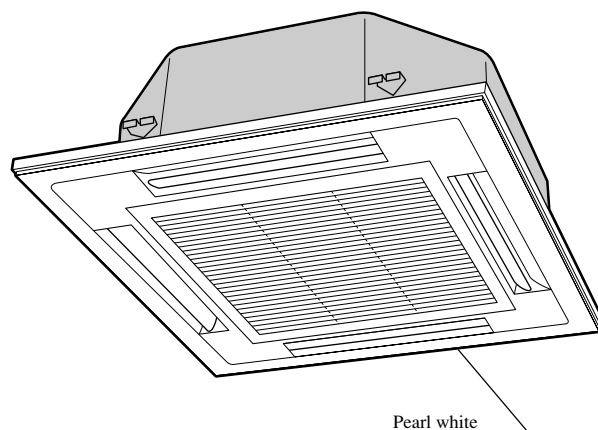


## 19.2.4 Exterior appearance

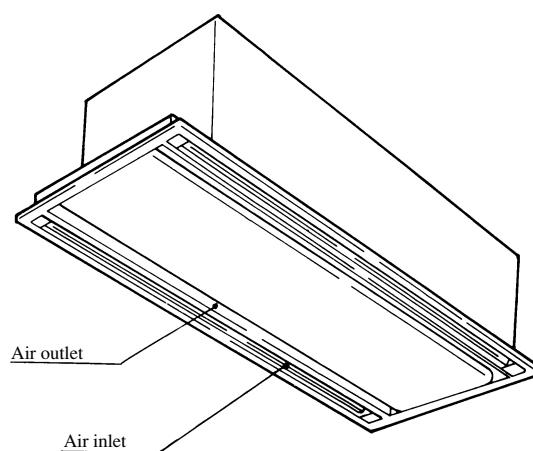
### (1) Indoor unit

#### (a) Ceiling recessed type (FDT)

- Decorative panel



#### (b) 2-way outlet ceiling recessed type (FDTW)



- Decorative panel

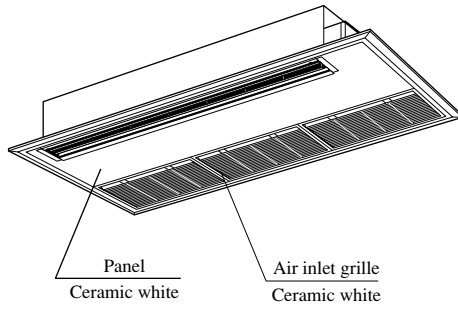
##### (i) Standard type

Panel part No.	Type	Panel color	Applicable model
TW-PSA-22W-E	With Auto swing	Pearl white	FDTW28, 45, 56 type
TW-PSA-32W-E			FDTW71, 90 type
TW-PSA-42W-E			FDTW112, 140 type

##### (ii) Attachment of ceiling material type

Panel part No.	Type	Panel color	Applicable model
TW-PSB-28W-E	With Auto swing	Misty white	FDTW28, 45, 56 type
TW-PSB-38W-E			FDTW71, 90 type
TW-PSB-48W-E			FDTW112, 140 type

**(c) 1-way outlet ceiling recessed type (FDTS)**

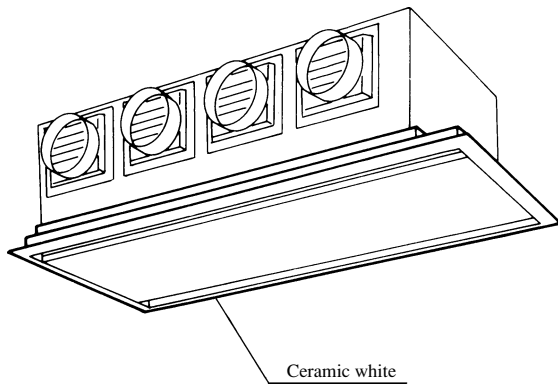


- Decorative panel

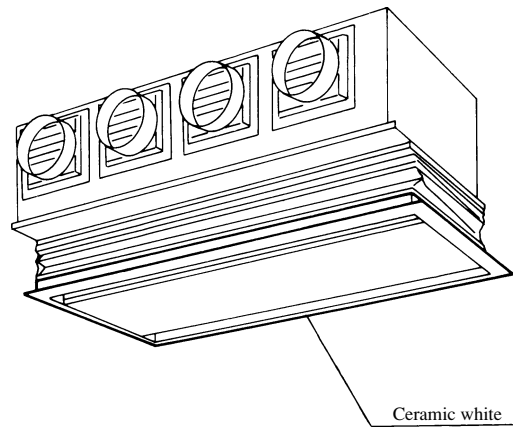
Panel part No.	Type	Panel color	Applicable model
TS-PSA-26W-E	With Auto swing	Misty white	FDTS22, 28, 36, 45 type
TS-PSA-36W-E			FDTS71 type

**(d) Cassetteria type (FDR)**

Silent panel type

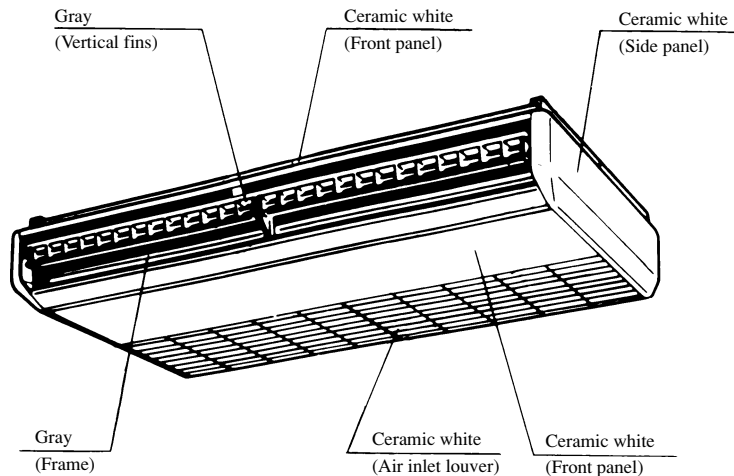


Canvas-duct panel type

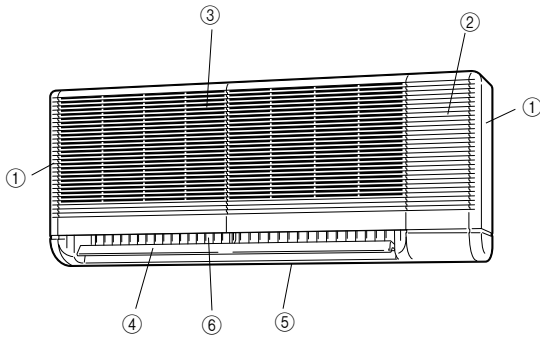


**(e) Satellite ducted type (FDUM) ..... Zinc steel plate**

**(f) Ceiling suspension type (FDE)**

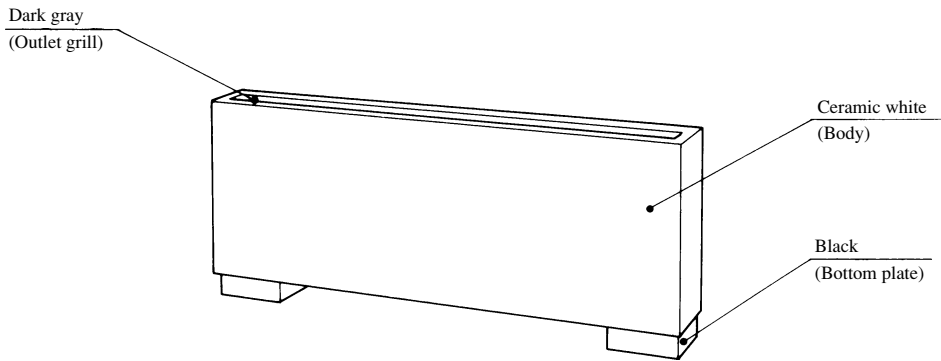


**(g) Wall mounted type (FDK)**



No.	Parts name	Color
①	Side plate	Ceramic white
②	Front panel	
③	Inlet grill	
④	Outlet grill	
⑤	Bottom plate	
⑥	Right and Left louvers	Light gray

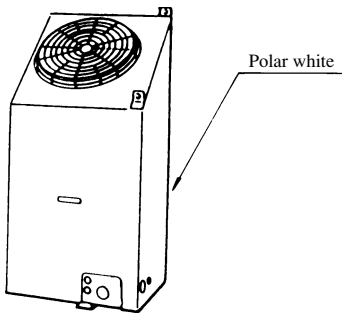
**(h) Floor standing exposed type (FDL)**



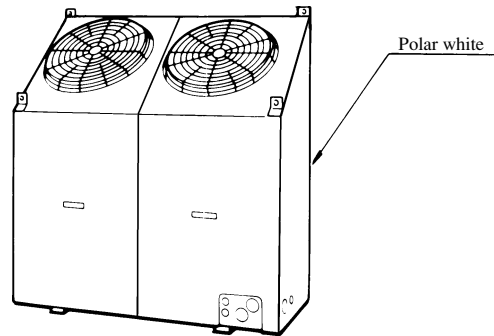
**(i) Floor standing hidden type (FDFU) ..... Zinc steel plate**

**(2) Outdoor unit**

**Models FDCP140HKXE2B  
FDCJ140HKXE2B**

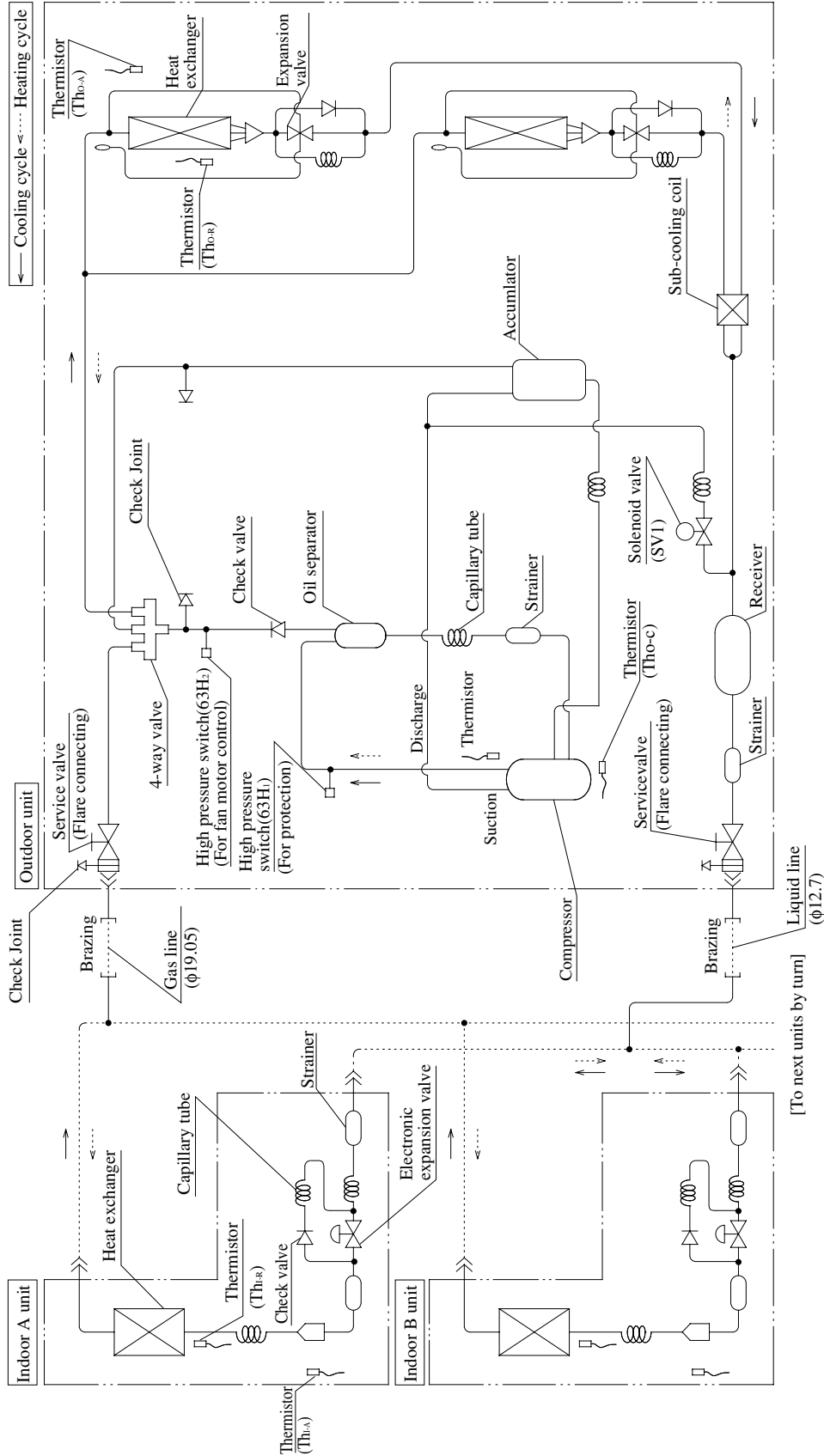


**Models FDCP224HKXE2B, 280HKXE2B  
FDCJ224HKXE2B, 280HKXE2B**



## 19.2.5 Piping system

Models **FDCP140HKXE2B**  
**FDCJ140HKXE2B**



Notes (1) Preset point of protective devices

FDCJ type:  
63H<sub>1</sub> · OFF 2.94 MPa (30kgf/cm<sup>2</sup>), ON2.35MPa (24kgf/cm<sup>2</sup>)(For protection)  
63H<sub>2</sub> · OFF 2.50 MPa (25.5kgf/cm<sup>2</sup>), ON2.06MPa (21kgf/cm<sup>2</sup>)(For heating FMO and control of high pressure)

FDCP type:  
63H<sub>1</sub> · OFF 3.24 MPa (33kgf/cm<sup>2</sup>), ON2.65MPa (27kgf/cm<sup>2</sup>)(For protection)  
63H<sub>2</sub> · OFF 2.79 MPa (28.5kgf/cm<sup>2</sup>), ON2.26MPa (23kgf/cm<sup>2</sup>)(For heating FMO and control of high pressure)

(2) Function of thermistor

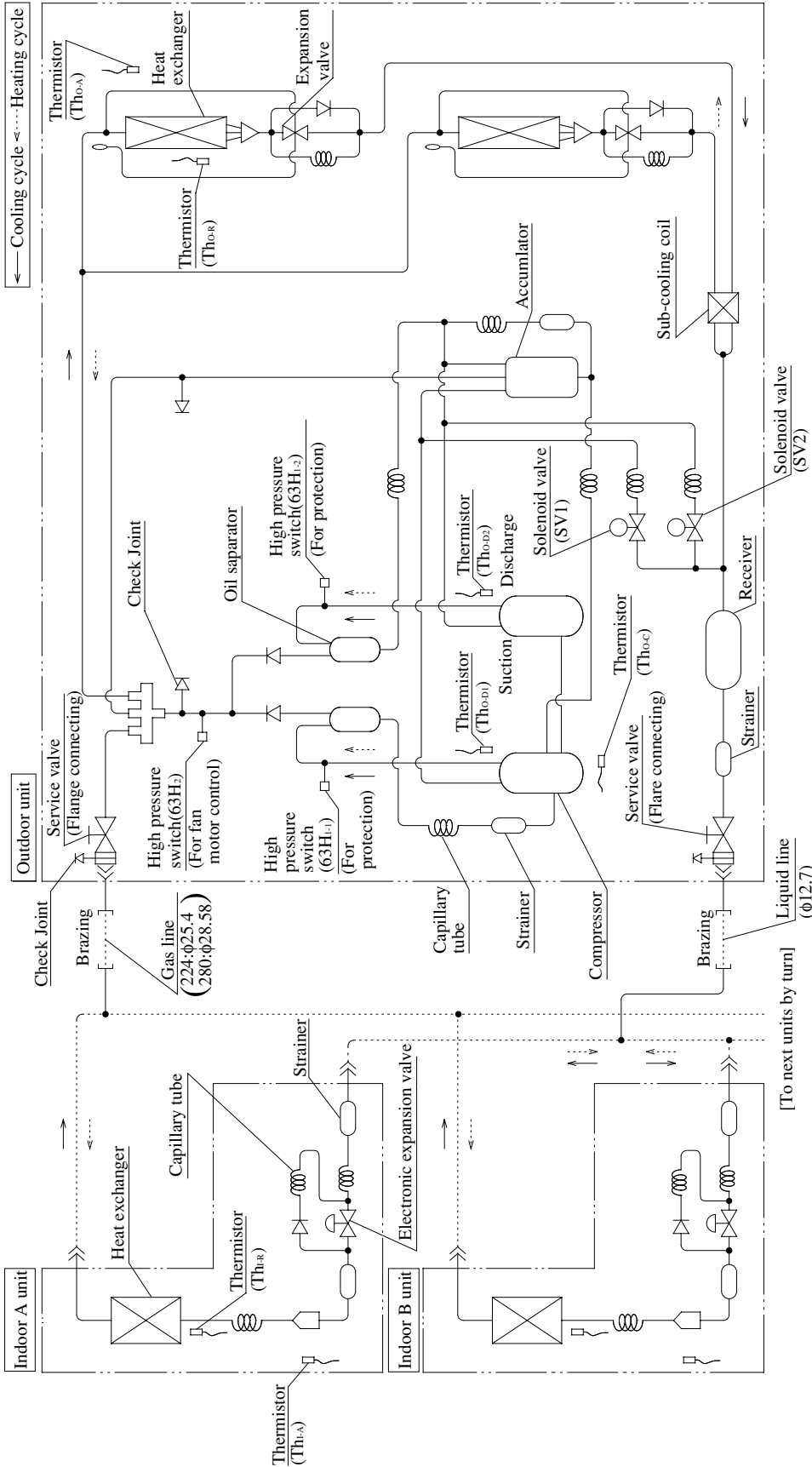
Th<sub>o-R</sub> : Fan control in heating, or frost prevention in cooling.  
Th<sub>o-A</sub> : For heating and cooling to low outdoor temp., for control of defrosting.

Th<sub>o-R</sub> : For control of defrosting.

Th<sub>o-D</sub> : For control of discharge gas temperature.

Th<sub>o-C</sub> : For control of temperature under the dome.

**Models FDCP224HKXE2B, 280HKXE2B  
FDCJ224HKXE2B, 280HKXE2B**



Notes (1) Preset point of protective devices

FDCJ type:  
 63H<sub>1</sub>: OFF 2.94 MPa (30kgf/cm<sup>2</sup>), ON2.35MPa (24kgf/cm<sup>2</sup>)(For protection)  
 63H<sub>2</sub>: OFF 2.50 MPa (25.5kgf/cm<sup>2</sup>), ON2.06MPa (21kgf/cm<sup>2</sup>)(For heating FMO and control of high pressure)

FDCP type:  
 63H<sub>1</sub>: OFF 3.24 MPa (33kgf/cm<sup>2</sup>), ON2.65MPa (27kgf/cm<sup>2</sup>)(For protection)  
 63H<sub>2</sub>: OFF 2.79 MPa (28.5kgf/cm<sup>2</sup>), ON2.26MPa (23kgf/cm<sup>2</sup>)(For heating FMO and control of high pressure)

(2) Function of thermistor

- $Th_{iR}$  : Fan control in heating, or frost prevention in cooling.
- $Th_{oA}$  : For heating and cooling to low outdoor temp., for control of defrosting.
- $Th_{oR}$  : For control of defrosting.
- $Th_{oD}$  : For control of discharge gas temperature.
- $Th_{oC}$  : For control of temperature under the dome.

### 19.2.6 Selection chart

(1) 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.

**Indoor unit**

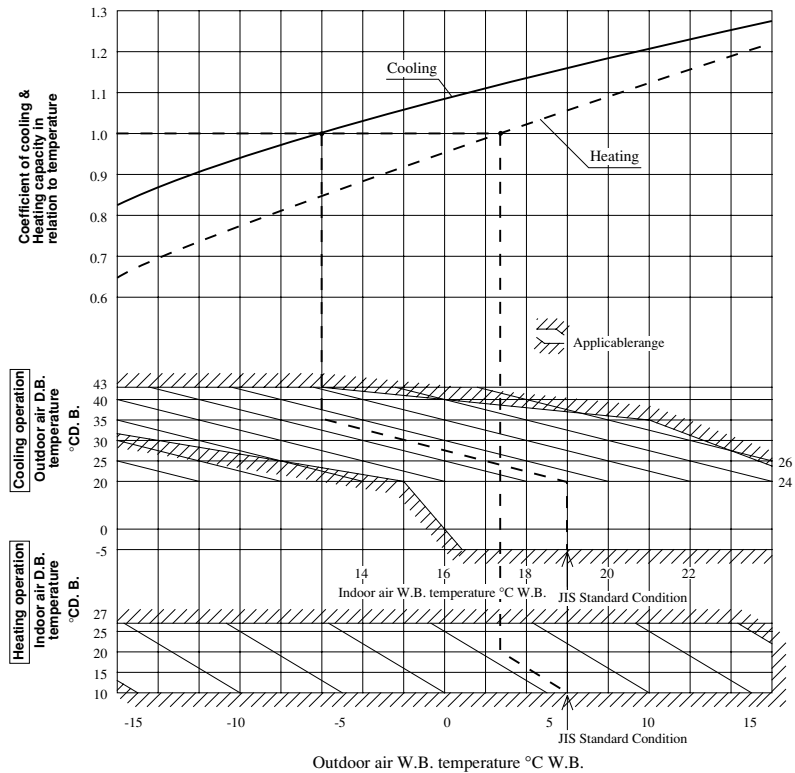
$$\text{Each indoor unit} = \text{System performance} \times \frac{\text{Indoor unit capacity}}{\text{Indoor unit capacity when operating simultaneously.}}$$

**Outdoor unit**

$$\text{System performance} = \frac{\text{Performance from connected capacity} \times \text{correction coefficient from indoor and outdoor temperature conditions} \times (\text{correction coefficient from piping distance} - \text{correction coefficient from condensation when heating})}{\text{correction coefficient from different between indoor and outdoor temperature}}$$

Note(1) Refer to page 788 and 802 for the correction coefficient.

**(a) Coefficient of cooling and heating capacity in relation to temperatures**



**(b) Correction of cooling and heating capacity in relation to one way length of refrigerant piping.**

Equivalent piping length [m] <sup>(1)</sup>	5	10	15	20	25	30	35	40	45	50
Cooling	1.0	0.99	0.975	0.965	0.95	0.94	0.925	0.915	0.9	0.89
Heating	1.0	1.0	1.0	1.0	1.0	0.995	0.995	0.99	0.99	0.985
Equivalent piping length [m]	55	60	65	70	75	80	85	90	95	100
Cooling	0.875	0.865	0.85	0.84	0.825	0.815	0.8	0.79	0.775	0.765
Heating	0.985	0.98	0.98	0.975	0.975	0.97	0.97	0.965	0.965	0.96
Equivalent piping length [m]	105	110	115	120	125					
Cooling	0.745	0.74	0.725	0.715	0.7					
Heating	0.96	0.955	0.955	0.95	0.95					

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

$$\text{equivalent piping length} = \text{Real gas piping length} + \text{Number of bends in gas piping} \times \text{Equivalent piping length of bends.}$$

Equivalent length of each joint

Unit : m/one part

Gas piping size	φ12.7	φ15.88	φ19.05	φ25.4	φ28.58
Joint (90°elbow)	0.10	0.10	0.15	0.15	0.20

- (c) 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	5 m	10 m	15 m	20 m	25 m	30 m
Adjustment coefficient	0.01	0.02	0.03	0.04	0.05	0.06

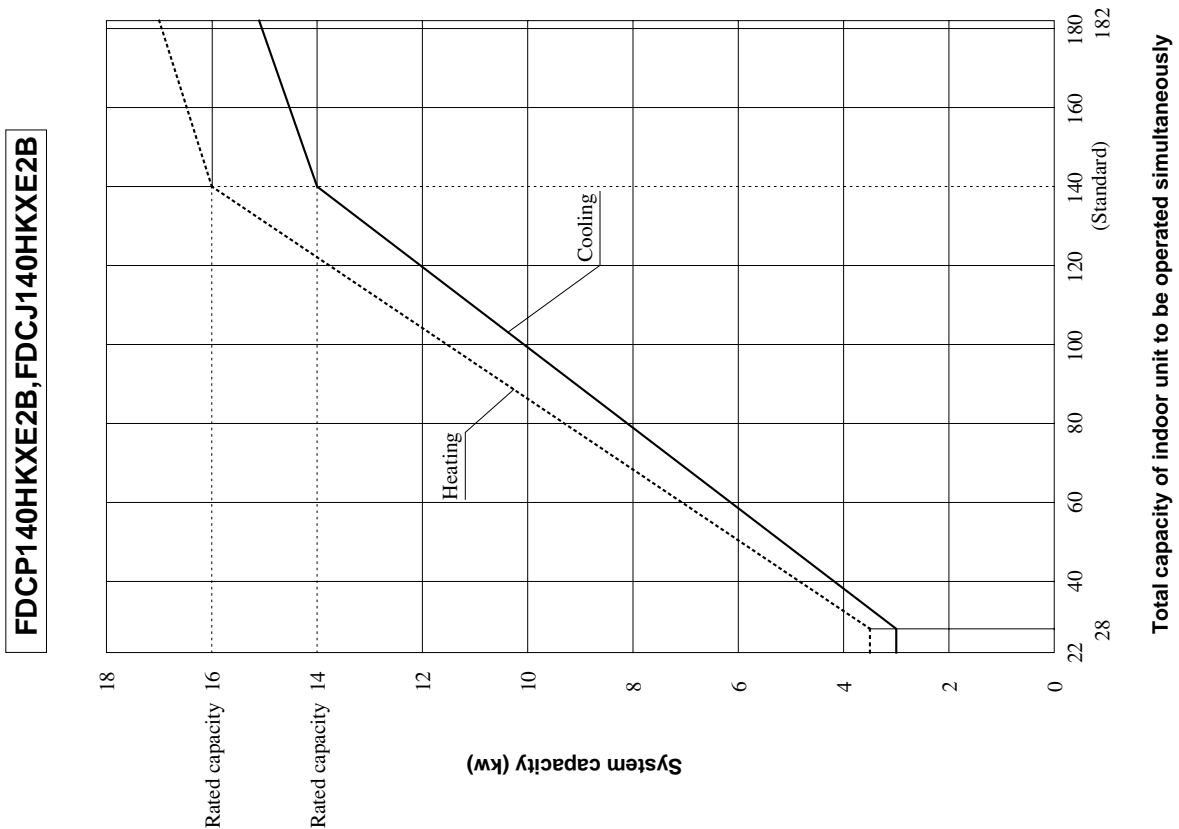
Height difference between the indoor unit and outdoor unit in the vertical height difference	35 m	40 m	45 m	50 m
Adjustment coefficient	0.07	0.08	0.09	0.10

- (d) Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger

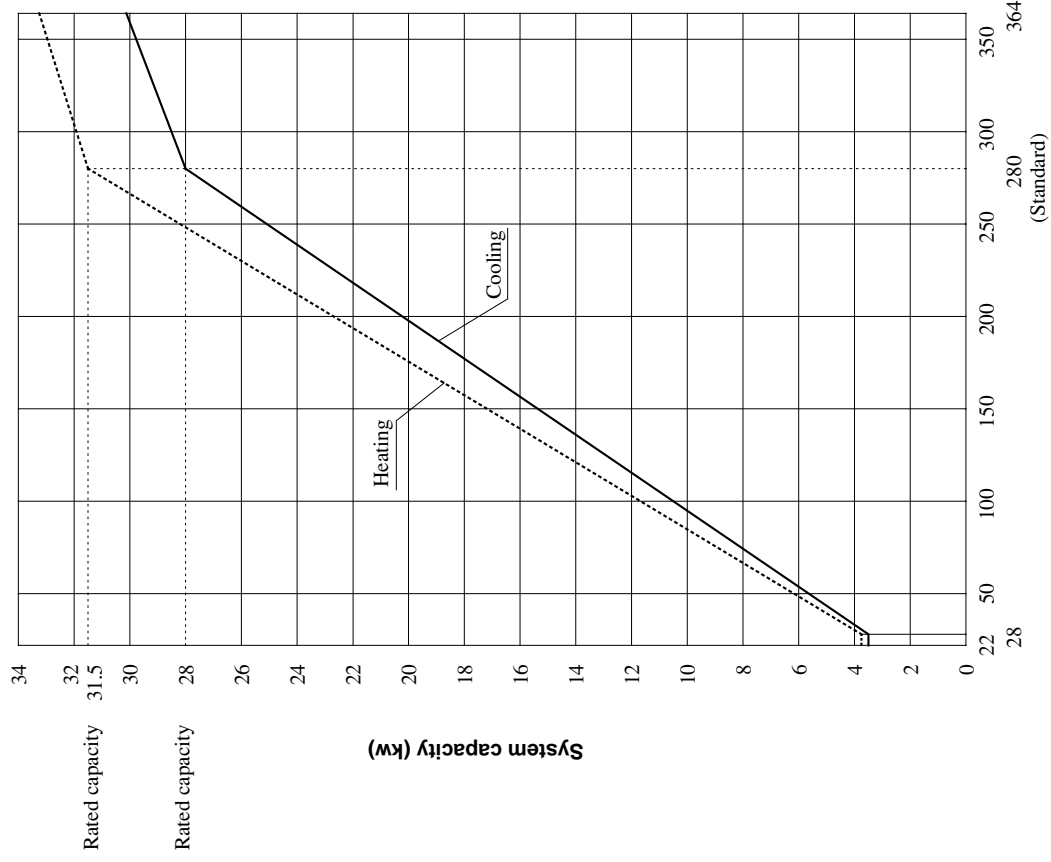
Air inlet temperature of outdoor unit in °C WB	-15	-13	-11	-9	-7	-5	-3	-1	1	3	5
Adjustment coefficient	0.96	0.96	0.95	0.94	0.93	0.91	0.88	0.86	0.87	0.92	1.00

The correction factors will change drastically according to weather conditions. So necessary adjustment should be made empirically according to the weather data of the particular area.

- (2) Correction of outdoor unit capacity according to capacity of indoor unit to be operated simultaneously

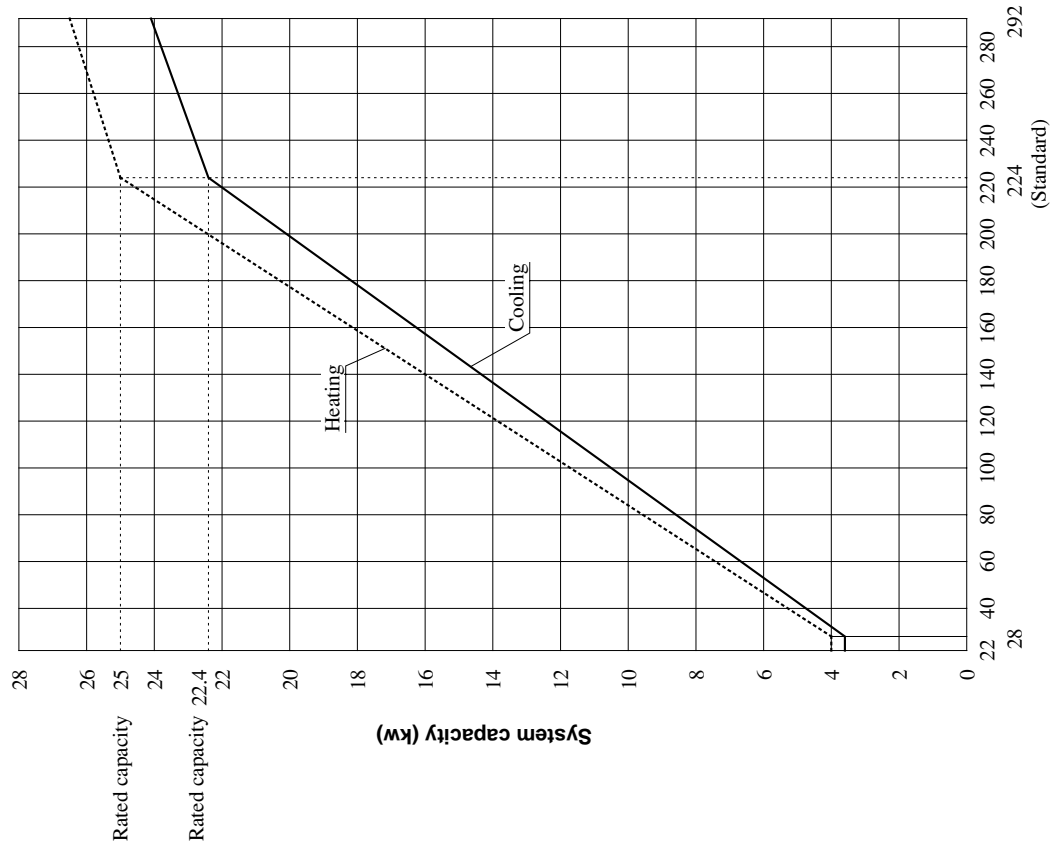


**FDCP280HKXE2B, FDCJ280HKXE2B**



**Total capacity of indoor unit to be operated simultaneously**

**FDCP224HKXE2B, FDCJ224HKXE2B**



**Total capacity of indoor unit to be operated simultaneously**



**Capacity Correction Calculations** (The procedure for both cooling and heating is the same.)

Example

**Conditions**

- **Unit** (50 Hz)
  - Outdoor unit FDCJ280HKXE2B 1 unit
  - Indoor unit FDTJ90HKXE2 - 1 unit
  - FDTJ140HKXE2 - 1 unit
  - FDTWJ28HKXE2B - 1 unit
  - FDTSJ22HKXE2B - 1 unit
- **Piping length** (Shall be common among units) ..... 60 meters (suitable length)
- **Difference in height between indoor and outdoor units** ..... 15 meters  
(Outdoor unit is lower)
- **Air conditions** ..... Outdoor air temperature 33°CDB  
Indoor temperature 26°CDB 19 °CWB

} Correction when cooling?

**Outdoor unit performance correction**

- ① **Total connection capacity from indoor unit** ...  $90 \times 1 \text{ unit} + 140 \times 1 \text{ unit} + 28 \times 1 \text{ unit} + 22 \times 1 \text{ unit} = 280$   
 $\approx 28\text{kW}$  (From table above)
- ② **Performance correction from indoor and outdoor temperatures**  
 $28 \times 1.02 \approx 28.5\text{kW}$
- ③ **Performance correction from piping length and difference in height between indoor and outdoor units**  
 $28.5 (0.865 - 0.03) \approx 23.8\text{kW}$  (Actual performance)

**Performance correction of indoor unit**

$\text{Performance correction of indoor unit} = \text{System performance} \times \frac{\text{Indoor unit capacity}}{\text{Total capacity of indoor units operating simultaneously}}$
--

[Example] FDTJ90HKXE2

$$23.8 \times \frac{90}{280} \approx 7.65\text{kW}$$

**Performance of indoor unit**

- FDTJ90HKXE2** ..... 7.65kW (Actual performance)
- FDTJ140HKXE2** ..... 11.9kW (Actual performance)
- FDTWJ28HKXE2B** ..... 2.38kW (Actual performance)
- FDTSJ22HKXE2B** ..... 1.87kW (Actual performance)

**(3) Sensible heat capacity**

**(a) FDT Series**

**Model FDTJ28HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	2.89	2.58	2.98	2.60	3.05	2.61	3.13	2.63	3.21	2.64	3.28	2.6
	29	2.83	2.55	2.91	2.57	2.99	2.59	3.07	2.61	3.15	2.62	3.22	2.6
	31	2.76	2.52	2.85	2.55	2.92	2.56	3.01	2.58	3.09	2.60	3.16	2.6
	33	2.68	2.49	2.77	2.52	2.86	2.54	2.95	2.56	3.02	2.58	3.10	2.5
	35	2.60	2.46	2.70	2.49	2.80	2.52	2.88	2.54	2.95	2.55	3.04	2.5
	37	2.53	2.43	2.63	2.46	2.72	2.49	2.81	2.51	2.89	2.53	2.98	2.5
	39	2.46	2.40	2.56	2.43	2.64	2.46	2.74	2.49	2.83	2.51	2.91	2.5

**Model FDTJ36HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	3.72	3.19	3.83	3.22	3.93	3.24	4.02	3.25	4.12	3.27	4.21	3.2
	29	3.64	3.16	3.75	3.19	3.84	3.20	3.95	3.22	4.05	3.24	4.14	3.2
	31	3.55	3.12	3.66	3.15	3.76	3.17	3.87	3.20	3.97	3.21	4.06	3.2
	33	3.45	3.08	3.57	3.11	3.68	3.14	3.79	3.17	3.88	3.18	3.99	3.2
	35	3.35	3.04	3.47	3.08	3.60	3.11	3.71	3.14	3.80	3.15	3.91	3.1
	37	3.25	3.00	3.38	3.04	3.50	3.07	3.61	3.10	3.72	3.13	3.83	3.1
	39	3.16	2.96	3.29	3.00	3.40	3.04	3.52	3.07	3.64	3.10	3.75	3.1

**Model FDTJ45HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
15	27	4.65	3.99	4.78	4.02	4.91	4.05	5.03	4.07	5.15	4.09	5.27	4.1
	29	4.55	3.95	4.68	3.98	4.80	4.01	4.93	4.03	5.06	4.05	5.18	4.0
	31	4.44	3.90	4.58	3.94	4.70	3.97	4.83	3.99	4.96	4.02	5.08	4.0
	33	4.31	3.85	4.46	3.89	4.60	3.93	4.73	3.96	4.86	3.98	4.98	4.0
	35	4.19	3.80	4.34	3.85	4.50	3.89	4.64	3.92	4.75	3.94	4.88	3.9
	37	4.07	3.75	4.23	3.80	4.37	3.84	4.52	3.88	4.65	3.91	4.78	3.9
	39	3.95	3.71	4.11	3.76	4.25	3.80	4.40	3.84	4.55	3.87	4.68	3.9

**Model FDTJ56HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
15	27	5.78	4.48	5.95	4.51	6.11	4.53	6.26	4.54	6.41	4.55	6.55	4.5
	29	5.66	4.43	5.83	4.46	5.98	4.47	6.14	4.49	6.30	4.51	6.44	4.5
	31	5.52	4.36	5.70	4.40	5.85	4.42	6.01	4.44	6.18	4.46	6.32	4.4
	33	5.36	4.30	5.55	4.34	5.72	4.37	5.89	4.40	6.04	4.41	6.20	4.4
	35	5.21	4.23	5.40	4.28	5.60	4.32	5.77	4.35	5.91	4.36	6.08	4.3
	37	5.06	4.17	5.26	4.22	5.44	4.26	5.62	4.29	5.78	4.32	5.95	4.3
	39	4.92	4.10	5.11	4.16	5.29	4.19	5.48	4.24	5.66	4.27	5.83	4.2

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

**Model FDTJ71KHXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
16	27	7.33	5.31	7.55	5.34	7.75	5.35	7.94	5.36	8.13	5.36	8.31	5.3
	29	7.18	5.24	7.39	5.27	7.58	5.28	7.78	5.29	7.99	5.30	8.17	5.3
	31	7.00	5.15	7.22	5.19	7.41	5.21	7.63	5.23	7.83	5.24	8.02	5.2
	33	6.80	5.06	7.04	5.11	7.26	5.14	7.47	5.16	7.66	5.17	7.86	5.1
	35	6.60	4.97	6.85	5.03	7.10	5.07	7.31	5.10	7.49	5.11	7.70	5.1
	37	6.42	4.89	6.67	4.95	6.90	4.99	7.13	5.02	7.33	5.04	7.55	5.0
	39	6.23	4.81	6.48	4.87	6.70	4.91	6.94	4.95	7.16	4.98	7.39	5.0

**Model FDTJ90HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
21	27	9.30	6.82	9.57	6.85	9.82	6.87	10.06	6.88	10.31	6.89	10.53	6.8
	29	9.10	6.72	9.37	6.76	9.60	6.78	9.86	6.80	10.13	6.82	10.35	6.8
	31	8.87	6.62	9.15	6.67	9.40	6.69	9.67	6.72	9.93	6.74	10.16	6.7
	33	8.62	6.51	8.92	6.56	9.20	6.61	9.47	6.64	9.71	6.65	9.96	6.6
	35	8.37	6.39	8.69	6.46	9.00	6.52	9.27	6.56	9.50	6.57	9.77	6.5
	37	8.14	6.29	8.45	6.36	8.75	6.42	9.04	6.46	9.30	6.49	9.57	6.5
	39	7.90	6.19	8.22	6.26	8.50	6.31	8.80	6.37	9.10	6.42	9.37	6.4

**Model FDTJ112HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
28	27	11.57	8.71	11.91	8.76	12.22	8.79	12.52	8.81	12.82	8.82	13.10	8.8
	29	11.32	8.60	11.66	8.65	11.95	8.68	12.28	8.71	12.60	8.74	12.88	8.7
	31	11.04	8.47	11.39	8.54	11.69	8.57	12.03	8.61	12.35	8.64	12.64	8.6
	33	10.73	8.33	11.10	8.41	11.45	8.47	11.78	8.51	12.08	8.54	12.40	8.5
	35	10.42	8.20	10.81	8.29	11.20	8.37	11.54	8.42	11.82	8.44	12.15	8.4
	37	10.12	8.07	10.52	8.16	10.89	8.24	11.24	8.30	11.57	8.34	11.91	8.3
	39	9.83	7.94	10.23	8.04	10.57	8.11	10.95	8.19	11.32	8.25	11.66	8.2

**Model FDTJ140HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
30	27	14.46	10.29	14.88	10.34	15.27	10.36	15.65	10.37	16.03	10.37	16.38	10.3
	29	14.15	10.15	14.57	10.20	14.94	10.21	15.34	10.24	15.75	10.26	16.10	10.2
	31	13.80	9.98	14.24	10.04	14.62	10.07	15.04	10.11	15.44	10.13	15.81	10.1
	33	13.41	9.80	13.87	9.88	14.31	9.94	14.73	9.98	15.11	10.00	15.50	10.0
	35	13.02	9.62	13.51	9.72	14.00	9.81	14.42	9.85	14.77	9.86	15.19	9.8
	37	12.66	9.45	13.15	9.55	13.61	9.64	14.06	9.70	14.46	9.74	14.88	9.7
	39	12.29	9.28	12.78	9.40	13.22	9.47	13.69	9.55	14.15	9.62	14.57	9.6

Note (1) Symbols are as follows :

- TC** : Total cooling capacity (kW)
- SHC** : Sensible heat capacity (kW)

**(b) FDTS Series**

**Model FDTSJ22HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
11	27	2.27	2.04	2.34	2.06	2.40	2.08	2.46	2.09	2.52	2.10	2.57	2.11
	29	2.22	2.02	2.29	2.04	2.35	2.06	2.41	2.07	2.48	2.08	2.53	2.09
	31	2.17	2.00	2.24	2.02	2.30	2.04	2.36	2.05	2.43	2.07	2.48	2.08
	33	2.11	1.98	2.18	2.00	2.25	2.02	2.31	2.03	2.37	2.05	2.44	2.06
	35	2.05	1.95	2.12	1.98	2.20	2.00	2.27	2.02	2.32	2.03	2.39	2.04
	37	1.99	1.93	2.07	1.95	2.14	1.98	2.21	2.00	2.27	2.01	2.34	2.03
	39	1.93	1.91	2.01	1.93	2.08	1.95	2.15	1.98	2.22	2.00	2.29	2.01

**Model FDTSJ28HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	2.90	2.58	2.98	2.60	3.06	2.62	3.12	2.63	3.21	2.64	3.29	2.66
	29	2.83	2.55	2.92	2.57	3.00	2.59	3.07	2.61	3.14	2.62	3.23	2.64
	31	2.77	2.52	2.85	2.55	2.93	2.57	3.02	2.59	3.09	2.60	3.16	2.61
	33	2.69	2.49	2.78	2.52	2.87	2.54	2.95	2.56	3.04	2.58	3.10	2.59
	35	2.60	2.46	2.72	2.49	2.80	2.52	2.88	2.54	2.97	2.56	3.05	2.58
	37	2.54	2.43	2.63	2.46	2.73	2.49	2.82	2.52	2.90	2.54	2.98	2.55
	39	2.45	2.40	2.55	2.43	2.65	2.46	2.75	2.49	2.83	2.51	2.92	2.53

**Model FDTSJ36HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	3.73	3.20	3.84	3.22	3.94	3.24	4.02	3.25	4.13	3.27	4.23	3.28
	29	3.64	3.16	3.75	3.19	3.86	3.21	3.95	3.23	4.04	3.24	4.15	3.26
	31	3.56	3.13	3.66	3.15	3.77	3.18	3.88	3.20	3.97	3.21	4.06	3.23
	33	3.46	3.09	3.58	3.12	3.69	3.15	3.79	3.17	3.90	3.19	3.98	3.20
	35	3.35	3.04	3.49	3.08	3.60	3.11	3.71	3.14	3.82	3.16	3.92	3.18
	37	3.26	3.01	3.38	3.04	3.51	3.08	3.62	3.11	3.73	3.13	3.84	3.15
	39	3.15	2.96	3.28	3.00	3.41	3.04	3.54	3.07	3.64	3.10	3.75	3.12

**Model FDTSJ45HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	4.66	3.86	4.80	3.89	4.92	3.91	5.02	3.92	5.16	3.94	5.28	3.95
	29	4.55	3.82	4.69	3.85	4.82	3.87	4.94	3.89	5.05	3.90	5.18	3.92
	31	4.45	3.77	4.58	3.80	4.72	3.83	4.85	3.85	4.96	3.87	5.08	3.88
	33	4.33	3.72	4.47	3.76	4.61	3.79	4.74	3.81	4.88	3.84	4.98	3.85
	35	4.19	3.66	4.37	3.71	4.50	3.75	4.64	3.77	4.77	3.80	4.91	3.82
	37	4.08	3.62	4.22	3.66	4.39	3.70	4.53	3.73	4.66	3.76	4.80	3.78
	39	3.94	3.56	4.10	3.61	4.26	3.65	4.42	3.69	4.55	3.72	4.69	3.75

