DAIKIN

ED 48 – 1

ENGINEERING DATA

Air Cooled Packaged Air Conditioners For Computer Room Use

DFRJ Series
– Cooling Only –

DAIKIN INDUSTRIES, LTD.

Air Cooled Packaged Air Conditioners For Computer Room Use

DFRJ280P + (CRJ140NK) × 2
DFRJ400P + (CRJ212PAK) × 2
DFRJ560P + (CRJ300PAK) × 2

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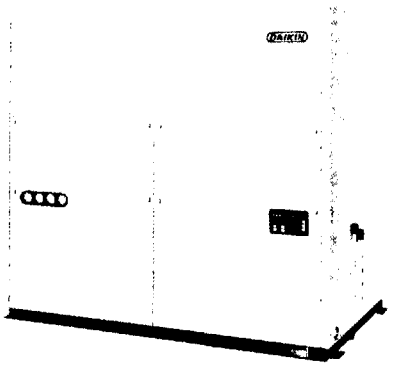
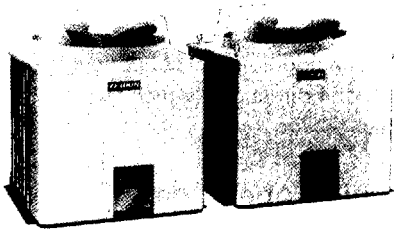




1. Features

The Daikin Remote Condenser Type Air Cooled Packaged Air Conditioners for Computer Room are available in each two models in Standard Type DFRJ + CRJ Series (25.0/28.0kW and 35.0/40.0kW and 50.0/56.0kW on 50/60Hz).
Compared with general air conditioning, air conditioning for computer room is required to cool mostly sensible heat (sensible heat ratio ≒ 1) as heat generated by computers is great and also to maintain constant temperature, humidity and cleanness. The newly developed DFRJ + CRJ series are of the effective down-flow type and have adopted the refrigerant reheating and compressor capacity control system to save power consumption. Each of the operative outdoor air temperature ranges is from ≧15°C to 43°C in case of Standard Type and from ≧5°C to 52/49°C (50/60Hz) in case of High Ambient Temp. Type. The remote condenser is designed to be installed on roof tops, on verandas, on the ground or any place outdoors. Therefore, the casing of the remote condenser is completely proofed against weather.

Easy installation:

The units of this series are assembled, internally piped and wired, and charged with refrigerant at the factory and are subject to stringent test run before delivery. All that is required on the spot are refrigerant piping and wiring to the main power source. What is more, weight of the units is reduced greatly. Since the indoor unit is divided in two pieces, main body (with eye bolts) and air filter chamber, the unit can be brought in easily. Eye bolts are also attached to the remote condenser.

Space saving:

The indoor units (DFRJ) are constructed extremely compact and light so that computer room can be effectively used. In particular, the depth of the units is reduced. What is more, the units can be installed with their back in contact with the wall. The remote condenser is equipped with 3 or 4 eye bolts to bring it in easily. In addition, the condenser is designed to draw in the air from 3 or 4 directions, which reduces the required spacing around it.

Economical operation:

Seven unloading steps ensure accurate economical temperature control. This reduces reheating load.
Our reheater is a discharge gas type - far more economical and safe than conventional electric heaters.
All operations are sequencer controlled by an electronic thermostat.

Easy operation:

The control panel is provided at the front to facilitate operation, and the remote control terminal is also provided for remote operation. States of operation are indicated by pilot lamps (For power source, operation and abnormal operation) and gauges (For discharge and suction pressure). The red lamp lights up when operation is normal and white one lights up when operation is abnormal.

Multiple functions:

- **Precise air conditioning**
  In addition to the normal fan operation and cooling, the following operations are also possible.
  - ○ Humidifying by the evaporating pan type humidifier.
  - ○ Dehumidifying by cooling with reheating operation.
  - ○ Preheating for starting-up by an optional heater in winter.

  In addition, the operation can be started in 3 modes 45, 30, 0% in accordance with room temperature to prevent dew from forming inside of the computer or under the floor due to rapid cooling at the onset.

- **Starting sequence of compressors**
  In order to equalize compressor operation period, starting sequence of two compressors is changeable.

- **Single compressor operation**
  One compressore of the two can selectively be operated by selector switch, so the remaining system can be inspected while the other is in operation.

- **Test operation for compressors**
  The compressors can be operated or stopped by the selector switch, without relying on the thermostat. Therefore, the compressors can be easily adjusted while testing.

- **Remote control is possible**
  The terminal for remote control and pilot lamp is attached.

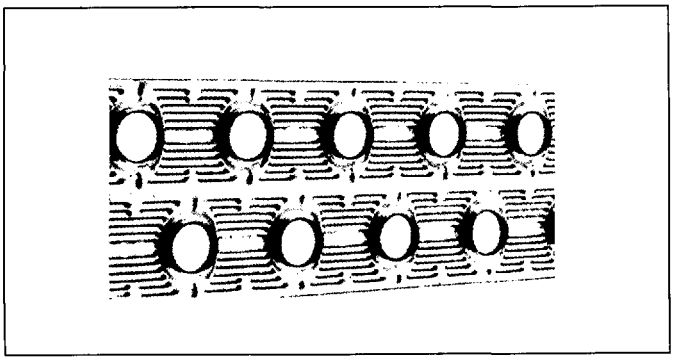
Main components:

- **The hermetically sealed reciprocating compressors (DFRJ280P·400P)**
  developed with Daikin's own technology are equipped with the unloader mechanism which is capable of controlling capacity widely. The compressors are installed by means of vibration isolation rubbers to reduce vibration transferring to free-access floor. They are equipped with accumulators and the various safety devices, enhancing additional reliability and durability.

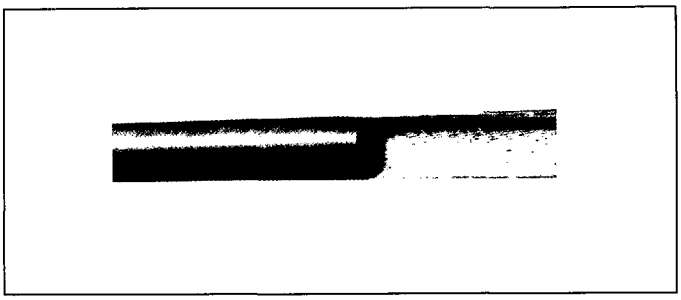
- **The hermetically sealed scroll compressor for DFRJ560P**
  The smoothly rotating scroll compressor ensures high efficiency and high power as well as less vibration and low noise.

- **The evaporator, reheater and the condenser** are of the unique cross fin coil type. Waffle louver fins and Hi-X tubes (internal surface of the tubes is modified) are adopted to improve heat exchange coefficient greatly. (except CRJ140NK)

Waffle louver fins



Hi-X tube

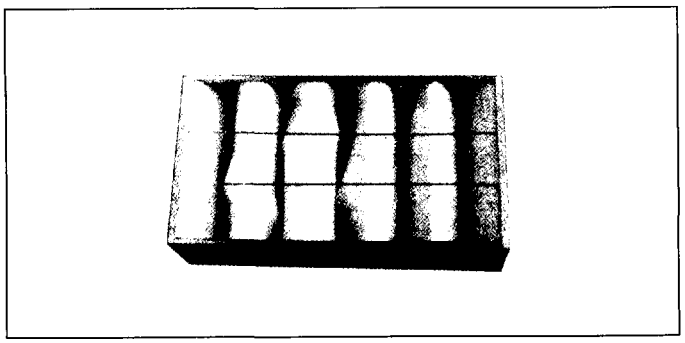


- **The evaporator fan and motor**
  The evaporator fan is of the dual suction multi-blade type and is driven by the belt.
  The motor is equipped with an over-current relay for safe operation.

- **The condenser fan and motor**
  The condenser fan is a direct drive propeller fan and discharges warm air and operation noise upwards. The motor using non-lubrication bearings is of the 8-pole water proof induciton type and is equipped with a thermal protector.

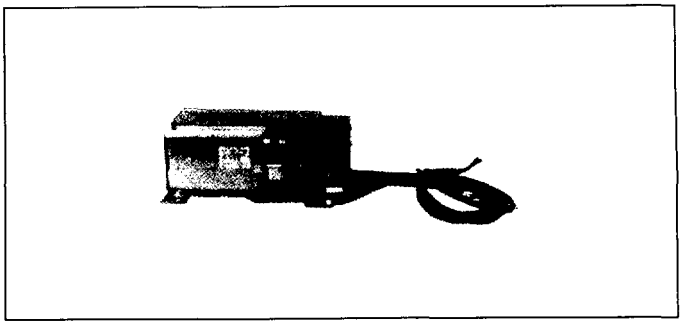
- **The air filter** is of the throw-away type, and is made of acetate unwoven fabric which has highly efficient filtering efficiency. The air filter can be smoothly attached or detached from the front.

Air filter



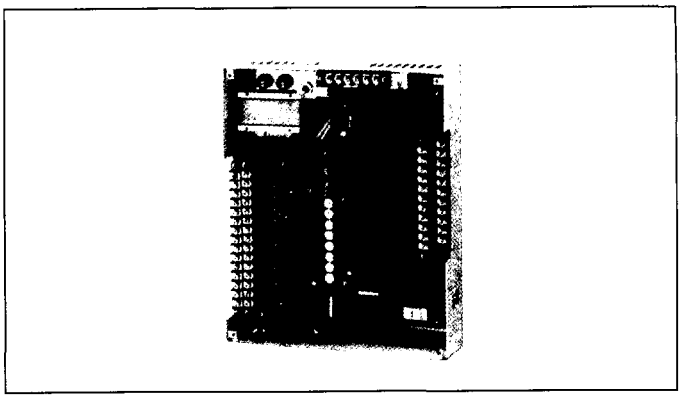
- **The humidifier** is of the evaporating pan type and is equipped with water interruption float switch, over-heat protector and thermal fuse as safety devices. In additon, water in the water tank is blown requlary to prevent scale from being settled.

Evaporating pan type humidifier

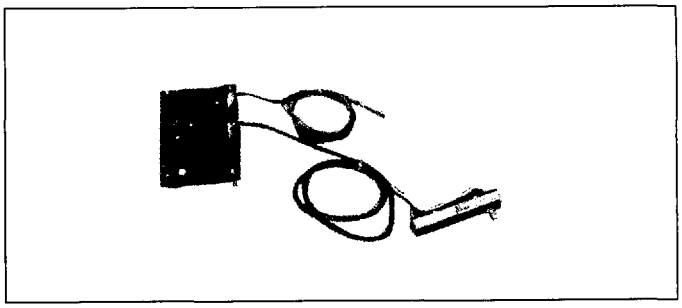


- **The sequence controller and electronic thermostat** are adopted to control discharge air temperature with accuracy of ±1°C, enhancing additional reliability.

Sequence controller



Electronic thermostat



2. Specifications

Model			DFRJ280P + (CRJ140NK) × 2	DFRJ400P + (CRJ212PAK) × 2	DFRJ560P + (CRJ300PAK)
*1 Total cooling capacity (50/60Hz)		kW	25.0/28.0	35.5/40.0	50.0/56.0
		Btu/h	85,400/95,700	121,200/136,600	170,700/191,400
		kcal/h	21,500/24,100	30,500/34,400	43,000/48,200
Capacity steps		%	100,85,70,55,45,30,15,0		
Connections	Refrigerant piping - Liquid	mm	φ12.7 × 2	φ12.7 × 2	φ15.9 × 2
	- Gas	mm	φ15.9 × 2	φ19.1 × 2	φ22.2 × 2
	Humidifier water supply		FPT 1/2B	FPT 1/2B	FPT 1/2B
	Drain piping - Upper/Lower		MPT 1 1/4B	MPT 1 1/2B	MPT 1 1/4
Indoor unit			**DFRJ280P**	**DFRJ400P**	**DFRJ560P**
Casing/Colour			Cold rolled steel plate/Ivory white		
Compressor	Type		Hermetically sealed reciprocating		Hermetically sealed scroll
	Model × No.		2T55HFL × 2	2T55UFL × 2	JT280A-LYE4 × 2
	No. of cylinders		2 × 2	2 × 2	–
	Speed	r.p.m.	2,900/3,450	2,900/3,450	2,900/3,450
	Motor output × No.	kW	3.75 × 2	5.5 × 2	7.5 × 2
	Refrigeration oil		SUNISO 3GSD		SUNISO 4GSDID-K
	Charge	ℓ	2.6 × 2	2.6 × 2	4.0 × 2
Coil	Type		Cross fin coil (Waffle louver fins and Hi-X tubes)		
	Row × stage		2 × 20	2 × 20	2 × 24
	Fin pitch	mm	2.0	2.0	2.0
	Face area	m²	0.615 × 2	0.874 × 2	1.17 × 2
Reheater	Type		Cross fin coil (Waffle louver fins and Hi-X tubes)		
Fan	Type		Dual suction multi-blade		
	Model		2D2E	2D2E	2D 2 1/4C
	Drive		Belt drive		
	Air flow rate	m³/min	140/160	210/240	320/350
		cfm	4,940/5,650	7,410/8,470	11,300/12,360
	Motor output	kW	2.2	3.7	7.5
Evaporating pan type humidifier (415V)		kW	3	4	6
		kg/h	3.9	5.2	7.8
Air filter (Factory set)			Acetate unwoven cloth (Throw-away type, 95% filtering efficiency AFI weighing method)		
	Size × No. - Filter media	mm	(2,470 × 450 × 18t) × 4	(2,470 × 450 × 18t) × 4	(2,200× 520 × 18t) × 4
	- Filter frame	mm	(800 × 440 × 240t) × 4	(800 × 440 × 240t) × 4	(800 × 490 × 145t) × 4
Refrigerant	Model		R-22		
	Charge	kg	13 × 2 { DFRJ : 5 × 2 / CRJ : 8 × 2 }	13.5 × 2 { DFRJ : 5.8 × 2 / CRJ : 7.7 × 2 }	20 × 2 { DFRJ : 9.4 × 2 / CRJ : 10.6 × 2 }
	Control		Thermal expansion valve		
	No. of circuits		2	2	2
Electronic thermostat			7 steps		
Acoustic and heat insulation material			Glass fiber 19mm thick		
Dimensions H × W × D		mm	1,930 × 1,950 × 950	1,930 × 1,950 × 950	2,060 × 2,150 × 950
Height of main body		mm	1,630	1,630	1,860
Machine weight (Main body × air filter chamber)		kg	605 (563 + 42)	640 (593 + 47)	780 (740 + 40)
Remote condenser			**(CRJ140NK) × 2**	**(CRJ212PAK) × 2**	**(CRJ300PAK) × 2**
Casing/Colour			Paintable galvanized steel plate (Weather proof)/Ivory white		
Coil	Type		Cross fin coil (Aluminium waffle fins and Hi-X tubes)	Cross fin coil (Waffle louver fins and Hi-X tubes)	
	Row × stage		(2 × 24) × 2	(1 × 40) × 2	(2 × 50) × 2
	Fin pitch	mm	2.0	2.0	2.0
	Face area	m²	(0.84) × 2	(1.57) × 2	(1.97) × 2
Fan	Type		Propeller		
	Model × No.		(P60E) × 2	(P52H) × 2	(P52H × 2) × 2
	Drive		Direct drive		
	Air flow rate	m³/min	(98/110) × 2	(140/160) × 2	(160/180) × 2
		cfm	(3,460/3,880) × 2	(4,940/5,650) × 2	(5,650/6,350) × 2
	Motor output	kW	(0.15) × 2	(0.14 + 0.20) × 2	(0.14 + 0.20) × 2
Dimensions H × W × D		mm	(850 × 770 × 770) × 2	(1,220 × 1,280 × 690) × 2	(1,440 × 1,280 × 690) × 2
Machine weight		kg	(78) × 2	(115) × 2	(130) × 2

