

## **16. HIGH STATIC PRESSURE, DUCT TYPE PACKAGED AIR- CONDITIONER**

**( Split system, Air cooled )  
cooling only type**

**FDU308CEN-A  
308CES-A  
408CES-A  
508CES-A  
508CEM-A**

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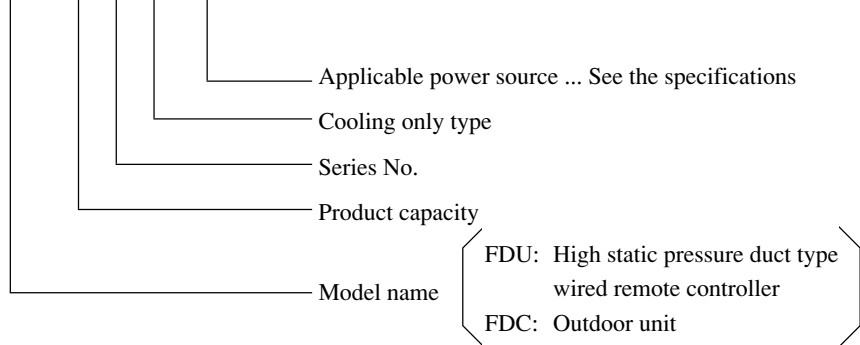
## 16.1 GENERAL INFORMATION

### 16.1.1 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 four 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 4 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) The controls are wired residential split air conditioner type remote controller with 4 malfunction modes.
- (5) All models have service valves protruding from the outdoor unit for faster flare connection work in the field.
- (6) Operation noise has been drastically reduced by increasing the number of high performance fans and by thorough sound insulation.
- (7) When installing, the optimum outside static pressure can be set using the fan controller.
- (8) With the height of all equipment made uniform at 360 mm and neatly installed into the ceiling, the installation of equipment with different capacities into the same ceiling space is made easy.

### 16.1.2 How to read the model name

Example: **FDU 30 8 C EN - A**



# 16.2 SELECTION DATA

## 16.2.1 Specifications

Model **FDU308CEN-A**

Item		Model		FDU308CEN-A		
				FDU308-A	FDC306CEN3	
<b>Nominal cooling capacity<sup>(1)</sup></b>		ISO-T1	W	7100		
		ISO-T3		5700		
<b>Power source</b>				1 Phase, 220/240V 50Hz		
<b>Operation data<sup>(3)</sup></b>	ISO-T1	Cooling input	kW	3.29/3.33		
		Running current (Cooling)	A	16.5/17.3		
		Power factor (Cooling)	%	91/80		
	ISO-T3	Cooling input	kW	3.48/3.52		
		Running current (Cooling)	A	17.5/18.3		
		Power factor (Cooling)	%	90/80		
		Inrush current (L.R.A)	A	89		
		Noise level	dB(A)	41	56	
	<b>Exterior dimensions</b>					
<b>Height × Width × Depth</b>		mm	360 × 820 × 830		844 × 950 × 340	
<b>Net weight</b>		kg	48		67	
<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 fins & inner grooved tubing	Slitted fins & bare tubing	
Refrigerant control				-	Capillary tube	
<b>Refrigerant</b>				R22		
<b>Quantity</b>		kg	Holding charged		1.3 [Pre-charged up to the piping length of 5m]	
<b>Refrigerant oil</b>		ℓ	-		1.63 (SUNISO 3GS)	
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	130 × 1		60 × 1	
Starting method				Line starting	Line starting	
<b>Air flow (Standard)</b>		CMM	20		54	
Available static pressure		Pa (mmAq)	Standard: 100 (10), Max 200 (20)		-	
Fresh air intake				Available	-	
Air filter, Q'ty				Field purchased	-	
Shock & vibration absorber				Rubber sleeve (for fan motor)	Rubber mount (for compressor)	
Electric heater		W	-		-	
<b>Operation control</b>						
Operation switch				Remote control switch (Optional: RCD-C-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.		
Optional parts				-		

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
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.

JIS B8616 "UNITARY AIR-CONDITIONERS"

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

**Model FDU308CES-A**

Item		Model		FDU308CES-A	
				FDU308-A	FDC306CES3
<b>Nominal cooling capacity<sup>(1)</sup></b>	ISO-T1	W	7100/7700		
	ISO-T3		5700/6000		
<b>Power source</b>		3 Phase, 380-415V 50Hz, 380V 60Hz			
<b>Operation data<sup>(3)</sup></b>	ISO-T1	Cooling input	kW	3.05/3.06/3.64	
		Running current (Cooling)	A	5.9/6.0/7.1	
		Power factor (Cooling)	%	79/71/78	
	ISO-T3	Cooling input	kW	3.24/3.25/3.87	
		Running current (Cooling)	A	6.3/6.4/7.6	
		Power factor (Cooling)	%	78/71/77	
		Inrush current (L.R.A)	A	43	
		Noise level	dB(A)	41/43	56
<b>Exterior dimensions</b>					
<b>Height × Width × Depth</b>		mm	<b>360 × 820 × 830</b>	<b>844 × 950 × 340</b>	
<b>Net weight</b>		kg	<b>48</b>	<b>67</b>	
<b>Refrigerant equipment</b>					
<b>Compressor type &amp; Q'ty</b>			–	<b>RC5538ESE1 × 1</b>	
Motor		kW	–	<b>2.24</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>Holding charged</b>	<b>1.3 [Pre-charged up to the piping length of 5m]</b>	
<b>Refrigerant oil</b>		ℓ	–	<b>1.63 (SUNISO 3GS)</b>	
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	<b>130 × 1</b>	<b>60 × 1</b>	
Starting method			Line starting	Line starting	
<b>Air flow (Standard)</b>		CMM	<b>20/24</b>	<b>54/56</b>	
Available static pressure		Pa (mmAq)	<b>Standard: 100 (10), Max 200 (20)</b>	–	
Fresh air intake			Available	–	
Air filter, Q'ty			Field purchased	–	
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)	
Electric heater		W	–	–	
<b>Operation control</b>					
Operation switch			Remote control switch (Optional: RCD-C-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 (in)			
<b>Refrigerant piping size</b>			<b>Liquid line: φ9.52 (3/8")</b>	<b>Gas line: φ15.88 (5/8")</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.		
Optional parts			–		

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
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.

JIS B8616 "UNITARY AIR-CONDITIONERS"

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

## Model FDU408CES-A

Item		Model	FDU408CES-A		
			FDU408-A	FDC406CES3	
<b>Nominal cooling capacity<sup>(1)</sup></b>	ISO-T1	W	<b>10200/11300</b>		
	ISO-T3		<b>8900/9900</b>		
<b>Power source</b>			<b>3 Phase, 380-415V 50Hz, 380V 60Hz</b>		
<b>Operation data<sup>(3)</sup></b>	ISO-T1	Cooling input	kW 3.96/3.96/4.88		
		Running current (Cooling)	A 7.8/7.8/9.4		
		Power factor (Cooling)	% 77/71/79		
	ISO-T3	Cooling input	kW 4.30/4.30/5.38		
		Running current (Cooling)	A 8.4/8.4/10.1		
		Power factor (Cooling)	% 78/71/81		
		Inrush current (L.R.A)	A 45		
		Noise level	dB(A) 44/46	57	
	<b>Exterior dimensions</b>				
<b>Height × Width × Depth</b>		mm	<b>360 × 820 × 830</b>	<b>1250 × 950 × 340</b>	
<b>Net weight</b>		kg	<b>49</b>	<b>80</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	Slitted fins & bare tubing	
Refrigerant control			-		
<b>Refrigerant</b>			<b>R22</b>		
<b>Quantity</b>		kg	<b>Holding charged</b>	<b>1.55 (Pre-charged up to the piping length of 0m)</b>	
<b>Refrigerant oil</b>		ℓ	-	<b>1.63 (SUNISO 3GS)</b>	
High pressure control			High pressure regulator valve		
<b>Air handling equipment</b>					
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 2	
Motor		W	<b>200 × 1</b>	<b>60 × 2</b>	
Starting method			Line starting		
<b>Air flow (Standard)</b>		CMM	<b>27/32</b>	<b>100/110</b>	
Available static pressure		Pa (mmAq)	<b>Standard: 100 (10), Max 200 (20)</b>		
Fresh air intake			Available		
Air filter, Q'ty			Field purchased		
Shock & vibration absorber			Rubber sleeve (for fan motor)		
Electric heater		W	-		
<b>Operation control</b>					
Operation switch			Remote control switch (Optional: RCD-C-E)		
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 (in)	<b>Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")</b>		
<b>Refrigerant piping size</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.		
Optional parts			-		

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
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.

JIS B8616 "UNITARY AIR-CONDITIONERS"

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

**Model FDU508CES-A**

Item		Model		FDU508CES-A		
				FDU508-A	FDC506CES3	
<b>Nominal cooling capacity<sup>(1)</sup></b>		ISO-T1	W	<b>12500/14000</b>		
		ISO-T3		<b>10600/11900</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	5.01/5.03/6.03		
		Running current (Cooling)	A	10.3/10.3/11.5		
		Power factor (Cooling)	%	74/68/80		
	<b>ISO-T3</b>	Cooling input	kW	5.56/5.58/6.63		
		Running current (Cooling)	A	11.6/11.6/12.5		
		Power factor (Cooling)	%	73/67/81		
		Inrush current (L.R.A)	A	68		
		Noise level	dB(A)	45/47	59	
	<b>Exterior dimensions</b>					
<b>Height × Width × Depth</b>		mm	<b>360 × 1200 × 830</b>		<b>1250 × 950 × 340</b>	
<b>Net weight</b>		kg	<b>62</b>		<b>85</b>	
<b>Refrigerant equipment</b>						
<b>Compressor type &amp; Q'ty</b>		-		<b>RC5563ESE2 × 1</b>		
Motor		kW	-		<b>3.73</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>Holding charged</b>		<b>1.85 [Pre-charged up to the piping length of 5m]</b>	
<b>Refrigerant oil</b>		ℓ	-		<b>2.07 (SUNISO 3GS)</b>	
High pressure control		High pressure regulator valve				
<b>Air handling equipment</b>						
Fan type & Q'ty		Multiblade centrifugal fan × 2		Propeller fan × 2		
Motor		W	<b>230 × 1</b>		<b>60 × 2</b>	
Starting method		Line starting		Line starting		
<b>Air flow (Standard)</b>		CMM	<b>34/40</b>		<b>100/110</b>	
Available static pressure		Pa (mmAq)	<b>Standard: 100 (10), Max 200 (20)</b>		-	
Fresh air intake		Available		-		
Air filter, Q'ty		Field purchased		-		
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		Remote control switch (Optional: RCD-C-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)	<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.				
Optional parts		-				

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
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.

