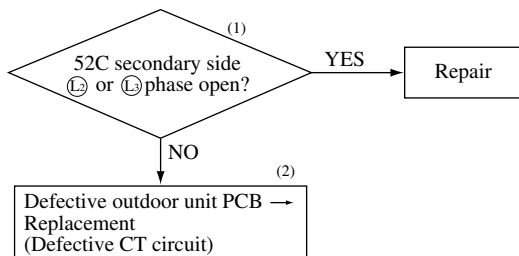


Note (1) Measure and check the current value.

Confirm that the overcurrent setting by SW<sub>3</sub> of outdoor unit PCB is correct.

**3 The wiring (secondary wiring of 52C) to the compressor is open.**

Outdoor unit	
Red LED	3 time flashes
Green LED	Stays OFF

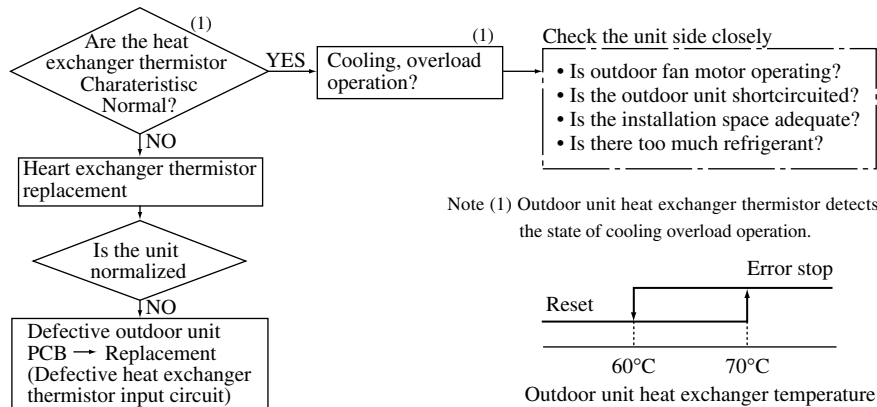


Notes (1) When voltage is detected at 52C primary side L<sub>1</sub> or L<sub>2</sub> phase but not at the secondary side, check also 52C (broken coil, poor contact).

(2) When voltage is detected at 52C primary side L<sub>1</sub> or L<sub>2</sub> phase and there is no error at 52C (52C is energized if TB<sub>1</sub> L<sub>1</sub> or L<sub>2</sub> terminal and 52C coil secondary side connector are short circuited), the outdoor unit PCB (defective X<sub>01</sub> circuit or X<sub>01</sub>).

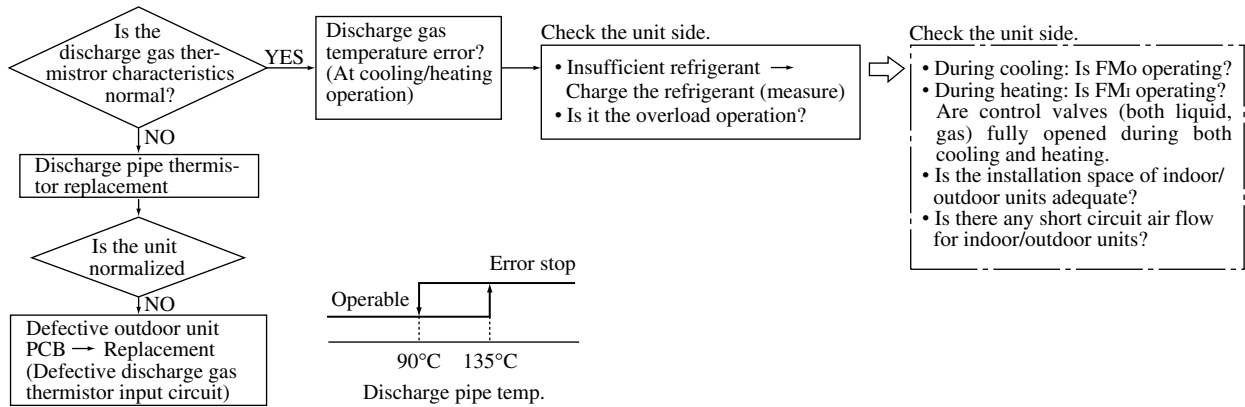
#### 4 The outdoor heat exchanger temperature is too high (70°C or over)