Notes:

*1. Nominal cooling capacity is based on the following conditions:
   Indoor air temp.: 24°CDB (75°FDB),
   17°CWB (63°FWB)
   Outdoor air temp.: 35°CDB (95°FDB),
   Equivalent ref.piping length : 5m
   Level difference : 0m
2. The capacities are gross capacities which do not include a deduction for evaporator fan motor heat.
3. Power supply : (YE) 3 phase,
   50Hz, 380~415V, 60Hz, 400~440V

Conversion formulae			
Btu/h	=	kcal/h	× 3.97
kW	=	kcal/h	× 0.001163
Inches	=	mm	× 0.0394
Pounds	=	kg	× 2.205
Psi	=	kg/cm2	× 14.22
kPa	=	kg/cm2	× 98.07
cfm	=	m3/min	× 35.3
US Gallons	=	Liter	× 0.264
UK Gallons	=	Liter	× 0.220

e.g. 22,500 kcal/h = 22,500 × 3.97
= 89,300 Btu/h

Safety devices

The following safety devices are equipped as standard.

Model	DFRJ280P	DFRJ400P	DFRJ560P
Compressor thermal protector	●	●	●
Fan motor thermal protector (Condenser fan motor)	●	●	●
Overcurrent relay (Comp.)	●	●	●
Overcurrent relay (Fan motor)	●	●	●
Hight pressure switch	●	●	●
Fusible plug	●	●	●
Crankcase heater	●	●	●
Float switch (Humidifier)	●	●	●
Overheat protector (Humidifier)	●	●	●
Thermal fuse (Humidifier)	●	●	●

Optional accessories

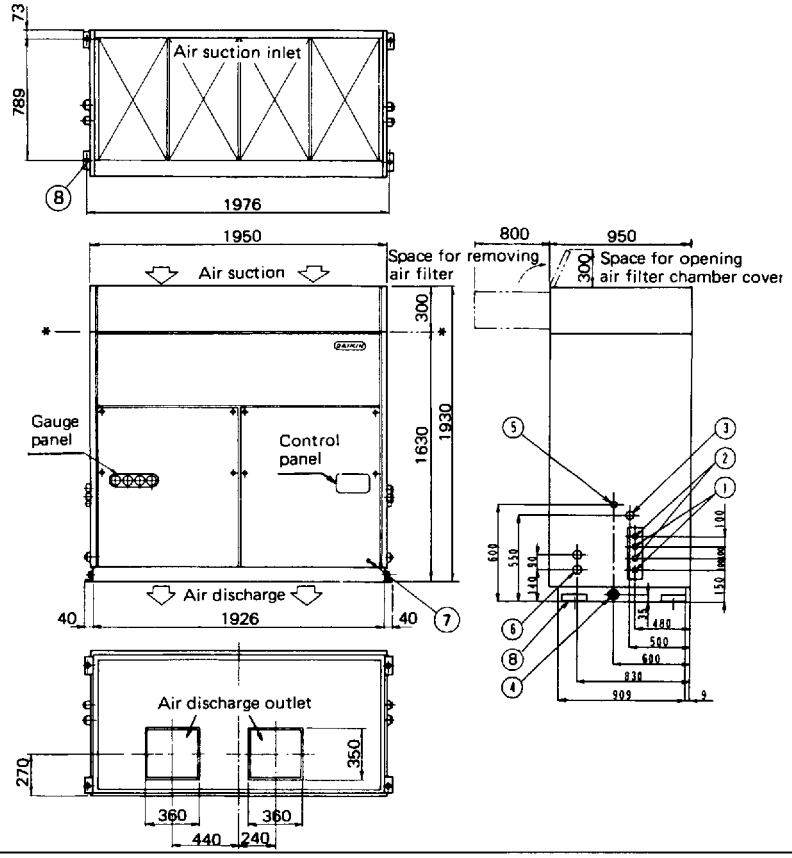
Model	DFRJ280P	DFRJ400P	DFRJ560P
Electric heater**	●	●	●
Wooden base	●	●	●
Vibration isolation pad	●	●	●

**This electric heater is used for heating up when the unit is operated under 10°C room temp. after a prolonged idle period in winter.

3. Dimensions

(Unit : mm)

DFRJ280P
DFRJ400P

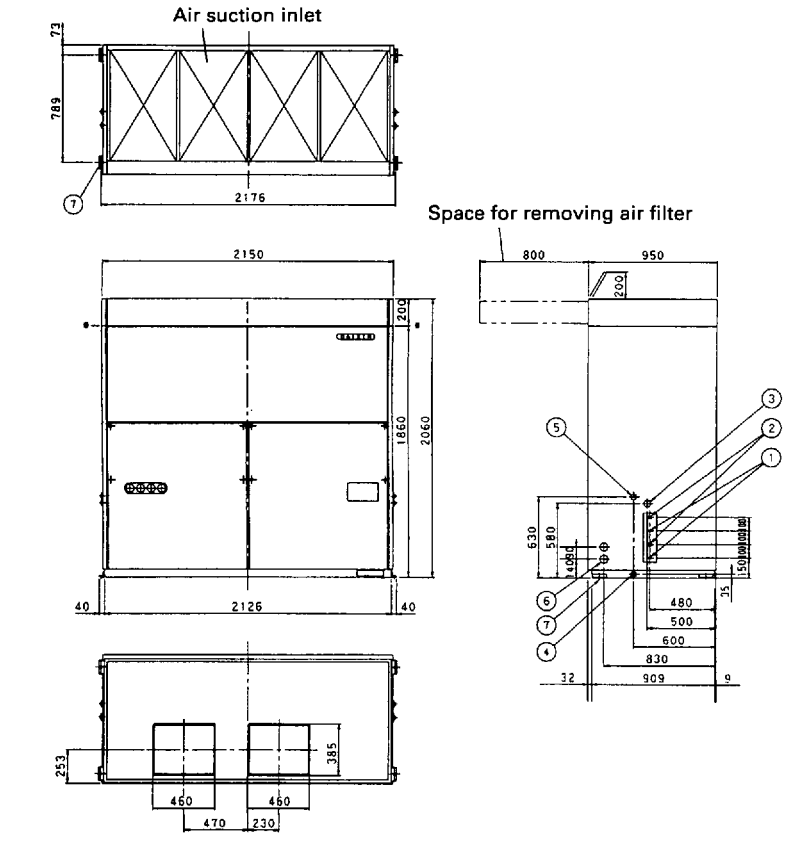


① Liquid pipe connection	
DFRJ280P	ϕ 12.7 DCuT Flare
DFRJ400P	ϕ 12.7 DCuT Brazing
② Gas pipe connection	
DFRJ280P	ϕ 15.9 DCuT Flare
DFRJ400P	ϕ 19.1 DCuT Brazing
③ Upper drain	PT 1 1/4B Male screw
④ Lower drain	PT 1 1/4B Male screw
⑤ Humidifier water supply	PT 1/2B Female screw
⑥ Power supply intake	ϕ 45 Hole
⑦ Grounding terminal in switch box	M6 Bolt
⑧ Anchor bolt set plate (detachable)	4- ϕ 17 Hole

Notes:
1. The unit is divided in two pieces at * when bringing in.
2. ① ~ ⑥ are provided on the right side as standard, but they can be also provided on the left side on the spot.

(Unit : mm)

DFRJ560P



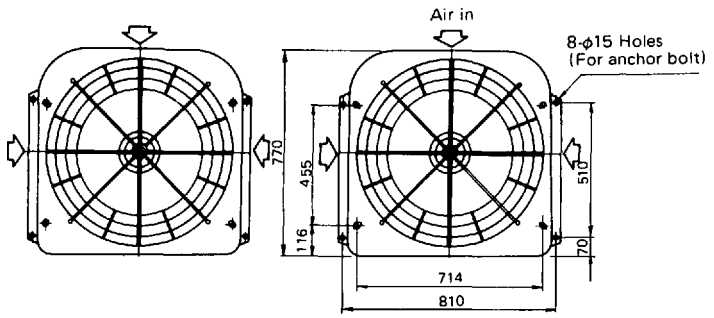
① Liquid pipe connection	ϕ 15.9 DCuT Flare
② Gas pipe connection	ϕ 22.2 DCuT Brazing
③ Upper drain	PT 1 1/4B Male screw
④ Lower drain	PT 1 1/4B Male screw
⑤ Humidifier water supply	PT 1/2B Female screw
⑥ Power supply intake	ϕ 58 Hole
⑦ Anchor bolt set plate (detachable)	4- ϕ 17 Hole

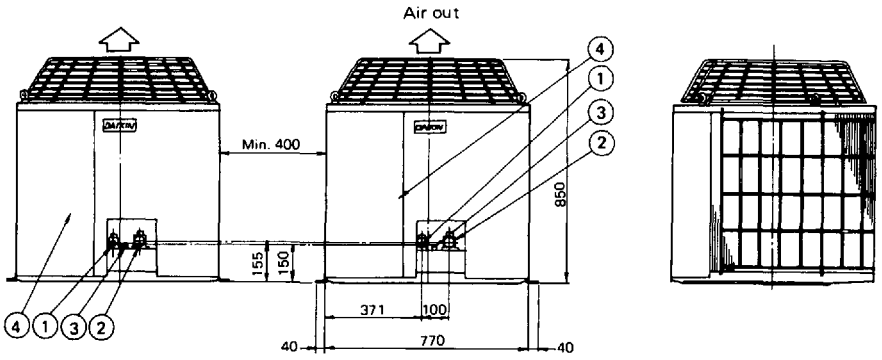
Notes:
1. The unit is divided in two pieces at * when bringing in.
2. ①~⑥ are provided on the right side as standard, but they can be also provided on the left side on the spot.

(Unit : mm)

(CRJ140NK)×2

No.1 Remote condenser No.2 Remote condenser



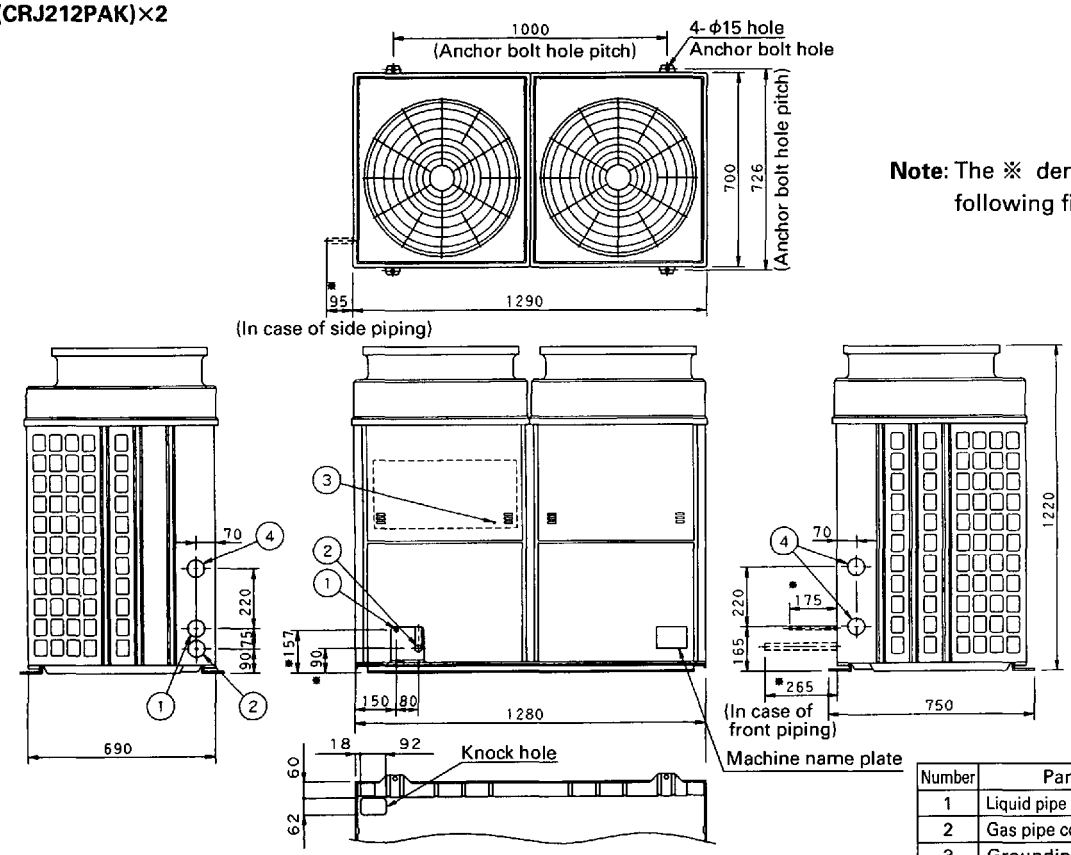


① Liquid pipe connection φ 12.7 DCuT Flare
② Gas pipe connection φ 15.9 DCuT Flare
③ Control wire intake
④ Grounding terminal M6 Bolt

Note: DFRJ280P has 2 sets of CRJ140NK respectively.