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

**Model FDT SJ71HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
18	27	7.36	5.56	7.57	5.59	7.77	5.61	7.92	5.61	8.14	5.63	8.34	5.64
	29	7.19	5.49	7.40	5.52	7.61	5.55	7.80	5.56	7.97	5.57	8.18	5.58
	31	7.01	5.41	7.23	5.45	7.44	5.48	7.65	5.50	7.82	5.51	8.01	5.52
	33	6.83	5.33	7.06	5.37	7.27	5.41	7.48	5.44	7.70	5.46	7.85	5.46
	35	6.60	5.23	6.89	5.30	7.10	5.34	7.31	5.37	7.53	5.40	7.74	5.42
	37	6.43	5.15	6.66	5.21	6.93	5.27	7.14	5.30	7.36	5.33	7.57	5.36
	39	6.22	5.06	6.48	5.13	6.72	5.18	6.97	5.24	7.19	5.27	7.40	5.30

**(c) FDR Series**

**Model FDRJ22HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
10	27	2.28	2.05	2.35	2.06	2.41	2.08	2.46	2.09	2.52	2.10	2.58	2.11
	29	2.23	2.02	2.29	2.04	2.36	2.06	2.42	2.07	2.47	2.08	2.53	2.09
	31	2.17	2.00	2.24	2.02	2.31	2.04	2.37	2.06	2.42	2.06	2.48	2.08
	33	2.12	1.98	2.19	2.00	2.25	2.02	2.32	2.04	2.38	2.05	2.43	2.06
	35	2.05	1.95	2.13	1.98	2.20	2.00	2.27	2.02	2.33	2.03	2.40	2.05
	37	1.99	1.93	2.06	1.95	2.15	1.98	2.21	2.00	2.28	2.01	2.35	2.03
	39	1.93	1.90	2.01	1.93	2.08	1.96	2.16	1.98	2.23	2.00	2.29	2.01

**Model FDRJ28HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	2.90	2.58	2.98	2.60	3.06	2.62	3.12	2.63	3.21	2.64	3.29	2.66
	29	2.83	2.55	2.92	2.57	3.00	2.59	3.07	2.61	3.14	2.62	3.23	2.64
	31	2.77	2.52	2.85	2.55	2.93	2.57	3.02	2.59	3.09	2.60	3.16	2.61
	33	2.69	2.49	2.78	2.52	2.87	2.54	2.95	2.56	3.04	2.58	3.10	2.59
	35	2.60	2.46	2.72	2.49	2.80	2.52	2.88	2.54	2.97	2.56	3.05	2.58
	37	2.54	2.43	2.63	2.46	2.73	2.49	2.82	2.52	2.90	2.54	2.98	2.55
	39	2.45	2.40	2.55	2.43	2.65	2.46	2.75	2.49	2.83	2.51	2.92	2.53

**Model FDRJ45HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	4.66	3.86	4.80	3.89	4.92	3.91	5.02	3.92	5.16	3.94	5.28	3.95
	29	4.55	3.82	4.69	3.85	4.82	3.87	4.94	3.89	5.05	3.90	5.18	3.92
	31	4.45	3.77	4.58	3.80	4.72	3.83	4.85	3.85	4.96	3.87	5.08	3.88
	33	4.33	3.72	4.47	3.76	4.61	3.79	4.74	3.81	4.88	3.84	4.98	3.85
	35	4.19	3.66	4.37	3.71	4.50	3.75	4.64	3.77	4.77	3.80	4.91	3.82
	37	4.08	3.62	4.22	3.66	4.39	3.70	4.53	3.73	4.66	3.76	4.80	3.78
	39	3.94	3.56	4.10	3.61	4.26	3.65	4.42	3.69	4.55	3.72	4.69	3.75

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

**Model FDRJ56HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	5.80	4.36	5.97	4.39	6.13	4.40	6.25	4.40	6.42	4.41	6.57	4.42
	29	5.67	4.30	5.84	4.33	6.00	4.35	6.15	4.36	6.28	4.36	6.45	4.37
	31	5.53	4.24	5.70	4.27	5.87	4.29	6.04	4.32	6.17	4.32	6.32	4.32
	33	5.39	4.18	5.57	4.21	5.73	4.24	5.90	4.26	6.07	4.28	6.19	4.28
	35	5.21	4.10	5.43	4.16	5.60	4.18	5.77	4.21	5.94	4.23	6.10	4.25
	37	5.07	4.04	5.25	4.08	5.47	4.13	5.63	4.16	5.80	4.18	5.97	4.20
	39	4.91	3.97	5.11	4.02	5.30	4.06	5.50	4.10	5.67	4.13	5.84	4.15

**Model FDRJ71HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
18	27	7.36	5.56	7.57	5.59	7.77	5.61	7.92	5.61	8.14	5.63	8.34	5.64
	29	7.19	5.49	7.40	5.52	7.61	5.55	7.80	5.56	7.97	5.57	8.18	5.58
	31	7.01	5.41	7.23	5.45	7.44	5.48	7.65	5.50	7.82	5.51	8.01	5.52
	33	6.83	5.33	7.06	5.37	7.27	5.41	7.48	5.44	7.70	5.46	7.85	5.46
	35	6.60	5.23	6.89	5.30	7.10	5.34	7.31	5.37	7.53	5.40	7.74	5.42
	37	6.43	5.15	6.66	5.21	6.93	5.27	7.14	5.30	7.36	5.33	7.57	5.36
	39	6.22	5.06	6.48	5.13	6.72	5.18	6.97	5.24	7.19	5.27	7.40	5.30

**Model FDRJ90HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
20	27	9.32	6.71	9.59	6.74	9.85	6.76	10.04	6.75	10.31	6.76	10.57	6.76
	29	9.11	6.61	9.38	6.64	9.65	6.67	9.88	6.68	10.10	6.67	10.37	6.69
	31	8.89	6.51	9.16	6.55	9.43	6.58	9.70	6.60	9.92	6.60	10.15	6.60
	33	8.66	6.40	8.95	6.45	9.22	6.49	9.49	6.52	9.76	6.54	9.95	6.53
	35	8.37	6.27	8.73	6.36	9.00	6.39	9.27	6.43	9.54	6.45	9.81	6.47
	37	8.15	6.17	8.44	6.23	8.78	6.30	9.05	6.34	9.32	6.37	9.59	6.39
	39	7.88	6.05	8.21	6.13	8.51	6.19	8.84	6.25	9.11	6.28	9.38	6.31

**Model FDRJ112HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
28	27	11.60	8.72	11.94	8.77	12.25	8.80	12.50	8.80	12.84	8.83	13.15	8.84
	29	11.33	8.60	11.67	8.66	12.01	8.70	12.30	8.72	12.57	8.72	12.90	8.75
	31	11.07	8.48	11.40	8.54	11.74	8.59	12.07	8.63	12.34	8.64	12.63	8.65
	33	10.77	8.35	11.13	8.42	11.47	8.48	11.80	8.52	12.14	8.56	12.39	8.56
	35	10.42	8.20	10.86	8.31	11.20	8.37	11.54	8.42	11.87	8.46	12.21	8.49
	37	10.15	8.08	10.51	8.16	10.93	8.26	11.27	8.31	11.60	8.36	11.94	8.39
	39	9.81	7.93	10.21	8.04	10.60	8.12	11.00	8.20	11.33	8.26	11.67	8.30

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

**Model FDRJ140HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
34	27	14.50	10.78	14.92	10.84	15.32	10.88	15.62	10.87	16.04	10.90	16.44	10.91
	29	14.17	10.63	14.59	10.69	15.01	10.75	15.37	10.77	15.71	10.77	16.13	10.80
	31	13.83	10.48	14.25	10.55	14.67	10.60	15.09	10.65	15.43	10.66	15.79	10.67
	33	13.47	10.31	13.92	10.40	14.34	10.46	14.76	10.52	15.18	10.56	15.48	10.56
	35	13.02	10.12	13.58	10.26	14.00	10.32	14.42	10.38	14.84	10.43	15.26	10.47
	37	12.68	9.97	13.13	10.07	13.66	10.19	14.08	10.25	14.50	10.30	14.92	10.35
	39	12.26	9.78	12.77	9.91	13.24	10.01	13.75	10.12	14.17	10.18	14.59	10.23

**(d) FDUM Series**

**Model FDUMJ36HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	3.73	3.20	3.84	3.22	3.94	3.24	4.02	3.25	4.13	3.27	4.23	3.28
	29	3.64	3.16	3.75	3.19	3.86	3.21	3.95	3.23	4.04	3.24	4.15	3.26
	31	3.56	3.13	3.66	3.15	3.77	3.18	3.88	3.20	3.97	3.21	4.06	3.23
	33	3.46	3.09	3.58	3.12	3.69	3.15	3.79	3.17	3.90	3.19	3.98	3.20
	35	3.35	3.04	3.49	3.08	3.60	3.11	3.71	3.14	3.82	3.16	3.92	3.18
	37	3.26	3.01	3.38	3.04	3.51	3.08	3.62	3.11	3.73	3.13	3.84	3.15
	39	3.15	2.96	3.28	3.00	3.41	3.04	3.54	3.07	3.64	3.10	3.75	3.12

**Model FDUMJ45HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	4.66	3.86	4.80	3.89	4.92	3.91	5.02	3.92	5.16	3.94	5.28	3.95
	29	4.55	3.82	4.69	3.85	4.82	3.87	4.94	3.89	5.05	3.90	5.18	3.92
	31	4.45	3.77	4.58	3.80	4.72	3.83	4.85	3.85	4.96	3.87	5.08	3.88
	33	4.33	3.72	4.47	3.76	4.61	3.79	4.74	3.81	4.88	3.84	4.98	3.85
	35	4.19	3.66	4.37	3.71	4.50	3.75	4.64	3.77	4.77	3.80	4.91	3.82
	37	4.08	3.62	4.22	3.66	4.39	3.70	4.53	3.73	4.66	3.76	4.80	3.78
	39	3.94	3.56	4.10	3.61	4.26	3.65	4.42	3.69	4.55	3.72	4.69	3.75

**Model FDUMJ56HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	5.80	4.36	5.97	4.39	6.13	4.40	6.25	4.40	6.42	4.41	6.57	4.42
	29	5.67	4.30	5.84	4.33	6.00	4.35	6.15	4.36	6.28	4.36	6.45	4.37
	31	5.53	4.24	5.70	4.27	5.87	4.29	6.04	4.32	6.17	4.32	6.32	4.32
	33	5.39	4.18	5.57	4.21	5.73	4.24	5.90	4.26	6.07	4.28	6.19	4.28
	35	5.21	4.10	5.43	4.16	5.60	4.18	5.77	4.21	5.94	4.23	6.10	4.25
	37	5.07	4.04	5.25	4.08	5.47	4.13	5.63	4.16	5.80	4.18	5.97	4.20
	39	4.91	3.97	5.11	4.02	5.30	4.06	5.50	4.10	5.67	4.13	5.84	4.15

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

**Model FDUMJ71HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
18	27	7.36	5.56	7.57	5.59	7.77	5.61	7.92	5.61	8.14	5.63	8.34	5.64
	29	7.19	5.49	7.40	5.52	7.61	5.55	7.80	5.56	7.97	5.57	8.18	5.58
	31	7.01	5.41	7.23	5.45	7.44	5.48	7.65	5.50	7.82	5.51	8.01	5.52
	33	6.83	5.33	7.06	5.37	7.27	5.41	7.48	5.44	7.70	5.46	7.85	5.46
	35	6.60	5.23	6.89	5.30	7.10	5.34	7.31	5.37	7.53	5.40	7.74	5.42
	37	6.43	5.15	6.66	5.21	6.93	5.27	7.14	5.30	7.36	5.33	7.57	5.36
	39	6.22	5.06	6.48	5.13	6.72	5.18	6.97	5.24	7.19	5.27	7.40	5.30

**Model FDUMJ90HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
20	27	9.32	6.71	9.59	6.74	9.85	6.76	10.04	6.75	10.31	6.76	10.57	6.76
	29	9.11	6.61	9.38	6.64	9.65	6.67	9.88	6.68	10.10	6.67	10.37	6.69
	31	8.89	6.51	9.16	6.55	9.43	6.58	9.70	6.60	9.92	6.60	10.15	6.60
	33	8.66	6.40	8.95	6.45	9.22	6.49	9.49	6.52	9.76	6.54	9.95	6.53
	35	8.37	6.27	8.73	6.36	9.00	6.39	9.27	6.43	9.54	6.45	9.81	6.47
	37	8.15	6.17	8.44	6.23	8.78	6.30	9.05	6.34	9.32	6.37	9.59	6.39
	39	7.88	6.05	8.21	6.13	8.51	6.19	8.84	6.25	9.11	6.28	9.38	6.31

**Model FDUMJ112HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
28	27	11.60	8.72	11.94	8.77	12.25	8.80	12.50	8.80	12.84	8.83	13.15	8.84
	29	11.33	8.60	11.67	8.66	12.01	8.70	12.30	8.72	12.57	8.72	12.90	8.75
	31	11.07	8.48	11.40	8.54	11.74	8.59	12.07	8.63	12.34	8.64	12.63	8.65
	33	10.77	8.35	11.13	8.42	11.47	8.48	11.80	8.52	12.14	8.56	12.39	8.56
	35	10.42	8.20	10.86	8.31	11.20	8.37	11.54	8.42	11.87	8.46	12.21	8.49
	37	10.15	8.08	10.51	8.16	10.93	8.26	11.27	8.31	11.60	8.36	11.94	8.39
	39	9.81	7.93	10.21	8.04	10.60	8.12	11.00	8.20	11.33	8.26	11.67	8.30

**Model FDUMJ140HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
34	27	14.50	10.78	14.92	10.84	15.32	10.88	15.62	10.87	16.04	10.90	16.44	10.91
	29	14.17	10.63	14.59	10.69	15.01	10.75	15.37	10.77	15.71	10.77	16.13	10.80
	31	13.83	10.48	14.25	10.55	14.67	10.60	15.09	10.65	15.43	10.66	15.79	10.67
	33	13.47	10.31	13.92	10.40	14.34	10.46	14.76	10.52	15.18	10.56	15.48	10.56
	35	13.02	10.12	13.58	10.26	14.00	10.32	14.42	10.38	14.84	10.43	15.26	10.47
	37	12.68	9.97	13.13	10.07	13.66	10.19	14.08	10.25	14.50	10.30	14.92	10.35
	39	12.26	9.78	12.77	9.91	13.24	10.01	13.75	10.12	14.17	10.18	14.59	10.23

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)



**(e) FDE Series**

**Model FDEJ36HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	3.73	3.34	3.84	3.36	3.94	3.39	4.02	3.40	4.13	3.42	4.23	3.44
	29	3.64	3.30	3.75	3.33	3.86	3.36	3.95	3.38	4.04	3.39	4.15	3.41
	31	3.56	3.26	3.66	3.30	3.77	3.32	3.88	3.35	3.97	3.37	4.06	3.38
	33	3.46	3.23	3.58	3.26	3.69	3.29	3.79	3.32	3.90	3.34	3.98	3.35
	35	3.35	3.18	3.49	3.23	3.60	3.26	3.71	3.29	3.82	3.31	3.92	3.34
	37	3.26	3.15	3.38	3.18	3.51	3.23	3.62	3.26	3.73	3.28	3.84	3.31
	39	3.15	3.10	3.28	3.15	3.41	3.19	3.54	3.23	3.64	3.25	3.75	3.28

**Model FDEJ45HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	4.66	3.86	4.80	3.89	4.92	3.91	5.02	3.92	5.16	3.94	5.28	3.95
	29	4.55	3.82	4.69	3.85	4.82	3.87	4.94	3.89	5.05	3.90	5.18	3.92
	31	4.45	3.77	4.58	3.80	4.72	3.83	4.85	3.85	4.96	3.87	5.08	3.88
	33	4.33	3.72	4.47	3.76	4.61	3.79	4.74	3.81	4.88	3.84	4.98	3.85
	35	4.19	3.66	4.37	3.71	4.50	3.75	4.64	3.77	4.77	3.80	4.91	3.82
	37	4.08	3.62	4.22	3.66	4.39	3.70	4.53	3.73	4.66	3.76	4.80	3.78
	39	3.94	3.56	4.10	3.61	4.26	3.65	4.42	3.69	4.55	3.72	4.69	3.75

**Model FDEJ56HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	5.80	4.36	5.97	4.39	6.13	4.40	6.25	4.40	6.42	4.41	6.57	4.42
	29	5.67	4.30	5.84	4.33	6.00	4.35	6.15	4.36	6.28	4.36	6.45	4.37
	31	5.53	4.24	5.70	4.27	5.87	4.29	6.04	4.32	6.17	4.32	6.32	4.32
	33	5.39	4.18	5.57	4.21	5.73	4.24	5.90	4.26	6.07	4.28	6.19	4.28
	35	5.21	4.10	5.43	4.16	5.60	4.18	5.77	4.21	5.94	4.23	6.10	4.25
	37	5.07	4.04	5.25	4.08	5.47	4.13	5.63	4.16	5.80	4.18	5.97	4.20
	39	4.91	3.97	5.11	4.02	5.30	4.06	5.50	4.10	5.67	4.13	5.84	4.15

**Model FDEJ71HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
18	27	7.36	5.56	7.57	5.59	7.77	5.61	7.92	5.61	8.14	5.63	8.34	5.64
	29	7.19	5.49	7.40	5.52	7.61	5.55	7.80	5.56	7.97	5.57	8.18	5.58
	31	7.01	5.41	7.23	5.45	7.44	5.48	7.65	5.50	7.82	5.51	8.01	5.52
	33	6.83	5.33	7.06	5.37	7.27	5.41	7.48	5.44	7.70	5.46	7.85	5.46
	35	6.60	5.23	6.89	5.30	7.10	5.34	7.31	5.37	7.53	5.40	7.74	5.42
	37	6.43	5.15	6.66	5.21	6.93	5.27	7.14	5.30	7.36	5.33	7.57	5.36
	39	6.22	5.06	6.48	5.13	6.72	5.18	6.97	5.24	7.19	5.27	7.40	5.30

Note (1) Symbols are as follows :

- TC** : Total cooling capacity (kW)
- SHC** : Sensible heat capacity (kW)

**Model FDEJ112HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
28	27	11.60	8.72	11.94	8.77	12.25	8.80	12.50	8.80	12.84	8.83	13.15	8.84
	29	11.33	8.60	11.67	8.66	12.01	8.70	12.30	8.72	12.57	8.72	12.90	8.75
	31	11.07	8.48	11.40	8.54	11.74	8.59	12.07	8.63	12.34	8.64	12.63	8.65
	33	10.77	8.35	11.13	8.42	11.47	8.48	11.80	8.52	12.14	8.56	12.39	8.56
	35	10.42	8.20	10.86	8.31	11.20	8.37	11.54	8.42	11.87	8.46	12.21	8.49
	37	10.15	8.08	10.51	8.16	10.93	8.26	11.27	8.31	11.60	8.36	11.94	8.39
	39	9.81	7.93	10.21	8.04	10.60	8.12	11.00	8.20	11.33	8.26	11.67	8.30

**Model FDEJ140HKXE2B**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
34	27	14.50	10.78	14.92	10.84	15.32	10.88	15.62	10.87	16.04	10.90	16.44	10.91
	29	14.17	10.63	14.59	10.69	15.01	10.75	15.37	10.77	15.71	10.77	16.13	10.80
	31	13.83	10.48	14.25	10.55	14.67	10.60	15.09	10.65	15.43	10.66	15.79	10.67
	33	13.47	10.31	13.92	10.40	14.34	10.46	14.76	10.52	15.18	10.56	15.48	10.56
	35	13.02	10.12	13.58	10.26	14.00	10.32	14.42	10.38	14.84	10.43	15.26	10.47
	37	12.68	9.97	13.13	10.07	13.66	10.19	14.08	10.25	14.50	10.30	14.92	10.35
	39	12.26	9.78	12.77	9.91	13.24	10.01	13.75	10.12	14.17	10.18	14.59	10.23

**(f) FDK Series**

**Model FDKJ22HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
9	27	2.27	2.04	2.34	2.06	2.40	2.08	2.46	2.09	2.52	2.10	2.57	2.11
	29	2.22	2.02	2.29	2.04	2.35	2.06	2.41	2.07	2.48	2.08	2.53	2.09
	31	2.17	2.00	2.24	2.02	2.30	2.04	2.36	2.05	2.43	2.07	2.48	2.08
	33	2.11	1.98	2.18	2.00	2.25	2.02	2.31	2.03	2.37	2.05	2.44	2.06
	35	2.05	1.95	2.12	1.98	2.20	2.00	2.27	2.02	2.32	2.03	2.39	2.04
	37	1.99	1.93	2.07	1.95	2.14	1.98	2.21	2.00	2.27	2.01	2.34	2.03
	39	1.93	1.91	2.01	1.93	2.08	1.95	2.15	1.98	2.22	2.00	2.29	2.01

**Model FDKJ28HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
10	27	2.90	2.58	2.98	2.60	3.06	2.62	3.12	2.63	3.21	2.64	3.29	2.66
	29	2.83	2.55	2.92	2.57	3.00	2.59	3.07	2.61	3.14	2.62	3.23	2.64
	31	2.77	2.52	2.85	2.55	2.93	2.57	3.02	2.59	3.09	2.60	3.16	2.61
	33	2.69	2.49	2.78	2.52	2.87	2.54	2.95	2.56	3.04	2.58	3.10	2.59
	35	2.60	2.46	2.72	2.49	2.80	2.52	2.88	2.54	2.97	2.56	3.05	2.58
	37	2.54	2.43	2.63	2.46	2.73	2.49	2.82	2.52	2.90	2.54	2.98	2.55
	39	2.45	2.40	2.55	2.43	2.65	2.46	2.75	2.49	2.83	2.51	2.92	2.53

Note (1) Symbols are as follows :

- TC** : Total cooling capacity (kW)
- SHC** : Sensible heat capacity (kW)

**Model FDKJ36HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
10	27	3.73	2.93	3.84	2.95	3.94	2.96	4.02	2.97	4.13	2.98	4.23	2.98
	29	3.64	2.89	3.75	2.91	3.86	2.93	3.95	2.94	4.04	2.95	4.15	2.96
	31	3.56	2.86	3.66	2.88	3.77	2.90	3.88	2.91	3.97	2.92	4.06	2.93
	33	3.46	2.82	3.58	2.84	3.69	2.86	3.79	2.88	3.90	2.89	3.98	2.90
	35	3.35	2.77	3.49	2.81	3.60	2.83	3.71	2.85	3.82	2.86	3.92	2.88
	37	3.26	2.73	3.38	2.76	3.51	2.79	3.62	2.81	3.73	2.83	3.84	2.85
	39	3.15	2.68	3.28	2.72	3.41	2.75	3.54	2.78	3.64	2.80	3.75	2.82

**Model FDKJ45HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
11.5	27	4.66	3.54	4.80	3.56	4.92	3.57	5.02	3.57	5.16	3.58	5.28	3.59
	29	4.55	3.49	4.69	3.51	4.82	3.53	4.94	3.54	5.05	3.54	5.18	3.55
	31	4.45	3.44	4.58	3.46	4.72	3.48	4.85	3.50	4.96	3.51	5.08	3.51
	33	4.33	3.39	4.47	3.42	4.61	3.44	4.74	3.46	4.88	3.47	4.98	3.47
	35	4.19	3.33	4.37	3.37	4.50	3.40	4.64	3.42	4.77	3.43	4.91	3.45
	37	4.08	3.28	4.22	3.31	4.39	3.35	4.53	3.37	4.66	3.39	4.80	3.41
	39	3.94	3.22	4.10	3.26	4.26	3.30	4.42	3.33	4.55	3.35	4.69	3.37

**Model FDKJ56HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
17	27	5.80	4.75	5.97	4.78	6.13	4.81	6.25	4.82	6.42	4.84	6.57	4.86
	29	5.67	4.69	5.84	4.73	6.00	4.76	6.15	4.78	6.28	4.79	6.45	4.81
	31	5.53	4.64	5.70	4.67	5.87	4.71	6.04	4.74	6.17	4.75	6.32	4.77
	33	5.39	4.57	5.57	4.62	5.73	4.65	5.90	4.69	6.07	4.71	6.19	4.72
	35	5.21	4.50	5.43	4.56	5.60	4.60	5.77	4.64	5.94	4.66	6.10	4.69
	37	5.07	4.44	5.25	4.49	5.47	4.55	5.63	4.59	5.80	4.62	5.97	4.65
	39	4.91	4.37	5.11	4.43	5.30	4.48	5.50	4.54	5.67	4.57	5.84	4.60

**Model FDKJ71HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
21	27	7.36	5.95	7.57	5.99	7.77	6.02	7.92	6.03	8.14	6.06	8.34	6.07
	29	7.19	5.87	7.40	5.92	7.61	5.96	7.80	5.98	7.97	5.99	8.18	6.02
	31	7.01	5.80	7.23	5.85	7.44	5.89	7.65	5.93	7.82	5.94	8.01	5.96
	33	6.83	5.72	7.06	5.78	7.27	5.82	7.48	5.86	7.70	5.89	7.85	5.90
	35	6.60	5.63	6.89	5.71	7.10	5.75	7.31	5.80	7.53	5.83	7.74	5.86
	37	6.43	5.56	6.66	5.62	6.93	5.69	7.14	5.73	7.36	5.77	7.57	5.81
	39	6.22	5.47	6.48	5.54	6.72	5.61	6.97	5.67	7.19	5.71	7.40	5.75

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

**(g) FDFL, FDFU Series**

**Models FDFLJ28HKXE2, FDFUJ28HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
12	27	2.90	2.58	2.98	2.60	3.06	2.62	3.12	2.63	3.21	2.64	3.29	2.66
	29	2.83	2.55	2.92	2.57	3.00	2.59	3.07	2.61	3.14	2.62	3.23	2.64
	31	2.77	2.52	2.85	2.55	2.93	2.57	3.02	2.59	3.09	2.60	3.16	2.61
	33	2.69	2.49	2.78	2.52	2.87	2.54	2.95	2.56	3.04	2.58	3.10	2.59
	35	2.60	2.46	2.72	2.49	2.80	2.52	2.88	2.54	2.97	2.56	3.05	2.58
	37	2.54	2.43	2.63	2.46	2.73	2.49	2.82	2.52	2.90	2.54	2.98	2.55
	39	2.45	2.40	2.55	2.43	2.65	2.46	2.75	2.49	2.83	2.51	2.92	2.53

**Models FDFLJ45HKXE2, FDFUJ45HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
14	27	4.66	3.86	4.80	3.89	4.92	3.91	5.02	3.92	5.16	3.94	5.28	3.95
	29	4.55	3.82	4.69	3.85	4.82	3.87	4.94	3.89	5.05	3.90	5.18	3.92
	31	4.45	3.77	4.58	3.80	4.72	3.83	4.85	3.85	4.96	3.87	5.08	3.88
	33	4.33	3.72	4.47	3.76	4.61	3.79	4.74	3.81	4.88	3.84	4.98	3.85
	35	4.19	3.66	4.37	3.71	4.50	3.75	4.64	3.77	4.77	3.80	4.91	3.82
	37	4.08	3.62	4.22	3.66	4.39	3.70	4.53	3.73	4.66	3.76	4.80	3.78
	39	3.94	3.56	4.10	3.61	4.26	3.65	4.42	3.69	4.55	3.72	4.69	3.75

**Models FDFLJ71HKXE2, FDFUJ71HKXE2**

Air flow (m <sup>3</sup> /min)	Outdoor air temp. (°CDB)	Indoor air temperature											
		17.0°CWB		18.0°CWB		19.0°CWB		20.0°CWB		21.0°CWB		22.0°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
18	27	7.36	5.56	7.57	5.59	7.77	5.61	7.92	5.61	8.14	5.63	8.34	5.64
	29	7.19	5.49	7.40	5.52	7.61	5.55	7.80	5.56	7.97	5.57	8.18	5.58
	31	7.01	5.41	7.23	5.45	7.44	5.48	7.65	5.50	7.82	5.51	8.01	5.52
	33	6.83	5.33	7.06	5.37	7.27	5.41	7.48	5.44	7.70	5.46	7.85	5.46
	35	6.60	5.23	6.89	5.30	7.10	5.34	7.31	5.37	7.53	5.40	7.74	5.42
	37	6.43	5.15	6.66	5.21	6.93	5.27	7.14	5.30	7.36	5.33	7.57	5.36
	39	6.22	5.06	6.48	5.13	6.72	5.18	6.97	5.24	7.19	5.27	7.40	5.30

Note (1) Symbols are as follows :

**TC** : Total cooling capacity (kW)

**SHC** : Sensible heat capacity (kW)

## 19.2.7 Characteristics of fan

### (1) Cassetteria type (FDR)

- External static pressure table Unit : Pa (mmAq)

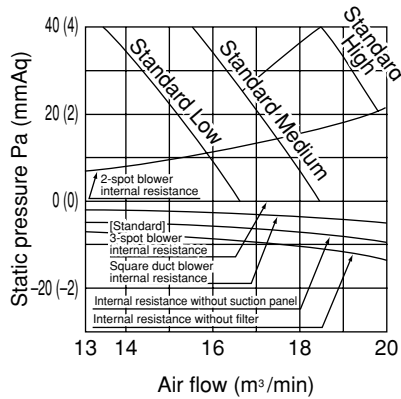
Type	Duct specs.		1 spot <sup>(1)</sup> closing		Standard <sup>(2)</sup>		Square duct <sup>(3)</sup>	
	Air flow (m <sup>3</sup> /min)		Standard	High <sup>(4)</sup> speed	Standard	High <sup>(4)</sup> speed	Standard	High <sup>(4)</sup> speed
FDR22 type	10	-	-	-	45 (4.5)	85 (8.5)	50 (5)	90 (9)
FDR28 type	12	-	-	-	45 (4.5)	85 (8.5)	45 (4.5)	85 (8.5)
FDR45 56 type	14	-	-	-	50 (5)	85 (8.5)	50 (5)	90 (9)
FDR71 type	18	30 (3)	65 (6.5)	45 (4.5)	80 (8)	50 (5)	85 (8.5)	
FDR90 type	20	25 (2.5)	60 (6)	45 (4.5)	80 (8)	50 (5)	85 (8.5)	
FDR112 type	28	40 (4)	70 (7)	50 (5)	80 (8)	55 (5.5)	85 (8.5)	
FDR140 type	34	40 (4)	70 (7)	50 (5)	80 (8)	55 (5.5)	85 (8.5)	

Notes (1) 1 spot closing: Round duct flange at center is removed and shield with a special panel (option).

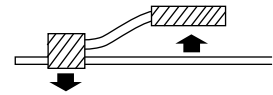
- (2) Standard: Ø200 duct are installed at all blowout holes.
- (3) Square duct: All round ducts are removed and replaced with special square duct flanges (option).
- (4) When operating at a high speed, invert the connection of white and red connectors on the flank of control box.

### How to interpret the blower characteristics table

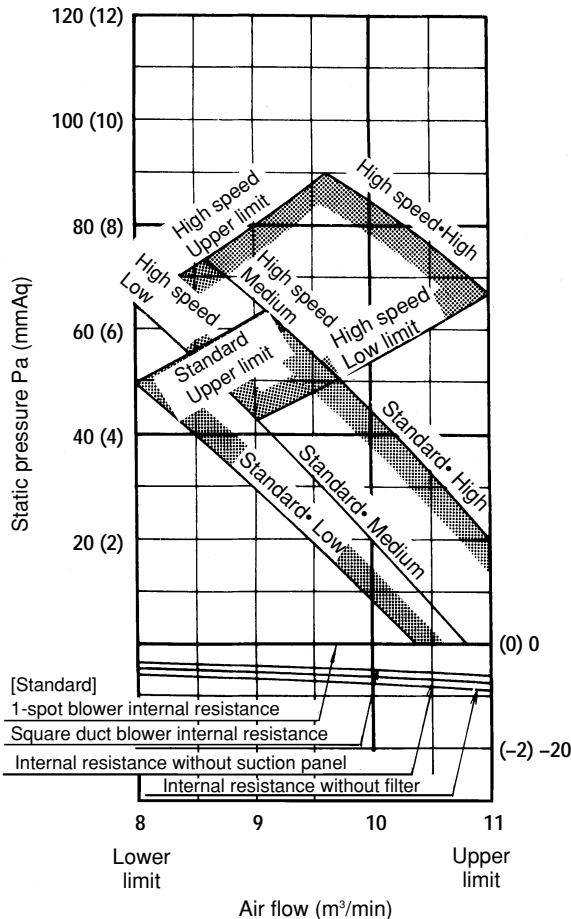
Example : Case of FDRJ71HKXE2



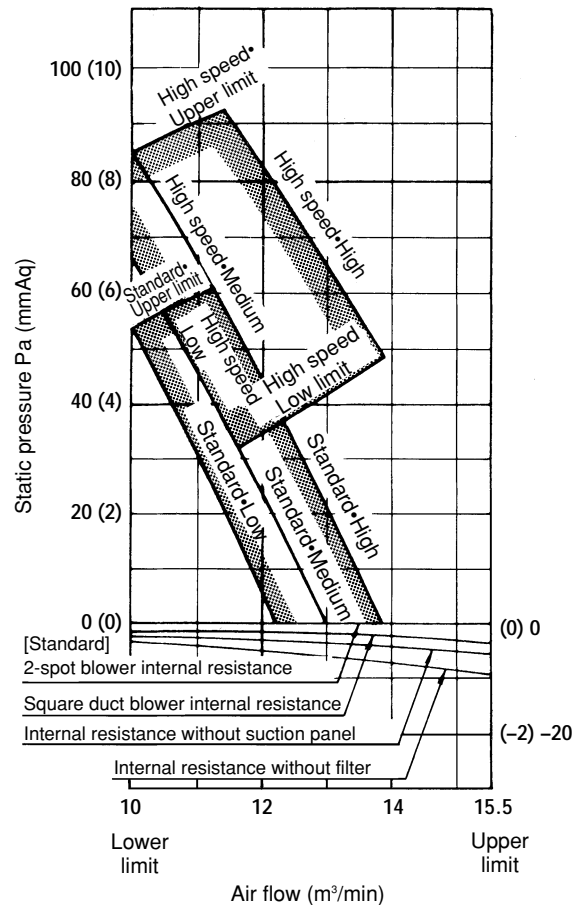
- ① 2-spot blowout..... Internal resistance increases more than the standard 3-spot blowout. Approx. 1.4mmAq at 17m<sup>3</sup>/min
- ② Square duct blowout..... Internal resistance decreases more than the standard round duct (ø200 3-spot). 3 Pa (0.3mmAq) at 17 m<sup>3</sup>/min. (External static pressure increases in reverse.)
- ③ Suction panel..... When the suction panel is not used with the ceiling return type, the part of internal resistance related to the panel decrease. 3 Pa (0.3mmAq) ( = 0.6-0.3 ) at 17mm<sup>3</sup>/min.



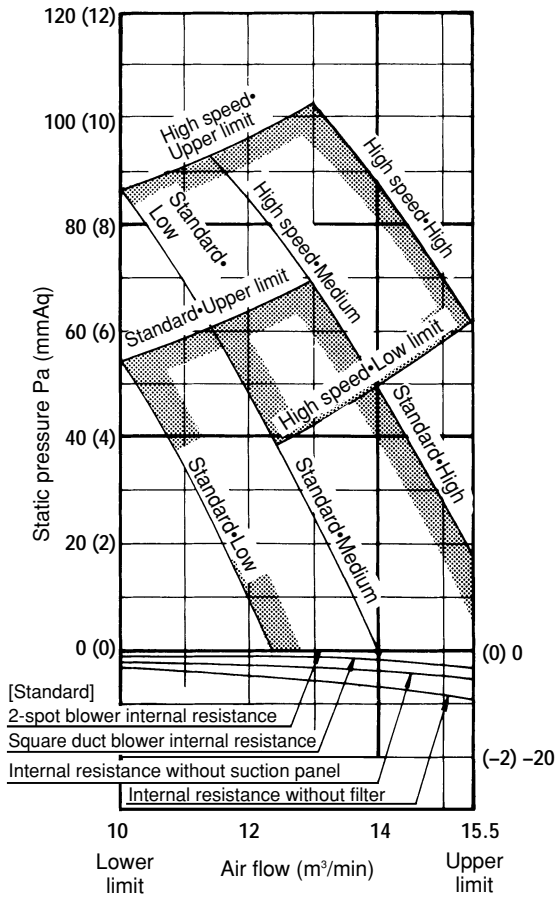
### Model FDRJ22HKXE2



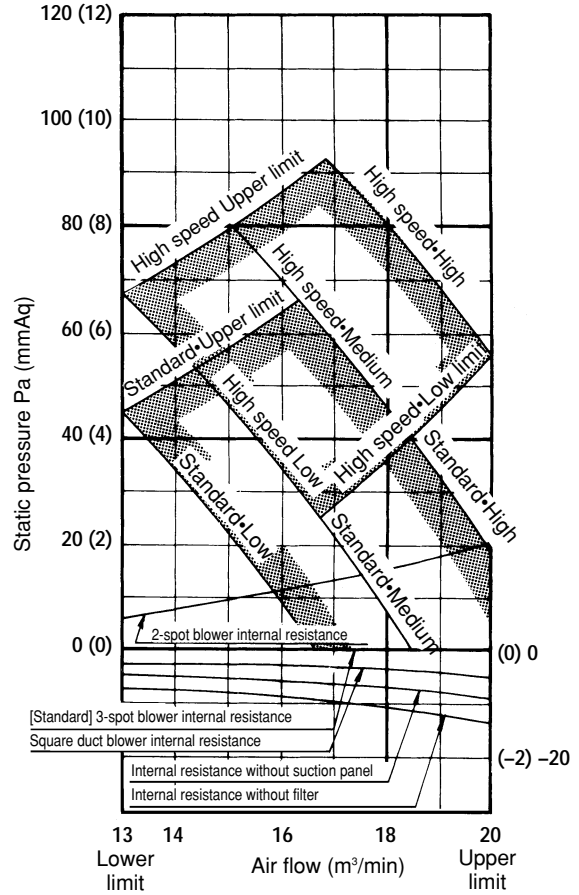
### Model FDRJ28HKXE2



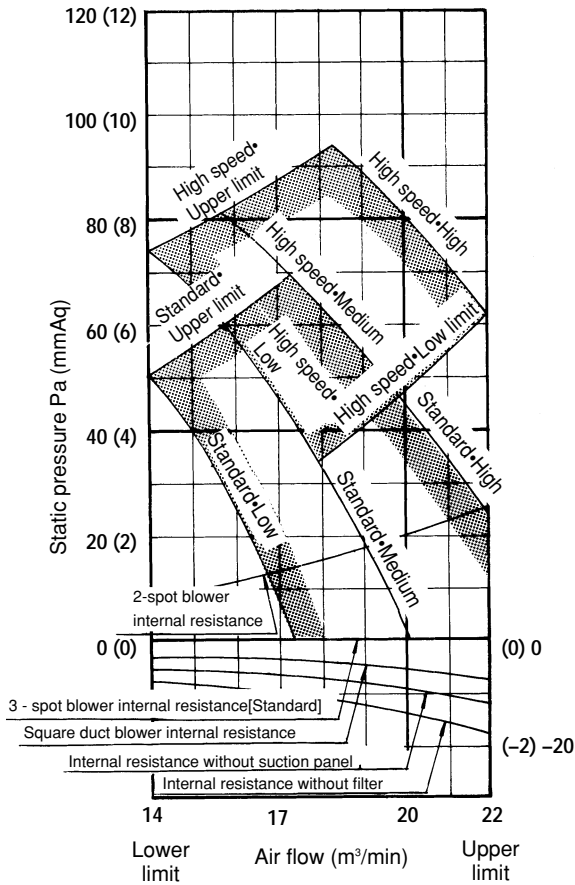
**Models FDRJ45HKXE2, 56HKXE2**



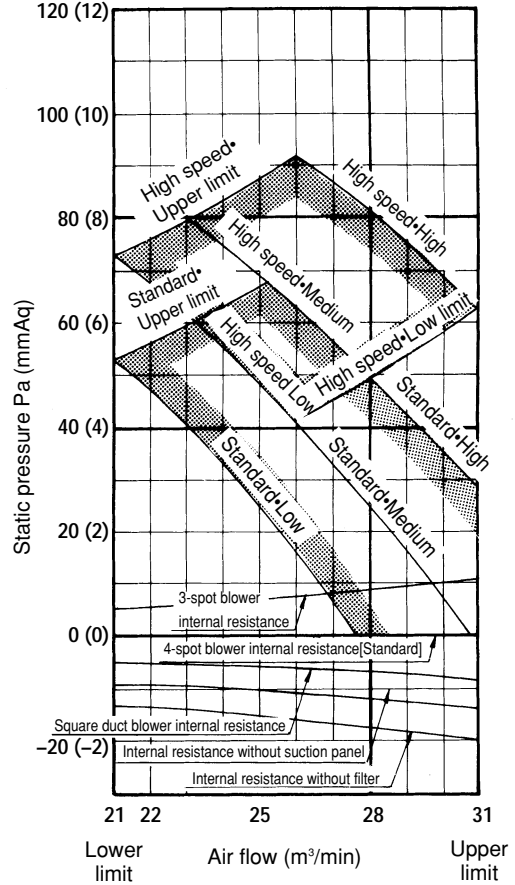
**Model FDRJ71HKXE2**



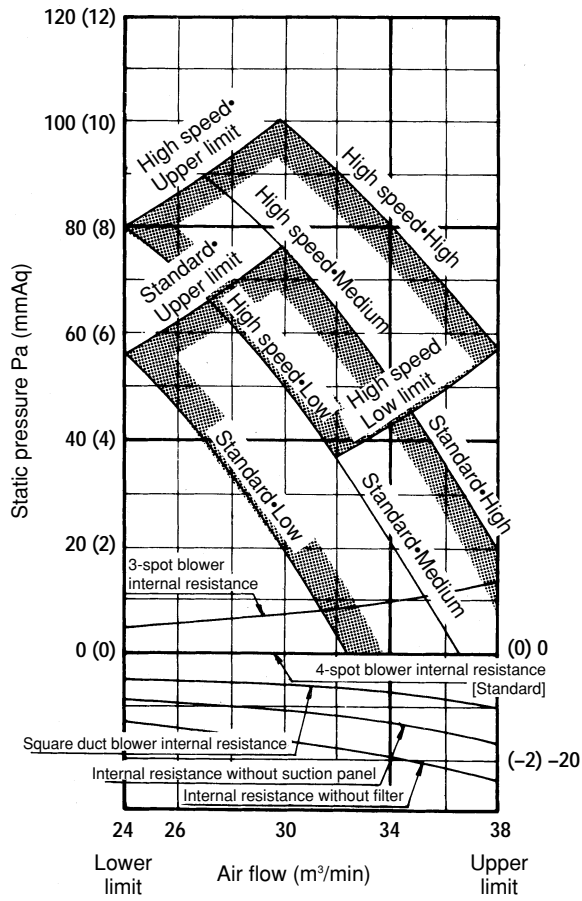
**Model FDRJ90HKXE2**



**Model FDRJ112HKXE2**



Model FDRJ140HKXE2



**(2) Satellite ducted type (FDUM)**

- External static pressure table

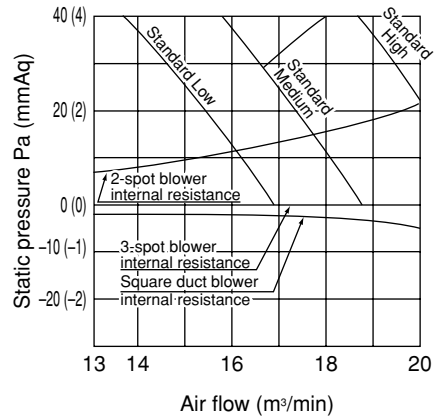
Unit : Pa (mmAq)

Type	Duct specs. Air flow (m <sup>3</sup> /min)	1 spot closing		Standard		Square duct	
		Standard	High <sup>(4)</sup> speed	Standard	High <sup>(4)</sup> speed	Standard	High <sup>(1)</sup> speed
FDUM36 type	12	-	-	50 (5)	85 (8.5)	50 (5)	90 (9)
FDUM45 56 type	14	-	-	50 (5)	85 (8.5)	50 (5)	90 (9)
FDUM71 type	18	35 (3.5)	70 (7)	50 (5)	85 (8.5)	55 (5.5)	90 (9)
FDUM90 type	20	30 (3)	65 (6.5)	50 (5)	85 (8.5)	55 (5.5)	90 (9)
FDUM112 type	28	50 (5)	80 (8)	60 (6)	90 (9)	65 (6.5)	95 (9.5)
FDUM140 type	34	50 (5)	75 (7.5)	60 (6)	85 (8.5)	65 (6.5)	95 (9.5)

Note (1) For high speed operation, insert the white connector and the red connector beside the control box in other places respectively.