JIS B8616 "UNITARY AIR-CONDITIONERS"

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

## Model FDU508CEM-A

Item		Model	FDU508CEM-A		
			FDU508-A	FDC506CEM3	
<b>Nominal cooling capacity<sup>(1)</sup></b>	ISO-T1	W	<b>12500/14000</b>		
	ISO-T3				
<b>Power source</b>			<b>11900</b>		
			<b>3 Phase, 230V 50Hz/220V 60Hz</b>		
<b>Operation data<sup>(3)</sup></b>	ISO-T1	Cooling input	kW	4.76/5.76	
		Running current (Cooling)	A	15.2/16.9	
		Power factor (Cooling)	%	79/89	
	ISO-T3	Cooling input	kW	6.28	
		Running current (Cooling)	A	18.2	
		Power factor (Cooling)	%	91	
		Inrush current (L.R.A)	A	108	
		Noise level	dB(A)	45/47	59
<b>Exterior dimensions</b>					
<b>Height × Width × Depth</b>		mm	<b>360 × 1200 × 830</b>	<b>1250 × 950 × 340</b>	
<b>Net weight</b>		kg	<b>62</b>	<b>85</b>	
<b>Refrigerant equipment</b>					
<b>Compressor type &amp; Q'ty</b>			-	<b>RC5563EME2 × 1</b>	
Motor		kW	-		
Starting method			-		
<b>Heat exchanger</b>			Louver fins & inner grooved tubing	Slitted fins & bare tubing	
Refrigerant control			-		
<b>Refrigerant</b>			<b>R22</b>		
<b>Quantity</b>		kg	<b>Holding charged</b>	<b>1.8 [Pre-charged up to the piping length of 5m]</b>	
<b>Refrigerant oil</b>		ℓ	-		
High pressure control			High pressure regulator valve		
<b>Air handling equipment</b>					
Fan type & Q'ty			Multiblade centrifugal fan × 2	Propeller fan × 2	
Motor		W	<b>230 × 1</b>	<b>60 × 2</b>	
Starting method			Line starting		
<b>Air flow (Standard)</b>		CMM	<b>34/40</b>	<b>100/110</b>	
Available static pressure		Pa (mmAq)	<b>Standard: 100 (10), Max 200 (20)</b>		
Fresh air intake			Available		
Air filter, Q'ty			Field purchased		
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)	
Electric heater		W	-		
<b>Operation control</b>					
Operation switch			Remote control switch (Optional: RCD-C-E)		
Room temperature control			Thermostat by electronics		
<b>Safety equipment</b>			Internal protector for compressor. Internal thermostat for fan motor. Internal pressure relief valve for compressor.		
<b>Installation data</b>		mm (in)	<b>Liquid line: φ9.52 (3/8") Gas line: φ19.05 (3/4")</b>		
<b>Refrigerant piping size</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.		
Optional parts			-		

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
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.

JIS B8616 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz/220V 60Hz.



### 16.2.2 Range of usage & limitations

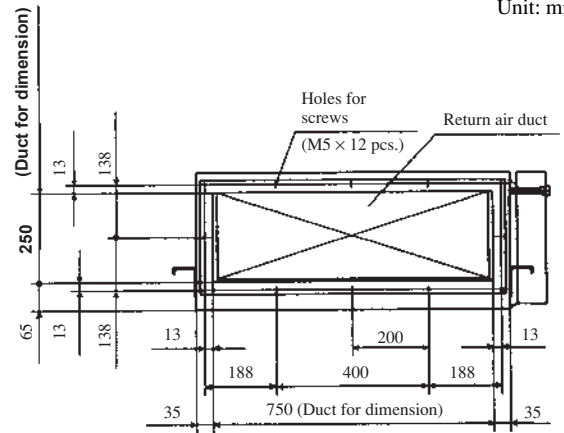
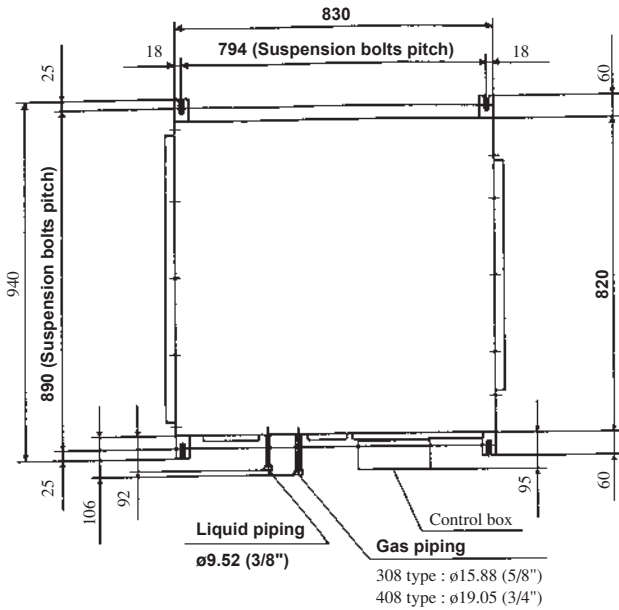
Item	Models	All models
Indoor return air temperature (Upper, lower limits)		Refer to the selection chart
Outdoor air temperature (Upper, lower limits)		
Indoor unit atmosphere (behind ceiling) temperature and humidity		Dew point temperature 28°C or less, relative humidity 80% or less
Refrigerant line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

**16.2.3 Exterior dimensions**

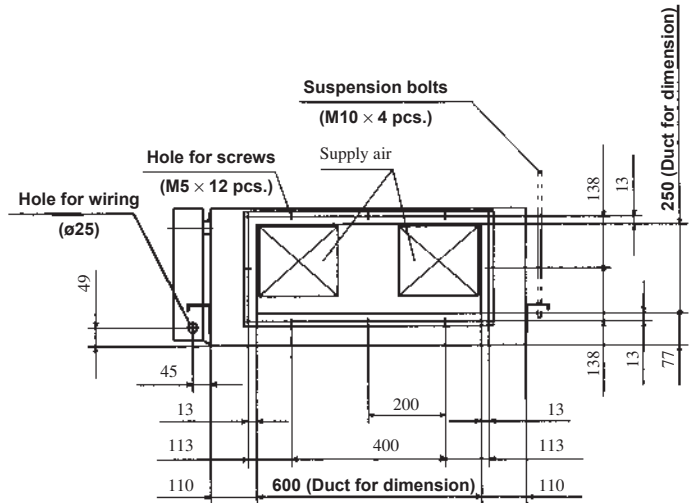
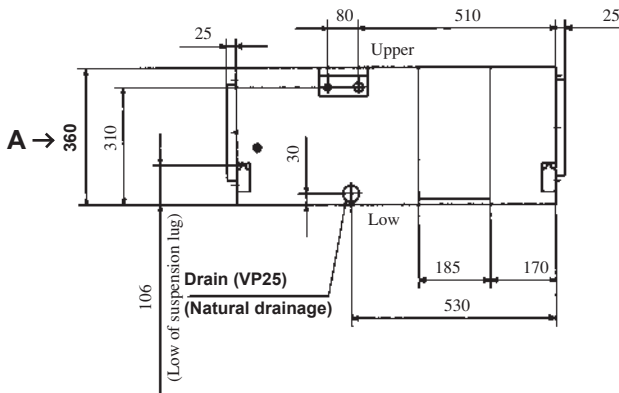
**(1) Indoor unit**

**Models FDU308-A, 408-A**

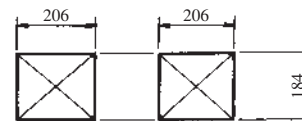
Unit: mm



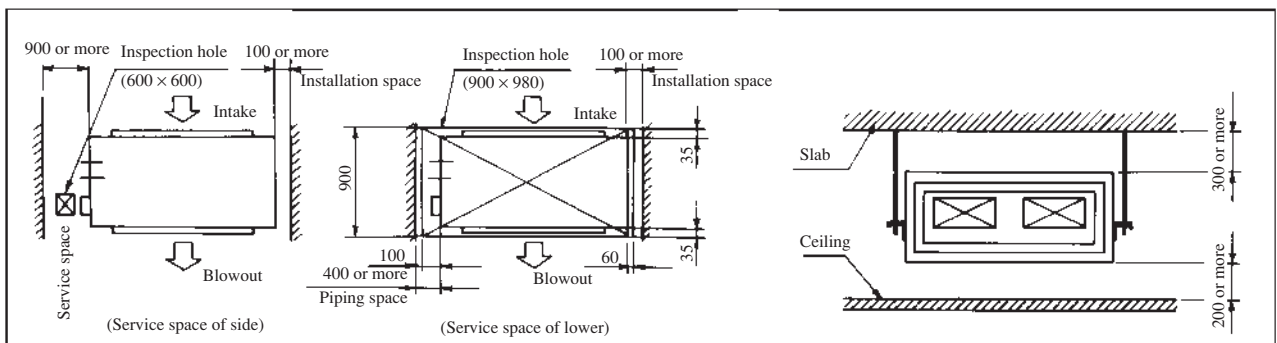
**VIEW A**



**Dimension for supply air**

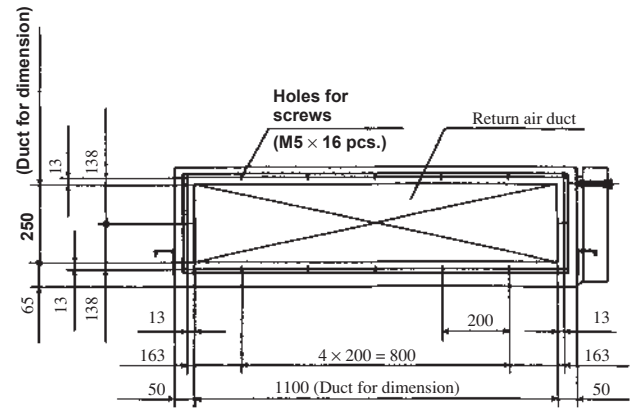
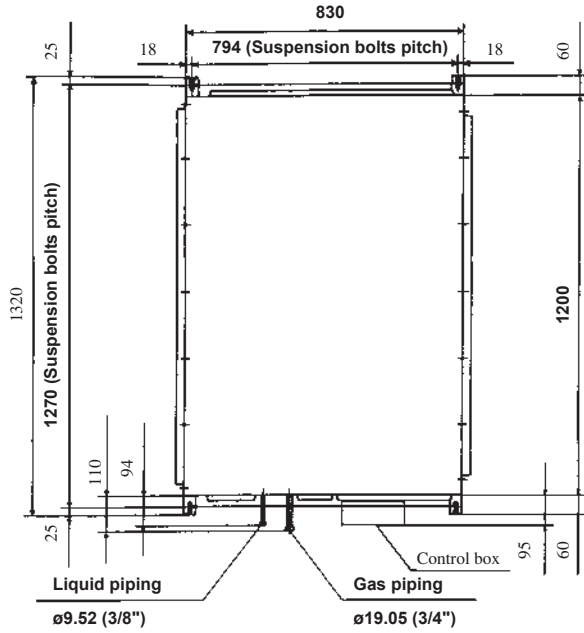