(Unit : mm)

(CRJ212PAK)×2

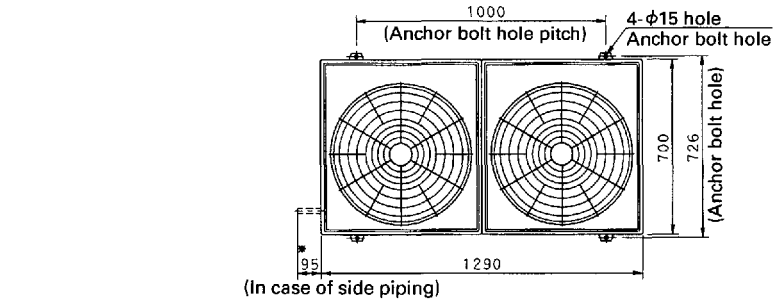


Note: The ※ denotes dimensions following fitting of pipes.

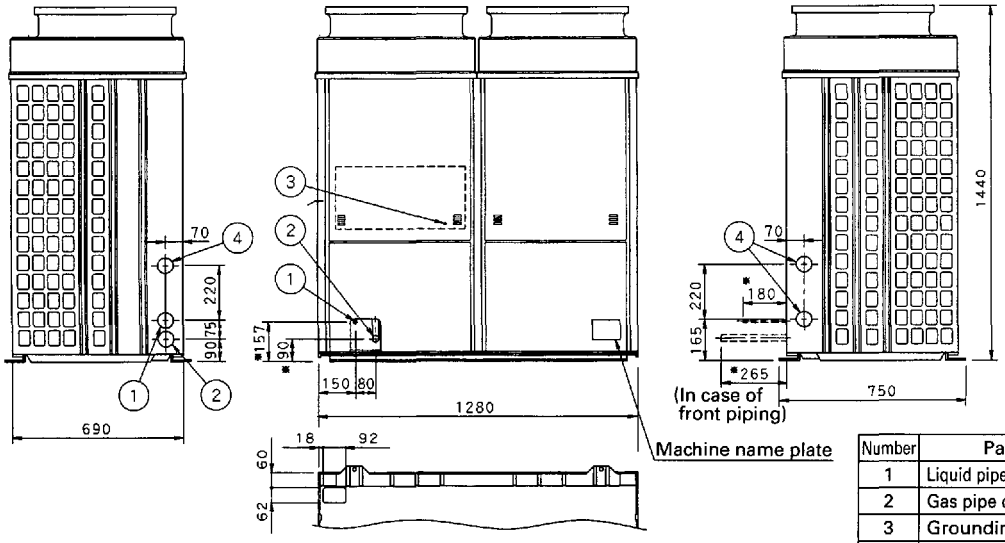
Number	Part name	Description
1	Liquid pipe connection port	φ12.7mm brazing connection
2	Gas pipe connection port	φ19.1mm brazing connection
3	*Grounding terminal*	Inside switch box (M5)
4	Power wiring port	φ62

(Unit : mm)

(CRJ300PAK)×2



Note: The ※ denotes dimensions following fitting of pipes.



Number	Part name	Description
1	Liquid pipe connection port	φ15.9mm brazing connection
2	Gas pipe connection port	φ22.2mm brazing connection
3	Grounding terminal	Inside switch box (M5)
4	Power wiring port	φ62

4. Capacity tables

● **DFRJ280P**

Q: Cooling capacity
W: Power input

Hz	Outdoor temp. °CDB	Suction air temp. °CWB 14.0 Q kW	14.0 W kW	16.0 Q kW	16.0 W kW	17.0 Q kW	17.0 W kW	18.0 Q kW	18.0 W kW	20.0 Q kW	20.0 W kW	22.0 Q kW	22.0 W kW
50 Hz	20	26.0	8.2	27.7	8.3	28.8	8.4	30.0	8.4	32.6	8.6	35.7	8.9
	22	25.5	8.4	27.3	8.5	28.3	8.6	29.5	8.7	32.0	8.9	35.1	9.1
	24	25.0	8.6	26.8	8.7	27.9	8.8	28.9	8.9	31.5	9.1	34.6	9.4
	26	24.5	8.8	26.3	8.9	27.3	9.0	28.5	9.1	31.0	9.3	34.0	9.6
	28	24.0	9.0	25.8	9.1	26.8	9.2	28.0	9.3	30.5	9.6	33.5	9.9
	30	23.6	9.2	25.2	9.3	26.3	9.4	27.4	9.6	29.9	9.8	33.0	10.2
	32	23.0	9.4	24.8	9.6	25.7	9.7	26.9	9.8	29.4	10.1	32.4	10.4
	34	22.5	9.6	24.3	9.8	25.2	9.9	26.3	10.0	28.8	10.3	31.8	10.7
	35	22.3	9.7	24.0	9.9	[25.0]	[10.0]	26.1	10.1	28.6	10.4	31.5	10.8
60 Hz	20	28.8	10.5	31.0	10.7	32.2	10.9	33.5	11.0	36.3	11.4	39.8	11.9
	22	28.2	10.8	30.4	11.1	31.6	11.2	32.9	11.3	35.7	11.7	39.2	12.2
	24	27.8	11.1	29.9	11.3	31.1	11.5	32.3	11.7	35.3	12.0	38.6	12.5
	26	27.3	11.4	29.3	11.6	30.5	11.8	31.8	12.0	34.7	12.4	38.0	12.9
	28	26.8	11.6	28.8	11.9	30.0	12.1	31.2	12.2	34.1	12.7	37.4	13.2
	30	26.2	11.9	28.2	12.2	29.4	12.3	30.6	12.5	33.5	13.0	36.8	13.5
	32	25.7	12.1	27.8	12.4	28.8	12.6	30.0	12.8	32.9	13.2	36.1	13.8
	34	25.1	12.4	27.2	12.7	28.2	12.9	29.5	13.1	32.3	13.5	35.5	14.1
	35	24.9	12.5	26.9	12.8	[28.0]	[13.0]	29.2	13.2	31.9	13.7	35.1	14.3

Notes:

1. Figures in [ ] show nominal capacities.
2. The above capacities are net capacities which include an addition for indoor fan motor heat.
3. Capacities are based on the following conditions.
   Equivalent ref. piping length 5m
   Level difference 0m
   Refrigerant piping .....Standard size

Correction factors for capacity and power input, and bypass factor to changes in air flow rate.

	Air flow rate(m³/min)		110	130	140	160	180
Correction factor	50 Hz	Capacity	0.95	0.98	1.00	1.03	1.05
		Power input	0.99	1.00	1.00	1.00	10.1
	60 Hz	Capacity	——	0.98	0.99	1.00	1.02
		Power input	——	0.99	1.00	1.00	1.00
Bypass factor			0.20	0.26	0.29	0.35	0.41

● **DFRJ400P**

Q: Cooling capacity
W: Power input

Hz	Outdoor temp.	Suction air temp. °CWB											
		14.0		16.0		17.0		18.0		20.0		22.0	
		Q	W	Q	W	Q	W	Q	W	Q	W	Q	W
	°CDB	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
50 Hz	20	38.0	12.6	40.6	12.8	42.1	13.0	43.8	13.1	47.5	13.5	51.9	14.0
	22	37.2	12.9	39.8	13.1	41.3	13.3	42.8	13.4	46.5	13.8	51.0	14.3
	24	36.4	13.2	38.9	13.4	40.5	13.6	42.0	13.8	45.7	14.2	50.1	14.7
	26	35.6	13.4	38.1	13.7	39.5	13.9	41.1	14.1	44.7	14.5	49.0	15.0
	28	34.8	13.7	37.3	14.0	38.7	14.2	40.2	14.4	43.7	14.8	48.0	15.4
	30	34.0	14.0	36.4	14.3	37.7	14.5	39.3	14.7	42.7	15.2	47.0	15.8
	32	33.1	14.3	35.5	14.6	36.8	14.8	38.3	15.0	41.8	15.5	46.0	16.1
	34	32.3	14.6	34.7	14.9	36.1	15.1	37.4	15.4	40.8	15.8	45.0	16.5
	35	31.8	14.8	34.2	15.1	35.5	15.3	36.9	15.5	40.4	16.0	44.5	16.7
60 Hz	20	41.6	16.6	44.6	17.0	46.1	17.2	47.9	17.5	52.0	18.0	56.9	18.6
	22	40.7	16.9	43.6	17.3	45.3	17.6	47.1	17.8	51.1	18.3	55.9	19.0
	24	39.9	17.3	42.8	17.7	44.4	17.9	46.2	18.1	50.2	18.7	55.0	19.3
	26	39.0	17.6	41.9	18.0	43.6	18.2	45.3	18.4	49.3	19.0	54.1	19.7
	28	38.3	17.8	41.1	18.3	42.8	18.5	44.4	18.7	48.5	19.3	53.3	20.0
	30	37.5	18.1	40.2	18.6	41.9	18.8	43.6	19.1	47.7	19.6	52.5	20.3
	32	36.6	18.4	39.5	18.8	41.1	19.1	42.9	19.3	46.8	19.9	51.7	20.7
	34	35.9	18.7	38.8	19.1	40.4	19.4	42.2	19.6	46.1	20.2	50.9	21.0
	35	35.7	18.8	38.4	19.2	40.0	19.5	41.7	19.8	45.7	20.4	50.5	21.1

Notes:

1. Figures in ☐ show nominal capacities.
2. The above capacities are net capacities which include an addition for indoor fan motor heat.
3. Capacities are based on the following conditions.
   Equivalent ref. piping length 5m
   Level difference 0m
   Refrigerant piping .....Standard size

Correction factors for capacity and power input, and bypass factor to changes in air flow rate.

	Air flow rate(m^3/min)		170	195	210	230	240	260
Correction factor	50 Hz	Capacity	0.96	0.98	1.00	1.01	1.02	1.04
		Power input	0.99	1.00	1.00	1.00	1.00	1.01
	60 Hz	Capacity	—	0.96	0.98	0.99	1.00	1.02
		Power input	—	0.99	1.00	1.00	1.00	1.00
Bypass factor			0.24	0.29	0.32	0.36	0.38	0.42

● **DFRJ560P**

Q : Cooling capacity
W: Power input

Hz	Outdoor temp. °CDB	Suction air temp. °CWB											
		14.0		16.0		17.0		18.0		20.0		22.0	
		Q kW	W kW	Q kW	W kW	Q kW	W kW	Q kW	W kW	Q kW	W kW	Q kW	W kW
50 Hz	20	50.6	19.0	54.5	19.3	56.2	19.5	58.1	19.6	60.9	19.9	65.8	20.1
	22	49.9	19.6	53.6	19.9	55.4	20.1	57.3	20.2	60.1	20.5	64.8	20.8
	24	49.1	20.2	52.8	20.5	54.7	20.7	56.5	20.9	59.2	21.1	63.9	21.4
	26	48.5	20.8	52.1	21.1	53.9	21.3	55.6	21.5	58.5	21.8	63.1	22.0
	28	47.6	21.4	51.3	21.8	53.1	22.0	54.8	22.1	57.5	22.4	62.1	22.7
	30	46.9	22.1	50.5	22.4	52.2	22.6	53.9	22.8	56.6	23.1	61.1	23.4
	32	46.0	22.8	49.4	23.1	51.1	23.3	52.7	23.5	55.4	23.8	59.8	24.1
	34	45.4	23.5	48.8	23.9	50.5	24.1	52.1	24.3	54.7	24.6	59.1	24.9
	35	44.9	23.9	48.4	24.3	**50.0**	**24.5**	51.6	24.7	54.2	25.0	58.6	25.3
60 Hz	20	57.3	22.0	61.5	22.4	63.5	22.6	65.5	22.8	70.0	23.1	74.4	23.5
	22	56.4	22.8	60.6	23.2	62.6	23.4	64.6	23.6	69.0	24.0	73.3	24.4
	24	55.5	23.6	59.7	24.0	61.6	24.2	63.7	24.4	67.9	24.8	72.2	25.2
	26	54.7	24.4	58.7	24.8	60.7	25.0	62.6	25.2	66.8	25.6	71.1	26.1
	28	53.8	25.1	57.8	25.6	59.7	25.8	61.7	26.0	65.8	26.4	69.9	26.9
	30	52.8	25.9	56.8	26.4	58.7	26.6	60.6	26.9	64.6	27.3	68.7	27.8
	32	51.9	26.8	55.8	27.3	57.7	27.5	59.4	27.7	63.4	28.2	67.4	28.7
	34	50.9	27.7	54.7	28.2	56.6	28.5	58.4	28.7	62.2	29.2	66.1	29.7
	35	50.5	28.2	54.2	28.7	**56.0**	**29.0**	57.8	29.2	61.7	29.7	65.5	30.2

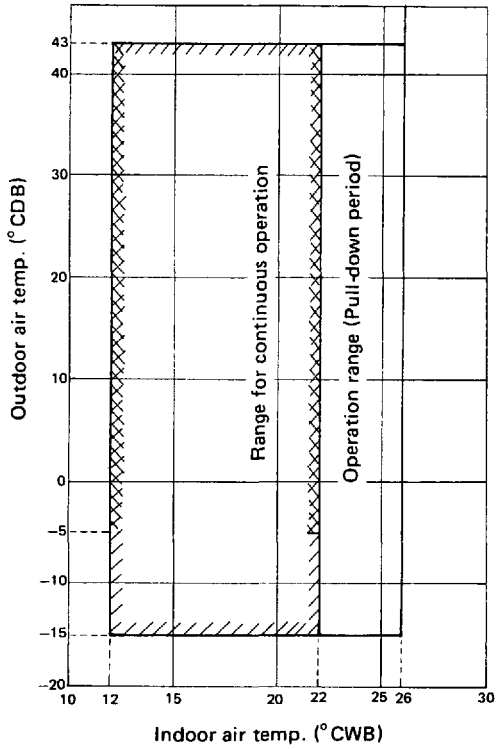
Notes:

1. Figures in [ ] show nominal capacities.
2. The above capacities are net capacities which include an addition for indoor fan motor heat.
3. Capacities are based on the following conditions.
   Equivalent ref. piping length 5m
   Level difference 0m
   Refrigerant piping .....Standard size

Correction factors for capacity and power input, and bypass factor to changes in air flow rate.