Outdoor unit	
Red LED	4 time flashes
Green LED	Stays OFF



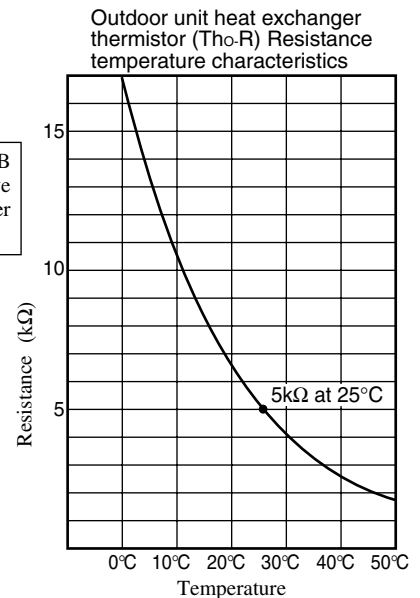
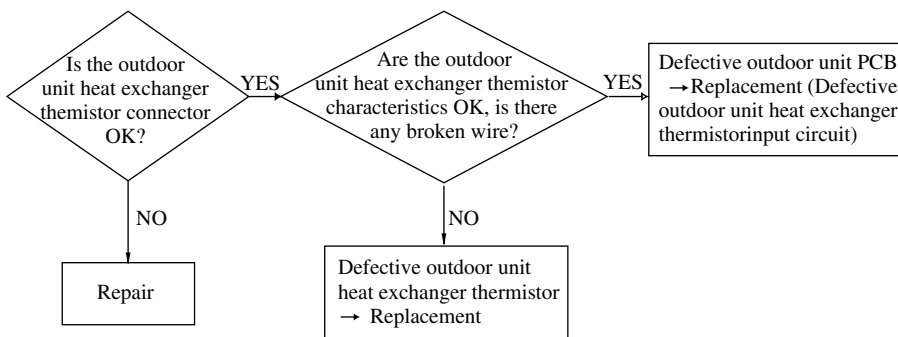
#### 5 The discharge gas temperature is too high. (Only case of FDC208~508, FDCP308~508)

Outdoor unit	
Red LED	5 time flashes
Green LED	Stays OFF



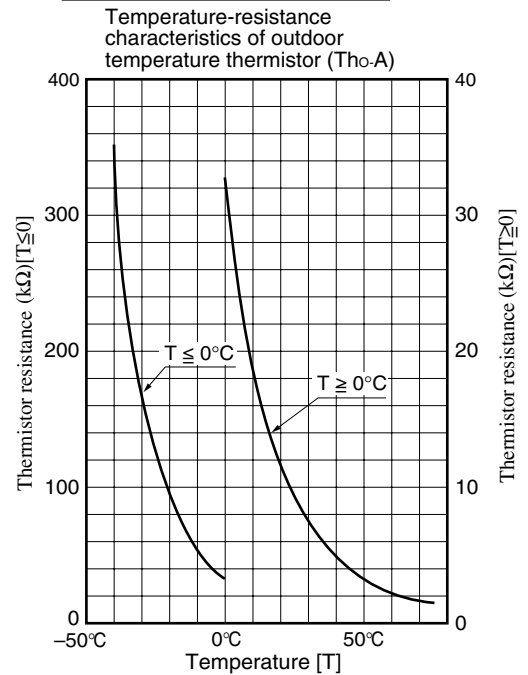
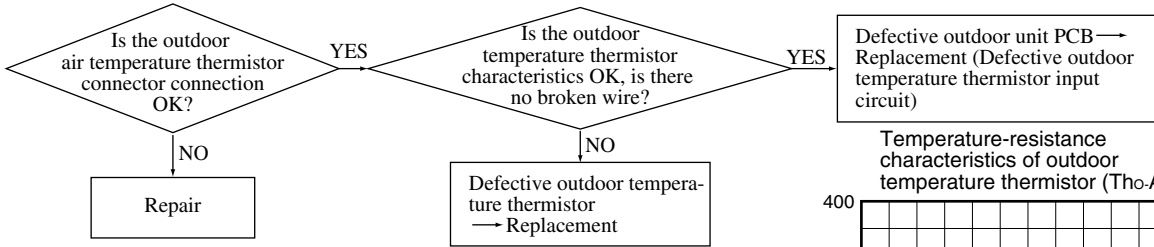
#### 6 Defective outdoor unit heat exchanger thermistor