**How to interpret the blower characteristics table**

**Example : Case of FDUMJ71HKXE2**



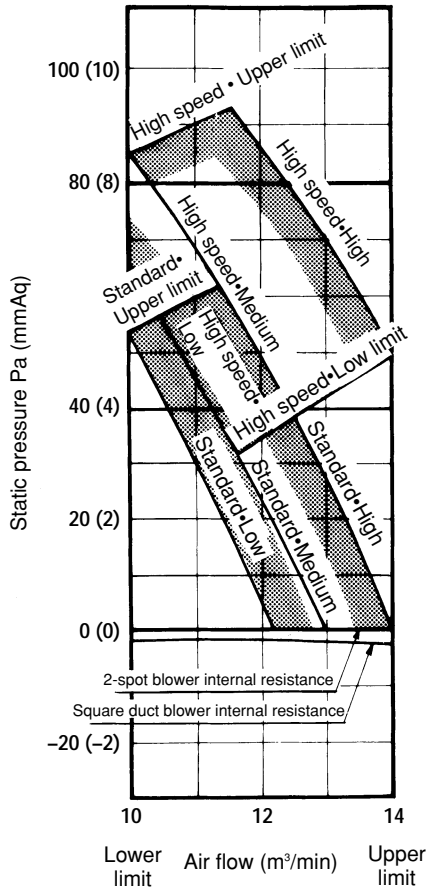
**1 2-spot blowout.....**

Internal resistance increases more than the standard 3-spot blowout. Approx. 14Pa (1.4mmAq) at 17m<sup>3</sup>/min

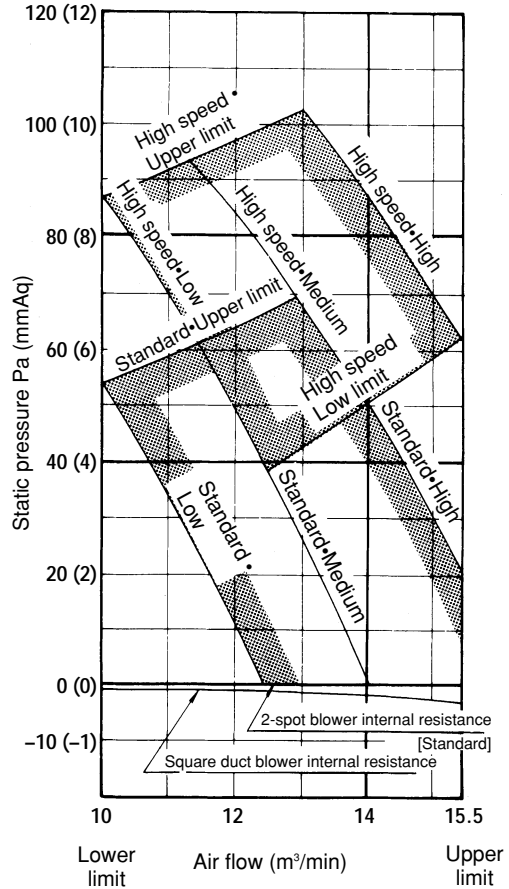
**2 Square duct blowout.....**

Internal resistance decreases more than the standard round duct (ø200 3-spot). 3Pa (0.3mmAq) at 17 m<sup>3</sup>/min. (External static pressure increases in reverse.)

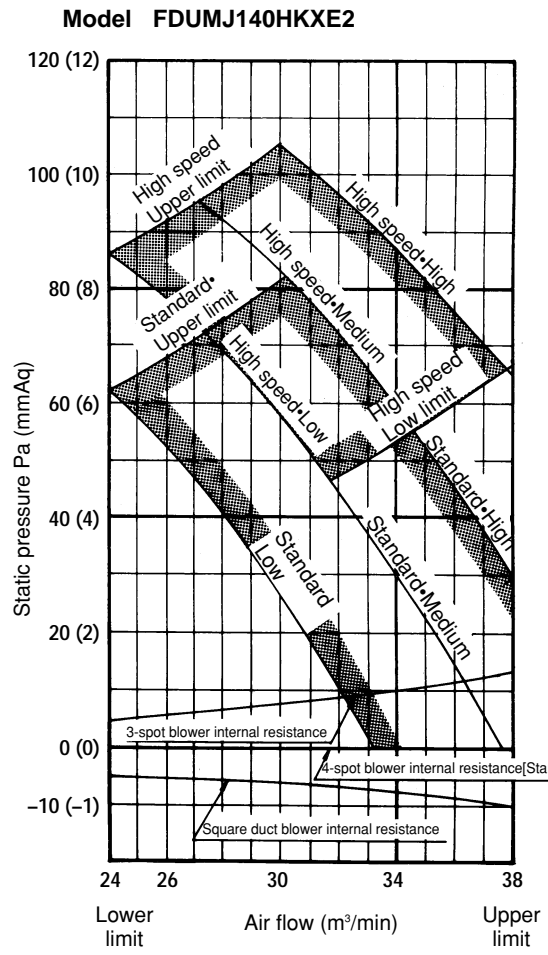
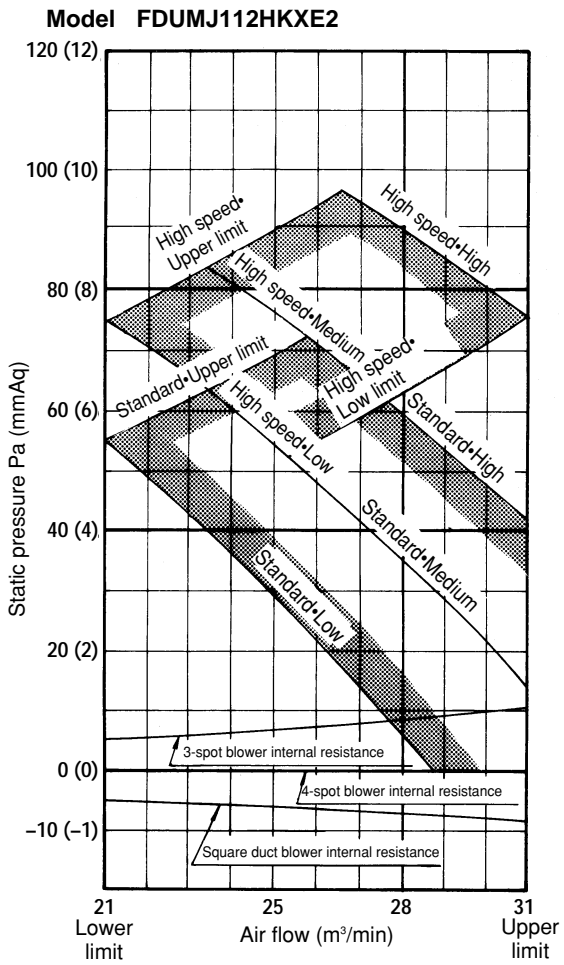
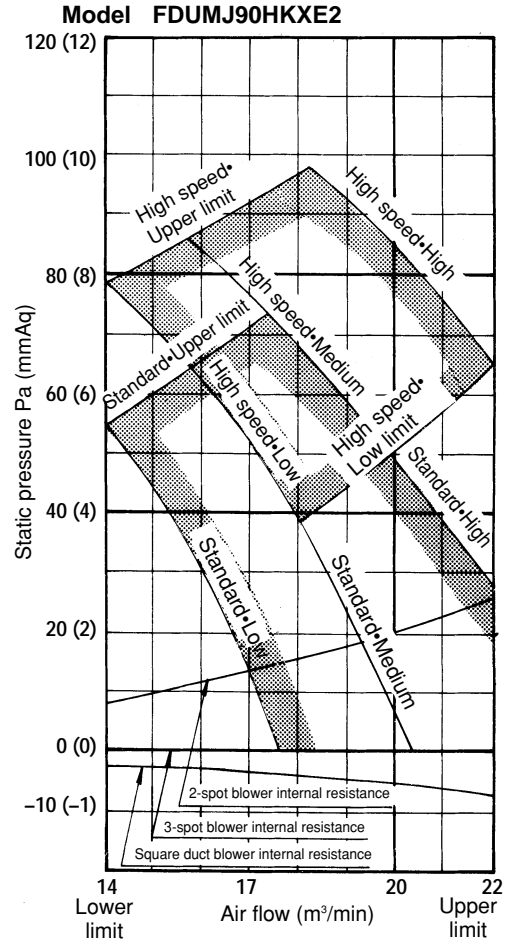
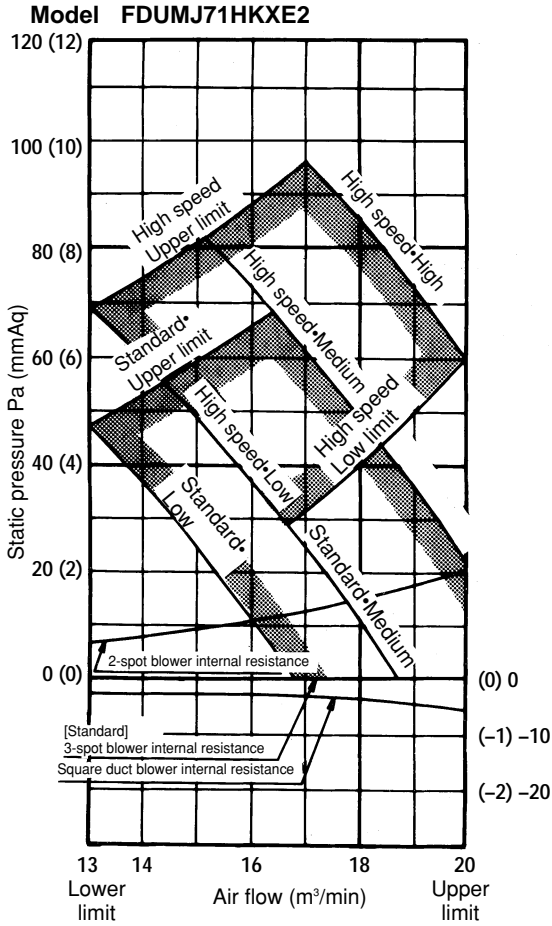
**Model FDUMJ36HKXE2**



**Models FDUMJ45HKXE2, 56HKXE2**







## 19.2.8 Noise level

Note (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

(2) The data in the chart are measured in an anechoic room.

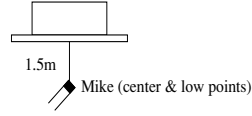
(3) The noise levels measured in the field are usually higher than the data because of reflection.

### (1) Indoor unit

#### (a) Ceiling recessed type (FDT)

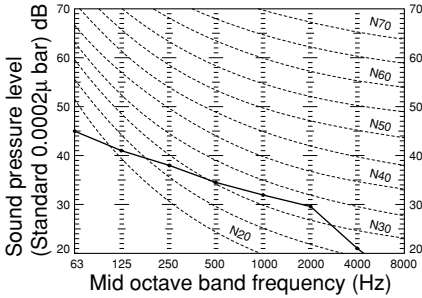
Measured based on JIS B 8616

Mike position as below Mike position as below



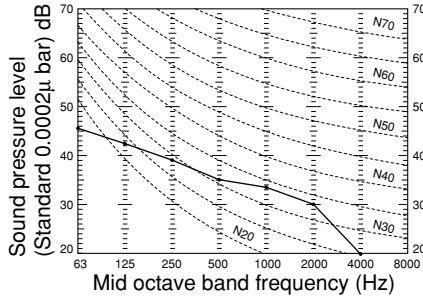
**Models FDTJ28HKXE2,36HKXE2**

**Noise level** 37 dB (A) at HIGH  
34 dB (A) at MEDIUM  
33 dB (A) at LOW



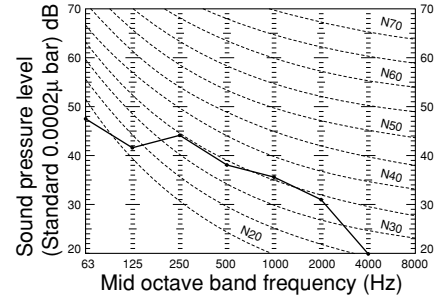
**Models FDTJ45HKXE2,56HKXE2**

**Noise level** 38 dB (A) at HIGH  
35 dB (A) at MEDIUM  
34 dB (A) at LOW



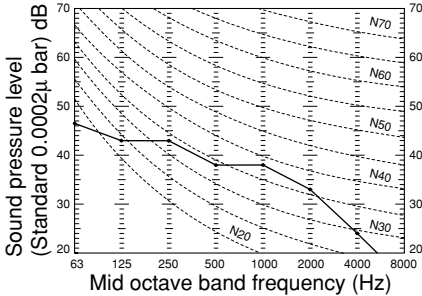
**Model FDTJ71HKXE2**

**Noise level** 40 dB (A) at HIGH  
38 dB (A) at MEDIUM  
36 dB (A) at LOW



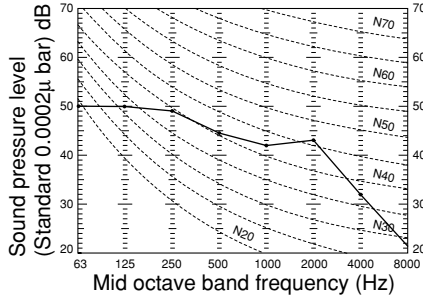
**Model FDTJ90HKXE2**

**Noise level** 42 dB (A) at HIGH  
40 dB (A) at MEDIUM  
38 dB (A) at LOW



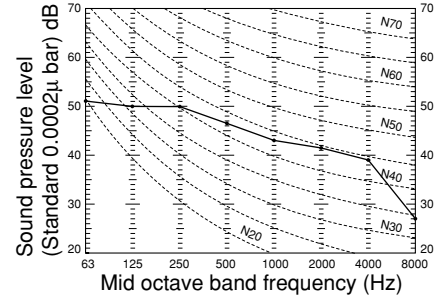
**Model FDTJ112HKXE2**

**Noise level** 49 dB (A) at HIGH  
46 dB (A) at MEDIUM  
42 dB (A) at LOW



**Model FDTJ140HKXE2**

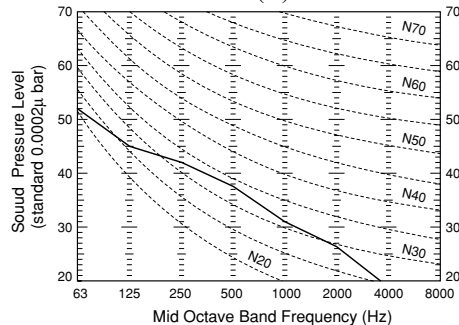
**Noise level** 50 dB (A) at HIGH  
47 dB (A) at MEDIUM  
45 dB (A) at LOW



#### (b) 2-way outlet ceiling recessed type (FDTW)

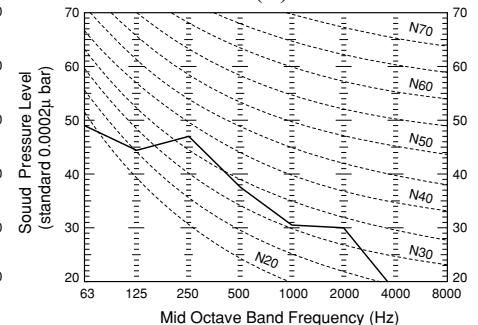
**Models FDTWJ28HKXE2B, 45HKXE2B, 56HKXE2B**

**Noise level** 39 dB (A) at HIGH  
36 dB (A) at MEDIUM  
33 dB (A) at LOW



**Model FDTWJ71HKXE2B**

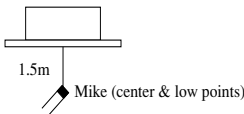
**Noise level** 41 dB (A) at HIGH  
38 dB (A) at MEDIUM  
35 dB (A) at LOW



Measured based on JIS B 8616

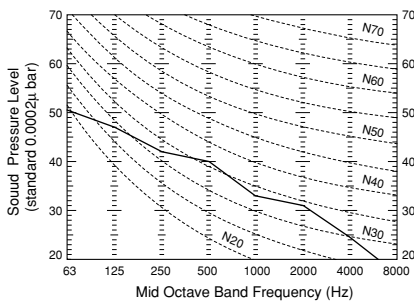
Mike position as below

Mike position as below



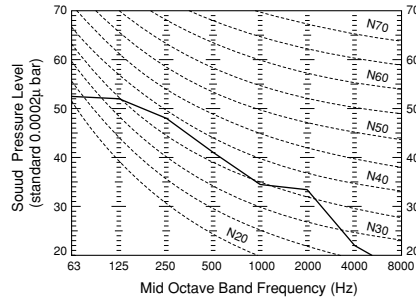
**Model FDTWJ90HKXE2B**

**Noise level** 41 dB (A) at HIGH  
39 dB (A) at MEDIUM  
36 dB (A) at LOW



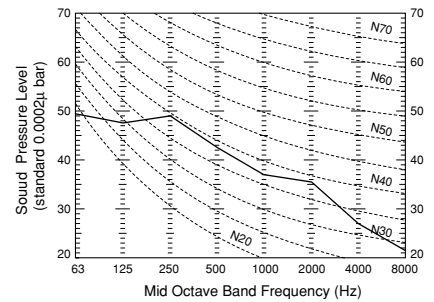
**Model FDTWJ112HKXE2B**

**Noise level** 44 dB (A) at HIGH  
41 dB (A) at MEDIUM  
38 dB (A) at LOW



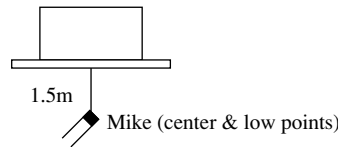
**Model FDTWJ140HKXE2B**

**Noise level** 45 dB (A) at HIGH  
42 dB (A) at MEDIUM  
39 dB (A) at LOW



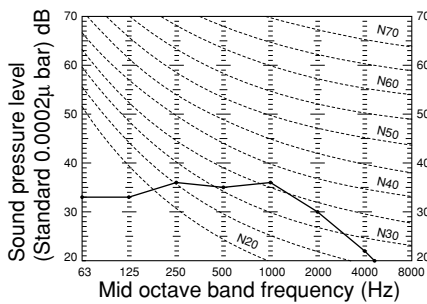
**(c) 1-way outlet ceiling recessed type (FDTS)**

**Measured based on JIS B 8616**  
Mike position as below



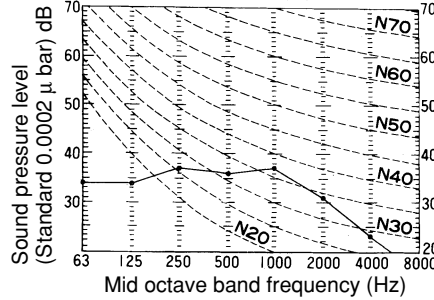
**Model FDTSJ22HKXE2B**

**Noise level** 39 dB (A) at MEDIUM  
38 dB (A) at LOW

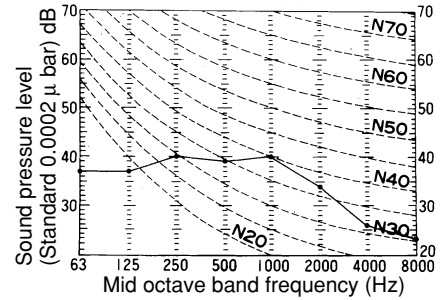


**Models FDTSJ28HKXE2B, 36HKXE2B Model FDTSJ45HKXE2B**

**Noise level** 40 dB (A) at HIGH  
39 dB (A) at MEDIUM  
38 dB (A) at LOW

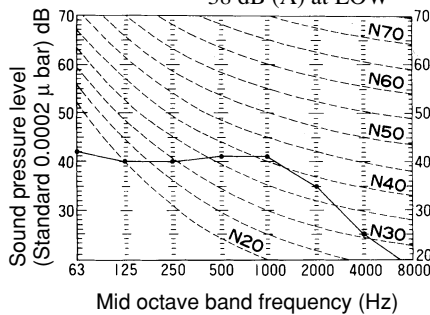


**Noise level** 43 dB (A) at HIGH  
40 dB (A) at MEDIUM  
38 dB (A) at LOW



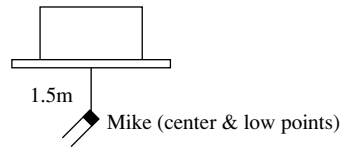
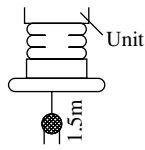
**Model FDTSJ71HKXE2B**

**Noise level** 44 dB (A) at HIGH  
40 dB (A) at MEDIUM  
38 dB (A) at LOW



**(d) Casseteria type (FDR)**

Measured based on JIS B 8616  
Mike position as below



**(i) Canvas duct Panel type**

**Model FDRJ22HKXE2**

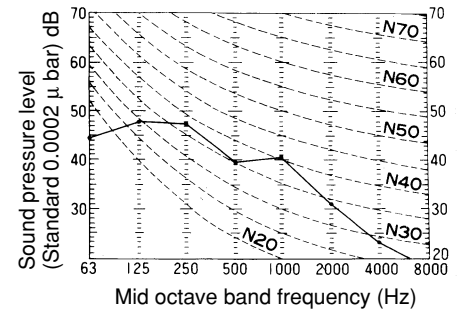
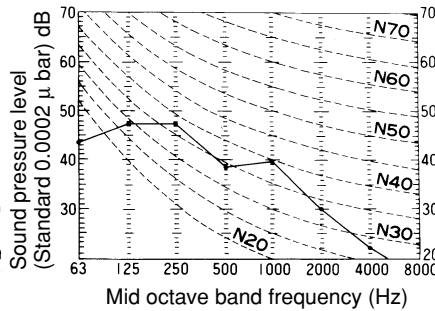
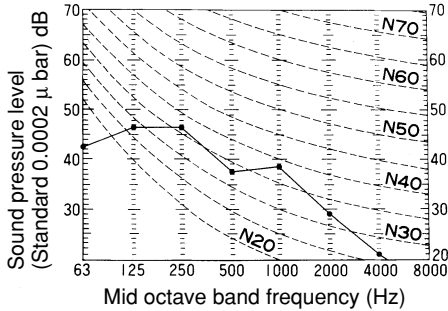
Noise level 42 dB (A) at HIGH  
40 dB (A) at MEDIUM  
37 dB (A) at LOW

**Model FDRJ28HKXE2**

Noise level 43 dB (A) at HIGH  
41 dB (A) at MEDIUM  
38 dB (A) at LOW

**Models FDRJ45HKXE2, 56HKXE2**

Noise level 44 dB (A) at HIGH  
41 dB (A) at MEDIUM  
38 dB (A) at LOW



**Models FDRJ71HKXE2, 90HKXE2**

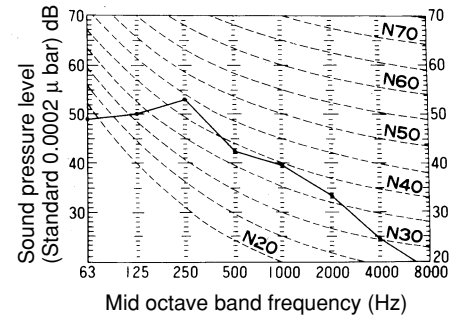
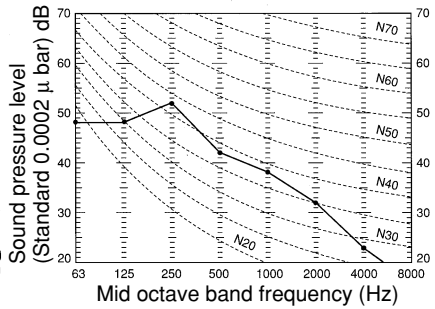
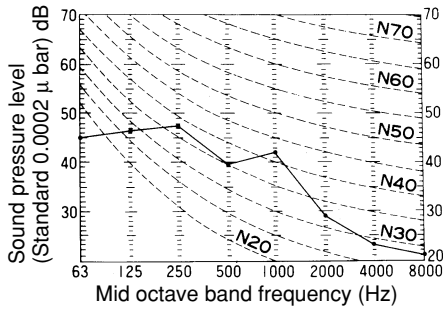
Noise level 44 dB (A) at HIGH  
41 dB (A) at MEDIUM  
38 dB (A) at LOW

**Model FDRJ112HKXE2**

Noise level 46 dB (A) at HIGH  
43 dB (A) at MEDIUM  
39 dB (A) at LOW

**Model FDRJ140HKXE2**

Noise level 47 dB (A) at HIGH  
44 dB (A) at MEDIUM  
40 dB (A) at LOW



**(ii) Silent Panel type**

**Model FDRJ22HKXE2**

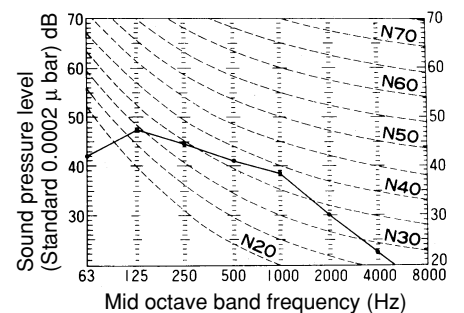
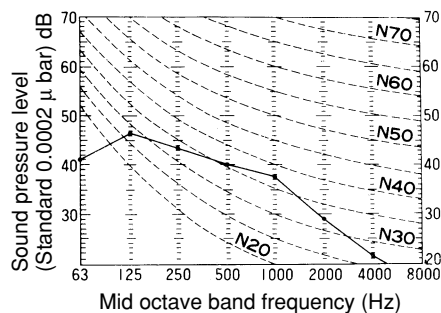
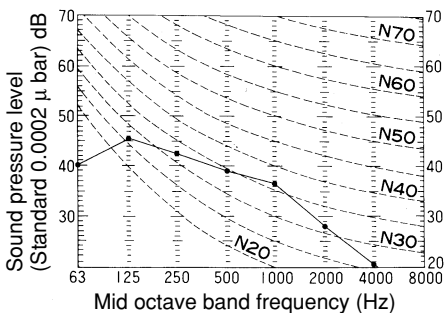
Noise level 41 dB (A) at HIGH  
39 dB (A) at MEDIUM  
36 dB (A) at LOW

**Model FDRJ28HKXE2**

Noise level 42 dB (A) at HIGH  
40 dB (A) at MEDIUM  
37 dB (A) at LOW

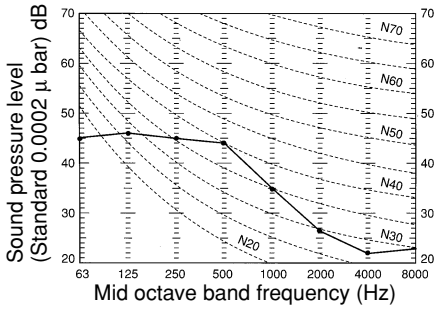
**Models FDRJ45HKXE2, 56HKXE2**

Noise level 43 dB (A) at HIGH  
40 dB (A) at MEDIUM  
37 dB (A) at LOW



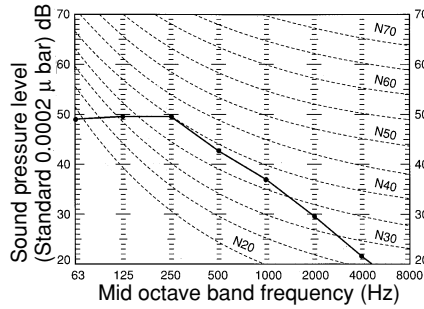
**Models FDRJ71HKXE2, 90HKXE2**

**Noise level** 43 dB (A) at HIGH  
40 dB (A) at MEDIUM  
37 dB (A) at LOW



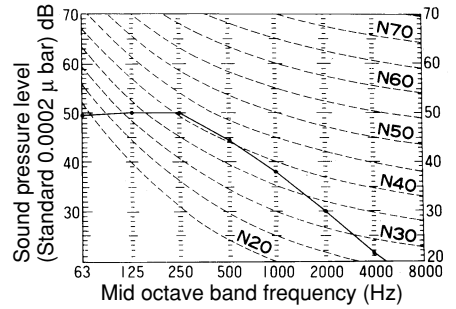
**Model FDRJ112HKXE2**

**Noise level** 45 dB (A) at HIGH  
42 dB (A) at MEDIUM  
38 dB (A) at LOW



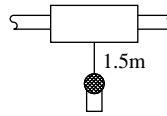
**Model FDRJ140HKXE2**

**Noise level** 46 dB (A) at HIGH  
43 dB (A) at MEDIUM  
39 dB (A) at LOW



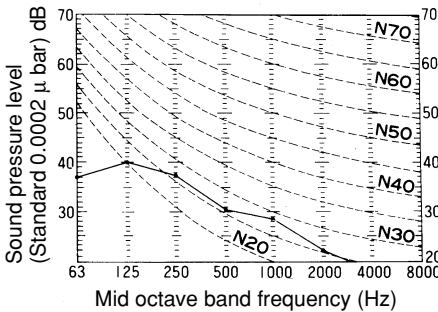
**(e) Satellite ducted type (FDUM)**

Measured based on JIS B 8616  
Mike position as below



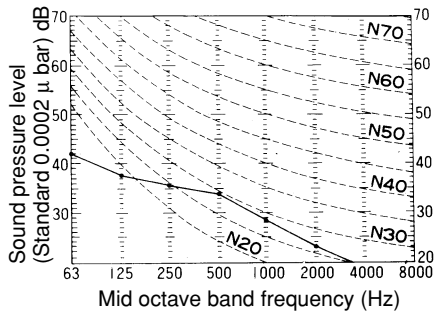
**Model FDUMJ36HKXE2**

**Noise level** 34 dB (A) at HIGH  
32 dB (A) at MEDIUM  
29 dB (A) at LOW



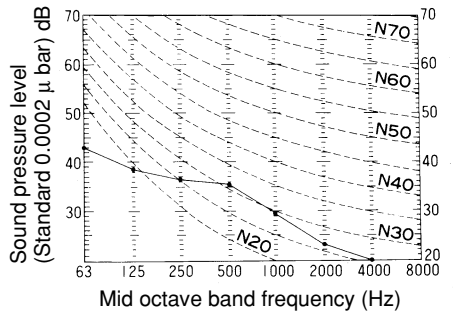
**Models FDUMJ45HKXE2, 56HKXE2, 71HKXE2**

**Noise level** 35 dB (A) at HIGH  
32 dB (A) at MEDIUM  
29 dB (A) at LOW



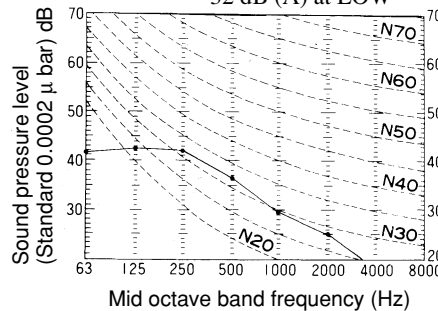
**Model FDUMJ90HKXE2**

**Noise level** 36 dB (A) at HIGH  
33 dB (A) at MEDIUM  
30 dB (A) at LOW



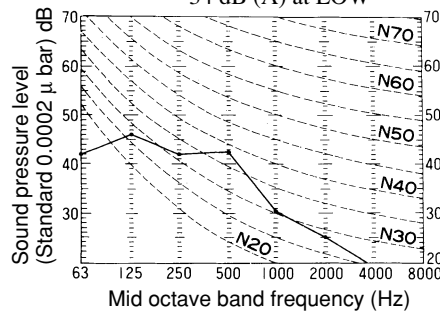
**Model FDUMJ112HKXE2**

**Noise level** 38 dB (A) at HIGH  
35 dB (A) at MEDIUM  
32 dB (A) at LOW



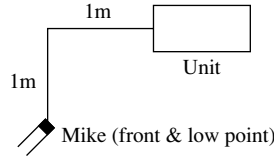
**Model FDUMJ140HKXE2**

**Noise level** 39 dB (A) at HIGH  
37 dB (A) at MEDIUM  
34 dB (A) at LOW



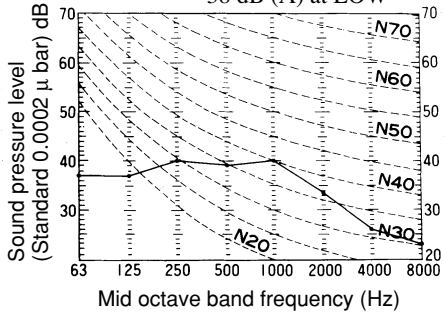
**(f) Ceiling suspension type (FDE)**

Measured based on JIS B 8616  
Mike position as below



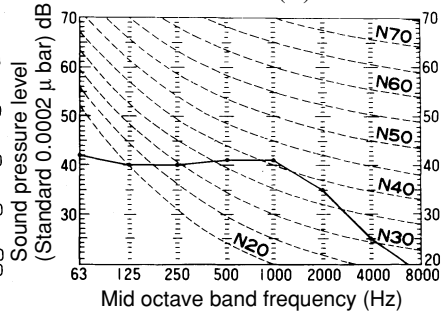
**Models FDEJ36HKXE2B, 45HKXE2B, 56HKXE2B**

**Noise level** 43 dB (A) at HIGH  
40 dB (A) at MEDIUM  
38 dB (A) at LOW



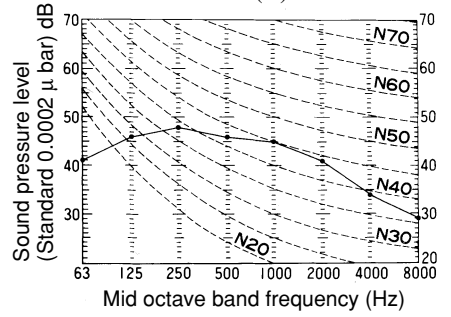
**Model FDEJ71HKXE2B**

**Noise level** 44 dB (A) at HIGH  
40 dB (A) at MEDIUM  
38 dB (A) at LOW



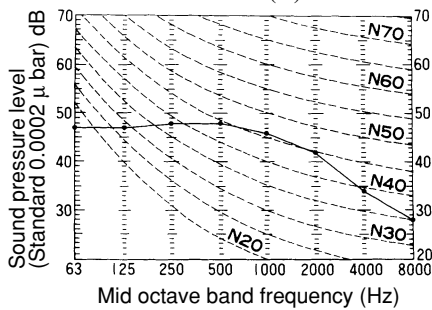
**Model FDEJ112HKXE2B**

**Noise level** 49 dB (A) at HIGH  
46 dB (A) at MEDIUM  
42 dB (A) at LOW



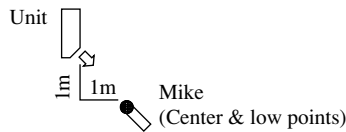
**Model FDEJ140HKXE2B**

**Noise level** 50 dB (A) at HIGH  
47 dB (A) at MEDIUM  
42 dB (A) at LOW



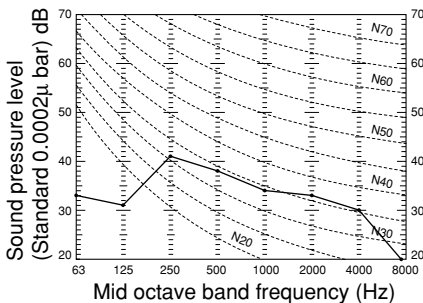
**(g) Wall mounted type (FDK)**

Measured based on JIS B 8616  
Mike position as below



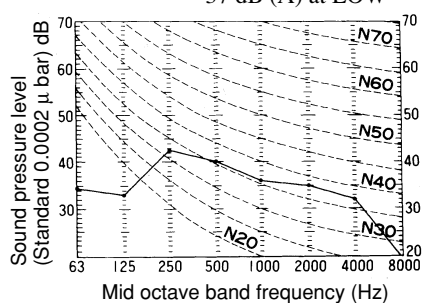
**Model FDKJ22HKXE2**

**Noise level** 40 dB (A) at HIGH  
37 dB (A) at LOW



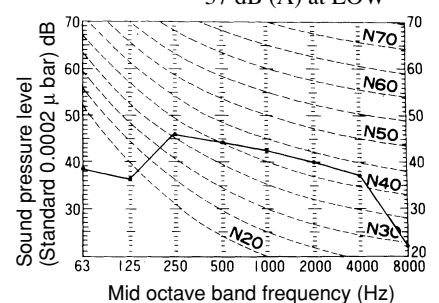
**Models FDKJ28HKXE2, 36HKXE2**

**Noise level** 42 dB (A) at HIGH  
40 dB (A) at MEDIUM  
37 dB (A) at LOW



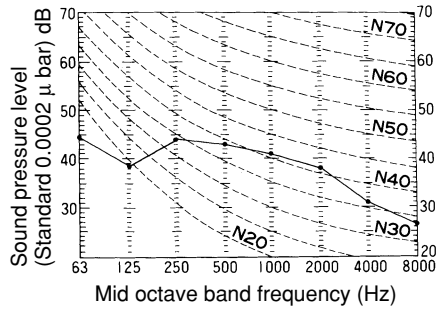
**Model FDKJ45HKXE2**

**Noise level** 44 dB (A) at HIGH  
41 dB (A) at MEDIUM  
37 dB (A) at LOW



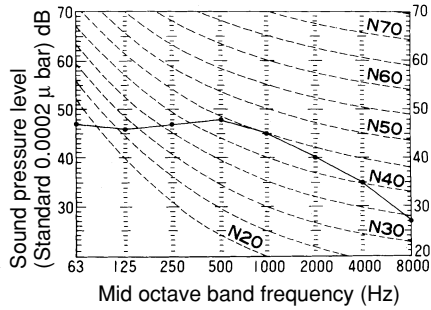
**Model FDKJ56HKXE2**

**Noise level** 46 dB (A) at HIGH  
43 dB (A) at MEDIUM  
39 dB (A) at LOW



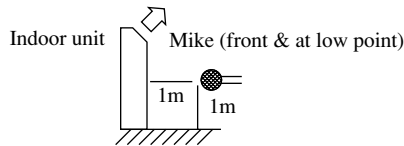
**Model FDKJ71HKXE2**

**Noise level** 47 dB (A) at HIGH  
44 dB (A) at MEDIUM  
40 dB (A) at LOW



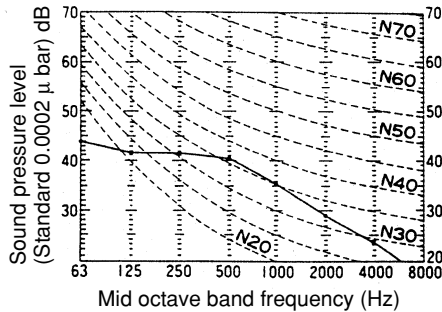
**(h) Floor standing type (FDFL, FDFU)**

**Measured based on JIS B 8616**  
Mike position as below



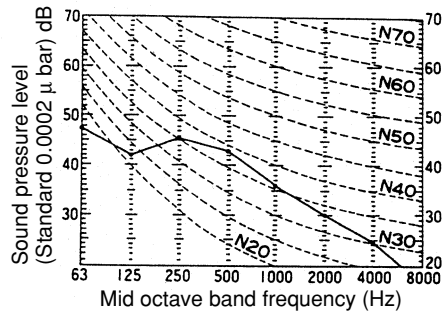
**Models FDFLJ28HKXE2, FDFUJ28HKXE2**

**Noise level** 41 dB (A) at HIGH  
38 dB (A) at MEDIUM  
36 dB (A) at LOW



**Models FDFLJ45HKXE2, 71HKXE2, FDFUJ45HKXE2, 56HKXE2, 71HKXE2**

**Noise level** 43 dB (A) at HIGH  
41 dB (A) at MEDIUM  
40 dB (A) at LOW

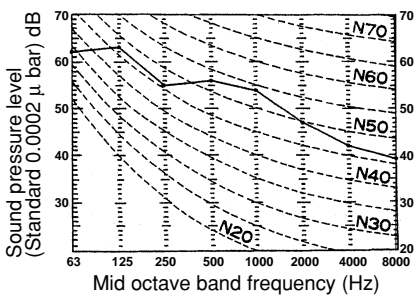


**(2) Outdoor unit (FDC)**

Note (1) The positions for the microphones are directly in front of the unit, each at a height of 1 meter and this is the measured value.