		Air flow rate	260	280	300	320	350	360
Correction factor	50 Hz	Capacity	0.98	0.99	0.99	1.00	1.01	1.01
		Power input	0.99	1.00	1.00	1.00	1.00	1.00
	60 Hz	Capacity	0.97	0.98	0.99	0.99	1.00	1.00
		Power input	0.99	0.99	1.00	1.00	1.00	1.00
Bypass factor			0.25	0.28	0.31	0.34	0.37	0.38

5. Operation limit



Note:
The graphs are based on the following operative conditions.

- Equivalent piping length 5m
- Level difference 0m

6. Fan performance

(1) Performance data

Model	Air flow rate (m³/min.)		ESP	0	50	100	150	200	250	300	350	400	450	500	ESP (Factory set)	
	50Hz	60Hz													50Hz	60Hz
DFRJ280P	110	—	r.p.m.	600	680	775	855	935	1000	1080	1150	1210	1270		112	—
			kW	0.42	0.57	0.74	0.93	1.14	1.36	1.58	1.80	2.05	2.45			
	130	130	r.p.m.	650	730	825	905	965	1035	1105	1170	1240	1300		78.4	172
			kW	0.68	0.85	1.04	1.24	1.46	1.70	1.95	2.23	2.65	2.93			
	140	140	r.p.m.	680	770	855	935	995	1070	1135	1200	1260			58.8	152
			kW	0.85	1.03	1.23	1.44	1.67	1.93	2.20	2.64	2.93				
	160	160	r.p.m.	810	890	950	1015	1085	1145	1205	1265				—	98.0
			kW	1.31	1.52	1.74	1.97	2.24	2.72	3.02	3.35					
	180	180	r.p.m.	910	980	1040	1105	1165	1205						—	14.7
			kW	1.94	2.17	2.60	2.88	3.17	3.50							
DFRJ400P	170	—	r.p.m.	730	790	840	905	965	1020	1095	1160	1220	1280		147	—
			kW	1.05	1.22	1.41	1.61	1.83	2.05	2.29	2.55	2.81	3.08			
	195	195	r.p.m.	800	850	900	955	1005	1070	1135	1200	1250			93.0	218
			kW	1.57	1.77	1.98	2.20	2.44	2.69	2.94	3.21	3.56				
	210	210	r.p.m.	850	890	940	985	1045	1105	1165	1230	1290			58.8	183
			kW	1.96	2.17	2.40	2.63	2.88	3.14	3.46	4.14	4.47				
	240	240	r.p.m.	940	980	1030	1085	1145	1205	1255	1310				—	98.0
			kW	2.95	3.18	3.44	3.74	4.47	4.79	5.12	5.47					
	260	260	r.p.m.	1020	1060	1110	1160	1205							—	26.5
			kW	3.60	4.53	4.84	5.16	5.49								
DFRJ560P	260		r.p.m.	780	830	880	940	990	1050	1100	1140	1190			230	430
			kW	2.02	2.15	2.28	2.42	2.60	2.81	3.00	3.21	3.58				
	285		r.p.m.	840	900	960	1020	1075	1130	1180	1230				150	330
			kW	2.65	2.83	3.02	3.31	3.56	3.72	3.98	4.21					
	320		r.p.m.	940	1000	1070	1130	1185	1235	1285					58.8	230
			kW	3.44	3.65	4.01	4.33	4.56	4.87	5.11						
	350		r.p.m.	1080	1140	1230	1265								—	98.0
			kW	5.61	5.81	6.13	6.47									
	360		r.p.m.	1140	1200	1250	1300								—	60
			kW	6.41	6.75	6.91	7.23									

Symbols:

ESP : External static pressure (Pa)
r.p.m. : Fan speed (r.p.m.)
kW : Required motor output (kW)

Note:

□ shows the operating range of the fan motor based on factory setting. In case the fan motor is used out of the range, change motor size.

(2) Specifications

Model		DFRJ280P	DFRJ400P	DFRJ560P
Fan motor		3 phase, 4 pole		
Motor speed (50/60Hz)	r.p.m.	1,420/1,710	1,420/1,710	1,420/1,710
Rated output	kW	2.2	3.7	7.5
Max. replacement output	kW	3.7	5.5	-
Max. fan speed		1,300	1,300	1,300
Pulley size				
Motor pulley		2B129-28 (Fixed dia.)	2B143-28 (Fixed dia.)	3B235-35 (Fixed dia.)
Fan pulley		2B235-35 (Fixed dia.)	2B235-35 (Fixed dia.)	3B171-38 (Fixed dia.)
V belt size × No.		B39 × 2	B40 × 2	B43 × 3
Air flow rate range 50Hz	m³/min.	110 ~ 180	170 ~ 260	260 ~ 360
60Hz	m³/min.	130 ~ 180	195 ~ 260	

Note:

Nomenclature of pulleys is based on the following indication.

□ B 143 - 28
- 28 — Pulley shaft dia. (mm)
- 143 — Pulley O.D. (mm)
- B — B type pully
- □ — No. of belts (BLANK: One belt / 2 : Two belts)

(3) Fan speed based on the standard motor pulley

Model	Motor pulley pitch dia. (mm)	Fan speed (r.p.m.)	
		50Hz	60Hz
DFRJ280P	118	750	900
DFRJ400P	132	840	1010
DFRJ560P	160	1020	1230

7. Electric characteristics

Model	Symbol of power supply	Rated power supply (Volts-ph-Hz)	Starting methods	Indoor unit							Outdoor unit		Total		
				Compressor			Fan motor		Evaporating pan type humidifier		Fan motor		MRC	NRC	
				No.	LRA each	MRC each	No.	MRC each	kW	MRC	No.	MRC each		Humidifier OFF	Humidifier ON
DFRJ280P + CRJ140NK	YE	380-3-50	Sequence direct	2	52	10	1	4.6	2.5	3.8	2	0.6	29.0	19.3	23.1
		400-3-50			55				2.8	4.0		0.6	29.2	17.9	21.9
		415-3-50			56				3.0	4.2		0.6	29.4	16.8	21.0
		400-3-60			50				2.8	4.0		0.6	29.2	21.0	25.0
		440-3-60			53				3.4	4.4		0.6	29.6	18.5	22.9
DFRJ400P + CRJ212PAK	YE	380-3-50	Sequence direct	2	81	13	1	7	3.4	5.1	2	2.6	40.7	28.6	33.7
		400-3-50			85				3.7	5.4		2.7	41.1	26.5	31.9
		415-3-50			88				4.0	5.6		2.8	41.4	25.2	30.8
		400-3-60			75				3.7	5.4		2.6	41.0	30.6	36.0
		440-3-60			82				4.5	5.9		2.7	41.6	26.9	32.8
DFRJ560P + CRJ300PAK	YE	380-3-50	Sequence direct	2	104	22	1	15	5.0	7.5	2	2.6	69.1	35.2	42.7
		400-3-50			109				5.6	8.1		2.7	69.8	39.9	41.0
		415-3-50			113				6.0	8.3		2.8	70.1	31.7	40.0
		400-3-60			93				5.6	8.1		2.6	69.7	37.5	45.6
		440-3-60			102				6.7	8.9		2.7	70.6	32.9	41.8

Symbols:

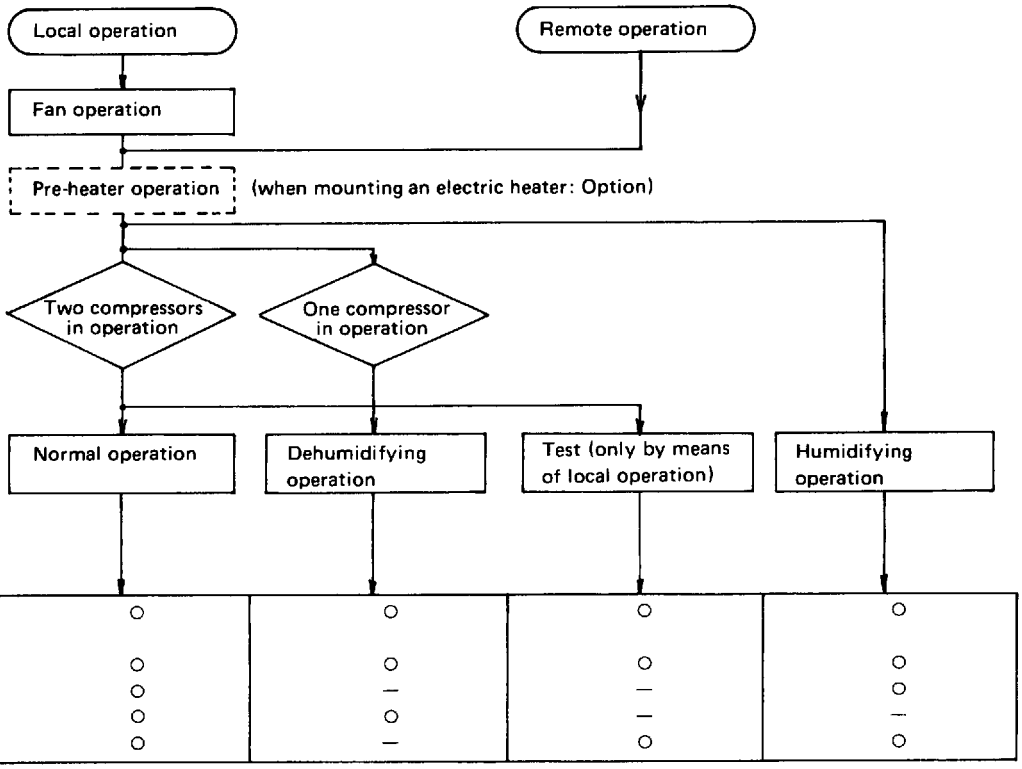
LRA : Locked rotor amps (A)
MRC : Max. running current (A)
NRC : Nominal running current (A)

Notes:

1. Total MRC means maximum running current within operating range, i.e., total maximum running current of compressor MRC, indoor and outdoor fan motor MRC and humidifier MRC.
2. Total NRC means nominal running current for unit at the same conditions as the nominal cooling capacity on page 5-3.

8. Operation control

(1) Operation mode



Main devices	Normal operation	Dehumidifying operation	Test (only by means of local operation)	Humidifying operation
Fan	○	○	○	○
Compressor				
Full load	○	○	○	○
Unload	○	—	—	○
Reheater	○	○	—	—
HEP	○	—	○	○

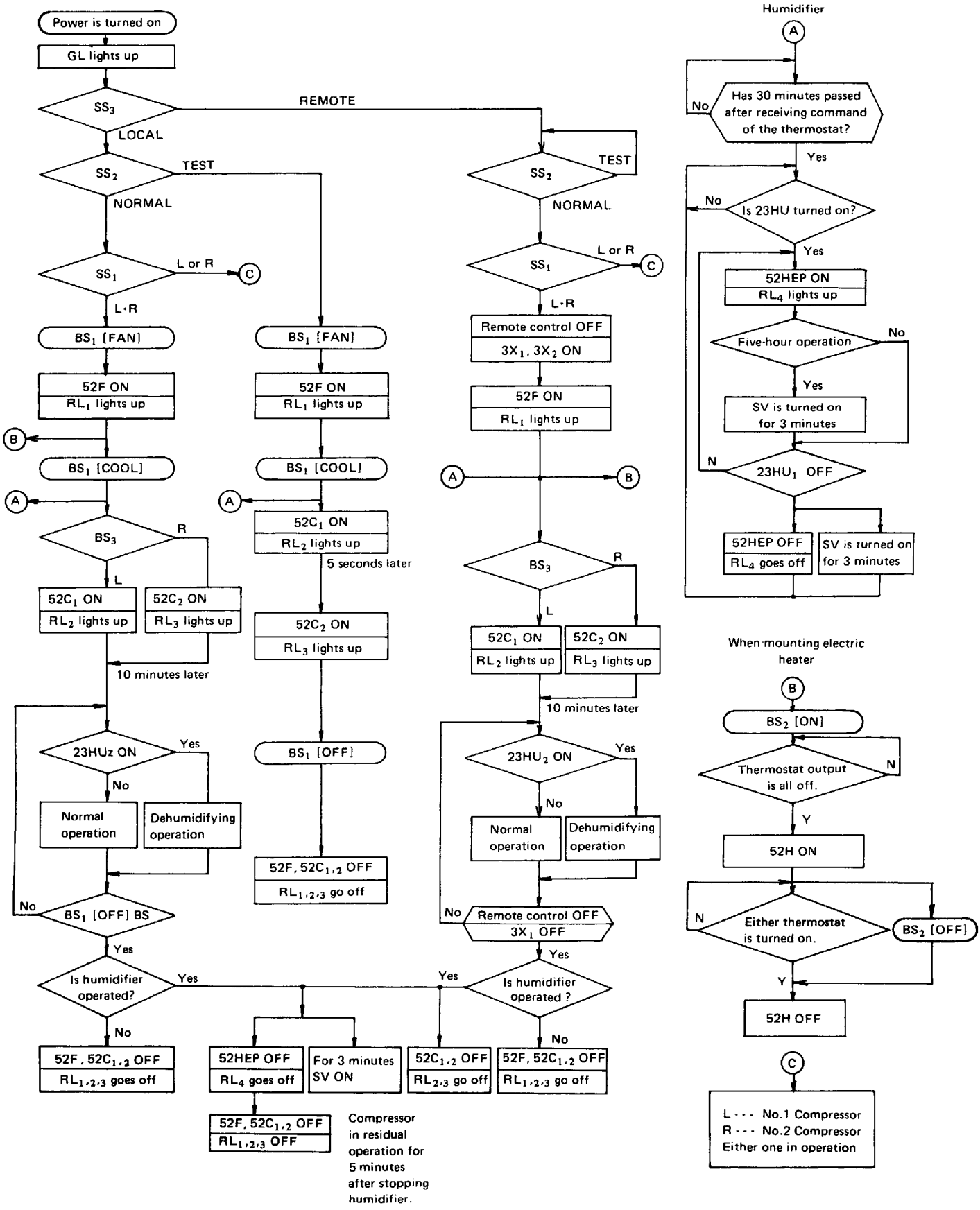
Fan operation ..... Fan operation by the master control switch