**Space for installation and service**

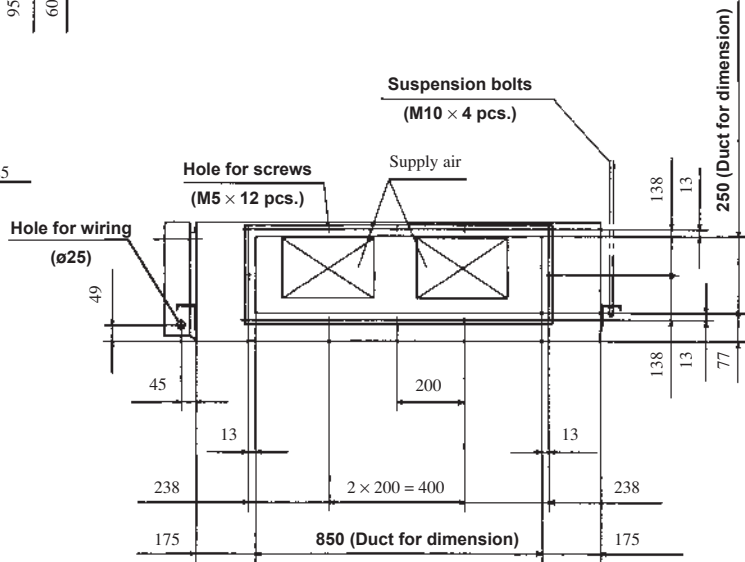
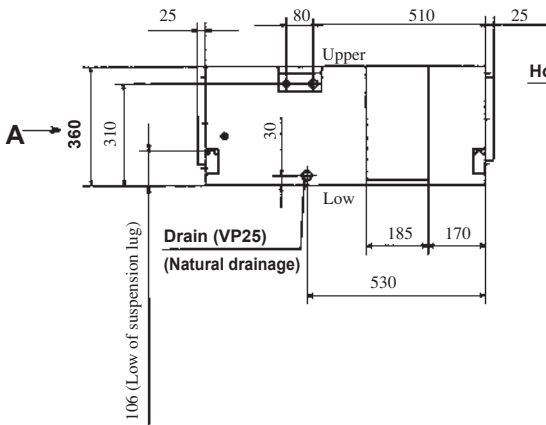


**Model FDU508-A**

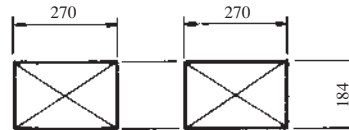
Unit: mm



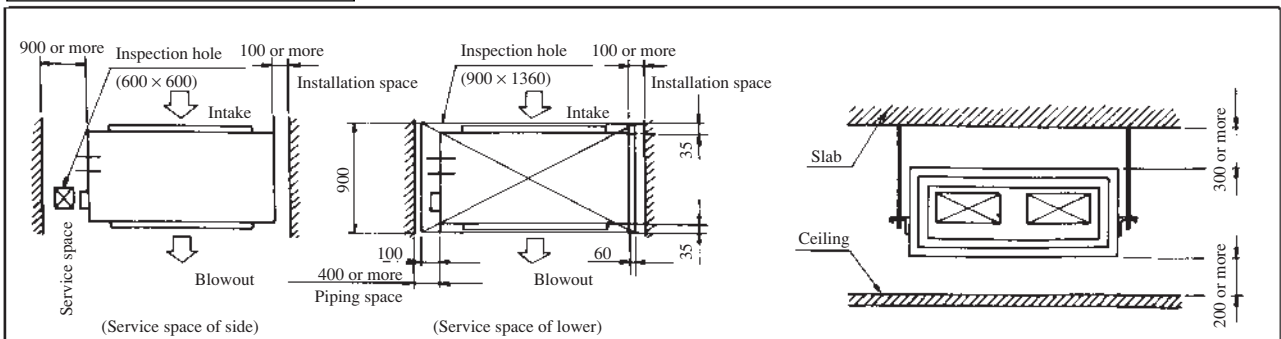
**VIEW A**



**Dimension for supply air**

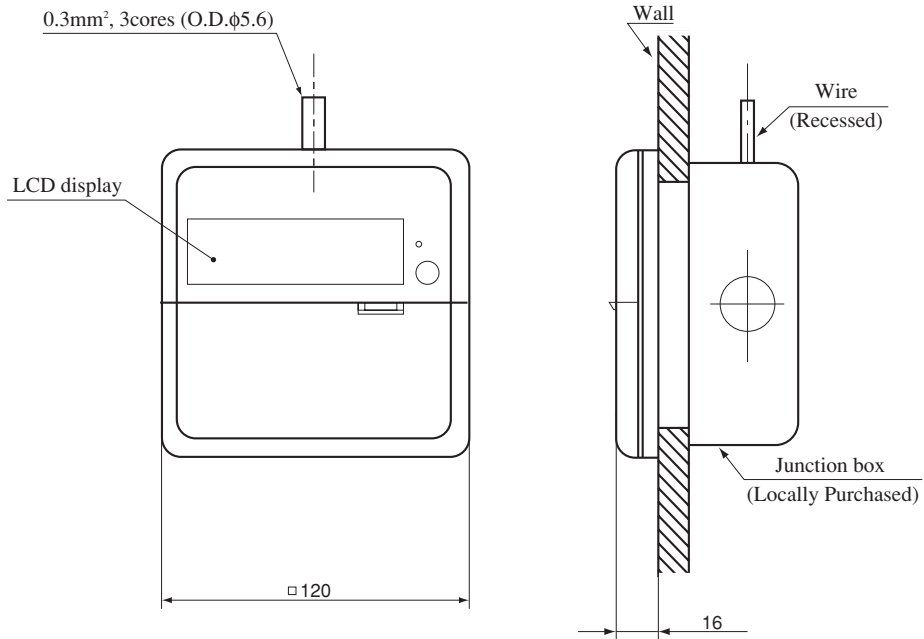


**Space for installation and service**

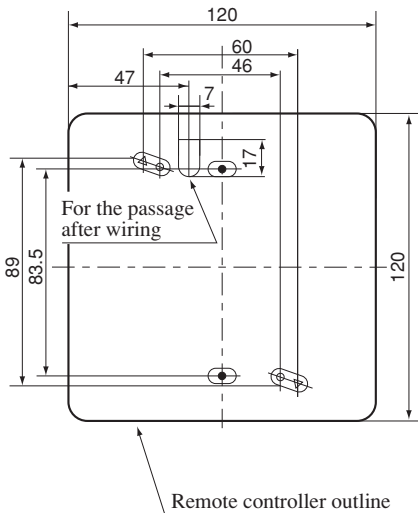


**(2) Remote controller (Optional parts)**

Unit: mm



Remote controller mounting dimensions



- ◆ Usable JIS box, JIS C 8336
  - Switch box for 1 piece (without cover)  
(use of the ● mark hole as illustrated on the left)
  - Switch box for 2 pieces  
(use of the ○ mark hole as illustrated on the left)  
(without cover)  
(use of the △ mark hole as illustrated on the left)  
(when installing the cover)

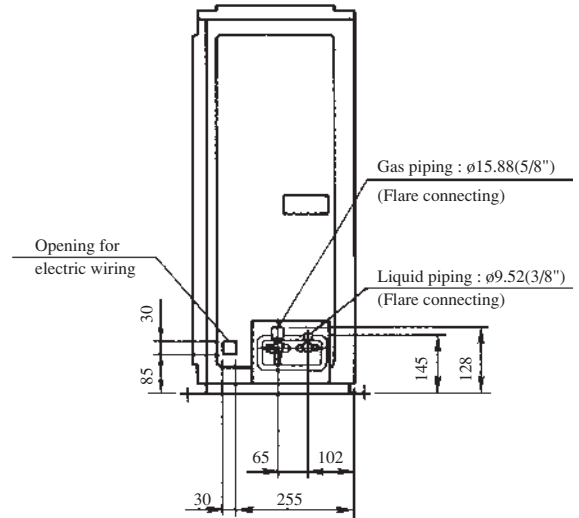
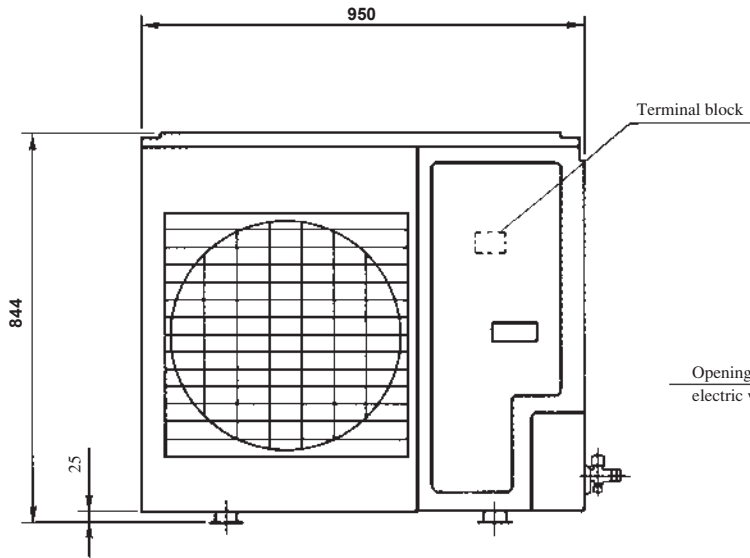
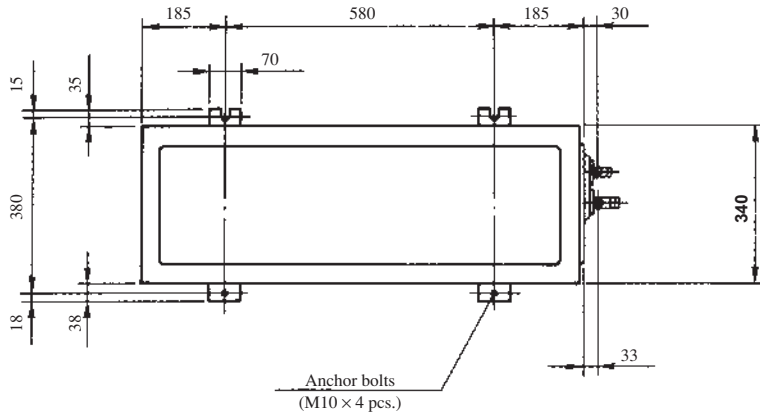
Note (1) Allowable length of remote controller cable: 600 m

**Allowable rang of wire thickness and length**

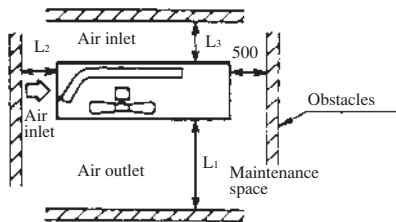
Standard Within	0.3 mm <sup>2</sup>	× Within 100 m
	0.5 mm <sup>2</sup>	× Within 200 m
	0.75 mm <sup>2</sup>	× Within 300 m
	1.25 mm <sup>2</sup>	× Within 400 m
	2 mm <sup>2</sup>	× Within 600 m