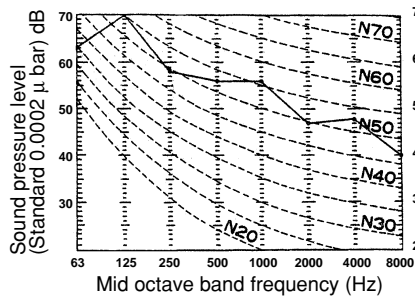
**Models FDCP140HKXE2B, FDCJ140HKXE2B**

**Noise level** 56 dB (A)



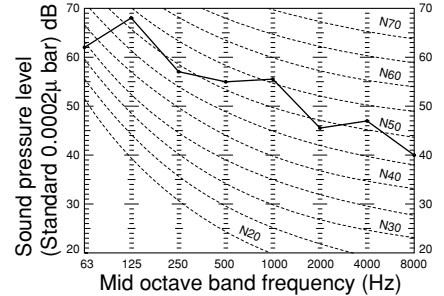
**Models FDCP224HKXE2B, FDCJ224HKXE2B**

**Noise level** 58 dB (A)



**Models FDCP280HKXE2B, FDCJ280HKXE2B**

**Noise level** 59 dB (A)



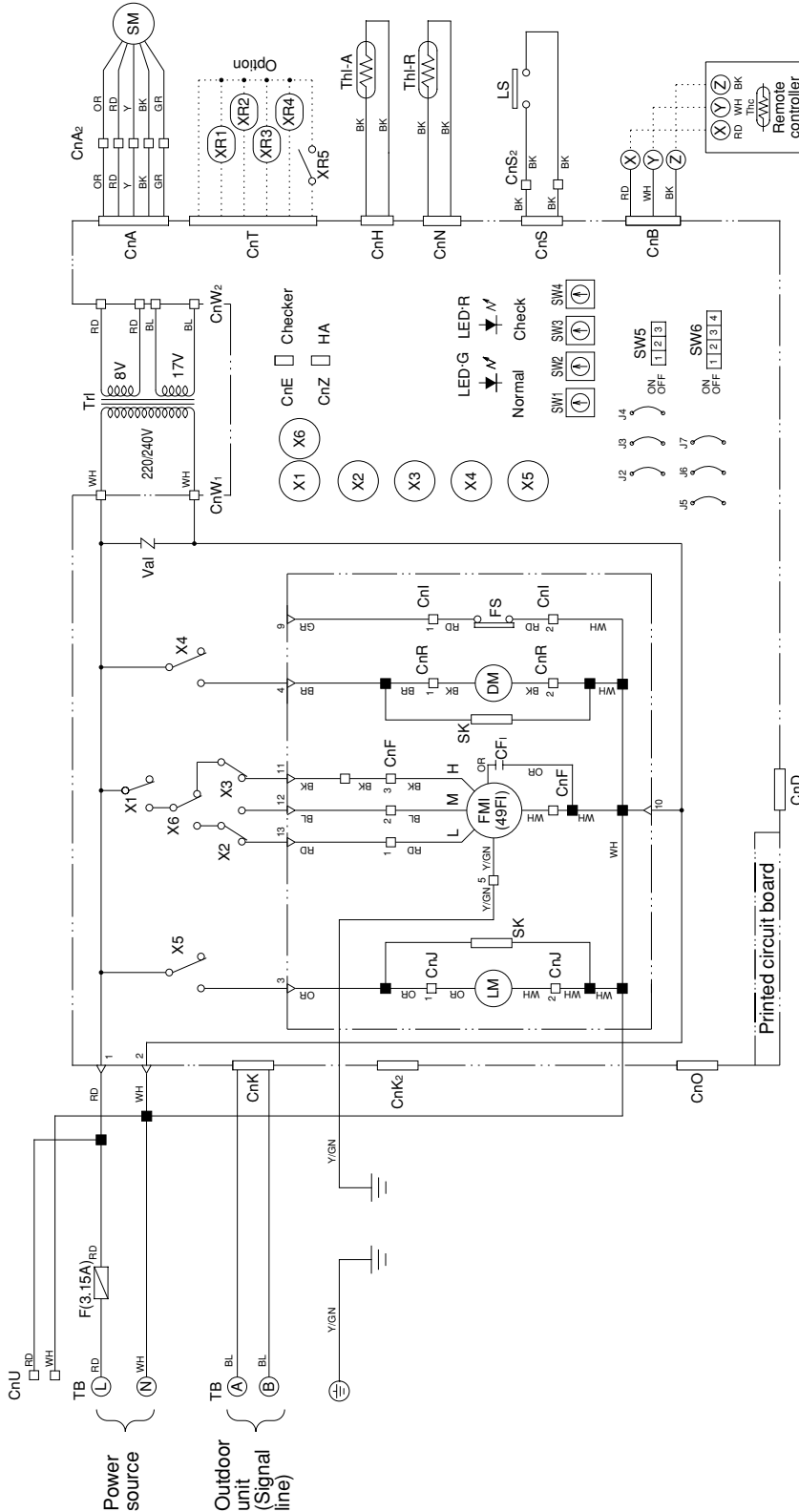
# 19.3 ELECTRICAL DATA

## 19.3.1 Electrical wiring

### (1) Indoor unit

#### (a) Ceiling recessed type (FDT)

Models All models



#### Color mark

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

#### Function of switches

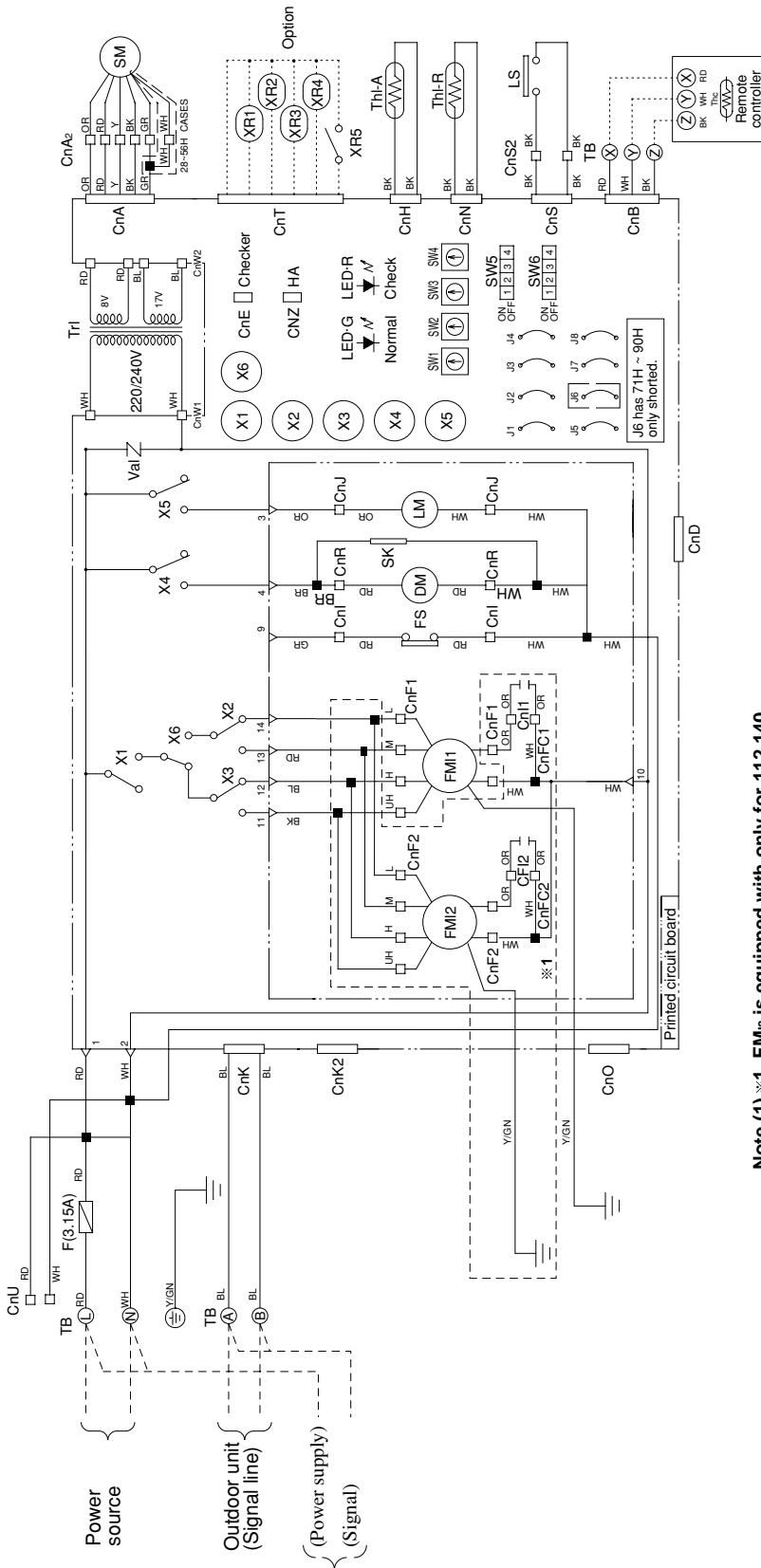
Mark	Function	
	ON	OFF
SW5-1	ON	Input signal
	OFF	Reverse Invalid
SW5-2	ON	Heating temp. shift + 3°C
	OFF	Normal
SW5-3	ON	Test run of condensate pump motor
	OFF	Normal

#### Meaning of marks

Mark	Parts name	Parts name	Parts name	Mark	Parts name
FM	Fan motor	Thermistor	F	Fuse	
49Fi	Internal thermostat (for FMI)	Thermostat	CnA-Z	Connector (mark)	
CFi	Capacitor for FMI	Indoor unit address unit's place	TB	Terminal block	
DM	Drain motor	Outdoor unit address unit's place	mark	Terminal (F)	
FS	Floot switch (for overflow prevention)	Outdoor unit address unit's place	mark	Connector	
LM	Louver motor	Change of heat pump type	XR1	Heating indication (DC12)	
LS	Limit switch	Outdoor unit address unit's place	XR2	Heating indication (DC12)	
SM	Stepping motor (For Exp.v)	Transformer	XR3	Check indication (DC12)	
X1,2,3,6	Auxiliary relay (For FMI)	Varistor	XR4	Distant operation	
X4	Auxiliary relay (For DM)	Indication lamp (Red)	XR5	Spark killer	
X5	Auxiliary relay (For LM)	Indication lamp (Green)	SK		



(b) 2-way outlet ceiling recessed type (FDTW)  
Models All models



Color mark

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

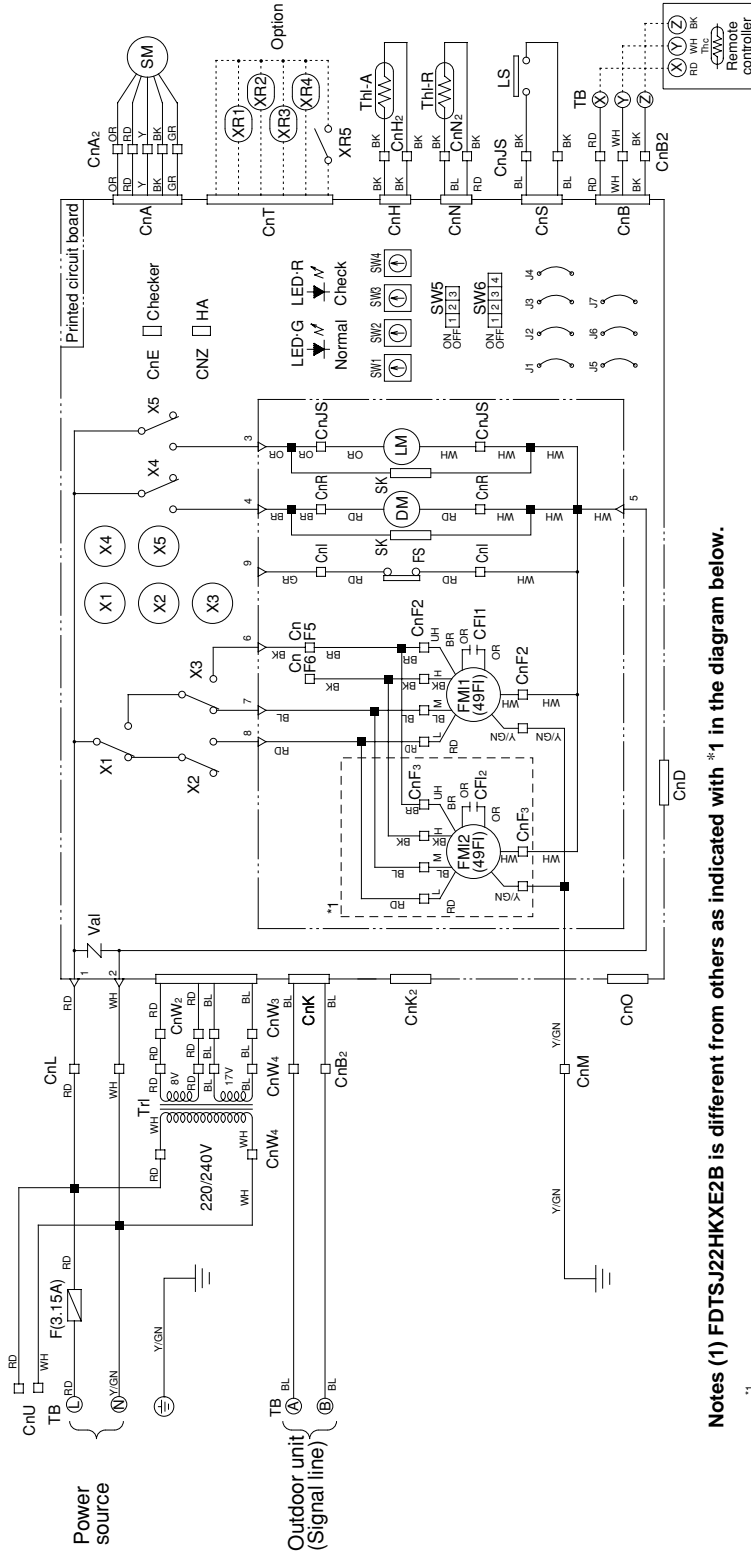
Meaning of marks

Mark	Parts name	Mark	Parts name
FM <sub>1</sub>	Fan motor	F	Fuse
49F <sub>1</sub>	Internal thermostat for FM <sub>1</sub>	CnA-Z	Connector (G mark)
CF <sub>1</sub>	Capacitor for FM <sub>1</sub>	TB	Terminal block
DM	Drain motor	mark	Terminal (F)
FS	Float switch (For overflow prevention)	mark	Connector
LM	Limit switch	XR1	Operation indication (DC12)
LS	Stepping motor (For Exp.v)	XR2	Heating indication (DC12)
SM	Auxiliary relay (For FM <sub>1</sub> )	XR3	ON indication for CM (DC12)
X1,2,3,6	Auxiliary relay (For DM)	XR4	Check indication (DC12)
X4	Auxiliary relay (For LM)	XR5	Distant operation
X5	Auxiliary relay (For LM)	SK	Spark killer

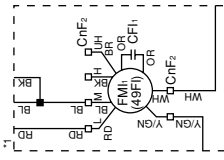
Function of switches

Mark	Function	
	ON	OFF
SW5-1	Input signal	Reverse Invalid
SW5-2	ON	Run Stop
	OFF	Heating temp. shift + 3°C
SW5-3	ON	Normal
	OFF	Test run of condensate pump motor

**(c) 1-way outlet ceiling recessed type (FDTs)**  
**Models All models**



Notes (1) FDTsJ22HKXE2B is different from others as indicated with \*1 in the diagram below.



(2) \*2 FM12 is equipped with only for FDTsJ71HKXE2B.

**Meaning of marks**

Mark	Parts name	Mark	Parts name	Mark	Parts name
FM1,2	Fan motor	Th-A	Thermistor	F	Fuse
49Fi	Internal thermostat for FM1	Th-R	Thermistor	CnA-Z	Connector (□ mark)
CF1,2	Capacitor for FM1	SW1	Indoor unit address ren's place	TB	Terminal block
DM	Drain motor	SW2	Indoor unit address unit's place	*4mark	Terminal (F)
FS	Float switch	SW3	Outdoor unit address ren's place	*4mark	Terminal (F)
LM	Louver motor	SW4	Outdoor unit address unit's place	XR1	Connector
LS	Limit switch	SW6	Change of heat pump type	XR2	Heating indication (DC12)
SM	Stepping motor (For Exp.v)	Tri	Transformer	XR3	Heating indication (DC12)
X1,2,3	Auxiliary relay (For FM1)	Val	Valistor	XR4	Check indication for CM (DC12)
X4	Auxiliary relay (For DM)	LED-R	Indication lamp (Red)	XR5	Distant operation
X5	Auxiliary relay (For LM)	LED-G	Indication lamp (Green)	SK	Spark killer

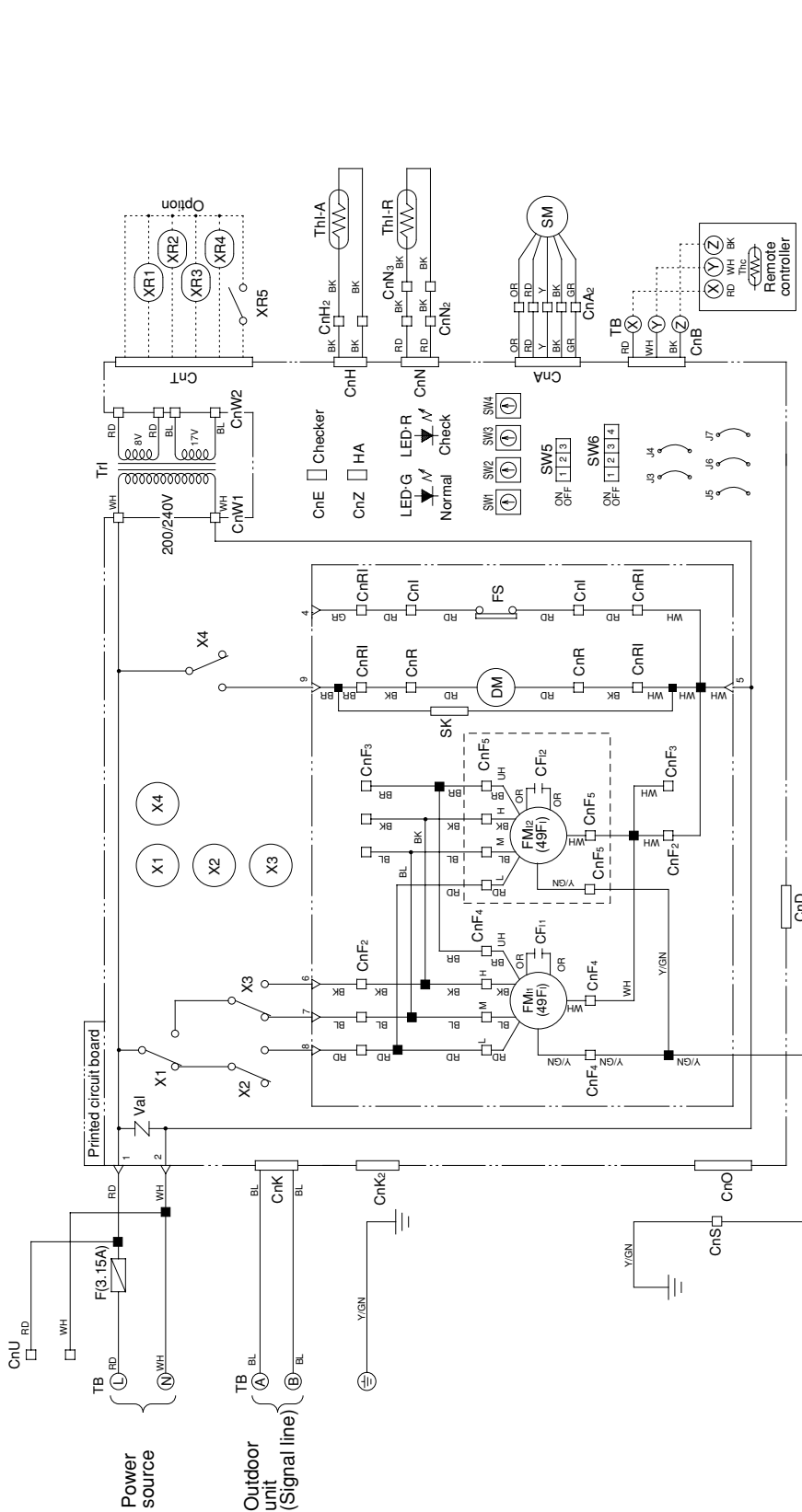
**Color mark**

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

**Function of switches**

Mark	Function	
	Input signal	Reverse Invalid
SW5-1	ON	Run Stop
	OFF	Reverse Invalid
SW5-2	ON	Heating temp. shift + 3°C
	OFF	Normal
SW5-3	ON	Test run of condensate pump motor
	OFF	Normal

**(d) Cassetteria type (FDR)**  
**Models All models**



**Color mark**

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

**Meaning of marks**

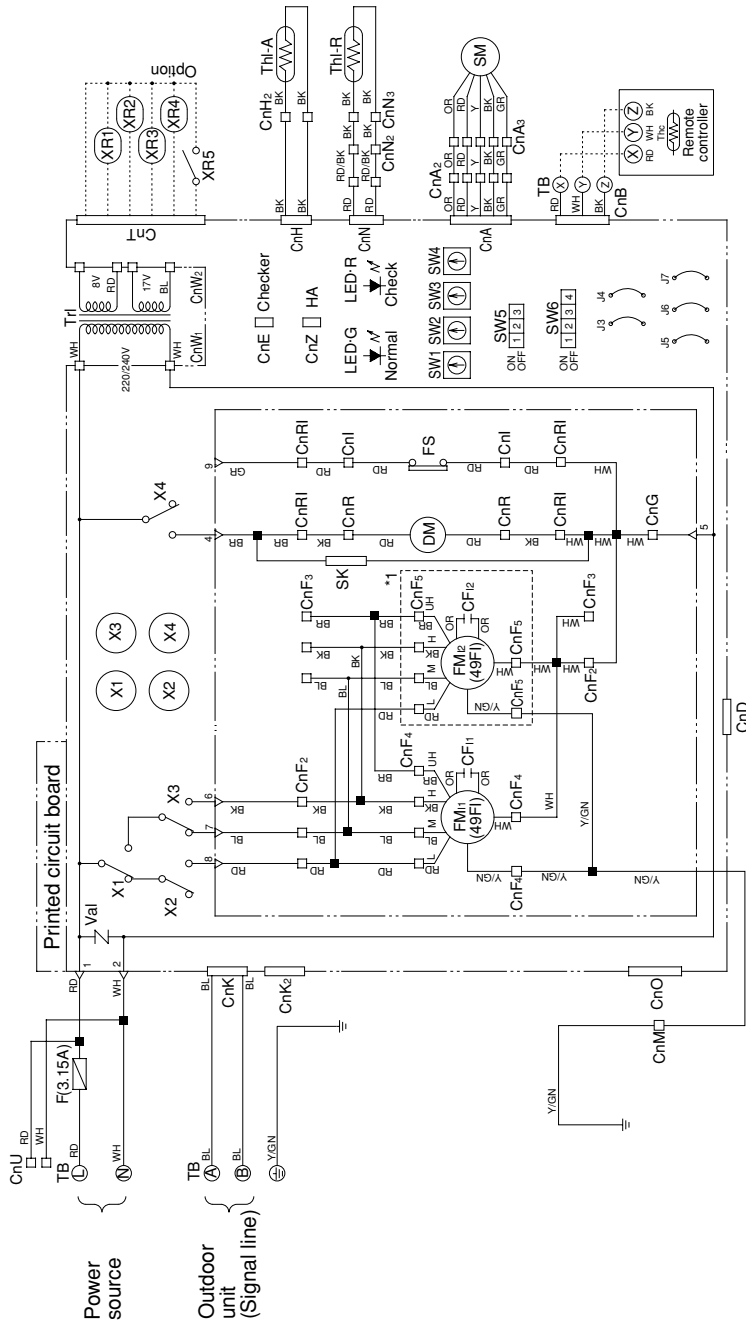
Mark	Parts name	Mark	Parts name
FM <sub>1,2</sub>	Fan motor	CnA-Z	Connector (α mark)
CF <sub>1,2</sub>	Capacitor for FM1	TB	Terminal block
DM	Drain motor	mark	Terminal (F)
FS	Float switch	XR1	Connector
SM	Stepping motor (For Exp.v)	XR2	Operation indication (DC12)
X1,2,3	Auxiliary relay (For FMj)	XR3	Heating indication (DC12)
X4	Auxiliary relay (For DM)	XR4	ON indication for CM (DC12)
49F <sub>1</sub>	Internal thermostat for FM <sub>1</sub>	XR5	Check indication (DC12)
Th1-A	Thermistor	SK	Distant operation Spark killer
			Fuse

**Note (1) \*1 FM<sub>2</sub> is equipped with only for FDRJ112HKXE2,140HKXE2.**

**Function of switches**

Mark	Function
SW5-1	ON Input signal OFF Reverse Invalid Run Stop
SW5-2	ON Heating temp. shift + 3°C OFF Normal
SW5-3	ON Test run of condensate pump motor OFF Normal

**(e) Satellite ducted type (FDUM)**  
**Models All models**



**Color mark**

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

**Function of switches**

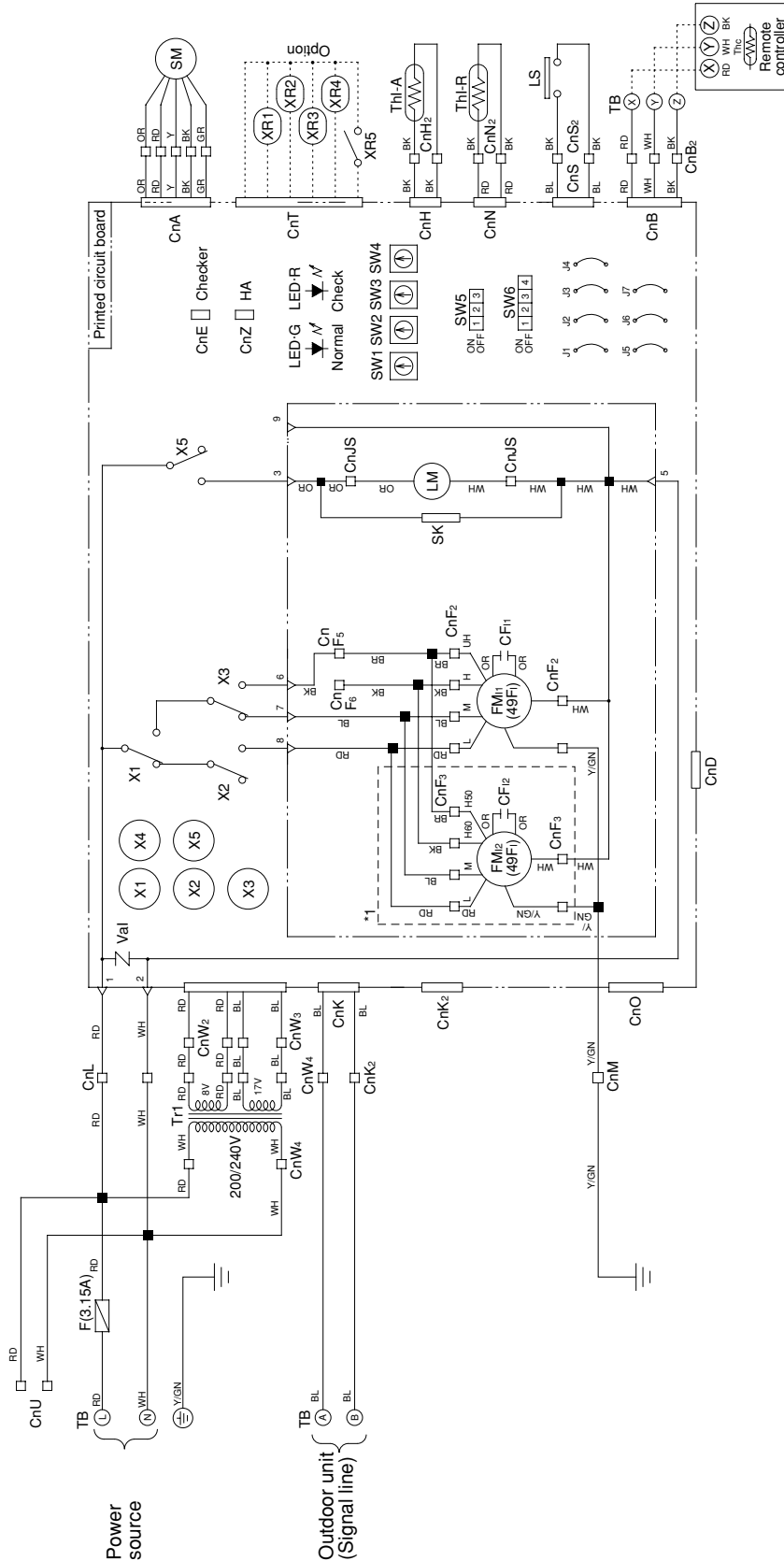
Mark	Function	
	Input signal	Reverse Invalid
SW5-1	ON	Reverse Invalid
	OFF	Run Stop
SW5-2	ON	Heating temp. shift + 3°C
	OFF	Normal
SW5-3	ON	Test run of condensate pump motor
	OFF	Normal

Note (1) \* 1 FM<sub>1,2</sub> is equipped with only for FDUMJ12HKXE2, 140HKXE2.

**Meaning of marks**

Mark	Parts name	Mark	Parts name
FM <sub>1,2</sub>	Fan motor	CnA-Z	Connector (C mark)
CF <sub>1,2</sub>	Capacitor for FM <sub>1</sub>	TB	Terminal block
DM	Drain motor	<mark	Terminal (F)
FS	Float switch (For overflow prevention)	mark	Connector
SM	Stepping motor (For Exp.v)	XR1	Operation indication (DC12)
X1.2.3	Auxiliary relay (For Exp.v)	XR2	Heating indication (DC12)
49F	Internal thermostat for FM <sub>1</sub>	XR3	ON indication for CM (DC12)
Th-A	Thermistor	XR4	Check indication (DC12)
		XR5	Distant operation
		SK	Spark killer
			Fuse

(f) Ceiling suspension type (FDE)  
Models All models



Color mark

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

Meaning of marks

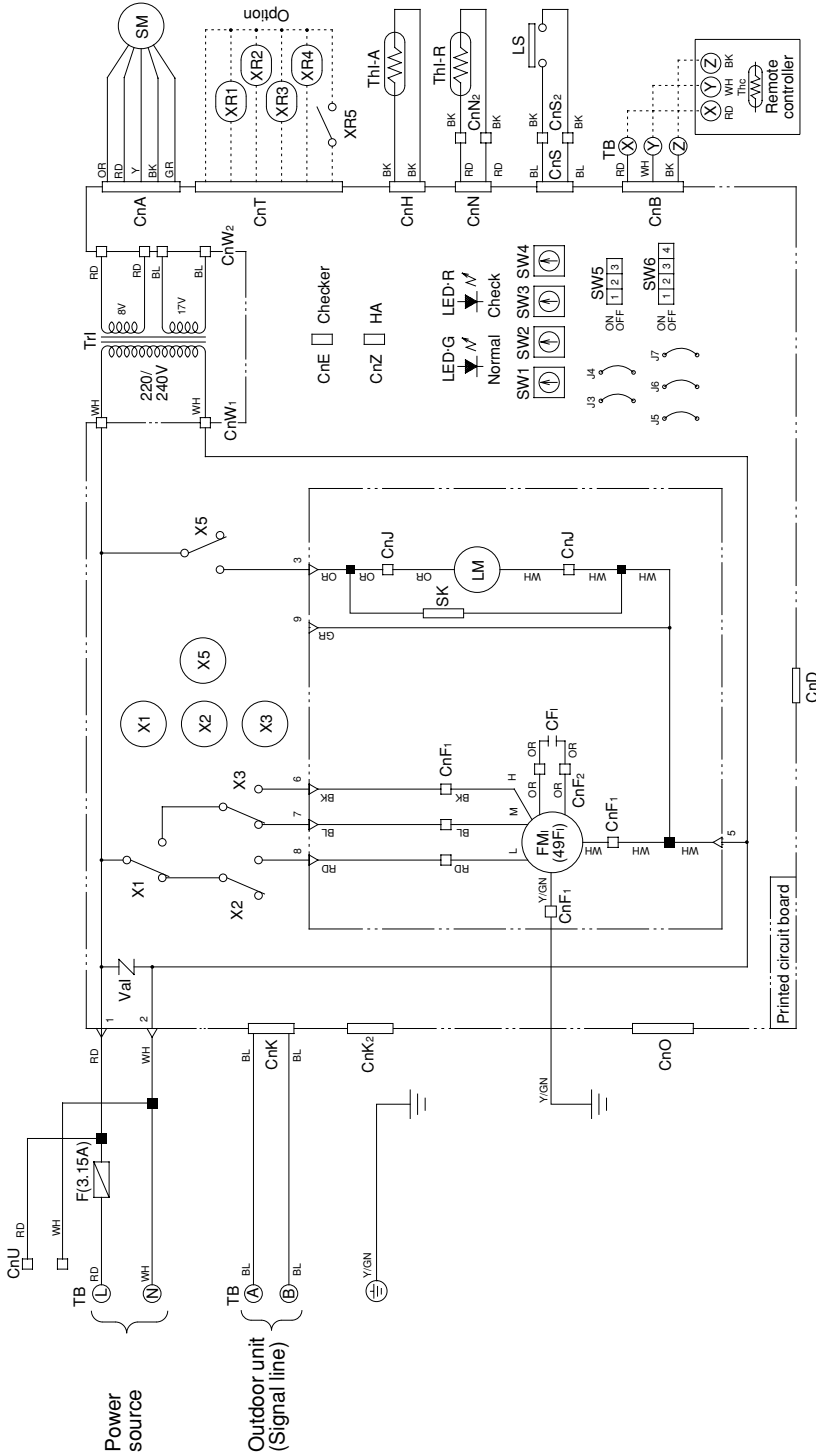
Mark	Parts name	Mark	Parts name
FM <sub>1,2</sub>	Fan motor	CnA-Z	Connector (G mark)
CF <sub>1,2</sub>	Capacitor for FM <sub>1</sub>	TB	Terminal block
49F <sub>1,2</sub>	Internal thermostat for FM <sub>1</sub>	mark	Terminal (F)
LM	Louver motor	mark	Connector
LS	Limit switch	XR1	Operation indication (DC12)
SM	Stepping motor (For Exp.v)	XR2	Heating indication (DC12)
X1,2,3	Auxiliary relay (For FM <sub>1</sub> )	XR3	ON indication for CM (DC12)
X4	Auxiliary relay (For FM <sub>2</sub> )	XR4	Check indication (DC12)
X5	Thermistor	XR5	Distant operation
Th-A	Thermistor	SK	Spark killer

Function of switches

Mark	Function	
SW5-1	ON	Input signal
	OFF	Reverse Invalid
SW5-2	ON	Run Stop
	OFF	Heating temp. shift + 3°C
SW5-3	ON	Normal
	OFF	Test run of condensate pump motor

Note(1) \*1 FM<sub>1,2</sub> is equipped with only for FDEJ71HKXE2B,112HKXE2B,140HKXE2B.

**(g) Wall mounted type (FDK)**  
**Models All models**



**Color mark**

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

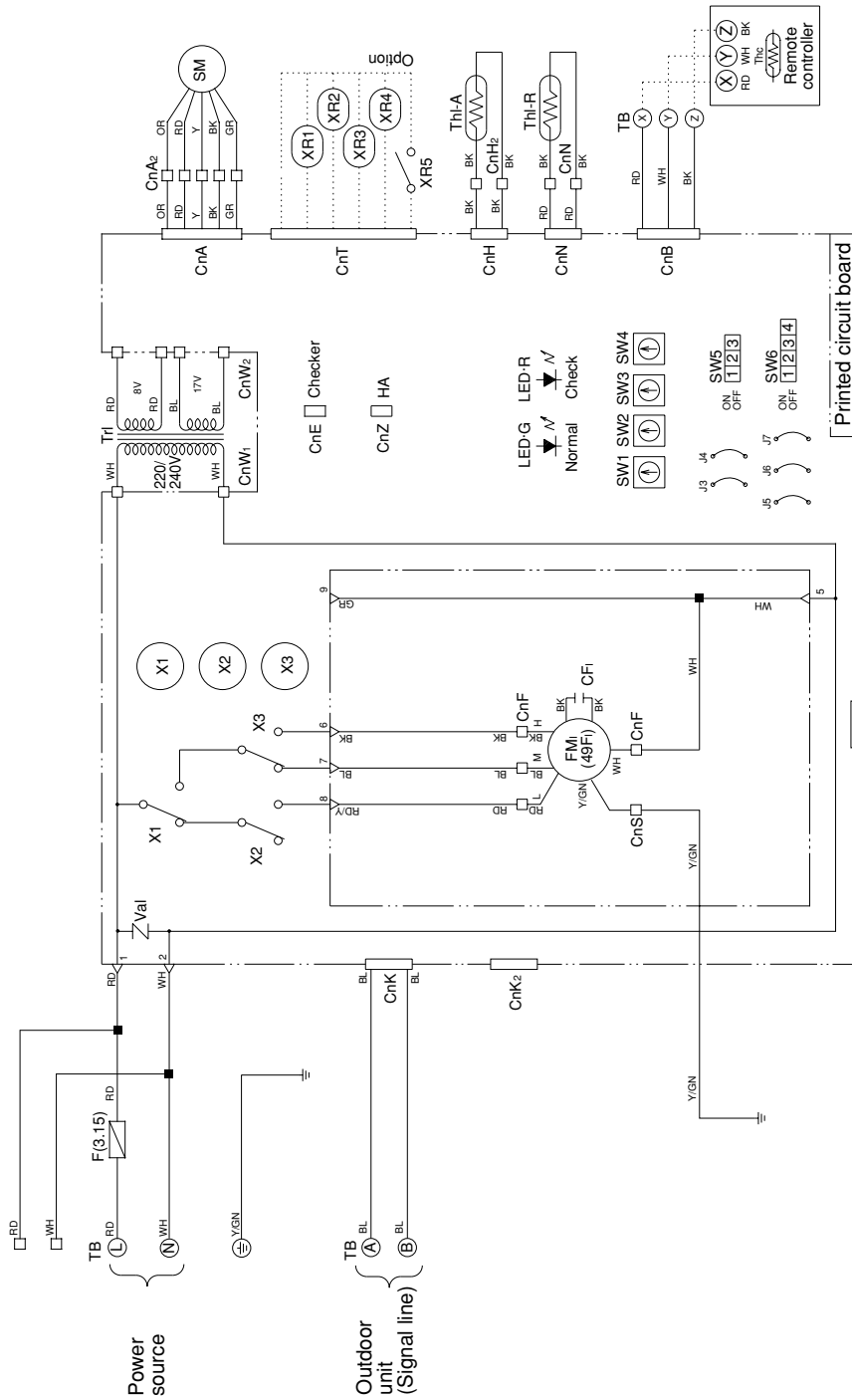
**Meaning of marks**

Mark	Parts name	Mark	Parts name	Mark	Parts name
FM <sub>1</sub>	Fan motor	Th-A-Z	Thermistor	CnA-Z	Connector (□ mark)
CF <sub>1</sub>	Capacitor for FM <sub>1</sub>	TB	Indoor unit address ten's place	Terminal block	Terminal block
49F <sub>1</sub>	Internal thermostat for FM <sub>1</sub>	<mark	Outdoor unit address ten's place	mark	Terminal (F)
LM	Louver motor	mark	Outdoor unit address unit's place	mark	Connector
LS	Limit switch	XR1	Change of heat pump type	XR1	Operation indication (DC12)
SM	Stepping motor (For Exp.v)	XR2	Transformer	XR2	Heating indication (DC12)
X1,2,3	Auxiliary relay (For FM)	TR	Varistor	XR3	ON indication for CM (DC12)
X5	Auxiliary relay (For LM)	Val	Indication lamp (Red)	XR4	Check indication (DC12)
Th-A	Thermistor	LED-R	Indication lamp (Green)	XR5	Distant operation
		LED-G	Fuse	SK	Spark killer

**Function of switches**

Mark	Function
SW5-1	ON: Reverse Invalid OFF: Run Stop
SW5-2	ON: Heating temp. shift + 3°C OFF: Normal
SW5-3	ON: Test run of condensate pump motor OFF: Normal

- (h) Floor standing exposed type (FDFL)
  - (i) Floor standing hidden type (FDFU)
- Models All models



Notes (1) FDTJSJ22HKXE2B is different from others as indicated with \*1 in the diagram below.

**Color mark**

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

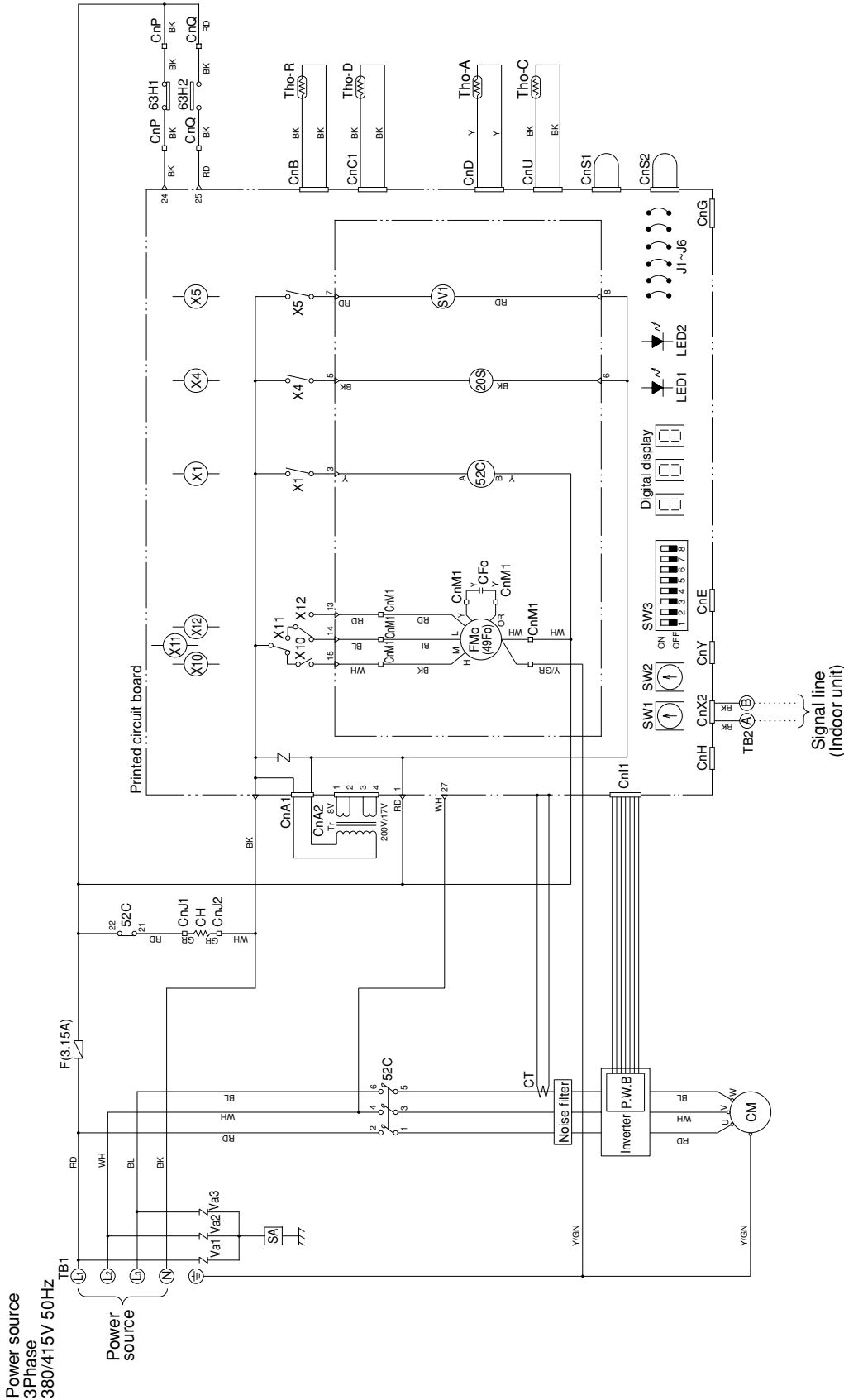
**Meaning of marks**

Mark	Parts name	Mark	Parts name
FM <sub>1</sub>	Fan motor	CnA-Z	Connector (□ mark)
CF <sub>1</sub>	Capacitor for FM <sub>1</sub>	TB	Terminal block
49F <sub>1</sub>	Internal thermostat for FM <sub>1</sub>	<mark	Terminal (F)
SM	Stepping motor (For Exp.v)	■ mark	Connector
X1, 2, 3	Auxiliary relay (For FM <sub>1</sub> )	XR1	Operation indication (DC12)
Th-A	Thermistor	XR2	Heating indication (DC12)
Th-R	Thermistor	XR3	Heating indication (DC12)
SW1	Indoor unit address ten's place	XR4	ON indication for CM (DC12)
SW2	Indoor unit address unit's place	XR5	Check indication (DC12)
			Distant operation

**Function of switches**

Mark	Function
SW5-1	ON: Input signal OFF: Reverse Invalid
SW5-2	ON: Heating temp. shift + 3°C OFF: Run Stop
SW5-3	ON: Normal OFF: Test run of condensate pump motor

**(2) Outdoor unit**  
**Models FDCP140HKXE2B**  
**FDCJ140HKXE2B**



**Color mark**

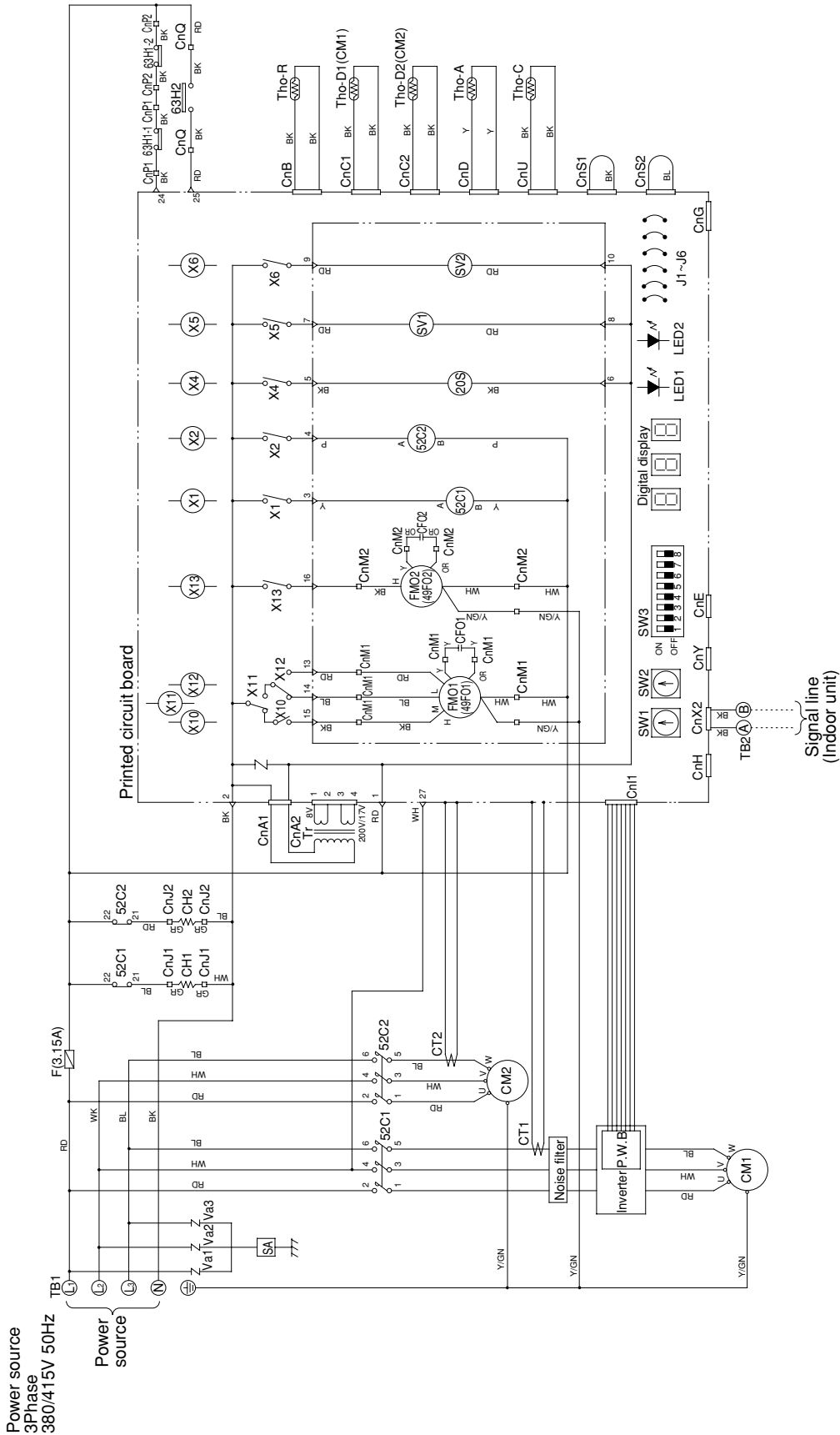
Mark	Color	Mark	Color
BK	Black	WH	White
BL	Blue	Y	Yellow
OR	Orange	GR	Gray
RD	Red	Y/GN	Yellow/Green

**Meaning of marks**

Mark	Parts name	Mark	Parts name
CM	Compressor motor	Tr	Transformer
FMo	Fan motor (outdoor unit)	Va1-3	Varistor
49Fo	Internal thermostat for FMo	TB1-2	Terminal block (O mark)
52C	Magnetic contactor for CM	F	Fuse
CH	Crankcase heater	SW1	Indoor unit address ten's place
Cfo	Capacitor for FMo	SW2	Indoor unit address unit's place
X1	Auxiliary relay (for 52C)	LED1	Indication lamp (Red)
X4	Auxiliary relay (for 20S)	LED2	Indication lamp (Green)
X5	Auxiliary relay (for SV1)	mark	Terminal (F)
X10-12	Auxiliary relay (for FMo)	mark	Connector



**Models FDCP224HKXE2B, 280HKXE2B  
FDCJ224HKXE2B, 280HKXE2B**



Color mark

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

Meaning of marks

Mark	Parts name	Mark	Parts name
CM	Compressor motor	Va-4	Varistor
FM01,2	Fan motor (outdoor unit)	TB1,2	Terminal block (O mark)
49F01,2	Internal thermostat for FMO	F	Fuse
52C	Magnetic contactor for CM	SW1	Indoor unit address ten's place
CH1,2	Crankcase heater	SW2	Indoor unit address unit's place
CF01,2	Capacitor for FMO	LED1	Indication lamp (Red)
X1,2	Auxiliary relay (for 52C, 52C2)	LED2	Indication lamp (Green)
X3,4	Auxiliary relay (for SV1, SV2)	mark	Terminal (F)
X5,6	Auxiliary relay (for FM01)	mark	Connector
X10-12	Auxiliary relay (for FM01)		
X13	Auxiliary relay (for FM02)		
20S	4way valve (coil)		
SV1,2	Solenoid valve		
63H1,1-2	High Pressure switch (for protection)		
63H2	High Pressure switch (for control)		
THO-A	Thermistor (outdoor air temp.)		
THO-B	Thermistor (dome temperature)		
THO-C	Thermistor (discharge temp.)		
THO-D	Thermistor (outdoor H.X. temp.)		
CT1,2	Current sensor		
SA	Arrestor		
Tr	Transformer		

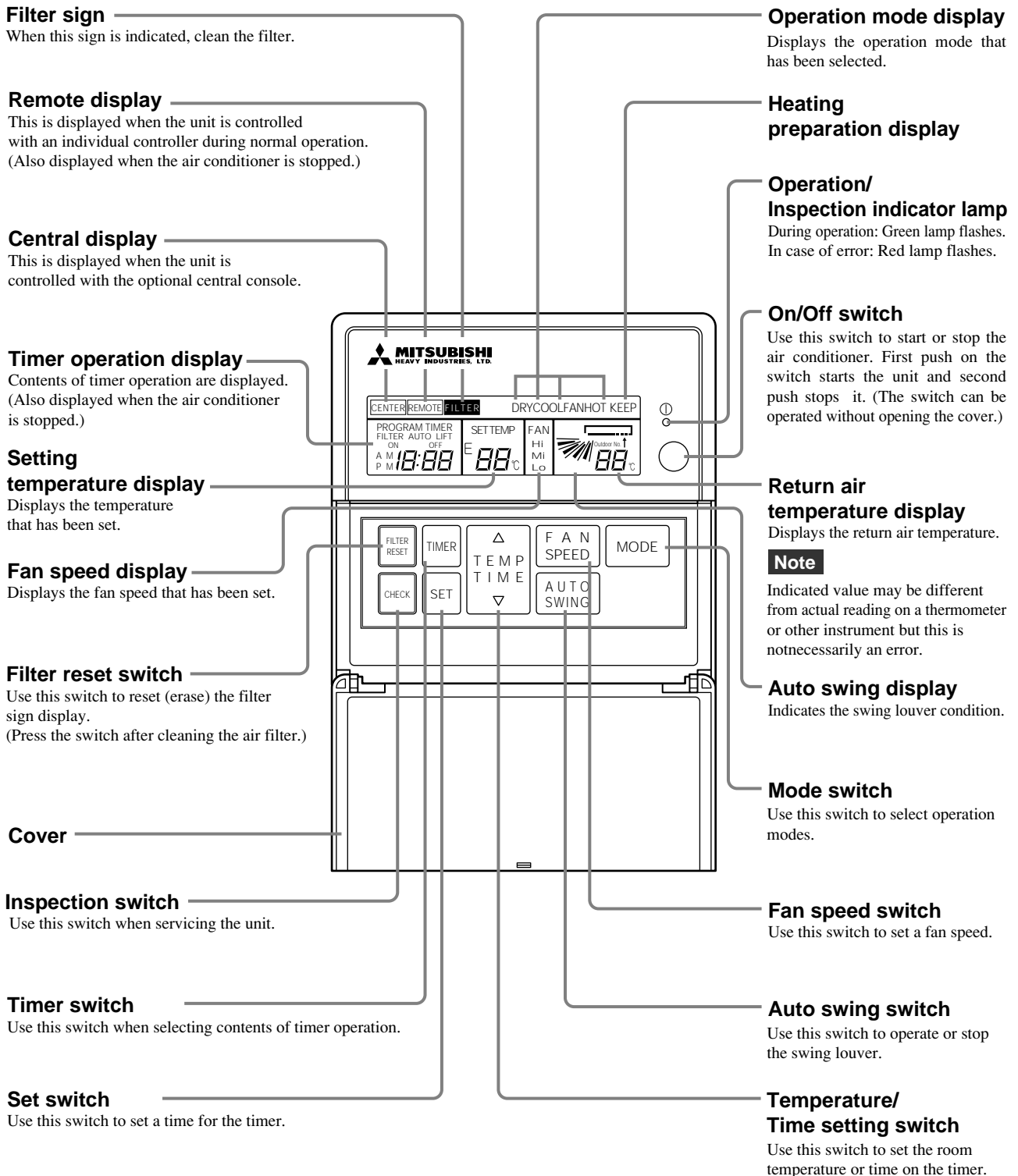
## 19.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

### (1) Remote controller (Optional parts)

FDR, FDUM, FDFL and FDFU 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.**



**(2) Operations of major functional items under each operation mode**

Operation mode Functional item	Cooling			Heating			Dehumidifying
	Thermostat ON	Thermostat OFF	Fan Complete stop	Thermostat ON	Thermostat OFF	Defrosting	
Indoor unit fan	Remote controller command	Remote controller command	Remote controller command	Remote controller command	Intermittent operation <sup>(3)</sup>	○→×	○/×
Indoor unit electronic expansion valve	Selected frequency adaptation	Fully closed	Fully closed	Selected frequency <sup>(4)</sup> adaptation	Fully closed	Fully opened	Selected frequency adaptation
Compressor 1 (Inverter)	○	×	×	○	×	○	○/×
Compressor 2 (Without inverter)	○/×	×	×	○/×	×	○	○/×
Outdoor unit fan (FMo-1)	○/×	×	×/○	○/×	×	○→×	○/×
Outdoor unit fan (FMo-2)	○/×	×	×/○	○/×	×	○→×	○/×
4-way valve	×	×	×	×	○	○→×	×
Solenoid valve SV1 (Compressor cooling)	○/×	×	×	○/×	×	○/×	○/×
Solenoid valve SV2 (Compressor cooling)	○/×	×	×	○/×	×	○/×	○/×

Notes (1) Compressor 2 is available on FDCJ224, 280, FDPC224 and 280 only.

