

Manual No. '11•KX-T-166 updated April 10, 2012

# **VRF INVERTER MULTI-SYSTEM AIR CONDITIONERS**

# Alternative refrigerant R410A use models (OUTDOOR UNIT)

KX6 series (Heat pump type) FDCR224KXE6 FDCR280KXE6

Note

(1) Regarding the Indoor unit series, refer to the manual No.'10 • KX-DB-144

- (2) Regarding the Duct Connected-High static Pressure-type Outdoor Air Processing Unit Series
  - (FDU500~1800FKXE6), refer to the DATA BOOK No.'08 KX-DB-122



# CONTENTS

1 GE	ENERAL INFORMATION	1
1.1	Increased indoor unit connection capacity	1
1.2	How to read the model name	1
1.3	Branch pipe set and Header pipe set	1
2 OI	UTDOOR UNIT	
2.1	Specifications	2
2.2	Exterior dimensions	
2.3	Electrical wiring	6
2.4	Noise level	7
3 RA	ANGE OF USAGE & LIMITATIONS	
4 SE	ELECTION CHART	10
5 PI	PING SYSTEM	17
6 AF	PPLICATION DATA	
6.1	Cautions for reuse of existing pipes	19
6.2	Installation of outdoor unit	
6.3	Method for connecting the accessory pipe	
6.4	Installation work check sheet (For heat pump unit)	
6.5	Check operation procedure	
6.6	Instructions for installing the branch pipe set (option)	
6.7	Service valve kit installation manual	53
6.8	Pipe washing check sheet	55
6.9	Instruction manual piping re-fresh kit	
7 Ol	UTLINE OF OPERATION CONTROL BY MICROCOMPUTER	58
7.1	Operation control function by the outdoor controller	58
8 SY	STEM TROUBLESHOOTING PROCEDURE	
8.1	Basics of troubleshooting	89
8.2	Explanation of troubleshooting	
8.3	Contents of troubleshooting	91
8.4	Outdoor unit control PCB replacement procedure	
8.5	Inverter PCB replacement procedure	148

# **1 GENERAL INFORMATION**

## 1.1 Increased indoor unit connection capacity

• Capacity from 50% to 130% is possible

Item	Number of connectable	Connectable capacity
FDCR224KXE6	1 to 13 units	112 ~ 292
FDCR280KXE6	1 to 16 units	140 ~ 364

## 1.2 How to read the model name

## (1) Outdoor unit



## 1.3 Branch pipe set and Header pipe set

## (1) Branch pipe set (Option)

Total capacity downstream	Branching pipe set
Less than 180	DIS-22-1G
180 or more but less than 371	DIS-180-1G

## (2) Header pipe set (Option)

Total capacity downstream	Header set model type	Number of branches		
Less than 180	HEAD4-22-1G	4 branches at the most		
180 or more but less than 371	HEAD6-180-1G	6 branches at the most		

Note

This unit complies with EN61000-3-3.

For outdoor unit, EN61000-3-2 is not applicable as consent by the utility company or notification to the utility company is given before usage.

# 2 OUTDOOR UNIT

# 2.1 Specifications

Models			FDCR224KXE6	FDCR280KXE6	
Nominal cooling capacity*1		1147	22.4	28.0	
Nominal heating capacity*2		KVV	25.0	31.5	
Power source			380-415V	3N~ 50Hz	
D	Cool	1.1.1/	5.60	8.09	
Power consumption	Heat	KVV	6.03	8.21	
	Cool		9.25/8.47	13.22/12.10	
Running current	Heat	A	9.85/9.02	13.41/12.28	
Sound Pressure Level (Cool / Heat)		dB(A)	58/58	59/60	
Exterior dimensions		mm	1675 × 10	80 × 480	
Height $ imes$ Width $ imes$ Depth		11111	10/5/10		
Exterior appearance			stucco	white	
(Munsell color)			(4.2 Y /.5 / 1.1) ne	ar equivalent	
Netweight		kg	22	4	
Refrigerant equipment			GTC 5150NH40K × 1	GTC5150NH40K×1	
compressor type & Q'ty					
Motor		kW	3.81	5.22	
Starting method			Direct line start		
connectable capacity		%	50-130	50-130	
capacity control range		%	27-114	20-115	
Crankcase heater		W	3	3	
Refrigerant equipment			Straight fin & inner (	arooved tubing	
Heat exchanger			Studyne in a miner		
Refrigerant control			Electronic expa	insion valve	
Refrigerant			R41	0A	
Quantity		kg	11	.5	
Refrigerant oil			1.7 (M-M	A32R)	
Defrost control			MC controlled De-Icer		
Air handling equipment			Propellar	an X 0	
fan type & Q'ty					
Motor		W	144×2		
Starting method			Direct lin	e start	
Air flow (Standard)		CMM	20	0	
Static Pressure		Pa	Max	.35	
Shock & vibration absorber			Rubber mount (for	r compressor)	
safety equipment			Compressor over current protection / abnormal high pressure protection abnormal low pressure protection / abnormal discharge temperture protection / over current protection		
Installation data		(• )	φ9.52(3/8")	~\$\phi_15.88(5\frac{5}{8"})	
Refrigerant piping size	Gas Line	mm (in)	$\phi_{19.05(3/4")} \sim \phi_{25.4(1")}$	$\phi_{22,22}(7/8") \sim \phi_{28,58}(11/8")$	
Connecting method			Liquid:Flare /	Gas:Brazing	
Drain			Hole for drain	( <i>ф</i> 20 ×4)	
Insullation for piping			Necessary (both Lig	id & Gas lines)	
Accessories					

Notes (1) The data are measured at the following conditions. (The piping length is 7.5m)

Adapted to RoHS directive

Item	Indoor air te	emperature	Outdoor air	Standards		
Operation	DB	WB	DB	WB	Stanuarus	
Cooling*1	27°C	19℃	35℃	24°C		
Heating*2 20°C		-	7℃	6℃	130-11	

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

(3) Refer to the technical data about below.

· Reusability of the existing pipes.

Necessity of Re-fresh kit and Service valve kit when washing existing pipes.





'11 • KX-T-166





'11 • KX-T-166



CH1	Crankcase heater	SW1		Address setting SW outdoor unit No. (2 digits)	TB1,2	Terminal block
CM	Compressor motor	SW2		Address setting SW outdoor unit No. (1 digit)	Tho-A	External air thermistor
CNA-Z1	Connector	SW3-1		Inspection LED reset	Tho-C1	Under-dome thermistor
CT1	Current sensor	SW3-2		Spare	Tho-D1	Discharge pipe thermistor
C1	Electrolytic capacitor	SW3-3		Model setting	Tho-H	Super-cooling coil thermistor 2
DM	Diode module	SW3-4,5		Spare	Tho-P1	Power transistor thermistor
EEVH	Heating expansion valve	SW3-6	ON	Pipe washing operation	Tho-R1	Heat exchanger thermistor 1 (Exit / front)
EEVSC	Super-cooling coil expansion valve		OFF	Normal operation	Tho-R2	Heat exchanger thermistor 1 (Exit/rear)
FMo1,2	Fan motor	SW3-7	ON	Forced heating / cooling mode	Tho-S	Suction pipe thermistor
F1	Fuse		OFF	Normal operation	Tho-SC	Super-cooling coil thermistor 1
IPM	Intelligent power module	SW3-8	ON	Test mode	X01~03,06~09	Aux. relay
J11,12	Power supply, voltage switching		OFF	Normal operation	7SEG1	7-segment LED (Data display)
J13	External input switching level / pulse	SW4-1~4		Model setting	7SEG2	7-segment LED (Function display)
J14	Spare	SW4-5,6		Demand switching	205	4-way switching solenoid
J15	Defrosting start temperature selection,	SW4-7,8		Spare	52X1,2	Solenoid for CM
	normal / cold region	SW5-1	ON	Test run	63H1-1	High pressure switch
LED1	Inspection (Red)		OFF	Normal operation	63H1-R1,2	High pressure switch
LED1 (INV)	Normal (Yellow) Flashing	SW5-2	ON	Cooling at test run		
LED2	Normal (Green)		OFF	Heating at test run		
LED3	Service (Green)	SW5-3	ON	Pump-down operation		
L1″L3	DC reactor		OFF	Normal operation		
PSH	High pressure sensor	SW5-4		Spare		
PSL	Low pressure sensor	SW5-5	ON	Super Link communication		
PWB1~3	PCB		OFF	Super Link II communication		
R1	Rush current suppression resistor	SW5-6~8	•	Spare		
SV1	Solenoid valve (fluid return)	SW6-1~8		Spare		
SV6	Solenoid valve (oil return)	SW7		Data delete / write		
SV11	Solenoid valve (gas bypass)	SW8		7-segment indication up (1 digit)		
SV12	Solenoid valve (gas bypass)	SW9		7-segment indication up (2 digits)		

## 2.4 Noise level

Measured based on JIS B 8616

Mike position as highest noise level in position as below Distance from front side 1m Height 1m













# **3** RANGE OF USAGE & LIMITATIONS

System		FDCR224KXE6	FDCR280KXE6		
Indoor intake air temperature (Upper, lower limits)		Please see th	e next nage		
Outdoor air tempera (Upper, lower limits)	iture				
Indoor units that can be	Number of connected units	1 to 13 unit	1 to 16 unit		
used in combination	Connectable capacity <sup>(1)</sup>	112 ~ 292	140 ~ 364		
Total piping length		510m (	or less		
Main pipe length		130m (	or less		
Single direction pipi	ng length	Actual length : 160m or less, E	guivalent length : 185m or less		
Allowable pipe lengt	th from the first branching	90m or less (However, difference between the longest and shortest piping : 40m or less)			
Elevation difference between t	he first branching point and the indoor unit	18m or less			
Difference in height between	Outdoor unit is higher	50m or less			
indoor and outdoor units	Outdoor unit is lower	40m or less			
Difference in the eleva	tion of indoor units in a system	15m or less			
Indoor unit atmosphere (behind ceiling) temperature and humidity (Only models FDT, FDTC, FDTW, FDTS, FDTQ, (FDU, FDUM, FDQS, FDUH		Dew point temperature 28 $^\circ$ C or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU : Dew point temperature 23 $^\circ$ C or less, relative humidity 80% or less)			
Compressor	1 cycle time	6 min or more (3 minutes or more from start to	o stop or 3 minutes or more from stop to start)		
frequency	Stop time	3 min e	or more		
	Voltage fluctuation	Within ±10% o	f rated voltage		
Power source	Voltage drop during start	Within ±15% o	f rated voltage		
	Phase unbalance	Within ±3% of rated voltage			

Allowable length of refrigerant piping, height difference between indoor and outdoor unit

## (1) Branch pipe method (using branch piping)



## (2) Header System (Header used)



Note (1) A branch piping system cannot be connected after a header system.

(2) 90m or less (However, difference between the longest and shortest piping : 40m or less)

## (3) Mixed System (Branch piping and Header used)



Note (1) A branch piping system cannot be connected after a header system. (2) 90m or less (However, difference between the longest and shortest piping : 40m or less)



## Operating temperature range

"CAUTION" Cooling operation under low outdoor air temperature conditions

KXE6 models can be operated in cooling mode at low outdoor air temperature condition within above temperature range. However in case of severely low temperature conditions if the following precaution is not observed, it may not be operated in spite of operable temperature range mentioned above and cooling capacity may not be established under certain conditions.

## [Precaution]

In case of severely low temperature condition

- 1) Install the outdoor unit at the place where strong wind cannot blow directly into the outdoor unit.
- 2) If there is no installation place where can prevent strong wind from directly blowing into the outdoor unit, prepare a windbreak fence or something like that locally in order to divert the strong wind from the outdoor unit.

## [Reason]

Under the low outdoor air temperature conditions of -5°C or lower, if strong wind directly blow into the outdoor unit, the outdoor heat exchanger temperature will drop, even though the outdoor fan is stopped by outdoor fan control. This makes high and low pressures to drop as well. This low pressure drop makes the indoor heat exchanger temperature to drop and will activate anti-frost control at indoor heat exchanger at frequent intervals, that cooling operation may not be established for any given time.

# 4 SELECTION CHART

(1) Equipment selection flow



## (2) Capacity calculation method

## (a) Calculating the indoor unit capacity compensation

Indoor unit capacity (cooling, heating) = Indoor unit total rated capacity

× Capacity compensation coefficient according to temperature conditions See item (3) (a) concerning the capacity compensation coefficient according to temperature conditions.

## (b) Calculating the outdoor unit capacity compensation

Outdoor Unit Capacity (Cooling, Heating) = Outdoor unit rated capacity (rated capacity when 100% connected)

- $\times$  Capacity compensation coefficient according to temperature conditions
- $\times$  Capacity compensation coefficient according to piping length
- $\times$  Capacity compensation coefficient according to height difference
- $\times$  Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger
- × Capacity compensation coefficient according to indoor unit connection capacity
- ① See item (3) (a) concerning the capacity compensation coefficient according to temperature conditions.
- (2) See item (3) (c) concerning the capacity compensation coefficient according to piping length.
- ③ See item (3) (d) concerning the capacity compensation coefficient according to height difference. This compensation should be carried out only in cases where the outdoor unit is lower during cooling and higher during heating.
- (4) See item (3) (e) correction of heating capacity in relation to the frost on the outdoor unit heat exchanger. This compensation should be carried out only when calculating the heating capacity.
- (5) See item (3) (f) concerning the capacity compensation coefficient according to indoor unit connected capacity. This compensation should be carried out only in cases where the indoor unit total capacity is 100% or higher.

## (c) Calculating system capacity

Compare the capacities determined in items (a) and (b) above and let the smaller value be the system capacity (cooling, heating).

- ① In cases where indoor unit total capacity (cooling, heating) > outdoor unit capacity (cooling, heating) System capacity (cooling, heating) = Outdoor unit capacity (cooling, heating)
- (2) In cases where indoor unit total capacity (cooling, heating) < outdoor unit capacity (cooling, heating)
- System capacity (cooling, heating) = Indoor unit capacity (cooling, heating)

## (d) Calculating indoor unit capacity [item (c) ①only]

Indoor unit capacity (cooling, heating) = System capacity (cooling, heating)

× [(Indoor unit capacity) / (Indoor unit total capacity)]

## Capacity calculation examples

## Example 1

## Cooling (when the indoor unit connected total capacity is less than 100%)

- Indoor, outdoor unit height difference ...... 15 m (Outdoor unit is lower)
- Temperature conditions ...... Outdoor temperature: 33°C DB
- Temperature conditions ...... Indoor temperature: 19°C WB
- <Indoor unit total cooling capacity>: Item (2) (a) calculation.
- Indoor unit rated cooling capacity: 5.6 kW
- Capacity compensation coefficient according to temperature conditions: 1.02 (Calculated according to Indoor 19°C WB / Outdoor 33°C DB); (See page 13) Indoor unit cooling capacity:  $5.6 \text{ kW} \times 1.02 = 5.7 \text{ kW}$
- Indoor unit total cooling capacity calculation;
- indoor unit total cooling capacity: 5.7 kW  $\times$  3 units = <u>17.1 kW</u>

## <Outdoor unit maximum cooling capacity> : Item (2) (b) calculation

- Outdoor unit rated cooling capacity: 22.4 kW
- Capacity compensation coefficient according to temperature conditions: 1.02 (Calculated according to Indoor 19°C WB / Outdoor 33°C DB); (See page 13) Outdoor unit cooling capacity: 22.4 kW × 1.02  $\approx$  22.8 kW
- Capacity compensation coefficient according to piping length: 0.92 (calculated according to 60 m length); (See page 15)  $22.8 \text{ kW} \times 0.92 = 21.0 \text{ kW}$

- Capacity compensation coefficient according to height difference: 0.97 (calculated according to 15 m difference); (See page 16)  $21.0 \text{ kW} \times 0.97 = 20.4 \text{ kW}$
- Capacity compensation coefficient according to indoor unit connected total capacity: 1.0 ← (56 × 3) / 224 < 100%) No compensation

## <System cooling capacity>: Item (2) (c) calculation

Compare the indoor unit total cooling capacity and the outdoor unit maximum cooling capacity. The smaller value is the actual system cooling capacity.

- Indoor unit total cooling capacity: 17.1 kW
  - ⇒ System cooling capacity: 17.1 kW
- Outdoor unit maximum cooling capacity: 20.4 kW

## <Indoor unit capacity compensation> No compensation (5.7 kW)

## Example 2

## Cooling (when the indoor unit connected total capacity is 100% or higher)

- Outdoor unit FDCR224KXE6.....1 Unit

- Indoor, outdoor unit height difference ...... 15 m (Outdoor unit is higher)
- Temperature conditions ...... Outdoor temperature: 35°C DB
- Temperature conditions ...... Indoor temperature: 18°C WB

## <Indoor unit total cooling capacity>: Item (2) (a) calculation.

- Indoor unit rated cooling capacity: 5.6 kW
- Capacity compensation coefficient according to temperature conditions: 0.95 (Calculated according to Indoor  $18^{\circ}C WB / Outdoor 35^{\circ}C DB$ ); (See page 13) Indoor unit cooling capacity: 5.6 kW × 0.95 = 5.3 kW
- Indoor unit total cooling capacity calculation;
- indoor unit total cooling capacity: 5.3 kW × 5 units = 26.5 kW

## <Outdoor unit maximum cooling capacity> : Item (2) (b) calculation

- Outdoor unit rated cooling capacity: 22.4 kW
- Capacity compensation coefficient according to temperature conditions: 0.95 (Calculated according to Indoor 18°C WB / Outdoor 35°C DB); (See page 13) Outdoor unit cooling capacity:  $22.4 \text{ kW} \times 0.95 = 21.3 \text{ kW}$
- Capacity compensation coefficient according to piping length: 0.92 (calculated according to 60 m length); (See page 15)  $21.3 \text{ kW} \times 0.92 = 19.6 \text{ kW}$
- Capacity compensation coefficient according to height difference: 1.0 (the outdoor unit is higher during cooling) No compensation
- Capacity compensation coefficient according to indoor unit connected total capacity:  $1.08 \leftarrow (56 \times 5) / 224 = 125\%$  (See page 16) 19.6 kW × 1.08 = 21.2 kW

## <System cooling capacity>: Item (2) (c) calculation

Compare the indoor unit total cooling capacity and the outdoor unit maximum cooling capacity. The smaller value is the actual system cooling capacity.

- Indoor unit total cooling capacity : 26.5 kW rightarrow System cooling capacity: 21.2 kW
- Outdoor unit maximum cooling capacity : 21.2 kW

## <Indoor unit cooling capacity Compensation>: Item (2) (d) calculation.

 $\frac{21.2 \text{ kW} \times 5.3 \text{ kW}}{26.5 \text{ kW}} = \frac{4.2 \text{ kW}}{4.2 \text{ kW}}$ 

## **Example 3**

## Heating (when the indoor unit connected total capacity is 100% or higher)

- Outdoor unit FDCR224KXE6......1 Unit
- Piping length ...... 60 m (Equivalent length)
- Temperature conditions ...... Outdoor temperature: 6°C WB
- Temperature conditions ...... Indoor temperature: 19°C DB

## <Indoor unit total heating capacity>: Item (2) (a) calculation.

- Indoor unit rated heating capacity: 6.3 kW
- Capacity compensation coefficient according to temprature conditions: 1.04 (Calculated according to Outdoor 6°C WB / Indoor 19°C DB); (See page 14) Indoor unit heating capacity:  $6.3 \text{ kW} \times 1.04 = 6.6 \text{ kW}$
- Indoor unit total heating capacity calculation;

indoor unit total heating capacity:  $6.6 \text{ kW} \times 5 \text{ units} = 33.0 \text{ kW}$ 

## <Outdoor unit maximum heating capacity> : Item (2) (b) calculation

- Outdoor unit rated heating capacity: 25.0 kW
- Capacity compensation coefficient according to temperature conditions: 1.04 (Calculated according to Outdoor 6°C WB / Indoor 19°C DB); (See page 14) Outdoor unit heating capacity: 25.0 kW × 1.04 = 26.0 kW
- Capacity compensation coefficient according to piping length: 0.982 (calculated according to 60 m length); (See page 15)  $26.0 \text{ kW} \times 0.982 = 25.5 \text{ kW}$
- Capacity compensation coefficient according to height difference: 0.96 (calculated according to 20 m difference); (See page 16)  $25.5 \text{ kW} \times 0.96 = 24.5 \text{ kW}$
- Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger: 1.0 (calculated according to 6°C WB); (See page 000) 24.5 kW  $\times$  1.0 = 24.5 kW.
- Capacity compensation coefficient according to indoor unit connected total capacity:  $1.0 \leftarrow (56 \times 5) / 224 = 125\%$  (See page 16) 24.5 kW × 1.0 = 24.5 kW.

## <System heating capacity>: Item (2) (c) calculation

Compare the indoor unit total heating capacity and the outdoor unit maximum heating capacity. The smaller value is the actual system heating capacity.

• Indoor unit total heating capacity : 33.0 kW 🖒 System heating capacity: 24.5 kW

Outdoor unit maximum heating capacity : 24.5 kW

<Indoor unit heating capacity compensation> (Item (2) (d) calculation

 $\frac{24.5 \text{ kW} \times 6.6 \text{ kW}}{33.0 \text{ kW}} \doteq \frac{4.9 \text{ kW}}{4.9 \text{ kW}}$ 

## (3) Capacity compensation coefficient

- (a) Capacity compensation coefficient and power consumption compensation coefficient according to indoor and outdoor temperature conditions.
  - 1) Capacity compensation coefficient



Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.
 (2) When performing the cooling operation with the outdoor air temperature being -5°C or under, a windbreak fence must be installed.



Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.



## 2) Power consumption correction factor

Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.



Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.

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

(Note) This table is for reference only. If the refrigerant piping one way equivalent after the first branch is extended longer than 40 m, it could drop further by about 10% in the worst case.

## 1) Cooling



## 2) Heatling





#### Model : FDCR280KXE6



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

Equivalent piping length = Real gas piping length + Number of bends in gas piping × Equivalent piping length of bends.

Equivalent length of each joint Unit : m/one part								
Gas piping size	φ9.52	φ12.7	φ15.88	φ19.05	ф22.22	¢25.4	¢28.58	¢31.8
Joint (90°elbow)	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.55

## (d) 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	5 m	10 m	15 m	20 m	25 m	20 m
outdoor unit in the vertical height difference	5111	10 111	15111	20 111	23 111	30 111
Adjustment coefficient	0.99	0.98	0.97	0.96	0.95	0.94
					_	
Height difference between the indoor unit and						

neight amerence between the maoor and and	35 m	/0 m	15 m	50 m
outdoor unit in the vertical height difference	55 m	40 111	45 111	50 11
Adjustment coefficient	0.93	0.92	0.91	0.90

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

Air inlet temperature of outdoor unit in °C WB	-20	-15	-13	-11	-9	-7	-5	-3	-1	1	3	5 or more
Adjustment coefficient	0.96	0.96	0.96	0.95	0.94	0.93	0.91	0.88	0.86	0.87	0.92	1

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.

## (f) The capacity compensation coefficient and power consumption compensation coefficient vary

according to the total capacity of concurrently operating indoor units, as shown below. (Note) This table shows typical values.



(Note) If the connecting capacity of the indoor unit exceeds 130%, consider the connecting capacity as 130%.



- Notes (1) Preset point of protective devices 63H1-1:Open 4.15MPa,Close 3.15MPa (for protection) 63H1-R1:Open 3.20MPa,Close 2.95MPa (for control) 63H1-R2:Open 3.24MPa,Close 2.65MPa (for control) (2) Function of thermistor
  - PSH: ON 3.30MPa (For compressor of control, cooling) ON 3.00MPa (For compressor of control, heating)
  - PSL: ON 0.18MPa,OFF 0.236MPa (For compressor of control) ON 0.134MPa,OFF 0.18MPa (For protection)

- Thi-R1, R2: Heating operation :Indoor fan control. Cooling operation :Frost prevention control. Super heat control.
- Thi-R3 For super heat control of cooling operation.
- Tho-D1 For control of discharge pipe temperature.
- Tho-C1: For control of temperature under the dome.
- Tho-S: For control of suction pipe temperature.
- Tho-R1, R2: For control of defrosting.
- Tho-A: For control of defrosting.
- Tho-SC: Electronic expansion valve(EEVSC) control of cooling operation.
- Tho-H: For super heat control of sub-cooling coil.

# **5 PIPING SYSTEM** Models FDCR224KXE6, 280KXE6 5.1 Including service valve kit and pipe r



- Notes (1) Preset point of protective devices 63H1-1:Open 4. 15MPa, Close 3. 15MPa (for protection) 63H1-R1:Open 3. 20MPa, Close 2. 95MPa (for control) 63H1-R2:Open 3. 24MPa, Close 2. 65MPa (for control) (2) Function of thermistor PSH: ON 3. 30MPa (For compressor of control, cooling) ON 3. 00MPa (For compressor of control, heating)
  - PSL: ON 0.18MPa, OFF 0.236MPa (For compressor of control) ON 0.134MPa, OFF 0.236MPa (For protection)

- Thi-R1,R2: Heating operation :Indoor fan control. Cooling operation :Frost prevention control. Super heat control.
- Thi-R3: For super heat control of cooling operation.
- Tho-D1: For control of discharge pipe temperature.
- Tho-C1: For control of temperature under the dome.
- Tho-S: For control of suction pipe temperature.
- Tho-R1, R2: For control of defrosting.
- Tho-A: For control of defrosting.
- Tho-SC: Electronic expansion valve(EEVSC) control of cooling operation.
- Tho-H: For super heat control of sub-cooling coil.

5.2

# **6 APPLICATION DATA**

## 6.1 Cautions for reuse of existing pipes

## ① Procedure of installation work for reuse of existing pipes

## Check & consideration



## ② Flowchart of the confirmation of reusability of existing pipes Judge if existing pipes are reusable or not according to the following flowchart.



## ③ Check and consideration for reuse of existing wires and power supply equipment

Keep in mind the following contents when reusing existing wires and power supply equipment.

(1) Confirmation of existing wires

Check existing wires not only for kinds of wire and number of core wires but also for the length of wire extension and number of branches with reference to the equipment drawings or other. Take notice of the following points for connecting wires.

- When using a shielding wire, make sure to earth one side only.
- Do not use shielding wires and other kinds of wire in the same system.
- Do not use multi-core wires having a number of cores more than necessary.
- Confirm that wires are separated sufficiently from the power supply cable.
- Confirm that the wire diameter is larger than 0.75 mm<sup>2</sup>.
- (2) Confirmation of existing power supply equipment Confirm the voltage, number of phases, circuit breaker capacity, etc. for existing power supply equipment.
   When reusing existing power supply equipment, make sure to check the degree of aging and damages on them.
   Sufficient care must be taken to prevent earth leakage or fire when using old wires or power supply equipment.
- (3) Confirmation of reliability of existing wiresIn so far as there is no problem on the above (1) and (2),the existing wires and power supply equipment can be utilized basically.

- (4) Confirmation of conductivity of existing wires Check existing wires for conductivity and voltage and the circuit breaker for proper operation.If any anomaly is detected, replace wires or parts and
- (5) Confirmation of compatibility of power supply equipment

put them in appropriate condition.

Since the circuit breaker capacity or other may vary depending on systems, check if the power supply equipment is compatible or not according to the procedure for wiring at outside of unit. Check simultaneously also for deterioration or damages on the equipment and, if any anomaly is detected, repair such appropriately.

Confirm that the existing earth leakage breaker is adaptable to the inverter (high frequency). If it is not, replace it with a breaker adaptable to the inverter.

(6) Confirmation of failure history

Check if there are records of failure such as transmission or conductivity error owing to anomalies on wires or power supply equipment. If there is any, check if such failure had been repaired properly. If it is not, repair it properly.

(7) Confirmation of the procedure for wiring at outside of unit

Wiring problem could cause failures of equipment, earth leakage or fire. When considering a reuse of existing wires or power supply equipment, check them sufficiently according to the procedure for wiring at outside of unit. If any trace of defect is detected on parts or wires, replace them or use new equipment.

# **KX SERIES INSTALLATION MANUAL**



## **Outdoor unit capacity** FDCR224~280

This installation manual deals with outdoor units and general installation specifications only. For indoor units, please refer to the respective installation manuals supplied with your units. OPlease read this manual carefully before you set to installation work and carry it out according to the instructions contained in this manual. When washing existing pipes using the re-fresh kit, refer to the instruction manual packed with the re-fresh kit for the procedures, etc.

#### Application data

When install the unit, be sure to check whether the selection of installation place, power supply specifications, usage limitation (piping length, height differences between indoor and outdoor units, power supply voltage and etc.) and installation spaces.