**(3) Outdoor unit**  
**Models FDC306CEN3, 306CES3**

Unit: mm



**Required space for maintenance and air flow**



**Minimum allowable space to the obstacles**

Unit: mm

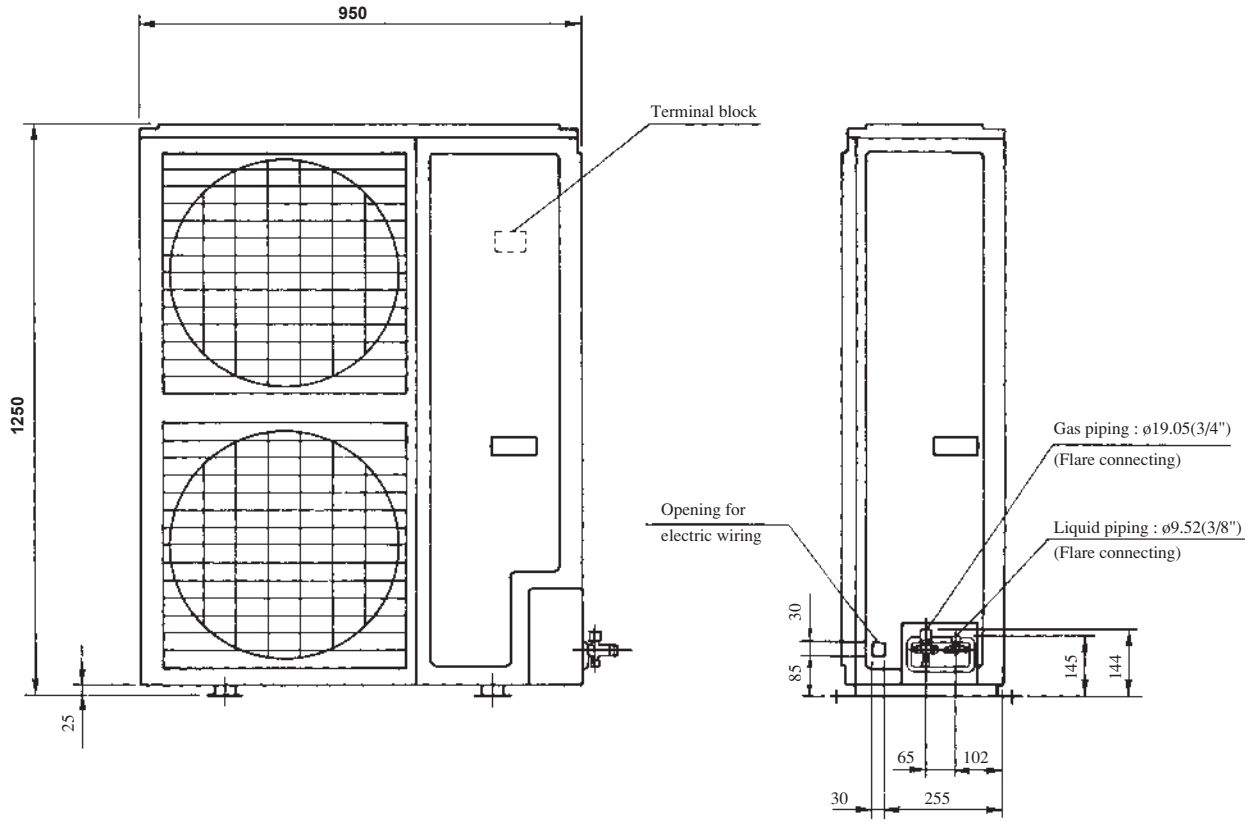
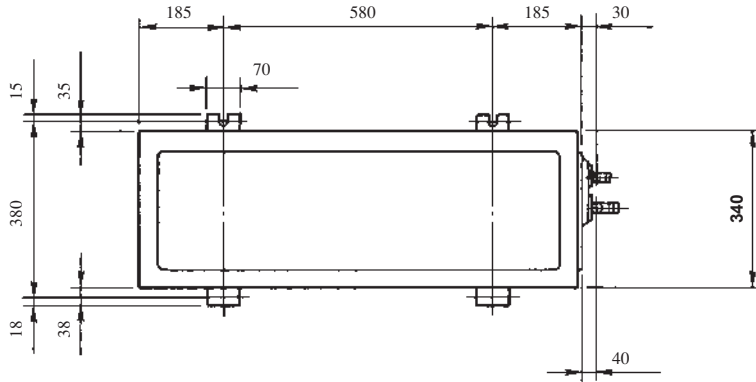
Mark	Installation type	Unit: mm		
		I	II	III
L1	Open	Open	500	
L2	300	0	Open	
L3	100	150	100	

**Notes**

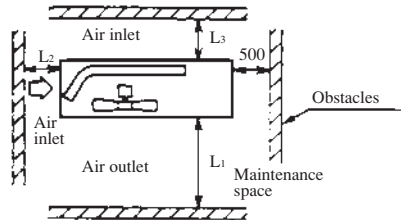
- (1) Fix the unit with anchor bolts.
- (2) Strong wind must not be directed to the air outlet.
- (3) Free space over the unit must be larger than 1 m.
- (4) The unit should not be surrounded by obstructions in all direction.  
 At least one direction around the unit must be free.

**Models FDC406CES3, 506CES3, 506CEM3**

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	Open	500
L <sub>2</sub>	300	0	Open	Open
L <sub>3</sub>	150	300	150	150

**Notes**

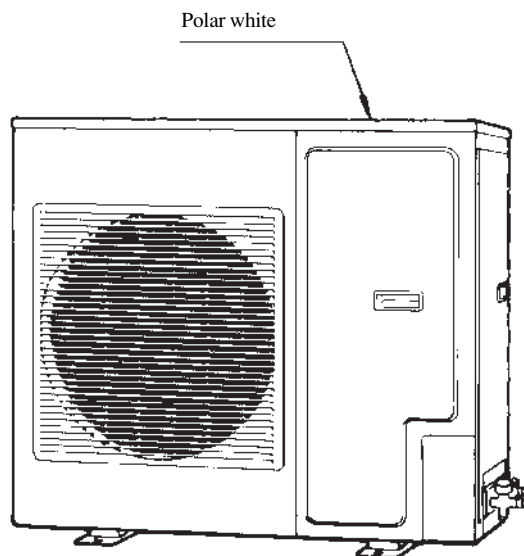
- (1) Fix the unit with anchor bolts.
- (2) Strong wind must not be directed to the air outlet.
- (3) Free space over the unit must be larger than 1 m.
- (4) The unit should not be surrounded by obstructions in all direction.  
At least one direction around the unit must be free.

## 16.2.4 Exterior appearance

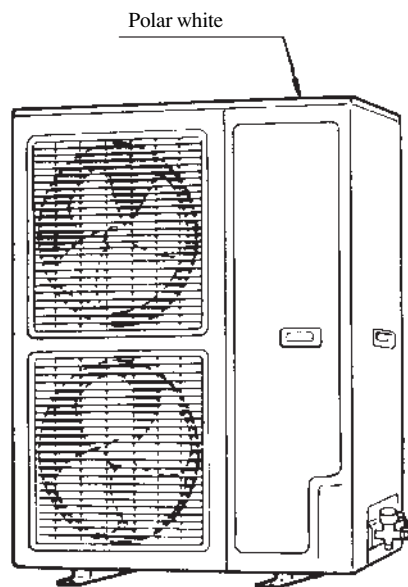
(1) Indoor unit ..... Zinc steel plate

(2) Outdoor unit

Models FDC306CEN3, 306CES3

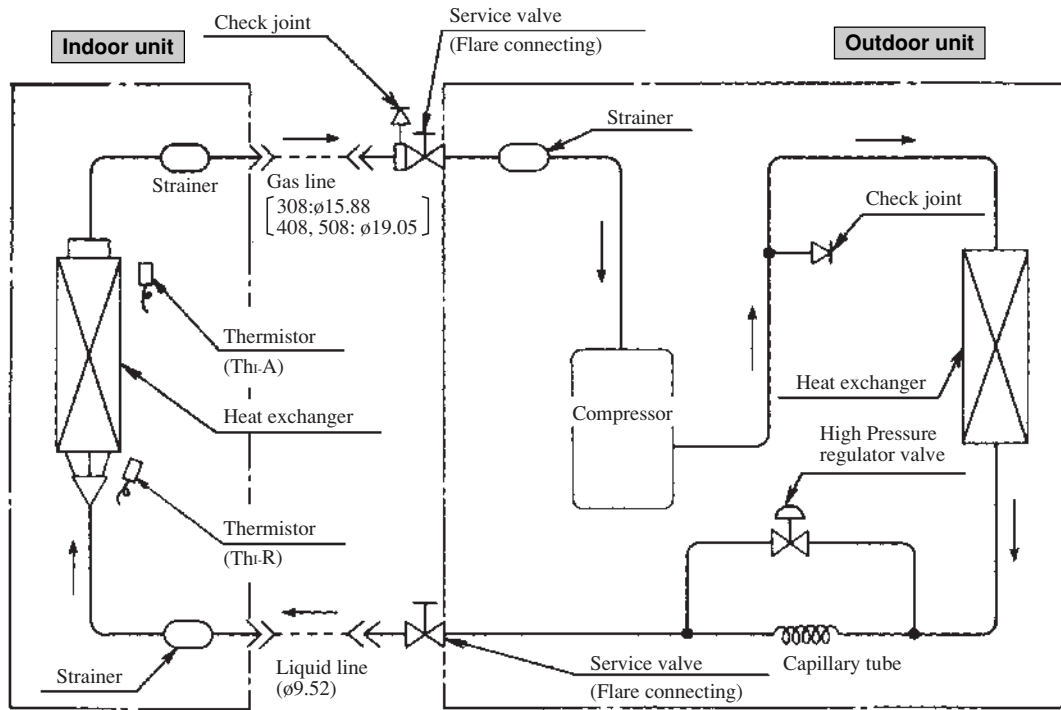


Models FDC406CES3, 506CES3, 506CEM3



### 16.2.5 Piping system

Models FDU308CEN-A, 308CES-A, 408CES-A, 508CES-A, 508CEM-A



### Preset point of protective devices

Part name	Mark	Equipped unit	All models
Thermistor (for frost prevention)	Th1-R	Indoor unit	OFF 2.5°C ON 10°C