(2) ○ : ON, × : OFF, ○/× : ON or OFF

(3) This applies to when the jumper wire is shorted (state at shipping). It is OFF if the connection is open.

(4) It is fully open for one minute when the compressor begins operation.

**(3) Cooling operation**

**(a) Cooling**

1) If the sum of selected and required frequencies is not larger than the maximum frequency, the required frequencies listed in the following table apply. If the sum of required frequencies is larger than the maximum frequency, the required frequencies divided proportionally apply.

**Frequency bands for indoor unit models**

Model (Indoor) Category	All series								
	22 model	28 model	36 model	45 model	56 model	71 model	90 model	112 model	140 model
Required frequency (Hz)	10 ~ 15	10 ~ 20	10 ~ 25	10 ~ 25	15 ~ 30	15 ~ 40	15 ~ 50	35 ~ 60	35 ~ 70
Selected frequency (Hz)	5 ~ 15	5 ~ 20	5 ~ 25	5 ~ 25	5 ~ 30	5 ~ 40	5 ~ 50	5 ~ 60	5 ~ 70

Notes (1) Frequency during cooling is 45 Hz.

(2) The required frequency is counted in the unit of 5 Hz and the selected frequency in the unit of 1 Hz.

**Frequency bands for outdoor unit models**

Item	Capacity	140 model	224 model	280 model
Compressor's total operation frequency (Hz)		20 ~ 80	20 ~ 120	20 ~ 130

Note (1) Frequency is controlled in the unit of 5 Hz.

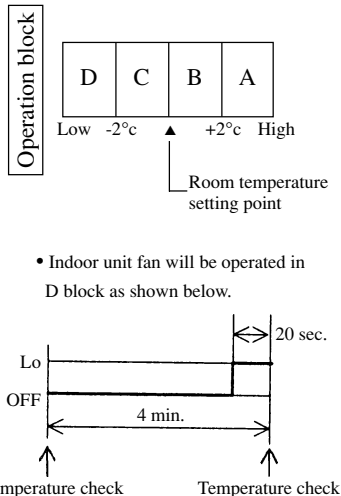
**Compressor capacity control (only for 224, 280 models)**

Model	Fk (Hz) condition	CM1 (Inverter)	CM (Without inverter)
FDCJ224HKXE2B	Fk < 70Hz	25 ~ 90Hz	OFF
FDPC224HKXE2B	Fk ≥ 70Hz	40 ~ 100Hz	ON
FDCJ280HKXE2B	Fk < 80Hz	25 ~ 95Hz	OFF
FDPC280HKXE2B	Fk ≥ 80Hz	40 ~ 100Hz	ON

Note (1) In case when CM1 only changes from ON to the CM2 ON range, CM1 is reduced at 40 Hz and then CM2 is turned ON.

## (4) Dehumidifying (Thermal dry) [Indoor unit adaptation]

- This cooling operation is mainly for dehumidifying, with which the compressor, indoor and outdoor fans are operated in the patterns as listed in the following table and in accordance with operation blocks switched with the room temperature sensor. The operation blocks are selected by checking the return air temperature at 4-minute intervals. Respective functional items are operated in each operation block as shown by the following table.



Item		Operation block			
		A	B	C	D
Indoor unit frequency (Hz)	22 model	10	10	10	0
	28 model	15	10	10	0
	36 model	20	15	10	0
	45 model	20	15	10	0
	56 model	25	15	15	0
	71 model	30	20	15	0
	90 model	40	25	15	0
	112 model	50	40	35	0
140 model	60	45	35	0	
Compressor	Sum of frequencies on combined indoor units				
Indoor unit electronic expansion valve	Frequency adaptation				
Indoor unit fan	Hi	Lo	Lo	Lo↔OFF	
Outdoor unit fan	Operation	Operation	Operation	Stop	

## (5) Heating operation

### (a) Heating

- This is same as the cooling operation.

### (b) Heating operation with thermostat OFF

#### 1) Intermittent fan operation control

- When the jumper wire J3 on the indoor PCB is shorted (installed at shipping), the fan of the unit of which the thermostat is turned OFF during heating is operated in the Lo mode, and the indoor fan is turned OFF if the temperature rises 1°C or more than the return air temperature at the thermostat OFF.
- Indoor fan OFF condition is maintained for 5 minutes and then the operation is reset at the Lo mode again. After operating for 2 minutes in the Lo mode, return air temperature is checked and, if it is 1°C or higher, the indoor fan is turned OFF or, if it is not higher than 1°C, the Lo mode operation continues.

Notes (1) If the heating thermostat has been turned OFF, the temperature is indicated on the remote controller only when the indoor fan is operated in the Lo mode.

When it is OFF, the room temperature at the end of Lo operation is indicated.

(2) If the operation is changed to the defrosting mode while the heating thermostat is at OFF or the thermostat is turned OFF during defrosting, the indoor fan is turned OFF.

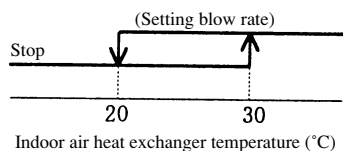
(3) Residual operation of heater is dominant over this control.

#### 2) Fan stop control

- If the jumper wire J3 on the indoor PCB (installed at shipment) is opened or the thermostat is turned OFF during heating operation with the remote control sensor operating, the fan on the indoor unit is turned OFF.

### (c) Hot start (Prevention of cold draft during heating) [Indoor unit adaptation]

If the required frequency in the room is other than 0 Hz at the start of heating operation, the indoor fan is controlled in accordance with the temperature of indoor air heat exchanger (detected with Th1-R).



Notes(1) When the hot start (the compressor is operating and the indoor unit fan is not operating at the setting blow rate) is going on, the heating preparation is displayed (LCD on the remote controller).

(2) When the required frequency is other than 0 Hz, once the blower should start, it will not stop even if the temperature drops below 20°C.

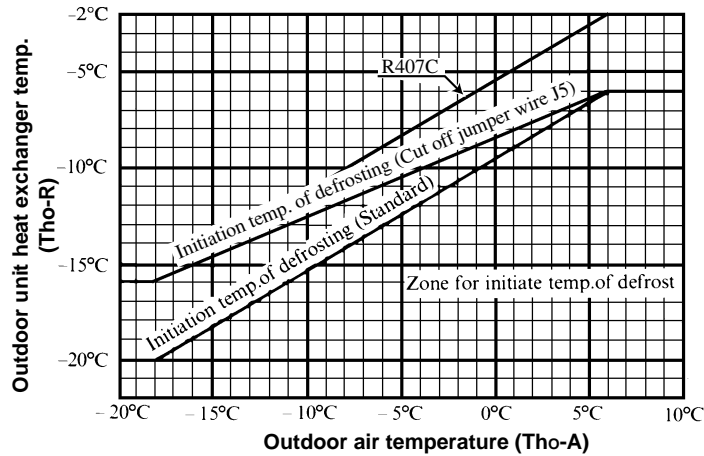
(3) After the blower has been turned OFF for 7 minutes, the blower is operated regardless of the heat exchanger temperature. (For 7 minutes after completion of defrosting during defrosting operation)

**(d) Defrosting**

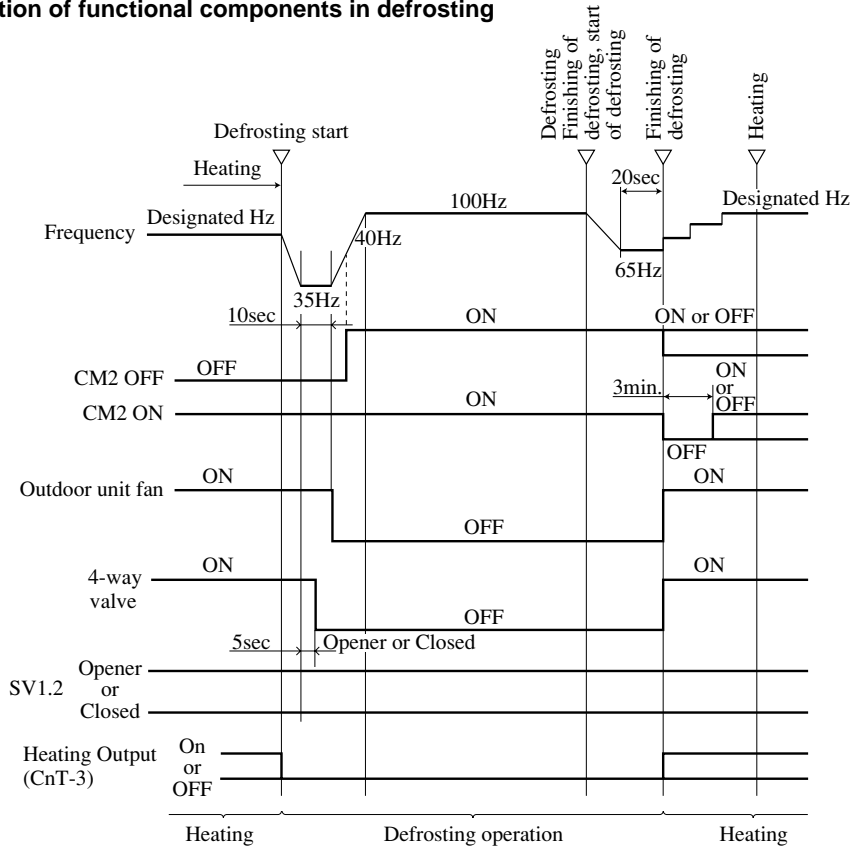
**(i) Conditions for starting defrosting**

When all the following conditions are met, the defrosting operation will start:

- 1) The cumulative operating time of the compressor comes up to 48 minutes after completion of a defrosting operation, or it comes up to 33 minutes after a heating operation starts (the remote controller is turned on).
- 2) Eight minutes has passed after the compressor was turned off and on.
- 3) Eight minutes has passed after end of outdoor unit fan motor control.
- 4) After all the above conditions have been met, the temperature of the heat exchanger thermistor (Tho-R) has been below the defrosting start temperature for three minutes in succession.



**(ii) Operation of functional components in defrosting**



**(iii) Conditions for finishing Defrosting**

When any of the following conditions is met, the defrosting finishing operation will start.

- 1) When the temperature of the heat exchanger thermistor (Tho-R) increases above 14°C (R407C : 20°C)
- 2) When 12 minutes has passed after start of defrosting.

**(e) Compressor operation frequency UP control**

- 1) If any indoor unit demands the maximum frequency for more than 3 minutes continuously during heating operation (provided either one of the following conditions is met), the compressor operation frequency will be increased by 5 Hz. Further increase of 5 Hz will repeat at each time when the maximum frequency is maintained for 3 minutes. However, the frequency will not rise beyond the upper limit of 30 Hz.
  - When there are more than one units of indoor blower of which the thermostats are turned OFF or which are blowing.
  - When one or more units have stopped heating.
  - When the outdoor temperature is below 0°C.
- 2) This control is released when the required frequency becomes lower than the maximum frequency.
- 3) When the protective function that suppresses the frequency is actuated during the control, the protective motion takes place based on the condition in which the frequency has been raised.

**(6) Compressor operation frequency UP/DOWN control**

- (a) When operation starts from the state that the compressor inverter being stopped (CM1), the frequency starts from 5 Hz and rises in the unit of 1 Hz up to 25 Hz.
- (b) The frequency is changed at a rate of 2 Hz per second at the inverter side for both UP and DOWN. However, if the frequency is specified to be 0 Hz, the operation is stopped immediately.
- (c) Inverter frequency is fixed in the range of 25 to 100 Hz. Frequency increases at a rate of 5 Hz/sec in this range.

**(7) Compressor start/stop control**

- (a) Inverter compressor (CM1) will be stopped immediately upon receipt of stop command from the indoor unit or by a serial signal error and when the protective function is actuated on the controller of the unit or inverter.
- (b) If the inverter compressor (CM1) is stopped, the non-inverter compressor (MC2) (for models 224 and 280) will be stopped simultaneously.

**(8) 4-way valve switching assurance**

**At the start of inverter compressor (CM1), the following operations take place regardless of selected frequency.**

**(a) 5 ~ 25 Hz operation**

It is operated in the range of 5 ~ 25 Hz. In this operation, however, the compressor cannot be operated with the current safe or high pressure controls or discharge pipe control.

**(b) 25 ~ 65 Hz operation (only for 224, 280 models)**

Maximum frequency is determined based on the temperature detected with the outdoor air temperature sensor (Tho-A).

- 1) Below 0°C : Maximum frequency is 90 Hz. Operation takes place at 90 Hz for 45 seconds after the start.
- 2) Above 0°C : Maximum frequency is 65 Hz. Operation takes place at 65 Hz for 32.5 seconds after the start.

However, if conditions to start the current safe or high pressure controls or discharge pipe temperature control are met in the mean time, this control is terminated and substituted with the current safe or high pressure controls or discharge pipe temperature control which determines the compressor frequency. When the latter control is released, the operation returns to the normal mode.

**(9) Equipment related to unit protection and maintenance**

**(a) Test run mode [Outdoor unit adaptation]**

- 1) Test run operation mode is controlled from outdoor using switches SW3-5 , 6 which are provided on the outdoor unit control PCB. (This is independent from CnS.)

**Functions of switches**

Switch	Function	
SW3-5	ON	• All indoor units on the connection are operated. • Indoor unit demands the maximum frequency and the outdoor unit is operated at the maximum frequency ((a) 2) according to the demand from the indoor unit.
	OFF	• Normal operation
SW3-6	ON	SW3-5ON : Cooling operation
	OFF	SW3-5 ON : Heating operation

Note (1) This operation is dominant over other options such as the center console, etc. Operation status is transmitted to the optional equipment.

2) Upper limit of frequency during test run operation

Upper limit of frequency is equal to the sum of maximum required frequencies (Hz) of units on the connection.

- 3) During the test run operation, there is no fuzzy control but other controls are effective. Remote controller displays the operation status and a word "Center".

**(b) Compressor protection control**

(i) Start of compressor protection

1) Inverter is operated at the frequency not exceeding the upper limit of 65 Hz for 1 minute and 45 seconds after the start in order for protection of compressor and then changes the frequency to the selected frequency. CM2 (for 224, 280) is stopped for the same period of 1 minute and 45 seconds. If the selected frequency is lower than 65 Hz, the operation continues at the same frequency. However, at the initial start of inverter after turning power ON or starting 6 hours or more after stopping the compressor, the frequency is raised at a rate of 5 Hz/minute starting from 25 Hz for 12 minutes.

(ii) Compressor protection at high frequency

If operation is maintained at 95 Hz or higher for 9 minutes continuously, the frequency is reduced to 90 Hz. The operation continues for 1 minute at the frequency and, if the required frequency of indoor unit is reduced to below 90 Hz by the protective control or others in the mean time, the operation continues at such frequency. After operating at 90 Hz, the frequency is raised at a rate of 5 Hz per 10 seconds.

(iii) Compressor start delay (3-minute timer)

When the inverter compressor (CM1) has been stopped due to the cooling (heating) thermostat operation, by the remote controller start switch, error or others, the compressor start is disabled from 3 minutes. However, the 3-minute timer becomes invalid when the power switch has been turned on.

Compressor (CM2) also does not start for 3 minutes after the stop and, if it has been started and stopped, then it cannot be started for 6 minutes after the start.

(iv) Operation with equal amount of oil (Only for 224, 280 models)

After the CM2 has been operated continuously for 3 hours, the following operations take place:

Step 1: CM1 is operated at 40 Hz with CM2 ON for 3 minutes.

Step 2: CM1 is operated at 90 Hz (224) or 95 Hz (280) with CM2 OFF for 3 minutes.

**(c) Crankcase heater power on detection control**

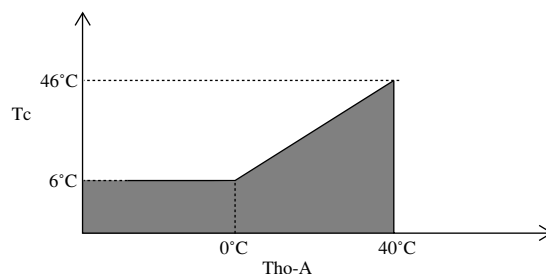
With this control, duration of time when power has been turned ON (CH power on) is accumulated and, when operation is started earlier than 6 hours, frequency is controlled as follows.

(i) Purpose of this control is to protect the compressor dilution ratio at the time of soak out on the compressor.

When the service switch (SW3-3) is turned OFF (setting at shipping), the following controls are performed.

This control is invalid when the switch is turned ON.

- ① When the external temperature (Tho-A) and under-dome temperature (Tc) are in the shadowed area in the following figure, the compressor will not be started.

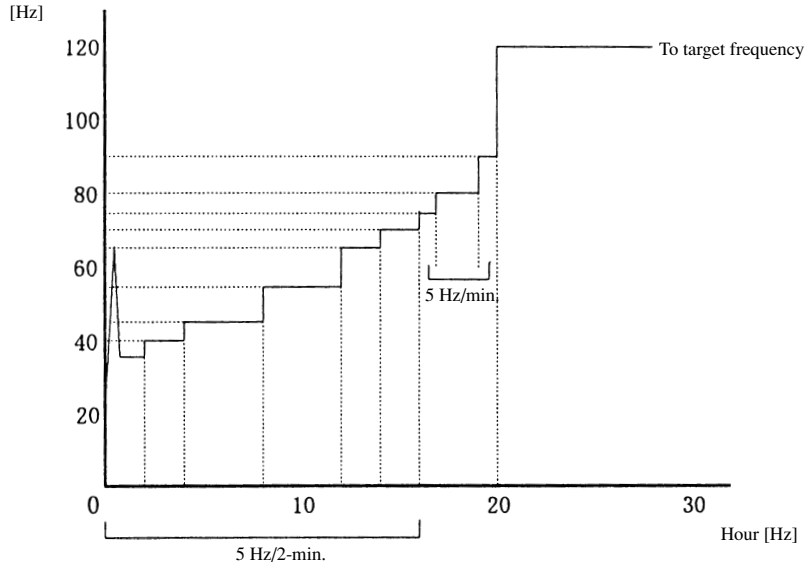


- ② Compressor will be started if either one of the following conditions is met.

- a) 6 hours after power ON
- b) Service switch (SW3-3) ON
- c) When temperatures run out the shadowed area in the step ①.

- ③ While the compressor is stopped by this control, the following data are displayed on the 7-segment display regardless of setting of the display selector switch (SW4).

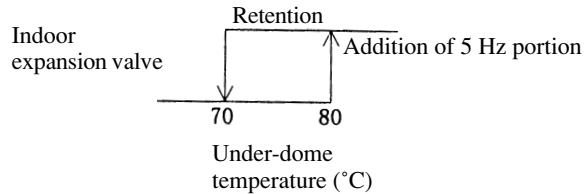
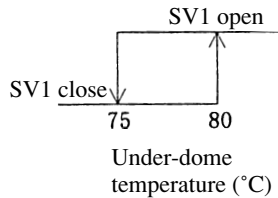
- Immediately after power ON, specify as “360” and the number is reduced by “3” at every 3- minute.  
(This corresponds to 6 hours after power ON and indicates remaining number of minutes.)



Note (1) If operation is stopped within 20 minutes, second and later starts are subject to this control.

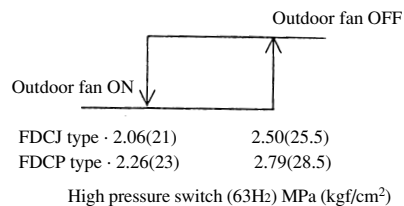
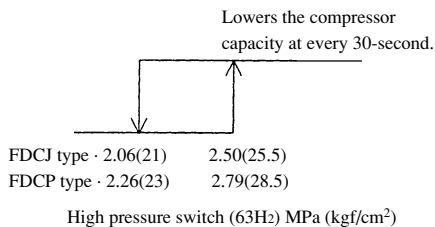
### (d) Under-dome temperature control

Fluid bypass solenoid valve (SV1) and indoor expansion valve are controlled based on the temperature of under-dome thermistor (Tho-C) assembled on the compressor (CM1).



### (e) High pressure control

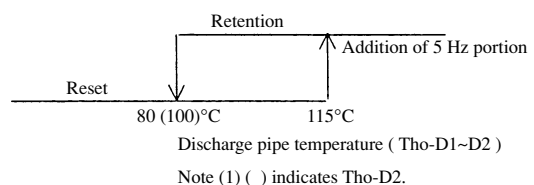
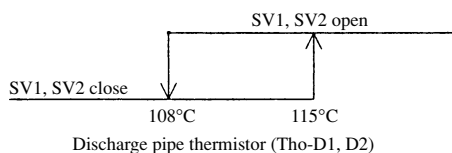
Monitors the high pressure during heating operation so as to turn the outdoor fan OFF and control the compressor capacity.



### (f) Discharge pipe temperature control

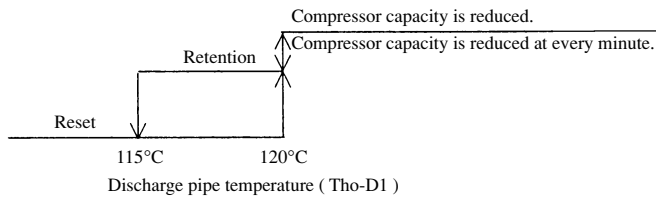
If the discharge pipe temperature (Tho-D1, D2 detection) exceeds the setting value, the temperature rise is suppressed by controlling the liquid bypass solenoid valve, indoor expansion valve and compressor capacity and, if the pressure rises further, the compressor is stopped.

(i) Liquid bypass solenoid valve control



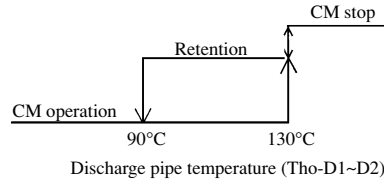


(ii) Compressor control



(iii) Discharge pipe temperature error

- When the discharge pipe temperatures (Tho-D1, D2 detection) rise beyond 130°C and is maintained for 2 seconds, the compressors (CM1, CM2) are stopped but it will be reset if the temperatures drop below 90°C.



- If the discharge pipe temperature (Tho-D1~D2 detection) occurs twice within 60 minutes or the condition higher than 130°C has continued for 60 minutes including the duration of time of compressor stop, the unit operation is stopped with the error stop.

Note (1) Unless the temperature of 90°C or under is maintained for 45 minutes after the discharge pipe error, the unit cannot be started again. (Reset the power supply to clear.)

**(g) Current safe control**

- (i) If the incident current value (T phase of converter entrance) at the inverter entrance exceeds the setting value, the frequency is reduced in the unit of 5 Hz so as to control the operation current.
- (ii) If the required frequency becomes lower than the current safe frequency under this control, the latter frequency dominates the operation.
- (iii) If the frequency is maintained continuously below the reset value for 3 minutes, the operation enters the frequency release mode. If it fails to reduce the frequency for 6 minutes continuously, this control is released and the operation returns to the normal mode.

**(h) Current cut control**

Current cut protects the inverter from overcurrent. If current exceeds the setting value, it stops the inverter immediately and resets the inverter automatically 3 minutes later. After the automatic reset, the inverter starts at 35 Hz and raises the frequency by 5 Hz at every 30-second till the frequency reaches the target value. If the current cut function is actuated four times within 15 minutes, it turns OFF the 52C and stops the operation with the error stop.

**(i) Power transistor overheat protection.**

If the power transistor is heated up to the setting temperature (118°C), the inverter is stopped immediately but reset automatically 3 minutes later or if the temperature drops to the normal level

If the control is actuated again within 2 hours or has continued for one hour, the inverter is stopped with the error stop.

**(j) Expansion valve control for oil return**

When the compressor is started initially after turning power ON or accumulated time of compressor ON exceeds 10 hours, this control stops the compressor, turns the thermostat and blowing OFF and fully opens expansion valves, one by one at intervals of 4 minutes, of the unit stopped with the error stop, in order to collect lubrication oil.

Notes (1) Expansion valves are opened fully in the order of registration of addresses on the outdoor unit not in the order of address No.

(2) Expansion valves are opened for 1 minute on the unit in the cooling or dehumidifying mode or 4 minutes on the unit in the heating mode.

**(k) Abnormal high pressure rise protection**

If either one of high pressure switches [63H1-1, 63H1-2, FDCJ: 2.94 open/2.35 close MPa (30 open/24 close kgf/cm<sup>2</sup>), FDCP: 3.24 open/2.65 close MPa (33 open/27 close kgf/cm<sup>2</sup>)] is actuated twice within 40 minutes, the compressor stops with the error stop.

[However, when the switch is actuated initially, the compressor stops for a delay of 3 minutes and then returns to the normal operation.]

**(l) Non-inverter compressor (CM2) overcurrent protection (Only for 224, 280 models)**

If the T phase current at the secondary side of 52C2 is detected exceeding the setting value for approx. 0.5 second, the compressor stops. The compressor is reset automatically after a 3-minute delay. If the error is detected at second time within 40 minutes after the initial detection, the unit stops with the error stop.

**(m) Compressor oil level protection**

When operation has continued at less than 30 Hz for 9 minutes or more, and if operation at 35 Hz per minute continued for 30 minutes or more, CM1 is stopped forcibly for 3 minutes.

However, when the frequency is at less than 30 Hz the protective control has been actuated, its control dominates.

**(n) Compressor (CM1) motor lock protection**

If the current value exceeds the setting value for 0.5 seconds continuously during operation, the compressor stops. If the current detected after a 3- minute delay is less than 2A, the compressor can be started again.

If the detection is repeated 5 times within 60 minutes after the initial detection or the condition that the current does not drop below 2A continues for 10 minutes after the first to fourth stops of compressor, the compressor stops with the error stop.

**(o) Open phase protection**

(i) When CM1 is on ( $\geq 20\text{Hz}$ ) and there is L3-phase current of 0.5 A or less for 10 continuous seconds, it is determined to be a phase fault and CM1 and CM2 are set to off.

(ii) If this is detected 5 times within 60 minutes of the first detection, an error stop is performed. If (i) is detected when CM1 is on within 10 minutes of the power being turned on, an error stop is performed on the first detection.

(iii) If the CM2 L3-phase current is 2 A or less for 5 continuous sections after CM2 has gone on, it is determined to be a phase fault and an error stop is performed.

**(p) Antiphase protection and open L2 phase at 52C1 primary side**

This function monitors the phase order on the primary side of 52C1 (whenever power is turned ON) and judges L1 → L3 → L2 → L3 as the antiphase (monitors simultaneously also open phase of L2 phase at the primary side). If the antiphase continues for 2 seconds, the compressor is stopped with the error stop.

**(q) Indoor unit connection number protection**

If the number of indoor units on the connection exceeds the number as listed below, the compressor stops with the error stop.

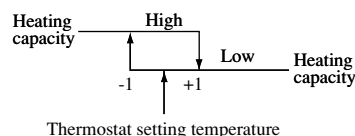
Item \ model	140 model	224, 280 model
Number of units on connection	10 units	16 units

Note (1) They are the numbers of units used for judgement of error for the purpose of control and not equal to the numbers of units which can be connected.

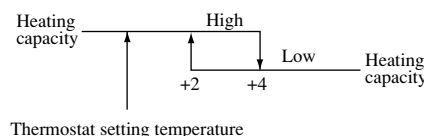
**(10) Value shift adjustment of room air temperature detection in heating**

Under the standard specifications, the room temperature is adjusted at the setting temperature by controlling the indoor unit capacity based on the setting temperature of thermostat and the suction air temperature.

However, where the unit is installed in the ceiling and warm air tends to stay around the ceiling, temperature in the living space may not be adjusted at the setting temperature. In such occasion, it is recommended to change the setting of dip switch SW5-2, which is found on the PCB of the indoor unit, to ON position so that the capacity control is tripped at +3 above the setting temperature of thermostat and thus the heating feeling will improve.



**Standard**

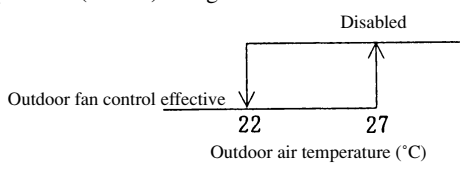


**With SW5-2 "ON"**

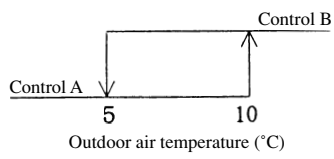
Note (1) Refer to page 911 for position of SW

**(11) Cooling operation control at lower outdoor air temperature (down to -5°C)**

(a) This control starts 1 minute after starting compressor during cooling or dehumidifying operation, controls the outdoor fan at the outdoor temperature (Tho-A) being below 22°C and enables the cooling operation.



(b) Outdoor fan control



- Control A  
For 140 : OFF, 1 ~ 2 speed control ranges  
For 224, 280 : OFF, 1 ~ 3 speed control ranges
- Control B  
For 140 : 1 ~ 3 speed control ranges  
For 224, 280 : 1 ~ 4 speed control ranges

**Outdoor fan tap**

**140 model**

Fan tap	3 speed	2 speed	1 speed	OFF
FM <sub>01</sub>	Hi	Me	Lo	OFF

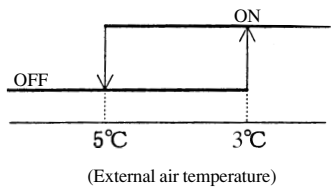
**224,280 models**

Fan tap	4 speed	3 speed	2 speed	1 speed	OFF
FM <sub>01</sub>	Hi	Hi	Me	Lo	OFF
FM <sub>02</sub>	ON	OFF	OFF	OFF	OFF

(c) In cases of 224 and 280 only, the low outdoor air cooling control is releases temporarily when the number of operating compressors is changed (1 unit → 2 unit) and the outdoor fan is operated in the Hi mode. The low outdoor air temperature cooling control becomes effective 2 minutes later.

**(12) Snow protection fan control**

If J6 on the outdoor unit PCB is opened, the outdoor fans on the units which have been stopped with the total or error stop are operated in the Hi mode once at every 10-minute while the outdoor temperature is lower than 3°C.



**(13) Forced heating/cooling operation**

With this control, SW3-7 on the outdoor unit PCB is turned on and CnG (equipped with short circuit pin) is shorted or opened so as to forcibly determine whether the indoor unit is operated for cooling or heating. If any operation mode other than the forcible mode is commanded from the indoor unit, the mode unmatched message is displayed on the remote controller or others and the operation enters in the blowing mode.

SW3-7	CnG	Operation
OFF	Open/short	Normal operation
ON	Open	Cooling
	Short	Heating

Note (1) SW-7 is at OFF and CnG is open at the shipping from factory.

**(14) Silent mode control**

Silent mode is selected if the CnG (equipped with short circuiting pin) is shorted during normal operation.

- (a) When the highest speed for the specific model of outdoor fan (140 : 3 speed, 224, 280 : 4 speed) is selected, the speed is stepped down by one step.

However, the following cases are excluded:

- ① For 30 seconds after starting operation
- ② For 30 minutes after the compressor stop due to actuation of 63H1 or CT2 during cooling
- ③ For 2 minutes after changing the number of operating compressors from 1 to 2 units

- (b) Upper limits of compressor operation frequency are specified as follows. (Excluding during defrosting)

140: 65 Hz (CM1 - 90 Hz)                      224: 100 Hz (CM1 -80 Hz, CM2 - ON)  
280: 115 Hz (CM1 - 80 Hz, CM2 - ON)

**(15) Backup operation (Only for 224, 280 models)**

If the dip switch SW3-2 is turned ON, operation continues with CM1 (inverter compressor) only for emergency when CM2 (without inverter) is stopped by trouble.

- (a) Upper limit of operating frequency is set at 90 Hz for 224 or 95 Hz for 280 and distributed to indoor units proportionally divided.
- (b) Overcurrent error, open T phase error, discharge temperature error (Tho-D2) and discharge pipe sensor error (Tho-D2) on CM2 are not detected.

**(16) Indoor/outdoor connection unmatched check function**

If dip switches SW3-4, 5 and 6 are turned ON, a test run operation is performed from outdoor so as to inspect the unmatched connection between indoor and outdoor.

**(a) When crankcase heater power ON control is effective**

- 1) Both in- and outdoor units are stopped after a cooling test run operation till the operation time of compressor (CM1) is accumulated at 16 minutes.  
(Indoor expansion valve fully open, indoor fan OFF, "Center" display on remote control)
- 2) Heat exchanger temperatures on all indoor units are checked 3 minutes later or after release of 6-minute start delay of CM2. Then outdoor units only are started to check, at intervals of 20 seconds, if the indoor heat exchanger temperatures have dropped 7 degrees or more compared with those before the re-start.
- 3) If there is any unit on which the temperature does not drop 7 degrees or more after continuing the check for 5 minutes, the error is displayed on the remote controller and the outdoor unit.  
If it is normal, "- - -" is flashed on the 7-segment indicator and the unit is stopped.  
Flashing on the 7-segment indicator can be returned to the normal display by turning SW3-4 to OFF.

**(b) When the crankcase heater power ON control is not operating****(i) During normal operation**

- 1) Both indoor and outdoor units are stopped after cooling test operation for 3 minutes. (Indoor expansion valve fully open, indoor fan OFF and "Center" display on remote controller)
- 2) Heat exchanger temperatures on all indoor units are checked 3 minutes later or after release of 6-minute start delay of CM2. Then outdoor units only are started to check, at intervals of 20 seconds, if the indoor heat exchanger temperatures have dropped 7 degrees or more compared with those before the re-start.
- 3) Detail of display is same as (a), 3) above.

**(ii) When the compressor has been stopped for more than 6 hours**

- 1) Cooling test run operation is continued till the compressor (CM1) operation time is accumulated at 8 minutes and then both in- and outdoor units are stopped.  
(Indoor expansion valve fully open, indoor fan OFF, "Center" display on remote controller)
- 2) Heat exchanger temperatures on all indoor units are checked 3 minutes later or after release of 6-minute start delay of CM2. Then outdoor units only are started to check, at intervals of 20 seconds, if the indoor heat exchanger temperatures have dropped 7 degrees or more compared with those before the re-start.
- 3) Detail of display is same as (a), 3) above.

**(17) FILTER sign**

When the operation time (time when the ON/OFF switch is turned to ON) is counted up at 600 hours <sup>(1)</sup>, the filter sign on the remote controller flickers.

This condition can be reset any time with the “Filter reset” switch. It is effective also to turn power OFF to reset.

Note (1) The function is invalidated if the jumper wire (J4) is opened. (See page 911 for the location of PCB.)

**(18) Auto Swing Control (Excepted FDR, FDUM, FDFL, FDFU models)**

(a) Have a louver motor to move the louvers up and down for the so called “AUTO SWING” function.

(b) The louver auto swing starts when the AUTO SWING switch is pressed once and stops when the AUTO SWING switch 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.)

**(c) Stopping the louvers**

When the AUTO SWING switch 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 J2 on the indoor unit printed circuit board is cut, the louvers stop immediately at the AUTO SWING switch is pressed to stop them and the LCD display changes to show this position. Refer to page 911 for position of jumper wire J2.

**(d) Movement of louver when the power supply to the controller controlling 4 positions of the louver is switched on.**

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.

**(e) Keeping the louvers horizontal during heating**

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 switch (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 louver and the LCD display return to their previous positions. (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 setting of the ON/OFF or AUTO SWING switches.)

**(19) Condensate pump motor (DM) control (Only FDT, FDTW, FDTS, FDR, FDUM models)**

(a) Drain motor is started no sooner than the compressor is turned ON during cooling or dehumidifying operation. The drain motor continues to operate for 2 minutes after the stop of unit operation, stop with the error stop, thermostat stop and at switching from cooling or dehumidifying operation to blowing or heating operation. When there is any unit subjected to oil return control, the drain motor is operated for 3 minutes at such occasion.

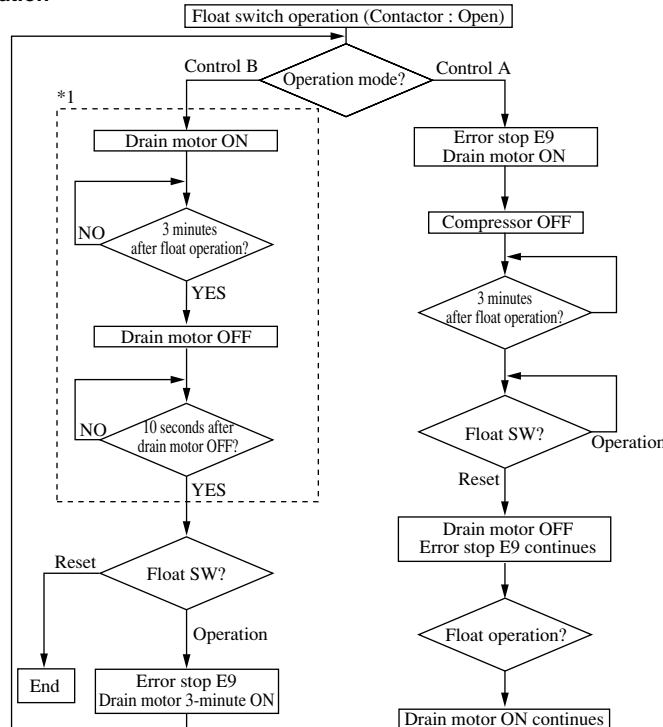
Note (1) Drain motor may be operated forcibly by turning ON the dip switch SW<sub>5.3</sub> on the PCB. Turn the switch OFF to stop the drain motor.

(b) Overflow detection is always operable by means of the float switch regardless of operation modes. If the overflow is detected (or when the float switch is disconnected or its wire is broken), operation is stopped with the error stopped. (FDT, FDTW, FDTS, FDR and FDUM) If the overflow is detected while the drain motor is stopped, the drain motor is operated for 3 minutes and then the overflow detection is performed to judge whether it is normal or not.

Indoor unit operation mode					
	OFF <sup>(1)</sup>	COOL	DRY	FAN <sup>(2)</sup>	HEAT
During compressor ON		Control A			
During compressor OFF		Control B			

Notes (1) Including OFF and error stop during COOL, DRY, FAN and HEAT.  
 (2) Including "FAN" operation due to unmatch of operation mode.

### • Flow chart of drain motor operation



\* 1 In the flow in the frame of broken line, operations of operation mode change and thermostat reset are effective and operated immediately upon selection. However, the compressor ON command is not transmitted.

#### (1) Control A

- If the float switch detects the draining, operation is stopped with the error stop (E9 is displayed) and operate the drain pump.
- Float switch is checked 3 minutes later on the unit stopped by the error and, if the error persists still, the drain motor is left at ON but, if the error has already been reset, the drain motor is turned OFF. E9 is displayed till the error is reset.

#### (2) Control B

- If the float switch detects the draining, the expansion valve is closed, the drain motor is turned ON for 3 minutes and, as 10 seconds elapses after the drain motor OFF, the float switch is checked. If the result is normal, the operation stops in the normal way while, if it is not normal, E9 is displayed, the drain motor is turned ON and the operation stops with the error stop with the expansion valve being closed completely. (It is left at ON while the draining is detected.)

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

#### (a) External control (remote display) output

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

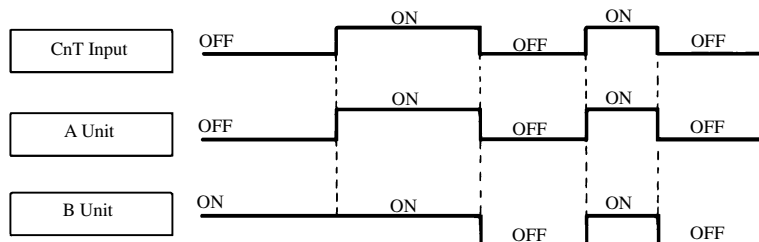
- Operation output: Power to engage DC 12V relay (provided by the customer) is outputted during operation.
- Heating output: Power to engage DC 12V relay (provided by the customer) is outputted during the heating operation.
- Compressor ON output: Power to engage DC 12V relay (provided by the customer) 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.

**(b) 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 CnT is invalid.

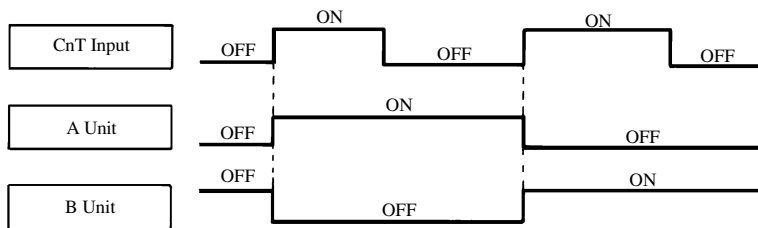
(i) At shipping from factory (SW5-1 on PCB OFF)

- 1) Input signal to CnT OFF → ON [Edge input] Air conditioner ON
- 2) Input signal to CnT ON → OFF [Edge input] Air conditioner OFF



(ii) When SW5-1 on the PCB of indoor unit is turned on at the field.

