



TECHNICAL MANUAL

VRF INVERTER MULTI-SYSTEM AIR-CONDITIONERS

(OUTDOOR UNIT)

KXZ series

- Single use (Used also for combination)
FDCB224KXZE1, 280KXZE1, 335KXZE1
- Combination use
FDCB450KXZE1, 500KXZE1, 560KXZE1, 615KXZE1, 670KXZE1, 735KXZE1, 800KXZE1,
850KXZE1, 900KXZE1, 950KXZE1, 1000KXZE1

· Note:
(1) Regarding the indoor unit series, refer to the No.'14·KX-DB-206,'14·KX-T-222 and '15·KX-T-235.

PREFACE

Combination table for KX4, KX6 and KXZE1 series

Category	Outdoor unit		Connectable remote control		Indoor unit							
					Same series	Same series	Mixed series	Mixed series	Mixed series	Same or Mixed series	Mixed series	Same series
			3-wire type	RC-E1	KXE4	KXE4(A) KXE4A	KXE4A	KXE4A	KXE4A			
3-wire type	RC-E1R			KXE4R KXE4BR KXE5R	KXE4R KXE4BR KXE5R		KXE4R KXE4BR KXE5R					
2-wire type	RC-E3 RC-E4 RC-E5 RC-EX1A					KXE6 KXE6A KXE6B KXE6D KXE6F KXZE1	KXE6 KXE6A KXE6B KXE6D KXE6F KXZE1			KXE6 KXE6A KXE6B KXE6D KXE6F KXZE1	KXE6 KXE6A KXE6B KXE6D KXE6F KXZE1	
Heat pump (2-pipe) systems	FDCA-HKXE4	5HP			YES[D]	YES[D]	NO	NO	NO	NO	NO	NO
	FDCA-HKXE4	8-48HP			NO	YES[D]	NO	NO	NO	NO	NO	NO
	FDCA-HKXE4A FDCA-HKXE4R	5HP 5,6HP			NO	YES[D]	YES[D]*1	NO	NO	YES[D]*1	NO	NO
	FDCA-HKXE4A FDCA-HKXE4R FDCA-HKXE4BR FDCA-HKXE4D	8-48HP 8-48HP 8-48HP 8-48HP			NO	YES[D]	YES[D]	YES[D]	YES[D]	YES[D]	YES[D]	YES[D]
	FDC-KXE6	4,5,6HP			NO	NO	NO	NO	NO	NO	NO	YES[B]*6
	FDC-KXE6	8-48HP			NO	NO	NO	NO	NO	YES[C]	YES[C]	YES[B]
	FDCB-KXZE1	8-36HP			NO	NO	NO	NO	NO	NO	NO	YES[A]

Note (1) YES: Connectable (See following table in detail), NO: Not connectable

*1 Except FDKA71KXE5R

	Outdoor unit	Connected indoor unit		Dip switch setting of outdoor unit KXZE1/KXE6	Superlink protocol	Limitation
		Same series	Mixed series			
YES[A]*2	KXZE1	KXE6		II (New)	New (for KXZE1/KXE6)	New (for KXZE1/KXE6)
YES[B]*2	KXE6	KXE6		II (New)	New (for KXZE1/KXE6)	New (for KXZE1/KXE6)
YES[C]	KXE6	KXE4 series	KXE6 & KXE4 series	I (Previous)	Previous (for KXE4)	Previous (for KXE4)
YES[D]	KXE4 series	KXE4 series	KXE4 series		Previous (for KXE4)	Previous (for KXE4)

*2 If outdoor unit system (YES [A] or YES [B]) is connected to other outdoor unit systems (YES [C] and/or YES [D]) in one Superlink network, the dip switch of outdoor unit KXZE1 (YES [A]) or KXE6 of (YES [B]) should be set from II(New) to I (Previous). In this case the Superlink protocol and limitation of outdoor unit system (YES [A] or YES [B]) are switched to Previous (for KX4).