# SAFETY PRECAUTIONS

- •We recommend you to read this "SAFETY PRECAUTIONS" carefully before the installation work in order to gain full advantage of the functions of the unit and to avoid malfunction due to mishandling.
- The precautions described below are divided into AWARNINGS and ACAUTIONS. The matters with possibilities leading to serious consequences such as death or serious personal injury due to erroneous handling are listed in the AWARNINGS and the matters with possibilities leading to personal injury or damage of the unit due to erroneous handling including probability leading to serious consequences in some cases are listed in  $\triangle$  CAUTIONS. These are very important precautions for safety. Be sure to observe all of them without fail. The meaning of "Marks" used here are as shown on the right
- Always do it according to the instruction. Never do it under any circumstance.
- Be sure to confirm no anomaly on the equipment by commissioning after completed installation and explain the operating methods as well as the maintenance methods of this equipment to the user according to the owner's manual.
- •Keep the installation manual together with owner's manual at a place where any user can read at any time. Moreover if necessary, ask to hand them to a new user
- This unit complies with FN61000-3-3
  - For outdoor unit, EN61000-3-2 is not applicable as consent by the utility company or notification to the utility company is given before usage.



○ A place where stringent regulation of electric noises is applicable.

Where noise and hot air will not bother neighboring residents.
 Where snow will not accumulate.

O A place where no TV set or radio receiver is placed within 5m.

(If electrical interference is caused, seek a place less likely to cause the problem)

O Where it is safe for the drain water to be discharged.

'11 • KX-T-166

#### Notabilia as a unit designed for R410A

- Do not use any refrigerant other than R410A. R410A will rise to pressure about 1.6 times higher than that of a conventional refrigerant.
   A unit designed for R410A has adopted a different size outdoor unit service valve charge port and a different size check joint provided in the unit to prevent the charging of a wrong refrigerant by matske. The processed dimension of the flared part of a refrigerant provided and flare nut's parallel side measurement have also been altered to raise strength against pressure. Accordingly, you are required to arrange dedicated R410A tools listed in the unit to be interviewed with a strength against pressure.
- Do not use a charge cylinder. The use of a charge cylinder will cause the refrigerant composition to change, which results in performance degradation.
  In charging refrigerant, always take it out from a cylinder will cause the refrigerant composition to change, which results in performance degradation.
  In charging refrigerant, always take it out from a cylinder in the liquid phase.
  All indoor units must be models designed exclusively for R410A. Please check connectable indoor unit models in a catalog, etc. (A wrong indoor unit, if connected into the system, will impair proper system operation)

## 1. BEFORE BEGINNING INSTALLATION (Check that the models, power supply specifications, piping, wiring are correct.)

#### Caution

- Be sure to read this manual before installation to follow the proper installation methods.
- When installing the indoor unit, read the installation manual of indoor unit.
- Optional distribution parts are required for the piping (Branch pipe set, header set). For details, refer to the catalog, etc.
- Make sure to install the earth leakage breaker. (Select a product compatible with high frequency.) •There is risk of damaging the compressor if the unit is operated while the discharge pipe thermistor, suction pipe thermistor, pressure sensor, etc. are removed. Never attempt to
- operation in such condition. With this air-conditioning system, room temperature may rise, depending on installation conditions, while indoor units are stopped, because small quantity of refrigerant flows into the stopped indoor units if heating operation is conducted on the system.

#### Accessory

	Name	Quantity	Location of use	
Wire	G	2	Insert this in CNG on the outdoor unit PCB when using the silencing mode or forced cooling mode	Secured in the control box with adhesive tape.
Edging		1	Use it for protection of a knock-out hole.	It is attached to the bracket with an adhesive tape in the proximity of the service valve.
Attached pipe		1	Use this when connecting gas pipe.	Attached on the base below the operation valve.
Instruction	manual	1	When the installation work is completed, give instructions to the customer and ask him/her to keep it.	Attached on the base below the operation valve.

#### **Combination pattern**

Combination pattern of outdoor units, number of indoor units connected and capacity of connection are as show in the table at right.

#### It can be used in combination with the following indoor unit.

Indoor unit	Remote controller	Connection OK/NO	0		utdoor unit	Indoor unit		
FDOAAKXE6	RC-E3(2 cores), RC-E4(2 cores)	ОК	Capa	icity	Combination pattern	Number of units connected (unit)	Range of total capacity of connected indoor units	
FDOAAAKXE4R, KXE4BR, KXE5R	RC-E1R(3 cores)	ОК	22	4	Single	1~13	112~292	
	RC-E1(3 cores)	NO	28	0	Single	1~16	140~364	
$FD \bigcirc A \triangle \triangle KXE4, KXE4(A), KXE4A RC-E1(3 cores)$		NU	-					

#### [Items sold separately]

Refrigerant pipe distribution parts, which are not contained in the package, will be required for installation.

As for refrigerant pipe distribution parts, we offer branching pipe sets (Model type: DIS) and header sets (Model type: HEAD) as parts used on the indoor side of piping. Please select one suiting your application. In selecting distribution parts, please also refer to "4. REFRIGERANT PIPING.

- If you are not sure which parts to select, please consult with your dealer or the manufacture. When washing existing pipes using the re-fresh kit, it is necessary to install the service valve kit (Model: FDCR-V-KIT-E).

## 2. INSTALLATION LOCATION (Obtain approval from the customer when selecting the installation area.)

#### 2-1. Selecting the installation location

- Where air is not trapped.
- Where the installation fittings can be firmly installed.
- Where any object does not prevent inlet or outlet air. Out of the heat range of other heat sources.  $\sim$
- O Where strong winds will not blow against the outlet air.
- Please note
- a) If there is a possibility of a short-circuit, then install a flex flow adapter.
   b) When installing multiple units, provide sufficient intake space so that a short-circuit does not occur.
- c) In areas where there is snowfall, install the unit in a frame or under a snow hood to prevent snow from accumulating on it.
- (Inhibition of collective drain discharge in a snowy country) d) Do not install the equipment in areas where there is a danger for potential explosive atmosphere.
- e) Install the equipment in a location that can sufficiently support the weight of the equipment.
- f) If a unit is installed into a special environment as shown below, there will be a danger that the corrosion of the outdoor unit or its malfunctioning is caused. If this is the case, please consult with the distributor from whom you have purchased the unit.
  - Where corrosive gas is generated (such as a hot-spring resort area).
  - · Where the unit is subject to sea breezes (coastal area).
  - Where the unit is subject to oil mists.
  - · Where equipment generating electromagnetic waves exists in the vicinity.
- g) When strong winds occur
  - Where it is likely that the unit is subjected to strong winds, provide wind guards according to the following guidelines. Strong winds can cause performance degradation, an accidental stop due to a rise of high pressure and a broken fan.

①Place the unit outlet pipe perpendicular

to the wind direction.

When installing units side by side, install the flex flow adaptor. (This is not required if a distance of 1,500 mm may be procured between the secured between the blowing outlet and the wall.)





<sup>(2)</sup>Please install so the direction of the air from the blowing

3 When the foundation is not level, use wires to tie down the unit.

Fasten with anchor bolts

- 23 -

Dedicated R410A tools a) Gauge manifold b) Charge hose Electronic scale for refrigerant charging d) Torque wrench e) Flare tool f) Protrusion control copper pipe gauge Vacuum pump adapter h) Gas leak detector



may arise.

and/or electric component failure

## 2-2. Installation space (Ex. servicing space)

## a) Minimum installation space

- (Please select an installation point with due attention to the direction of installation of the refrigerant pipe) (If the installation conditions shown in this drawing are not satisfied, please consult with your dealer or the manufacturer.)
- b) When units are installed side by side, leave a 10 mm or wider service space between the units. c) Don't install at a place where it will be surrounded with walls in four directions.
- Even when it is not surrounded with walls in four directions and it is met the installation conditions as shown by this figure, if there is risk of short-circuit, install the flex flow adaptor to prevent the
- as shown by this right, if there is his of short-circuit, instant the flex flow adapto short-circuit.
- d) There must be a 1-meter or larger space in the above.
   e) A barrier wall placed in front of the exhaust diffuser must not be higher than the unit.

# 3. Unit delivery and installation

▲ Caution Attach the ropes on the unit and carry it in avoiding displacement of gravity center. Improper slinging may cause the unit to lose balance and fall.

#### 3-1. Delivery

Deliver the unit in the packing to the specified installation place.

•To hoist the unit, attach a pair of textile ropes with cushion materials attached to protect it.

Request

Put cushion materials between the unit and the ropes to avoid damages.

## 3-2. Cautions for installation

Make sure to lock the fixing legs of outdoor unit with 4 pieces of anchor bolt (M10). Best margin of protrusion for bolt above the floor is 20 mm.

• When installing the unit, make sure to lock its legs with the following bolts.







Wear plate

20

• Securely install the unit so that it does not fall over during earthquakes or strong winds, etc.

Wooden base

CAUTION

limitation of use during installation.

- Refer to the above illustrations for information regarding concrete foundations.
- Install the unit in a level area. (With a gradient of 5 mm or less.)

Improper installation can result in a compressor failure, broken piping within the unit and abnormal noise generation.



In case that the unit operates in cooling mode, when the outdoor temperature is  $-5^{\circ}$ C or lower, please equip a flex flow adapter and a snow guard hood (option) on the unit.

## 4. REFRIGERANT PIPING

4-1. Determination of piping specifications (Please select from the following matrix according to indoor unit specifications and installation site conditions)

#### (1) Limitation on use of pipes

When arranging pipes, observe the restrictions on use concerning the longest distance of (1), total piping	length,
allowable pipe length from initial branching and allowable difference of height (difference between head	s).
<ul> <li>Avoid any trap ( ' ) or bump ( , ) in piping as they can cause fluid stagnation</li> <li>Maximum length (To the furthest indoor unit) Actual length Less than 160 m (Actual lengthan 185 m)</li> </ul>	ith less
It is required to change the pipe diameter when the actual length exceeds 90 m.	
Determine the size of main pipe, referring to the table of main pipe selection table of (3) (a) Total piping length 510 m or less	
Length of main pipe	
Allowable pipe length from initial branching	
Difference in pipe lengths between indoor units, however, is 40 m or less.	
<ul> <li>Allowable difference in height (Difference of heads)</li> </ul>	
(a) When an indoor unit is positioned at a higher place 50 m or less	
(b) When an outdoor unit is positioned at a lower place	
(c) Difference of heights between indoor units in a system	
(2) Selection of pipe material	
<ul> <li>Use pipes with the inside clean and free from any harmful sulfur, oxides, dirt, chips &amp; oil, o (contamination)</li> </ul>	r moisture
•Use following refrigerant pipes.	Height diffe
Material Phosphate deoxidation treated seamless pipe (C1220T-O, 1/2H, JIS H3300)	Equivalent
C1220T-1/2H for O.D. ø25.4 or more, or C1220T-O for ø22.22 or less	Total piping
Wall thickness and size - Select according to the guide for pipe size selection	
(This product uses R410A. Since, in case of pipes in the size of ø25.4 or more, materials o	f -O lacks
sufficient capacity to withstand pressure, make sure to use pipes of 1/2H material and thic	Kness

•When a pipe is branched, make sure to use our branching set or header set.

When setting branching pipes, take care of the mounting direction and consult carefully with the instruction manual.

•Regarding the handling of operation valve, refer to 4-3 (1) Operating method of operation valve.



Make sure to install within the range of limitation. Otherwise, resulting malfunction of compressor may not be warranted. Observe always the

#### (3) Pipe size selection

MARNING Make sure that the materials of existing pipes, pipe diameters and pipe wall thickness are appropriate and that the design pressure (allowable pressure) is 3.24 MPa or higher.

•When selecting pipe sizes to install additional indoor units, refer to the technical data of KXE6 SERIES. Use C1220T-1/2H material for ø25.4 or larger.



(a) Main pipe (Between outdoor unit and initial branch at indoor unit side): Section A in Fig.1

			Liquid pipe size					Gas pipe size									
	Outdoor unit	ø6.4	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø25.4	ø28.6	ø31.8	ø34.7	
Mate at a	224		O*1	0	O*2						O*1	0	0				
Main pipe	280		O*1	0	O*2							O*1	0	0			

#### (b) Between the initial branch at indoor unit side and the indoor unit side: Section B in Fig.1

	In do ou unit conceitu.		Liquid pipe size					Gas pipe size								
	indoor unit capacity	ø6.4	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø25.4	ø28.6	ø31.8	ø34.7
Pipe diameter between indoor	– 101 or less		0						O*3	O*3						
branch and main pipe	Over 101 – 180 or less		0							0	0					
(Combined capacity of indoor units)	Over 180 – 364 or less			0							0	0	0	O*4	O*5	

(c) Between indoor unit branch and indoor unit: Section C in Fig.1

	In de en unit como situ		Liquid pipe size							Ga	as pipe s	size			-	
	indoor unit capacity	ø6.4	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø25.4	ø28.6	ø31.8	ø34.7
Indoor branch pipe	22	0						0	O *6							
	28	0						0	O *6							
	36	0							0							
	45	0							0	0						
	56	0	0						0	0						
	71		0						0	0	0					
	80		0							0	0					
	90		0							0	0					
	112		0							0	0	0				
	140		0							0	0	0				
	160		0							0	0	0				
	224		0	0							0	0	0			
	280		0	0								0	0	0		

\*1. It cannot be used when the pipe length exceeds 90 m

\*2. It cannot be used when the main pipe length exceeds 80 m

\*3. It can be used when the capacity of indoor unit connected with  $\phi$  15.9 Gas pipe size is 44 or less and difference of height between the indoor units is within 10m. It can be used when the capacity of indoor unit connected with  $\phi$  12.7 Gas pipe size is 35 or less and difference of height between the indoor units is within 10m.

\*4. It can be used when the capacity of indoor units connected at the down stream is higher than 280.

\*5. It can be used when the capacity of indoor units connected at the down stream is higher than 335.

\*6. It can be used when the difference of height between the indoor units is within 10m.

## 4-2. Piping work

(1) Pipe connecting position and pipe outgoing direction



• First remove the five screws (X mark) of the service panel and push it down into the direction of the arrow mark and then remove it by pulling it toward you.

• The pipe can be laid in any of the following directions: side right, front, rear and downward.

• Remove a knock-out plate provided on the pipe penetration to open a minimum necessary area and attach an edging material supplied as an accessory by cutting it to an appropriate length before laying a pipe.

- In laying pipes on the installation site, cut off the casing's half blank that covers a hole for pipe penetration with nippers.
- If there is a risk of small animals entering from the pipe penetration part, close the part with some sealing material or the like (to be arranged on the installer's part).
- In the case of an installation using a collective drain system, use a port other than the bottom one to take out cables and pipes. If the bottom port is used, seal it thoroughly so that drain water may not spill out.
- Use an elbow (to be arranged on the user's part) to connect control valves to the piping.
- In anchoring piping on the installation site, give 1.5m or a longer distance between an outdoor unit and an anchoring point where the piping is secured as illustrated below. (A failure to observe this instruction may result in a pipe fracture depending on a method of isolating vibrations employed.)

CAUTION

outdoor unit.

If you tighten it without using double spanners, you may deform the service valve, which can cause an inflow of nitrogen gas into the

• The pipe should be anchored every 1.5m or less to isolate the vibration.

## (2) Field piping work

#### Important

- Please take care so that installed pipes may not touch components within a unit.
- During the pipe installation at site, keep the service valves shut all the time.
- Give sufficient protections (compressed and brazed or by an adhesive tape) to pipe ends so that any water or foreign matters may not enter the pipes.
- In bending a pipe, bend it to the largest possible radius (at least four times the pipe diameter). Do not bend a pipe repeatedly to correct its form.
- An outdoor unit's pipe and refrigerant piping are to be flare connected. Flare a pipe after engaging a flare nut onto it. A flare size for R410A is different from that for conventional R407C. Although we recommend the use of flaring tools developed specifically for R410A, conventional flaring tools can also be used by adjusting the measurement of protrusion B with a protrusion control gauge.
- Be sure to use the accessory pipe for connection to the gas operation valve. For details, refer to the installation manual of the accessory pipe.
- Tighten a flare joint securely with two spanners. Observe flare nut tightening torque specified in the table below.



Operation valve size (mm)	Tightening torque (N • m)	Tightening angle (°)	Recommended length of tool handle (mm)
Ø6.35 (1/4")	14~18	45~60	150
Ø9.52 (3/8")	34~42	30~45	200
Ø12.7 (1/2")	49~61	30~45	250
Ø15.88(5/8")	68~82	15~20	300
Ø19.05 (3/4")	100~120	15~20	450



· Do not apply any oil on a flare joint.

- Blazing must be performed under a nitrogen gas flow. Without nitrogen gas, a large quantity of foreign matters (oxidized film) are created, causing a critical failure from capillary tube or expansion valve clogging.
- Brazing of the service valve and the pipes should be performed while cooling the valve body with a wet towel.
- Perform flushing. To flush the piping, charge nitrogen gas at about 0.02MPa with a pipe end closed with a hand. When pressure inside builds up to a sufficient level, remove the hand to flush. (in flushing a pipe, close the other end of the pipe with a plug).

#### **Operation procedure**

U	During the pipe installation at site, keep the service valves shut all the time.
2	Blazing must be performed under a nitrogen gas flow. Without nitrogen gas, a large
	quantity of foreign matters (oxidized film) are created, causing a critical failure from capillary
	tube or expansion valve clogging.



Plug the end of the pipe with tape, or other

③ Give sufficient protections (compressed and brazed or with an adhesive tape) so that water or foreign matters may not enter the piping.



Secondary side

0.02MPa

Hand

④ Perform flushing. To flush the piping, charge nitrogen gas at about 0.02MPa with a pipe end closed with a hand. When pressure inside builds up to a sufficient level, remove the hand to flush. (in flushing a pipe, close the other end of the pipe with a plug).

## 4-3. Air tightness test and air purge

(1) Air tightness test

- ① Although an outdoor unit itself has been tested for air tightness at the factory, please check the connected pipes and indoor units for air tightness from the check joint of the service valve on the outdoor unit side. While conducting a test, keep the service valve shut all the time.
- 2 Since refrigerant piping is pressurized to the design pressure of a unit with nitrogen gas for testing air tightness, please connect instruments according the drawing below. Under no circumstances should chlorine-based refrigerant, oxygen or any other combustible gas be used to pressurize a system Keep the service valve shut all the time. Do not open it under any circumstances.
- Be sure to pressurize all of the liquid, gas pipes.
- ③ In pressurizing the piping, do not apply the specified level of pressure all at once, but gradually raise pressure. a) Raise the pressure to 0.5 MPa, and then stop. Leave it for five minutes or more to see if the pressure drops. b) Then raise the pressure to 1.5 MPa, and stop. Leave it for five more minutes to see if the pressure drops.
- c) Then raise the pressure to the specified level (3.24 MPa), and record the ambient temperature and the pressure.
- d) If no pressure drop is observed with an installation pressurized to the specified level and left for about one day, it is acceptable. When the ambient temperature changes 1°C, the pressure also changes approximately 0.01 MPa. The pressure, if changed, should be compensated for.
- e) If a pressure drop is observed in checking e) and a) d), a leak exists somewhere. Find a leak by applying bubble test liquid to welded parts and flare joints and repair it. After repair, conduct an air-tightness test again.
- (4) Always pull air from the pipes after the airtightness test.



Allen wrench type



· Open the valve stem till it hits the stopper. No need to apply

force more than that

· After the adjustment, replace the blind nut as it was

#### CAUTION

Relief valve

Primary side

Station valve

Nitrogen

aas

mh

Applying excessive pressure can cause an inflow of nitrogen gas into an outdoor unit.

Nitrogen

Standard torque at sections on operation valve

Operation valve size (mm)	Shaft tightening torque (N⋅m)	Cap tightening torque (N·m)	Check joint blind nut tightening torque (N⋅m)
Ø9.52 (3/8")	6~8	20~30	10~12
Ø12.7 (1/2")	14~16	25~35	10~12
Ø19.05 (3/4")	3	30~35	12~14

Securely tighten the cap and the blind nut after the adjustment.

Avoid applying any excessive force when operating the shaft or when tightening the cap or blind nut. Otherwise, it could cause malfunction or leakage from the shaft, cap or blind nut.

Remove the cap and adjust as shown below Stopper ГhС Pin ą State at shipping (closed) State of oper

· After the adjustment, replace the cap as it was

Pin type



(2) Air purge (When washing pipes using the re-fresh kit, do not air purge before connecting the kit.) Perform the air purge from both the operation check joints at fluid side and gas side.



- (1) Dress refrigerant pipes (both gas and liquid pipes) for heat insulation and prevention of dew condensation.
- Improper heat insulation/anti-dew dressing can result in a water leak or dripping causing damage to household effects, etc. (2) Use a heat insulating material that can withstand 120°C or a higher temperature. Poor heat insulating capacity can cause heat insulation problems or cable deterioration.
- All gas pipes must be securely heat insulated in order to prevent damage from dripping water that comes from the condensation formed on them during a cooling operation or personal injury from burns because their surface can reach quite a high temperature due to discharged gas flowing inside during a heating operation.
- Wrap indoor units' flare joints with heat insulating parts (pipe cover) for heat insulation (both gas and liquid pipes).
- Give heat insulation to both gas and liquid side pipes. Bundle a heat insulating material and a pipe tightly together so that
  no gaps may be left between them and wrap them together with a connecting cable by a dressing tape.
- Although it is verified in a test that this air conditioning unit shows satisfactory performance under JIS condensation test conditions, both gas and liquid pipes need to be dressed with 20mm, or over, heat insulation materials additionally above the ceiling where relative humidity exceeds 70%.

## 5. Drainage

- Where water drained from the outdoor unit may freeze, connect the drain pipe using optional drain elbow and drain grommet.
- Outdoor unit has 4 drain outlets on the bottom.
- When guiding drain water to a scupper, etc, install the parts on a flat stand (optional item), blocks, or other
- Connect the drain elbow as shown by the figure. Seal remaining holes with grommets.
  When draining water collectively, use holes for wires and pipes opened other than on the bottom. When this is impracticable, sufficiently seal the drain pipe to prevent water leakage.



ing indo

TITI

7777777

Liquid piping

Band (acce

Exterior tape

Pipe cover (accessory)

111111

\_\_\_\_\_

## 6. Electric wiring

Electrical installation work must be performed by an electrical installation service provider qualified by a power provider of the country. Electrical installation work must be executed according to the technical standards and other regulations applicable to electrical installations in the country.

- Please install an earth leakage breaker without fail. The installation of an earth leakage breaker is compulsory in order to prevent electric shocks or fire accidents.
   Cince this unit amplem investor control please use on the installation of an earth leakage breaker is compulsory in order to prevent electric shocks or fire accidents.
- is unit employs inverter control, please **use an impulse withstanding type** to prevent an earth leakage breaker's false actuation.)

## Please note

- a) Use only copper wires
- a) Use only copper wires. Do not use any supply cord lighter than one specified in parentheses for each type below. braided cord (code designation 60245 IEC 51), if allowed in the relevant part 2; ordinary tough rubber sheathed cord (code designation 60245 IEC 53); flat twin tinsel cord (code designation 60227 IEC 41) ordinary polyvinyl chloride sheathed cord (code designation 60227 IEC 53). Please do not use anything lighter than polychloroprene sheathed flexible cord (cord designation 60245 IEC57) for supply cords of parts of appliances for outdoor use.
   b) Use separate power supplies for the indoor and outdoor units. O The new supplies for the indoor and outdoor units.
- c) The power supplies for indoor units in the same system should turn on and off simultaneously.
- d) Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire. A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power cable. If improperly grounded, an electric shock or malfunction may result.
- e) The installation of an impulse with standing type earth leakage breaker is necessary. A failure to install an earth leakage breaker can result in an accident such as an electric shock or a fire. Do not turn on the power until the electrical work is completed. Be sure to turn off the power when servicing.
- Please do not use a condensive capacitor for power factor improvement under any circumstances. (It does not improve power factor, while it can cause an abnormal overheat accident)
- g) For power supply cables, use conduits
- b) Please <u>do not lay electronic control cables (remote control and signaling lines) and other high current cables together outside the unit.</u> Laying them together can result in malfunctioning or a failure of the unit due to electric noises.
   i) Power cables and signaling lines must always be connected to the terminal block and secured by cable fastening clamps provided in the unit.
   j) Fasten cables so that they may not touch the piping, etc.
   When explore a cables are taken and the provided in the unit due to electric noises.

- b) Y have causes so that they may not outch the piping, etc.
   k) When cables are connected, please make sure that all electrical components within the electrical component box are not free or not loose on the terminal connection and then attach the cover securely. (Improper cover attachment can result in malfunctioning or a failure of the unit, if water penetrates into the box.)
   1) Make sure to use circuit breakers (earth leakage breaker and circuit breaker) of proper capacity. Use of breakers of larger capacity could result in trouble on components or fire accident. The circuit breaker should isolate all poles under over current.
- m) Install isolator or disconnect switch on the power supply wiring in accordance with the local codes and regulations. The isolator should be locked in OFF state in accordance with EN60204-1.
- n) After maintenance, all wiring, wiring ties and the like, should be returned to their original state and wiring route, and the necessary clearance from all metal parts should be secured.

#### 6-1. Wiring system drawing



## 6-2. Power supply connection

(1) Method of leading out cables

- controlle
- As shown on the drawing in Section 4-2, cables can be laid through the front, right, left or bottom casing.
   In wiring on the installation site, cut off a half-blank covering a penetration of the casing with nippers.
   In the case of an installation using a collective drain system, use a port other than the bottom one to take out cables and pipes. If the bottom port is used, seal it thoroughly so that drain and the bottom one to take out cables and pipes. If the bottom port is used, seal it thoroughly so that drain and the bottom one to take out cables and pipes. If the bottom port is used, seal it thoroughly so that drain and the bottom one to take out cables and pipes. If the bottom port is used, seal it thoroughly so that drain and the bottom one to take out cables and pipes. water may not spill out.

X·Y

#### (2) Notabilia in connecting power cables

- Connect the ground wire before you connect the power cable. When you connect a grounding wire to a terminal block, use a
- grounding wire longer than the power cable so that it may not be subject to tension. Do not turn on power until installation work is completed. Turn off power to the unit before you service the unit. Ensure that the unit is properly grounded. Always connect power cables to the power terminal block.

- To connect a cable to the power terminal block, use a round crimp contact terminal. If two cables are to be connected to one terminal, arrange cables in such a manner that you put their crimp contact terminals together back to back. Further, put the thinner cable above the thicker one in arranging cables for such connection. • Use specified wires in wiring, and fasten them securely in such a manner that the terminal blocks are not subject to external
- force
- In fastening a screw of a terminal block, use a correct-size driver.
  Fastening a screw of a terminal block with excessive force can break the screw.
  When electrical installation work is completed, make sure that all electrical components within the electrical component box are free of loose connector coupling or terminal connection

#### (3) Outdoor unit power supply specification: 380/415V 3N~ 50Hz 380V 3N~ 60Hz

		Cable size for	Wire length	Moulded-case	e circuit breaker (A)	E di la la contra da contra	Ear	th wire
Model	Power source	power source (mm <sup>2</sup> )	(m)	Rated current	Switch capacity	Earth leakage breaker	Size (mm <sup>2</sup> )	Screw type
224KXE6 280KXE6	Three-phase 380/415V 50Hz 380V 60Hz	5.5	54	30	30	30A, 30mA less than 0.1 sec	2	M5

Please note a) The method of laying cables has been determined pursuant to the Japanese indoor wiring regulations (JEAC8001). (Please adapt it to the regulations in effect in each country) b) For details, please refer to the installation manual supplied with the indoor unit.

#### (4) Indoor unit power source (Outdoor unit is another power source.) & signal line Request

Combined total capacity	Cable size for	WE 1 (1/1)	Moulded-case c	ircuit breaker (A)	Earth Ioskoon brooker	Signal line (mm <sup>2</sup> )			
of indoor units	power source(mm <sup>2</sup> )	wire length(m)	Rated current	Switch capacity	Edi li i itandye vi edhel	outdoor-indoor	indoor-indoor		
less than 7A	2	01	00		20A. 30mA				
less than 11A	3.5	21	20	20	20		less than 0.1 sec	2 aara 🗸	0.75 ×
less than 12A	5.5	33	20	0 30 0	30 30A, 3 less than	30A, 30mA	Z CUTE X	0.75 %	
less than 16A	5.5	24	30			less than 0.1 sec			

※ Please use a shielded cable.

 (a) Table at left shows the standard specification. Use the power supply of single phase 220/240V.
 (b) Distance in the table shows the value obtained when indoor units are connected in series. The table shows the wire size and the distance provided voltage drop is within 2% for each total current of indoor unit. Where the current exceeds the values in the table, change the wire size according to the extension wiring regulations. (c) Wires connected to indoor units are allowed up to 5.5 mm<sup>2</sup>. For 8 mm<sup>2</sup> or more, use a dedicated pull box and branch to indoor units with 5.5 mm<sup>2</sup> or less.

CAUTION

work



If the earth leakage breaker is exclusively

need to install a circuit breaker for wiring

for ground fault protection, then you will



#### 6-3. How to connect signal cables

The communication protocol can be choosen from following two types. One of them is the conventional Superlink (hereinafter previous SL) and the other is the new Superlink II (hereinafter new SL). These two communication protocols have the following advantages and restrictions, so please choose a desirable one meeting your installation conditions such as connected indoor units and centralized controller. When signal cables are connected into a network involving outdoor units, indoor units or centralized control equipment that do not support new SL, please select communications in the previous SL mode, even if the refrigerant system is separated from theirs.