Input signal to CnT becomes valid at OFF → ON only and the motion of air conditioner [ON/OFF] is inverted.



**(21) Multiple Units Control-Simultaneous Control of 16 unit with one remote controller**

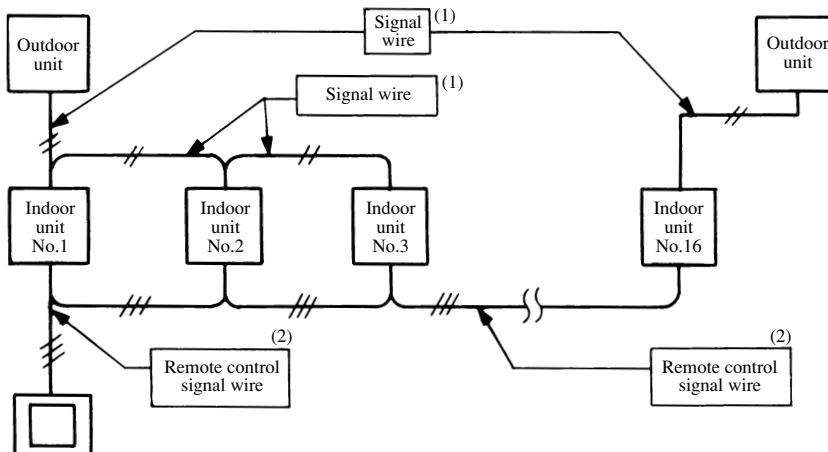
**(a) Function**

Multiple units (even of outdoor different systems, 16 units maximum) can be simultaneously controlled by using a remote control switch (a special order item). The remote control switch is used to set the “operation mode”, and all the unit can be operated and stopped at intervals of 0.5 to 1 second in the order of unit number. Thermostat and protective functions of each unit functions independently.

Note(1) When part of the group gets out of order (the protective device operates), the relevant unit comes to an abnormal stop, but other normal units keep operating.

**(b) Wiring Procedures**

- (i) Lay power cable of each unit and signal wire as usual. (Remove the remote control switches from all units excluding only one unit.)  
Lay wiring for the remote controller separately from power cable and wires for all other electrical equipment.
- (ii) Arrange the terminal block (X, Y, Z) of the remote controller as shown next page for the simultaneous control, and lay cross over in each indoor unit.



Notes (1) The overall length of the signal wire shall be less than 1000m.

(2) The length of remote control signal wire and crossover for remote controller between room shall be less than 600m.

**(22) External input operation**

External input: From CnS1, operation permission/prohibition control; From CnS2: Demand control/normal operation switching.

- J1: Switches between CnS1 and CnS2 input method.

J1 short circuit: Level input by CnS1 and CnS2.

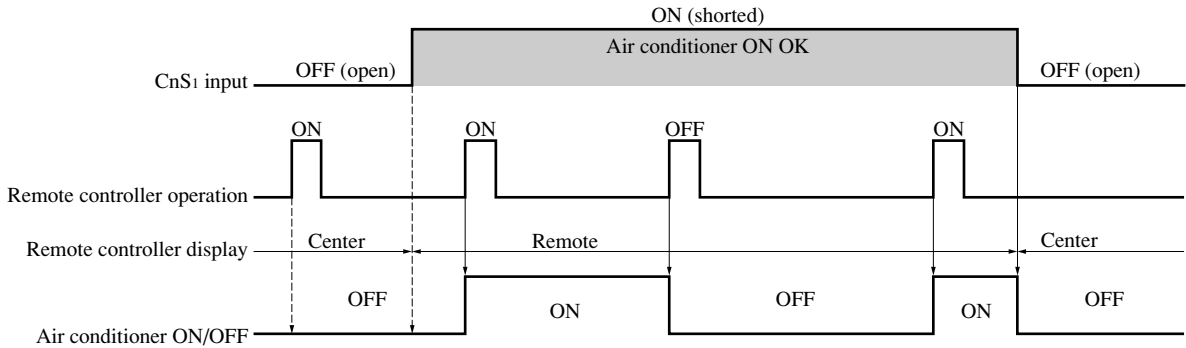
J1 open: Pulse input by CnS1 and CnS2.

**(a) From CnS1, operation permission/prohibition control**

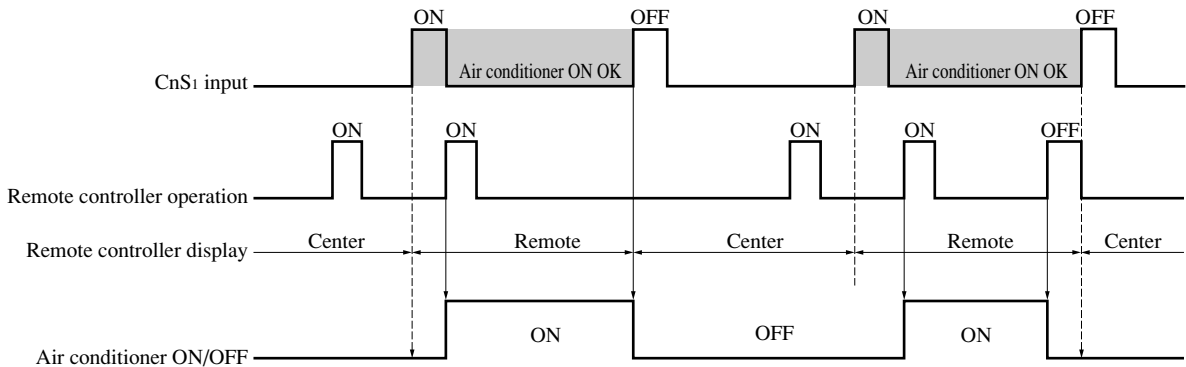
Input : CnS1	CnS1 input method change: J1	CnS1 : Operation permission/Prohibition mode change
Short circuit Disconnection	J1; Short circuit Lever input	Operation prohibition mode → Operation permission mode
	J1; Disconnection Pulse input	Operation permission/Prohibition model change (Reversal)
Short circuit Disconnection	J1; Short circuit	Operation permission mode → Operation prohibition mode
	J1; Disconnection	— (NOP)

- 1) The remote controller displays the operating mode. "To Option" sends the operating mode.
- 2) CnS1, performs the following operations by the changing of jumper wire J1 from short circuit to open circuit.  
If pulse input, the pulse duration is 500 ms or more.

① Operation with J1 short circuit

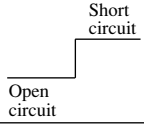
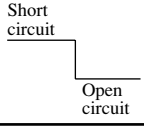


② Operation with J1 disconnection





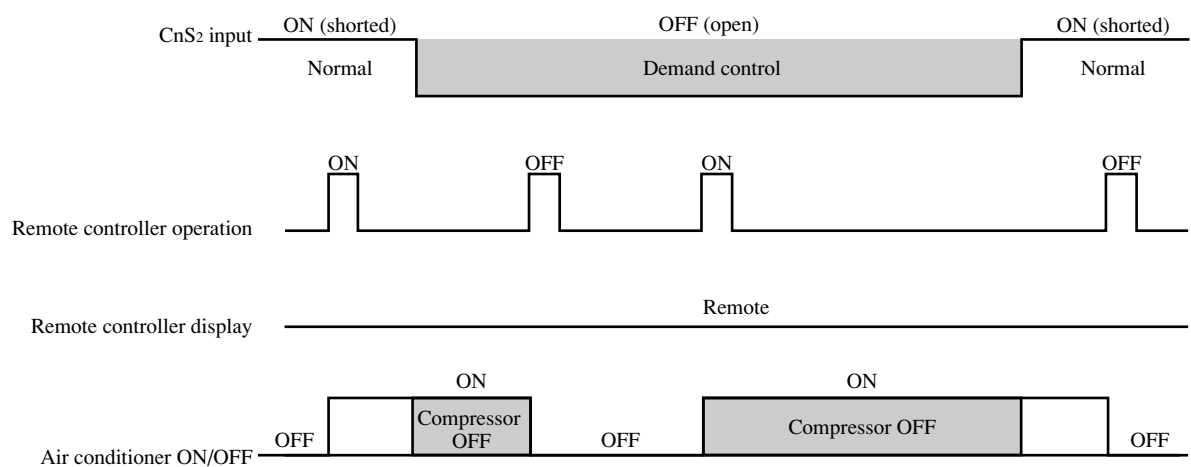
(b) From CnS2, operation permission/prohibition control

Input : CnS2	CnS2 input method Formula switching: J1	CnS2 : Demand control/normal operating switching
	J1; Short circuit Level input	Demand control → Normal operation
	J1; Open circuit Pulse input	Normal operation/Demand control switching (Reversal)
	J1; Short circuit	Normal operation → Demand control
	J1; Open circuit	— (NOP)

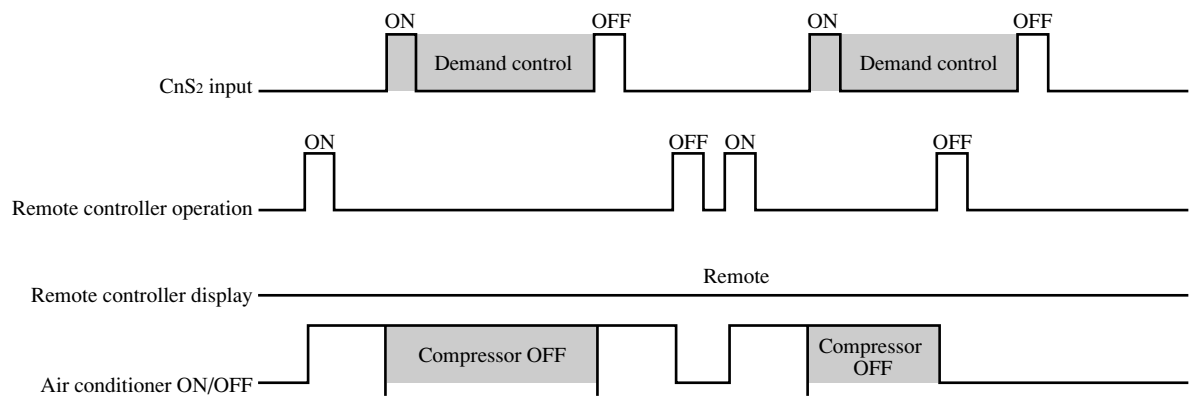
Note (1) The factory settings are: J1 - short circuit; CnS2 - short circuit (short pin connection)

- 1) The remote controller displays the operating mode. “To Option” sends the operating mode.
- 2) Demand control  
Sets all compressors to OFF.
- 3) CnS2, performs the following operations by the changing of jumper wire J1 from short circuit to open circuit.  
If pulse input, the pulse duration is 500 ms or more.

① J1 - Short circuit







② J1 - Open circuit



## 19.5 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,  and , 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  section. However, there is also a possibility of serious consequences in relationship to the points listed in the  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.
- 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.

## 19.5.1 Installation of indoor unit

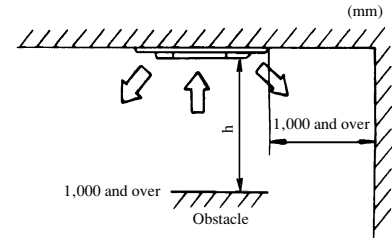
### (1) Ceiling recessed type (FDT)

#### (a) Selection of installation location

- 1) Select location where the space above ceiling is larger than those mentioned below and perfect draining can be assured.
- 2) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
- 3) Places free from air disturbances to the air inlet and outlet of the indoor unit.
- 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.)
- 5) Do not place where the unit is exposed to oil splashes or steam (e.g. kitchens and machine plants). (Installation and use at such places will cause the performance drop, corrosion in the heat exchanger and damage in molded synthetic resin parts.)
- 6) Do not place 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.
- 7) Do not place adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals, Generated noise may cause malfunctioning of the controller.

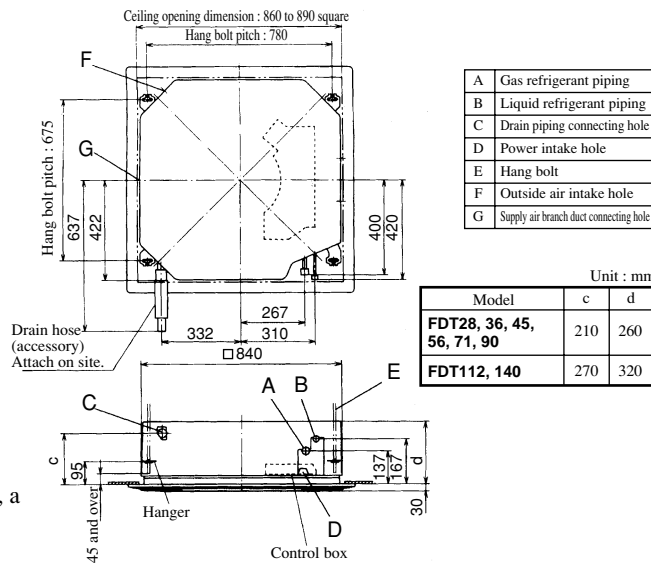
Type	Space above ceiling (h)
FDT28, 36, 45, 56, 71, 90	Over 270mm
FDT112, 140	Over 330mm

#### • Installation space



#### (b) Preparation for installation

- 1) Ceiling hole size and Position of suspension bolts.
  - a) The pattern sheet may shrink or expand as humidity changes, so check the actual size before use.
  - b) The size of ceiling opening can be adjusted within the range shown below. Bring the unit body to the ceiling opening right in the center so as not to be set aside and so that space between a ceiling opening end and the outside of the unit body becomes equal to that on the opposite side.
  - c) The size of the pattern sheet equals to the maximum size of the square ceiling opening.
- 2) Location of pipes  
For the location of pipe, see the exterior dimension.



#### (c) Hanging

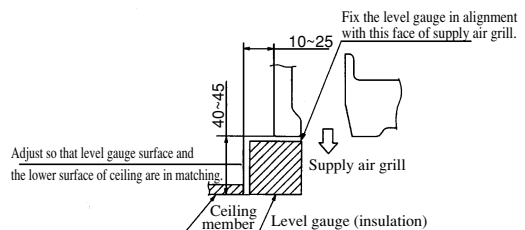
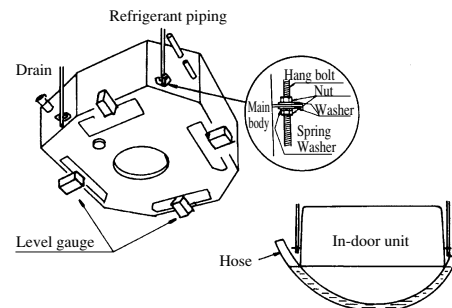
- Arrange four sets of a hang bolt (M10 or M8), a nut for it, a plain washer and a spring washer on site.

#### When there is the ceiling

1. Make an 860 to 890 mm-square cutout on the ceiling.  
Refer to the outside dimensions of packing cardboard container.
- ▶ Align the center of ceiling cutout and the center of unit.
2. Decide the hang bolt position (675 × 780).
3. Use four hang bolts and fix them so that each bolt can resist the pull out load of 50 kgf.
4. Decide the length of hang bolt to approx. 70 mm above the ceiling surface.
5. After hanging in the unit, fix the attached level gauge and secure the height of unit.
6. Use a transparent hose filled with water to check the levelness of unit.  
(The maximum allowable height difference between both ends of unit is 3 mm.)

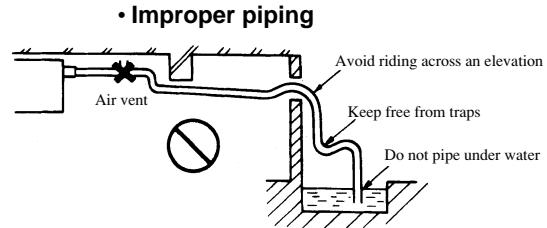
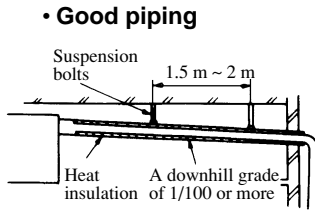
#### Request

- For the hang bolt whose length exceeds 1.3m, use the M10 size hang bolt and moreover combine a diagonal member to the hang bolt for reinforcement.

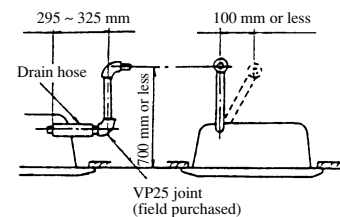
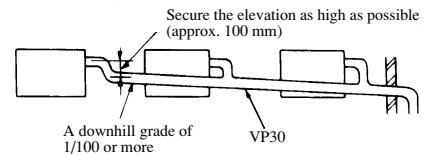
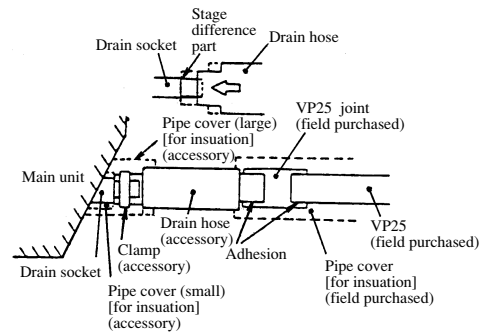


**(d) Drain Piping**

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



- 2) When connecting the drain pipe to 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.
- 3) For drain pipe, use hard PVC general purpose pipe VP-25(I.D.1") 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).
- 4) 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. Use VP-30(1 1/4") or thicker pipe for this purpose.
- 5) Be sure to provide heat insulation to hard PVC pipes of indoor placement.
- 6) Do not ever provide an air vent.
- 7) The height of the drain head can be elevated up to a point 700 mm above the ceiling 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 event 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 within the distance given in the sketch below.
- 8) Avoid positioning the drain piping outlet at a place where generation of odor may be stimulated. Do not lead the drain piping direct into a sewer from where sulfur gas may generate.
- 9) The purpose of drain hose is to absorb minute discrepancy of the unit or the drain piping occurred when they are installed. Therefore, when it is bent intentionally or used under expanded condition, it may be damaged and result in water leakage.



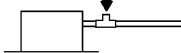
**Drainage Test**

- 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.

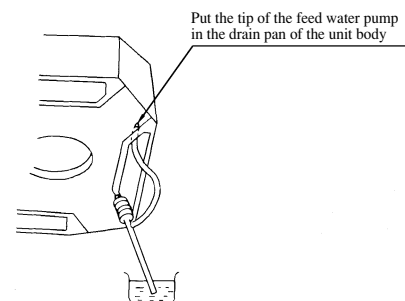
**Procedures**

- ① Supply about 1000 cc of water to the unit through the air outlet by using a feed water pump.

Pour water into a convex joint



( If the electrical work has not been completed, connect a convex joint in the drain pipe connection to provide a water inlet. Then, check if water leaks from the piping system and that drain flows through the drain pipe normally. )



- ② Check at the exhaust port if drain is flowing.  
(Note) Conduct this test paying attention to rotating sound of the drain motor.
- ③ Remove the drain plug located on the bottom of the drain pan when the water has to be evacuated from the unit.
- ④ After the test, fit the drain plug to the original place and turn off the power source.

**(e) Fixing of Decorative Panel (The panel fixing bolts are attached on the panel.)**

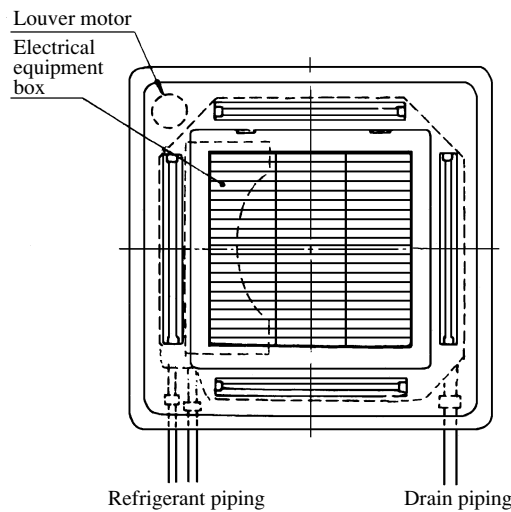
- 1) Check with the accessory level gauges that indoor unit height and the size of ceiling hole are correct.
  - Remove the level gauges from the indoor unit before fixing the decorative panel.
- 2) Screw two bolts out of four accessory bolts less than 5 mm in the indoor unit diagonally.
- 3) Hang the panel on the two bolts and fix them temporarily.
- 4) Tighten the bolts fixed temporarily and the remaining two bolts.  
Screw the remaining two bolts, and tighten all (four) bolts.
- 5) Connect the louver motor connector (red) to the panel respectively.
- 6) If the louver motor is not operated by remote control, check if the connector is connected correctly, and turn off the power for more than 10 seconds, then reset it.

**Panel Joint Setting**

- The panel can turn 30 mm to the left and to the right in all (approx 2°), and the indoor unit turns 30 mm to the left and to the right in all (approx 3°), But, it cannot turn if the panel is secured.

**Limit in Fixing Panel**

- ① Fix the panel only in the direction shown in the figure.
- ② If it is fixed in other way, air will leak. Also, wires cannot be connected for auto swing and receiver amp.

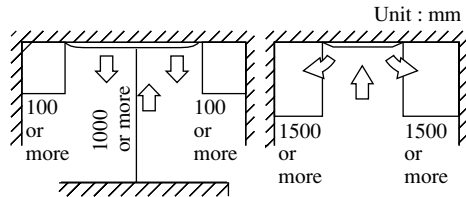


**(2) 2-way outlet ceiling recessed type (FDTW)**

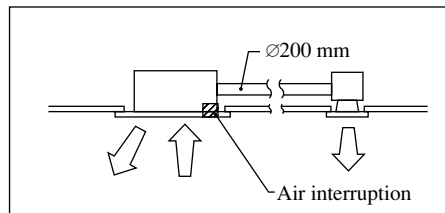
**(a) Selection of installation location**

- 1) This unit is a ceiling surface direct return air and direct supply air type.  
Install the unit a place the allows air to reach every part of the room, in accordance with the shape and heigh of the room.

**• Installation space**



- 2) This unit permits connecting a branch duct (B 200 mm) according to the method shown in the figure below so that air distribution may be improved to the shape of the room. (For the connecting part of the duct, refer to the exterior dimension on page 760.)



**3) Cold air throw**

Unit : m

Models	FDTW28, 45, 56 type	FDTW71, 90 type	FDTW112 type	FDTW140 type
<b>Item</b>				
<b>Standard</b>	4.0	4.5	4.7	5.0
<b>UHi</b>	4.5	5.0	5.2	5.5

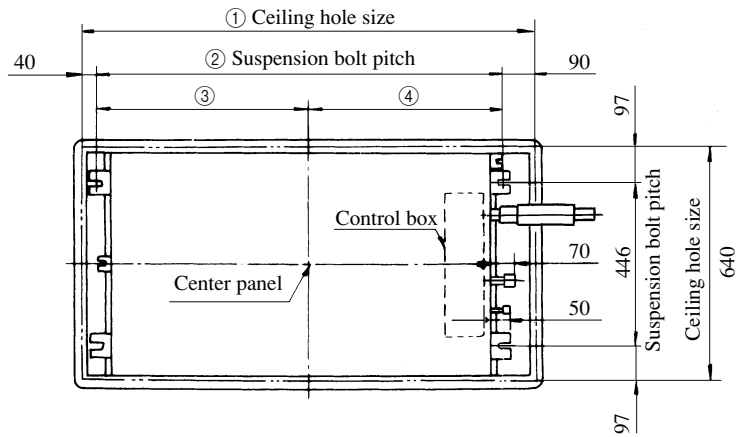
Note (1) The cold air throw is the same in 2 directions.  
Conditions:  
1. Unit height: 3.0 m above the floor  
2. Fan speed: Hi  
3. Location: Free space without obstacle  
4. The throw is as the per the table above.  
5. Air velocity at the throw: 0.3(m/s)

- 4) Places where chilled or heated air circulates freely. When the installation height exceeds 3.5m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
- 5) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
- 6) 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.
- 7) 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.)

- 8) 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.
- 9) 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.
- 10) Place adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.

**(b) Preparations for installation**

- 1) Ceiling hole and suspension bolt positions
  - a) The pattern sheet shrinks or expands as humidity changes, so check the actual size before use.
  - b) The ceiling hole sizes and suspension bolt sizes are shown in the following figure.



**Dimension table**

Unit : mm

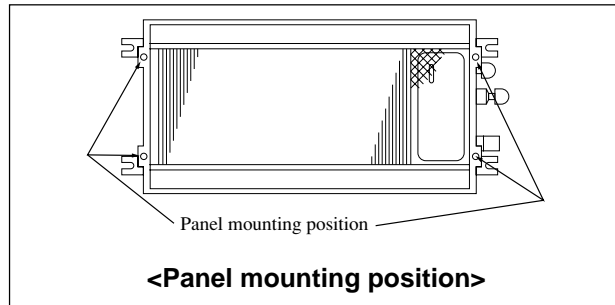
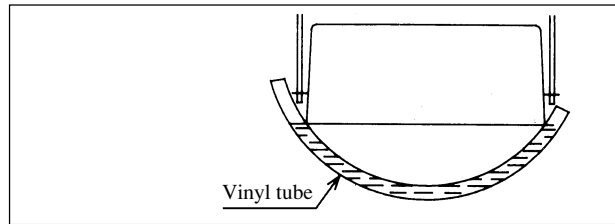
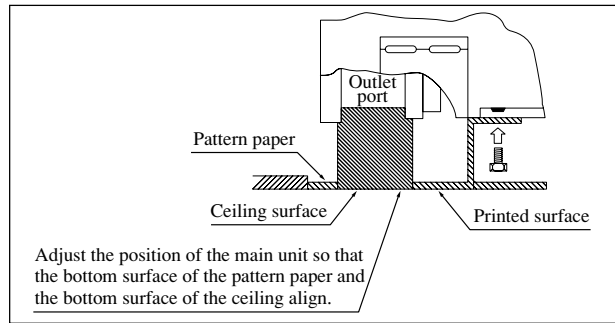
Mark	①	②	③	④
<b>FDTW28, 45, 56 type</b>	1015	885	468	417
<b>FDTW71, 90 type</b>	1260	1130	590	540
<b>FDTW112, 140 type</b>	1730	1600	825	775

**(c) Installation**

For the suspension bolt, use four M10 or W 3/8 bolts and secure so that each bolt can withstand a 50 kg/f pullout load.  
Use a suspension bolt length that extends approximately 95 mm for the ceiling surface.

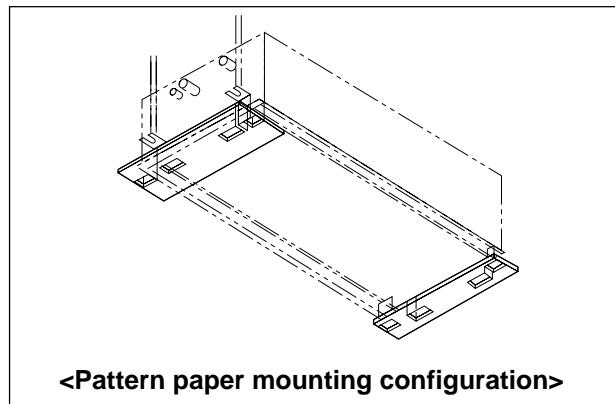
## A. If there is a ceiling

- 1) Open the hole in the installation location to the ceiling opening dimensions.
- 2) Install the suspension bolts (procured locally) at the designated locations.  
(Use care as the center of the spacing for the suspension bolts is not at the center of the panel.)
- 3) Hang the unit, use the four bolts to mount the pattern paper provided to the panel mounting section and adjust the height.
- 4) Use a level or transparent hose with water in it to confirm that the unit is level. If the unit is not level, problems such as water leakage or improper operation of the float switch could occur.
- 5) After confirming the above, secure the unit in position.



## B. If ceiling is to be installed later

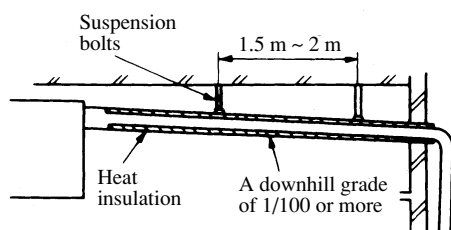
- 1) Follow steps A2 to A4 in the previous section "A. If there is a ceiling" to install the unit and mount the pattern paper.
- 2) When the ceiling is installed, the outer perimeter of the pattern paper can be referred to for making the opening in the ceiling.
- 3) After checking the height and that the unit is level, secure the unit in position.



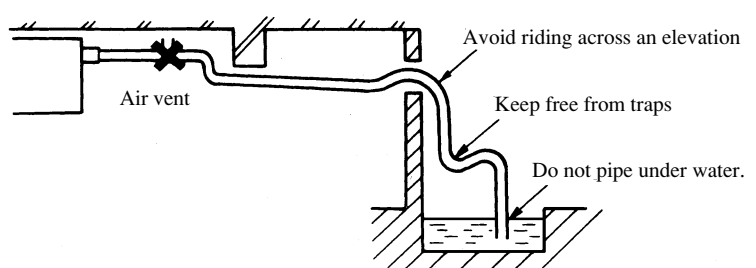
## (d) Drain piping

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

### • Good piping

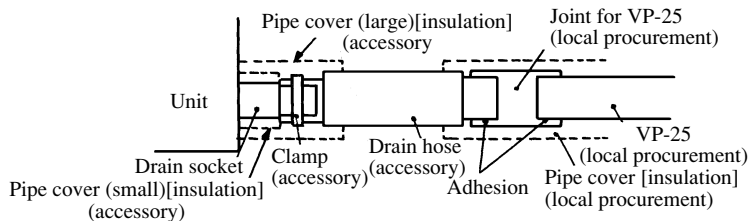
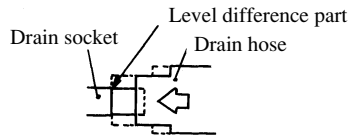


### • Improper piping

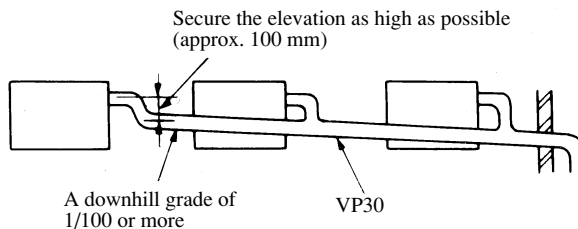




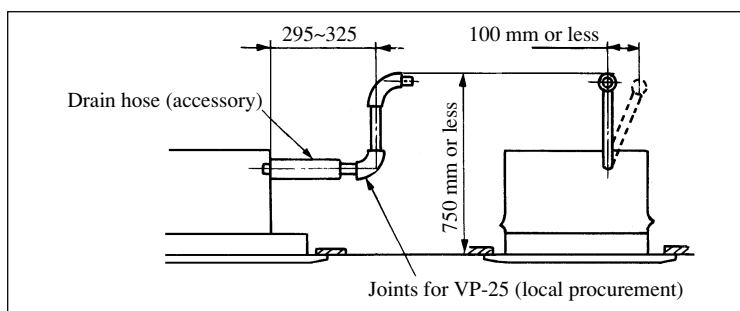
- 2) When connecting the drain pipe to the unit, pay sufficient attention not to apply excess force to the piping on the unit side. Also, fix the piping at a point as close as possible to the unit.
- 3) For drain pipe, use hard PVC general purpose pipe VP-25 (I.D.1") which can be purchased locally. When 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).



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



- 5) Be sure to provide heat insulation to hard PVC pipes of indoor placement.
- 6) Do not ever provide an air vent.
- 7) The height of the drain head may be elevated up to a point 750mm above the ceiling 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.



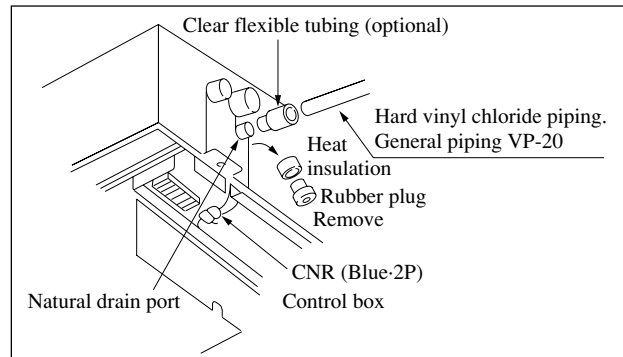
- 8) Avoid positioning the drain piping outlet at a place where generation of odor may be stimulated. Do not lead the drain piping direct into a sewer from where sulfur gas may generate.

**When Using a Natural Drain Port**

- 1) Remove the heat insulating material and rubber plug of the natural drain port.
- 2) By using the natural drain connecting tube (option), connect the drain pipe (VP-20) and completely clamp it with a clamp.  
Note (1) If the drain pipe is directly connected to the natural drain port, the drain pan becomes unremovable.
- 3) Disconnect the connector CNR (blue, 2P) for the drain motor.

## FDC-HKX

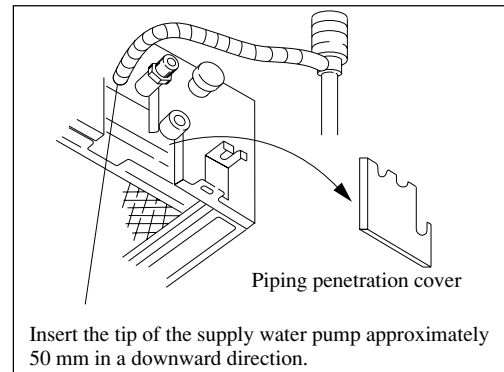
Note (1) If the connector remains connected, drain water is discharged from the standard pipe connecting port, leading to water leakage.



### Drainage Test

When using the standard drain port, execute a drainage test after completion of electric work.

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



- 1) Inject about 1,000cc by using a feed water pump from the grommet on the drain pump side.
- 2) At the drain port (transparent portion), check if drainage is performed.
- 3) After completion of the drain test, completely perform heat insulation for the drain pipe up to the main unit.

### (g) Fixing of Panel ( The panel fixing bolts are attached on the panel. )

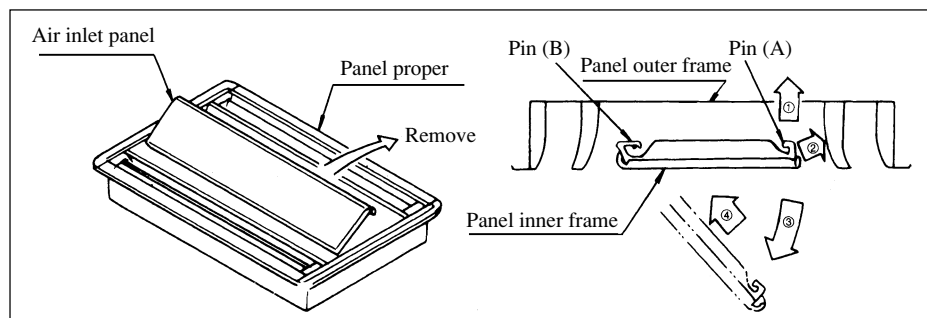
Note (1) Care should be exercised in handling the supply air port on the panel because it is easily depressed by finger nail.

- 1) Check with the accessory level gauges that the indoor unit height and the size of ceiling hole are correct.

Notes (1) Remove the level gauge from the indoor unit before fixing the panel.

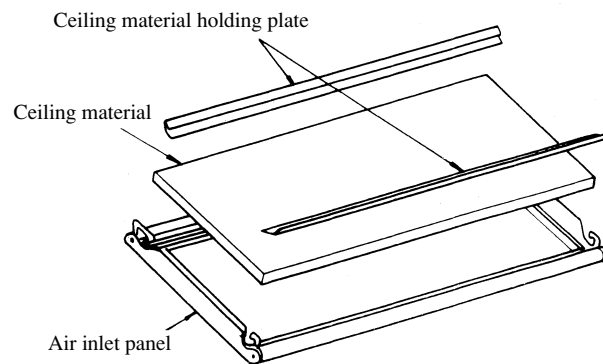
- (2) Remove the Air inlet panel from the panel proper.

### Procedure for Dismounting the Air inlet Panel



- a) Remove the panel from the pin (A) in the order of the arrows ① and ②.
- b) Open the panel slightly as shown by the arrow ③ and move it to the arrow ④. Then remove it from the pin (B).
- 2) Screw two bolts out of four accessory bolts less than 5mm in the panel diagonally.
- 3) Hook the panel on the two bolts and set it temporarily.
- 4) Tighten the bolts fixed temporarily and the remaining two bolts.
- 5) Connect the louver motor connector (white, 3P) and the limit switch connector (white, 2P) to the panel respectively.
- 6) When the louver motor cannot be operated by remote controller operation, check the connector connections and turn off the power supply for 10 seconds or more for resting.

**For Ceiling Material Inlaid Panel**



**• Ceiling Material Dimensions**

Unit : mm

Models	FDTW28, 45, 56 type	FDTW71, 90 type	FDTW112, 140 type
Item			
Width	300	300	300
Length	970	1215	1685

- ① Remove the air inelt panel from panel proper.
- ② Remove the ceiling holding plates (2 sheets) temporarily set on the suction panel with screws.
- ③ Install the ceiling material on the air intel panel and fix it with the ceiling holding plates so as not to produce any play.

Note (1) Use a ceiling material with a thickness of 6-15mm and a side length of 300mm or more.

Ceiling material thickness : 6-10 mm      10 ~ 15 mm



**Ceiling Material Instaling Direction**

**(3) 1-way outlet ceiling recessed type (FDTS)**

**Preparation of indoor unit**

It can be installed by either one of the following methods. Select the most adequate method for your particular case.

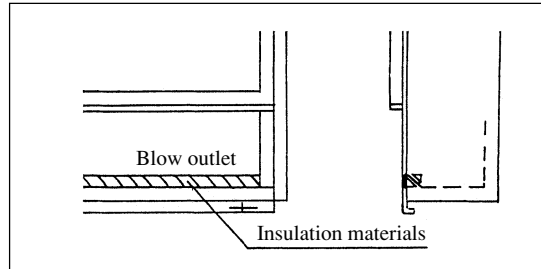
	Ⓐ <b>Standard installation</b>	Ⓑ <b>Higher ceiling</b>
<b>Installation example and limitation</b>		

Note (1) In the case of installing on the high ceiling, part of indoor unit requires some modification.

**Procedures of rework**

**Installation on higher ceiling**

Adhere the insulation materials attached to the direct blow panel on the blow outlet of indoor unit.



**(a) Selection of installation location**

- 1) Where cool and hot air will be distributed sufficiently.

Where the installation height exceeds 3m, warmed air is likely to concentrate close to the ceiling. In such case, you should install also a circulator.

**Reference**

**• Cooled (warmed) air throw**

		Unit : m	
Models	Item	Reaching distance	
		Standard	Higher ceiling
All models		7	

**[ Conditions ]** 1. Unit height

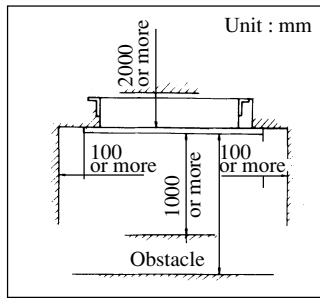
Standard ceiling: 2.4--3.0(m) above floor      Higher ceiling: 3.0--4.0(m) above floor

- 2. Kind of operation: Hi
- 3. Place: Free space without obstruction;
- 4. Reaching distance means the horizontal distance for the wind to reach the floor.
- 5. Wind velocity at the reaching distance: 0.5m/s

Note (1) Wind capacity is UHi in case of a higher ceiling. It is value of Hi for other cases.

- 2) Where the ceiling has sufficient rigidity.
- 3) Where there is no obstacles in front of the suction intel and blow outlet.
- 4) It should be avoided such places as kitchen, machine factory, etc. where there profuse liquid splashes or thick steam.
- 5) Where the height of ceiling exceeds 200mm.

6) Where a space as shown below can be secured.

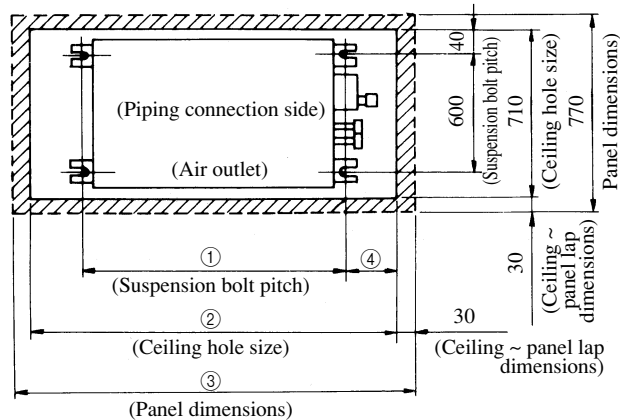


- 7) It should be avoided where a machine generating high frequency waves is installed.
- 8) Select a place to branch the piping so that same distance will be obtained for each of one way piping.
- 9) Where humidity may exceed 80% behind the ceiling or the dew point may exceed 28°C, adhere polyurethane foam materials (t 10 or more) over the insulation materials on the external plate.
- 10) Where it is convenient for the piping and wiring to the outdoor.
- 11) Where protected from direct exposure to sun beams.
- 12) Where it is free from volatile gas generation.

**(b) Standard location**

**1) Installation**

**a) Ceiling hole size and position of suspension bolt**

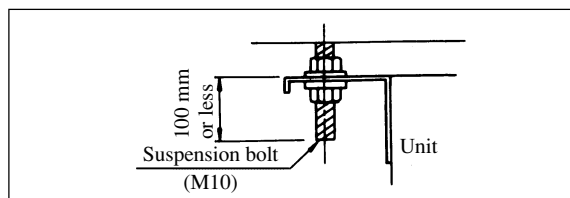


Unit : mm

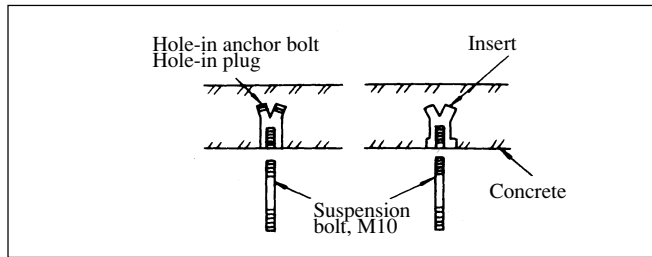
Models	Mark	①	②	③	④
FDTS22, 28, 36, 45 type		990	1230	1290	180
FDTS71 type		1250	1440	1500	145

**b) Length of fixed suspension bolt (customer orderd parts M10)**

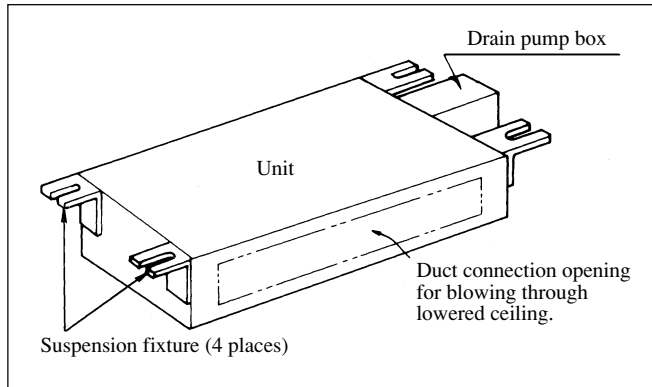
[Reference] Suspension bolt pitch is adjustable within  $\pm 10$ mm in sidwise direction. Since there is no adjustment allowance in back and forth direction, determine the position exactly with a measure. (Lap margin between ceiling and panel is 30mm.)



c) **Fixing of Suspension bolt.** Fix the bolts securely as shown below or by any other adequate means.

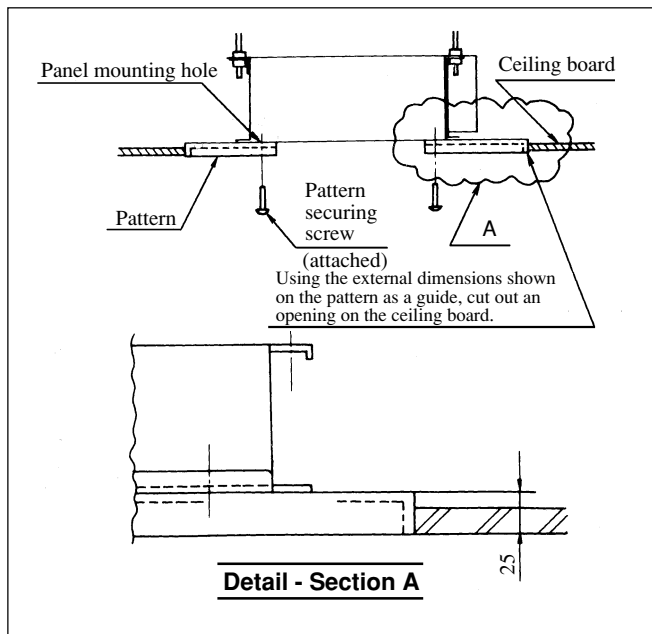


d) **Installation**



**Procedures**

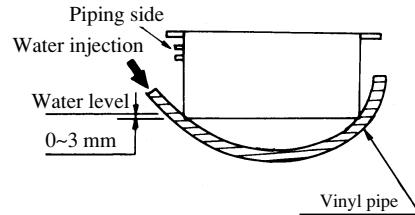
- ① Install nuts on the Suspension bolts at outside. Suspension the suspension fixtures on the Suspension bolts first and then insert the remaining fixtures on the remaining Suspension bolts at and lock them with nuts.
- ② Since the indoor unit and the panel height cannot be adjusted, adjust the height using an attached pattern before fixing the indoor unit.



**Check of levelness**

Check the levelness as follows. Use a level gauge or adjust the levelness with the following method.

Adjust the bottom of main unit and the water level as shown below.