(2) Combination with new central control, PC windows central control and BMS interface unit

		Central control, PC windows central control and BMS interface unit					
		SC-SL1N-E	SC-SL2NA-E	SC-SL4-AE/BE	SC-WGWNB-A/B	SC-LGWNA-A	SC-BGWNA-A/B
YES[A] & YES[B]	Connectable I/U	16	64	128 (128x1)	128 (64x2)*3	96 (48x2)	128 (64x2)*3
	Superlink protocol	New	New	New	New	New	New
	Connectable network	1	1	1	2	2	2
YES[C] & YES[D]	Connectable I/U	16	48	144 (48x3)	96 *4 (48x2)	96 *4 (48x2)	96 *4 (48x2)
	Superlink*5 protocol	Previous	Previous	Previous	Previous	Previous	Previous
	Connectable network	1	1	3	2	2	2

*3 Maximum number of AC cell is limited up to 96.

In case the number of connected indoor units are more than 96, some AC cells should hold 2 or more indoor units.

*4 In case of other central control like SC-SLxN-E is connected in the same network, the connectable indoor unit is limited up to 64(32x2).

*5 In case of previous Superlink protocol, the Superlink mode of new central control should be set "Previous".

*6 In case of (YES[A] or YES[B]), previous central control is available to use. But the limitation of connectable indoor unit and so on is complied with the rule of previous Superlink.

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1. GENERAL INFORMATION

1.1 Specific features

Connectable indoor capacity

Capacity from 80% to 130% is possible.

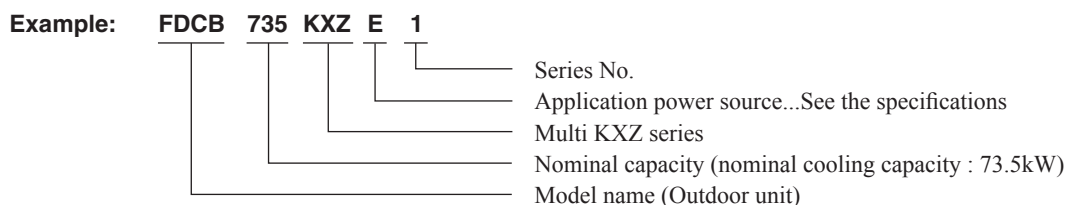
Model \ Item	Number of connectable units			Connectable capacity
FDCB224KXZE1	1	to	19	180 — 291
FDCB280KXZE1	1	to	24	224 — 364
FDCB335KXZE1	1	to	29	268 — 435
FDCB450KXZE1	2	to	39	360 — 585
FDCB500KXZE1	2	to	43	400 — 650
FDCB560KXZE1	2	to	48	448 — 728
FDCB615KXZE1	2	to	53	492 — 799
FDCB670KXZE1	2	to	58	536 — 871
FDCB735KXZE1	3	to	63	588 — 955
FDCB800KXZE1	3	to	69	640 — 1040
FDCB850KXZE1	3	to	73	680 — 1105
FDCB900KXZE1	3	to	78	720 — 1170
FDCB950KXZE1	3	to	80	760 — 1235
FDCB1000KXZE1	3	to	80	800 — 1300

Note

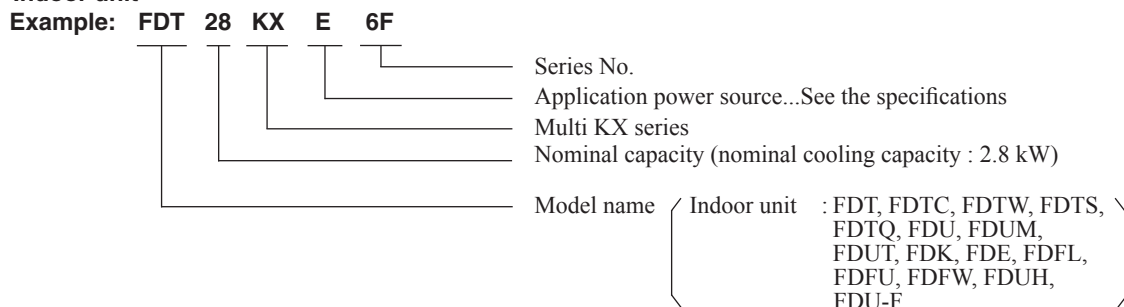
For outdoor unit, EN61000-3-2 and EN61000-3-12 are not applicable as consent by the utility company or notification to the utility company is given before usage.