Communication protocol	Conventional communication protocol (previous SL)	New communication protocol (new SL)
Outdoor unit setting (SW5-5)	ON	OFF (Factory default)
No. of connectable indoor units	Max. 48	Max. 128
No. of connectable outdoor unitsin a network	Max. 48	Max. 32
No. of connectable outdoor units	Up to 1000m	Up to 2,000 m for wires other than shielding wire Up to 1,500 m for 0.75 mm <sup>2</sup> shielding wire (MVVS) Up to 1,000 m for 1.25 mm <sup>2</sup> shielding wire (MVVS)
Signal cable (furthest length)	Up to 1000m	Up to 1000m
Connectable units to a network	Units not supporting new SL (FDOAAAKXE4 series) Units supporting new SL (FDOAAKXE6 series) Can be used together.	Units supporting new SL (FDOCAKXE6 series)

Note: For FDT224 and 280 models, calculate the number of units taking 1 indoor unit as 2 units for the sake of communication.

Signal cables are for DC 5 V. Never connect wires for 220/240 V or 380/415 V. Protective fuse on the PCB will trip.

 $\fbox{1}$  Confirm that signal cables are prevented from applying 220/240 V or 380/415 V

② Before turning the power on, check the resistance on the signal cable terminal block. If it is less than 100Ω, power supply cables may be connected to the signal cable terminal block

When the FD\_\_\_\_ KXE6 Series unit(s) only is connected; Standard resistance value = 5,100/number of connected units

- When the FD\_A\_\_ KXE4 Series unit(s) only is connected: Standard resistance value = 9,200/number of connected units

When the FDOAAA KXE4 Series and type FDOAA KXE6 Series units are connected in a mixture:

Standard resistance value = 46,000/{(Number of FD\_A\_KXE4 Series units connected x 5) + (Number of FD\_A\_KXE6 Series units connected x 9)} Number of connected units includes the indoor unit, outdoor unit and SL devices.

If the resistance value is less than 100Ω, disconnect the signal cables temporarily to divide to more than one network, to reduce the number of indoor units on the same network, and check each network

## Indoor and outdoor units signal cables

• Connect the signal line between indoor unit and outdoor unit to A1 and B1.

Connect the signal line between outdoor units to A2 and B2.

Please use a shielded cable for a signal line and connect a shielding earth at all the indoor units and outdoor units.

(1) When one outdoor unit is used.



OIndoor and outdoor signal lines do not have a polarity. Any of the connections in the following illustration can be made



(1) The signal lines can also be connected using the method shown below.

Outdoor unit	Outdoor unit	Outdoor unit	ł
#	#	 -# <sup>/</sup>	
Indoor unit	Indoor unit	Indoor unit	i
 # ~	#	 #	
Indoor unit	Indoor unit	Indoor unit	į.



Important  $\bigcirc$ Loop wiring prohibited.

Outdoor unit	Outdoor unit	Outdoor unit	Outdoor unit	The signal lines cannot form a
				loop, so the wirings shown as in the diagram are prohibited.
Indoor unit	Indoor unit	Indoor unit	Indoor unit	

#### Power cable and signal cable connection

shown in the table



is up to 600 m. When the wire is more than 100 m long, use the wire

● Use 3-core wires for FDOA△AKXE4 or 2-core wires for FDO△AKXE6



- · Give adequate slack to cables in fastening them. • Fix power cables separately from signal cables.

Outgoing cable direction

• As like the refrigerant pipe, it can be let out in any of 4 directions of right-hand side, front, rear and bottom.

Wiring label

The wiring label is attached on the back of the service panel.

#### Request

- When connecting to the power supply terminal block,
- use the crimp terminals for M5 as shown at right.
- When connecting to the signal terminal block, use
- the crimp terminals for M3.5 as shown at right.

Length (m)	Wire size
Within 100 - 200	0.5mm <sup>2</sup>
Within - 300	0.75mm <sup>2</sup>
Within - 400	1.25mm <sup>2</sup>
Within - 600	2.0mm <sup>2</sup>

12.5 mm or less Ó 7 mm or less

## 7. CONTROLLER SETTINGS

#### 7-1. Unit address setting

This control system controls the controllers of more than one air conditioner's outdoor unit, indoor unit and remote control unit through communication control, using the microcomputers built in the respective controllers. Address setting needs to be done for both outdoor and indoor units. Turn on power in the order of the outdoor units and then the indoor units Use 1 minute as the rule of thumb for an interval between them.

The communication protocol can be chosen from following two types. One of them is the conventional communication protocol (previous SL) and the other is the new communication protocol (new SL). These two communication protocols have their own features and restrictions as shown by Table 6-3. Select them according the indoor units and the centralized control to be connected. When signal cables are connected into a network involving outdoor units, indoor units or centralized control equipment that do not support new SL, please select communications in the previous SL mode, even if the refrigerant system is separated from theirs.

When communication is established after setting addresses, check the communication protocol with the 7 segment display panel of the outdoor unit.

#### Address setting methods

The following address setting methods can be used. The procedure for automatic address setting is different from the conventional one. Please use the automatic address setting function after reading this manual carefully.

Communication protocol					previous SL			
Address setting method Au				Manual	Automatic	Manual		
When plural refrigerant systems are linked with signal lines	Case 1	When signal lines linking plural refrigerant systems are provided between outdoor units. (When the network connector is disconnected, refrigerant systems are separated each other)	0K <sup>⊛1</sup>	OK	×	0K		
(e.g., to implement centralized control)	plement centralized Case 2 When	When signal lines linking plural refrigerant systems are provided between indoor units.	× <sup>₩2</sup>	OK	×	0K		
When only one refrigerant system is involved (signal lines do not link plural refrigerant systems)				OK	ОК	0K		

%1 Do not connect the signal line between outdoor units to A1 and B1. This may interrupt proper address setting. (Case 3) Do not connect the signal line between indoor unit and outdoor unit to A2 and B2. This may interrupt proper address setting. (Case 4)

%2 In Case 2, automatic address setting is not available. Set addresses manually.



#### Address No. setting

Set SW1 through 4 and SW5-2 provided on the PCB and SW1 & 2 provided on the outdoor unit PCB as shown in the drawings below.

	SW1, 2 (blue)	For setting indoor No. (The ten's and one's)
Indoor PCB	SW3, 4 (green)	For setting outdoor No. (The ten's and one's)
	SW5-2	Indoor No. switch (The hundred's Place) [OFF : 0, ON : 1]
Outdoor PCB	SW1, 2 (green)	For setting outdoor No. (The ten's and one's)



SW2 (SW4) 0

g For one's place By inserting a flat driver (precision screw driver) into this groove and turn the arrow to point a desired number.

#### •Summary of address setting methods (figures in [ ] should be used with previous SL)

		Units supporting new SL			Units NOT supporting new SL			
	Indoor unit a	ddress setting	Outdoor unit address setting	Indoor unit address setting		Outdoor unit address setting		
	Indoor No. switch	Outdoor No. switch	Outdoor No. switch	Indoor No. switch	Outdoor No. switch	Outdoor No. switch		
Manual address setting (previous SL/new SL)	000~127 [47]	00~31 [47]	00~31 [47]	00~47	00~47	00~47		
Automatic address setting for single refrigerant system installation (previous SL/new SL)	000	49	49	49	49	49		
Automatic address setting for multiple refrigerant systems installation (with new SL only)	000	49	00~31	×	×	×		
o not set numbers other than those shown in the table, or an error may be generated.								

Note: When units supporting new SL are added to a network using previous SL such as one involving FDOA/KXE4 series units, choose previous SL for the communication protocol and set addresses manually. Since the models FDT224 and 280 have 2 PCBs per unit, set different indoor unit No. and SW on each PCB.

An outdoor unit No., which is used to identify which outdoor unit and indoor units are connected in a refrigerant system, is set on outdoor unit PCB and indoor unit PCB. Give the same outdoor unit No. to all outdoor unit and indoor units connected in same refrigerant system.

• An indoor unit No. is used to identify individual indoor units. Assign a unique number that is not assigned to any other indoor units on the network.

Unless stated otherwise, the following procedures apply, when new SL is chosen for the communication protocol. When previous SL is chosen, use figures shown in [] in carrying out these procedures.

#### Manual address setting Generally applicable to new SL/previous SL, use figures in [] with previous SL.

- 1 Outdoor unit address setting
  - Set as follows before you turn on power. Upon turning on power, the outdoor unit address is registered. Set **the Outdoor Unit No. switch to a number 00 - 31 [in the case of previous SL: 00 - 47]**. Set a unique number by avoiding the numbers assigned to other outdoor units on the network.
- Indoor unit address setting
  - Set as follows before you turn on power. Upon turning on power, the indoor unit address is registered.
  - Set the Indoor Unit No. switch to a number 000 127 [in the case of previous SL: 00 47].

Set the Outdoor Unit No. switch to the outdoor unit No. of the associated outdoor unit within the range of 00 - 31 [in the case of previous SL: 00 - 47].

- Set a unique number by avoiding the numbers assigned to other indoor units on the network.
- ③ Turn on power in order from the outdoor unit to indoor units. Give a one-minute or longer interval for them.
  - \* When there are some units not supporting new SL connected in the network, set SW5-5 to ON to choose the previous SL communication mode. In the case of previous SL, the maximum number of indoor units connectable in a network is 48.

## Automatic address setting Generally applicable to new SL/previous SL, use figures in [ ] with previous SL.

With new SL, you can set indoor unit addresses automatically even for an installation involving multiple refrigerant systems connected with same network, in addition to the conventional automatic address setting of a single refrigerant system installation.

However, an installation must satisfy some additional requirements such as for wiring methods, so please read this manual carefully before you carry out automatic address setting.

#### (1) In the case of a single refrigerant system installation (Generally applicable to new SL/previous SL, use figures in [] with previous SL.)

- ① Outdoor unit address setting
- Set as follows before you turn on power. Make sure that the <u>Outdoor Unit No. switch</u> is set to 49 (factory setting)
- ② Indoor unit address setting
- Set as follows before you turn on power.

#### Make sure that the Indoor Unit No. switch is set to 000 [in the case of previous SL: 49] (factory setting)

- Make sure that the Outdoor Unit No. switch is set to 49 (factory setting)
- ③ Turn on power in order from the outdoor unit to indoor units. Give a one-minute or longer interval for them. Unlike the procedure set out in (2) below, you need not change settings from the 7 segment display panel.
- ④ Make sure that the number of indoor units indicated on the 7 segment display panel agrees with the number of the indoor units that are actually connected to the refrigerant system.

(2) In the case of a multiple refrigerant systems installation (Applicable to new SL only. In the case of previous SL, set addresses with some other method.)

(This option is available when the interconnection wiring among refrigerant systems is on the outdoor side and new SL is chosen as the communication protocol.)

#### Address setting procedure (perform these steps for each outdoor unit)

#### [STEP1] (Items set before turning on power)

- ① Outdoor unit address setting
- Set as follows before you turn on power.

Set the <u>Outdoor Unit No. switch</u> to a number <u>00 - 31</u>. Set a unique number by avoiding the numbers assigned to other outdoor units on the network. (2) Indoor unit address setting

- Set as follows before you turn on power.
  - Make sure that the <u>Indoor Unit No. switch</u> is set to 000 (factory setting)
  - Make sure that the Outdoor Unit No. switch is set to 49 (factory setting)
- ③ Isolate the present refrigerant system from the network.

Disengage the network connectors (white 2P) of the outdoor units. (Turning on power without isolating each refrigerant system will result in erroneous address setting.)

#### [STEP2] (Power on and automatic address setting)

- ④ Turn on power to the outdoor unit
- Turn on power in order from the outdoor unit to indoor units. Give a one-minute or longer interval for them.
- (5) Select and enter "1" in P31 on the 7 segment display panel of each outdoor unit to input "Automatic address start."
- (6) Input a starting address and the number of connected indoor units.
- Input a starting address in P32 on the 7 segment display panel of each outdoor unit.
- (7) When a starting address is entered, the display indication will switch back to the "Number of Connected Indoor Units Input" screen. Input the number of connected indoor units from the 7 segment display panel of each outdoor unit. Please input the number of connected indoor units for each outdoor unit. (You can input it from P33 on the 7 segment display panel.) When the number of connected indoor units is entered, the 7 segment display panel indication will switch to "AUX" and start flickering.

#### [STEP3] (Automatic address setting completion check)

- (8) Indoor unit address determination
  - When the indoor unit addresses are all set, the 7 segment display panel indication will switch to "AUE" and start flickering.
  - If an error is detected in this process, the display will show "AC
- Check the 7 segment display panel of each outdoor unit.
- Depending on the number of connected indoor units, it may take about 10 minutes before the indoor unit addresses are all set.

#### [STEP4] (Network definition setting)

(9) Network connection

When you have confirmed an "AUE" indication on the display of each outdoor unit, engage the network connectors again.

10 Network polarity setting

After you have made sure that the network connectors are engaged in (®), select and enter "1" in P34 on the 7 segment display panel of any outdoor unit (on only 1 unit) to specify network polarity.

#### (1) Network setting completion check

When the network is defined, "End" will appear on the 7 segment display panel. An "End" indication will go off, when some operation is made from the 7 segment display panel or 3 minutes after.

	STEP1	STEP2	STEP3	STEP4
Indoor unit power source	②0FF	④0N	_	—
Outdoor unit power source	①0FF	@0N	_	—
Indoor unit (indoor/outdoor No.SW)	②indoor000/outdoor 49 (factory setting)	_	-	_
Outdoor unit (outdoor No.SW)	(1)01,02(Ex)	_	_	_
Network connectors	③Disconnect(each outdoor unit)	—	_	<pre> ⑨Connect(each outdoor unit) </pre>
Start automatic address setting		(5) Select "Automatic Address Start" on each outdoor unit.		
Set starting address		6outdoor 01: 01 (Ex) outdoor 02: 04 (Ex)	-	_
Set the number of indoor unit		⑦outdoor 01:[03](Ex) outdoor 02:[03](Ex)	-	_
Polarity setting		_	_	10 Set in P34 on the 7 segment display panel of any outdoor unit.
7 segment display		⑦ [AUX] (Blink)	(8) "AUE" (blink), or "A $\bigcirc$ " in error events.	① 「End」



[STEP3]





• Within a refrigerant system, indoor units are assigned addresses in the order they are recognized by the outdoor unit. Therefore, they are not necessarily assigned addresses in order from the nearest to the outdoor unit first as depicted in drawings above.

· Make sure that power has been turned on to all indoor units.

• When addresses are set, you can have the registered indoor unit address No.'s and the outdoor unit address No. displayed on the remote control unit by pressing its Inspection switch.

· Automatic address setting can be used for an installation in which prulal indoor units are controlled from one remote control unit.

• Once they are registered, addresses are stored in microcomputers, even if power is turned off.

• If you want to change an address after automatic address setting, you can change it from the remote control unit with its "Address Change" function or by means of manual setting. Set a unique address by avoiding the address assigned to other indoor unit on the network when the address is changed.

· Do not turn on power to centralized control equipment until automatic address setting is completed.

• When addresses are set, be sure to perform a test run and ensure that you can operate all indoor and outdoor units normally. Also check the addresses assigned to the indoor units.

#### Address change (available only with new SL)

"Address Change" is used, when you want to change an indoor unit address assigned with the "Automatic Address Setting" function from a remote control unit. Accordingly, the conditions that permit an address change from a remote control unit are as follows.

	Indoor unit addr	ess setting	Outdoor unit address setting	
	Indoor No.SW	Outdoor No.SW	Outdoor No.SW	
Automatic address setting forsingle refrigerant system installation	000	49	49	
Automatic address setting for multiple refrigerant systems installation	000	49	00~31	

If "CHANGE ADD.  $\mathbf{\nabla}$ " is selected with some addresses falling outside these conditions, the following indication will appear for 3 seconds on the remote controller "INVALID OPER".

## **Operating procedure**

(1) When single indoor unit is connected to the remote controller.

	Item	Operation	Display
1	Address change mode	① Press the AIR CON No. switch for 3 seconds or longer.	[CHANGE ADD.▼]
		(2) Each time when you press the $\clubsuit$ switch, the display indication will be switched.	[CHANGE ADD.▼] ⇔[MASTER I/U▲]
		③ Press the Set switch when the display shows "CHANGE ADD. ▼" and then start the address change mode, changing the display indication to the "Indoor Unit No. Setting" screen from the currently assigned address.	[//U 001 0/U 01] (1sec) →[♦ SET I/U ADD.] (1sec) →[//U 001 ♦] (Blink)
2	To set a new indoor unit No.	④ Set a new indoor unit No. with the \$switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	[I/U 000▲] ⇔[I/U 001 ♠] ⇔[I/U 002 ♠] ⇔ · · · ⇔[I/U 127▼]
		(5) After selecting an address, press the Set switch, and then the indoor unit address No. is defined.	[I/U 002] (2sec)
3	To set a new outdoor unit No.	(6) After showing the defined indoor address No. for 2 seconds, the display will change to the "Outdoor Address No. Setting" screen. The currently assigned address is shown as a default value.	[//U 002] (2sec Lighting) →[♦SET 0/U ADD.] (1sec) →[0/U 01 ♦] (Blink)
		⑦Set a new outdoor unit No. with the ♦ switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	$ \begin{array}{c} [0/U\ 00 \blacktriangle] \\ \Leftrightarrow [0/U\ 01 \diamondsuit] \\ \Leftrightarrow [0/U\ 02 \diamondsuit] \\ \Leftrightarrow & \cdot & \cdot \\ \Leftrightarrow [0/U\ 31 \blacktriangledown] \end{array} $
		(iii) After selecting an address, press the Set switch, and then the outdoor unit No. and the indoor unit No. are defined.	[I/U 002 0/U 02] (2sec Lighting) →[SET COMPLETE] (2sec Lighting) →Returns to normal condition.

#### (2) When plural indoor units are connected to the remote controller.

When plural indoor units are connected, you can change their addresses without altering their cable connection.

	Item	Operation	Display
1	Address change mode	① Press the AIR CON Unit No. switch for 3 seconds or longer.	[CHANGE ADD▼]
		(2) Each time when you press the $\clubsuit$ switch, the display indication will be switched.	[CHANGE ADD▼] ⇔[MASTER I/U▲]
		③ Press the Set switch when the display shows "CHANGE ADD. ▼" The lowest indoor unit No. among the indoor units connected to the remote control unit will be shown.	[♦SELECT I/U] (1sec) →[I/U 001 0/U 01▲] (Blink)
2	Selecting an indoor unit to be changed address	④ Pressing the ♦ switch will change the display indication cyclically to show the unit No.'s of the indoor units connected to the remote controller and the unit No.'s of the outdoor units connected with them.	[//∪ 001 0/∪ 01▲] ⇔[//∪ 002 0/∪ 01 ♦] ⇔[//∪ 003 0/∪ 01 ♦] ⇔ · · ·
		⑤ Then the address No. of the indoor unit to be changed is determined and the screen switches to the display " ♦ SET I/U ADD."	⇔[I/U 016 0/U 01▼] [♦ SET I/U ADD.] (1sec) →[I/U 001 ♦](Blink)
3	Setting a new indoor unit No.	(6) Set a new indoor unit No. with the ♦ switch. A number indicated on the display will increase or decrease by 1 upon pressing the ▲ or ▼ switch respectively.	[//U 000▲] ⇔[//U 001 ♠] ⇔[//U 002 ♠] ⇔ · · · ⇔[//U 127▼]
		⑦ After selecting an address, press the Set switch. Then the address No.of the indoor unit is determined.	[I/U 002] (2sec)
4	Setting a new outdoor unit No.	<ul> <li>⑧ The display will indicate the determined indoor address No. for 2 seconds and then switch to the         * ◆ SET 0/U ADD." screen.         A default value shown on the display is the current address.</li> </ul>	[//U 002] (2sec lighting) ⇔[
		( $\textcircled{B}$ ) Set a new outdoor unit No. with the $\clubsuit$ switch. A number indicated on the display will increase or decrease by 1 upon pressing the $\blacktriangle$ or $\blacktriangledown$ switch respectively.	$ \begin{array}{ccc} [0/U & 00 \blacktriangle] \\ \Leftrightarrow [0/U & 01 \diamondsuit] \\ \Leftrightarrow [0/U & 02 \diamondsuit] \\ \Leftrightarrow & \ddots \\ \Leftrightarrow [0/U & 31 \blacktriangledown] \end{array} $
		① After selecting an address, press the Set switch. Then the address of the indoor unit and outdoor unit are determined.	[//U 002 0/U 02](2sec lighting) → [ ♦ SELECT](1sec lighting) → [I/U SELECTION▼](lighting)
		1 If you want to continue to change addresses, return to step $4.$	[Press the ♦switch](1sec) → [SET COMPLETE] (2~10sec lighting)
5	Ending the session	g the session (2) If you want to end the session (and reflect new address settings) In Step (0), press the ▼ switch to select "END ▲." If you have finished changing addresses, press the Set switch while "END ▲" is shown. While new settings are being transmitted, "SET COMPLETE" will be indicated. Then the remote controller display will change to the normal state.	
		(3) If you want to end the session (without reflecting new address settings) Before you complete the present address setting session, press the "ON/OFF" switch. Then the display is change to exit from this mode and switch the display to the normal state. All address settings changed in the session will be aborted and not reflected.	[ON/OFF] →Forced termination

The ♦ switch will continuously change the display indication to the next one in every 0.25 seconds when it is pressed for 0.75 seconds or longer. If the Reset switch is pressed during an operation, the display indication returns to the one that was shown before the last Set switch operation. Even if an indoor unit No. is changed in this mode, the registered indoor unit No. before address change mode is displayed when [I/U SELECTION ▼] is shown. When "SET COMPLETE" is shown, indoor unit No.'s are registered.

**NOTICE** Turn on power to centralized control equipment after the addresses are determined. Turning on power in wrong order may result in a failure to recognize addresses.
## • 7 segment display indication in automatic address setting

## Items that are to be set by the customer

Code	Contents of a display				
P30	Communication protocol	0: Previos SL mode 1: New SL mode	(The communication plotocol is displayed ; display only)		
P31	Automatic address start				
P32	Input starting address Specify a starting indoor unit address in automatic address setting.				
P33	Input number of connected indoor units Specify the number of indoor units connected in the refrigerant system in automatic address setting.				
P34	Polarity difinition	0: Network polarity not 1: Network polarity defi	defined. ined.		

## 7 segment display indication in automatic address setting.

Code	Contents of a display
AUX	During automatic address setting. X: The number of indoor units recognized by the outdoor unit.
AUE	Indoor unit address setting is completed normally.
End	Polarity is defined. (Automatic address) Completed normally.

## Address setting failure indication

Code	Contents of a display	Please check
A00	Unable to find any indoor unit that can be actually communicated with.	Are signal lines connected properly without any loose connections? Is power for indoor units all turned on?
A01	The number of the indoor units that can be actually communicated with is less than the number specified in P33 on the 7 segment display panel.	Are signal lines connected properly without any loose connections? Input the number of connected indoor units again.
A02	The number of the indoor units that can be actually communicated with is more than the number specified in P33 on the 7 segment display panel.	Are signal lines connected properly without any loose connections? Are the network connectors coupled properly? Input the number of connected indoor units again.
A03	Starting address (P32) + Number of connected indoor units (P33) > 128	Input the starting address again. Input the number of connected indoor units again.
A04	While some units are operating in the previous SL mode on the network, the automatic address setting on multiple refrigerant systems is attempted.	Perform manual address setting. Separate old SL setting unit from the network Arrange all units to operate in the new SL.

## Error indication

Code	Contents of a display	Cause
E2	Duplicating indoor unit address.	Incorrect manual address setting
E3	Incorrect pairing of indoor-outdoor units.	<ul> <li>An outdoor unit number that does not exist in the network is specified</li> <li>No master unit exists in combination outdoor unit.</li> </ul>
E11	Address setting for plural remote controllers.	Indoor unit address is set from plural remote controllers.
E12	Incorrect adderess setting of indoor units.	Automatic address setting and manual address setting are mixed.
E31	Duplicating outdoor unit address.	Plural outdoor units are exist as same address in same network.
E46	Incorrect setting.	Automatic address setting and manual address setting are mixed.

## 7-2. Selection of controls

Controls of outdoor unit may be selected as follows using the dip switches on the PCB and  $P\bigcirc\bigcirc$  on the 7-segment. To change  $P\bigcirc\bigcirc$  on the 7-segment, hold down SW8 (7-segment display increment up; 1-digit). SW9 (7-segment increment up; 10-digit) and SW7 (Data write/Enter).

Control selecting method	1	Content of control		
SW setting on PCB	POO on 7-segment			
SW3-7 to ON=1 *1	Set external input function allocation to "2" *1	Forced cooling mode (It can be fixed at cooling with external input terminals open, or at heating with them short-circuited.)		
SW5-1 to ON + SW5-2 to ON	_	Cooling test run		
SW5-1 to ON + SW5-2 to OFF	-	Heating test run		
Close the fluid operation valve on outdoor unit and set as follows: (1) SW5-2 on PCB to ON (2) SW5-3 on PCB to ON (3) SW5-1 on PCB to ON	_	Pump down operation		
SW4-5:0FF, SW4-6:0FF*1         80% (Factory default)           SW4-5:0N, SW4-6:0FF*1         60%           SW4-5:0FF, SW4-6:0N*1         40%           SW4-5:0N, SW4-6:0N*1         00%	Set allocation of external input function to "1" *1	Inputting signals to external input terminals selects the demand mode. (J13 short-circuited: Level input, J13 open: Pulse input)		
SW5-5	_	Communication method selection ON: Previous SL communication, OFF: New SL communication		
J13: Closed (Factory default), J13: Open	_	External input switing (CnS1, CnS2 only) Closed: Level input, Open: Pulse input)		
J14: Closed (Factory default), J14: Open		Defrost recover temperature Closed: normal, Open: cold weather district		
J15: Closed (Factory default), J15: Open	-	Defrost start temperature Closed: normal, Open: cold weather district		
_	P01	Operation priority selection 0: First push priority (at shipping) 1: Last push priority		
_	P02	Outdoor unit fan snow protection control 0: Control disabled (at shipping) 1: Control enabled		
-	P03	Outdoor unit fan snow protection control ON time setting - 30 sec (at shipping) 10, 30-600 sec		
	004	Energy saving mode *2 OFF: Disabled (at shipping)		
_	P04	2 stage demand mode 000, 040, 060, 080 [%]		
_	P05	Silencing mode setting 0 (at shipping) - 3: Larger values for larger effect		
-	P06	Allocation of external output (CnZ1)		
-	P07	Allocation of external input (CnS1)		
-	P08	Allocation of external input (CnS2)		
_	P09	Allocation of external input (CnG1)		
-	P10	Allocation of external input (CnG2)		
-	P11~	Spare		

\*1 Control is switched when both the allocation of external input function (P07-10) and SW are changed.

(Example: To use CnS1 for the input of forced cooling mode, set P07 at 2 and SW3-7 at 0N. To use CnS2 for the input of forced cooling mode, set P08 at 2 and SW3-7 at 0N.) \*2 In the energy saving mode, the capacity restriction becomes effective even if no signals are input at external input terminals.

By changing the allocation of external input functions (P07-19) on the 7-segment, functions of external input terminals may be selected. Inputting signals to external input terminals enable the following functions.

Setting value for allocation of external input function	With external input terminals short-circuited	With external input terminals open
"0" : External operation input	Invalid	Valid
"1" : Demand input	Invalid	Valid
"2" : Cooling/heating forced input	Valid	Invalid
"3" : Silent mode 1 *1	Valid	Invalid
"4" : Spare		
"5" : Outdoor fan snow guard control input	Valid	Invalid
"6" : Test run external input 1 (equivalent to SW5-1)	Test run start	Normal
"7" : Test run external input 2 (equivalent to SW5-2)	Cooling	Heating
"8" : Silent mode 2 *2	Valid	Invalid
"9" : 2 stage demand input	Invalid	Valid

\*1 Valid/invalid is changed depending on outdoor temperature.

\*2 It is always Valid, regardless of outdoor temperature.

## 7-3. External input and output terminals specifications

	Name	Purpose (Factory default)	Specification	Operating side connector
External input CnS1 External operation input (Closed at shipping)		Non-voltage contactor (DC12V)	J.S.T (NICHIATSU) B02B-XAMK-2 (LF) (SN)	
	External input CnS2	Demand input (Closed at shipping)	Non-voltage contactor (DC12V)	J.S.T (NICHIATSU) B02B-XARK-2 (LF) (SN)
	External input CnG1 Forced refrigerant input (Open at shipping)		Non-voltage contactor (DC12V)	J.S.T (NICHIATSU) B02B-XAEK-2 (LF) (SN)
External input CnG2 Silencing mode input (Open at shipping)		Non-voltage contactor (DC12V)	J.S.T (NICHIATSU) B02B-XASK-2 (LF) (SN)	
	External output CnZ1 Spare output (External output) External output CnH Operation output		DC12V output	MOLEX 5566-02A-RE
			DC12V output	MOLEX 5566-02A-BU
	External output CnY	Error output	DC12V output	MOLEX 5266-02A

The external output function of CnZ1 can be changed by changing the setting in P06 on the 7 segment display panel.