Pre-heater operation ..... Heater operation by the switch for electric heater
(Discharge air temperature control by the thermostat)

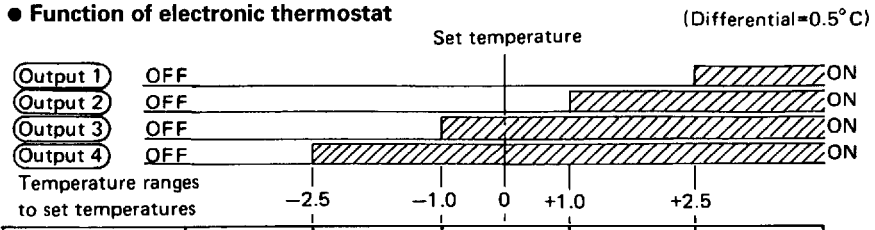
- **Normal operation** ..... Normal operation (Humidistat for dehumidifying is turned off)
- **Dehumidifying operation** .... Dehumidifying during high humidity (Humidistat for dehumidifying is turned on.)
- **Test** ..... Forced compressor operation by the master control switch

Humidifying operation ..... Evaporating pan type humidifier operation (Humidistat for humidifying is turned on)

(2) Operation flow



● Function of electronic thermostat



Temperature range	A	B	C	D	E
Capacity control steps when power is supplied.	Step 0			Step 2	Step 3
Capacity control steps during operation (After sampling)	1 step down immediately	1 step down 3 minutes later	Step remains unchanged	1 step up 3 minutes later	1 step up immediately

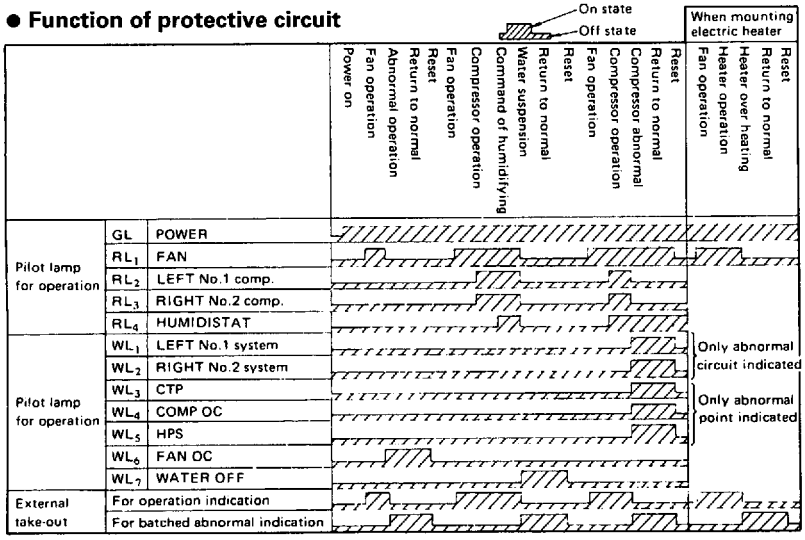
When supplying the power (DC24V) to the electronic thermostat by means of the sequence controller (SC), it dispatches the on/off signal to the sequence controller (SC) by means of the attached variable resistor VR and thermistor Th. Once the thermostat is set to discharged air temperature by VR, the temperature range of the thermostat is set in 5 steps (A-E) based on such set temperature at its center, and thus, a certain temperature range is determined by the difference between set temperature and discharged air temperature measured by the thermistor, and then dispatches the on/off signal to SC.

Then SC memorizes the temperature range dispatched by the electronic thermostat and raises or reduces steps of capacity controls (8 steps from 0 to 7) one by one, compared with the temperature range next (3 minutes later).

Notes:

1. Sampling is performed every three minutes.
2. Volume set temperatures range from 13 to 26°C.

● Function of protective circuit



● Capacity control

	Devices \ STEP / Load %		STEP 7	6	5	4	3	2	1	0
			100	85	70	55	45	30	15	0
Normal operation	No.1 system	COMP	◎	◎	○	○	◎	○	○	●
		$20BS_{11}$	—	—	—	ON	—	—	ON	—
		$20BS_{12}$	—	—	—	—	—	—	—	—
	No.2 system	COMP	◎	○	○	○	●	●	●	●
		$20BS_{21}$	—	—	—	—	—	—	—	—
		$20BS_{22}$	—	—	—	—	—	—	—	—
Dehumidifying operation	No.1 system	COMP	◎	◎	◎	◎	◎	◎	◎	●
		$20BS_{11}$	—	ON	ON	ON	—	ON	ON	—
		$20BS_{12}$	—	—	—	ON	—	—	ON	—
	No.2 system	COMP	◎	◎	◎	◎	●	●	●	●
		$20BS_{21}$	—	—	ON	ON	—	—	—	—
		$20BS_{22}$	—	—	—	—	—	—	—	—

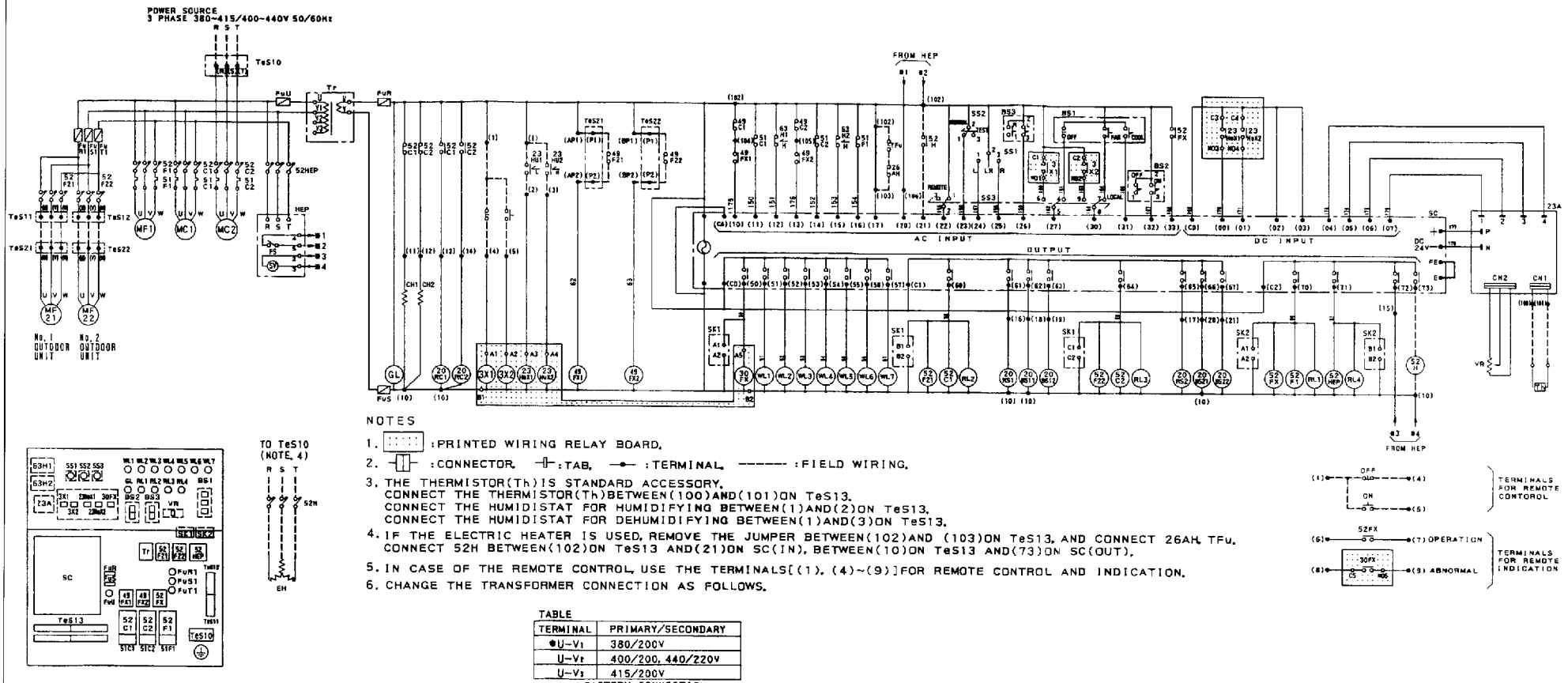
1. Explanation of symbols

COMP	Symbols		52C	20RS
	◎	Full load	ON	OFF
	○	Unload	ON	ON
	●	Stopping	OFF	ON
$20BS_{11-22}$ (Solenoid valve for reheater)	—	Closed(OFF)		
	ON	Opened		

2. The above is based on the fact that the No.1 system is prior to No.2 system (in case of BS_3 (L)). In case No.2 system (BS_3 (R)) is prior to No.1 system, the function of No.1 is reversed with that of No.2.
3. In case No.1 system is in operation (SS_2 is either L or R), the system indicated by SS_2 starts by priority.
   (Capacity control in case of No.1 system operation is up to 3 steps.)

9. Wiring diagram

DFRJ280P + (CRJ140NK) × 2



NOTES

1. [ ] : PRINTED WIRING RELAY BOARD.
2. —⊣⊢— : CONNECTOR, —⊣⊢— : TAB, —●— : TERMINAL, ------ : FIELD WIRING.
3. THE THERMISTOR(Th) IS STANDARD ACCESSORY.
   CONNECT THE THERMISTOR(Th) BETWEEN(100) AND(101) ON TeS13.
   CONNECT THE HUMIDISTAT FOR HUMIDIFYING BETWEEN(1) AND(2) ON TeS13.
   CONNECT THE HUMIDISTAT FOR DEHUMIDIFYING BETWEEN(1) AND(3) ON TeS13.
4. IF THE ELECTRIC HEATER IS USED, REMOVE THE JUMPER BETWEEN(102) AND (103) ON TeS13, AND CONNECT 26AH, TFu.
   CONNECT 52H BETWEEN(102) ON TeS13 AND(21) ON SC(IN), BETWEEN(10) ON TeS13 AND(73) ON SC(OUT).
5. IN CASE OF THE REMOTE CONTROL, USE THE TERMINALS[(1), (4)~(9)] FOR REMOTE CONTROL AND INDICATION.
6. CHANGE THE TRANSFORMER CONNECTION AS FOLLOWS.

TABLE

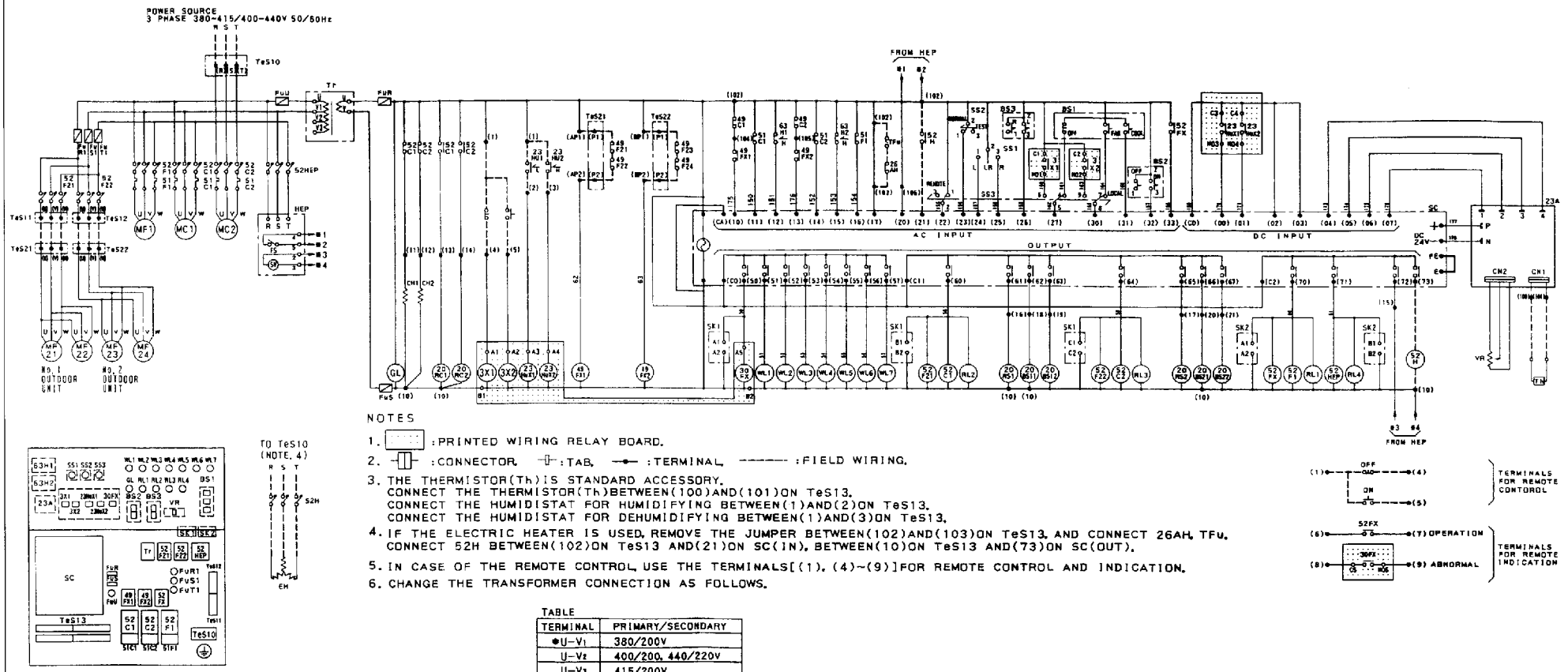
TERMINAL	PRIMARY/SECONDARY
*U-V1	380/200V
U-V2	400/200, 440/220V
U-V3	415/200V