1.2 How to read the model name

(1) Outdoor unit



(2) Indoor unit



1.3 Table of models

Model	Capacity													
	15	22	28	36	45	56	71	90	112	140	160	224	280	
Ceiling cassette-4 way type (FDT)			○	○	○	○	○	○	○	○	○			
Ceiling cassette-4 way compact type (FDTC)	○	○	○	○	○	○								
Ceiling cassette-2 way type (FDTW)			○		○	○	○	○	○	○				
Ceiling cassette-1 way type (FDTS)					○		○							
Ceiling cassette-1 way compact type (FDTQ)		○	○	○										
Duct connected-High static pressure type (FDU)					○	○	○	○	○	○	○	○	○	
Duct connected-Low/Middle static pressure type (FDUM)		○	○	○	○	○	○	○	○	○	○			
Duct connected (thin)-Low static pressure type (FDUT)	○	○	○	○	○	○	○							
Wall mounted type (FDK)		○	○	○	○	○	○							
Ceiling suspended type (FDE)				○	○	○	○		○	○				
Floor standing (with casing) type (DFL)							○							
Floor standing (without casing) type (DFU)			○		○	○	○							
Floor standing-2 way type (DFW)		○		○	○									
Duct connected (Compact and Flexible) type (FDUH)		○	○	○										
Outdoor air processing unit (FDU-F)								○ (650)		○ (1100)		○ (1800)	○ (2400)	
Outdoor units to be combined (FDC)	FDCB224KXZE1-FDCB1000KXZE1													

Note (1) Reference No. of data book or technical manual : '14-KX-DB-206 , '14-KX-T-222 and '15-KX-T-235.

1.4 Outdoor units combination table

Models	Item	Combination outdoor unit models			Indoor unit	
		FDCB224 KXZE1	FDCB280 KXZE1	FDCB335 KXZE1	Connectable capacity	Number of connectable units
FDCB450KXZE1		2	-	-	360 – 585	2 to 39 units
FDCB500KXZE1		1	1	-	400 – 650	2 to 43 units
FDCB560KXZE1		-	2	-	448 – 728	2 to 48 units
FDCB615KXZE1		-	1	1	492 – 799	2 to 53 units
FDCB670KXZE1		-	-	2	536 – 871	2 to 58 units
FDCB735KXZE1		2	1	-	588 – 955	3 to 63 units
FDCB800KXZE1		1	2	-	640 – 1040	3 to 69 units
FDCB850KXZE1		-	3	-	680 – 1105	3 to 73 units
FDCB900KXZE1		-	2	1	720 – 1170	3 to 78 units
FDCB950KXZE1		-	1	2	760 – 1235	3 to 80 units
FDCB1000KXZE1		-	-	3	800 – 1300	3 to 80 units

(a) Outdoor unit side branch pipe set (Option)

Outdoor unit	Branch pipe set
For two units (for FDCB450KXZE1-670KXZE1)	DOS-2A-3
For three units (for FDCB730KXZE1-1000KXZE1)	DOS-3A-3

Note (1) Be sure to use this when combining units.

(b) 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
371 or more but less than 540	DIS-371-1G
540 or more	DIS-540-3

(c) 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
371 or more but less than 540	HEAD8-371-2	8 branches at the most
540 or more	HEAD8-540-3	8 branches at the most

2. OUTDOOR UNIT

2.1 Specification

- Single use (Used also for combination)