	"0" : Operation output			
	"1" : Error output			
ſ	"2" : Compressor ON output			
	"3" : Fan ON output			
	"4 – 9" : Spare			

## 8. TEST OPERATION AND TRANSFER

## 8-1. Before starting operation

(1) Make sure that a measurement between the power supply terminal block and ground, when measured with a 500V megger tester, is greater than 1 MΩ.

When the unit is left for a long time with power OFF or just after the installation, there is possibility that the refrigerant is accumulated in the compressor and the insulation resistance between the contact terminals for power supply and grounding decreases to  $1M\Omega$  or around. When the insulation resistance is  $1M\Omega$  or more, the insulation resistance will rise with crank case heater power ON for 6 hours or more because the refrigerant in the

when the insulation resistance is IMLD or more, the insulation resistance will rise with crank case neater power UN for 6 hours or more because the refrigerant in the compressor is evaporated.

- (2) When the resistance of the signaling line terminal block is 100Ω or less before turning the power on, the power cables may be connected to the signaling line terminal block. Check the wiring referring to the standard resistance value of 6-3.
- (3) Be sure turn ON the power supply to supply power to the crank case heater 6 hours before operation.

After supplying the power to the crank case heater, the compressor may not start unless the time mentioned above elapses. (For protection of compressor) In such occasion, the 7-segment LED shows "dLOOO". Wait till the temperature in the compressor rises sufficiently after turning power on to the crank case heater, before starting the test run.

- (4) Make sure that the bottom of the compressor casing is warm.
- (5) Be sure to fully open the service valves (liquid, gas) for the outdoor unit.
- Operating the outdoor unit with the valves closed may damage the compressor.

(6) Confirm that the power is supplied to all indoor units. It could cause trouble if there is any indoor unit which is not powered.

## CAUTION

Please make sure that the service valves (gas, liquid) are full open before a test run. Conducing a test run with any of them in a closed position can result in a compressor failure.

8-2. Test run (When washing pipes using the re-fresh kit, refer to the instruction manual packed with the ref-fresh kit for the procedures, etc.)

## (1) Test run from an outdoor unit.

Whether CnS1 is set to ON or OFF, you can start a test run by using the SW5-1 and SW5-2 switches provided on the outdoor unit PCB.

Select the test run mode first.

Please set SW5-2 to ON for a cooling test run or OFF for a heating test run. (It is set to OFF at the factory for shipment)

Turning SW5-1 from OFF to ON next will cause all connected indoor units to start.

When a test run is completed, please set SW5-1 to OFF.

Note: During a test run, an indoor unit cannot be operated from the remote control unit (to change settings). ("Under centralized control" is indicated)

## (2) Method of starting a test run for a cooling operation from an outdoor unit: please operate a remote control unit according to the following steps.

(a) Start of a cooling test run

Operate the unit by pressing the START/STOP button.

Oselect the "COOLING" mode with the MODE button.

OPress the TEST RUN button for 3 seconds or longer.

The screen display will be switched from "Select with ITEM  $\clubsuit$  " $\rightarrow$  "Determine with SET] " $\rightarrow$  "Cooling test run  $\checkmark$ ."

○When the SET button is pressed while "Cooling test run ▼" is displayed, a cooling test run will start. The screen display will be switched to "COOLING TEST RUN."

(b) Termination of a cooling test run

○When the START/STOP button or the "TEMP SET ☑ △ " button is pressed, a cooling test run will be terminated.

## 8-3. Transfer

- After completing the installation and test run, explain methods of use and maintenance to the customer, referring to the Instruction Manual. Ask the customer to keep the installation manual safely together with the Instruction Manual.
- Instruct the customer that the power should not be turned off even if the unit is not to be used for a long time. This will enable operation of the air conditioner any time. (Since the compressor bottom is warmed by the crank case heater, seasonal compressor trouble can be prevented.)

## 9. CAUTIONS FOR SERVICING (for R410A and compatible machines)

(1) To avoid mixing of different types of oil, use separate tools for each type of refrigerant.

(2) To avoid moisture from being absorbed by the ice machine oil, the time for when the refrigerant circuit is open should be kept as short as possible. (Within 10 min. is ideal.)

(3) For other piping work, airtighteness testing, vacuuming, and refrigerant charging, refer to section 4, REFRIGERANT PIPING.

(4) Diagnostic Inspection Procedures

For the meanings of failure diagnosis messages, please refer to the technical manual.

(5) 7-segment LED indication

Data are indicated when so chosen with the indication selector switch. For the details of indication, please refer to the technical manual. (6) Internal wiring

After maintenance, all wiring, wiring ties and the like, should be returned to their original state and wiring route, and the necessary clearance from all metal parts should be secured.

# Method for connecting the accessory pipe

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# Be sure to use the accessory pipe to connect the operation valve on the gas side with the field pipe.

- 1 Referring to Table 1 and Table 2 , prepare the straight pipe and the elbow in the field, which are used in the construction examples A-D applicable to the connecting direction.
- 2 Firstly, use the accessory pipe to assemble the connecting pipe assembly outside the outdoor unit. As shown in the figures of construction examples A ~ D applicable to the connecting direction (chain double dashed line), braze the accessory pipe and the parts prepared in the above 1. ●rient the accessory pipe according to the dimensions as shown in □ of Fig. 1.
- 3 After assembly of the connecting pipe, connect it to the operation valve on the gas side inside the outdoor unit.
- Tighten the flare nut with appropriate torque.

38

- 4 After connection of the connecting pipe assembly to the operation valve on the gas side, braze the connecting pipe assembly and the field pipe.
- 5 After the brazing, insulate using the attached heat insulating material and band as shown by Fig. 2.

## Table 1 Parts used for the connecting pipe assembly

No.	Name	Quantity	Remark
1	Accessory pipe	1	Accessory
2	Heat insulating material	1	Accessory
3	Band	2	Accessory
4	Straight pipe 1	1	Procured at the field
5	Straight pipe 2	1 or 0	Procured at the field (Not required for downward direction)
6	Elbow	1 or 0	Procured at the field (Not required for downward direction)

## Table 2 Length and specification of straight pipe (Procured in the field)

A Downward		B Forward	C Rightward	D Backward	
Straight pipe1	270 mm or over	70~120mm	70~120mm	70~120mm	
Straight pipe2	—	125mm or over	125mm or over	515mm or over	

 Be sure to use pipes of 1/2H material, and wall thickness above 1mm. (Pressure resistance of O-type pipe is not enough)





About brazing

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PSB012D941A

# 6.4 Installation work check sheet (For heat pump unit)

Site name and system name Date Date

Please write the model name and serial number.

Sorting	Check item	Standard	Result	Action or value	Date
1.Indoor unit	Is the installation space within allowable limit?	Check the technical manual.(Flow pattern short-circuit, installation space)	,		
	②Is the installation position (the position of suspension bolts) fit to the celling space?	Check the position of suspension bolts and ceiling space.			
	③Did you use the suspension bolt of specified size?	Check the technical manual (M10 or M8)			
	(a) It has a protective shielding to avoid the weld spatter?	Don't unpack before installation. Protect with cardboards etc. during installation.			
lan Later 🥂	GIs the air condition in the ceiling under the limitation? (Against dew condensation)	Dew-point temperature below 28°C, RH below 80%.			
	(b) Is there the gap on the piping insulation?	Be sure to seal the gaps of insulation and flare nuts. Don't damage the insulation.			
	OThe horizontal drain piping has downward slope?	The adequate slope is1/50~1/100 trap piping is prohibited.			
	RNo trap on the vertical drain piping?	Don't attach a trap when the Indoor unit is installed whose external stallc pressure is 0 Pa. (Except the duct type unit)			
	(B) The connection with concentrated drain piping goes from upward?	Connect from the upper part of concentrated drain piping.			,
	It correct that the standing height of drain piping connected to the indoor unit?	Within 600~750mm from ceiling board or lower part of the unit.(FDR)			
	Does the drain piping stand at the nearest point from the unit?	Stand at the position within 295~325mm from the unit.			
	Is the drain hose the accessory of indoor unit?	Be sure to use the accessory drain hose.			
	(3) Is the drain hose fixed by the accessory band?	Don't use the adhesionbond.			
	Does the drain piping suck odor from the drain tub?	There mustn't be the strange odor near the outlet of the drain piping.			
	(b) Is the drain piping insulated ? (Against dew condensation)	Insulation work must be performed. (The drain temperature is about 5°C )			
	(B) Is the drain piping supported with correct interval?	The interval for vinyl piping: 1m, The interval for copper piping: 2m			
	Are the number of connected indoor units and the total capacity within the limit?	Refer to technical manual and installation manual.		The indoor unit capacity: % The number of connected indoor unit:	
2.Outdoor unit	(D)Is the installation space within allowable limit?(No short-circuit)	Check the technical manual. It must be 3°C or less that the difference between the ambient temperature and the one around outdoor unit.			
	Is the slave unit switch set correctly in case of combination system?	SW4-7 must be QN if the outdoor unit is slave unit.			
	③Is the installation base fixed surely? Is the base bolt fixed? The discharging of drain and rain is OK?	Check if the drain water, rain water are discharged surely. Refer to the technical manual.			
	Are the power supp <b>lies of indoor and out</b> door units independent from each other?	Basically, they must have its own powersupply.			
	Are the power supply for master and slave unit separated in case of combination system ?	The master and slave units must have their own power supply.			
	The power supply voltage is within allowable limit?	The unbalance in each phase of power supply: within $\pm 3\%$ Voltage drop at starting: -15% or more			
	Do wiring and breaker adapt to the standard?	Check with technical manual.			
	BEach unit has its own earth leakage breaker?	Each unit must have its own earth leakage breaker.			
	@Was the grounding work performed?	The ground work should be done by qualified electrician.			
	Din case of combination system, the oil equalization piping between master and slave units is installed?	Be sure to install.			

Note ) If the standard is satisfied, write down OK, if not, write down x and the action executed. (There are some items where you must write down values even if OK)

Sorting	Check Item	Standard	Result	Action or value	date
3.system	igodot Is the material of refrigerant piping genuine?	Phosphorus deoxidized seamless copper pipe C1220T, JIS H3300			
	S the length of refrigerant piping within allowable limit?	Check with the technical manual.		The length of piping: m The pipe length between the outdoor unit and the first branch: m	·
	The helght difference is within allowable limit?	Check the technical manual.		The height difference between indoor/outdoor unit: m indoor units: m	
	Are the pipe size and thickness decided based on the indoor unit capacity?	Check the technical manual.(The size and radial thickness depend upon indoor unit scapacity)			
	(G)No trap or bump piping on the refrigerant piping?	Any trap or bump piping are prohibited.			
	(6)When you perform piping welding, do you (a) use nitrogen , (b) cool the service valve?	(a)Perform it by running nitrogen or making substitution. (Against oxidized product)			
	Ouring work, you executed measures to prevent rain and dust from entering the piping by sealing the ends of piping?	The sealing must besolid not to be removed easily. The measure for preventing foreign substances from entering the piping.		· · · · · · · · · · · · · · · · · · ·	
	Bls the branch pipe genulne?	Check the part number of genuine product with technical manual.			
	OAre the branch pipings properly set?	Check with technical manual.(Instali horizontally or vertically)			
9. •••••	(I) Is the refrigerant piping supported with suspension bolts?(Vibration absorption).	Support with suspension bolts of exclusive use for refrigerant piping at every two meters.			
	(DAre the refrigerant pipings(both liquid and gas) insulated?	Use the material with over 120°C heat resistance. Use the material on which the dew condensation is not formed 0-5°C.			
	Over the measures for vibration absorption and insulation executed on the through-holes for the refrigerant piping in the wall and beam?	The measures for vibration absorption and heat insulation must be executed.			
	(3)Was the air tight test performed? (Use nitrogen gas.Too high pressure is prohibited)	Pressure:4.15MPa(in case of FDCR:3.24MPa)No fluctuation, of pressure for 24 hours. Refer to the technical manual about the pressure fluctuation caused from temperature.		The pressure value after 24 hours MPa	
	Was sufficient vacuuming performed ? (Both with liquid and gas pipings )	Keep -755mmHg or less and vacuum for over 60 minutes.		The vacuuming time min	
	(BWas the quantity of refrigerant calculated for piping?	Refer to the technical manual. (AddItional charging quantity is for liquid piping)		Additional charging quantity kg	
	(B)The specified amount of refrigerant was charged with measuring?	Use a scale. Charge the liquid refrigerant.			
	OAre the total amount of refrigerant and additional charge recorded on the model name lable?	Record the size and length of piping, and the amount of additional charge.			
4. Communication	①Are the signal line and the power line crossed?	If the resistance on the signal line terminal block is below $100\Omega$ (Refer to the technical manual), the crossing may occur.			
network	②Are the signal line and remote control line crossed?	Don't use the same lines.			
	ONo loop wiring on the signal lines?	Loop wiring is prohibited.			
	Are the type and size of the signal line right?	Type: shielded cord 0.75~1.25mm <sup>2</sup> Connect the shield earth at both ends of signal line.			
	Sis the length of signal line within usage limit?	Refer to the technical manual.			
	(6) is the Superlink protocol(new or previous SL) right?	If new and previous SL are mixed in the same SL network, turn on SW5-5 of all outdoor units.			
	Was the address number decided reasonably?	Consider the combination of indoor/outdoor units, the use of each roorn, operating time and tenant segmentation etc.			
	(B)Was the address number of indoor/outdoor unit indicated clearly on the system diagram(The layout drawing of indoor unit etc.)?	Write it down on the system diagram.			
	(9)You handed over the address diagram to the worker and instructed to set address ?	You must instruct with a diagram basically.			
	(D) The indoor address is set to 000 during auto address setting?	Set to 000. (Factory default: 000)			
5.Test run (The test	Did you turn on power for 6 hours before the test run? Is the bottom of the compressor warm?	Turn on the crankcase heater for 6 hours before the test run. Or the bottom of compressor is warm enough.		The power-on time H	
run must	(2)Is each service valve opened?	Open the liquid and gas service valve, the oil equalization service valve.			
individually	Who loose at the wiring connection?	Check whether the combination is right with			
for each refrigerant	pipe)of indoor/outdoor units right?	the temperature of heat exchanger etc.			
system)	When network connectors all connected without omission?	All rietwork connectors are connected.			
	(6)Can you confirm that the system hasn't any failure with the running data?	Heter to the test run procedure.			
	ØDid you perform the draining test?	Check the leakage and clogging of water.			

Note ) If the standard is satisfied, write down OK, if not, write down x and the action executed.

(But , there are some items where you must write down values even if OK)

# 6.5 Check operation procedure

## (1) Check operation

The following (1 - 3) can be checked automatically with this operation.

- ① Checking of operation valves opened/closed. Checks to see if operation valves are opened.
- ② Checking of mismatch on wiring or piping. Checks to see if refrigerant piping or signal wiring between indoor and outdoor units in the same refrigerant system are connected properly.
- ③ Checking of indoor expansion valve operation. Checks to see if indoor expansion valve operates properly.
- \* Check operation should be performed before initial test run after completion of installation. When any corrective measure for nonconformity has been taken, perform the check operation again after repair.

## Operational condition

- Temperature range: Outdoor air temperature ...  $0 \sim 43^{\circ}$ C, Indoor air temperature ...  $10 \sim 32^{\circ}$ C.
- Connecting capacity of indoor units: 80% or more of outdoor unit capacity.

## Precautions

- Check each outdoor unit system for single use or each refrigeration system for combination use. Outdoor units in other refrigerant system shall not be operated.
- After turning on power supply to outdoor unit and connected indoor units, start check operation with all connected indoor units stopped.
- In combination use, check the setting and the result displayed on the 7-segment display of master outdoor unit.
- If the unit has been operating before check operation, wait for 5 minutes after stopping the unit operation before starting check operation, in order to avoid misjudgment.
- In combination use, judging operation valves opened or closed by check operation can be done as no good (NG), when all of operation valves in liquid line, gas line and oil equalizing line of both master and slave outdoor units are closed. However, in other cases than the above, judgment may not be done.
- During check operation it is impossible to stop operation from remote controller. Accordingly, before starting check operation, be sure to confirm that no one working near the indoor unit especially near the rotating part such as fan of indoor unit or something is remaining near the fan of indoor unit.

## Purpose

The purpose of this check operation is only to verify any overlooked items to be checked during the ordinary checking done at the site after installation. Accordingly it has no function to substitute the ordinary checking to be done during or after installation work and to restore automatically as a result of checking operation.

Therefore be sure to conduct the checking in ordinary way after installation firstly, and then to perform this check operation. We believe that this checking method could prevent from overlooking any items to be checked.

## (2) Flow of the check operation

Check operation is performed as follows.



Note (1) For preliminary check method, refer to "(3) Confirmation before check operation".

- (2) For details of check operation, refer to "(4) Check operation procedure".
- (3) For measures to be taken in case of NG, refer to "(5) Measures to be taken after check operation".

## (3) Confirmation before check operation

- · Confirm the installation has been completed properly by hearing, actual inspection or other method.
- This preliminary confirmation is indispensable to prevent troubles during or after check operation.
- Check operation can be performed only when the following conditions (1) (8) are established.
- Check the following contents listed in the table with 7-segment display and MentePC.

	Item Content		Check method	Check result
(1)	Preparation	Supply power to outdoor and indoor units.		
		No outdoor unit in other refrigerant systems is operating.		
		All indoor units are stopped.		
		It has elapsed more than 5 minutes after the stopping.		
(2)	Connecting capacity of indoor units	Connecting capacity of indoor units is 80% or more of outdoor unit capacity.	Check capacities of outdoor and indoor units.	
(3)	Address setting	Addresses of outdoor unit (in combination use, both of master and slave outdoor units) and indoor units have been set.	Check the number of connected units.	
(4)	Temperature range	Outdoor air temperature is $0 - 43^{\circ}$ C. Indoor air temperature is $10 - 32^{\circ}$ C.	Check outdoor air temperature with 7-segment display and indoor air temperature with MentePC.	
(5)	Others	System communicating method is of new SL.	Check the model name of outdoor unit, indoor units, central control device, etc.	
		System is not in error stop condition.	Check to see if any error code (E??) is displayed on indoor or outdoor unit.	
(6)	Outdoor unit operation valve	Outdoor unit operation valve is opened. *1	Check visually.	
(7)	Refrigerant amount	Proper amount of refrigerant is charged.	Check the additional charged amount of refrigerant is written in the plate for specifying refrigerant charging amount on the back of outdoor service panel.	
(8)	Number of connected indoor units	It is same as the number of connected indoor units installed.	Check with 7-segement display or MentePC.	

\*1 • Be sure to open the operation valves in both liquid and gas lines of outdoor unit before starting check operation. In combination use, open the operation valves not only in liquid and gas lines but also in oil equalizing line of both master and slave outdoor units.

· Operating with operation valves closed causes vacuum operation that results in a compressor fault.

• If the operation valves are "closed" before test run, be sure to verify whether the evacuation, air tightness test and additional refrigerant charge have been completed by hearing to installation contractor, before opening the operation valves.

 $\Rightarrow$  Otherwise, it may cause such trouble as mixing air (non-condensation gas and water) in, forgetting to charge additional refrigerant at the site, or others.

## (4) Check operation procedure

Flow	Work	Operation status (Displayed on 7-segment)	Meaning of 7-segment display	Remarks
Preliminary check	Check in advance as per "(3) Confirmation before check operation".			Don't operate any outdoors unit in other refrigerant systems during check operation.
Start of check operation	Turn "Chek operation switch (SW3-5)" on outdoor control PCB from OFF to ON.	"H1 Max. remaining time"	Remaining time: Max. remaining time for check operation	This operation status is displayed during preparation for check operation.
	In combination use, turn "Chek operation switch (SW3-5) on master control PCB from OFF to ON.	"H0 HE"	When "H0-HE" is displayed for more then 10 minutes, then check operation is not started yet. In such case refer to "(3) confirmation before check	be displayed. In combination use, "H0" is displayed on the slave outdoor unit. *Be sure to start check operation when all indoor units are stopping.
Implementing auto checking		"H2 Max. remaining time"	Remaining time: Max. remaining time for auto checking.	In combination use, "H0" is displayed on the slave outdoor unit.
End of auto checking,	Record the indication of 7-segment indicator on	"CHO End"	Result of check operation is judged normal.	End the check operation.
judgment result	gment outdoor unit. ult	"CHL"	Operation valve may be closed.	Refer to "(5) Measures to be taken after check operation".
		"CHU Anomalous indoor unit No."	Refrigerant piping or signal wiring between indoor and outdoor units may not be connected correctly.	
		"CHJ Anomalous indoor unit No."	Indoor expansion valve may not be operating properly.	
		"CHE"	Check operation has not ended properly. All judgment results at the end are displayed.	
		Other display		
Check of nonconforming item	Check for anomalous condition as per "(5) Measures to be taken after check operation"		When any display other than "CHO-End" is displayed after auto checking.	Refer to "(5) Measures to be taken after check operation".
End of check operation	Turn off "Chek operation run switch (SW3-5)" on outdoor control PCB.		Returns to normal display.	

Notes (1) When "HO-HE" is displayed for more than 10 minutes, or any displays other than "CHO-End" is displayed at the end of cheek operation, turn SW3-5 to OFF and take necessary measures.

And then turn SW3-5 to ON again and perform the check operation.

(2) During check operation it is impossible to stop operation from remote controller. Accordingly, before starting check operation, be sure to confirm that no one working near the indoor unit especially near the rotating part such as fan of indoor unit or something is remaining near the fan of indoor unit.

When interrupting check operation, turu SW3-5 to OFF, Compressor stops and 7-segment display returns to normal display.

## (5) Measures to be taken after check operation

When any display other than "CHO-End" is displayed after completing the judgment of check operation, the meanings of each display are shown as follows.

After also also a the contents of inc	ana akiana ana kunana kuinan		in a suffer way a large of the supervision of the s
ATTOR CHOCKING THE CONTENTS OF INS	endetion and ronairing	I NANCANTARMINA ITAME	norrorm chock onoration again
	טעכטווטון מווע וכטמווווע		

Code display	Data display	Meaning of display	Contents of Inspection
CHL		Refrigerant circuit is choked at certain	Operation valve on outdoor unit may be left closed.
		place.	Low pressure sensor may be anomalous. Check the detected pressure displayed on 7-segment and compare it with the value measured with gauge manifold.
			Refrigerant piping or signal wiring may not be connected properly. *1 (See page 47.) Check with Mente PC, etc.
			Indoor heat exchanger temperature thermistor may be anomalous or disconnected. *2 (See page 47.)
			Refrigerant may not be charged correctly.
			Indoor unit expansion valve may not be operating properly. Connector of indoor unit expansion valve coil may not be connected. *3 (See page 47.) Indoor unit expansion valve coil may be disconnected from main body of expansion valve. *4 (See page 47.)
			Outdoor unit PCB may be defective.
CHU	Anomalous indoor unit	Refrigerant is not circulated in the indoor unit of indicated No.	Refrigerant piping or signal cables may not be connected properly between indoor and outdoor units. *1 (See page 47.) Check with Mente PC, etc.
	No.		Indoor heat exchanger temperature thermistor may be anomalous or disconnected. *2 (See page 47.)
			Operation valve on outdoor unit may be left closed. Check it especially when many indoor units No. are displayed in data display column of CHU.
			it may be displayed by influence of liquid flooding due to the trouble on any other indoor unit. If CHJ is displayed at the same time, check preferentially the indoor unit displaying CHJ and after repairing, perform check operation again.
			Refrigerant may not be charged correctly.
			Indoor unit expansion valve may not be operating properly. Connector of indoor unit expansion valve coil may not be connected. *3 (See page 47.) Indoor unit expansion valve coil may be disconnected from main body of expansion valve. *4 (See page 47.)
CHJ	Anomalous indoor unit	Expansion valve on the indoor unit of indicated No. does not operate	Indoor heat exchanger temperature thermistor may be anomalous or disconnected. *2 (See page 47.)
	No.	properly.	it may be displayed by influence of liquid flooding due to the trouble on any other indoor unit.
			Contamination may be trapped in expansion valve due to installation or transitional cause.
			Indoor unit expansion valve may not be operating properly. Connector of indoor unit expansion valve coil may not be connected. *3 (See page 47.) Indoor unit expansion valve coil may be disconnected from main body of expansion valve *4 (See page 47.)
			Refrigerant may not be charged correctly.
CH1		Indoor heat exchanger temperature anomaly.	Indoor heat exchanger temperature thermistor may be anomalous or disconnected. *2 (See page 47.)
CH3		Unable to do indoor EEV trouble check.	Unable to do indoor EEV trouble check because of unstable operation.

Code display	Data display	Meaning of display	Contents of Inspection
СНН		It may be liquid flooding.	Refrigerant piping or signal cables may not be connected properly between indoor and outdoor units. *1 (See next page.)
			Power switch may be turned off on some indoor units. Check if power is supplied to all indoor units.
			Indoor unit expansion valve may not be operating properly. Connector of indoor unit expansion valve coil may not be connected. *3 (See next page) Indoor unit expansion valve coil may be disconnected from main body of expansion valve. *4 (See next page.) If no indoor unit indicates CHJ, check also indoor units which are not showing CHJ.
			Refrigerant may not be charged correctly.
CHE		Anomalous stop of check operation.	Some error may happen on indoor or outdoor units. Check if any error code "E??" is displayed on indoor or outdoor units.
			There may be anomalous on signal wire connection. Check if signal wire is connected firmly.
			SW setting on outdoor PCB might have been changed. Check if any SW setting has been changed during check operation.
CHE	Anomalous indoor unit	Anomalous stop of check operation.	Some error may happen on indoor or outdoor units. Check if any error code "E??" is displayed on indoor or outdoor units.
	No.	Indoor unit indicated its No. has anomaly.	There may be anomalous on signal wire connection. Check if signal wire is connected firmly.
			Power switch may be turned off on some indoor units. Check if power is supplied to indoor units.
E	40	High pressure anomaly.	Refrigerant circuit may be choked at a certain place. Refer to the technical manual or the above.
E	42	Current cut.	Refrigerant circuit may be choked at a certain place. Refer to the technical manual or the above.
			It might have been started operation while bottom of compressor was still cold. Perform check operation again after the bottom of compressor has been enough warm.
E	49	Low pressure anomaly.	Refrigerant circuit may be choked at a certain place. Refer to the technical manual or the above.
E	36-3	Liquid flooding anomaly.	It may be in the same condition as "CHH". Refer to the technical manual or the above.

Note (1) When an error code (E??) is displayed, press SW9 to display all indications other than the error code in series. Press SW9 again to return to error display.

(2) When check operation has been suspended, the followings listed in below table are displayed depending on judgment at the time of stoppage.

Code display	Data display	Contents of display		
HL		Refrigerant circuit is choked at a certain place.		
HL	LPL	Refrigerant circuit is choked at a certain place. (In combination use)		
HU	Anomalous indoor unit No.	Refrigerant is not circulated in the indoor unit of indicated No.		
HJ	Anomalous indoor unit No.	Expansion valve does not operate on the indoor unit of indicated No.		
UU	Anomalous indoor unit No.	Refrigerant is not circulated in the indoor unit of indicated No.		
U	Anomalous indoor unit No.	Refrigerant was not circulated in the indoor unit of indicated No. just after starting but it		
		has been confirmed that it is now circulated.		

(3) If refrigerant circuit is choked at a certain place, it may be stopped with error code E40 (High pressure anomaly), E42 (Current cut) or E49 (Low pressure anomaly).

(4) When it has stopped with error code E36-3 (Liquid flooding anomaly), it may be in the same condition as "CHH---".

(5) When it has stopped with error code E42 (Current cut), it might have been started operation while bottom of compressor was still cold. Perform check operation again after the bottom of compressor has been enough warm.



\*2 (If the connector comes off by a weak pull, it's no good. If not come off, It's OK) The connector of indoor heat exchanger temperature thermistor.

Normal



Disconnected



\*3 (If the connector comes off by a weak pull, it's no good. If not come off, It's OK) The connector of indoor expansion valve coil.