* FACTORY CONNECTION

3X1, 2	MAGNETIC RELAY	52FX	MAGNETIC RELAY	RL2	PILOT LAMP(LEFT-RED)	WL4	PILOT LAMP(COMP, OC-WHITE)
20BS11, 12	SOLENOID VALVE(REHEAT)	52HEP	MAGNETIC CONTACTOR(HEP)	RL3	PILOT LAMP(RIGHT-RED)	WL5	PILOT LAMP(HPS-WHITE)
20BS21, 22	SOLENOID VALVE(REHEAT)	63H1, 2	PRESSURE SWITCH	RL4	PILOT LAMP(HUMID-RED)	WL6	PILOT LAMP(FAN, OC-WHITE)
20RC1, 2	SOLENOID VALVE(MAIN)	BS1	PUSH BUTTON SWITCH	SC	SEQUENCE CONTROLLER	WL7	PILOT LAMP(WATER OFF-WHITE)
20RS1, 2	SOLENOID VALVE(UNLOAD)	BS2	PUSH BUTTON SWITCH	SK1, 2	SURGE ABSORBER		
23A	THERMOSTAT	BS3	PUSH BUTTON SWITCH	SS1	SELECTOR SWITCH(L-L·R-R)		
23HuX1, 2	MAGNETIC RELAY	CH1, 2	CRANKCASE HEATER	SS2	SELECTOR SWITCH(NORMAL-TEST)		
30FX	MAGNETIC RELAY(ALARM)	CN1, 2	CONNECTOR	SS3	SELECTOR SWITCH(LOCAL-REMOTE)		FIELD WIRING AND OPTIONAL ACCESORIES
49C1, 2	THERMO SWITCH(MC1·2)	FuR, S	FUSE(250V, 5A)	TeS10, 11, 12	TERMINAL STRIP(INDOOR UNIT)		
49F21, 22	THERMO SWITCH(MF21·22)	FuU, R1, S1, T1	FUSE(600V, 5A)	TeS21, 22	TERMINAL STRIP(OUTDOOR UNIT)	23Hu1	HUMIDISTAT(HUMIDIFYING)
49FX1, 2	MAGNETIC RELAY	GL	PILOT LAMP(POWER-GREEN)	Th	THERMISTOR(23A)	23Hu2	HUMIDISTAT(DEHUMIDIFYING)
51C1, 2	OVERCURRENT RELAY(MC1, 2)	HEP	HUMIDIFIER(PAN TYPE)	Tr	TRANSFORMER(300VA)	26AH	THERMO SWITCH(OVER HEAT)
51F1	OVERCURRENT RELAY(MF1)	MC1, 2	MOTOR(COMP)	VR	VARIABLE RESISTOR(23A)	52H	MAGNETIC CONTACTOR(EH)
52C1, 2	MAGNETIC CONTACTOR(MC1, 2)	MF21, 22	MOTOR(OUTDOOR FAN)	WL1	PILOT LAMP(LEFT-WHITE)	EH	ELECTRIC HEATER
52F1	MAGNETIC CONTACTOR(MF1)	MF1	MOTOR(INDOOR FAN)	WL2	PILOT LAMP(RIGHT-WHITE)	TFu	THERMAL FUSE(110°C)
52F21, 22	MAGNETIC CONTACTOR(MF21, 22)	RL1	PILOT LAMP(FAN-RED)	WL3	PILOT LAMP(CTP-WHITE)		

DU333-5518

DFRJ400P + (CRJ212PAK) × 2



NOTES

1. ▭ :PRINTED WIRING RELAY BOARD.
2. ⊣⊢ :CONNECTOR. ⊣⊢ :TAB. —●— :TERMINAL. ——— :FIELD WIRING.
3. THE THERMISTOR(Th)IS STANDARD ACCESSORY.
   CONNECT THE THERMISTOR(Th)BETWEEN(100)AND(101)ON TeS13.
   CONNECT THE HUMIDISTAT FOR HUMIDIFYING BETWEEN(1)AND(2)ON TeS13.
   CONNECT THE HUMIDISTAT FOR DEHUMIDIFYING BETWEEN(1)AND(3)ON TeS13.
4. IF THE ELECTRIC HEATER IS USED, REMOVE THE JUMPER BETWEEN(102)AND(103)ON TeS13, AND CONNECT 26AH, TFu.
   CONNECT 52H BETWEEN(102)ON TeS13 AND(21)ON SC(IN), BETWEEN(10)ON TeS13 AND(73)ON SC(OUT).
5. IN CASE OF THE REMOTE CONTROL, USE THE TERMINALS[(1), (4)~(9)]FOR REMOTE CONTROL AND INDICATION.
6. CHANGE THE TRANSFORMER CONNECTION AS FOLLOWS.

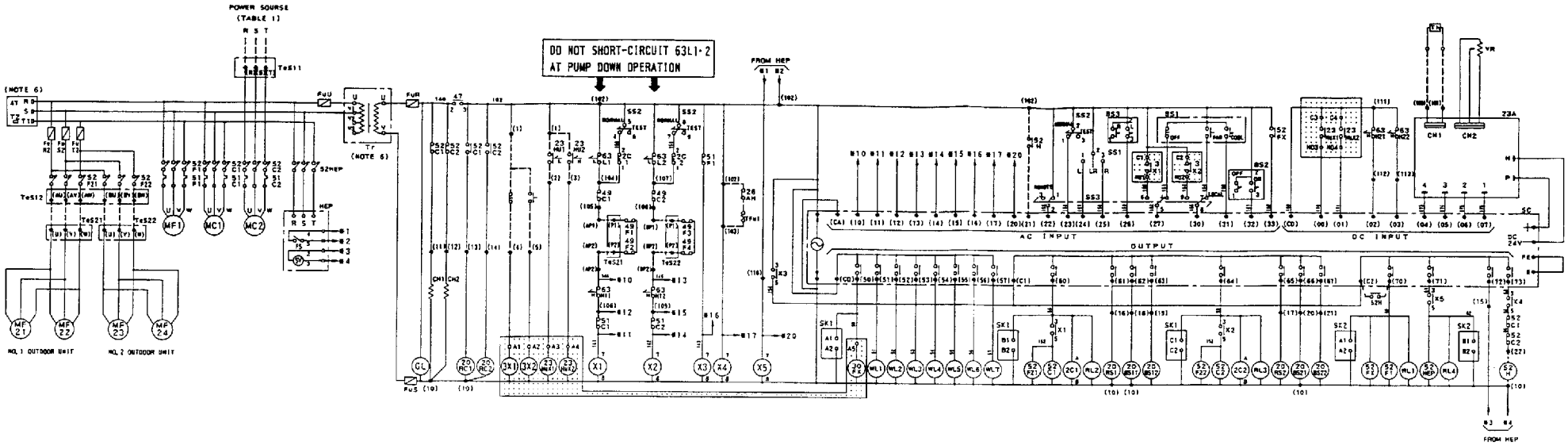
TABLE

TERMINAL	PRIMARY/SECONDARY
*U-V1	380/200V
U-V2	400/200, 440/220V
U-V3	415/200V

*FACTORY CONNECTION

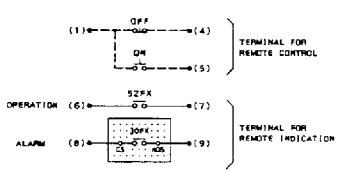
3X1, 2	MAGNETIC RELAY	52FX	MAGNETIC RELAY	RL1	PILOT LAMP(FAN-RED)	WL3	PILOT LAMP(CTP-WHITE)
20BS11, 12	SOLENOID VALVE(REHEAT)	52HEP	MAGNETIC CONTACTOR(HEP)	RL2	PILOT LAMP(LEFT-RED)	WL4	PILOT LAMP(COMP, OC-WHITE)
20BS21, 22	SOLENOID VALVE(REHEAT)	63H1, 2	PRESSURE SWITCH	RL3	PILOT LAMP(RIGHT-RED)	WL5	PILOT LAMP(HPS-WHITE)
20RC1, 2	SOLENOID VALVE(MAIN)	BS1	PUSH BUTTON SWITCH	RL4	PILOT LAMP(HUMID-RED)	WL6	PILOT LAMP(FAN, OC-WHITE)
20RS1, 2	SOLENOID VALVE(UNLOAD)	BS2	PUSH BUTTON SWITCH	SC	SEQUENCE CONTROLLER	WL7	PILOT LAMP(WATER OFF-WHITE)
23A	THERMOSTAT	BS3	PUSH BUTTON SWITCH	SK1, 2	SURGE ABSORBER		
23HuX1, 2	MAGNETIC RELAY	CH1, 2	CRANKCASE HEATER	SS1	SELECTOR SWITCH(L-L-R-R)		
30FX	MAGNETIC RELAY(ALARM)	CN1, 2	CONNECTOR	SS2	SELECTOR SWITCH(NORMAL-TEST)	FIELD WIRING AND OPTIONAL ACCESORIES	
49C1, 2	THERMO SWITCH(MC1, 2)	FuR, S	FUSE (250V, 5A)	SS3	SELECTOR SWITCH(LOCAL-REMOTE)		
49F21, 22, 23, 24	THERMO SWITCH(MF21, 22, 23, 24)	FuU	FUSE (600V, 5A)	TeS10, 11, 12	TERMINAL STRIP(INDOOR UNIT)	23Hu1	HUMIDISTAT(HUMIDIFYING)
49FX1, 2	MAGNETIC RELAY	FuR1, S1, T1	FUSE (600V, 10A)	TeS21, 22	TERMINAL STRIP(OUTDOOR UNIT)	23Hu2	HUMIDISTAT(DEHUMIDIFYING)
51C1, 2	OVERCURRENT RELAY(MC1, 2)	GL	PILOT LAMP(POWER-GREEN)	Th	THERMISTOR(23A)	26AH	THERMO SWITCH(OVER HEAT)
51F1	OVERCURRENT RELAY(MF1)	HEP	HUMIDIFIER(PAN TYPE)	Tr	TRANSFORMER(300VA)	52H	MAGNETIC CONTACTOR(EH)
52C1, 2	MAGNETIC CONTACTOR(MC1, 2)	MC1, 2	MOTOR(COMP)	VR	VARIABLE RESISTOR(23A)	EH	ELECTRIC HEATER
52F1	MAGNETIC CONTACTOR(MF1)	MF21~24	MOTOR(OUTDOOR FAN)	WL1	PILOT LAMP(LEFT-WHITE)	TFu	THERMAL FUSE(110℃)
52F21, 22	MAGNETIC CONTACTOR(MF21, 22, 23, 24)	MF1	MOTOR(INDOOR FAN)	WL2	PILOT LAMP(RIGHT-WHITE)		

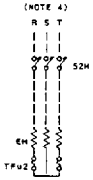
DU335-5120B



NOTES

1. [·····] :RELAY BOARD(RB) —●— :TERMINAL OF TeS
   —[]— :CONNECTOR —0— :TAB
2. ---- :FIELD WIRING ——— :JUMPER
3. THE THERMISTOR (Th) IS STANDARD ACCESSORY.
   CONNECT THE THERMISTOR (Th) BETWEEN (100) AND (101) ON TeS13.
   CONNECT THE HUMIDISTAT FOR HUMIDIFYING BETWEEN (1) AND (2) ON TeS13.
   CONNECT THE HUMIDISTAT FOR DEHUMIDIFYING BETWEEN (1) AND (3) ON TeS13.
4. IF THE ELECTRIC HEATER IS USED, REMOVE THE JUMPER BETWEEN (102) AND (103) ON TeS13. AND CONNECT 26AH, TFU1.
   CONNECT 52H BETWEEN (102) ON TeS13 AND (21) ON SC(IN), BETWEEN (10) ON TeS13 AND (22) ON TeS13, BETWEEN (C2)
   ON SC(OUT) AND (70) ON SC(OUT). THE POWER SUPPLY FOR 'EH' SHOULD NOT BE CONNECTED TO TeS11.
5. IN CASE OF THE REMOTE CONTROL, USE THE TERMINALS [(1), (4)–(9)] FOR REMOTE CONTROL AND INDICATION.
6. CHANGE THE CONNECTION OF TRANSFORMER AND PHASE REVERSAL RELAY ACCORDING TO THE TABLE 2.
7. DO NOT OPERATE THE UNIT BY SHORT-CIRCUITING 63L1·2. THIS CAN CAUSE A FAILURE OF THE UNIT.