Models			FDCB224KXZE1	FDCB280KXZE1	FDCB335KXZE1
Power source			3 Phase 380 - 415V 50Hz, 380V 60Hz		
Starting current		A	5		
Maximum current		A	18.2	21.2	21.2
Nominal cooling capacity	ISO-T1*1	kW	22.4	28.0	33.5
	ISO-T3*2		20.7	24.5	29.3
Nominal heating capacity*3			25.0	31.5	37.5
Power consumption	Cooling	ISO-T1	4.98	7.24	8.96
		ISO-T3	6.04	8.00	9.83
Heating			5.56	7.28	9.04
Running current	Cooling	ISO-T1	8.7 - 8.0	11.9 - 10.9	14.6 - 13.4
		ISO-T3	10.1 - 9.2	13.1 - 12.0	16.0 - 14.6
	Heating		9.6 - 8.8	12.0 - 11.0	14.8 - 13.5
Power factor	Cooling	ISO-T1	87 - 87	92 - 92	93 - 93
		ISO-T3	91 - 91	92 - 92	93 - 93
	Heating		88 - 88	92 - 92	93 - 93
Sound pressure level(Cooling/Heating)		dB(A)	56/57	55/57	61/58
Exterior dimensions					
Height × Width × Depth		mm	1690×1350×720		
Net weight		kg	272		
Refrigerant equipment compressor type & Q'ty			GTC5150NC47LF × 1		
Motor		kW	3.23 × 1	4.76 × 1	5.94 × 1
Starting method			Direct line starting		
Crankcase heater		W	33 × 1		
Refrigerant equipment Heat exchanger			M fin & inner grooved tubing		
Refrigerant control			Electronic expansion valve		
Refrigerant			R410A		
Quantity		kg	11.0		
Refrigerant oil		L	2.25(M-MA32R)		
Defrost control			Microcomputer controlled De-Icer		
Air handling equipment fan type & Q'ty			Propeller fan × 2		
Motor		W	386 × 2		
Starting method			Direct start		
Air flow(Standard) (Cooling/Heating)		m ³ /min	220/200	220/200	280/200
Static pressure		Pa	MAX. 50		
Shock & vibration absorber			Rubber mount(for compressor)		
Safety equipment			Compressor overheat protection / Overcurrent protection / Power transistor overheating protection / Abnormal high pressure protection		
Installation data			Liquid line : φ 9.52(3/8")		
Refrigerant piping size		mm(in)	Gas line : φ 19.05(3/4")	Gas line : φ 22.22(7/8")	Liquid line : φ 12.7(1/2") Gas line : φ 25.4(1")
Connecting method			Gas line : Brazing / Liquid line : Flare		
MAX. Pressure		MPa	High 4.15 Low 2.21		
Drain			Hole for drain(φ 20 × 10pcs , φ 45 × 3pcs)		
Insulation for piping			Necessary(both Liquid & Gas lines)		
Accessories			—	—	—

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

Adapted to RoHS directive

Standards	Item	Indoor air temperature		Outdoor air temperature		
		DB	WB	DB	WB	
*1	ISO-T1	Cooling	27 °C	19 °C	35 °C	24 °C
*2	ISO-T3	Cooling	29 °C	19 °C	46 °C	24 °C
*3	ISO-H1	Heating	20 °C	—	7 °C	6 °C

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1, T3, H1 "UNITARY AIR-CONDITIONERS"

PCB004Z081

• Combination use

Model			FDCB450KXZE1	FDCB500KXZE1	FDCB560KXZE1	FDCB615KXZE1	FDCB670KXZE1
Combination unit			FDCB224KXZE1	FDCB224KXZE1	FDCB280KXZE1	FDCB280KXZE1	FDCB335KXZE1
			FDCB224KXZE1	FDCB280KXZE1	FDCB280KXZE1	FDCB335KXZE1	FDCB335KXZE1
Power source			3 Phase 380-415V 50Hz , 380V 60Hz				
Starting current		A	10				
Maximum current		A	36.4	39.4	42.4	42.4	42.4
Nominal cooling capacity	ISO-T1*1	kW	45.0	50.0	56.0	61.5	67.0
	ISO-T3*2		41.5	45.2	49.0	53.8	58.6
Nominal heating capacity*3			50.0	56.0	63.0	69.0	75.0
Power consumption	Cooling	kW	10.00	12.05	14.47	16.20	17.92
	Heating		12.11	14.04	16.00	17.83	19.66
Running current	Cooling	A	17.5-16.0	20.6-18.8	23.9-21.9	26.5-24.3	29.2-26.8
	Heating		20.2-18.5	23.4-21.5	26.4-21.2	29.1-26.7	32.1-29.4
Power factor	Cooling	%	87-87	89-89	92-92	93-93	93-93
	Heating		91-91	91-91	92-92	93-93	93-93
Net weight		kg	544				
Refrigerant piping size	Liquid line	mm	φ 12.7				
	Gas line		φ 28.58				
	Oil equalization line		φ 9.52				