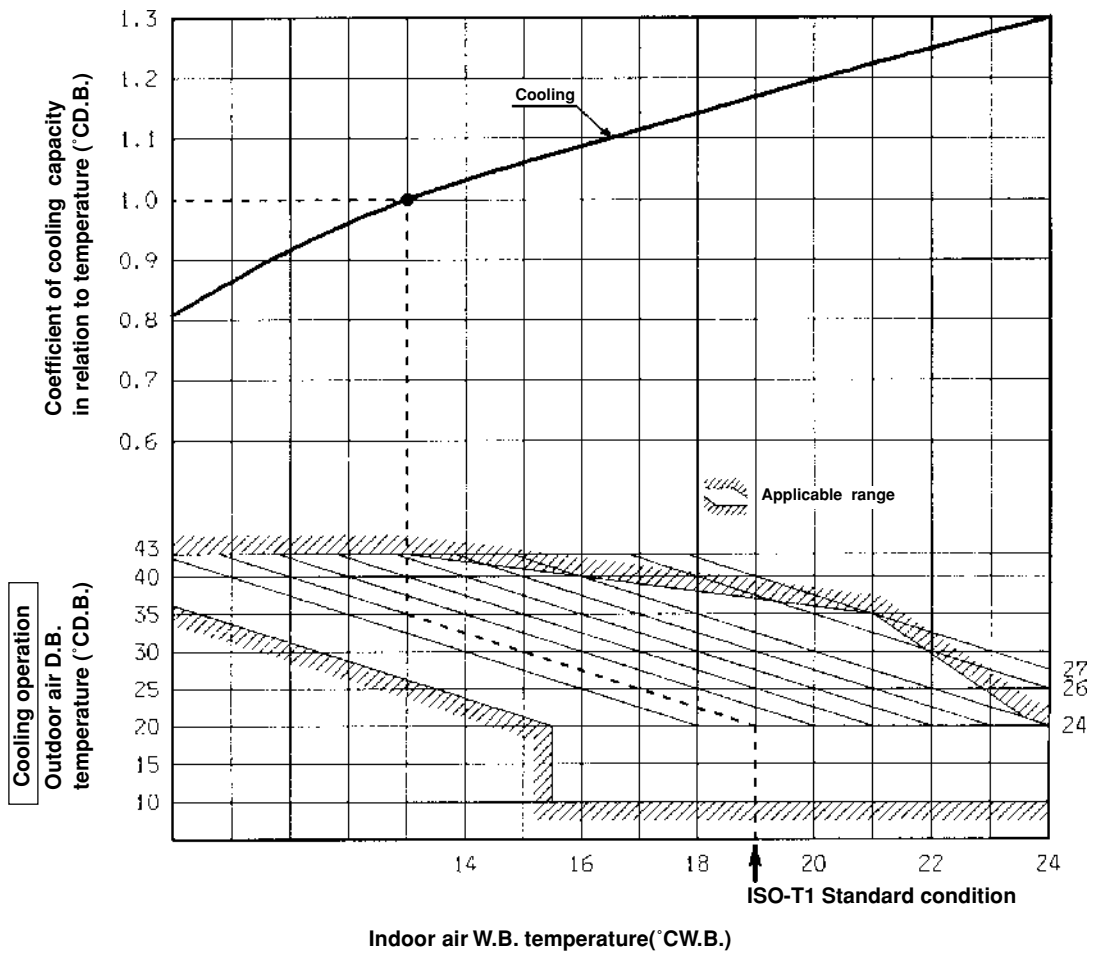


### 16.2.6 Selection chart

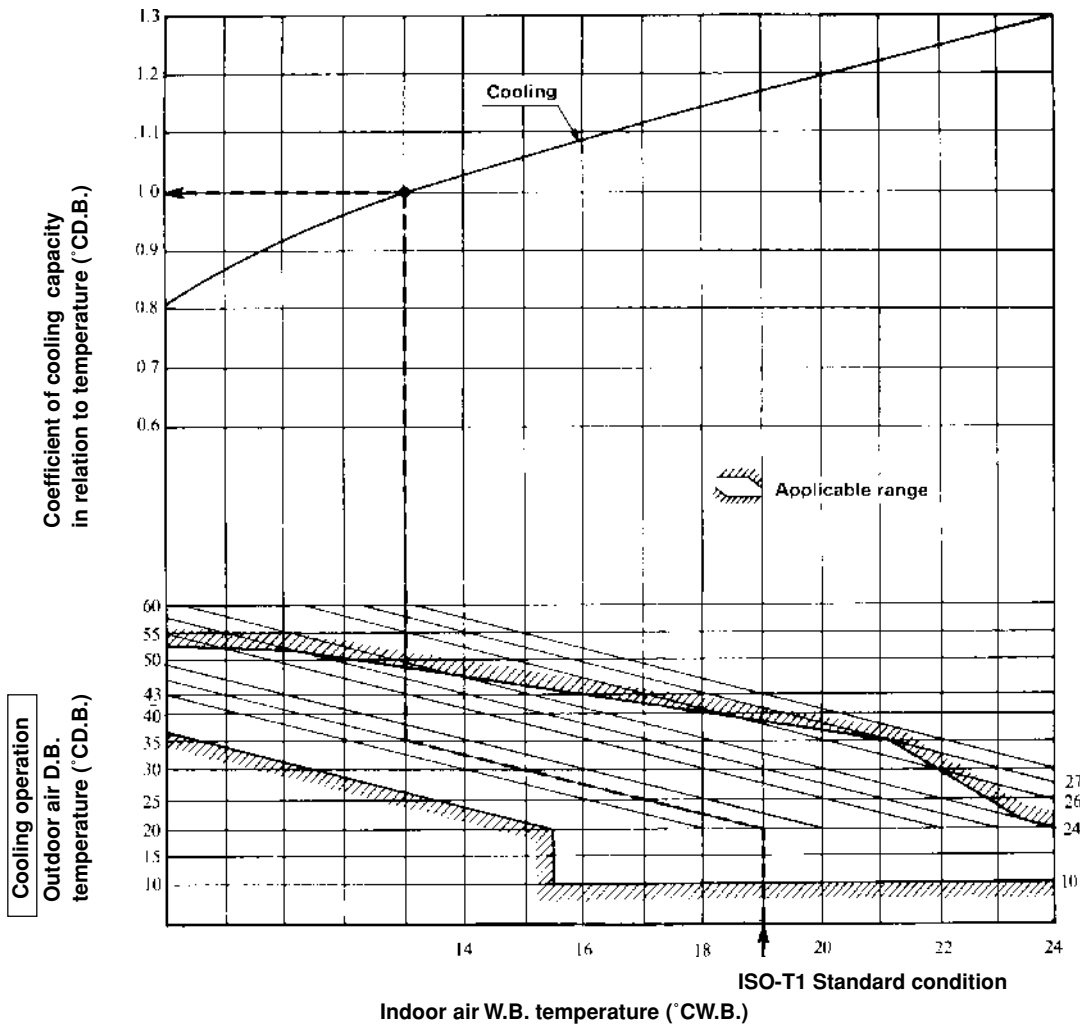
Correct the cooling capacity in accordance with the conditions as follows. The net cooling capacity can be obtained in the following way.

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

- (1) Coefficient of cooling capacity in relation to temperatures
  - (a) Only case of ISO-T1 models.



(b) Only case of ISO-T3 and SASO models.



**Table of bypass factor**

(50/60 Hz)

Item		Model	FDU308 type	FDU408 type	FDU508 type
Air flow	Upper limit		0.019/0.096	0.048/0.05	0.103/0.106
	Standard		0.067/0.086	0.032/0.043	0.076/0.094
	Lower limit		0.043/0.057	0.017/0.025	0.051/0.064

**(2) Correction of cooling capacity in relation to air flow rate control (fan speed)**

Coefficient: 1.00 at High, 0.95 at Low

**(3) Correction of cooling capacity in relation to one way length of refrigerant piping**

It is necessary to correct the cooling 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		5	10	15	20	25	30	35
Cooling	FDU308 type	1.0	0.99	0.98/0.975	0.97/0.965	0.96/0.95	0.95/0.94	0.94/0.925
	FDU408 type	1.0	0.995/0.99	0.985/0.98	0.98/0.97	0.97/0.96	0.965/0.95	0.955/0.94
	FDU508 type	1.0	0.99/0.985	0.975/0.97	0.965/0.955	0.95/0.94	0.94/0.925	0.925/0.91

Note (1) Equivalent piping length can be obtained by calculating as follows.  
 308 series [ø15.88 (5/8")]: Equivalent piping length = Real piping length + (0.10 × Number of bends in piping)  
 408, 508 series [ø19.05 (3/4")]: Equivalent piping length = Real piping length + (0.15 × Number of bends in piping)  
 [Equivalent piping length < Limitation length of piping + 5 m]

**(4) When the outdoor unit is located at a lower height than the indoor unit in cooling 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 differenc	5 m	10 m	15 m
Adjustment coefficient	0.01	0.02	0.03

**Piping length limitations**

Model	All models
Item	
Max. one way piping length	30 m
Max. vertical height difference	15 m

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

**How to obtain the cooling capacity**

**Example:** The net cooling capacity of the model FDU308CEN-A with the air flow “High”, the piping length of 15 m, the outdoor unit located 5 m lower than the indoor unit, indoor wet-bulb temperature at 19.0°C and outdoor dry-bulb temperature 35°C is

$$\text{Net cooling capacity} = \underset{\substack{\uparrow \\ \text{FDU308CEN-A}}}{7100} \times \underset{\substack{\uparrow \\ \text{Air flow "High"}}}{1.00} \times \underset{\substack{\uparrow \\ \text{Length 15 m.} \\ \text{Height difference 5 m}}}{(0.98 - 0.01)} \times \underset{\substack{\uparrow \\ \text{Factor by air temperatures}}}{1.0} = \mathbf{6887\ W}$$

## 16.2.7 Characteristics of fan

### How to interpret the blower characteristics table

Example • What is the Fan Controller’s Volume Number setting if, at the high operation speed of FDU308CES (60Hz), it is required to have 140Pa (14mmAq) outside static pressure at 24m<sup>3</sup>/min airflow volume as the operating point?

Move the 140Pa (14mmAq) outside static pressure point to the right as shown in the diagram below. The “(a) - point”, i.e. where this intersects with the solid curve tracing the 24m<sup>3</sup>/min airflow volume upwards, is the appropriate Volume Number. In this example the appropriate Volume Number is “No. 6”.

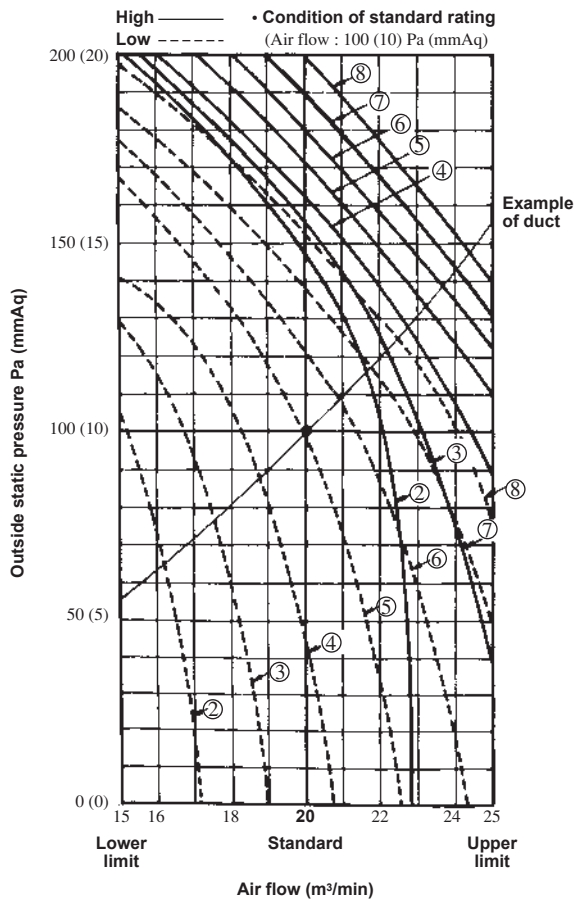
• In this situation, a condition of 19.7m<sup>3</sup>/min airflow volume at 93Pa (9.3mmAq) outside static pressure can be predicted at Low Tap and it can be concluded that operation is possible.