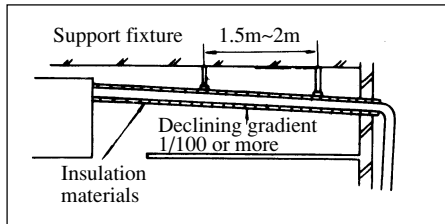


Slightly lower the piping side

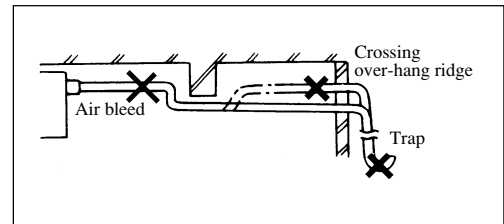
**2) Drain pipe**

- a) Set the drain pipe as a declining gradient (1/50 ~ 1/100) and avoid to cross an over-hand ridge or to allow a trap on the way.

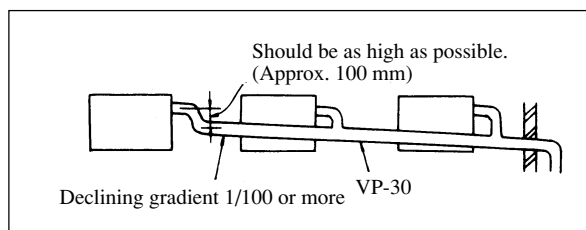
**• Good piping**



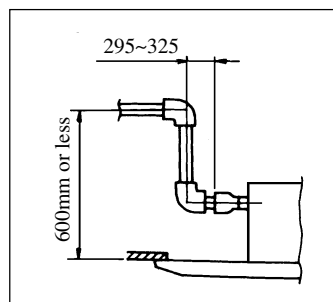
**• Improper piping**



- b) When connecting the drain pipe, avoid undue stress being applied to the pipe at the unit side and fix the pipe at a point as close as possible to the unit.
- c) A hard vinyl chloride pipe, general VP-25, which is available from markets is ideal for the drain pipe.
- d) When installing the drain pipe, make sure to use the attached drain pipe, drain pipe clamp, and insulation materials for drain pipe clamp.
  - Insert the drain pipe to the base of outlet.
  - Securely tighten the drain pipe clamp.
  - Make sure to insulate the drain pipe clamp.
- e) When there are plural number of drain pipes, arrange to position the converging pipe at about 100mm below the drain outlet as shown below. Use a pipe of VP-30 or higher for the converging pipe.



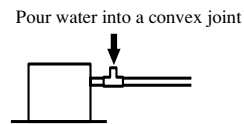
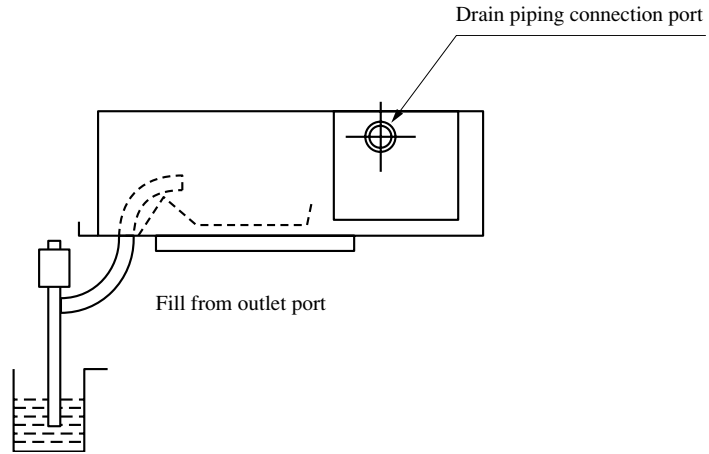
- f) Make sure to provide the thermal insulation for the hard vinyl chloride pipe and drain socket provided indoor.
- g) Air bleed should not be provided in any event.
  - When it is necessary to raise the drain head, the limitation is up to 600mm below the bottom face of ceiling where the unit is installed. The distance is the dimension of the pipe which is installed perpendicularly from a point close to the output for drain pipe connection.



## Drain test

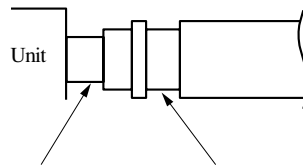
[Perform this before installing the ornament panel]

- Perform this upon completion of electrical work.
- Gradually introduce 2,000~3,000cc of water as shown below.



( If the electrical work has not been completed, connect a convex joint in the drain pipe connection to provide a water inlet. Then, check if water leaks from the piping system and that drain flows through the drain pipe normally. )

- Connect the remote control switch and set to cooling operation. The drain pump will operate with the compressor on.
- Test whether or not the water is draining while listening to the operating sounds of the electric motor for the drain water.

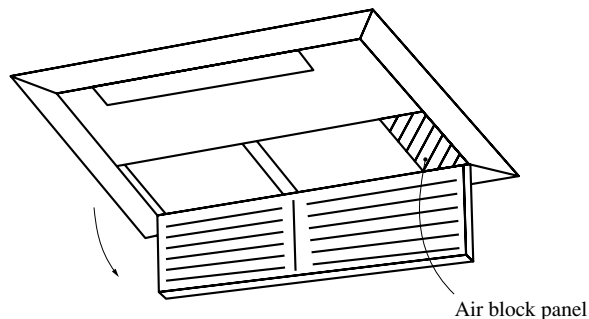


Check the drainage condition by using the transparent socket.

- Check that water is draining smoothly and that there is no water dripping from the connections or other areas.

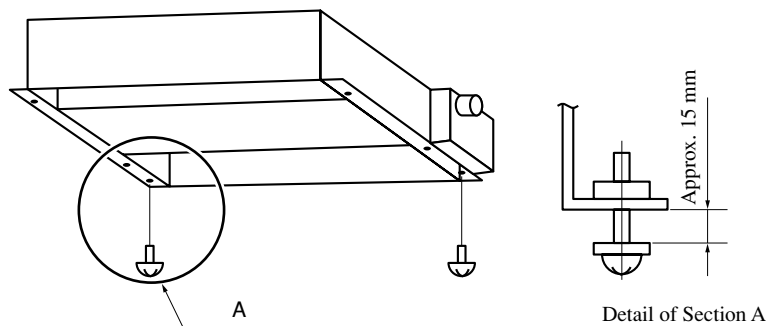
## Mounting the Panel

- ① Open the inlet grille and remove the air block panel from the inside. (Remove the 2 screws.)

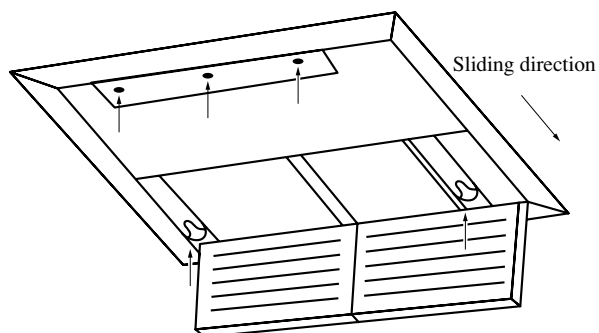




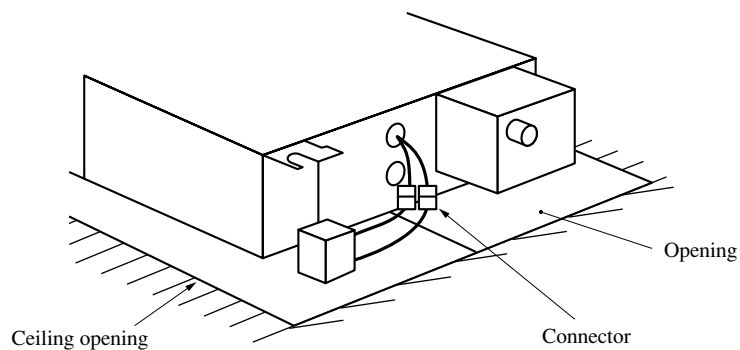
- ② Mount the two (M5 x 35) panel mounting screws to the indoor unit



- ③ Hang the panel on the two mounting screws on the indoor unit by using the two  $\hat{\circ}$  shaped holes. Slide the panel approximately 10 mm. Use the 5 panel mounting screws to secure the panel.



- ④ Use the opening to connect the connectors for the louver motor and limit switches.



- ⑤ Reinstall the wind shield plate.

**(c) Installation on higher ceiling**

Adhere the insulation materials on the blow outlet of the indoor unit. All others are same as the standard installation.

**(4) Cassetteria type (FDR)**

**(a) Preparation of indoor unit**

Before of during the installation of the unit, assemble necessary optional panel, etc. depending on the specific type.

**(b) Select places for installation satisfying 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 3 m, 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.
- 3) Places free from air disturbances to the suction port and blowout hole of the indoor unit, places where the fire alarm may not malfunction or short-circuit.
- 4) Places with the environmental dew-point temperature is lower that 28°C and the relative humidity is less than 80%.

( When installing at a place under a high humidity environment, pay sufficient attention the prevention of dewing such as thermal insulation of the unit prperly.)

**(c) Avoid installation and use at those place listed below.**

- 1) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).

Installation and use at such places incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic vesin parts.

- 2) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc) in generated or remains.

Installation and use at such places 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.

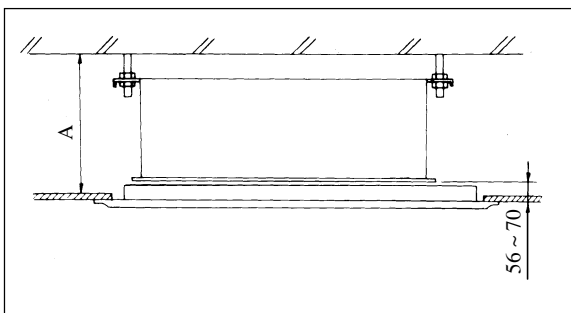
Generated noise may cause malfunctioning of the controller.

**(d) Preparation for installation**

**1) Selection of suspension pattern**

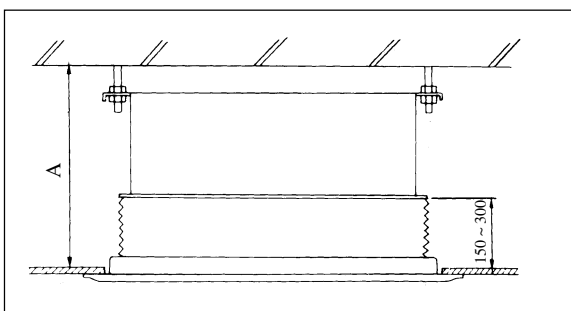
When the unit is hanged from ceiling, select one of following patterns depending on the dimensions of the ceiling.

**< Combination with silent panel >**



Models	Mark	A
FDR22, 28, 45, 56 71, 90 type		365 mm or more
FDR112, 140 type		416 mm or more

**< Combination with canvas panel >**



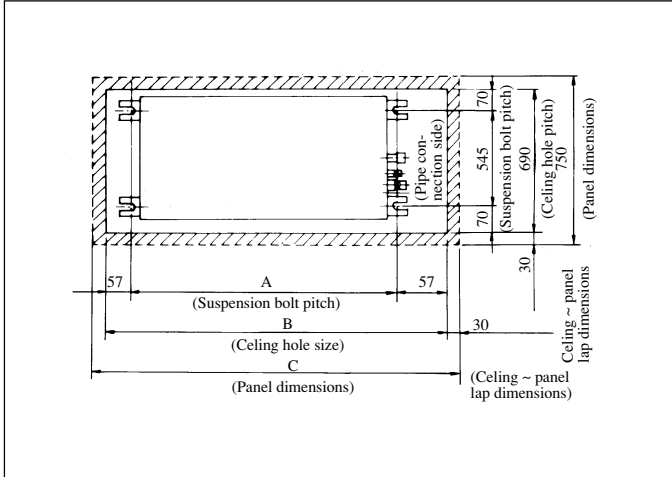
Models	Mark	A
FDR22, 28, 45, 56 71, 90 type		495 mm or more
FDR112, 140 type		510 mm or more

**2) Ceiling hole size and position of suspension bolt**

When boring at the ceiling, use the pattern sheet included in the accessory of the unit.

Leave the pattern sheet on the unit till decorative panel is installed.

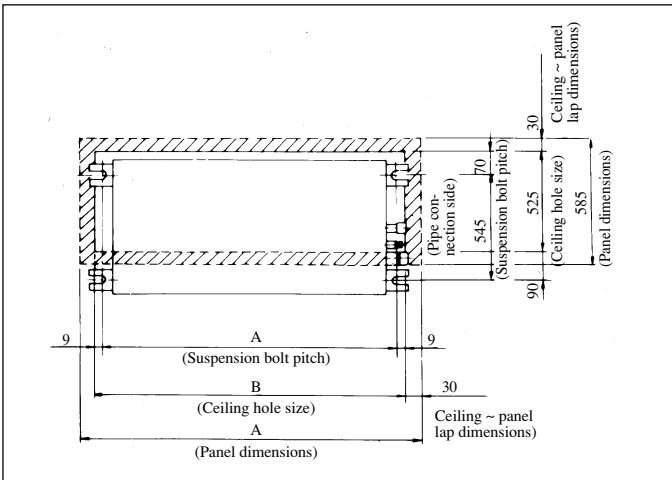
**< Combination with silent panel >**



Unit : mm

Mark	A	B	C
<b>FDR22, 28, 45, 56 type</b>	786	980	1040
<b>FDR71, 80 type</b>	986	1180	1240
<b>FDR112, 140 type</b>	1406	1600	1660

**< Combination with canvas panel >**

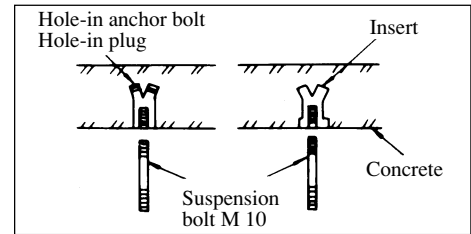


Unit : mm

Mark	A	B	C
<b>FDR22, 28, 45, 56 type</b>	786	804	864
<b>FDR71, 80 type</b>	986	1004	1064
<b>FDR112, 140 type</b>	1406	1424	1484

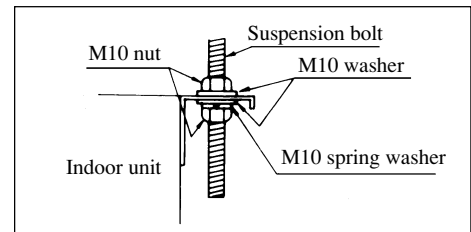
**3) Suspension bolts installation**

- Locate the suspension bolts position by using the pattern sheet  
(Use care of the piping direction when the unit is installed)



**(e) Installation of indoor unit**

- 1) Fix the indoor unit to the suspension bolts.  
If required, it is possible to suspend the unit to the beam, etc.  
Directly by use of the bolts without using the suspension bolts.

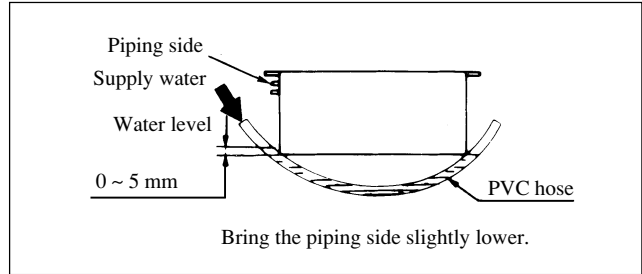


Note (1) When the dimensions of indoor unit and ceiling holes does not match, it can be adjusted with the slot holes of mounting bracket.

**2) Adjusting the unit's levelness**

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

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



② Unless the adjustment to the levelness is made properly, malfunctioning or failure of the float switch may occur.

**3) Tap selection on blower unit**

Taps of 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			
Control box side	Red	Connector, white	White	Control box side	Red	Connector, white	Red
	Blue		Blue		Blue		
	Black		Black		Black		
	White		White		White		
Motor side		Motor side		Motor side		Motor side	

**(f) Installation of decorative panel**

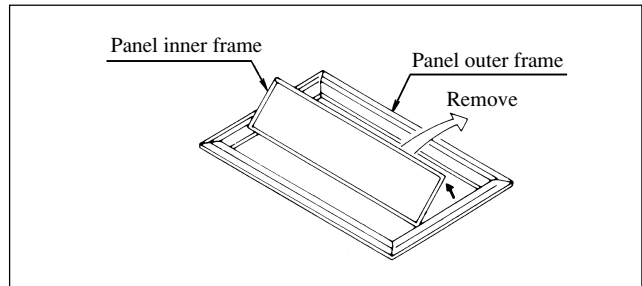
**1) Case of silent panel**

**a) Accessory**

Name	Q'ty	Position
Round head machine screw (M5 x 35)	4 pcs.	Securing the panel

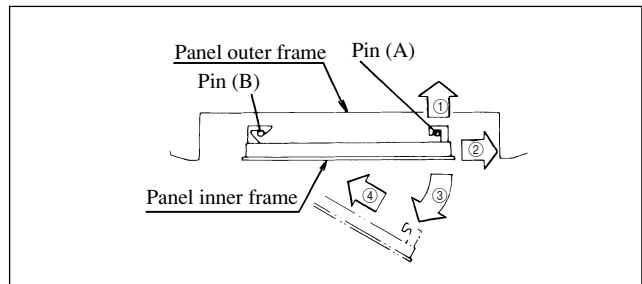
**b) Installation procedures**

① Remove the inner frame of panel

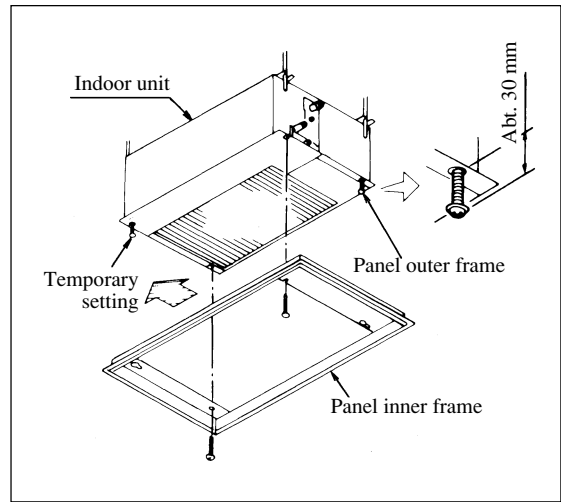


**< How to remove the panel inner frame >**

- Detach from pins (A) in the order of arrow ① → ②
- Open slightly as the arrow ③ and move toward the arrow ④ and detach from pin (B)



② Install the panel outer frame on the Indoor unit.



**Procedures of installation**

- ① Secure the panel tentatively with 2 of 4 panel set screws (panel accessory) as shown above.
- ② When the panel is supported with a pair of set screws, slide it in the arrow direction.  
Note (1) Panel outer frame has the orientation.
- ③ Lock the former 2 and remaining 2 set screws.
- ④ Install the panel inner frame in the reverse order of removal.

**2) Case of canvas panel**

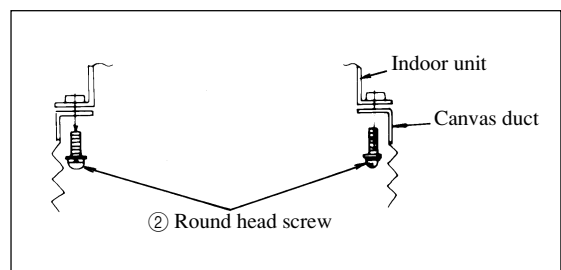
( Canvas duct (option) is necessary to install the canvas panel.)

**a) Accessory**

Symbol	Name	Q' ty	Position
①	Round head machine screw (M4 x 16)	4	Panel securing
②	Round head machine screw (M5 x 16)	8	Canvas duct securing
③	Round head machine screw (M5 x 25)	4	Chain securing
④	Holder	4	
⑤	Chain	4	

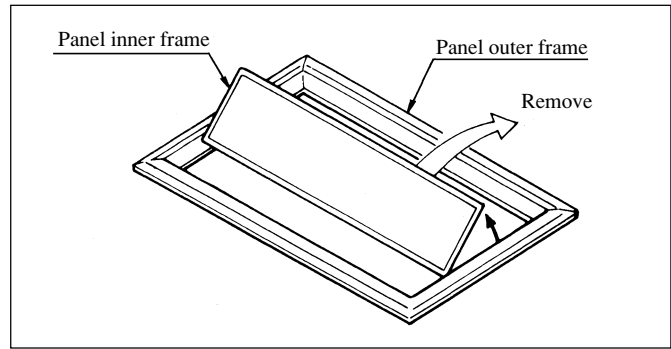
**b) Mounting procedures**

- ① Install the canvas duct (option, 4 places) on the Indoor unit.

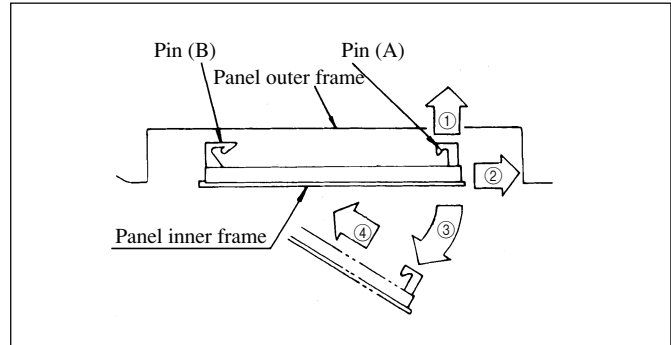


② **Remove the panel inner frame.**

It can be removed same as the silent panel.

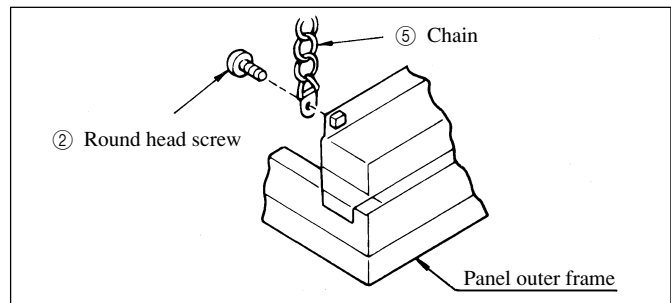


< How to remove the panel inner frame >



- Detach from pins (A) in the order of arrow ① → ②
- Open slightly as shown by the arrow ③. move in the ④ arrow direction and detach from pin (B).

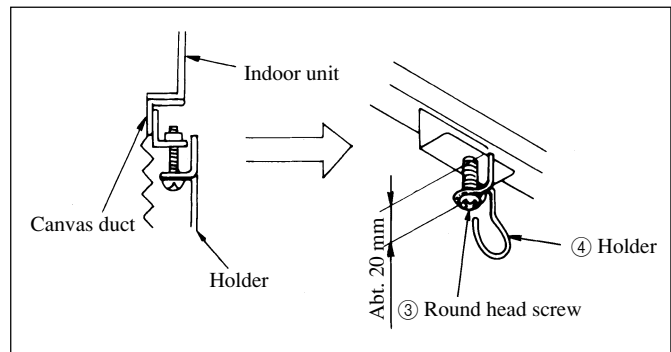
③ **Install the chains on the panel outer frame. (4 places)**



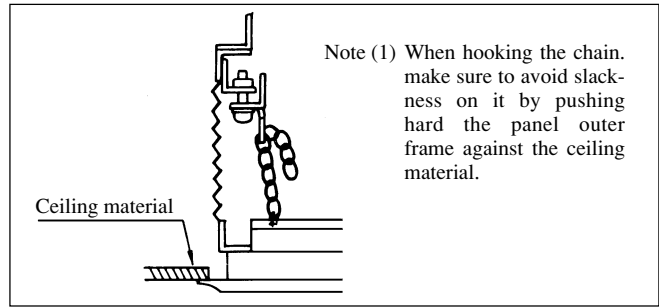
④ **Install the panel outer frame.**

**Procedures of installation**

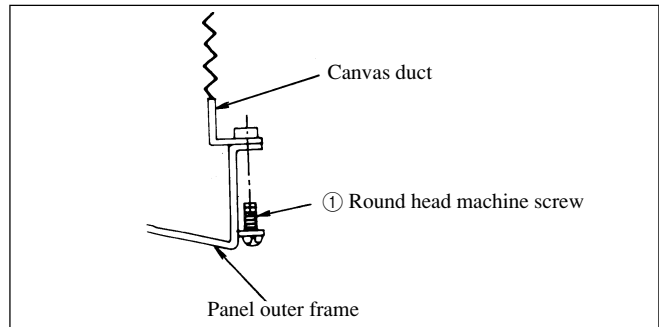
- Secure the holder tentatively as shown below. (4 places)



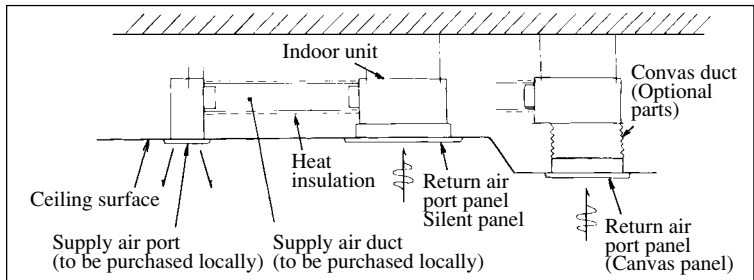
- Hook the chain of panel outer panel on the holder.



- Tighten ③ screw in the step ① till the panel outer frame contacts closely with the ceiling material.
- Secure the canvas duct and the panel outer frame with screws.



- ⑤ Remove the panel inner frame and install in the reverse order of removal.
- ⑥ Cautions for duct installation work



**Calculate the draft and external static pressure and select the length, shape and blowout.**

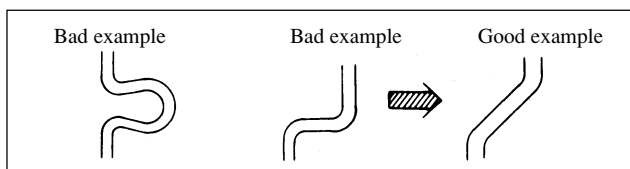
◆ **Supply air duct**

- 1-spot, 2-spot, 3-spot and 4-spot with  $\varnothing 200$  type duct are the standard specifications. Determine the number of spots based on following table.

FDR22 type	FDR28, 45, 56 type	FDR71, 90 type	FDR112, 140 type
1-spot	2-spot	2 ~ 3-spot <sup>(1)</sup>	3 ~ 4-spot <sup>(1)</sup>

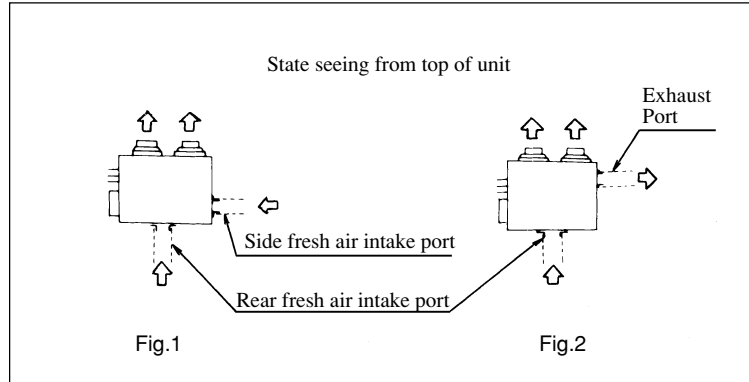
Notes (1) Shield the central supply air port for 2-spot.  
 (2) Shield the supply air port around the center for 3-spot.

- Limit the difference in length between spots at less than 2:1.
- Reduce the length of duct as much as possible.
- Reduce the number of bends as much as possible. (Corner R should be as larger as possible.)



- Use a band, etc. to connect the indoor unit and the supply air duct flange.
- Conduct the duct installation work before finishing the ceiling.

**(g) Connection of air intake and exhaust ducts.**



**1) Duct connecting position**

**a) Fresh air intake**

- Inlet can be selected from the side or rear faces depending on the working conditions.
- Use the rear fresh air intake when the simultaneous intake and exhaust is conducted. ( Side inlet cannot be used.)

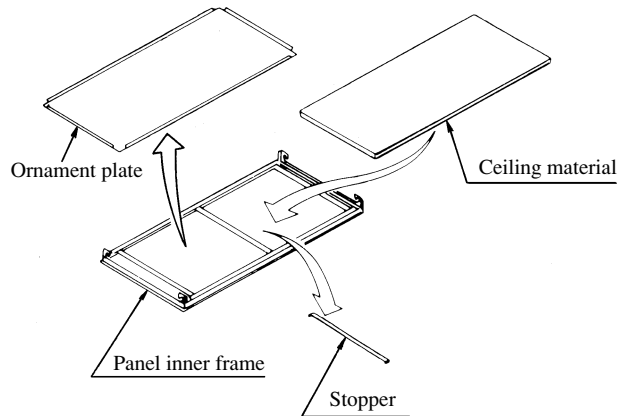
**b) Exhaust (Make sure to use also the air intake.)**

Use the side exhaust port.

**Attachment of ceiling material**

Ceiling material can be attached to the panel inner frame.

(Plate thickness max. 15mm)



**Attachment procedures**

- ① Remove the stopper.
- ② Remove the ornament plate and attach the ceiling material.
- ③ Hold down the ceiling material and return the stopper in position.

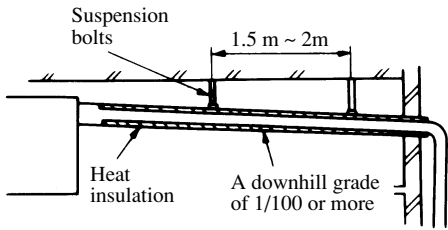
Note (1) If the ceiling material is attached, the ornament plate is not used.



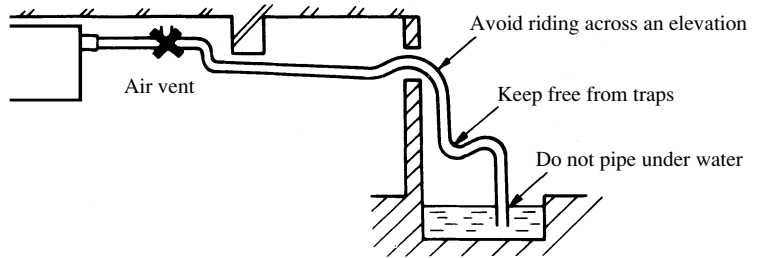
**(h) Drain piping**

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

● **Good piping**

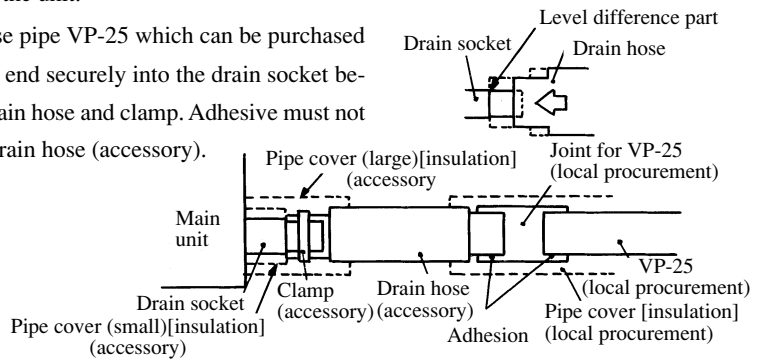


● **Improper piping**

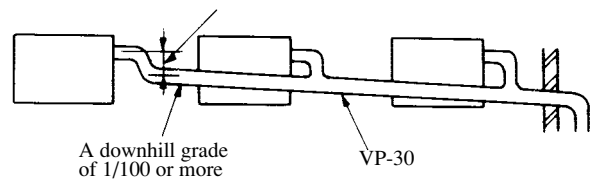


2) When connecting the drain pipe to the unit, pay sufficient attention not to apply excess force to the piping on the unit side. Also, fix the piping at a point as possible to the unit.

3) 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).



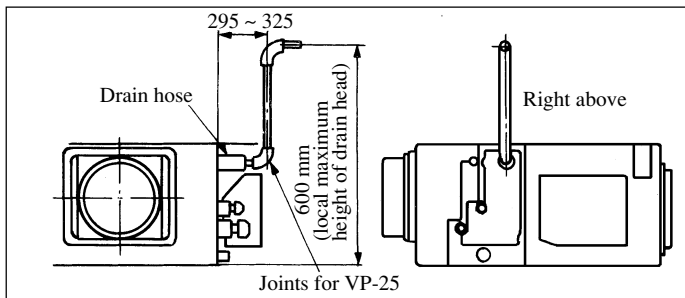
4) When constructing drain piping for several units, position the common pipe about 100mm below the drain outlet of each unit as shown in the sketch below. Use VP-30 or thicker pipe for this purpose. Secure the elevation as high as possible (approx. 100 mm)



5) Be sure to provide heat insulation to hard PVC pipes of indoor placement.

6) Do not ever provide an vent.

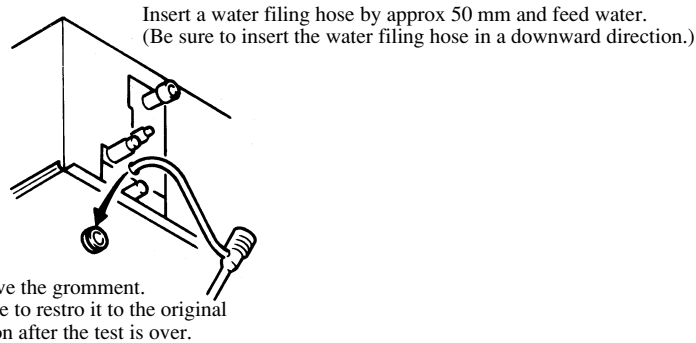
7) The height of the drain head may be elevated up to a point 600mm from the bottom of unit and when an obstacle exists in the ceiling space, elevate the piping to avoid the obstacle using an elbow or corresponding gadget. When doing this, if the stretch for the needed height is too high, the back-flow 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.



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

**9) Drainage test**

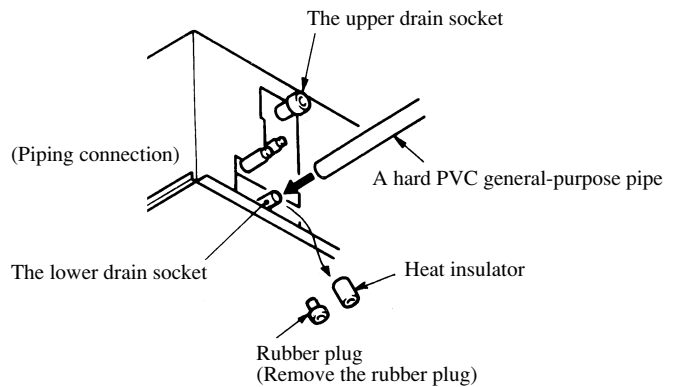
- a) During trial operation, make sure that drainage is properly executed and check that leakage is not found at connections.
- b) Be sure to carry out a drainage test when installing the system during a heating season.
- c) When installing the system in a building under construction, carry out the drainage test before ceiling tiles are installed.



- ① Supply approx 1000cc of water through the outlet of the unit using a feed water pump.
- ② Make sure that drainage is proceeding properly at the see-through outlet of the unit.  
\*Also confirm the revolving sound of the condensate motor when checking the drainage.
- ③ Then remove the drain plug at lower section of the unit to drain water off. After making sure water is not left, restore the drain plug to the original position.

**10) Drainage from the lower drain socket**

Only if the drain pipe can be installed in a downhill grade (1/50-1/100), the lower drain socket can be used for connecting to the drain pipe as illustrated.

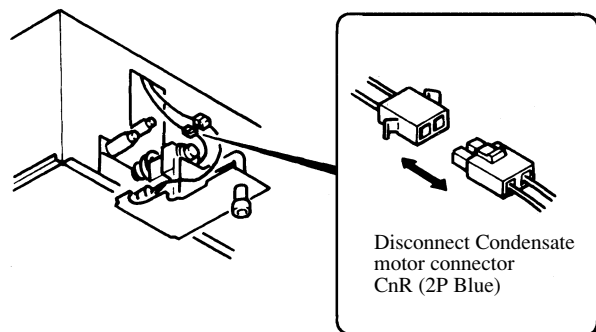


(Disconnect the connector for the drain motor)

As shown in the sketch to the right, disconnect the drain motor connector CnR (blue color coding).

Caution:

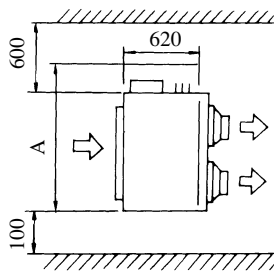
If the system is started with this connector connected as is, drain water is discharged out of the upper drain socket causing a heavy water leakage.



**(5) Satellite ducted type (FDUM)**

**(a) Selection of installation location**

- 1) Avoid installation and use at those places listed below.
  - a) 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.
  - b) 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.
  - c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.
  
- 2) Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user,.
  - a) 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.
  - b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
  - c) 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.
  - d) 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.)
  
- 3) Check if the selected place for installation is rigid enough to stand the weight of the unit.  
Otherwise, apply reinforcement using boards and beams before starting the installation work.



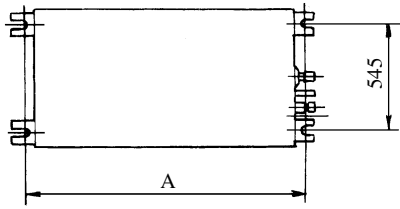
Unit : mm

Models	Mark	A
<b>FDUM36, 45, 56 type</b>		1100
<b>FDUM71, 90 type</b>		1300
<b>FDUM112, 140 type</b>		1720

**(b) Suspension**

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

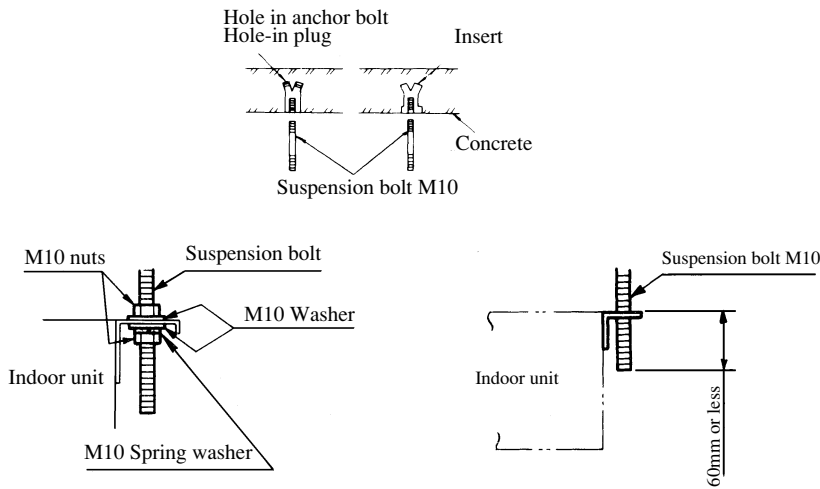
Unit : mm



Models	Mark	A
FDUM36, 45, 56 type		786
FDUM71, 90 type		986
FDUM112, 140 type		1406

**1) Fixing the suspension bolt (customer ordered parts M10)**

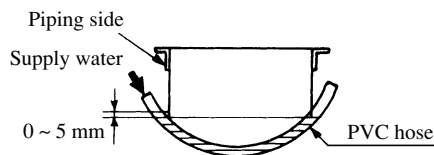
Securely fix the suspension bolt as illustrated below or in another way.



**2) Adjusting the unit's levelness**

a) 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.

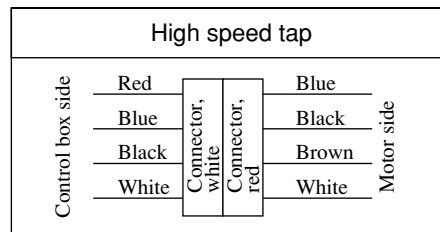
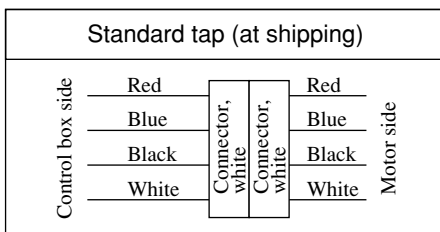


Bring the piping side slightly lower

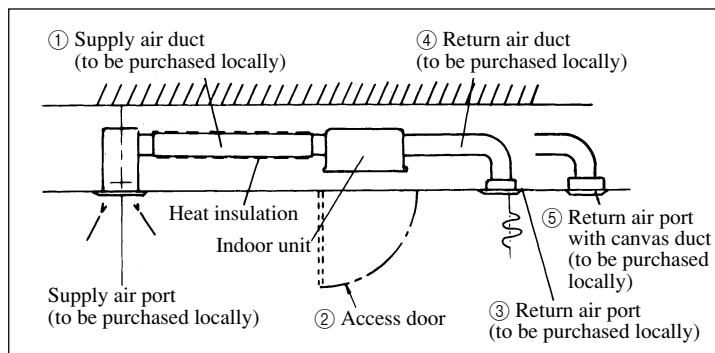
b) Unless the levelness is adjusted properly, the malfunction of the float switch will occur.

**3) 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.



(c) Duct installation



① Supply air duct

Same as FDR series. Refer to page 861.

② Access door

Access door must be provided without fail.

● Dimensions of access door and service space

( See exterior dimensions in page 773 to 775.)

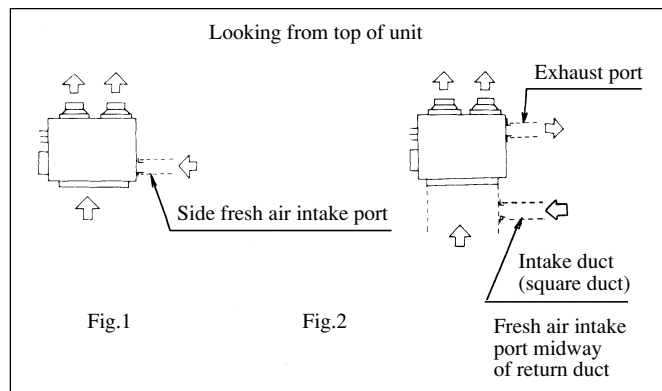
③ Return air port

An air filter is not included in the indoor unit. Use the return air port with air filter.

④ Return air duct: Use square duct.

⑤ Return air port with canvas duct

1) Connection of intake and exhaust ducts.



2) Duct connecting position.

< Fresh air intake >

- a) Use side air intake port.
- b) In case of simultaneous intake and exhaust, the side air intake port cannot be used, therefore, take air from the midway air intake port along the intake duct.

< Exhaust > Make sure to use suction as well.

- c) Use a side exhaust port.

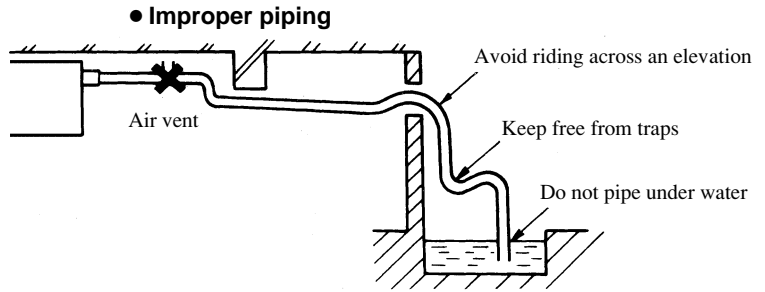
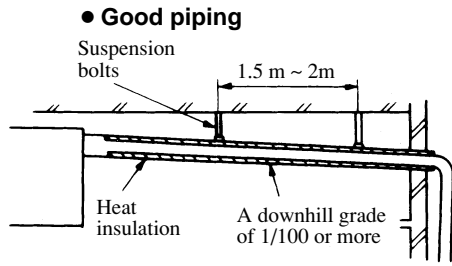
3) Duct connection

Use intake and exhaust duct flange of separately sold (for connection of  $\varnothing 125\text{mm}$  round duct) to connect  $\varnothing 125\text{mm}$  round duct.

The duct clamped by bands must be thermally insulated to prevent dew condensation.

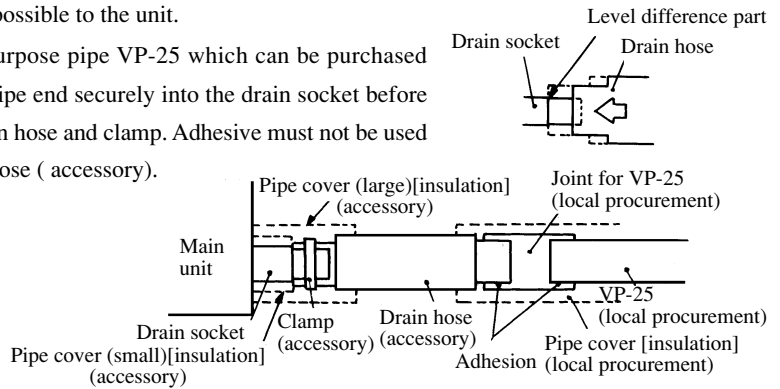
**(d) Drain piping**

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

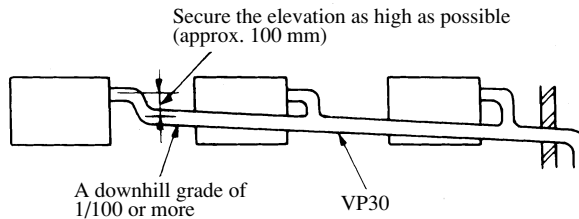


2) When connecting the drain pipe to the unit, pay sufficient attention not to apply excess force to the piping on the unit side. Also, fix the piping at a point as close as possible to the unit.

3) 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).