2C1·2	TIME LAG RELAY (60 sec.)	52FX	MAGNETIC RELAY	MF21·22·23·24	MOTOR (OUTDOOR FAN)	WL3	PIROT LAMP (CTP·LPS-WHITE)
20BS1·2	SOLENOID VALVE (REHEAT)	52HEP	MAGNETIC CONTACTOR (HEP)	RL1	PIROT LAMP (FAN-RED)	WL4	PIROT LAMP (COMP. DC-WHITE)
20BS21·22	SOLENOID VALVE (REHEAT)	63H11·12	PRESSURE SWITCH (HIGH)	RL2	PIROT LAMP (LEFT-RED)	WL5	PIROT LAMP (HPS-WHITE)
20RC1·2	SOLENOID VALVE (MAIN)	63H21·22	PRESSURE SWITCH (HIGH-CONTROL)	RL3	PIROT LAMP (RIGHT-RED)	WL6	PIROT LAMP (FAN. DC-WHITE)
20RS1·2	SOLENOID VALVE (UNLOAD)	63L1·2	PRESSURE SWITCH (LOW)	RL4	PIROT LAMP (HUMID-RED)	WL7	PIROT LAMP (WATER OFF-WHITE)
23A	THERMOSTAT	BS1	PUSH BUTTON SWITCH (CONTROL)	SC	SEQUENCE CONTROLLER	X1·2·3·4·5	MAGNETIC RELAY
23HUX1·2	MAGNETIC RELAY	BS2	PUSH BUTTON SWITCH (PREHEAT)	SK1·2	SURGE ABSORBER		
3X1·2	MAGNETIC RELAY	BS3	PUSH BUTTON SWITCH (COMP. START)	SS1	SELECTOR SWITCH (L-L·A-A)	FIELD WIRING AND OPTIONAL ACCESORIES	
30FX	MAGNETIC RELAY (ALARM)	CH1·2	CRANK CASE HEATER	SS2	SELECTOR SWITCH (NORMAL-TEST)	23HU1	HUMIDISTAT (HUMIDIFYING)
47	PHASE REVERSAL RELAY	CN1·2	CONNECTER	SS3	SELECTOR SWITCH (LOCAL-REMOTE)	23HU2	HUMIDISTAT (DEHUMIDIFYING)
49C1·2	THERMO SWITCH (MC1·2)	FUR·S	FUSE (250V, 5A)	TeS11·12·13	TERMINAL STRIP (INDOOR UNIT)	26AH	THERMO SWITCH (OVER HEAT)
49FI·2·3·4	THERMO SWITCH (MF21·22·23·24)	FUU	FUSE (600V, 5A)	TeS21·22	TERMINAL STRIP (OUTDOOR UNIT)	52H	MAGNETIC CONTACTOR (EH)
51C1·2	OVERCURRENT RELAY (MC1·2)	FUR2·52·T2	FUSE (600V, 10A)	Th	THERMISTOR (23A)	EH	ELECTRIC HEATER
51F1	OVERCURRENT RELAY (MF1)	GL	PILOT LAMP (POWER-GREEN)	TF	TRANSFORMER (300VA)	TFU1	THERMAL FUSE (EH:110℃)
52C1·2	MAGNETIC CONTACTOR (MC1·2)	HEP	HUMIDIFIER (PAN TYPE)	VR	VARIABLE RESISTOR (23A)	TFU2	THERMAL FUSE (EH:130℃)
52F1	MAGNETIC CONTACTOR (MF1)	MC1·2	MOTOR (COMPRESSOR)	WL1	PIROT LAMP (LEFT-WHITE)		
52F21·22	MAGNETIC CONTACTOR (MF21·22·23·24)	MF1	MOTOR (INDOOR FAN)	WL2	PIROT LAMP (RIGHT-WHITE)		

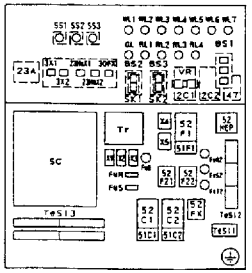
TABLE 1

SYMBOL	POWER SOURCE
YE	3 PHASE 380-415/400-440 50/60Hz

TABLE 2

*FACTORY CONNECTION

MODEL	NAME	VOLTAGE PRIMARY	VOLTAGE SECONDARY	TERMINAL
YE	TRANSFORMER	380V	200V	*U-V1
		400·440V	200·220V	U-V2
		415V	200V	U-V3
	PHASE-REVERSAL RELAY	380V	——	*R-S-T1
		400·415·440V	——	R-S-T2



DU337-538D

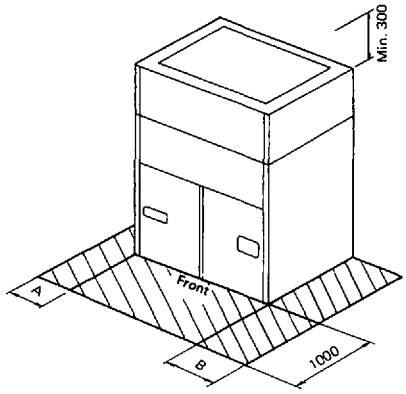
10. Installation

■ Service space

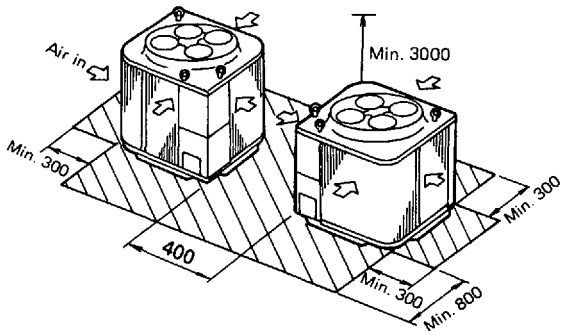
Take as much space as needed around the air conditioner for ease of access. On the front of the air conditioner, the control panel, pressure switches, switch box are attached. So a sufficient service space should be taken in front of the air conditioner. In addition, service space should be also taken on the front and the top of the air conditioner as the air filter is replaced at times.
Be certain that the unit has been installed in such a place where there is no danger of fire due to leakage of inflammable gas. In case multiple remote condensers are installed with their suction inlets faced one to the other, leave the spacing as shown on the right at least.

(Unit: mm)

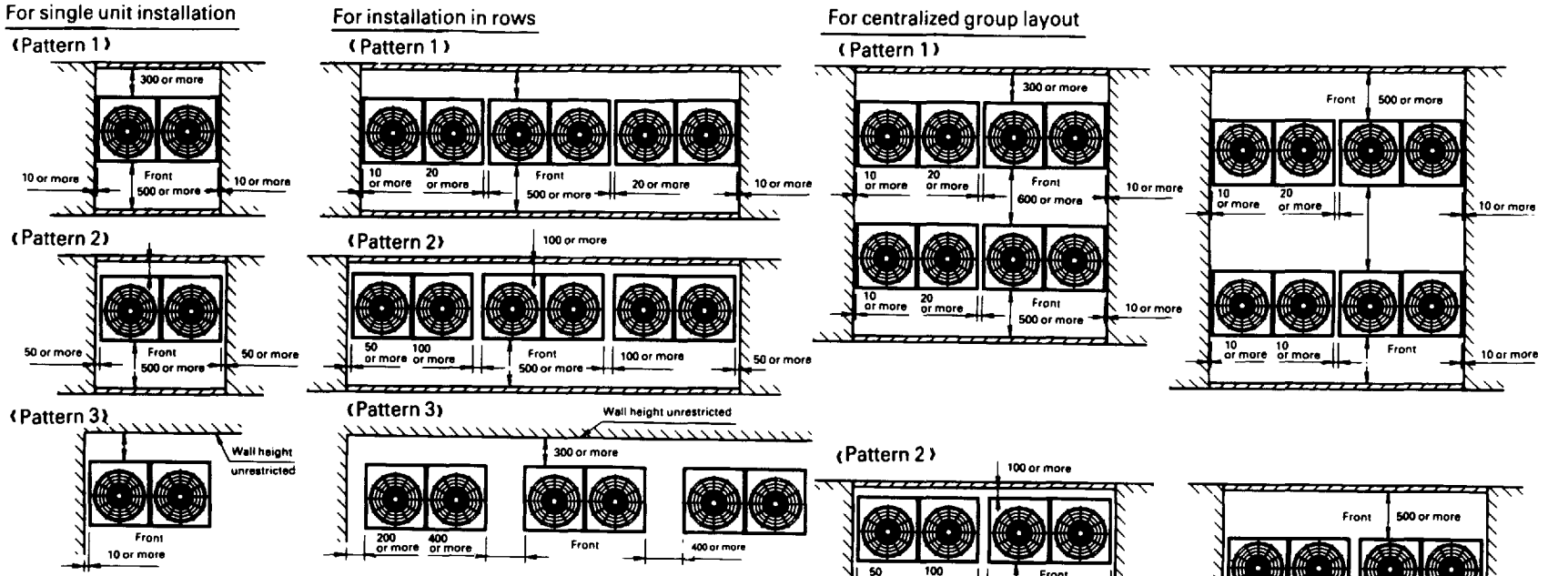
● **CRJ140NK**



Water piping direction	A	B
Right-hand piping	Min. 100	Min. 500
Left-hand piping	Min. 500	Min. 100



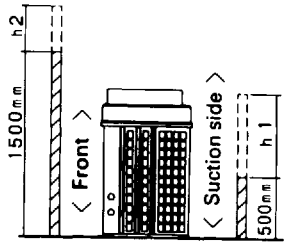
(Unit: mm)



Notes:

1 Heights of walls in case of Patterns 1 and 2:
Front: 1500mm
Suction side: 500mm
Side: Height unrestricted

2 If the above wall heights are exceeded then h1/2 and h2/2 should be added to the front and suction side service spaces respectively as shown in the figure on the right.

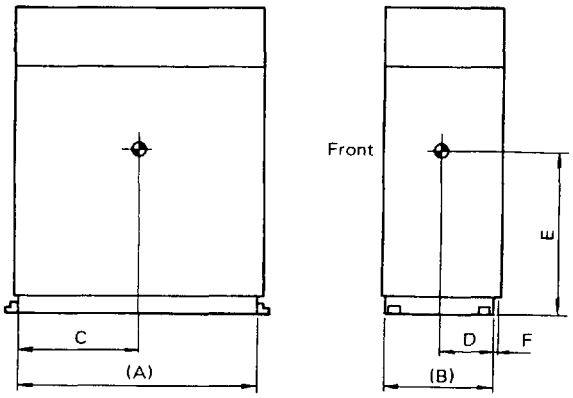


3 When installing the units the most appropriate pattern should be selected from those shown above in order to obtain the best fit in the space available always bearing in mind the need to leave enough room for a person to pass between units and wall and for the air to circulate freely.
(If more units are to be installed than are catered for in the above patterns your layout should take account of the possibility of short circuits.)

4 The units should be installed to leave sufficient space at the front for the on site refrigerant piping work to be carried out comfortably.

■ Location of center of gravity

(Indoor unit)



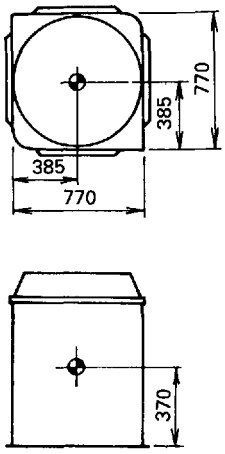
(Unit: mm)

Model	Size of base frame		Center of gravity				Machine weight (kg)
	A	B	C	D	E	F	
DFRJ280P	1926	909	965	540	770	9	605
DFRJ400P	1926	909	915	540	770	9	640
DFRJ560P	2126	909	1080	555	800	9	780

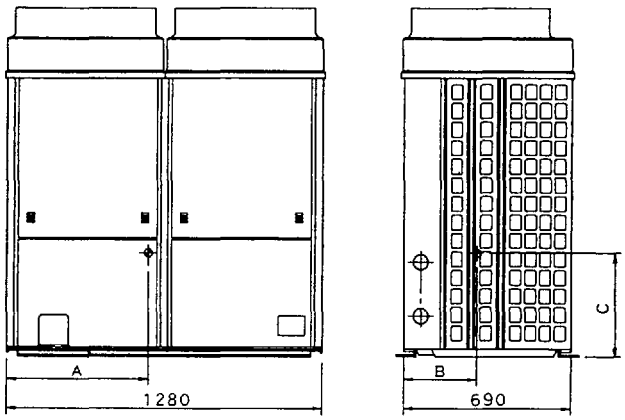
Note: The location of center of gravity during operation is shown on the left.

(Remote condenser)

● **CRJ140NK**



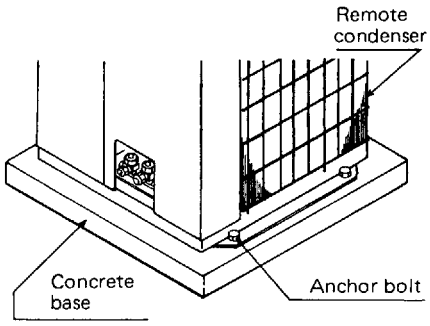
● **CRJ212PAK · 300PAK**



Model	A	B	C
CRJ212PAK	600	310	380
CRJ300PAK	600	310	510

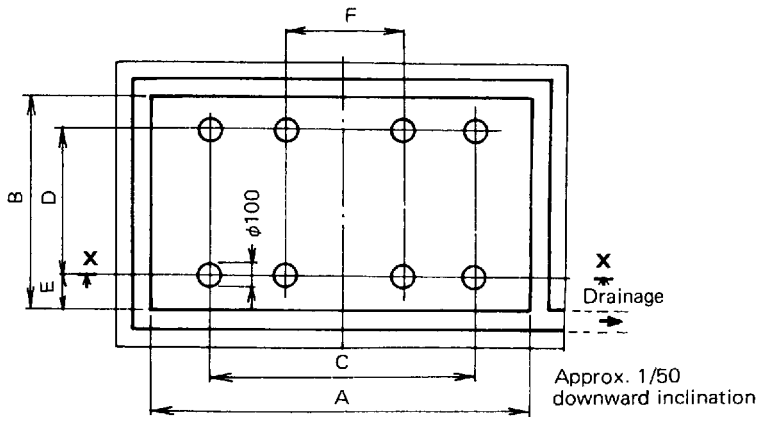
■ Foundation

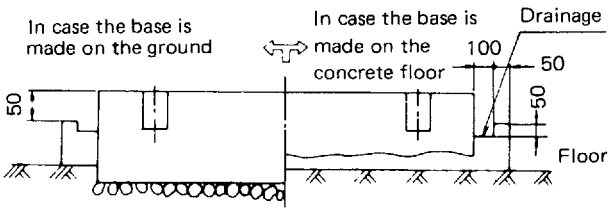
Fix the remote condenser on the concrete base with anchor bolts. The concrete base should be made higher than the floor level by approx. 100mm, and the floor should be strong enough to support the weight of the condenser and the concrete base.
The surface of concrete base should be flat and level, and provide a ditch around the base.