Model			FDCB735KXZE1	FDCB800KXZE1	FDCB850KXZE1	FDCB900KXZE1	FDCB950KXZE1	FDCB1000KXZE1
Combination unit			FDCB224KXZE1	FDCB224KXZE1	FDCB280KXZE1	FDCB280KXZE1	FDCB280KXZE1	FDCB335KXZE1
			FDCB224KXZE1	FDCB280KXZE1	FDCB280KXZE1	FDCB280KXZE1	FDCB335KXZE1	FDCB335KXZE1
Power source			3 Phase 380-415V 50Hz , 380V 60Hz					
Starting current		A	15					
Maximum current		A	57.6	60.6	63.6	63.6	63.6	63.6
Nominal cooling capacity	ISO-T1*1	kW	73.5	80.0	85.0	90.0	95.0	100.0
	ISO-T3*2		65.9	69.7	73.5	78.3	83.1	87.9
Nominal heating capacity*3			82.5	90.0	95.0	100.0	106.0	112.0
Power consumption	Cooling	kW	17.26	19.76	21.98	23.55	25.15	26.75
	Heating		20.08	22.04	24.00	25.83	27.66	29.49
Running current	Cooling	A	29.8-27.3	33.4-30.5	36.3-33.2	38.9-35.6	41.1-37.6	43.7-40.0
	Heating		33.5-30.7	36.8-33.7	39.6-36.3	42.7-39.1	45.2-41.4	48.2-44.1
Power factor	Cooling	%	88-88	90-90	92-92	92-92	93-93	93-93
	Heating		91-91	91-91	92-92	92-92	93-93	93-93
Net weight		kg	816					
Refrigerant piping size	Liquid line	mm	φ 15.88					
	Gas line		φ 31.75					
	Oil equalization line		φ 9.52					