Outdoor unit	
Red LED	1 time flash
Green LED	1 time flash



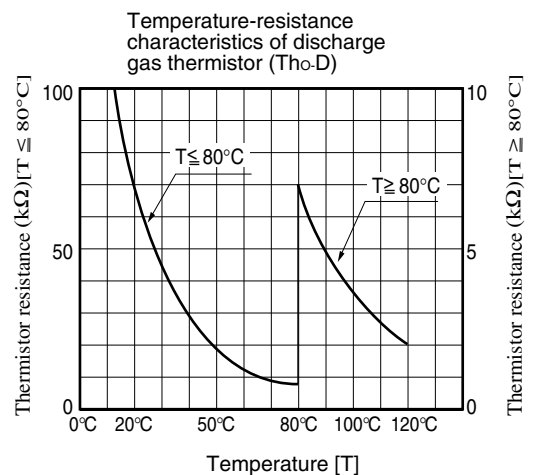
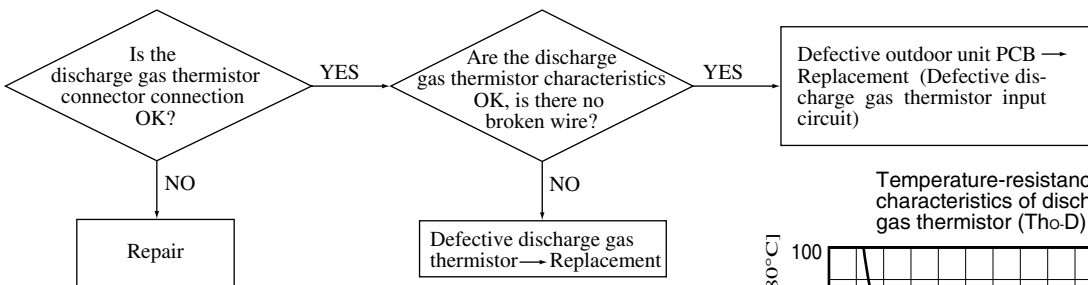
## 7 Defective outdoor temperature thermistor

Outdoor unit	
Red LED	2 time flashes
Green LED	1 time flash



## 8 Defective discharge gas thermistor (Only case of FDC208~508, FDCP308~508)

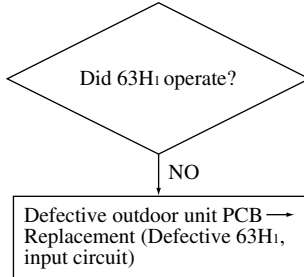
Outdoor unit	
Red LED	3 time flashes
Green LED	1 time flash





## 9 High pressure error [63H<sub>1</sub>] (Only case of FDCP308~508)

Outdoor unit	
Red LED	4 time flashes
Green LED	1 time flash



### At 63H<sub>1</sub> operation

#### 1. During cooling

- Is the outdoor unit fan motor operating?
- Is there no short circuit air circulation for the outdoor unit?
- Is there sufficient space for air inlet & outlet?

#### 2. During heating

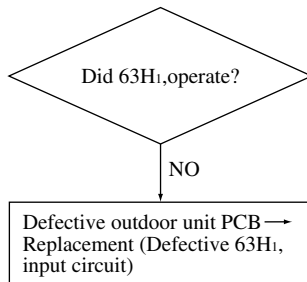
- Is the gas side service valve fully opened?
- Is the indoor unit heat exchanger thermistor detached from the detector case?
- Is the filter clogged?
- Is the outdoor unit fan controlled by due to defective 63H<sub>2</sub>?

#### 3. During colling/heating

- Is the refrigerant charge excessive?

## 63H<sub>1</sub>, 49C operation (Only case of FDC808)

Outdoor unit	
Red LED	4 time flashes
Green LED	1 time flash



### At 63H<sub>1</sub> operation

#### 1. During cooling

- Is the outdoor unit fan motor operating?
- Is there no short circuit air circulation for the outdoor unit?
- Is there sufficient space for air inlet & outlet?

#### 2. During heating

- Is the gas side service valve fully opened?
- Is the indoor unit heat exchanger thermistor detached from the detector case?
- Is the filter clogged?
- Is the outdoor unit fan controlled by due to defective 63H<sub>2</sub>?

#### 3. During colling/heating

- Is the refrigerant charge excessive?

### At 49C operation

#### During cooling/heating

- Isn't there insufficient refrigerant? (Isn't there gas leakage?)
- Isn't there a missing phase (L<sub>1</sub> or L<sub>2</sub> phase)?

## 10 Failure to open the service valve

Outdoor unit	
Red LED	5 time flashes
Green LED	1 time flash

This abnormality will be indicated only when the compressor is ON for the time after turning on the power. (Refer to page 321)