Normal





\*4

The indoor expansion valve coil itself. Normal



Disconnected





## Disconnected from main body



(6) Data sheet <Check Operation Data Sheet>

Project nam	е			Location							Checked by		
		Fill necessary data	in advance	7	Superlink version	٦	Date of installation	(d/m	(v)		Date of checking	(d/m/y)	
		Model	Address	-	Superlink II	-	Name of installer	(u/m	3/		Weather		
Outdoor	Master	r FDC	71001000	-	Superlink I*	-1					Outdoor air temperature		°C
unit	Slave	FDC		1	* In case of Superli	nk I. the	check operation canr	not be impleme	ented.		Start time of check operation	(h/m/)	
		100									Completion time of check operation	(h/m/)	
	Fill nec	cessary data in advan	се	Distant law off	Flour differences		1		Dising law with	Claustice differences			
	No.	Model	Address	O/U-I/U	C/U-I/U	No.	Model	Address	O/U-I/U	O/1-I/1			
Indoor unit	1	FD				41	FD						
	2	FD				42	FD						
	3	FD				43	FD				Judgmen	t	
	4	FD				44	FD				Checked items	Result	
	5	FD				45	FD						
	6	FD				46	FD				$\bigcirc$ No anomaly allowed. $\rightarrow$ If anomaly occurred: Error code E		
	7	FD				47	FD						
	8	FD				48	FD				7 account display at completion		
	9	FD				49	FD				27-segment display at completion		
	10	FD				50	FD						
	11	FD				51	FD				3 Others		
	12	FD				52	FD						
	13	FD				53	FD				(Comment/Measures to be taken/etc.)		
	14	FD				54	FD						
	15	FD				55	FD						
	16	FD				56	FD						
	17	FD				57	FD						
	18	FD				58	FD						
	19	FD				59	FD						
	20	FD				60	FD						
	21	FD				61	FD						
	22	FD				62	FD						
	23	FD				63	FD						
	24	FD				64	FD						
	25	FD				65	FD						
	26	FD				66	FD						
	27	FD				67	FD						
	28	FD				68	FD						
	29	FD				69	FD						
	30	FD				70	FD						
	31	FD				71	FD						
	32	FD				72	FD						
	33	FD				73	FD						
	34	FD				74	FD						
	35	FD				75	FD						
	36	FD				76	FD						
	37	FD				77	FD						
	38	FD				78	FD						
	39	FD				79	FD						
	40	FD				80	FD						

'11 • KX-T-166

## 6.6 Instructions for installing the branch pipe set (option)

PSB012D855B

This manual describes the specifications of branching pipe set and header set installation. For outdoor unit installation and indoor unit installation, please refer to the respective installation manuals supplied with your outdoor unit and indoor unit.
 Before you set about installation work, please read this manual carefully so that you can carry out installation work according to the instructions contained herein.

Please read the safety instructions contained in the installation manual supplied with your outdoor unit carefully and carry out installation work unerringly.

When installation work acompleted, conduct a test run to check the installation for any anomaly. Please also give the customer necessary instructions as to the operation and maintenance of the unit pursuant to the instruction manual (supplied with the indoor unit).
 Please ask the customer to keep the installation manual on the customer's part together with the instruction manual.

## PARTS LIST

Branching pipe set type	Gas side	liquid side	Different diameter pipe joint
DIS-22-1G	32:56年01 42:51年601 99:51年601 99:51年601 99:51年601 99:51年601 442	25:5%di 	None
DIS-180-1 <b>G</b>	252228 109/15/16 100/15/16 100/15/10	SE 59401 255 69401 255 69401 255 69401 448	P-1 P-2 P-7
HEAD4-22-1 <b>G</b>	35 540 	Se 52401 Se 5401 Dy 12.7 Dy 9552 415	None
HEAD6-180-1G	06 10415.88 10495.22 10495.22 10495.22	235 6640 - 72 1540 - 72 1540 - 70 1 - 70 1	P−1 P−2 8582 100 100 100 100 100 100 100 10

## **INSTALLATION PROCEDUCE**

1. Please select an appropriate branching pipe set model and a pipe size by consulting with the installation manual of the indoor unit or other relevant technical documents.

## Attention

①Use a pipe conforming to a pipe size specified for indoor unit connection for the section between an indoor unit and a branching pipe. ②Use a pipe conforming to a pipe size specified for outdoor unit connection for the section between an outdoor branching pipe and an outdoor unit.

(2)Use a pipe conforming to a pipe size specified for outdoor unit connection for the section between an outdoor branching pipe and an outdoor unit. 2. Cut a branching pipe set or a different diameter joint with a pipe cutter to make it fit for a selected pipe size before application.



(4) Always apply nitrogen gas when soldering joints. If nitrogen gas is not applied, a large amount of film oxide will be formed which could lead to a critical failure in the unit. Use caution to prevent moisture or any foreign matters from entering the pipe when connecting pipe ends.

For the method of air tightness testing and pulling air, please refer to the installation manual of the outdoor unit. (5) Do not leave piping with any open ends uncovered to prevent water or foreign matters from entering inside.

## 3. Please dress it with an attached insulation sheet for heat insulation. (Please dress both liquid and gas sides)

## Attention

- ① Apply an attached insulation sheet along a pipe, tape the joining line with a joint tape (to be procured on the installer's part) for complete sealing, and wrap the pipe and insulation sheet entirely with a tape.
- (2) Dress both liquid and gas pipes with attached insulation sheets for heat insulation.
- ③ Ensure that the liquid pipe is given the heat insulation as good as that of the gas pipe. The absence of heat insulation can cause dripping water from dew condensing on the pipe or performance degradation.



## 4. How to select a branching pipe

(1) How to select a branching pipe set

• An appropriate branching pipe size varies depending on the capacity of connected indoor units (combined total capacity connected downstream), so please choose from the table below.

Total capacity downstream	Branching pipe set model type
less than 180	DIS-22-1G
180 or higher – less than 371	DIS-180-1G

## Attention

- ① Use a pipe conforming to a pipe size specified for indoor unit connection for the section between an indoor unit and an indoor unit side branching pipe.
- ② A branching joint (for both gas and liquid) must always be positioned in such a way that it branches either horizontally or vertically.

(2) How to select a header set

- Depending on the number of units connected, connect plugged pipes (to be procured on the installer's part) at a branching point (on the indoor unit connection side).
- For the size of a plugged pipe, please refer to the documentation for a header set (optional part).

Total capacity downstream	Header set model type	Number of branches
less than 180	HEAD4-22-1G	Up to 4 branches
180 or higher – less than 371	HEAD6-180-1G	Up to 6 branches

## Attention

① Use a pipe conforming to a pipe size specified for indoor unit connection for the section between a header and an indoor unit.

② Always position a header (both gas and liquid headers) in such a way that it branches horizontally.

③ No 224 or 280 indoor unit is connectable to a header.

Branching pipe set

DIS-180-1G

DIS-22-1G

DIS-22-1G

## 5. Example of piping

Example 1: Branching type configuration

## Connected capacity: 294



## **Example 2: Header type configuration**

Connected capacity: 272



## Selection of a header set

Selection of a branching pipe set

Mark

Branch pipe 1

Branch pipe 2

Branch pipe 3

Mark	Selection procedure	Header set
Header 1	Combined total capacity of indoor units connected downstream (71+90+45+22+22+22)=272	HEAD6-180-1G

Selection procedure

Combined total capacity of indoor units connected downstream (80+90+56+40+28)=294

Combined total capacity of indoor units connected downstream

Combined total capacity of indoor units connected downstream

(56+40+28)=124

(40+28)=68

# Example 3: Branching + Header mixed type configuration Connected capacity: 326



## Selection of a branching pipe set

Mark	Selection procedure	Branching pipe set
Branch pipe 1	Combined total capacity of indoor units connected downstream (22+22+22+22+22+36+36 +36+36+36+36)=326	DIS-180-1G
Branch pipe 2	Combined total capacity of indoor units connected downstream (22+22+22+22+36+36 +36+36+36+36)=304	DIS-180-1G
Branch pipe 3	Combined total capacity of indoor units connected downstream (36+36+36+36+36+36)=216	DIS-180-1G
Branch pipe 4	Combined total capacity of indoor units connected downstream (36+36+36+36+36)=180	DIS-22-1G

## Selection of a header set

Ma	ırk	Selection procedure	Header set
Head	ler 1	Combined total capacity of indoor units connected downstream (22+22+22+22)=88	HEAD4-22-1G
Head	ler 2	Combined total capacity of indoor units connected downstream (36+36+36+36)=144	HEAD4-22-1G

# 6.7 Service valve kit Installation Manual

## PCB012D021A

- Read these "Precautions for safety" carefully before starting installation work and do it in the proper way.
- Safety instructions listed here are grouped into 🖄 Warnings and 🖄 Cautions]. If a non-compliant installation method is likely to result in a serious consequence such as death or major injury, the instruction is grouped into 🖄 Warnings to emphasize its importance. However, a failure to observe a safety instruction listed under 🖄 Cautions] can also result in a serious consequence depending on the circumstances. Please observe all these instructions, because they include important points concerning safety.
- When you have completed installation work, perform a test run and make sure that the installation is working properly. Then, explain the customer how to operate and how to take care of the air-conditioner according to the user's manual. Please ask the customer to keep this installation manual together with the user's manual.



## 1. BEFORE BEGINNING INSTALLATION

1 Install the service valve kit when carrying out the washing operation utilizing existing pipes. For the outdoor units which can use this kit, refer to the technical data – Installation manual of outdoor unit.

## 2 Confirmation of accessory

Installation manual	Check sheet	Gasket
		O 2 pcs.



/B\

PCB012D021A

## 2. INSTALLATION OF SERVICE VALVE KIT

## Selection of installation place

oWhere the service spaces shown in the figure at right are available.

 Use new pipes to connect between the service valve kit and the outdoor unit. It is prohibited to use existing pipes.

Restrict the actual pipe length no longer than 3 m.

## Request

- (1) Fix the kit securely using the fixing holes (for M10 bolt) at four places shown in the figure at right.
   (2) The service valve kit cannot be installed upside-down.
- Install the main unit at level such that the labels attached to the pipes are positioned upward.





\* Tighten the service valve

to the following torques.

30 N·m

11~13 N·m

Service valve cap

Check joint cap

## 3. REFRIGERANT PIPING

On the gas pipes of the service valve kit, the marking "To outdoor unit" is indicated on the gas pipe at outdoor unit side and the marking "To indoor unit" gas pipe is indicated on the gas pipe at indoor unit side. Be sure not to misconnect the gas pipes.

olt is not necessary to connect to the liquid pipe.

 Before connecting the pipes, make sure to open the panel and close the service valves A and C while open the service valve B.

OMake sure to substitute with nitrogen gas when doing brazing.

•When a pipe has been connected by means of brazing, make sure to heat insulate the pipe.





## Pipe connection

 $\circ$ When the size of connecting pipe is not same as the pipe diameter (ø25.4) of the service valve kit, use a joint of which size is different at both ends. (Work at site)

Install the service valve kit at the same level as or lower than the outdoor unit.

○Connect the service valve kit and the outdoor unit with actual pipe length no longer than 3 m.

Install it on the main pipe between the outdoor unit and the initial branch. (See following figure.)

- Close the panel after connecting pipes. (During the washing operation, open the cover to control
- the service valves.)



PSB012D869G

# 6.8 Pipe washing check sheet

Custo	omer :
Outdo	oor unit model/Serial No. :
Addit	ional refrigerant charge amount/Total pipe length :

/ m

kg /

\* Use this Check Sheet when washing pipes using the re-fresh kit. \* Original Sheet: Carefully handle the original Check Sheet because it is retained by the distributor.

Date of washing operation			
Person who washe	ed : (Affiliation)	(Name)	
Checked by :	(Affiliation)	(Name)	

Ch	eck		
Dareon in	Checked	Description of operation	Caution, etc.
charge	by		
		① Delivery and installation of indoor and outdoor units	Confirm that pipes connected to the indoor and outdoor units have been vacuumized.
		Turn on the circuit breakers on the indoor and outdoor units.	Turn on the switch of crankcase heater.
		Remove the front panels from the outdoor unit, service valve kit and re-fresh kit.	
		Confirm that there is no anomaly in the number of indoor units to be connected, their address numbers and appearance.	Use 7 SEG display. Mente PC, etc.
			Use the code No. C02 of 7 SEG to display the outdoor air temperature.
		Check the outdoor air temperature and the indoor air temperature	Becord the temperature on the "Outdoor air temperature" in the following table
		onor an outdoir an emporado and an meor an emporado.	It will not be washed properly if it is out of the range of use (Indoor 10 – 35°C outdoor $5 - 35°C$ )
		@ Connection of the re-freeh kit	- it will not be washed properly in it is out of the range of date. (indoor: 10 - 55 6, baddoor: 5 - 55 6.)
		Uii drain port is opened upward. Connect the hared nitting and lead the pipe to the drain oil container. (work at site)	• Size or oil orain noie is 015.88.
		Upen the service valve at the oil drain noie on the re-tresh kit.	Ine plate must be attached to the hange or re-tresh kit.
		Supply pressurized nitrogen from the check joint of re-fresh kit to drain oil.	Kaise the pressure gradually. Confirm that oil has been drained, before going to next step.
		[Open] the [Service valve at the oil drain hole on the re-fresh kit].	
		Connection of the flexible tube	Bolt tightening torque is 25 – 30 (N·m).
		Remove the plate and the gasket from the flange on the service valve kit.	Width across flat on the bolt is 17 mm.
		Remove the plate and the gasket from the re-fresh kit.	Retain the plate with care to protect from dust, till the end of washing.
		Remove the vinyl from the flexible tube.	<ul> <li>Retain the vinyl and rubber ring with care to protect from dust, till the end of washing.</li> </ul>
		Using the attached bolts and gasket (supplied items), connect the flexible tube to the flange of service valve kit.	Always use new gasket (Parts No.: PCA005A061).
		Using the attached bolts and gasket (supplied items), connect the flexible tube to the flange of re-fresh kit.	<ul> <li>Coat the gasket with refrigerating machine oil before installation. (For ease of attachment)</li> </ul>
		Connection of bypass gas pipe (Flared: ø9.52)	Flare the end of bypass gas pipe at site.
			Tightening torque is 38±4 (N·m).
		Connect the bypass gas pipe to the bypass gas service valve of outdoor unit. (Flared connection)	Retain the removed flare nut and flare cap with care to protect from dust. till the end of washing.
			Different flange hole pitches are used on both ends to prevent misconnection
		Connect the bypass gas pipe to the bypass gas service valve of re-fresh kit. (Flared connection)	Tightening torque is 38±4 (N·m).
		Connect the gauge manifolds or pressure gauges (work at site) at two places of the left (Inlet side) and right (Outlet side) check inints on the re-fresh kit.	
		③ Air tightness test (Airtight test of the re-fresh kit, flexible tube and hynass gas nine)	
		[Open] the [Bynass gas service valve of re-fresh kit]	
		Check the air-tinhtness at the ICheck init of service valve A1 on the capilice valve kit /2 21 MDe)	Draceuriza gradually
<u> </u>			- moounizo gradually.
<u> </u>		○ All purgo Delagas the property in the re-freeh kit through the [Check joint of comise value [C] on the service value hit is strengthere.	
		Release the pressure in the re-itest kit unough the <b>Lineck joint of service valve</b> (1) on the service valve kit to authosphere.	
		vacuumize through the [check joint of service valve c] on the service valve kit to atmosphere.	
		Open the [Service valve A] on the service valve kit to confirm that the inside of the pipe connected at site is vacuumized.	
		(5) Additional charge of refrigerant	2
		Charge the refrigerant for the pipe through the [Check joint of liquid service valve].	<ul> <li>Make the additional charge from the liquid side. Follow the step <sup>(6)</sup> if it cannot be charged fully.</li> </ul>
		(Never charge from the gas side.)	Record the charge amount. ("Additional charge amount ①" in the following table)
		© Pipe washing operation	Turn off the SW3-6 to stop the operation in the event of an emergency.
		[Open] the [Service valve C] on the service valve kit and the [Bypass gas service valve] on the outdoor unit.	
		[Close] the [Service valve B] on the service valve kit.	
		[Open] only the [Liquid service valve]. (Keep closing the gas service valve B on the service valve kit.)	
		Make sure to insert the [CNS1] (External operation input) connector.	<ul> <li>It cannot be washed properly if the connector CNS1 is disconnected.</li> </ul>
			<ul> <li>Outdoor fan is turned on, and 7 SEG shows the remaining time (approximate value).</li> </ul>
			<ul> <li>Compressor starts to run 2 minutes later, and the washing operation starts.</li> </ul>
		Turn [ON] the [SW3-6]. (Pipe washing operation starts.)	Induor unit start the cooling operation in the remaining time is reduced to adout 75 minutes.     Avoid touching the burges gas ping because it could because very bot
			<ul> <li>Avoid fourthing the uppass gas pipe because it could become very not.</li> <li>Since it is now controlled with the central control (the centrer mode) from the outdoor unit controls from individual indoor units.</li> </ul>
			are disabled.
		Charge additionally the portion of refrigerant, which could not be charged at the step (5), through the ICheck joint of	Charge in the liquid phase, and record the charge amount. ("Additional charge amount (2)" in the following table)
		service valve C1 on the service valve kit. Never use the check joints of service valves A and B for the additional charge	
		Becord the reading on the pressure gauge when the remaining time on 7 SFG is 60 – 65 minutes.	Record the readinos on the pressure paupes connected to the check inits. ("Pressure paupe (check init!)" and "Pressure paupe (check init R)" in the following table)
		neede are reading on the precent gauge men the remaining time of reactioned to minuted.	The other is a second s
			The gas pipe is in the state of pump down, at the end of washing.
		Washing operation is completed if the followings are displayed on 7 SEG.	• When the display (2) is shown, check to see if oil has been drained from the re-fresh kit, and repeat the washing operation.
		Display ①: PCL End Display ②: PCL	[Steps] Close the service valves A and C and the bypass gas service valve at outdoor side.  Collect refrigerant through the check joint
			of service valve C. + Confirmation of oil draining by the step 2 above + Vacuumizing through the check joint of service valve
<u> </u>		(Olassa) ika (Camias nakas 8, 0) sa ika samias naka kitus (K. 19	UP upen the service valves A and U and the bypass gas service valve. Turn off SW3-6 once and then back on again.
<u> </u>		Lousej une [Service valves A, C] on the service valve kit and the [Bypass gas service valve] on the outdoor unit.	
<u> </u>		Lopenj ule (service valve b) on the service valve kit.	
L		ium juhi jine jawa-oj.	It can be input from individual indoor units.
<u> </u>		U kemoval of the re-fresh kit	
L		Removal of the flexible tube and the bypass gas pipe	
			<ul> <li>Collect a small amount of refrigerant remaining in the re-fresh kit. (Provide a refrigerant collecting device.)</li> </ul>
		[Collect refrigerant] in the re-fresh kit through the check joint on the service valve C of service valve kit.	<ul> <li>Make an additional charge to the system for the amount of collected refrigerant, and record the amount.</li> </ul>
			("Additional charge amount ③" in the following table)
		Open up the inside of re-fresh kit to atmosphere.	
		[Close] the [Bypass gas service valve of re-fresh kit].	
		Remove the flexible hose and the bypass gas pipe.	
		Install the flare nut and flare cap on the bypass gas service valve of outdoor unit.	• Tightening torque is 38±4 (N·m).
		Install the flare nut and flare cap on the bypass gas service valve of re-fresh kit.	
			<ul> <li>Use the new gasket (Parts No.: SSA932A004T), which is attached to the outdoor unit.</li> </ul>
		Install the plate and pasket on the flance of service valve kit.	• Bolt tightening torque is 25 – 30 (N·m).
		· · · · · · · · · · · · · · · · · · ·	Finish up the tightening by registening alternately at top and bottom for more than 2 times.
<u> </u>		Nacuumize) through the ICheck joints of service values & C1 on the service value kit	
		[recomments] an origin the joined by a service valves a, b) of the service valve and an incoming value life for the testing of the service valve and the flore continue value life for the testing of the service valve and the flore continue value life for the testing of the service valve and the flore continue value life for the testing of the service valve and the flore continue value life for the testing of the service valve and the flore continue valve and the flore continue valve and the service valve and the service valve and the service valve and the flore continue valve and the service an	
		Lopent are Loomed values A, of on the service value with oneck then the hange section of service value kit for leakage,	
<u> </u>		using soup water of other.	a langet the used module which has been compared for size weaking takings the flags and the state
<u> </u>		Instantine prace and gasket on the manye or re-mesh kit.	miseri une useu gasket, whitch has been removed for pipe washing, between the filange and the plate.
<u> </u>		Instant the virigh, which has been removed at the step (2), on the flexible nose flange.	<ul> <li>Take care to protect the nange face and the inside of flexible tube from oust.</li> </ul>
<u> </u>		Kemove the gauge manifolds from the check joints.	- We to the second second second the second test in a first second second second second second second second se
ļ		(a) UII araining from the re-tresh kit	Ihis is necessary whenever the washing operation has been completed.
L		Urain oil from the re-tresh kit by opening the service valve at the oil drain hole.	Check this in the same way as the confirmation of oil draining of the step (2).
L		Keplacement of the filter of filter dryer	
		Replace the tilter when the differential pressure on the pressure gauge has exceeded 0.1 MPa.	<ul> <li>For the replacement method, refer to the instruction manual of the re-fresh kit.</li> </ul>
		100 Replenishment of refrigerating machine oil to the unit	<ul> <li>Replenish 450 mL of refrigerating machine oil (new MA32R oil) after completing the washing operation.</li> </ul>
			<ul> <li>For the replenishment method, refer to the instruction manual of the re-fresh kit.</li> </ul>



	Outdoor air temperature	°C
	Indoor air temperature	0°
	Additional charge amount $\textcircled{1}$	kg
- Check joint I (Inlet side)	Additional charge amount ②	kg
onook joint 2 (inot aldo)	Additional charge amount $\textcircled{3}$	kg
Check joint R (Outlet side)	Pressure gauge (check joint L)	MPa
Bypass gas service valve	Pressure gauge (check joint R)	MPa
- Oil drain hole service valve	Differential pressure (L-R)	MPa
<inside kit="" of="" re-fresh=""></inside>	Collected oil amount	g

## 6.9 Instruction manual piping re-fresh kit

Applicable model: | FDCROOOKXE6

PSA012B703A



## 2) Vacuumizing

# Be sure to turn on the power supply to the outdoor unit before starting air purge. Pipe washing operation cannot start till it elapses about 6 hours after turning on the outdoor unit.

After releasing the aright pressure to atmosphere through the check joints of service valves B and C vacuumize through the check joints of service valve C and liquid service valve. Keep open the service valve A during the vacuumizing.



## 5. Additional charge of refrigerant and pipe washing operation

#### 1) Additional charge

Charge an additional amount of refrigerant according to the pipe length. For the charge amount, refer to the installation manual of outdoor unit. Open the service valve C and the bypass gas pipe service valve at outdoor unit side, and then charge the

additional refrigerant through the check joint of liquid service val

## 

## Start the additional charge from the liquid pipe.

When necessary charge amount could not be added fully, continue to charge from the gas pipe while carrying out the pipe washing operation.

When charging from the gas pipe using the re-fresh multi, charge the refrigerant through the check joint of service valve C. (Do not charge from the service valves A and B to prevent the liquid accumulation.) When implementing the washing operation, turn on the power supply 6 hours earlier.

2) Pipe washing operation

## 

Do not enter the pipe washing operation mode without connecting the pipe re-fresh kit. It could break down the unit. . Do not start from the remote controller while the pipe re-fresh kit is connected. It could break down the unit.

- Open up the following service valves.
   Liquid service valve of ourdoor unit.
- · Bypass gas service valve of outdoor unit

· Service valve C of service valve kit Bypass gas service valve of re-fresh kit

Turn on the SW3-6 to enter the pipe washing operation mode. (It is controlled centrally from the outdoor unit.) Turn off the SW3-6 after completing the pipe washing

operation. (Central control from the outdoor unit is reset.) · Record the reading on the pressure gauge when the

remaining time on 7 SEG is 60 - 65 minutes.



Displays by 7 SEG and LEDs in the pipe washing operation mode are as shown in the following table

		Re-fresh multi				
	7 SEG	Green LED	Red LED			
In pipe washing mode	Remaining time to end *	Quick flashing	Dark			
At end of pipe washing mode	PCL End PCL	Ť	Ť			
At abnormal stop	Error code	Ŷ	By error code			
At emergency stop	Normal mode	Continuous flashing	-			

Remaining time to the end of pipe washing operation shows an approximate value and a little longer than actual time. When the time becomes less than 30 minutes, standby near the outdoor unit prepared for work after the end of operation. 3) Emergency stop

Pipe washing operation can be stopped by operating the dip switch. It is stopped if the SW3-6 is turned off.

For displays by 7 SEG and LEDs, refer to the table shown above. After an emergency stop, the pipe washing operation can be restarted by turning on the SW3-6.

#### 6. Removal of kit 1) Removal of the kit

After confirming the end of pipe washing operation with 7 SEG and LEDs, remove the pipe re-fresh kit.

#### i ) Open and close the gas pipe service valves only. Operate this in the following order (It is not necessary to close the liquid pipe.) Outdoor unit Outdoor unit ① Close the service valve C.



## **A**CAUTION

Use a gasket when installing the flange plate. Bolt tightening forque is 25 - 30 N-m. If tightened beyond this range, it could cause gas leakage

#### 2) Storing of the kit

① Disconnect the flange connection at the kit side ② Close the service valve of the bypass gas pipe, and disconnect the flared connection. After disconnecting the flared connection, make sure to insert the flare cap and tighten the flare nut. (3) Install the plate on the flange. Use a gasket and tighten bolts to a torque of 25 – 30 N-m.



④ Remove the gauge manifolds from the check joints.

#### 7. Test-run i) Make sure to check or implement the followings before starting test-run.

- ① Is the pipe washing operation switch (SW3-6) turned off?
- ② Service valves A and C are closed while the service valve B is opened
- (a) Is the bypass gas pipe service valve closed?
  (b) Is the flare nut of bypass gas pipe tightened after inserting the flare cap?
  (c) Is the flare installed on the flange? Is gasket installed under the plate?
- ii) After all check points are completed, vacuumize through the check joints of service valves A and C.
   iii) Then, open the service valves A and C. Check then the flange section for leakage, using soap water or other
- iv) After completing the pipe washing operation by means of the re-fresh kit, replenish by a pump 450 mL of new MA32R oil through the check joint of service valve B on the service valve kit.
- v) Carry out the test-run according to the procedures described in the installation manual of outdoor unit.

#### 8. Transportation of the kit

- . When carrying the pipe re-fresh kit, tilt it such that the holder and the casters are positioned at the bottom. If it is carried with the front or side is positioned at the bottom, the kit could be damaged. When carrying the kit by two persons, hold it with the tire side down. If it is held with the tire side up, instead,
- refrigerating machine oil remaining in the accumulator may spill out.

## 9. Maintenance

## ① Draining of collected oil

- · Drain the refrigerating machine oil collected in the pipe re-fresh kit after each washing operation. Since the amount of remaining refrigerating machine oil varies depending on systems being washed, if next washing is carried out without draining collected refrigerating machine oil, old oil may overflow and mix in new unit.
- · When draining refrigerating machine oil, place a container under the oil drain hole (See figure). • When draining oil, supply pressurized nitrogen gradually through the
- check joint L to drain oil forcibly from the oil drain hole (opening upward)
- · Dispose drained refrigerating machine oil according to applicable laws or regulations.

### ement of strainer

. When the differential pressure between the two check joints during pipe washing operation exceeds 0.1 MPa, replace the strainer

#### Replacement of strainer

- i ) Remove the flange bolt and panel board, and take out the filte
- element.
- ii ) Remove the spring, and take out old element.
- iii) Clean internal parts.iv) If gaskets installed at the panel board and under the main unit are damaged, replace them. Replacement gaskets are packed together with new element.
- v ) Set new element, and install the spring
- vi) Set the element on the main unit, and install the panel board. Tighten bolts to a torque of 25 27 N-m homogeneously. vii) Test for air-tightness to confirm that there is no leakage.

#### 10. Error diagnosis . When the pipe washing has been stopped by the abnormal stop, check the cause referring to the following table. Error code Description Check item Remedy Open the service valve. Unit service valve may be closed Has the additional charge been properly? Abnormal dischar Carry out the additional charge F36 temperature Is the outdoor air temperature within the range of use? Implement within the range of use Open the service valve. Unit service valve may be closed Abnormally high Check the balance pressure at the time of stop. If the saturation pressure temperature differs largely from the ambient temperature, repeat the charge. F40 pressure (63H trips.) lon-condensed gas may be mixed. Abnormally low Open the service valve E49 Unit service valve may be closed pressure

For other error displays, refer to the installation manual of outdoor unit.