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

Adapted to RoHS directive

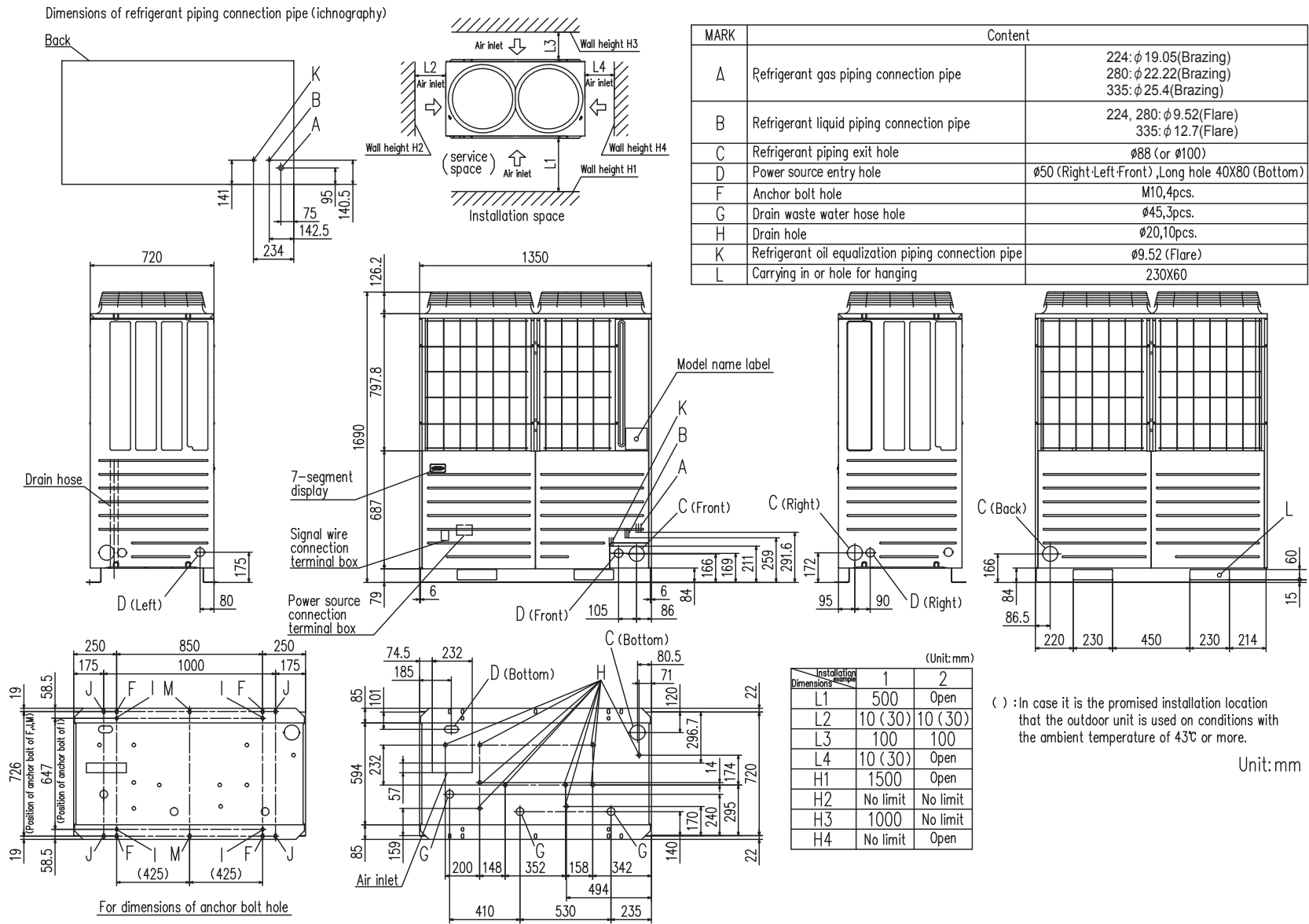
Standards	Item	Indoor air temperature		Outdoor air temperature		
		DB	WB	DB	WB	
*1	ISO-T1	Cooling	27 °C	19 °C	35 °C	24 °C
*2	ISO-T3	Cooling	29 °C	19 °C	46 °C	24 °C
*3	ISO-H1	Heating	20 °C	-	7 °C	6 °C

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1, T3, H1 "UNITARY AIR-CONDITIONERS"