Always follow the procedure in “(b) - Point” to verify that the condition at Low Tap is not outside the Feasible Operation Airflow Volume Range.

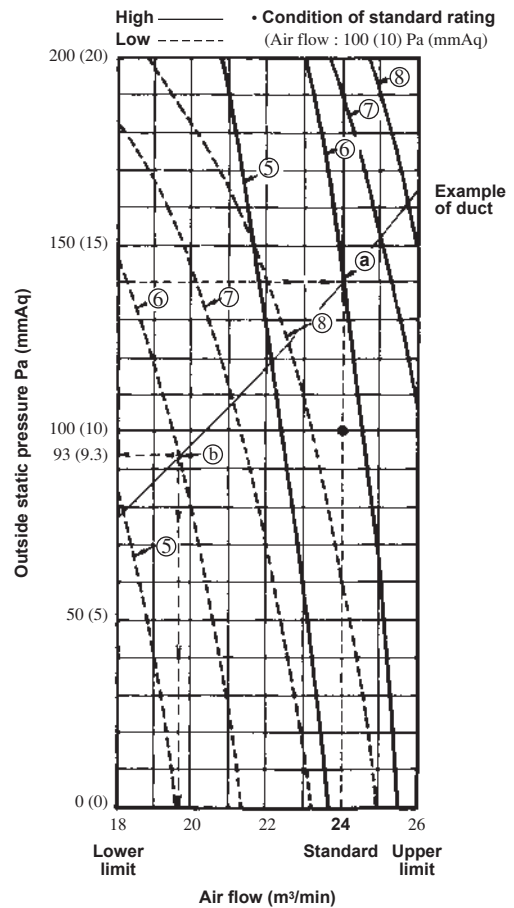
Notes (1) Circled values in the Special Feature Table indicate Fan Controller Volume Numbers. Volume Numbers with no entry are outside the Feasible Operation Airflow Volume Range and therefore operation is not possible.

(2) The Fan Controller Volume Number is set at “No. 5” when shipped from the assembly plant.

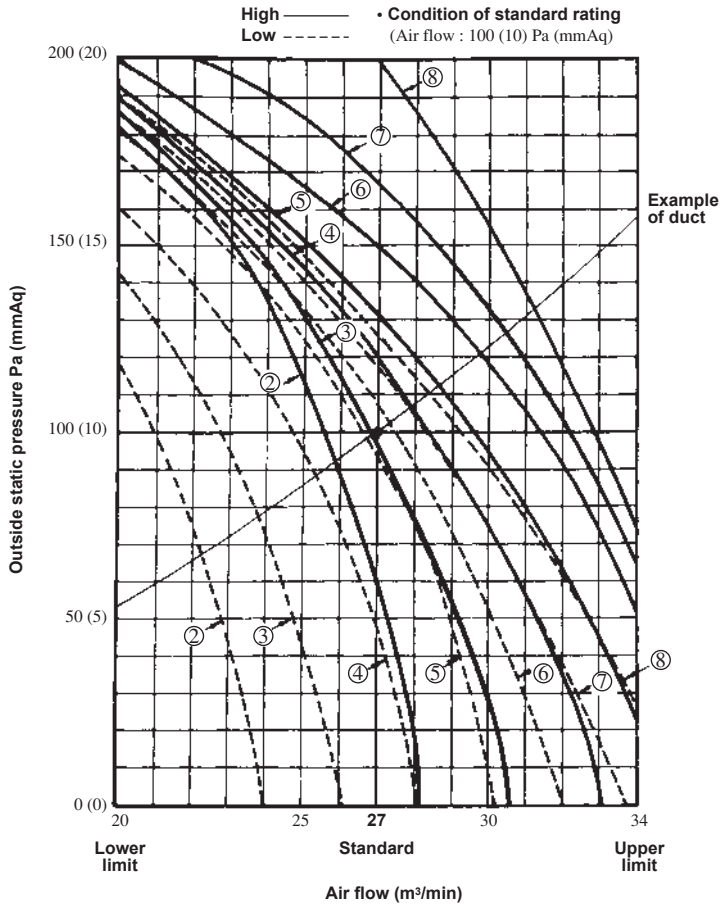
**Model FDU308-A (50Hz)**



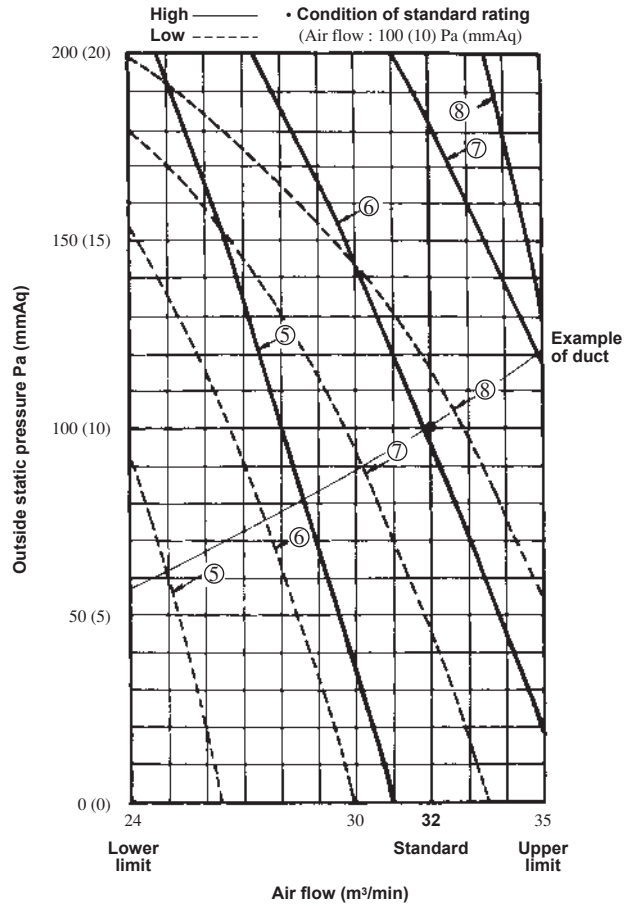
**Model FDU308-A (60Hz)**



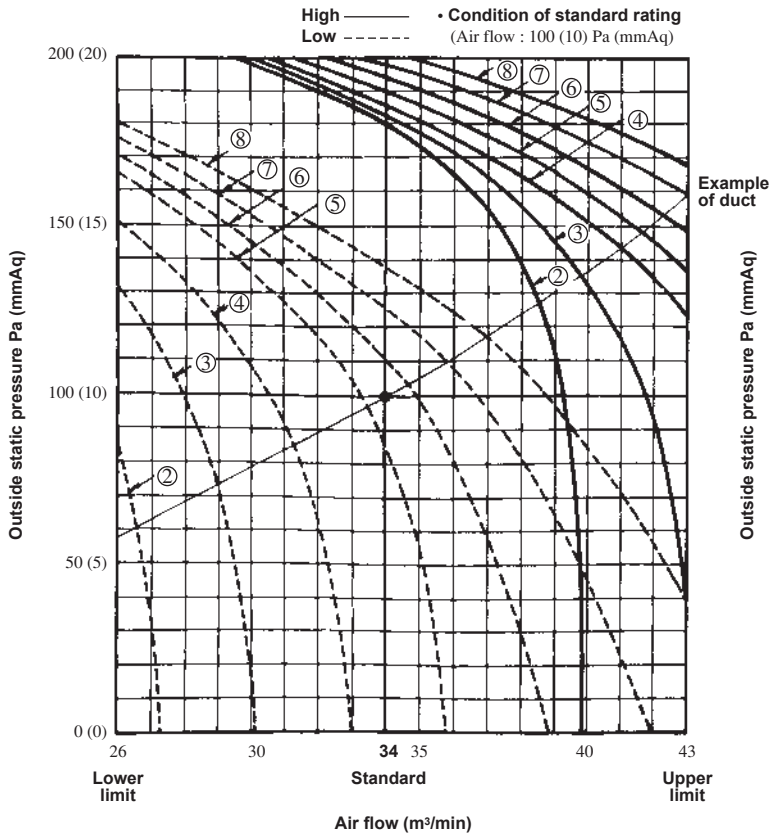
**Model FDU408-A (50Hz)**



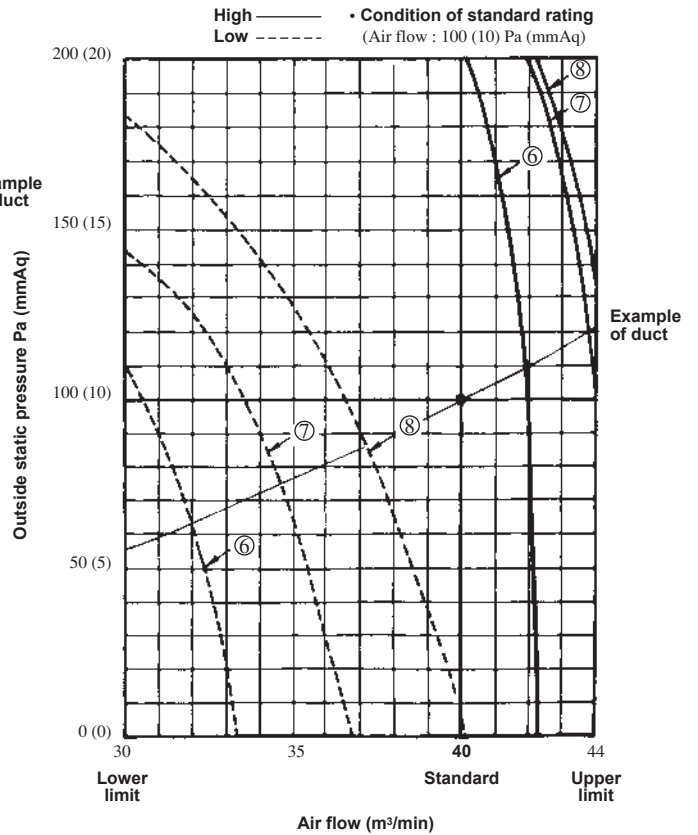
**Model FDU408-A (60Hz)**



**Model FDU508-A (50Hz)**



**Model FDU508-A (60Hz)**



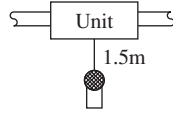
### 16.2.8 Noise level

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

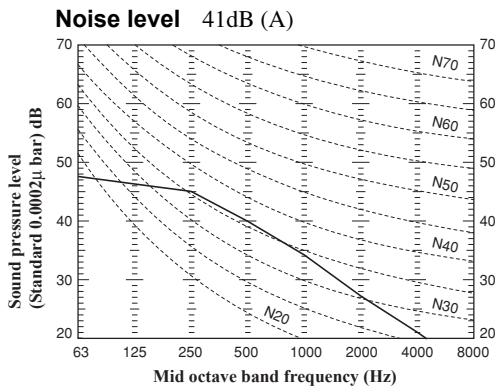
**Outdoor unit**  
**Measured based on JIS B 8616**  
 Mike position: at highest noise level  
 in position as below  
 Distance from front side 1 m  
 Height 1 m



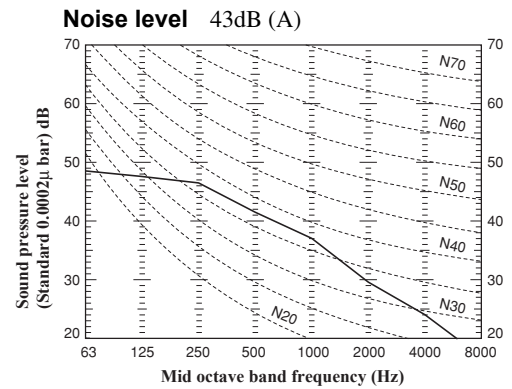
- (2) The data in the chart are measured in an anechoic room.
- (3) The noise levels measured in the field are usually higher than the data because of reflection.