(Unit: mm)

● **CRJ140NK**

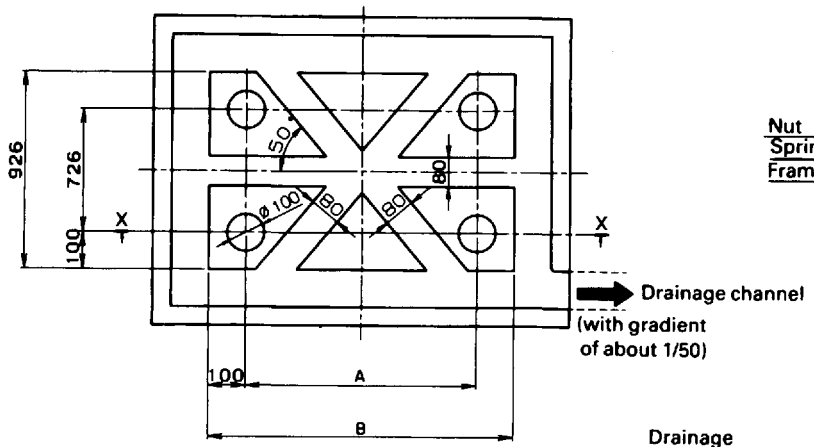


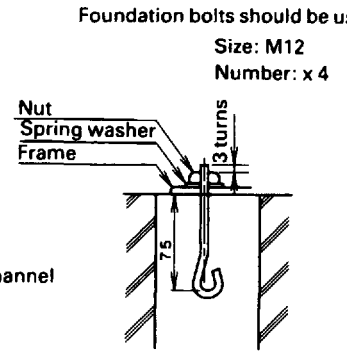


X – **X** Section

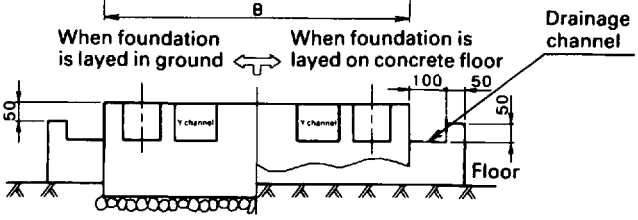
Model	A	B	C	D	E	F	Anchor bolt	
							Size	Q'ty
CRJ140NK	2,170	900	1,980	510	130	360	M10 × 125	8

● **CRJ212PAK · 300PAK**

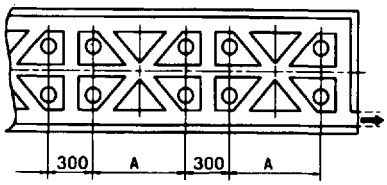




Basic foundation bolt work



X-X section viewed in direction of arrows



For installation of several units in a row

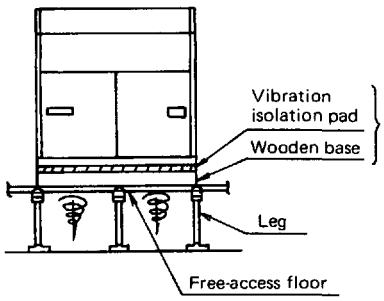
Notes:

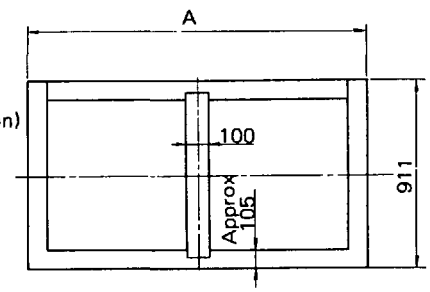
1 Standard concrete mix: 1 cement / 2 sand / 4 gravel with 10 reinforcing rods (approx. 300mm intervals).
2 Mortar should be used to level the surface. The edge of the concrete surface should be bevelled.
3 When setting the foundation on a concrete floor macadam is not required but the surface of the concrete should be broken up to make it uneven.
4 A drainage channel should be made around the foundation to cater for waste water around the machinery.
5 When installing a unit on the roof be sure to check the strength of the roof and pay special attention to waterproofing requirements.

Model	A	B
CRJ212PAK	355	555
CRJ300PAK	1000	1200

■ Installation of the indoor unit on the free-access floor

Be sure to provide wooden base (approx. 105mm thick) and vibration isolation pad (approx. 8mm thick) under the bottom of the indoor unit. If the wooden base is not provided, neither the drain piping can be provided, nor can the unit be installed stable. Further, the vibration isolation pad prevents operating vibration from transferring to the floor, which in turn prevents the computer from erratic operation.





Measurements of wooden base
(Unit: mm)

Model	A
DFRJ280P 400P	1928
DFRJ560P	2128

■ Refrigerant piping

The refrigerant is precharged in the indoor unit and remote condenser. The amount of refrigerant is tabulated on the right. Consequently, connect the pipes to the gas and liquid pipe connections respectively with the valves V_1 and V_2 closed. These valves have been closed before delivery. [Valve state of V_1 and V_2 : ①]

○ **Checking the piping work**

1. After piping work, charge nitrogen gas and fluorocarbon refrigerant (R-22) from the service ports of V_1 and V_2 valves and check the refrigerant circuit for gas tightness and gas leakage. [Valve state of V_1 and V_2 : ①]
2. Test pressure is 28 kg/cm²
3. Then accomplish vacuum drying up to 76 cm Hg low pressure. [Valve state of V_1 and V_2 : ①]

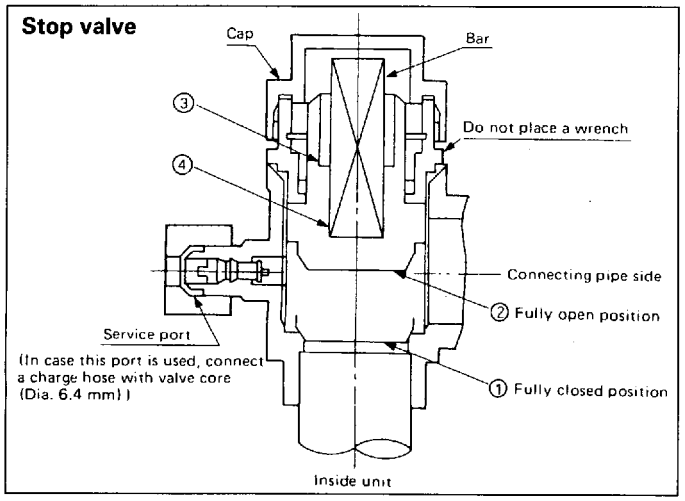
○ **Additional refrigerant charge**

Refrigerant precharge volume is based on piping length of 5m. If piping length is longer than 5m, additionally charge the refrigerant as stated below.

1. After vacuum drying stated above, charge the liquid refrigerant from V_1 port. At this stage, the air conditioner is not operated yet. [Valve state of V_1 and V_2 : ①]
2. Fully open the valves after completion of the work. [Valve state of V_1 and V_2 : ②]

○ **Manipulation of stop valve**

Remove the cap, insert a bar into ③ part and turn it up either clockwise or counter-clockwise with a wrench. The valve is fully closed or fully opened. After that, insert the bar into ④ part and return the cap.



Model		DFRJ280P	DFRJ400P	DFRJ560P
Refrigerant precharged volume	kg	13 × 2	13.5 × 2	20.0 × 2
Additional refrigerant charged volume	kg/m	0.1 × 2	0.1 × 2	0.19 × 2
Max. level difference		Indoor unit is higher than remote condenser by 20m		30m
		Indoor unit is lower than remote condenser by 30m		40m
Max. piping length		Actual piping length 35m		70m
		*Equivalent piping length 50m		100m

Notes:

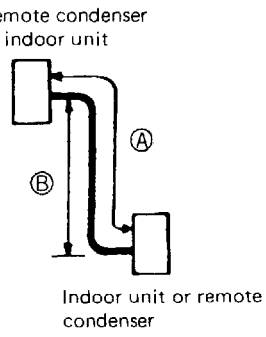
* How to calcurate equivalent piping length: Equivalent piping length means the total piping lenght of a pipe line in which L joints and traps provided in actual piping are converted to the length of a straight pipe and added to actual piping length.

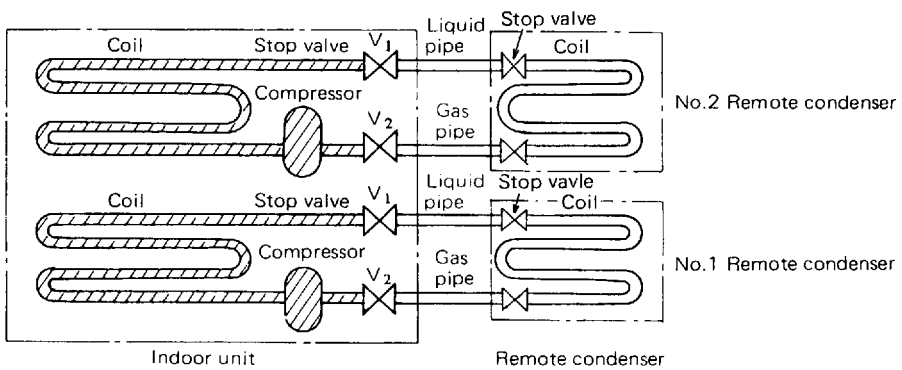
Equivalent piping length = Actual piping length + Numbers of L joints × an equivalent length per L joint + Numbers of trap bends × an equivalent length of pipe per trap bend.

- Calculation of equivalent piping length on the gas piping alone is enough.
- Actual piping length Ⓐ is the total piping length of gas pipe line, including level difference Ⓑ.
- In case two remote condensers are connected, obtain equivalent piping length per remote condenser, and examine each equivalent piping length.
- 90° bend of piping is equivalent to L joint.

Equivalent lenght of pipe for various fittings (Unit : m)

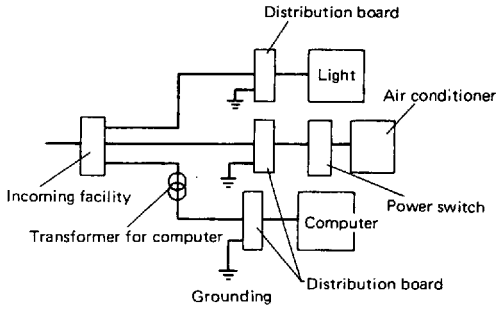
Pipe dia.(mm)	L joint	Trap bend
9.5	0.18	1.3
12.7	0.20	1.5
15.9	0.25	2.0
19.1	0.35	2.4
22.2	0.40	3.0
25.4	0.45	3.4
31.8	0.55	4.0





■ Cautions for air conditioning of computer room

- Prior to execution of the free-access floor, completely clean the floor and apply dust-proof paint to it as well as to the ceiling.
- Air tightness under the floor (in the ceiling as well in case of the ceiling return method) should be accomplished perfectly. All the openings should be closed by caulking. In case the computer room is connected to other room, it is necessary to divide it from the whole computer room.
- Height under the floor is over 250 ~ 300 mm. Air discharge outlets under the floor larger than 200 m^2 should be dispersed (Dispersion of air conditioners) so that temperature, humidity and static pressure under the floor become equal.
- Floor material should be strong enough to support the weight of the indoor unit. Consider locations of legs of the floor not to interrupt the air flow.
- Provide dew prevention treatment on the ceiling of the lower story, as cool air is circulated under the floor.
- It is necessary to consider the safety measures and fire-prevention measures to earthquake and fire for the whole computer system.
- In case the electric wiring is provided under the floor of the computer room, use a sealed cable or conduit tube to prevent against induction.
- In case an electric dust collector is used, it should be installed apart from the electronic computer as far as possible so that noise caused by high tension spark doesn't affect the computer.
- Provide the power supply exclusively for the air conditioner to protect the power supply for the electronic computer from being affected due to modulation voltage frequency and form at starting or stopping of the air conditioner.
- If it is impossible to provide a power supply exclusively for air conditioner, attach an appropriate noise-killer. In addition provide the grounding exclusively from the air conditioner. Avoid providing the grounding in common with the air conditioner and the computer.
- If load fluctuation of the electronic computer is very large, so carefully provide the instruments. (Load fluctuation: 30 ~ 100%).
- Provide an automatic temperature and humidity recorder so that temperature and humidity in the computer room and the free-access floor can be guarded and on the other hand, attach an alarming device to inform the operation of the abnormal conditions.



■ How to install the thermistor and humidistat

○ The thermistor for thermostat as an accessory and humidistat for humidifying and dehumidifying procured on the spot must be installed under the floor in front of the unit and wired in accordance with the diagram attached to the switch box cover.

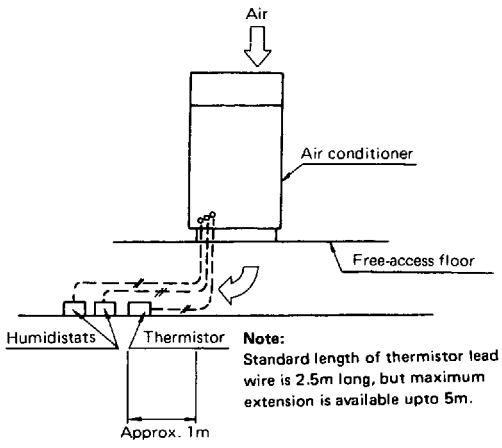
○ Location of the thermistor and humidistats must be such a place which is

- Average in temperature and humidity.
- Not affected by discharge air and yet the air is not stagnated.

○ Humidistat for humidifying and dehumidifying

- For humidifying RH 50% diff. more than 5%
- For dehumidifying RH 75% diff. more than 5%

e.g. Yamatake Honeywell H615A × 2



Note:
Standard length of thermistor lead wire is 2.5m long, but maximum extension is available upto 5m.

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