# Oil drain ľ

Check joint L



# 7 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

# 7.1 Operation control function by the outdoor controller

## (A) Normal control

(1) Operation of major functional components under each operation mode

Operation mode	Cooling/Dehumidifying				Heating	
Fonctional item	Thermostat ON	Thermostat OFF	Fan Stopped	Thermostat ON	Thermostat OFF	Defrost
Compressor (CM)	0	×	×	0	×	0
Solenoid for CM (52X1, 52X2)	0	0	×/O	0	0	0
Outdoor unit fan mortor (FMo-1)	0	×/O	×/O	O/X	×/O	O→X
Outdoor unit fan mortor (FMo-2)	O/X	X/O	X/O	O/X	×/O	O→X
4 way solenoid valve (20S)	×	×	×	0	0	O→X
Heating electronic expansion valve (EEVH)	Fully open	Fully open	<b>※</b> 1	Opening Angle Control	*2	Fully closed / Fully open
Super cooling coil electronic expansion valve (EEVSC)	Opening Angle Control	Fully closed	Fully closed	Fully closed	Fully closed	Fully closed
Solenoid valve (SV6) (oil return)	O/X	×	×	O/X	×	O/X
Solenoid valve (SV1) (fluid return)	O/X	O/X	×	O/X	O/X	O/X
Solenoid valve (SV11) (gas bypass)	×	×	×	O/X	×	×
Solenoid valve (SV12) (gas bypass)	O/X	×	×	×	×	×
Crankcase heater (CH1)	O/X	O/X	0	O/X	O/X	O/X

Note (1) It means  $\bigcirc$  : ON,  $\times$  : OFF,  $\bigcirc/\times$  : -,  $\times/\bigcirc$  : ON or OFF.

(2) This shows the state of output when all indoor units are under the same mode.

(3)  $\times 1$ : When stopped from cooling, it is fully open

When stopped from heating, it is fully closed unless another degree of opening is specified by the electronic expansion valve (EEV) control at the stop.

\*2: When stopped from heating, it is fully closed unless another degree of opening is specified by the electronic expansion valve (EEV) control at the stop.



## (2) Compressor pre-start control

## (a) Remote controller full stop $\rightarrow$ Operation

(i) Start conditions

• When it has changed to the compressor operation frequency command > 0 Hz from the state of compressor stopping.

- (ii) Control contents
  - It sets the compressor operation frequency command = 0 Hz, and then after this control ends, It starts the compressor.
- (iii) End conditions
  - When all of following conditions are satisfied

## ① It has elapsed 15 seconds after the start of this control.



## • Meaning of marks

	52X1, 52X2	Solenoid for compressor	СМ	Compressor
	EEVH	Heating electronic expansion valve	EEVSC	Subcooling coil electronic expansion valve
Γ	SV6	Solenoid valve [Oil return]	—	

## (b) Cooling $\rightarrow$ Heating

(i) Start conditions

• When the outdoor unit operation mode is changed from the cooling operation to heating operation

- (ii) Control contents
  - 1) When the compressor is operating, it makes the compressor stopped.
  - 2) Each functional component operates according to the sequence shown below.
- (iii) End conditions
  - End of sequence



Start conditions established

## • Meaning of marks

СМ	Compressor	EEVH	Heating electronic expansion valve
FMo1, FMo2	Fan motor	EEVSC	Subcooling coil electronic expansion valve
20S	4-way solenoid valve	—	

## (c) Heating $\rightarrow$ Cooling

(i) Start conditions

• When the outdoor unit operation mode is changed from the heating operation to cooling operation

- (ii) Control contents
  - 1) When the compressor is operating, it makes the compressor stopped.
  - 2) Each functional component operates according to the sequence shown below.
- (iii) End conditions
  - End of sequence



Start conditions established

Note (1) \*: It is fully closed till the end of 3-minute delay after the automatic reset.

· Meaning of marks

СМ	Compressor	EEVH	Heating electronic expansion valve
FMo1, FMo2	Fan motor	EEVSC	Subcooling coil electronic expansion valve
20S	4-way solenoid valve	—	

## (3) Compressor control

## (a) 4-way valve switching safeguard

- In order to switch 4-way valve completely, it makes the compressor speed increasing as follows.
- (i) This control starts to increase the compressor speed from 10Hz after the compressor pre-start control ends.
- (ii) The target compressor speed is shown in following table.

Item	4-way valve switching safegu	ard/Target compressor speed	
Model	Frequency (Fk)	Speed (rps)	
224	70	50	
280	70		

## (b) Compressor protection start

After the 4-way valve switching safeguard, the compressor is controlled with the following compressor protection start. Compressor protection start, normal

Compressor protection start A

Compressor protection start B

			Thermostat ON start	
		Initial start remote controller ON error reset	Operation mode	Operation mode is
			is changed during	not changed during
			thermostat OFF	thermostat OFF
Compressor ON Initial	Less than 45 min after power ON	Compressor protection start B	Compressor protection start B	Compressor protection start B
	45min. or more after power ON	Compressor protection start A	Compressor protection start A	Compressor protection start A
Compressor ON Second & later	Less than 45 min after stop	Compressor normal protection start	Compressor normal protection start	Compressor normal protection start
	45min. or more after stop	Compressor protection start A	Compressor protection start A	Compressor protection start A

- (i) Compressor protection start, normal
  - < Control contents >

Compressor maintains operation at lower limit frequency, after 4-way valve switching safeguard ends. (During this control, compressor speed is prohibited to increase.)

- After this control ends, comperssor speed is governed by the compressor speed control.
- < End conditions >
  - When either one of the following conditions is established
  - a) When it has elapsed 1 minute and 45 seconds after the start



## (ii) Compressor protection start A

< Control contents >

Compressor maintains operation at lower limit frequency, after 4-way valve switching safeguard ends. If the time from starting till reaching the lower limit frequency after 4-way valve switching safeguard operation has elapsed 1minute, the target frequency is changed to that of 1minute later from the lower limit frequency. During this control, the target frequency is increased at a rate of 5Hz/minute from the lower limit frequency. (Note) The starting point of this control is the completion point of inverter start (10Hz).

## < End conditions >

- When either one of following conditions is established
- a) When the frequency upper limit increase by this control continued for 15 minutes in total

When the inverter has stopped within 15 minutes after the start and is started again, it starts with the normal protection start and increases the frequency upper limit at a rate of 5 Hz/minute till the frequency increase continues for 15 minutes in total.



## (iii) Compressor protection start B

< Control contents >

Compressor maintains operation at lower limit frequency, after 4-way valve switching safeguard ends. If the time from starting till reaching the lower limit frequency after 4-way valve switching safeguard operation has elapsed 2 minutes, the target frequency is changed to that of 2 minutes later from the lower limit frequency. For 18 minutes after starting, the target frequency is increased at a rate of 5Hz/2 minutes from the lower limit frequency.

For 18 minutes after starting, the starting point of this control is the completion point of inverter start (10 Hz). From 18 minutes to 24 minutes, it is increased at a rate of 5 Hz/minute.

< End conditions >

When either one of the following conditions is established

(a) This frequency-up control will end when the cumulative operation time after starting becomes 24 minutes. If the inverter stopped within 24 minutes after starting and starts again, it starts with "Compressor protection start, normal" and increases the frequency at a rate of 5Hz/minute till the cumulative operation time after starting becomes 24 minutes.

However, if 45 minutes have been elapsed since inverter stopped and starts again, it starts with "Compressor protection start A".



## (4) Outdoor fan control

## (a) Outdoor fan speed and fan motor rotation speed.

The 7th outdoor fan speed in the following table is specified as the rated speed. Under the normal control, the speeds up to 8th level ( $800 \text{ min}^{-1}$ ) are used.

Outdoor fan tap	Cooling		Heating		
	FMo1 [min <sup>-1</sup> ]	FMo2 [min <sup>-1</sup> ]	FMo1 [min <sup>-1</sup> ]	FMo2 [min <sup>-1</sup> ]	
0th speed	0	0	0	0	
1st speed	200	0	200	0	
2nd speed	200	200	200	200	
3rd speed	300	300	300	300	
4th speed	400	400	400	400	
5th speed	500	500	500	500	
6th speed	575	575	575	575	
7th speed	700	700	700	700	
8th speed	800	800	800 (780)	800 (780)	

Note (1) Figures in the parentheses in the above table are applicable to FDCR224KXE6.

## (b) Fan control during cooling

During cooling and dehumidifying, fan speed is controlled in accordance with the high pressure (sensed by PSH) and the outdoor air temperature (sensed by Tho-A).

(i) Initial fan speeds are as follows.

Initial ourdoor fan speed at cooling

Model	Outdoor air temp $\leq 10^{\circ}$ C	10°C < Outdoor air Temp. < 15°C	$15^{\circ}C \le Outdoor air Temp.$
All models	2nd speed	4th speed	6th speed

(ii) During normal operation, the speed is changed in accordance with the high pressure value.

① When it has detected HP  $\geq$  2.2 MPa for 1 minute continuously, the fan speed is raised by one tap.

- 0 When it is 1.5 MPa < HP < 2.2 MPa, the present fan speed is maintained.
- $\circledast$  When it has detected HP  $\leqq$  1.5 MPa for 1 minute continuously, the fan speed is dropped by one tap.
- ④ Control range of fan speed is 1th 8th speeds.



- (iii) When states under this control change from HP < 3.3 MPa to HP  $\ge$  3.3 MPa, the fan speed is changed preferentially to the followings. (After the change it returns to the normal control.)
  - ① When the outdoor air temperature  $\geq$  30°C, it changes to 7th or higher speed.
  - 2 When the outdoor air temperature < 30°C, it changes to 3rd or higher speed.
  - ③ When the fan speed was higher than the above before the change of states, the fan speed is not changed.

## (c) Outdoor fan cooling control at low outdoor air temperature.

(i) Start conditions

- This control is performed when all of following conditions is established.
- ① When the ordinary outdoor fan control is performed
- $\odot$  Outdoor air temperature  $\leq 10^{\circ}$ C (It is reset with the hysteresis of the outdoor air temperature > 15°C.)



(3) Outdoor fan speed = 1st speed (200 min<sup>-1</sup>)

(ii) Control contents

- ① Initial fan speed is 200 min<sup>-1</sup>
- 2 If the following high pressure is detected for 20 seconds continuously, fan speed will be changed



- ③ Outdoor fan speed is in a range of 130 min<sup>-1</sup> 300 min<sup>-1</sup>.
- (iii) End conditions
  - When either one of following conditions is established
  - ① When the ordinary outdoor unit fan cooling control ends
  - ② Outdoor air temperature > 15°C
  - ③ Outdoor fan speed  $\geq$  2nd speed
  - (Note) This control range is not more than 300 min<sup>-1</sup>  $\times$  1 fan.

## (d) Outdoor fan heating control

- The fan speed control is performed based on the low pressure (detected with PSL) during heating operation.
- (i) Initial fan speed is 6th speed.
- (ii) Speed is changed depending on the low pressure value.
  - ① When it is detected LP  $\leq 0.75$  MPa for 30 seconds continuously, the fan speed is raised by 1 tap.
  - O When it is 0.75 MPa < LP < 0.85 MPa, the present fan speed is maintained.
  - $\odot$  When it is detected LP  $\ge$  0.85 MPa for 30 seconds continuously, the fan speed is dropped by 1 tap.
  - ④ Control range of fan speed is 1st 8th speeds.



- (iii) When states change from LP < 1.0 MPa to  $\geq$  HP 1.0 MPa during this control, the fan speed is changed preferentially to the following. (It returns to the normal control after the change.)
  - ① It changes to 4th or lower speed.
  - 2 If the fan speed was lower than the above speed before the change of states, the fan speed does not change.

#### (5) Defrost control

#### Temperature condition of defrosting (a)

Start conditions (Standard specification or cold region specification can be selected by switching the jumper 1) wire J15.)

Defrost operation will start, when outdoor unit whose compressor is operating under heating mode has satisfied all (i) When 33 minutes of cumulative compressor operation time has passed since heating operation started.

- When 33 minutes of cumulative compressor operation time has passed since the previous defrosting ended. (ii)
- (iii) When 8 minutes has passed since the compressor turned ON from OFF status.
- When 8minutes has passed since one outdoor fan turned ON from OFF status. (iv)
- After all above conditions have been met, when any of the following conditions is satisfied. (v) 1

  - When the outdoor heat exchanger temperature (sensed by Tho-R) and the outdoor air temperature (sensed by Tho-A) dropped below the defrosting start temperature in Fig. 1 for 30 seconds continuously When the suction pressure saturated temperature calculated by the low pressure (sensed by PSL) and the 2 outdoor air temperature (sensed by Tho-A) dropped below the defrosting start temperature in Fig. 2 for 3 minutes continuously



#### 2) End conditions

- Defrosting operation stops when any of the following conditions is satisfied.
- When 12 minutes has passed since defrost started (i)
- When the outdoor heat exchanger temperature (sensed by Tho-R1 is detected 10°C or higher continuously for (ii) 10 seconds
- (iii) When it has detected the high pressure (HP)  $\geq$  3.0 MPa

## (b) Time condition of defrosting

## 1) Start conditions

- Defrosting operation start when all of the following conditions are satisfied.
- i) When 33 minutes of cumulative compressor operation time has passed since heating operation started.
- (ii) When 33 minutes of cumulative compressor operation time has passed since the previous defrosting ended.
- (iii) When 105 seconds has passed since the compressor turned ON from OFF status in heating mode.
- (iv) When the oil return condition has been established(v) Following cases are excluded.
  - ① When the upper limit frequency of the compressor protection start A or B is lower than the defrosting frequency

2 During the normal compressor protection start

## 2) End conditions

- Defrosting operation stops when any of the following conditions is satisfied.
- (i) When 12 minutes has passed since defrost started
- (ii) When the outdoor heat exchanger temperature (sensed by Tho-R) is detected 10°C or higher continuously for 10 seconds
- (iii) When it has detected the high pressure (HP)  $\geq$  3.0MPa

## (6) Protective control

## (a) Discharge pipe temperature (Td) control

Discharge pipe temperature sensor (Tho-D1) monitors the discharge pipe temperature (Td) to avoid the rise of discharge pipe temperature.

## 1) Compressor capacity control

- (i) Start conditions
  - When all of following conditions are satisfied
  - ① When the compressor is ON state.
  - 2 When it detects the discharge pipe temperature (sensed by Tho-D1) is higher than 120°C
- (ii) Control contents
  - Whenever it detects the discharge pipe temperature is higher than 120°C for 5 seconds, the capacity is decreased.
- (iii) End conditions
  - When any of the following conditions is satisfied
  - $\odot$  When the discharge pipe temperature (sensed by Tho-D1) drops below 110°C
  - 2 When the compressor is OFF state.
  - 3 During the defrosting control

## 2) Indoor EEV slightly open control at heating stop.

Rise of discharge pipe temperature (Td) is restarined by opening the indoor EEV during heating stop.

## (b) Over-current protection control (Current safe)

- 1) If the input current value at the inverter inlet (converter inlet L3-phase) exceeds the setting value, the compressor speed is reduced. If the higher value persists even after the speed reduction, the speed is reduced further.
- 2) This control terminates when it is lower than the reset value for 3 minutes continuously or lower than the setting value for 6 minutes continuously.

## (c) Power transistor temperature (PT) protective control

If the power transistor temperature exceeds 75°C, the compressor speed is controlled.



## (7) Test run

## (a) Start conditions

- (i) Turn ON the test run switch (SW5-1). The switch is invalid if it is turned ON before the power ON.
- (ii) Pump down switch (SW5-3) must be turned OFF.

## (b) Contents of control

- (i) Turning ON the dip switch (SW5-2) conducts cooling operation and turning OFF (SW5-2) conducts heating operation.
  - 1) Cooling operation
    - Compressor operation frequency control is conducted by the cooling low pressure control.
  - 2) Heating operation
  - Compressor operation frequency control is conducted by the heating high pressure control.
- (ii) Test run start signal under corresponding operation mode is transmitted to all indoor units connected.

## (c) End conditions

- (i) When the test run switch (SW5-1) is turned OFF, it stops.
- (ii) When it has stopped anomalously by the error control during test run, the error is displayed in the same way as the case of normal operation and the state of anomalous stop is kept ON even if the test run switch (SW5-1) is turned OFF.

## (B) Optional controls

## • Functions of outdoor PCB connector CNS1 and CNZ1

 $\odot$  CNS1, CnS2, CnG1, CnG2 connector : By changing the allocation of external input "functions [P07-10-"X"] on the 7-segment, following functions can be selected.

Function No."X"	CNS1 short circuited	CNS1 open	
"0" : External operation input	Operation permission	Operation prohibition	
"1" : Demand input	Invalid	Valid	
"2" : Forced cooling/heating input	Heating	Cooling	
"3" : Silent mode input 1	Valid	Invalid	
"4" : Spare			
"5" : Outdoor fan snow guard control input	Valid	Invalid	
"6" : Test run external input 1 (SW5-1)	Test run start	Normail operation	
"7" : Test run external input 2 (SW5-2)	Cooling test run	Heating test run	
"8" : Silent mode input 2	Valid	Invalid	
"9" : 2-step demand input	Invalid	Valid	

© CNZ1 connector: By changing the allocation of external output functions [P06-"X"] on the 7-segment, following functions can be selected.

POO on the 7-segment	Content of control
P06	Allocation of external output (CnZ1)
P07	Allocation of external input (CnS1)
P08	Allocation of external input (CnS2)
P09	Allocation of external input (CnG1)
P10	Allocation of external input (CnG2)

## (1) External input and demand input

## (a) Operation permission and prohibition modes

- (Note) With 7-segment display [P07]-[0]
- 1) Operation permission or operation prohibition mode is switched with the connector (CnS1) and the jumper wire (J13) on the outdoor PCB.

J13: Switching of CnS1 input method

- J13 short-circuited: CNS1 is for the level input.
- J13 open: CnS1 is for the pulse input.
- 2) Operation permission/prohibition control by the external input CnS1 of outdoor unit

Input: CnS1	Switching with J13	CnS1: Switching of operation permission/ prohibition modes
Short-circuit	Short-circuit (Level input)	Operation prohibition mode → Operation permission mode
Open	Open (Pulse input)	Switching of operation permission/ operation prohibition modes (Reversal)
Short-circuit	Short-circuit (Level input)	Operation permission mode → Operation prohibition mode
Open	Open (Pulse input)	(NOP)

Note (1) Factory setting - J13: Short-circuit, CnS1: Short-circuit (Short-circuit pin connected)

- 3) The operation condition is desplayed on the LCD of remote controller and is transferred to optional centralised controller.
- 4) When the control comand from remote controller is not accepted (Under the condition of the system all stop status by external input), "Center" is dispalyed. See Item 5) mentioned below.
- CnS1 performs the following operations depending on the short-circuit or open of the jumper wire (J13). In case of pulse input, the pulse width is 500ms or larger.

1) J13 – Short-circuit



## (b) Demand control

(Note) With 7-segment [P07] = [1]

- 1) Demand control and normal operation are switched with the dip switches (SW4-5,4-6) and the jumper wire (J13) on the outdoor PCB.
  - J13 short-circuit: CnS1 is for the level input
  - J13 open: CnS1 is for the pulse input

2) Operation/ stop control by the demand input CnS2 of outdoor unit

,	1	
Input: CnS2	Switching with J13	CnS2: Switching of demand control/ normal operation
Short-circuit	Short-circuit (Level input)	Demand control → Normal operation
Open	Open (Pulse input)	Switching of normal operation/ demand control (Reversal)
Short-circuit	Short-circuit (Level input)	Normal operation → Demand control
Open	Open (Pulse input)	NOP

Note (1) Factory setting - J13: Short-circuit, CnS2: Short-circuit (Short-circuit pin connected)

- 3) The operation condition is desplayed on the LCD of remote controller and is transferred to optional centralised controller.
- 4) Demand control

Demand ratio can be switched with the dip switches (SW4-5, 4-6) on the outdoor PCB. SW4-5, SW4-6 demand switching: 0: Open, 1: Short-circuit (Factory default is open)

SW4-5	SW4-6	Compressor Out put(%)	
0	0	80	
1	0	60	
0	1	40	
1	1	0	

 CnS2 performs the following operations depending on the short circuited or open of the jumper wire (J13). In the case of pulse input, the pulse width is 500ms or larger.

1) J13 - Short-circuit



2 J13 - Open

CnS2 input		ON Demand control			ON Demand c	OFF ontrol	
	ризн П		PUSH PU	јsн ∏	PU	лян	
Remote controller operation		Remote				L	
Air-conditioner operation/stop		Compressor OFF			Compressor OFF		]
# 6) 2-step demand control

- (i) Starting conditions
  - 1) When all of the followings are met
  - a) When the 7-segment [P04] is set at any other than OFF
  - b) Under the demand control
  - c) When the outdoor unit external input terminal "2-step demand input" is valid (The external demand input is valid when it is opened)
  - d) To make valid the demand 2, the demand 1 also must be set to be valid.
- (ii) Contents of control
  - Same as (5) Energy saving mode control (See page 74.)
- (iii) Ending condition
  - · When starting conditions are not met
    - Energy saving mode control : Compressor Hz is restricted with the setting of P04 on the 7-segment, instead of external input.
    - Demand control : Compressor Hz is restricted with the external input ON. Demand rate is set with the dipswitch SW4-5 and SW4-6.
    - 2-step demand control : Compressor Hz is restricted with the external input ON. Demand rate is set with P04 on the 7-segment.

External input										Domond		
(Demand input)	No Inval	ormal id		Demand c		Demand control		ormal Invalid		control		
	(short-cire	cuited)		Valid (op	ened)		(sho	rt-circuited)	Va	alid (opened)	(shor	t-circuited)
External input (2-step demand input)	) No	ormal		2-step dema	and control		N	ormal	2-step	demand contr	ol	
Remote controller operation		PUSH		PUSH	PUSH			PUSH (Opened)	PUSH			PUSH
Remote controller				Remote								
operation			ON		ON				ON			
Air-conditioner	OFF		Demand 1	OFF	Demand 2	Demand 1		OFF		Demand 2		OFF
operationsstop												

Demand 1: Demand control with the compressor output as set by SW4-5 and SW4-6 Demand 2: Demand control with the compressor output as set by [P04]

# (2) Silent mode control

# (a) Start conditions

When all of the following conditions is established

- (i) At the start of silent mode initiated by the indoor unit or when the silent mode input is made effective (short-circuited) at the external input terminal (Factory default: CnG2) on the outdoor unit
- (ii) When the outdoor unit operation mode is cooling or heating
- (iii) When the outdoor air temperature satisfies the following conditions
  - 1) Silent setting 0, 1: Effective in zone A and B
  - 2) Silent setting 2, 3: Effective in zone B
    - (Note) Silent setting 0 to 3 can be swiched by [P05] of 7-segment display.

<Outdoor operation mode - Cooling>



Outdoor air temperature (°C)

<Outdoor operation mode - Heating>



Outdoor air temperature (°C)

- (iv) It is excluded when the following invalid conditions are established
  - (For prevention of anomalous pressure rise at start)
  - · For 30 seconds after either compressor has been turned ON
  - (During a special operation)
  - · During the 4-way valve switching safeguard
  - During the defrost control
  - · During the oil return control
  - · During the moved pump down control
  - · During the pump down control for removal of the unit
  - (Note) Any controls affected by the restriction of compressor and outdoor fan capcity during the silent mode are excluded.

# (b) Control contents

Setting values can be changed with the silent setting as follows.

- (i) Upper limit of compressor speed is restricted.
- (ii) Upper limit of outdoor fan speed is restricted.

Item	Upper limit of	compressor speed	Upper limit of	outdoor fan speed
	rŗ	0S	m	in <sup>-1</sup>
Setting	P224	P280	P224	P280
Silent setting 0 (Factory default)	80	100	780	800
Silent setting 1	74	88	700	700
Silent setting 2	64	80	575	575
Silent setting 3	50	60	540	540

# (c) End condition

· When the starting conditions are not established

### (3) Outdoor fan snow protection control

(a) This control is enabled/disabled by entering data into 7-segment display.

## (b) Setting method of outdoor fan control

# [Starting conditions]

When following conditions are established for 10 minutes continuously.

- Snow protection control setting is valid ([P02]-1) and outdoor air temperature < 3°C or external input of outdoor fan snow protection control ON. ([P07]-5 and CnS1 is shorted)
  - ① Set the Code No. to "P02".
  - (2) "0" or "1" is displayed at the data display area.
    - "0": Outdoor fan control disabled (Factory setting)
    - "1": Outdoor fan control enabled
  - ③ Press SW7 (Data write/delete) for 3 seconds continuously.
  - ④ "0" or "1" blinks every 0.5 second at the data display area.
  - ⑤ Press SW8 (one digit) to toggle the display back and forth between "0" and "1" (blinking).
  - If SW7 is pressed for 3 seconds or longer continuously while "0 " and "1" is blinking, the blinking stops. With this operation, the enabled/disabled setting of outdoor fan control is stored in memory of EEPROM, and henceforth the outdoor fan is controlled according to the contents of memory.
- ⑦ Contents of the outdoor fan control are retained even if the power is turned off and backed on again.

#### (c) Contents of outdoor fan snow protection control

- ① If the outdoor air temperature drops 3°C or lower when the unit is all stop or error stop, the outdoor fan runs at the rating speed (7th speed) once every 10 minutes.
- 2 The outdoor fan runs for 30 seconds.\*
  - \*Operation time outdoor fan is changeable from 10 to 600 seconds by [P03]
- 3 During this snow protection control, the compressor's magnetic contactor (52X1 52X2) is ON.

#### (d) End conditions of outdoor fan snow protection control

When follwing conditions are established.

- Snow protection control setting is invalid ([P02]-0) or outdoor air temperature > 5°C and external input of outdoor fan snow protection control OFF ([P07]-[5]and CnS1is opend).
- (ii) Compressor ON
- (iii) During all stop by anomaly
  - <Outdoor air temperature condition at snow protection control>



#### (4) External output

This function is used in order to operate the external optional devices in conjunction with relay outputs of the respective operation information from outdoor unit.

## [External output function]

External output function of CnZ1 can be switched by changing of [P06] on 7-segment display as mentioned below.

#### 0: Operation output

- When the outdoor unit operation mode is "Operation", the external output relay is turned ON.
- (Note) The "Operation" includes not only compressor ON mode but also Fan mode and thermostat OFF mode under the condition of remote controller ON. But the anomalous stop is excluded.
- 1: Error output
  - It is turned ON at anomalous stop, and turned OFF when "CHECK" and "RESET" buttons on remote controller are pressed simutaneously after recovering from the anomaly. Even if "CHECK" and "RESET" buttons are pressed before recovering from the anomaly, it is not turned OFF, but when recovering from the anomaly later, it is automatically turned OFF.
- 2: Compressor ON output
  - It is turned ON when the compressor is ON.
- 3: Fan ON output
  - It is turned ON when the outdoor fan speed command > 0.

# (5) Energy saving mode control

This control is effective, when [P04] of 7-segment display is set 000, 040, 060, 080 (except OFF)

#### Control contents

- (i) Compressor upper limit speed is changed according to the setting ratio.
- (ii) Compressor upper limit speed is obtained by multiplying the rating speed (at cooling/heating) with the setting ratio as follows.
  - OFF: Normal (Factory setting)
  - 80%: 80% of rating compressor upper limit speed
  - 60%: 60% of rating compressor upper limit speed
  - 40%: 40% of rating compressor upper limit speed
  - 0%: 0% of rating compressor upper limit speed (stop)
- (iii) Except 0% of energy saving ratio, the following controls take precedence over this control.
  - · 4-way valve switching safeguard
  - · Defrosting control
  - · Oil return control
  - · During the pump down control for removal of the unit
  - Pump down control at start/stop

# (6) Forced cooling/heating operation

- (i) With this control, SW3-7 on the outdoor PCB is turned ON and CnG1 (equipped with short circuit pin) is shorted or opened so as to forcibly determined whether the indoor unit is operated for cooling or heating.
- (ii) If any operation mode other than the forcible mode is commanded from indoor unit, the mode unmatch message is displayed on the remote controller or others and operation enters in the FAN mode.

SW3-7	CnG1	Operation
ON	Open	Cooling only
ON	Close	Heating only

#### (7) Emergency stop control

When one of indoor units receives the emergency stop signal from optional device like as refrigerant leakage detector and the information is transmitted to the outdoor unit, the outdoor unit stops operation and an emergency stop error is transmitted to all indoor units running.

Make the emergency stop effective by remote controller indoor function setting.

- (i) When it receives the "Emergency stop" command from the indoor unit, it makes all stop by error.
- (ii) It shows the Error display "E63" and transmits the "Emergency stop" command to all indoor units.
- (iii) If the "Emergency stop reset" command is received from the indoor unit, the "Emergency stop reset" command is transmitted to all indoor units.

'11 • KX-T-166

## (8) Pump down operation control for removal of the unit

When an outdoor unit is discarded or removed, the pump down control is performed at the outdoor unit side in order to recover the refrigerant quickly to the outdoor unit.

### (a) Start conditions

This is implemented with the liquid service valve closed.

- (i) Outdoor unit operation mode Stop
- (ii) Turn ON the test run cooling switch SW5-2 (cooling).
- (iii) Turn ON the pump down switch SW5-3 (pump down).
- (iv) Turn ON the test run switch SW5-1 when the above (i)-(iii) statuses are satisfied.
- Note (1) Input before the power ON is invalid.

# (b) Control contents

(i) Compressor starts under compressor start protection control and runs at target speed of pump down operation. However, when the operation start conditions have been established during the 3-minute delay control of compressor, the compressor starts after completing the 3-minute delay control.