**(1) Indoor unit**

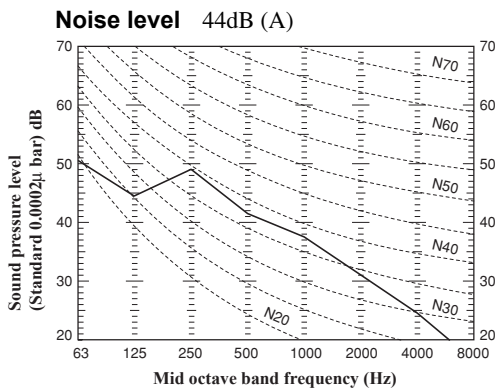
**Model FDU308-A (50Hz)**



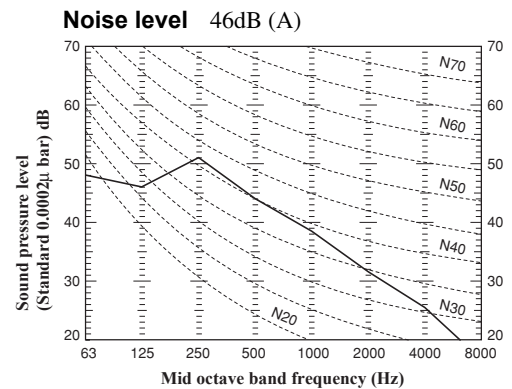
**Model FDU308-A (60Hz)**



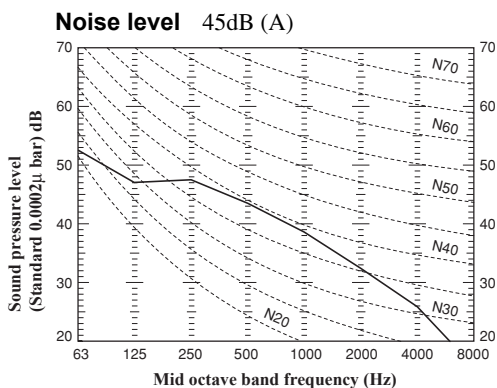
**Model FDU408-A (50Hz)**



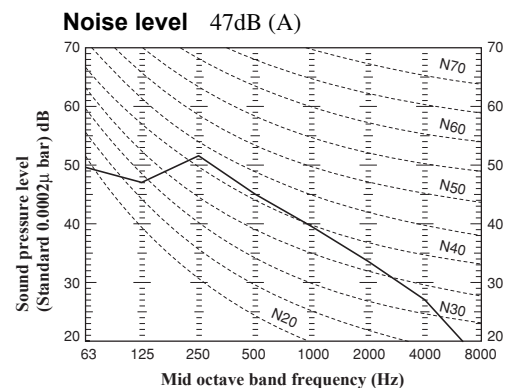
**Model FDU408-A (60Hz)**



**Model FDU508-A (50Hz)**

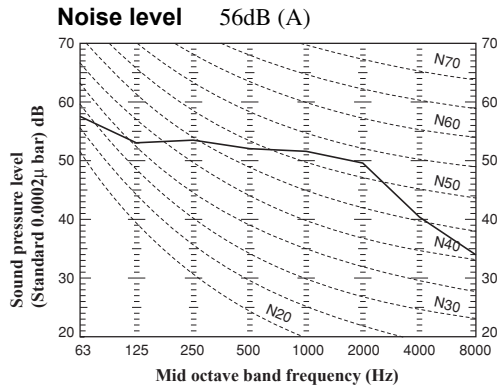


**Model FDU508-A (60Hz)**

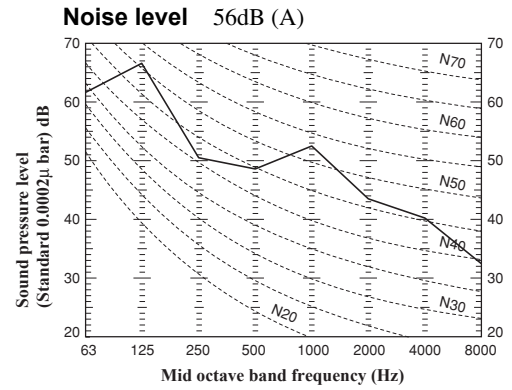


**(2) Outdoor unit**

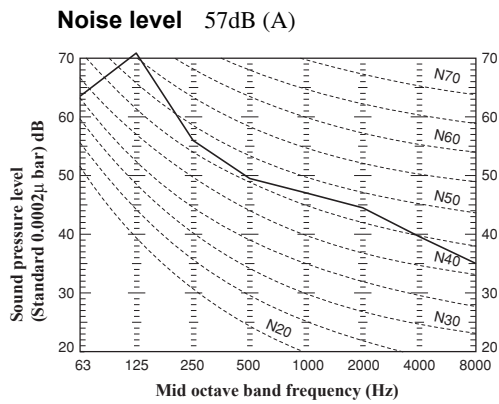
**Model FDC306CEN3**



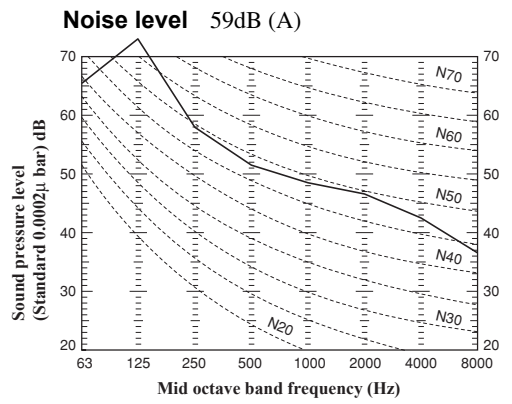
**Model FDC306CES3**



**Model FDC406CES3**



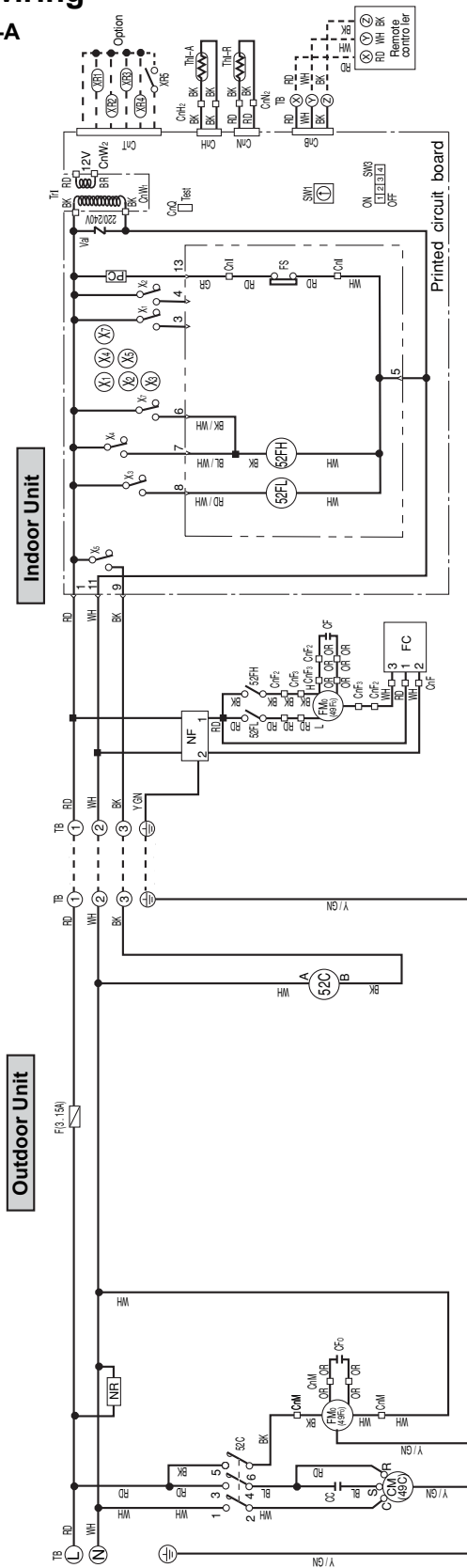
**Models FDC506CES3, 506CEM3**



# 16.3 ELECTRICAL DATA

## 16.3.1 Electrical wiring

Model FDU308CEN-A



**Power source**  
1 Phase 220/240V 50Hz

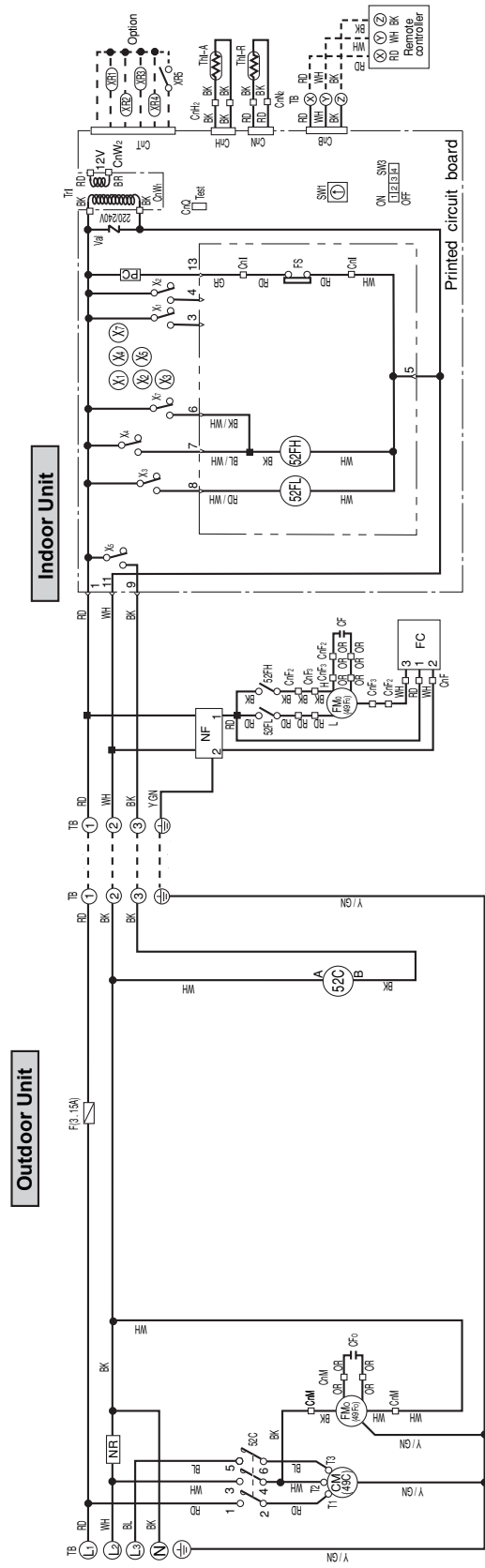
Color mark		Color
<b>BK</b>	Mark	Black
<b>BL</b>	Mark	Blue
<b>BR</b>	Mark	Brown
<b>GR</b>	Mark	Gray
<b>OR</b>	Mark	Orange
<b>RD</b>	Mark	Red
<b>WH</b>	Mark	White
<b>BK/WH</b>	Mark	Black/White
<b>BL/WH</b>	Mark	Blue/White
<b>RD/WH</b>	Mark	Red/White
<b>Y/GN</b>	Mark	Yellow/Green