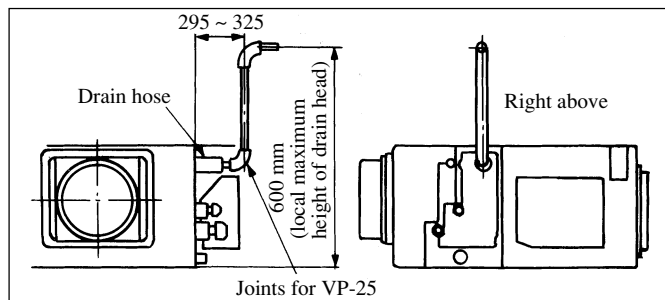
4) When constructing drain piping for several units, position the common pipe about 100 mm below the drain outlet of each unit as shown in the sketch below. Use VP-30 or thicker pipe for this purpose.



5) Be sure to provide heat insulation to hard PVC pipes of indoor placement.

6) Do not ever provide an air vent.

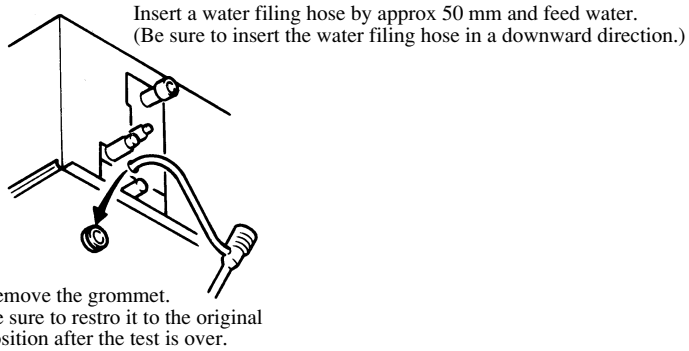
7) The height of the drain head may be elevated up to a point 600 mm from the bottom of unit and, when an obstacle exists in the ceiling space, elevate the piping to avoid the obstacle using an elbow or corresponding gadget. When doing this, if the stretch for the needed height is too high, the back-flow 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.



8) 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.

**9) Drainage test**

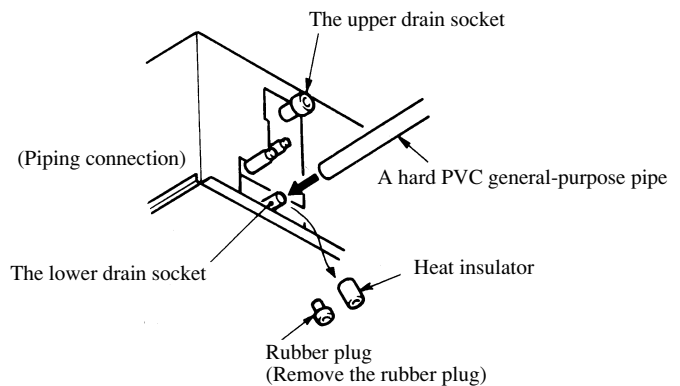
- a) During trial operation, make sure that drainage is properly executed and check that leakage is not found at connections.
- b) Be sure to carry out a drainage test when installing the system during a heating season.
- c) When installing the system in a building under construction, carry out the drainage test before ceiling tiles are installed.



- ① Supply approx 1000cc of water through the outlet of the unit using a feed water pump.
- ② Make sure that drainage is proceeding properly at the see-through outlet of the unit.  
\* Also confirm the revolving sound of the condensate motor when checking the drainage.
- ③ Then remove the drain plug at lower section of the unit to drain water off. After making sure water is not left, restore the drain plug to the original position.

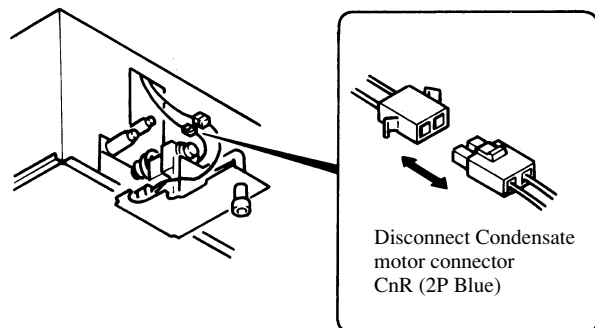
**10) Drainage from the lower drain socket**

Only if the drain pipe can be installed in a downhill grade (1/50-1/100), the lower drain socket can be used for connecting to the drain pipe as illustrated.



( Disconnect the connector for the drain motor)

As shown in the sketch to the right, disconnect the drain motor connector CnR ( blue color coding). If the system is started with this connector connected as is, drain water is discharged out of the upper drain socket causing a heavy water leakage.



**(6) Ceiling Suspension type (FDE)**

**(a) Selection of installation location**

- 1) A place where good air circulation and delivery can be obtained.

**Cold air throw**

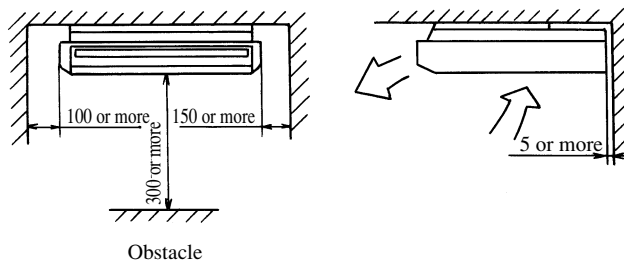
Unit : m

Models	FDE36, 45, 56 type	FDE71 type	FDE112 type	FDE140 type
Air throw	7.5	8	9.5	10

**Conditions**

- (1) Installation height: 2.4 ~ 3.0 m above the floor
  - (2) Fan speed: Hi
  - (3) Location: Free space without obstacles
  - (4) Distance of reach indicates the horizontal distance after the wind touched down the floor.
  - (5) Air velocity at the throw: 0.5 ( m/sec.)
- 2) A place where ceiling has enough strength to support the unit.
  - 3) A place where there is no obstruction to the return air inlet and supply air outlet ports.
  - 4) 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.
  - 5) A place where the space shown below may be secured.

**Ceiling mouting installation**



Unit : mm

- 6) This unit uses a microcomputer as a control device. Therefore avoid installing the unit near the equipment that generates strong electromagnetic waves and noise.

**(b) Installation preparation**

**1) Drilling of holes for interconnecting piping and wiring.**

- a) Drill a hole through the wall in accordance with the piping diameter. We recommend using a hole saw drill of 70 ~ 86 mm diameter and the hole should be drilled on an incline from inside to outside.
- b) Insert the accessory piping sleeve into the hold and cut it to the proper length in accordance with wall thickness.

**2) Installation of suspension bolts**

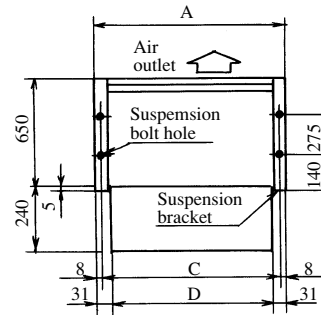
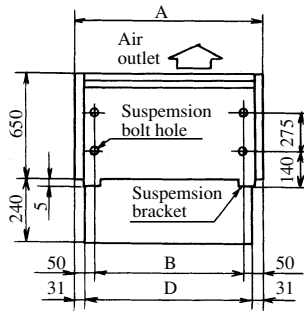
- a) Use the template sheet to determine the positions of suspension bolts and refrigerant pipings. The refrigerant piping can be routed either to the right, left, top or rear.



b) Positions of suspension bolts are as in the drawing below.

• When the suspension brackets face in

• When the suspension brackets face out

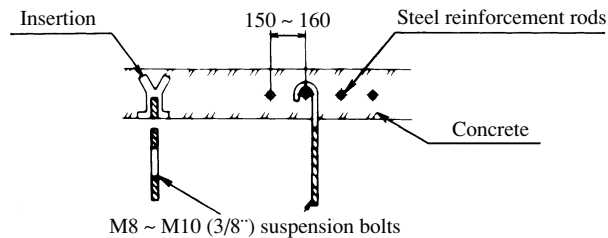


Unit : mm

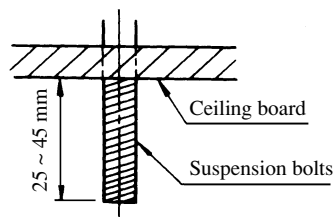
Models	Mark	A	B	C	D
FDE36, 45, 56 type		1000	900	984	938
FDE71, 112 type		1260	1160	1244	1198
FDE140 type		1470	1370	1454	1408

c) In case of ferro-concrete buildings

Fix the suspension bolts in the following way.



d) Length of suspension (in case of exposed type installation)

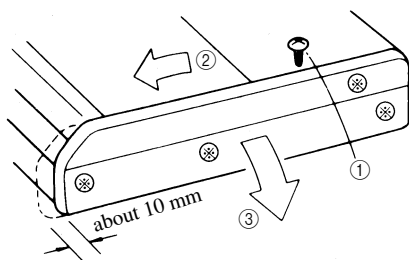


Notes (1) In case the suspension bracket face in, and the suspension bolts are made to the length as shown in the left drawing the bolts ends will be put in the plastics cap of the indoor unit top panel.

(2) Don't remove the plastics cap.

(c) Installation of indoor unit

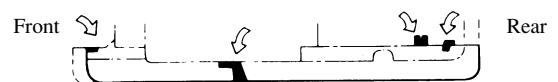
1) Detach the inside panel and suspension bracket



① Remove a fixing bolt of the side panel.

② Unhook four hooks (marked ⊗) by sliding the side panel in front side about 10mm, and detach the side panel from the unit.

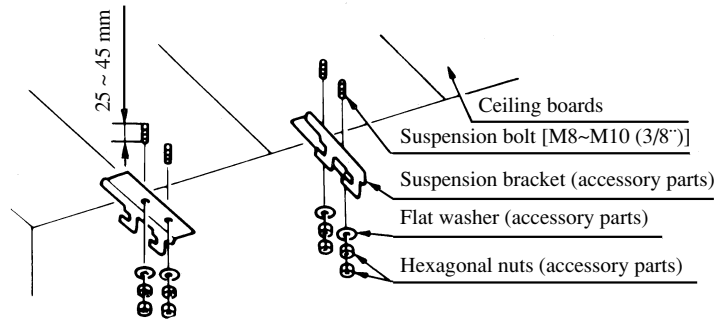
• Position of the hooks



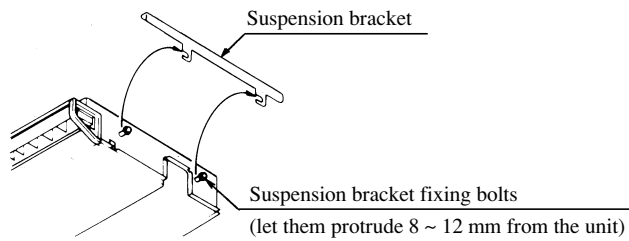
⇔ Slide for front side about 10 mm

**2) In case of exposed installation to the ceiling ( with suspension brackets facing in)**

**a) Fix the suspension brackets to suspension bolts**

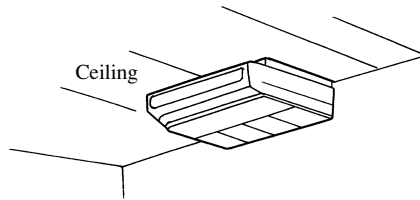


**b) Hook the unit to suspension brackets**



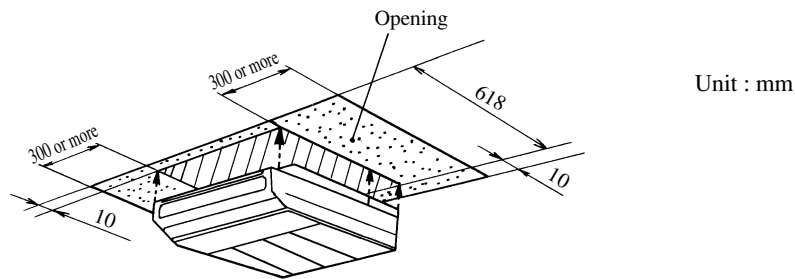
c) Fix unit securely in place by tightening the suspension bracket fixing bolts.

d) Attach the side panels and installation is finished.



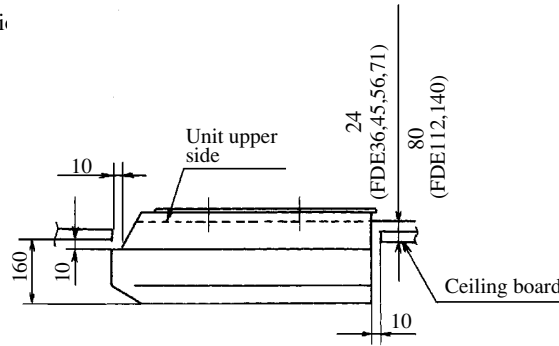
**3) In case the unit is half recessed into the ceiling ( the suspension brackets facing outside)**

a) Open a hole in the ceiling large enough for the unit and necessary installation work. ( Fill up the excess opening after the installation work is finished.)

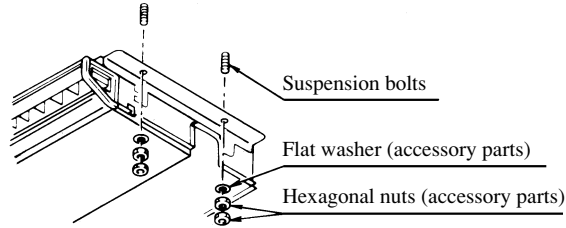


- b) Installation space dimension  
(Plug in dimensions)

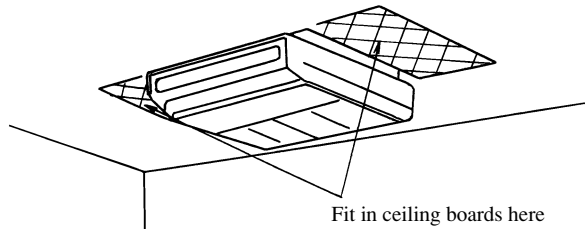
Unit: mm



- c) Mount the unit using suspension bolts



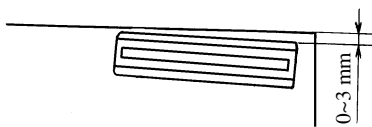
- d) Securely tighten the nuts and fix the indoor unit place.  
e) Attach the side panels and fit in ceiling board in the space around the unit and the work is finished.



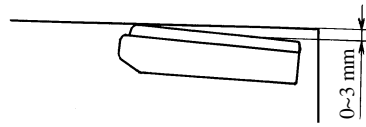
**4) Gradient for drainage**

Mounting with proper gradient for drainage is needed as shown below.

- In right and left directions



- Front and rear directions



Note (1) In case of left-hand side drainage, the gradient will be to the opposite side.

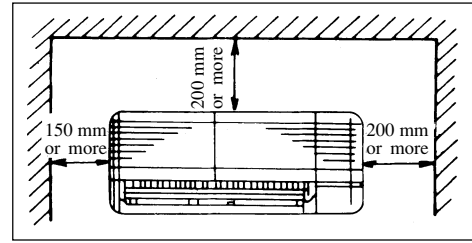
- Caution**
- In case of gradient is contrary, water may leak out.
  - Indoor side of drain pipe must be thermally insulated.

**(7) Wall mounted type (FDK)**

**(a) Selection of installation location**

- 1) Select the best position and direction depending on the shape of room and height of ceiling to ensure that the cooled or warmed air will be circulated sufficiently.

cooled air throw		Unit : m			
Item	Models	FDK22 type	FDK28 type	FDK36, 45 type	FDK56, 71 type
Air throw		5	6	7	8



**[Conditions]**

- a) Fan speed: Hi
  - b) Location: Free space without obstacles
  - c) Distance of reach indicates the horizontal distance after the wind touched down the floor.
  - d) Air velocity at the throw: 0.5 (m/sec.)
- 2) Where there is no obstacle around the Air inlet port or Air outlet port.
  - 3) Where a sufficient space can be reserved for the service of air filter and the attachment/removal of panels.
  - 4) Places exposed to oil splashes or steam (e.g. kitchens and machine plants ).  
Installation and use at such place will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
  - 5) Where pipes and wires can be arranged conveniently.
  - 6) On the solid floor
  - 7) Where the unit is not exposed directly to sun light.
  - 8) Place 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.
  - 9) Where a complete draining can be assured.
  - 10) Where a sufficient space can be reserved for service.

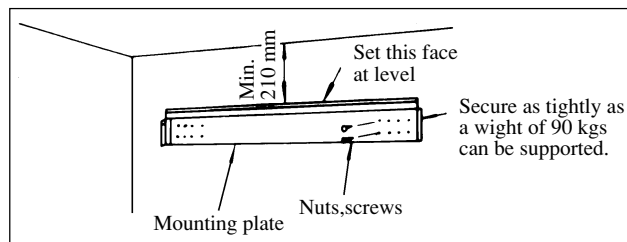
**(b) Method to install the mounting plate**

- 1) Indoor unit weighs about 20 kgs. Be sure to check closely the installation place and, if any risk is expected, provide a sufficient reinforcement with plates or beams. Indoor unit cannot be secured directly on the wall, etc.

Attached mounting plate must be used.

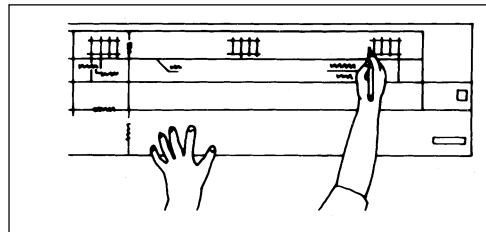
Wooden wall	Concrete wall (Use marketed anchors (M6))	
	Example of nut anchor	Example of bolt anchor
<p>Wood screw Mounting plate</p>	<p>Bolt Mounting plate</p>	<p>Nut Mounting plate 10 mm or over</p>

- 2) When installing a mounting plate on the wall, adjust it at level precisely and fix securely. Use the marketed anchor bolts (M6) when the wall is made of concrete.

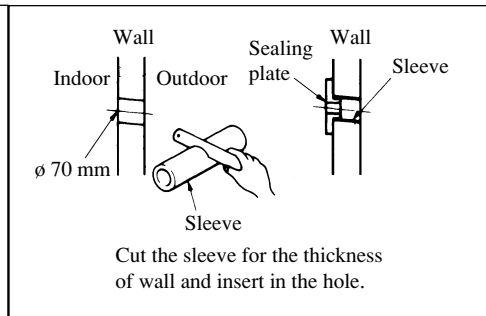
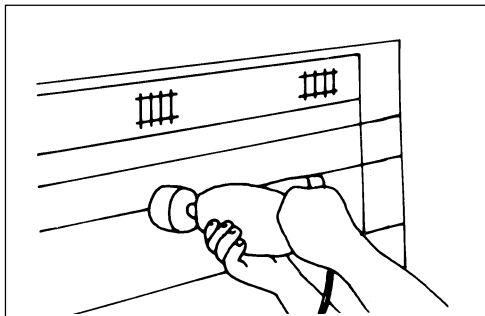


**(c) Installation**

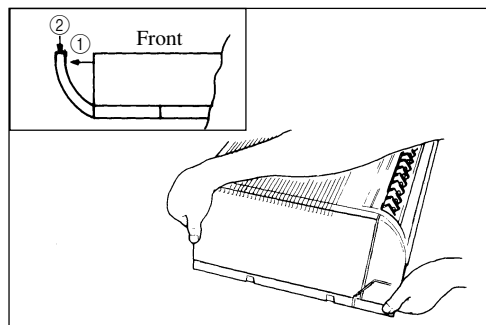
- 1) Use an attached pattern sheet and mark the position of screws to attach the mounting plate.



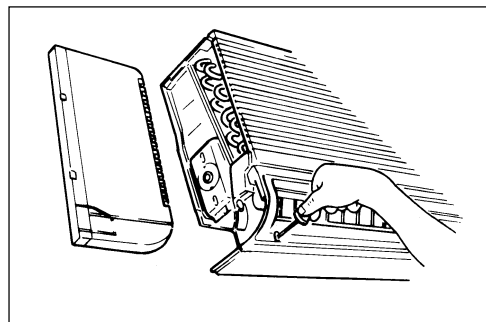
- 2) Determine the direction to lead the pipe and bore a through hole on the wall aligning with the pipe hole of unit.



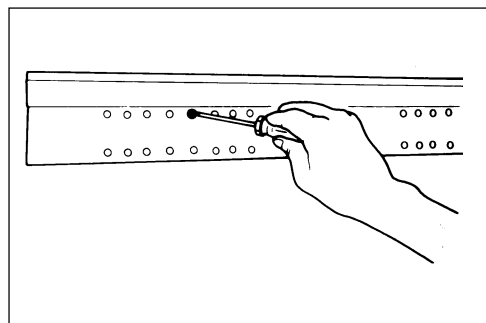
- 3) Remove screws (2 pcs.) and remove the right and left panels from the Indoor unit. ( Remove screws first, move slightl to remove.)



- 4) Remove the lower panel from the Indoor unit. It can be remove if 3 screws are loosened but not removed.

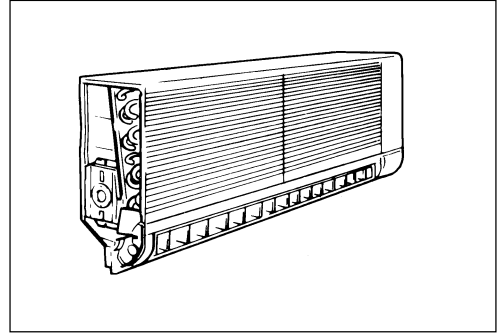


- 5) Secure the mounting plate with screws at a selected place on the wall. When the wall is made of concrete, use the marketed anchor bolts (M6)

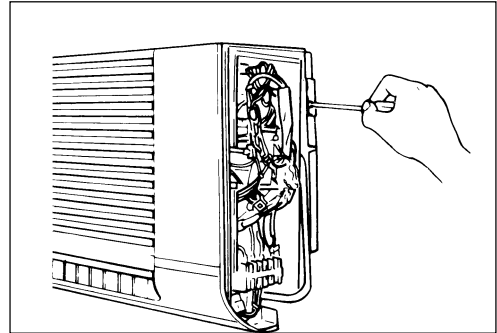


# FDC-HKX

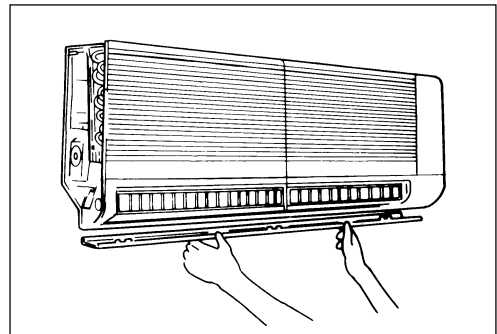
6) Hook and install the indoor unit on the mounting plate from top. Hook slightly at left at first and return to right.



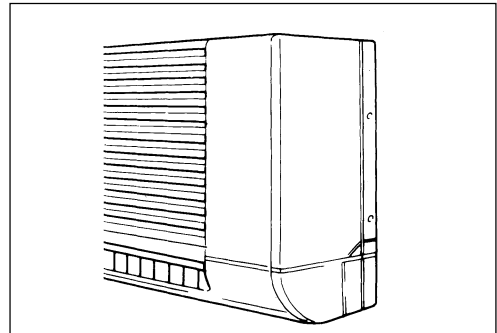
7) Fix the indoor unit on the mounting plate with a screw.



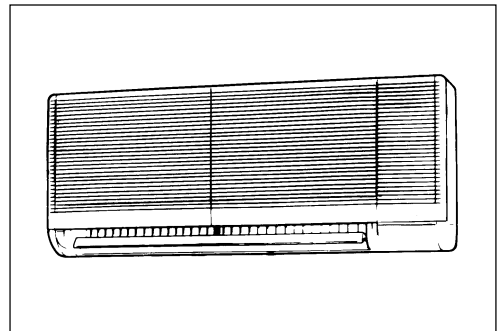
8) Install the lower panel at the original position.



9) Install the right and left side panels at their original position.



10) This is all for the installation.



**(8) Floor standing exposed type (FDFL)**

**(a) Selection of installation location**

- 1) A place where good air circulation and delivery can be obtained.

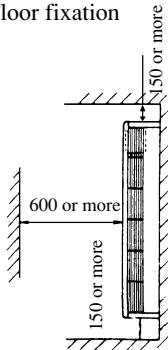
Cooled (warmed) air throw		Unit : m
Models	All models	
Air throw	4	

**[Conditions]**

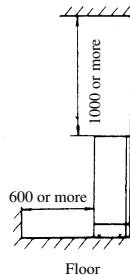
- (1) Fan speed: Hi
- (2) Location: Free space without obstacles
- (3) Distance of reach indicates the horizontal distance after the wind touched down the floor.
- (4) Air velocity at the throw: 0.5 (m/sec.)
- 2) Where there is no obstacle around the Air inlet port or Air outlet port.
- 3) Where a sufficient space can be reserved for the service of air filter and the attachment/removal of panels.
- 4) 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.
- 5) Where pipes and wires can be arranged conveniently.
- 6) On the solid floor
- 7) Where the unit is not exposed directly to sun light.
- 8) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas ( thinner, gasoline, etc.) is generated or remains.  
Installation and use at such place will cause corrosion in the heat exchanger and damage in molded synthtic resin parts.
- 9) Where a complete draining can be assured.
- 10) Where a sufficient space can be reserved for service.

**Floor standing installation**

• Floor fixation



• Wall fixation

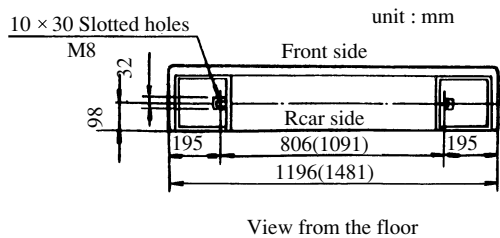


Unit : mm

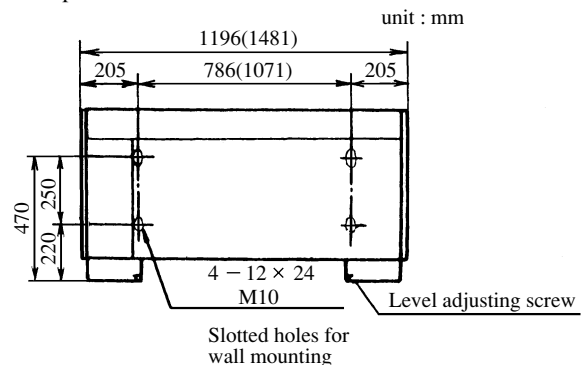
**(b) Bolt positions**

- 1) Bolt positions for metal settings used for floor fixation.

• Metal fitting used for floor fixation (accessories).



- 2) Bolt positions for wall fixation

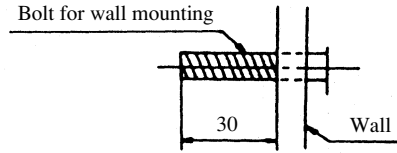
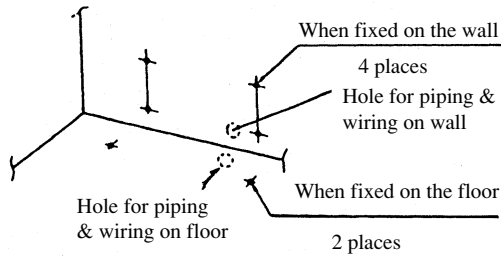


Note (1) Value in ( ) indicates 71 type.

**(c) Installation of unit**

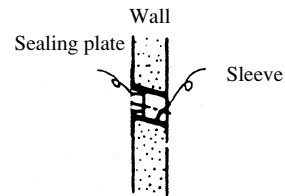
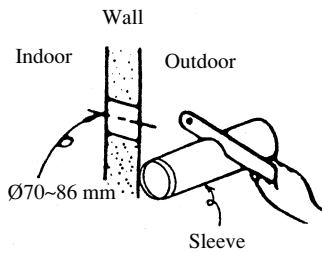
**1) Floor standing installation**

a) Position of mounting bracket fixing bolts Drill holes by referring to figures below.

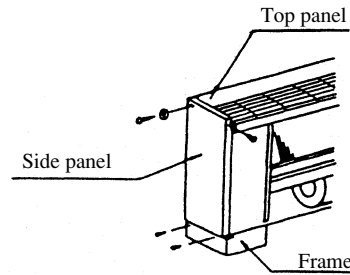
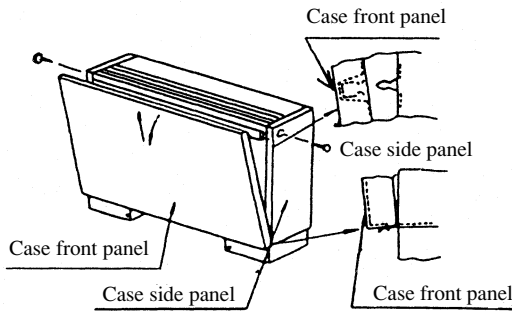


Note (1) Be sure to use a bolt of the length for wall mouning.

b) The method of drilling the wall is as follows.



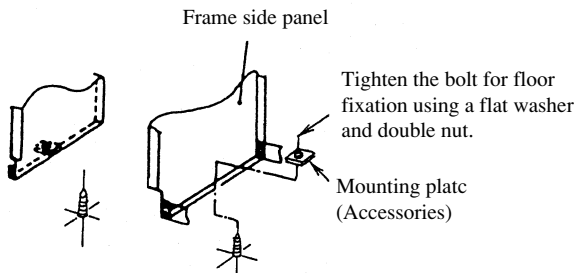
c) Remove the front and side panels.



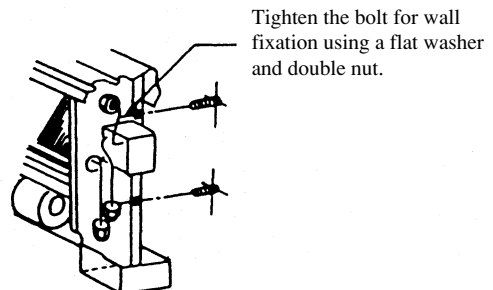
d) Level the unit using the level adjusting screw. Installation will be complrtd after attaching side and front panel.

e) Exceute fixation following the directions described below.

● When fixed on the floor



● When fixed on the wall

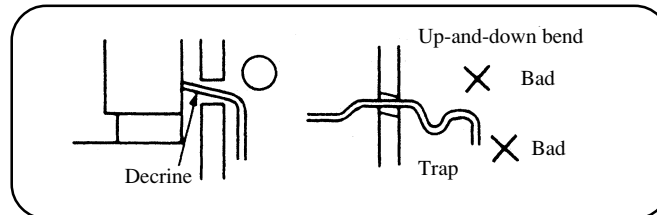




**(d) Drain piping**

The drain piping can be directed to the floor or rear sides as follows.

- (a) Connect a drain piping to the drain outlet and fix it by use of tighghening band.
- (b) Indoor side drain piping must be thermally insulated.
- (c) After finishing the drain piping, check the drainage by pouring some water in the drain pan.



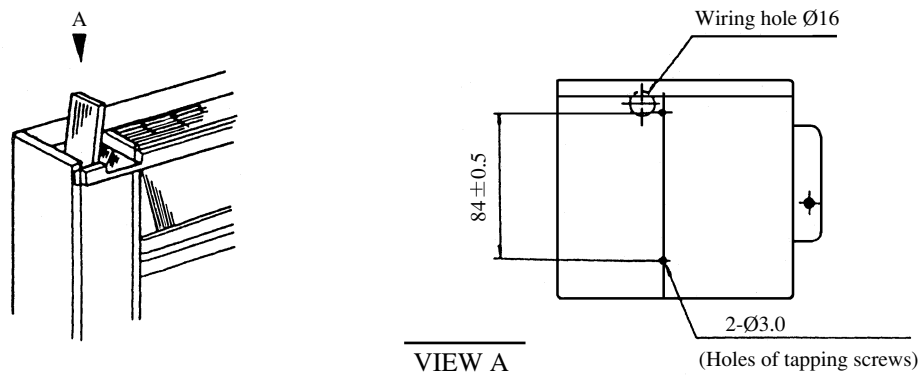
**(e) Installation of remote controller ( on the indoor unit )**

Attached remote controller may be installed on the indoor unit as shown below. The work can be done on the spot when the customer asks so or by other reasons.

Refer to the page 779 when it is instralled on the wall.

**1) Detach the front panel.**

Unit: mm

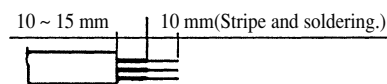


**2) Remote controller installation.**

- Attach the lower case with the screws (M4 × 128) accessory.

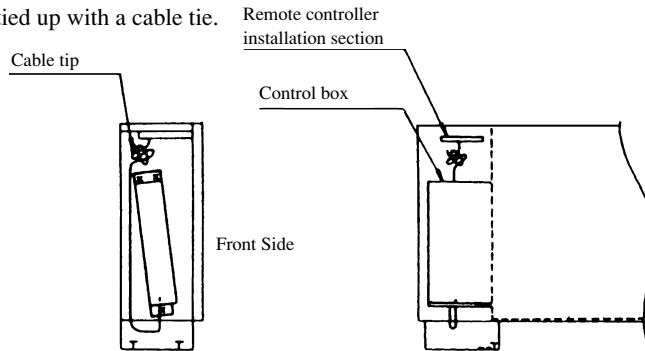
**3) Remote controller wiring.**

- a) Connect the terminals between the remote controller and the control box as per these wire color codes:[ (X) (red). (Y) (white), (Z) (black)], using the wires included in the kit.
- b) The wires should have a surplus length of approximately 30 cm. (Necessary when servicing with the front panel detached.)
- c) Strip and solder as shown below when cutting the wire. (Omitting the soldering process may cause looseness of the wiring.)



**4) Wiring route.**

- a) Wire from the wiring hole through the rear side of the control box to the terminal block.
- b) Any surplus wires should be tied up with a cable tie.



**(8) Floor standing hidden type (FDFU)**

**(a) Selection of installation hidden location**

- 1) A place where good air circulation and delivery can be obtained.

**Cooled (warmed) air throw** Unit : m

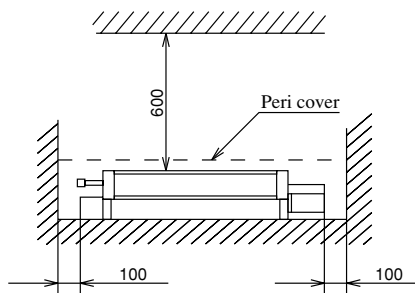
Models	All models
<b>Air throw</b>	<b>4</b>

**[Conditions]**

- (1) Fan speed: Hi
- (2) Location: Free space without obstacles
- (3) Distance of reach indicates the horizontal distance after the wind touched down the floor.
- (4) Air velocity at the throw: 0.5 (m/sec.)
- 2) Where there is no obstacle around the Air inlet port or Air outlet port.
- 3) Where a sufficient space can be reserved for the service of air filter and the attachment/removal of panels.
- 4) 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.
- 5) Where pipes and wires can be arranged conveniently.
- 6) On the solid floor
- 7) Where the unit is not exposed directly to sun light.
- 8) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas ( thinner, gasoline, etc.) is generated or remains.  
Installation and use at such place will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
- 9) Where a complete draining can be assured.
- 10) Where a sufficient space can be reserved for service.

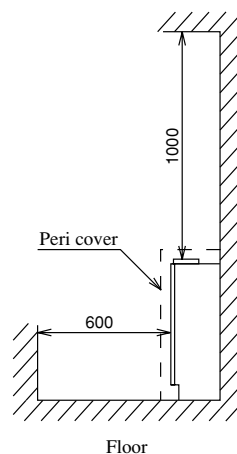
**Floor standing installation**

• Floor fixation



• Wall fixation

unit : mm



**(b) Bolt positions**

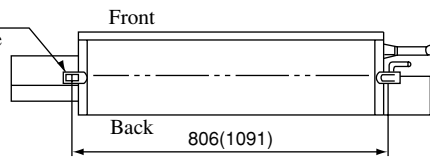
1) Bolt positions for metal settings used for floor fixation.

- Metal fitting used for floor fixation (accessories).

unit : mm

**Bolt positions for floor mounting hardware**

Floor mounting hardware  
Accessory  
10 x 30 elongated hole  
Use M8

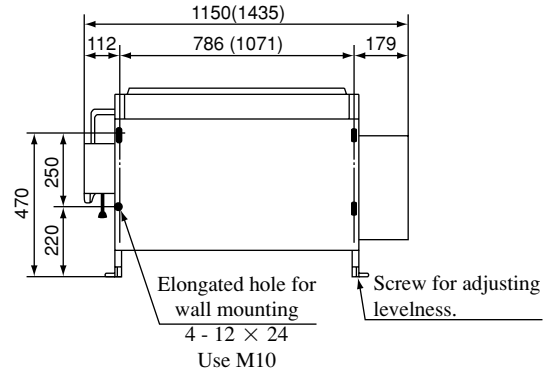


As viewed from floor side.

Note (1) Value in ( ) indicates 71 type.

2) Bolt positions for wall fixation

unit : mm

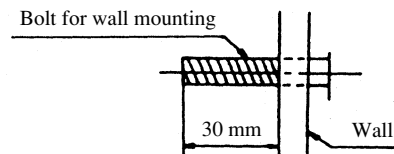
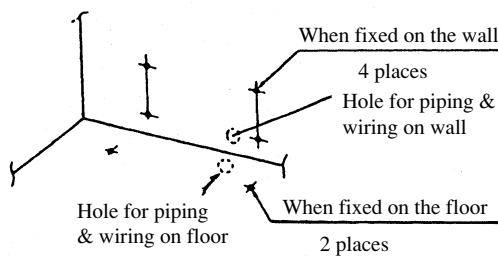


**(c) Installation of unit**

**1) Floor standing installation**

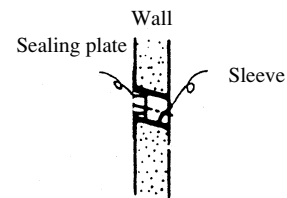
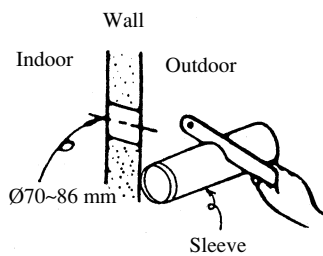
a) Position of mounting bracket fixing bolts

Drill holes by referring to figures below.



Note (1) Be sure to use a bolt of the length for wall mounding.

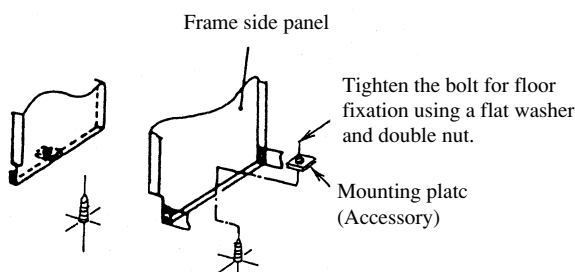
b) The method of drilling the wall is as follows.



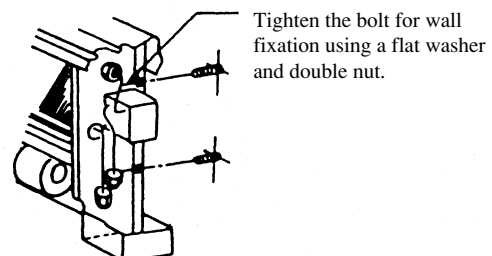
c) Level the unit using the level adjusting screw. Installation will be completed after attaching side and front panel.

d) Execute fixation following the directions described below.

- When fixed on the floor



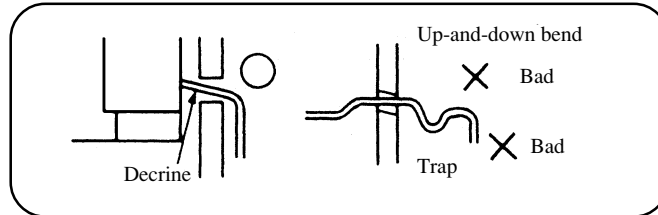
- When fixed on the wall



**(d) Drain piping**

The drain piping can be directed to the floor or rear sides as follows.

- (a) Connect a drain piping to the drain outlet and fix it by use of tighhening band.
- (b) Indoor side drain piping must be thermally insulated.
- (c) After finishing the drain piping, check the drainage by pouring some water in the drain pan.



**19.5.2 Installation of the remote controller (Optional parts)**

**(1) Selection of installation location**

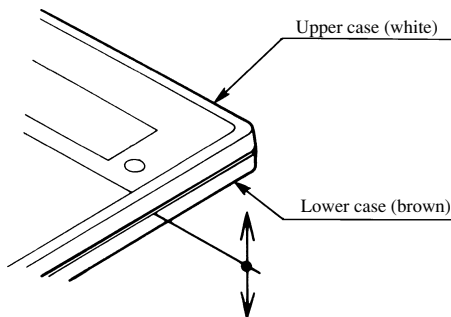
**Following locations should be avoided:**

- (a) Where exposed to direct sunlight
- (b) Near the heat source
- (c) Highly humid area or where splashed with water
- (d) Uneven installation surface

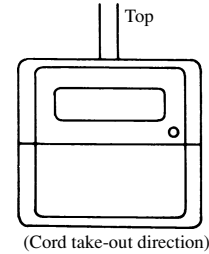
**(2) Selection of installation location**

**Exposed installation**

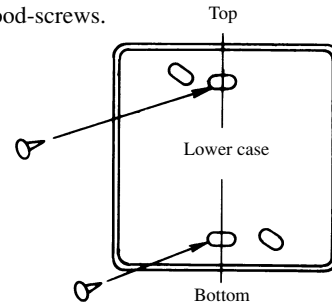
- (a) Remove the remote controller case.
  - Insert finger nails between the upper (white) and lower (brown) cases and ply them to open.



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



- 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.
- (c) Secure the remote controller lower case on the wall with 2 pieces of wood-screws.



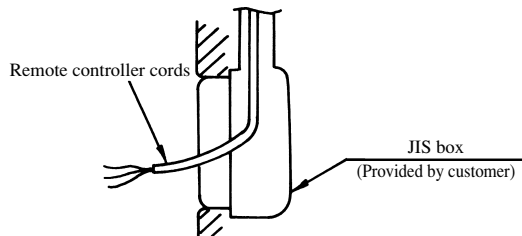
- (d) Connect the remote controller cords with the terminal block. Make sure to align the terminal numbers on the indoor unit and the remote controller. Polarities are specified on the terminal block so that the unit will not be operated if the cords are connected improperly.

Terminals: (X) red wire, (Y) white wire, (Z) black wire

- (e) Set necessary functions in accordance with the model of indoor unit.  
Refer to (c) for the setting of functions.
- (f) Couple the upper case with the lower case as they were.
- (g) Secure the remote controller cords on the wall or other using cord clamps.

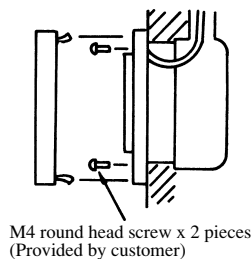
**Embedded installation**

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



**Adequate JIS box**

- JIS C 8336 Single switch box (without cover)
  - JIS C 8336 Medium size square outlet box and two-switch cover with paint margin
- 2) Remove the upper case from the remote controller.
  - 3) Secure the remote controller body on the JIS box with 2 pieces of M4 round head screw (provided by customer).
  - 4) Connect remote controller cords with the remote controller.  
(Refer to the section regarding the exposed installation.)
  - 5) Couple the upper case with the lower case as it was to finish up the installation.

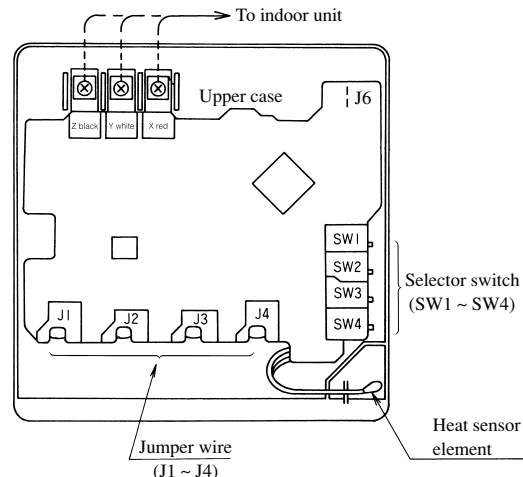


**Cautions for extension of remote controller cords**

- **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> × 3 core wires
  - ~ 300 m ... 0.75 mm<sup>2</sup> × 3 core wires
  - ~ 400 m ... 1.25 mm<sup>2</sup> × 3 core wires
  - ~ 600 m ... 2.00 mm<sup>2</sup> × 3 core wires
- **Make sure to ground one side only of the shielding wire.**

**(3) Setting the functions**

Change the setting of selector switches (WS1 ~ SW4) and jumper wires (J1 ~ J4) in accordance the functions of indoor unit and purposes of use.



**Functions of selector switches**

Switch		Function
SW1	C	Model type - Cooling only
	H	Model type - Heat pump model
SW2	ON	Remote control sensor - Valid
	OFF	Remote control sensor - Invalid
SW3	ON	Power failure compensation - Provided
	OFF	Power failure compensation - Not provided
SW4	S	Remote controller selector - Slave
	M	Remote controller selector - Master

**Functions of jumper wires**

Name		Function
J1	With	Return air temperature display - Valid
	None <sup>(1)</sup>	Return air temperature display - Invalid
J2	With	Blow rate display - 3 speed
	None <sup>(1)</sup>	Blow rate display - 2 speed
J3	With	Timer function - Valid (Normal)
	None <sup>(1)</sup>	Timer function - Invalid
J4	With	Auto swing display-With
	None <sup>(1)</sup>	Auto swing display - None
J6	With	For KX multi
	None <sup>(1)</sup>	For KXR multi

Note (1) "None" means it is not installed on the PCB or open.