Item	Нр	Target compressor speed at pump down operation
224	8	50HZ
280	10	62HZ

- (ii) As the start conditions are established, both red LED and green LED on the outdoor PCB flash continuously.
   7-segment display shows "PdS" (Channel 0) at the code display area.
- (iii) During the pump down operation control, the protective controls (excluing low pressure protective control, anomalous low pressure control and pressure ratio protection control) and the error detection control are effective.
- (iv) The sub-cooling coil expansion valve (EEVSC) closes fully during the pump down control.

# (c) End conditions

If any of the following conditions is satisfied, this control ends.

- (i) If a low pressure (LP) ≤ 0.01MPa is detected for 5 seconds continuously, it ends normally and initiates the followings.
  - ① Red LED: keeps lighting
  - ② Green LED: keeps flashing
  - ③ 7-segment display: PdE
  - ④ Remote controller: Stop
- (ii) Anomalous all stop by the error detection control
- (iii) If the cumulative compressor operation time under the pump down control totals 15 minutes (ending by time count up), it stops and initiates the following.
  - ① Red LED: stays OFF
  - ② Green LED: keeps flashing
  - 3 7-segment display: No display
  - ④ Remote controller: Stop
- (iv) When any of setting switches (SW5-1, SW5-2 and SW5-3) has been turned OFF during pump down. (Note) Even if only the pump down switch SW5-3 is turned OFF, it does not recognized as the cooling test run mode, but stops

# (C) Data output

#### (1) 7-segment and operation data retention

# (a) 7-segment display

Operation information is displayed for checking various operation data during test run and for helping malfunction diagnosis at servicing. Input data to microcomputer, contents of outdoor unit control, indoor unit registration information, or other, are mainly displayed on the 7-segment LED.

- (i) Operation information display
  - ① Displays each item at 7-segment of 3-digit  $\times$  2 on the outdoor unit PCB.
  - ② Display is controlled with the following buttons.
  - SW9: Setting button for order of 10 of display code
  - SW8: Setting button for order of 1 of display code
  - SW7: Data erase/write button
  - ③ Select the order of 10 for the code No. of each item with SW9 or SW8 for the order of 1. Following identification alphabets are used at the code display.
    - "C": "C00" "C99"
    - "P": "P00" "Pxx" (up to a place where content is specified)
  - Code [C96]is operable item. It is possible to delete the retained operation data (data of 30 minutes preceding an anomalous stop) by following resetting procedure.
    - <Resetting operation>
    - · Select code [C96]. If any anomalous data is retained, the data display [dEL] is shown.
    - Pressing SW7 for 3 seconds erases the memory data on RAM.
    - (EEPROM data are not erased.)
    - As the data are erased, the data display shows [- -].
       When no anomalous data are retained, it displays [---] as well.
    - Unless the reset operation is performed, data are retained. Therefore, if normal operation is resumed without the reset operation and an anomalous stop occurs again, no new anomalous data cannot be retained, but former anomalous data are still retained unchanged.
  - (5) If you press SW8 (order of 1), the number changes  $0 \rightarrow 1 \rightarrow 2 \dots 9 \rightarrow 0$ .
  - (6) If you press SW9 (order of 10), the number jumps to the leading code of each order of 10.
  - Data display [Cxx] and setting value display [Pxx] are considered to be continuous.
    - Example: Pressing SW9 at [C07] it changes to [C10]
      - : Pressing SW9 at [C90], it changes to [P00]
  - ⑦ Codes [C44] are operable items. With the following reset operation, the cumulative compressor operation time corresponding to the code No. can be erased (reset). (Reset of operation time after replacing the compressor) <Resetting operation>
    - · Select codes [C44]. Cumulative compressor operation time up to present is displayed.
    - · Pressing SW7 for 3 seconds erases the memory data.
    - However, the cumulative compressor operation time data in the 30 minutes log data preceding an anomalous stop (if this retained log data are not deleted) are not erased by this procedure.
  - (8) Data display for spare items is left in blank.
- (ii) When the temperature is below -10.0°C for the display of discharge pressure saturated temperature and suction pressure saturated temperature, the fraction after decimal point is rounded up. (Because the range of 7-segment display is 3-digit.)
- (iii) Return the error No. display after an error to the normal display by turning ON the dipswitch SW3-1.

- (iii) Precedence of display
  - (1) [Exx] > [Related to check operation ([CHJ] > [CHU])] > [PdE] > [PdS]> [oPx] > [Cxx]
  - ② If resetting from the display of ①, it is switched to [C00].
  - ③ If SW8 or SW9 is pressed during the display of ①, it changes to [C00]. However, unless no button input is done for 10 seconds after change to [C00], it changes to the display of ① automatically according to the precedence.
  - ④ Display switching

Special display is the display other than [CXX].



\* If the special display is reset in the meanwhile, it remains as [CXX].

# (b) List of 7-segment displays

Code No.	Contents of display	Data display range	Minimum unit	Remarks	
Error display	[Exx]				
Caution display	[Axx]				
Special display	Special display [PdS][PdE][CH][CHF][CO][HE][PCL][dLP][dLC][dLH][oPE][CAP]				
Code No.	Contents of data display	Data display range	Minimum unit	Remarks	
<sensor< td=""><td>value, actuator information&gt;</td><td></td><td></td><td></td></sensor<>	value, actuator information>				
C00	CM1 operation frequency	0 ~ 130	1Hz		
C01	(Spare)				
C02	Tho-A Outdoor air temperature	L,-20 ~ 43	1°C		
C03	Tho-R1 Heat exchanger temperature 1	L,-25 ~ 73	1°C		
C04	Tho-R2 Heat exchanger temperature 2	L,-25 ~ 73	1°C		
C05	(Spare)				
C06	(Spare)				
C07	Tho-D1 Discharge pipe temperature (CM1)	L,31 ~ 136	1°C		
C08	(Spare)				
C09	(Spare)				
C10	Tho-C1 Under-dome temperature (CM1)	L,5 ~ 90	1°C		
C11	(Spare)				
C12	Tho-P1 Power transistor temperature (CM1)	L,5 ~ 136	1°C		
C13	(Spare)				
C14	Tho-SC Sub-cooling coil temperature 1	L,18 ~ 73	1°C		
C15	Tho-H Sub-cooling coil temperature 2	L,-25 ~ 73	1°C		
C16	Tho-S Suction pipe temperature	L,-25 ~ 73	1°C		
C17	Inverter secondary current	0 ~ 50	1A		
C18	CT1 (CM1) current	0 ~ 50	1A		
C19	(Spare)				
C20	EEVH1 Heating expansion valve opening angle	0 ~ 500	1 pulse		
C21	(Spare)		F		
C22	EEVSC Sub-cooling coil expansion valve opening angle	0 ~ 500	1 pulse		
C23	FMo1 Actual fan speed	0 ~ 999	10min-1		
C24	FMo2 Actual fan speed	0 ~ 999	10min-1		
C25	PSH High pressure sensor	0 ~ 4.15	0.01MPa		
C26	PSL Low pressure sensor	0 ~ 1.70	0.01MPa		
C27	(Spare)				
C28	(Spare)				
C29	(Spare)				
				Order of 100: 63H1-1	
C30	Pressure switch	0,1	_	Order of 10: (Spare)	
		(U: Open, 1: Close)		Order of 1: (Spare)	
				Order of 100: CNS1	
C31	External input	0,1	_	Order of 10: CNS2	
		(U. Open, 1: Close)		Order of 1: CNG1	

Code No.	Contents of data display	Data display range	Minimum unit	Remarks
				Order of 100: CNG2
C32	External input	0,1	_	Order of 10: (Spare)
	1	(0: Open, 1: Close)		Order of 1: (Spare)
				Order of 100: 52C-1
C33	Relay output	0,1	_	Order of 10: 20S
	)	(0: Open, 1: Close)		Order of 1: Crankcase heater 1
				Order of 100: SV6
C34	Relay output	0,1	_	Order of 10: (Spare)
	icity output	(0: Open, 1: Close)		Order of 1: (Spare)
				Order of 100: SV1
C35	Relay output	0,1	_	Order of 10: SV11
	Kendy Output	(0: Open, 1: Close)		Order of 1: SV12
				Order of 100: (Spare)
C26	Polov output	0,1		Order of 10: (Spare)
0.50	Kelay bulput	(0: Open, 1: Close)	_	Order of 1: (Spare)
				Order of 100: External autrust (CNZ1)
027	Fraterinal automat	0,1		Order of 100. External output (CNZ1)
	External output	(0: Open, 1: Close)	_	Order of 10: ChH Operation output
				Order of 1: Chy Anomalous output
C38	(Spare)	—	-	
C39	(Spare)	-	-	
<out< td=""><td>door unit information&gt;</td><td></td><td></td><td></td></out<>	door unit information>			
C40	Number of connected indoor units	$0 \sim 50$	1	
C41	Capacity of connected indoor units	$0 \sim 200$	1	
C42	Number of indoor units with thermostat ON	0 ~ 50	1	
C43	Required Hz total	0~999	1 1Hz	
	Cumulative compressor operation time	0 ~ )))	1112	
C44	(CM1)	$0 \sim 655$	100h	
C45	(Spare)			
C46	Discharge pressure saturated temperature	-50 ~ 70	0.1°C	Range unable to display (-10°C or under) is in the unit of 1°C.
C47	Suction pressure saturated temperature	-50 ~ 30	0.1°C	Range unable to display (-10°C or under) is in the unit of 1°C.
C48	Sub-cooling coil temperature sensor 1 saturated pressure	-0.68 ~ 4.15	0.01 MPa	0 is omitted in negative range. -0.68 $\rightarrow$ [68]
C49	Super cooling	0 ~ 50	0.1deg	
C50	Super heat	0 ~ 50	0.1deg	
C51	Sub-cooling coil overheat	0 ~ 50	0.1deg	
C52	Discharge pipe overheat 1	0 ~ 50	0.1deg	
C53	Under-dome overheat 1	0 ~ 50	0.1deg	
C54	Target cooling low pressure	0.00 ~ 2.00	0.01MPa	
C55	Target heating high pressure	1.60 ~ 4.15	0.01MPa	
C56	Target Fk	0 ~ 999	1Hz	
C57	Inverter 1 operation frequency command	0 ~ 130	1Hz	
C58	(Spare)	0 ~ 130	1Hz	
C59	FMo1 Fan Speed command	0 ~ 999	10min-1	
C60	FMo2 Fan Speed command	0 ~ 999	10min-1	
	1.1.02 Fun Speed commund	· · · · · ·	101111-1	

code No.	Contents of data display	Data display range	Minimum unit	Remarks
<co1< td=""><td>ntrol status&gt;</td><td></td><td></td><td></td></co1<>	ntrol status>			
		0.1	-	3-digit: Under the oil return control
C61	Control status			2-digit: During defrosting
		(0.0FF, 1.0N)		1-digit: Spare
		0.1	-	3-digit: Under test run control
C62	Control status	(0:OFE 1:ON)		2-digit: Under the demand control
		$(0 \cdot OFF, 1 \cdot ON)$		1-digit: Under the silent mode control
		0.1	-	3-digit: In the capacity measuring mode
C63	Control status	(0: OFE 1: ON)		2-digit: Spare
		(0.0FF, 1.0N)		1-digit: Spare
		Spare         0.1           (0:OFF, 1:ON)	-	3-digit: Spare
C64	Spare			2-digit: Spare
				1-digit: Spare
		0.1	-	3-digit: Under the HP speed reduction control
C65	Protection control status	S  (0: OFF 1: ON)		2-digit: Under the LP speed reduction control
		(0.011, 1.011)		1-digit: Under the Td speed reduction control
		0.1	_	3-digit: Compression ratio speed reduction control
C66	Protection control status	(0:OEE 1:ON)		2-digit: Under the CS speed reduction control
		$(0 \cdot OFF, 1 \cdot ON)$		1-digit: Under the PT speed reduction control
		0.1	-	3-digit: Under the Tc speed reduction control
C67	Protection control status	(0:OEE 1:ON)		2-digit: Spare
		$(0 \cdot OFF, 1 \cdot ON)$		1-digit: Spare
C68	Cause of compressor stop	0~127	1	See page 83
		0.1	-	3-digit: Spare
C69	Spare	(0: OFE 1: ON)		2-digit: Spare
		$(0 \cdot 0 \Gamma r, 1 \cdot 0 N)$		1-digit: Spare

Code No.	Contents of data display	Data display range	Minimum unit	Remarks
<ano< td=""><td>omalous counter information&gt;</td><td></td><td></td><td></td></ano<>	omalous counter information>			
C70	Counter · Sensor wire disconnected	0 ~ 3	1	
C71	Counter · High pressure protection	0 ~ 5	1	
C72	Counter · Anomalous low pressure ③ (During operation)	0 ~ 5	1	
C73	Counter · Anomalous low pressure ① (During stop)	0 ~ 5	1	
C74	Counter · Discharge pipe 1 anomalous temperature	0 ~ 5	1	
C75	Counter · Anomalous FMo1 stop	0 ~ 5	1	
C76	Counter · Anomalous FMo2 stop	0 ~ 5	1	
C77	Counter · Current cut (CM1)	0 ~ 4	1	
C78	Counter · Compressor 1 starting failure	$0 \sim 20$	1	
C79	Counter · Inverter 1 comunication error	0 ~ 4	1	
C80	Counter · Power transistor 1 overheat	0 ~ 4	1	
C81	(Spare)			
C82	Counter · Inverter 1 desynchronism error	0 ~ 127	1	
C83	Counter · Inverter 1 comunication error cumulative	0 ~ 127	1	
C84	Counter · Indoor/outdoor comunication error	0 ~ 255	1	
C85	Counter · CPU reset	0 ~ 255	1	
C86	(Spare)			
C87	(Spare)			
C88	(Spare)			
C89	(Spare)			
C90	(Spare)			
C91	(Spare)			
C92	(Spare)			
C93	Counter – Liquid-back error	0 ~ 3	1	
C94	(Spare)			
<oth< td=""><td>ers&gt;</td><td></td><td></td><td></td></oth<>	ers>			
C95	(Spare)			
C96	Data reset			
C97	Program · Sub version	0 ~ 991	_	
C98	Program · POL version	0.00 ~ 9.99	0.01	
C99	Auto feed display	-		

Code No.	Contents of data display	Data display range	Minimum unit	Remarks
<use< td=""><td>r setting&gt;</td><td></td><td></td><td></td></use<>	r setting>			
P00	(Spare)		_	
P01	Operation priority selection	0,1	_	0: First push priority (at shipping) 1: Last push priorit
P02	Outdoor unit fan snow protection control	0,1	_	0: Control disabled (at shipping) 1: Control enabled
P03	Outdoor unit fan snow protection control ON time setting	$\frac{30 : (Factory default)}{10, 30 \sim 600 [Sec]}$	30	Changes like 10, 30, 60 90 600
P04	Energy saving mode	OFF,000,040, 060,080		0: OFF, 1: 0%, 2: 40%. 3: 60%, 4: 80% Factory default is 0: OFF.
P05	Silent mode setting	$\frac{0 : (Factory \ default)}{0 \sim 3}$	1	
P06	Allocation of external output (CnZ1)	$\frac{0 : (Factory \ default)}{0 \sim 9}$	1	
P07	Allocation of external input (CnS1)	$\frac{0 : (Factory \ default)}{0 \sim 9}$	1	
P08	Allocation of external input (CnS2)	$\frac{1 : (Factory \ default)}{0 \sim 9}$	1	
P09	Allocation of external input (CnG1)	$\frac{2 : (Factory \ default)}{0 \sim 9}$	1	
P10	Allocation of external input (CnG2)	$\frac{3 : (Factory default)}{0 \sim 9}$	1	
<serv< td=""><td>vice engineer setting&gt;</td><td></td><td></td><td></td></serv<>	vice engineer setting>			
P19	Preferencial switch to ensure certain indoor outlet air temperature at heating	0 : (Factory default) 0.1	_	<ul><li>0: Control for ensuring certain indoor outlet air temperature at heating is valid</li><li>1: Control for ensuring certain indoor outlet air temperature at heating is invalid</li></ul>
P20	Allowable total capacity of thermostat ON indoor units to ensure certain indoor outlet temperature at heating	110 : (Factory default) 100, 090, 080	_	Changes to 110, 100, 090, 080, 110
P21	Allowable number of thermostat ON indoor units to ensure certain indoor outlet temperature at heating	$\frac{0 : (Factory \ default)}{0 \sim 9}$	1	
<nev< td=""><td>/super link setting&gt;</td><td></td><td></td><td></td></nev<>	/super link setting>			
P30	Superlink communication	0,1	_	U: Previous superlink
P31	Automatic address setting start input	0 : (Factory default) 0,1	_	0: Automatic address setting standby 1: Automatic address setting start
P32	Input the starting indoor address for automatic address setting	$\frac{1 : (Factory default)}{1 \sim 127}$	1	Specify the starting indoor address connected in one refrigerant system for automatic address setting.
P33	Input the number of connected indoor units	$\frac{1 : (Factory default)}{1 \sim 24 (*)}$	1	Specify the number of indoor units connected in one refrigerant system for automatic address setting. (*) Maximum connectable number of indoor units for each outdoor unit
P34	Polarity difinition	$\frac{0 : (Factory \ default)}{0,1}$	_	0: Network polarity not defined 1: Network polarity defined

# Compressor stop cause (Cord No. C68)

It shows the latest compressor anomalous stop cause

Compressor stop cause					
	At power on	0			
	Outdoor air temperature	1			
	Outdoor heat exchanger temperture 1				
	Outdoor heat exchanger temperture 2				
	Discharge pipe temperature sensor 1(CM1)	4			
	Suction pipe temperature sensor	5			
Sensor disconnection	Sub-cooling temperature sensor 1(liquid side)	6			
and/or short-circuit	Sub-cooling temperature sensor 2(gas side)	7			
	Under-dome temperature sensor 1	8			
*	Power transistor temperature sensor 1	9			
	Active filter temperature sensor	10			
	High pressure sensor				
	Low pressure sensor	12			
	HP anomaly	20			
	LP anomaly	21			
	Td1 anomaly	22			
	FMo1 anomaly	23			
	FMo2 anomaly	24			
Anomaly datastion	Inverter 1 current cut	25			
Anomaly detection	Inverter 1 startup failure	26			
	Inverter 1 communication error	27			
	Inverter 1 anomalous compressor induced voltage and torque	28			
	Inverter 1 power tansistor overheat	29			
	Inverter 1 rotor lock				
	Liquid flooding anomaly	31			
	Outdoor operation mode heating/cooling switching	40			
Stop by restriction	Heating overload protection	41			
Stop by restriction	Stopping time by compressor dilution ratio protection control (Less than 30 minutes) *3	<u>50</u>			
	Stopping time by compressor dilution ratio protection control (Over 30 minutes) *3	51			

 $\frac{*3 \text{ As the actual operation, write the stop factor 50 at the start of power supply and, when the accumulated compressor start inhibition$ <u>time (counted only when the remote controller is turned on) has exceeded 30 minutes, overwrite on it with the stop factor with</u><u>51. The code of this stop factor is retained even after the protective start inhibition has been released, until it is overwritten with</u>another stop factor.

# (c) Saving of Operation Data

Mainly for investigating the causes of market claims, operation data are always saved in memory. If any trouble occurs, the data writing is stopped and only the operation data prior to the time when the trouble occurs are recorded. These data can be loaded to a PC via RS232C connector of PCB and utilized for identifying causes.

- (i) Operation data for a period of 30minutes prior to the present operation are saved and updated continuously.
- (ii) If an anomalous stop occurs, the data are not updated any more.
- (iii) Data are written in based on 1 minute sampling interval and following data is transmitted to PC upon demand.

Data	Data range	Example	
Software version	Ascii 15 bytes	KD3C218######## (# : NULL)	
PID (Program ID)	Ascii 2 bytes	5D	
Outdoor unit capacity	Ascii 3 bytes	As listed blow	
Power supply frequency	Ascii 2 bytes	60	
Outdoor address	Ascii 2 bytes	$00 \sim 3F$	
Indoor address × 16 units	Ascii 2 bytes × 16 units	$40 \sim 7F$	
Indoor capacity × 16 units	Ascii 3 bytes × 16 units	$022 \sim 280$	
	^		

Outdoor unit composition	Outdoor unit capacity data	Remarks
Single type	Example: 10HP - [S10]	S: Display with Horse Power of single type

(iv) Error retention and monitoring data

Code	White contents			Record dat	a	
No.	write contents	Data write range	Unit of write	Number of bytes		Contents
00	Indoor 1 Thi-A	$-14 \sim 50$	A/D value	1	Return ai	r
01	Indoor 1 Thi-R1	0 ~ 72	A/D value	1	Heat excl	nanger 1
02	Indoor 1 Thi-R2	0 ~ 72	A/D value	1	Heat excl	nanger 2
03	Indoor 1 Thi-R3	0 ~ 72	A/D value	1	Heat excl	nanger 3
04	Indoor 1 EEV	0 ~ 470	1 pulse	2		
05	Indoor 1 operation/stop	0,1	-	1	0	Stop
					1	Operation
06	Indoor 1 operation mode	0 ~ 4	-	1	0	Auto
					1	Dehumidifying
					2	Cooling
					3	Fan
					4	Heating
07	Indoor 1 request Hz	0 ~ 255	1Hz	1		
08	Indoor 1 answer Hz	0 ~ 255	1Hz	1		
09	Indoor 1 indoor local	-	-	1	Bit0	Anti-frost
					Bit1	EEV opening angle implementation
10	Indoor 1 Thi spare	$-14 \sim 50$	A/D value	1	Discharge	
11	Indoor 1 type	0 ~ 67	-	1	0	FDT
					1	FDK
					2	Others
					3	FDE
					4	FDTC
					5	
					6	
					7	
					60 ~	
12	Indoor 1PID	-	-	1		

Code No.	Write contents	Record data Data write range	Unit of write	Number of bytes	Contents
0	Error code	00 ~ 99	_	1	00: No error on outdoor unit 01-99: All errors
1	Error existing unit address	$00 \sim FF$	_	1	00 – 3F: Outdoor 40 – 6F: Indoor
<sens< td=""><td>sor value&gt;</td><td></td><td></td><td></td><td></td></sens<>	sor value>				
2	Tho-A Outdoor air temperature	-20 ~ 70	A/D value	1	
3	Tho-R1 Heat exchanger temp. 1	-40 ~ 75	A/D value	2	
4	Tho-R2 Heat exchanger temp. 2	-40 ~ 75	A/D value	2	
5	Tho-D1 Discharge pipe temp. (CM1)	-20 ~ 140	A/D value	1	
6	Tho-S Suction pipe temperature	$-40~\sim~75$	A/D value	2	
7	Tho-SC Sub-cooling coil temp. 1	-40 ~ 75	A/D value	2	
8	Tho-H Sub-cooling coil temp. 2	$-40~\sim~75$	A/D value	2	
9	Tho-P1 Power transistor temp. (Radiator fin)	-20 ~ 140	A/D value	1	
10	Inverter secondary current	0 ~ 50	A/D value	1	
11	Tho-C1 Under-dome temp. (CM1)	-40 ~ 90	A/D value	1	
12	CT1 Current	0 ~ 50	A/D value	1	
13	High pressure sensor	0 ~ 4.15	A/D value	1	
14	Low pressure sensor	0~1.70	A/D value	1	
<out< td=""><td>door unit information&gt;</td><td></td><td></td><td></td><td></td></out<>	door unit information>				
15	Number of connected indoor units	0 ~ 127	1 unit	1	
16	Capacity of connected indoor units	0 ~ 65535	_	2	
17	Number of indoor units with thermostat ON	0 ~ 255	1 unit	1	
18	Total capacity of indoor units with cooling thermostat ON	0 ~ 65535		2	
19	Total capacity of indoor units with heating thermostat ON	0 ~ 65535		2	
					0 Stop
20	Operation mode	$0 \sim 2$	_	1	1 Cooling
					2 Heating
21	Inverter CM1 actual operation frequency	0 ~ 255	1Hz	1	
22	FMo1 Actual fan speed	0 ~ 65535	10min-1	2	
23	FMo2 Actual fan speed	0 ~ 65535	10min-1	2	
24	Required Hz total	0 ~ 65535	1Hz	2	
25	Discharge pressure saturated temperature	$-50 \sim 70$	0.01°C	2	
26	Suction pressure saturated temperature	-50 ~ 30	0.01°C	2	
27	Sub-cooling coil temp. sensor 1 saturated pressure	-0.68 ~ 4.15	0.01MPa	2	
28	Pressure ratio	1.0 ~ 10.0	0.1	1	See below * mark
29	Cooling sub-cooling	0 ~ 50	0.1deg	2	
30	Suction overheat	0 ~ 50	0.1deg	2	
31	Sub-cooling coil overheat	0 ~ 50	0.1deg	2	
32	Discharge pipe overheat	0 ~ 50	0.1deg	2	
33	Compressor 1 under-dome overheat	0 ~ 50	0.1deg	2	
34	Target Fk	0 ~ 65535	1Hz	2	
35	Answer Hz total	0 ~ 65535	1Hz	2	
36	Inverter 1 operation frequency command	$0 \sim 120$	1Hz	1	

% Definition of signals

No.28: Pressure ratio

Pressure ratio = (High pressure sensor + 0.101) [MPa] / (Low pressure sensor + 0.101) [MPa]

Code	Write contents	Record data	Unit of	Number of	Contents		ntents
37	FMo1 Fan speed command	$0 \sim 65535$	10min-1	2			
38	FMo2 Fan speed command	0 ~ 65535	10min-1	2			
39	EEVH1 opening degree	0 ~ 65535	1 pulse	2			
40	EEVSC opening degree	$0 \sim 65535$	1 pulse	2			
41	Compressor target cooling low	$0.00 \sim 2.00$	0.01MPa	1			
	pressure						
42	Compressor target heating high pressure	0.00 ~ 4.15	0.01MPa	2			
43	Outdoor EEVH target superheat	0 ~ 25.5	0.1°C	1	Actual	range: 5°C – 11	۱°C
44	Outdoor EEVH initial learning opeing position	0 ~ 255	1 pulse	1			
45	Outdoor EEVSC target superheat	0 ~ 25.5	0.1°C	1			
46	Cumulative amount of hold-up oil.	0 ~ 2550	10cc	1	Actual	range: 0cc - 11	00cc
47	Oil return count down	0 ~ 255	3 min.	1	Actual	range: 0 - 6001	nin (10 hour)
<pce< td=""><td>3 hardware input&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></pce<>	3 hardware input>						
48	External input	-	-	1	Bit0	63H1	0: Open, 1: Short-circuit
					Bit1	(Spare)	0: Open, 1: Short-circuit
					Bit2	CNS1	0: Open, 1: Short-circuit
					Bit3	CNS2	0: Open, 1: Short-circuit
					Bit4	CNG1	0: Open, 1: Short-circuit
					Bit5	CNG2	0: Open, 1: Short-circuit
					Bit6	(Spare)	0: Open, 1: Short-circuit
					Bit7	(Spare)	0: Open, 1: Short-circuit
49	Dip SW [SW3]	-	_	1	Bit0	SW3-1	0 : OFF, 1 : ON
					Bit1	SW3-2	0 : OFF, 1 : ON
					Bit2	SW3-3	0 : OFF, 1 : ON
					Bit3	SW3-4	0 : OFF, 1 : ON
					Bit4	SW3-5	0 : OFF, 1 : ON
					Bit5	SW3-6	0 : OFF, 1 : ON
					Bit6	SW3-7	0 : OFF, 1 : ON
					Bit7	SW3-8	0 : OFF, 1 : ON
50	Dip SW [SW4]	_	_	1	Bit0	SW4-1	0 : OFF, 1 : ON
					Bit1	SW4-2	0 : OFF, 1 : ON
					Bit2	SW4-3	0 : OFF, 1 : ON
					Bit3	SW4-4	0 : OFF, 1 : ON
					Bit4	SW4-5	0 : OFF, 1 : ON
					Bit5	SW4-6	0 : OFF, 1 : ON
					Bit6	SW4-7	0 : OFF, 1 : ON
					Bit7	SW4-8	0 : OFF, 1 : ON
51	Dip SW [SW5]	-	_	1	Bit0	SW5-1	0 : OFF, 1 : ON
					Bit1	SW5-2	0 : OFF, 1 : ON
					Bit2	SW5-3	0 : OFF, 1 : ON
					Bit3	SW5-4	0 : OFF, 1 : ON
					Bit4	SW5-5	0 : OFF, 1 : ON
					Bit5	SW5-6	0 : OFF, 1 : ON
					Bit6	SW5-7	0 : OFF, 1 : ON
					Bit7	SW5-8	0 : OFF, 1 : ON