Meaning of marks		Parts name	Mark	Parts name
<b>CC</b>	Mark	Capacitor for CM	<b>Thi-A</b>	Thermistor
<b>CFI</b>	Mark	Capacitor for FMI	<b>Thi-R</b>	Thermistor
<b>CFo</b>	Mark	Capacitor for FMO	<b>Trl</b>	Transformer
<b>CM</b>	Mark	Compressor motor	<b>Val</b>	Valvistor
<b>CnA ~ W</b>	Mark	Connector (□ mark)	<b>49C</b>	Internal thermostat for CM
<b>F</b>	Mark	Fuse	<b>49Fo</b>	Internal thermostat for FMI
<b>Fc</b>	Mark	Fan controller	<b>52C</b>	Internal thermostat for FMO
<b>FMI</b>	Mark	Fan motor (Indoor unit)	<b>52FH</b>	Magnetic contactor for CM
<b>FMO</b>	Mark	Fan motor (Outdoor unit)	<b>52FL</b>	Auxiliary relay (for FMI)
<b>FS</b>	Mark	Float switch	<b>X1-5, 7</b>	Auxiliary relay (for FMI)
<b>NF</b>	Mark	Noise filter	◊	Auxiliary relay
<b>SW1</b>	Mark	Switch (Address set)	■	Terminal (F)
<b>SW3</b>	Mark	Changeover switch		Connector
<b>TB</b>	Mark	Terminal block (○ mark)		



**Model FDU308CES-A**

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

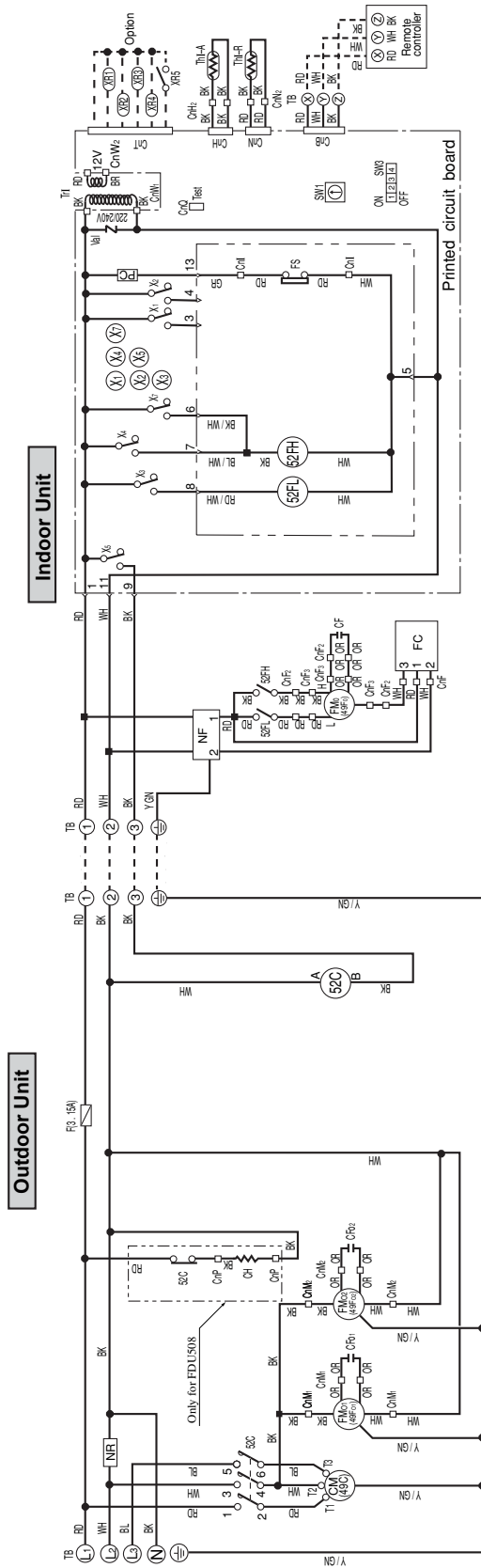


Color mark	
Mark	Color
BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
BK/WH	Black/White
BL/WH	Blue/White
RD/WH	Red/White
Y/GN	Yellow/Green

Meaning of marks	
Mark	Parts name
CF1	Capacitor for FMI
CF2	Capacitor for FMo
CM	Compressor motor
CnA ~ W	Connector (□ mark)
F	Fuse
Fc	Fan controller
FMI	Fan motor (Indoor unit)
FMo	Fan motor (Outdoor unit)
FS	Float switch
NF	Noise filter
SW1	Switch (Address set)
SW3	Changeover switch
TB	Terminal block (○ mark)
Thi-A	Thermistor
Thi-R	Thermistor
Tri	Transformer
Val	Valistor
49C	Internal thermostat for CM
49Fi	Internal thermostat for FMI
49Fo	Internal thermostat for FMo
52C	Magnetic contactor for CM
52FH	Auxiliary relay (for FMI)
52FL	Auxiliary relay (for FMo)
X1-5, 7	Auxiliary relay
◁	Terminal (F)
■	Connector

Models FDU408CES-A, 508CES-A

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



### Meaning of marks

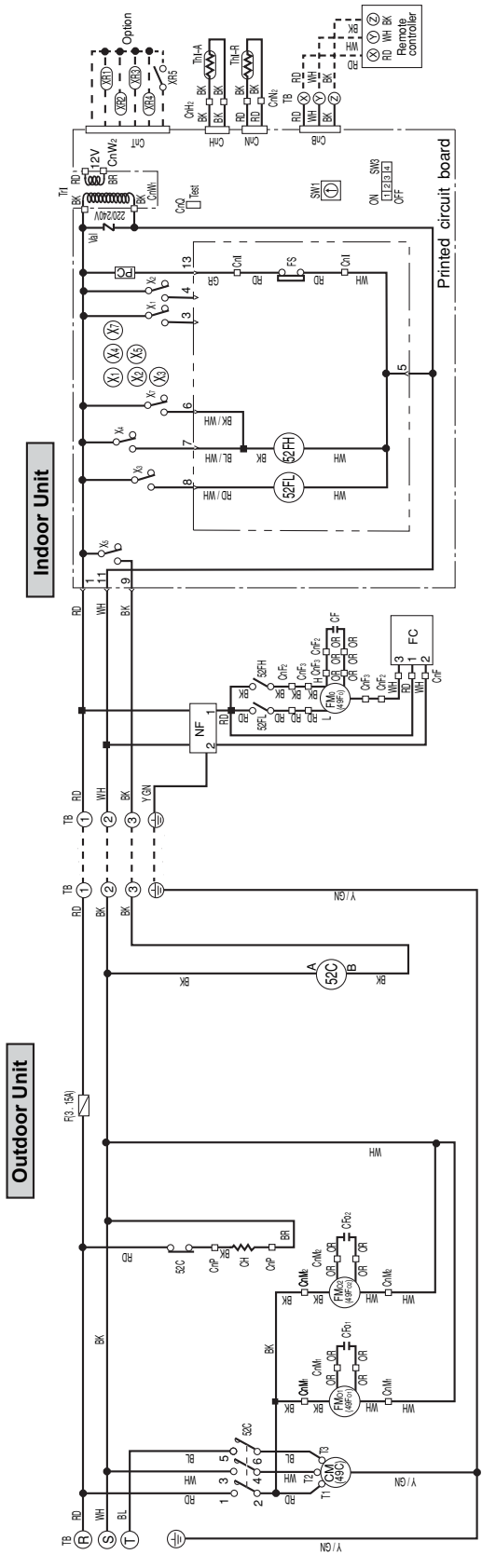
Mark	Parts name	Mark	Parts name
CF1	Capacitor for FMi	Th-A	Thermistor
CFo1, 2	Capacitor for FMo	Th-R	Thermistor
CH	Crankcase heater	Tr1	Transformer
CM	Compressor motor	Val	Valvistor
CnA ~ W	Connector (□ mark)	49C	Internal thermostat for CM
F	Fuse	49Fi	Internal thermostat for FMi
Fc	Fan controller	49Fo1, 2	Internal thermostat for FMo
FMi	Fan motor (Indoor unit)	52C	Magnetic contactor for CM
FMo1, 2	Fan motor (Outdoor unit)	52FH	Auxiliary relay (for FMi)
FS	Float switch	52FL	Auxiliary relay (for FMi)
NF	Noise filter	X1~5, 7	Terminal (F)
SW1	Switch (Address set)	◀	Connector
SW3	Changeover switch	■	
TB	Terminal block (O mark)		

### Color mark

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

**Model FDU508CEM-A**

**Power Source**  
**3 Phase 230V 50Hz/220V 60Hz**



Meaning of marks		Parts name		Parts name	
Mark	Parts name	Mark	Parts name	Mark	Color
CF1	Capacitor for FMI	Th-A	Thermistor	BK	Black
CF01, 2	Capacitor for FMO	Th-R	Thermistor	BL	Blue
CH	Crankcase heater	Tri	Transformer	BR	Brown
CM	Compressor motor	Val	Valvistor	GR	Gray
CnA ~ W	Connector (□ mark)	49C	Internal thermostat for CM	OR	Orange
F	Fuse	49Fi	Internal thermostat for FMI	RD	Red
Fc	Fan controller	49Fo1, 2	Internal thermostat for FMO	WH	White
FMI	Fan motor (Indoor unit)	52C	Magnetic contactor for CM	BK/WH	Black/White
FMO1, 2	Fan motor (Outdoor unit)	52FH	Auxiliary relay (for FMI)	BL/WH	Blue/White
FS	Float switch	52FL	Auxiliary relay (for FMI)	RD/WH	Red/White
NF	Noise filter	X1~5, 7	Auxiliary relay	Y/GN	Yellow/Green
SW1	Switch (Address set)	◀	Terminal (F)		
SW3	Changeover switch	■	Connector		
TB	Terminal block (O mark)				

## **16.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER**

Except for function relating to heating, same as the unit for FDT(N) heat pump type. See page 317.

## **16.5 APPLICATION DATA**

The application data for the cooling only models are similar to those for the heat pump models. (See page 623.)

## **16.6 MAINTENANCE DATA**

Same as the cooling /heating equipment for FDT(N) heat pump type. Refer to page 348.