Code No.	Write contents	Record data Data write range	Unit of write	Number of bytes		Contents		
52	Dip SW [SW6]	-	_	1	Bit0	SW6-1	0 : OFF, 1 : ON	
					Bit1	SW6-2	0 : OFF, 1 : ON	
					Bit2	SW6-3	0 : OFF, 1 : ON	
					Bit3	SW6-4	0 : OFF, 1 : ON	
					Bit4	SW6-5	0 : OFF, 1 : ON	
					Bit5	SW6-6	0 : OFF, 1 : ON	
					Bit6	SW6-7	0 : OFF, 1 : ON	
					Bit7	SW6-8	0 : OFF, 1 : ON	
53	Jumper SW	_	_	1	Bit0	J11	0: Open, 1: Short-circuit	
					Bit1	J12	0: Open, 1: Short-circuit	
					Bit2	J13	0: Open, 1: Short-circuit	
					Bit3	J14	0: Open, 1: Short-circuit	
					Bit4	J15	0: Open, 1: Short-circuit	
					Bit5	J16	0: Open, 1: Short-circuit	
					Bit6	(Spare)		
					Bit7	(Spare)		
<pce< td=""><td>3 hardware output&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></pce<>	3 hardware output>							
54	Relay output	_	_	1	Bit0	52X1, 52X2	0 : OFF, 1 : ON	
					Bit1	208	0 : OFF, 1 : ON	
					Bit2	CH1	0 : OFF, 1 : ON	
					Bit3	SV1	0 : OFF, 1 : ON	
					Bit4	SV6	0 : OFF, 1 : ON	
					Bit5	SV11	0 : OFF, 1 : ON	
					Bit6	(Spare)	0 : OFF, 1 : ON	
					Bit7	(Spare) FMC1,2	0 : OFF, 1 : ON	
55	Relay output	-	_	1	Bit0	Operation output (CnH)	0 : OFF, 1 : ON	
					Bit1	Error output (CnY)	0 : OFF, 1 : ON	
					Bit2	External output (CnZ)	0 : OFF, 1 : ON	
					Bit3	(Spare)	0 : OFF, 1 : ON	
					Bit4	(Spare)	0 : OFF, 1 : ON	
					Bit5	(Spare)	0 : OFF, 1 : ON	
					Bit6	(Spare)	0 : OFF, 1 : ON	
					Bit7	(Spare)	0 : OFF, 1 : ON	
<rela< td=""><td>ted to compressor&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></rela<>	ted to compressor>							
56	CM1 Cumulative operation hours (Approx.)	0 ~ 65535	1h	2				
57	CM1 Starting times	0 ~ 65535	× 20 times	2				
58	CM1 3-minute delay timer	0 ~ 180	1 sec	1				
59	Energizing time count down	0 ~ 255	1 min	1				
60	Control status CH Compressor protection timer	0 ~ 360	3 min	1				
61	Control status CH Compressor protection start	0 ~ 15	_	1	15 $0 \sim 14$	Protection start complete Protection start ON		

Code No.	Write contents	Record data Data write range	Unit of write	Number of bytes	Contents		
<erro< td=""><td>or counter information&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></erro<>	or counter information>						
72	Control status HP (63H1) anomaly counter	0~5	1	1			
73	Control status LP anomaly counter while running	0~5	1	1			
74	Control status LP anomaly counter while stopping	0~5	1	1			
75	Control status Td1 error counter	0~5	1	1			
76	Control status DC fan motor 1 error counter	0~5	1	1			
77	Control status DC fan motor 2 error counter	0~5	1	1			
78	Control status sensor wire disconnected counter	0~3	1	1			
79	Control status INV1 current cut error counter	0~4	1	1			
80	Control status INV1 starting failure counter	0 ~ 20	1	1			
81	Control status INV1 communication error counter	0~4	1	1			
82	Control status INV1 desynchronism error counter	0~4	1	1			
83	Control status INV1 communication error counter cumulative	0~255	1	1			
84	(Spare) Control status INV1 power transistor overheat error counter	0~4	1	1			
85	Control status INV1 rotor lock error counter	0~127	1	1			
<sett< td=""><td>ing value display&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></sett<>	ing value display>						
00	Operation priority switching outsoor fan	0.1		1	0	First push priority	
80	snow protection control	0,1	_	1	1	Last push priority	
07	Outdoor for more restantion control	0.1		1	0	Invalid	
0/	Outdoor ran show protection control	0,1		1	1	Valid	
88	Outdoor fan snow protection control ON time setting	30: (Factory default) 10, 30 – 600 [sec]	10 sec	1			
89	Demand ratio change value	OFF, 000, 040, 060, 080 Factory default 0: OFF	_	1			
90	Silent mode setting	0~9	_	1			
91	CNS1 function quota value	0~9	_	1			
92	CNS2 function quota value	0~9	_	1			
93	CNG1 function quota value	0~9	_	1			
94	CNG2 function quota value	0~9	_	1			
95	External output function quota	0~9	_	1			
96	Target cooling low pressure compensation	-0.20 ~ +0.20	0.01MPa	1			
97	Target cooling high pressure compensation	0.00 ~ 0.40	0.01MPa	1			
98	Heating setting 1 (Target outlet temperature)	40 ~ 50	1 [°C]	1			
99	Heating setting 2 (Target high pressure)	3.15 ~ 2.75	0.05[Mpa]	1			
100	Heating setting 3 (Judgment temperature)	30 ~ 38	1 [°C]	1			
<oth< td=""><td>er&gt;</td><td></td><td></td><td></td><td></td><td></td><td></td></oth<>	er>						
104	Override number	0 ~	_	1			
	<indoor information="" unit=""></indoor>						
106	Registered indoor $1 - 8$ operation	$0 \sim 4$		8	0	Auto	
	mode				1	Humidifying	
					2	Cooling	
					3	Fan	
					4	Heating	
107	Registered indoor 1 – 8 request Hz	0~255	1Hz	8			
108	Registered indoor 1 – 8 answer Hz	0~255	1Hz	8			

# 8 SYSTEM TROUBLESHOOTING PROCEDURE

# 8.1 Basics of troubleshooting

Basic troubleshooting is to check/analyze/save data by connecting the Mente PC.

Whenever arriving at the site, always connect the Mente PC before starting work.

Method of error data analysis (Basic procedure)

- · Identify whether particular error occurred during operation or stopping.
- Is it caused by the installation conditions of outdoor/indoor unit? (Refrigerant quantity, pipe length, short-circuit, clogged filter, etc.)
- Isn't there any beginner's mistake at the installation? (Wrong address, mistake in piping or wiring, etc.)
- Is the failure related to any hardware (parts)? (SV main body, coil, capillary, check valve, sensor, etc.)
- Is it a major component.

Compressor, inverter PCB and outdoor DC fan motor.

• Is it a failure of electrical component?



# 8.2 Explanation of troubleshooting

# (a) Checking 15V on the control PCB (Step to check if the inverter PCB fails or not)

Use this to diagnose E41, E42, E45 and E48.



### (b) Inspection of short-circuit on the power transistor module terminals

Disconnect the wiring of compressor and check for short-circuit with a tester.

Inspect between terminals of: P-U, P-V, P-W, N-U, N-V, N-W and P-N

- It will be easier to contact the tester at the following place at each terminal.
- P: P terminal of power transistor
- N: N terminal of power transistor
- U: End of red harness to compressor
- V: End of white harness to compressor
- W: End of blue harness to compressor

Terminal (+)	Terminal (-)	Normal value $(\Omega)$		
Р	N	Several 10 M		
N	Р	Several M		
Р	U			
Р	V	Several 10 M		
Р	W			
N	U			
N	V	Several 100K		
N	W			
U	Р			
V	Р	Several 100K		
W	Р			
U	N			
V	N	Several 10 M		
W	N			

Note (1) When a measured value is 0 - a few k $\Omega$ , the element may be broken. Replace the power transistor part.

# 8.3 Contentsoftroubleshooting

# (a) List of inspection displays

1) Indoor and outdoor units

Remote controller error code	7-segment display	Name of inspection	Classification	Page
E1		Remote controller communication error	Communication error	108
E2	_	Duplicated indoor unit address	Address setting error	109
E3	_	Outdoor unit signal line error	Address pairing setting error	110
E5	_	Communication error during operation	Communication error	110 • 111
E6	_	Indoor heat exchanger temperature thermistor anomaly (Thi-R)	Thermistor wire breakage	112
E7	_	Indoor return air temperature thermistor anomaly (Thi-A)	Thermistor wire breakage	113
E9	_	Drain trouble	System error	114
E10	_	Excessive number of indoor units (more than 17 units) by controlling one remote controller	Communication error	115
E12	_	Address setting error by mixed setting method	Address setting error	116
F1(	_	Indoor fan motor anomaly (FDT series)	DC fan motor error	117
EIO	_	Indoor fan motor anomaly (FDK series)	DC fan motor error	118
E18	_	Address setting error of master and slave indoor untis	Address setting error	119
E19	_	Indoor unit operation check drain motor check mode anomaly	Setting error	120
E20	_	Indoor fan motor rotion speed anomaly (FDT, FDTC, FDFW and FDK series)	DC fan motor error	121
E28	_	Remote controller temperature thermistor anomaly (Thc)	Thermistor wire breakage	122
E30	E30	Unmatch connection of indoor and outdoor unit	System error	123
E31	E31	Duplicated outdoor unit address No.	Address setting error	124
E32	E32	Open L3 Phase on power supply at primary side	Site setting error	125
E2(	E36-1	Discharge pipe temperature error (Tho-D1)	System error	126
E36	E36-3	Liquid flooding anomaly	System error	127
E37	E37-1, 2 E37-5, 6	Outdoor heat exchanger temperature thermistor (Tho-R) and subcooling coil temperature thermistor (Tho-SC, -H) anomaly	Thermistor wire breakage	128
E38	E38	Outdoor air temperature thermistor anomaly (Tho-A)	Thermistor wire breakage	129
E39	E39-1	Discharge pipe temperature thermistor anomaly (Tho-D1)	Thermistor wire breakage	130
E40	E40	High pressure anomaly (63H1-1 activated)	System error	131
E41 (E51)	E41 (E51)-1	Power transister overheat	System error	132
E42	E42-1	Current cut (CM1)	System error	133
E43	E43-1 E43-2	Excessive number of indoor units connected, excessive total capacity of connection	Site setting error	134
E45	E45-1	Communication error between inverter PCB and outdoor control (PCB)	Communication error	135
E46	E46	Mixed address setting methods coexistent in same network	Address setting error	136
E48	E48-1 E48-2	Outdoor DC fan motor anomaly	DC fan motor error	137
E49	E49	Low pressure anomaly	System error	138
E53/E55	E53/E55-1	Suction pipe temperature thermistor anomaly (Tho-S), Under-dome temperature thermistor anomaly (Tho-C1)	Thermistor wire breakage	139
E54	E54-1 E54-2	High pressure sensor anomaly (PSH)/Low pressure sensor anomaly (PSL)	Thermistor wire breakage	140
E56	E56-1	Power transitor temperature thermistor anomaly (Tho-P1)	Thermistor wire breakage	141
E58	E58-1	Anomalous compressor by loss of synchronism	System error	142
E59	E59-1	Compressor startup failure (CM)	System error	143
E60	E60-1	Rotor position detection failure (CM)	System error	144
E63	E63	Emergency stop	Site setting error	145

2) Optional controller in-use

SL SL SL	-1N-E -2N-E -3N-E	Indo contr	or unit ol PCB	Outdo contr	oor unit ol PCB	Location of	Description of trouble	Repair
Error code	Red LED	Red LED	Green LED	Red LED	Green LED	trouble		method
E75	Keeps flashing	Stays OFF	Keeps flashing	Stays OFF	Keep flashing	SL-1N-E SL-2N-E SL-3N-E	<ul> <li>Communication enor (Deflective communication circuit on the main unit of SL1N-E, SL2N-Eor SL3N-E)</li> </ul>	Replacoment

# (b) Troubleshooting

	Troubleshooting					G
η	Error code	LED	Green	Red	Content	
	Remote controller: None	Indoor	Keeps flashing	Stays Off	Operates but does not cool	
	7-segment display:	Outdoor	Keeps flashing	Stays Off	Operates but does not coor	



















G

	_					
ſ	٩	Error code	LED	Green	Red	Content Power supply system anomaly
		Remote controller: None	Indoor	Stays Off	Stays Off	(Dower supply to indeer unit DCD)
		7-segment display:	Outdoor	Stays Off	2 times flash	(Fower suppry to indoor unit FCB)
l	ſ					



G

F	Error code	LED	Green	Red	Content Dower supply system error
	Remote controller: None	Indoor	Stays Off	Keeps lighting	(Power supply to remote controller)
	7-segment display:	Outdoor	Stays Off	Keeps lighting	(I ower suppry to remote controller)
l	<u></u>				



G

ſ	Error code	LED	Green	Red	Content
	Remote controller: 🖱 WAIT 🖱	Indoor	Keeps flashing	Stays Off	毁WAIT恐(1)
	7-segment display:	Outdoor	Keeps flashing	Keeps flashing	
L					


















Note: If the indoor unit cannot communicate normally with the remote controller for 180 seconds, the indoor unit PCB starts to reset automatically.







Note: When the pump down switch is turned on, communication between indoor and outdoor units is cancelled so that "Communication error E5" will be displayed on the remote controller and indoor control PCB, but this is normal.

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Note: When this anomaly occurs at power ON, disconnection of connector or breakage of wire of float switch is suspected. Check and correct it (or replace it, if necessary).

G

β	Error code	LED	Green	Red	Content
	Remote controller: E10	Indoor	Keeps flashing	Stays Off	Excessive number of indoor units (moe than 17 units)
	7-segment display: -	Outdoor	Keeps flashing	Stays Off	by controlling one remoto controller
L	J				









_						<u> </u>
μ	Error code	LED	Green	Red	Content Le de cer fore en ator an arealy	
	Remote controller: E16 7-segment display: -	Indoor	Keeps flashing	1 time flash	(FDK series)	
		Outdoor	Keeps flashing	Stays Off		
L	J					









Note: Indoor operation check/drain pump check mode

- If the power is ON after SW7-1ON. indoor operation check/drain pump check mode can be established.
  - 1) When the communication between remote controller and indoor PCB is established 15 seconds after power ON, it goes to indoor operation check.
  - 2) When the communication between remote controller and indoor PCB is not established, it goes to drain pump check (CnB connector should be open before power ON)

					9
β	Error code	LED	Green	Red	Content Indoor fan motor
	Remote controller: E20	Indoor	Keeps flashing	1 time flash	rotation speed anomaly
	7-segment display: -	Outdoor	Keeps flashing	Stays Off	(In case of FDT, FDTC, FDFW and FDK series)
L	<u></u>				





be valid instantly instead of the remote controller temperature thermistor (Thc). Please note that even though the remote controller temperature thermistor (Thc) is valid, the displayed return air temperature on the remote controller LCD shows the value detected by the indoor return air temperature thermistor (Thi-A), not by the remote controller temperature thermistor (Thi-A), not by the remote controller temperature thermistor (Thc).







Note: After taken above measure, reset the power and confirm no error is displayed occurs Unless the power is reset after changing address, the set address will not be confirmed In case of combination use, set the same address to both master and slave units. Distinction of master or slave unit is done by setting SW4-7. (Refer the instruction manual and technical manual for details)







Note: If the error does not recur, connect the Mente PC and continue to collect data.









Note: If the error does not recur, connect the Mente PC and continue to collect data.





Note: In case that there is no the insulation resistance anomaly, the compressor anomaly could be considered. If this anomaly occurs after replacement of power transistor module and/or inverter PCB, try to replace compressor as well. If the error does not recur, connect the Mente PC and continue to collect data



is reset for both indoor unit and outdoor unit, the set addresses will not be confirmed



Note: If the error does not recur, connect the Mente PC and continue to collect data.



Note: After completing the above procedure, reset the power and confirm that the error display does not recur. Unless the power is reset for both indoor unit and outdoor unit, the set addresses will not be confirmed



Note: If the error does not recur, connect the Mente PC and continue to collect data.



Note: Check whether the indoor unit is connected to other outdoor superlink network. If the error does not recur, connect the Mente PC and continue to collect data.











Note: If the error does not recur, connect the Mente PC and continue to collect data.


Note: If the error does not recur, connect the Mente PC and continue to collect data.



Note: If the error does not recur, connect the Mente PC and continue to collect data.



Note: Indoor unit detected emergency stop signal gives command "all stop"

PCB012D017A

## 8.4 Outdoor unit control PCB replacement procedure

	Pr	ecautions fo	r Safety
<ul> <li>Since the following WARNING and CAU</li> <li>WARNING</li> <li>WARNING</li> <li>CAUTION</li> <li>II</li> </ul>	precaution is the JTION are descr ndicates an immi proper safety pro ndicates a poten if proper safety p	e important contents for ibed as follows: inently hazardous situat ocedures and instruction tially hazardous situation procedures and instruction	safety, be sure to observe them. ion which will result in death or serious injury if as are not adhered to. n which may result in minor or moderate injury ons are not adhered to.
			ING
<ul> <li>Securely replace PC If PCB is incorrectly</li> <li>Be sure to check th The PCB replaceme</li> <li>After nishing PCB re distribution, If PCB</li> </ul>	CB according to replace, it will c at the power sou ent under current eplacement, che is incorrectly rep	this following instructior ause an electric shock ource for the outdoor unit carrying will cause an ource that wiring is correctly alace, it will cause an ele	n. or re . is turned OFF before replace PCB, electric shock. y c onnected with the PCB before power actric shock or re.
			ION
Bundle the wiring set	o as not to tense	because it will cause a	n electric shock.
(Note) If cut the tie, t • Exchange th 1. Replace the <u>(Be sure to 1</u> and <u>check th</u> 2. Disconnect 3. Disconnect 4. Set the setti 5. Tighten up a 6. Connect the <u>CNEEV1</u> <u>CNTH</u> <u>CNTH</u> <u>CNTP2</u>	he wiring cables sl e control PCB acc control PCB <u>after</u> of measure voltage (D nat the voltage is dir the connectors fro- the blue wiring pa ng switches (SW1- a screw after passing connectors to the CNFAN_2 CNA2 %2	hould be bound with new t ording to the following pro- elapsing 3 minutes from po OC) at both capacitor termin scharged completely. (Refe m the PCB. ssing through CT1 on the 1 -6) of new PCB same as pr ng blue wiring through CT PCB. (Contirm the connect CNFAN_1 CNQ3 %2 CNFAN_1 CNQ3 %2	ie again. becedure. wer OFF. als (1. Power supply for PCB 2. Power supply for fan motor) r to Fig.1)) PCB before replace the coutrol PCB. revious PCB. '1 of the changed. tors are not half inserted.) CNW CNX1 After elapsing 3 minutes from power OFF
CNB2 CNUI CNF2 CNF1 CNF1 CNF2 CNS1 CNS2 CNG2 CNI CNG2 CNI CNG2 CNI CNG2 CNI CNG2 CNI CNG2 CNI CNI CNG2 CNI CNI CNI CNI CNI CNI CNI CNI CNI CNI	CNN6 CNR1	CNN2 CNN1 CNM1	*1 Reuse the parts used before the PCB exchange. *2 Please do not carry out wrong insertion. The PCB will be destroyed if a mistake is made in nutting CNA2 (brown) and CNO3 (yellow)



Fan motor voltage measurement point

Fig.1 Voltage measurement points



Appearance of the controller

### 8.5 Inverter PCB replacement procedure

## PCB012D018AB





Fig.1 Voltage Measurement Points



· Procedure on tightening harness (snubber capacitor) and power transistor with screw.

A metallic connection binder is set in each hole of the inverter PCB of "P", "N", "U", "V", and "W' beforehand. Then tighten the harness (snubber capacitor) and the power transistor with the screw together. (Connect snubber capacitor with "P" and "N".)

## 8.6 Outdoor unit transistor module replacement procedure

PCB012D008A

<ul> <li>Since the following WARNING and CA</li> </ul>	and a first in the incompany contracts from a first the same to all some the second
	UTION are described as follows:
<b>A</b> WARNING	Indicates an imminently hazardous situation which will result in death or serious injury if
	proper safety procedures and instructions are not adhered to.
	ndicates a potentially hazardous situation which may result in minor or moderate injury if proper safety procedures and instructions are not adhered to.
<ul> <li>Securely exchange If the transistor mo</li> </ul>	the transistor module according to this procedure.
<ul> <li>Be sure to check t module. The transi</li> </ul>	hat the power source for the outdoor unit is turned OFF before exchanging the transistor stor module exchange under current-carrying will cause an electric shock.
<ul> <li>After finishing the tr before power distrik</li> </ul>	ansistor module exchange, check that wiring is correctly connected with the transistor module bution. If the transistor module is incorrectly exchanged, it will cause an electric shock or fire.
<ul> <li>Band the wiring so</li> </ul>	as not to tense because it will cause an electric shock.
It is recommended to	o exchange the transistor module according to the following procedure.
1. Start the rep	placing work ten minutes after turning off the power. (Be sure to measure the voltage (DC)
between th	e capacitor terminals (P,N of transistor module or connector terminals of fan motor power etc.)
to check the	at the capacitor have been discharged completely.)
2. Disassemb	le the control box.
3. Disconnect	with the wire (U,V,W,P,N) to the transistor module.
(See Fig 1.	Parts Arrangement View)
4. Pull up the	inverter substrate from transistor module.
Remove tra	insistor module after removing the screw for transistor module.
5. Attach the	transistor module. Coat the transistor module where its reverse-side all over
With access	ories silicone grease (MRE equipment SA03434 or SA01846)uniformiy.
7. Connect w	ith the wire (UVWPN) to the transistor module
8. Assemble t	he control box as before.
	Connector connected by inverter substrate
P . wire (red) N · wire (blue)	Wire (blue) wire (white) wire (red)

#### Function of Dip switch for contorl (SW3, 4, 5)

• SW3 (Function setting)

Switch		Function	
SW2 1	ON	Inspection LED reset	
5 W 3-1	OFF	Normal	
SW2 7	ON	Forced cooling/heating	
5 ₩ 3-7	OFF	Normal	

Function

Defrost time Cold weather region

External input Level input

External input Pulse input

Defrost time Normal

#### • SW4 (Change demand ratio)

Switch			Function	
	ON		OFF	Compressor capacity 60%
SW4-5	UN	SW4-6	ON	Compressor capacity 0%
	OFF		OFF	Compressor capacity 80%
			ON	Compressor capacity 40%

• SW5 (Function setting)

#### ON/OFF Function ON Test run switch Test run SW5-1 OFF Test run switch Normal ON Test run operation mode Cooling SW5-2 OFF Test run operation mode Heating ON Pump down switch Pump down SW5-3 OFF Pump down switch Normal ON Super link protocol: Previos SL SW5-5 OFF Super link protocol: New SL

#### • SW4 (Model selection)

Jumper

J13

J15

■ Function of Jumper wire (J13, 15)

With

None

With

None

(With: Shorted / None: Opened)

Switch	SW4					
Model	1	2	3	4		
224	OFF	OFF	OFF	OFF		
280	ON	OFF	OFF	OFF		

#### • SW7, 8, 9 (Function setting)

Switch	Function		
SW7	Data erase/data write		
SW8	7-segment dispalay No.UP	order of 1	
SW9	7-segment dispalay No.UP	order of 10	

#### Function of Connector

Connector	Function	Color	Connector	Function	Color
CNEEV1	Heating EEV	Red	CNF2	Sub-cooling coil thermistor 1	Green
CNEEV2	Sub-cooling coil EEV	White	CNP1	Power transistor thermistor (CM)	Yellow
CNA2	Power fan motor	_	CNL1	High pressure sensor	Blue
CNFAN1	Fan motor 1	White	CNL2	Low pressure sensor	White
CNFAN2	Fan motor 2	Red	CNS1	External input	-
CNQ1	High pressure switch (CM1)	White	CNS2	Demand input	-
CNTH	Heat exchanger thermistor 1 (Exit/front)		CNN1	4-way switching solenoid valve	Red
	Discharge pipe thermistor	White	CNN2	Solenoid valve $\cdot$ oil return (CM1)	Green
	Suction pipe thermistor	white	CNN4	Solenoid valve (gas by pass)	Orange
	External air thermistor		CNN6	Solenoid valve (liquid bypass)	Pink
CNB2	Heat exchanger thermistor 2	Red	CNN9	Solenoid valve (gas bypass)	Black
CNU1	Under-dome thermistor (CM1)	Blue	CMM1	Solenoid valve for CM	Gray
CNF1	Sub-cooling coil thermistor 1	White	CNR1	Crankcase heater	White

# DIP Switch setting list (1) Outdoor unit (a) Control PCB

Switches	Description		De	fault setting	Remarks
SW1	Outdoor address No. (Order of 10)	Outdoor address No. (Order of 10)			0-9
SW2	Outdoor address No. (Order of 1)		9		0-9
SW3-1	Inspection LED reset	Normal*/Reset	OFF	Normal	
SW3-2	Spare	•	OFF		keep OFF
SW3-3	Refresh model selection		ON		keep ON
SW3-4	Reserved		OFF		keep OFF
SW3-5	Check operation start	Normal*/Start	OFF	Normal	
SW3-6	Pipe washing operation	Normal*/Start	OFF	Normal	
SW3-7	Forced heating/cooling	Normal*/Forced	OFF	Normal	
SW3-8	Reserved		OFF		keep OFF
SW4-1					
SW4-2	· · · · · · · ·				
SW4-3	Model selection		As per	model	See table 1
SW4-4					
SW4-5			OFF		
SW4-6	Demand ratio selection		OFF		See table 2
SW4-7	Reserved		OFF		Keep OFF
SW4-8	Spare		OFF		Keep OFF
SW5-1	Test run SW	Normal*/Test run	OFF	Normal	
SW5-2	Test run mode	Heating*/Cooling	OFF	Heating	
SW5-3	Pump down operation	Normal*/Pump down	OFF	Normal	
SW5-4	Reserved		OFF		Keep OFF
SW5-5	Superlink selection	New SL*/Previous SL	OFF	New SL(Auto)	
SW5-6	Reserved		OFF		Keep OFF
SW5-7	Reserved		OFF		Keep OFF
SW5-8	Reserved		OFF		Keep OFF
SW6-1	Reserved		OFF		Keep OFF
SW6-2	Reserved		OFF		Keep OFF
SW6-3	Spare		OFF		Keep OFF
SW6-4	Spare		OFF		Keep OFF
SW6-5	Spare		OFF		Keep OFF
SW6-6	Spare		OFF		Keep OFF
SW6-7	Spare		OFF		Keep OFF
SW6-8	Spare		OFF		Keep OFF
SW7	Data Erase/Write	Erase*/Write	OFF	Erase	
SW8	7-segment display code No. increase (Or	der of 1)	0		1
SW9	7-segment display code No. increase (Or	der of 10)	0		1
J10	Superlink terminal spare	Normal*/switch to spare	With	Normal	
J11					
J12	Power voltage selection		As per voltage		See table 3
J13	External input	Level*/Pulse	With	Level	1
J14	Spare		With		Keep With
J15	Defrost start temperature	Normal*/Cold region	With	Normal	
J16	Outdoor unit type selection	· · · · · · · · · · · · · · · · · · ·	AS per	model	See table 1
* Default setting					

Table 1: Model selection with SW4-1-SW4-4 and J16 0: OFF 1:ON

		0: OF	F
	224	280	
SW4-1	0	1	
SW4-2	0	0	
SW4-3	0	0	
SW4-4	0	0	
J16	None	None	

 Table 2: Demand ratio selection with SW4-5, SW4-6

 2: OFF 1:0N

		U: OFF T:ON			
SW4-5	SW4-6	Compressor capacity (%)			
0	0	80			
1	0	60			
0	1	40			
1	1	0			
Table 3: Power voltage selection with J11, J12					

able o. I ower voltage select		
		0: None 1: Witl
Outdoor unit	J11	J12
380/415V 50Hz	0	0

#### (2) Indoor unit

Switches	Description		De	fault setting	Remarks
SW1	Indoor unit address No. (Order of 10)		0		0-9
SW2	Indoor unit address No. (Order of 1)		0		0-9
SW3	Outdoor unit address No. (Order of 10	0)	4		0-9
SW4	Outdoor unit address No. (Order of 1)	)	9		0-9
SW5-1	Superlink selection	Automatic*/Previous SL	OFF	Automatic	
SW5-2	Indoor unit address No. (Order of 100	)	OFF	0	OFF: 0, ON: 1
SW6-1					
SW6-2	Madel coloritor				Can table 1
SW6-3	Model selection		As per model		See table 1
SW6-4					
SW7-1	Test run, Drain motor	Normal*/Test run	OFF	Normal	
SW7-2	Reserved		OFF		keep OFF
SW7-3	Spare		OFF		keep OFF
SW7-4	Reserved		OFF		keep OFF
JSL1	Superlink terminal spare	Normal*/switch to spare	With	Normal	
		* Default setting			

Table 1: Indoor unit model selection with SW6-1-SW6-4

Table 1: Indoor unit model selection with SW0-1-SW0-4													
											0: OFF 1:ON		
	P22	P28	P36	P45	P56	P71	P90	P112	P140	P160	P224	P280	
SW6-1	0	1	0	0	0	0	0	1	0	1	0	1	
SW6-2	0	0	1	0	1	0	1	1	0	0	1	1	
SW6-3	0	0	0	1	1	0	0	0	1	1	1	1	
SW6-4	0	0	0	0	0	1	1	1	1	1	1	1	

## **VRF INVERTER MULTI-SYSTEM AIR CONDITIONERS**

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