PCB004Z081

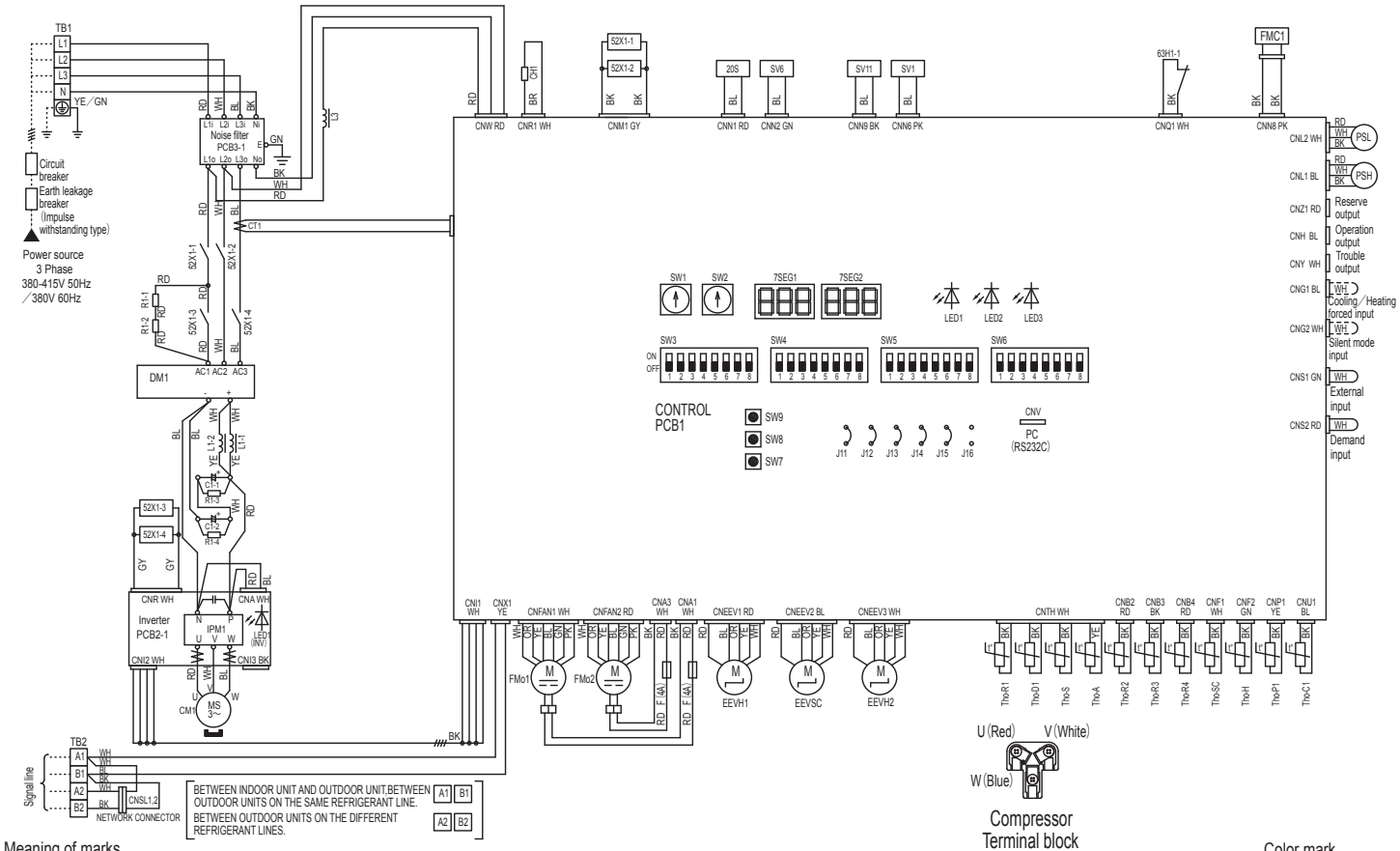
2.2 Exterior dimensions

Models FDCB224KXZE1, 280KXZE1, 335KXZE1



2.3 Electrical wiring

Models FDCB224KXZE1, 280KXZE1, 335KXZE1



Meaning of marks

Mark	Parts name
CH1	Crankcase heater
CM1	Compressor motor
CNA-Z	Connector
CT1	Current sensor
C1-1,2	Electrolytic capacitor
DM1	Diode module
EEVH1,2	Expansion valve for heating
EEVSC	Expansion valve for SC
F	Fuse
FMC1	Fan for IPM
FMo1,2	Blower motor
IPM	Intelligent power module
J11,12	Set up model (volt)
J13	External input select level / pulse
J14	Defrost recover temp
J15	Defrost start temp
J16	Spare
LED1	Inspection (Red)
LED1 (INV)	Normal (Yellow)-Flashing
LED2	Normal (Green)
LED3	Service (green for service)
L1-1,2	D.C.reactior
L3	D.C.reactior

Mark	Parts name
PSH	High pressure sensor
PSL	Low pressure sensor
PWB1-3	Printed wiring board (PCB)
R1-1-1,4	Rush current suppression resistor
SV1	Solenoid valve (CM1.bypass)
SV6	Solenoid valve (oil separator CM1)
SV11	Solenoid valve (gas bypass)
SW1	Address setting SW outdoor unit No. (2 digits)
SW2	Address setting SW outdoor unit No. (1 digit)
SW3-1	Inspection LED reset
SW3-2	Auto backup operation
OFF	Regular operation
SW3-3	Spare
SW3-4	Refrigerant quantity check
OFF	Regular operation
SW3-5	ON Check operation
OFF	Regular operation
SW3-6	Spare
SW3-7	ON Forced cooling / heating
OFF	Regular operation
SW3-8	Spare

Mark	Parts name
SW4-1,4	Model setting
SW4-5	Spare
SW4-6	Spare
SW4-7	Address setting switch (master-slave)
SW4-8	Address setting switch (master-slave)
SW5-1	ON Trial operation
OFF	Regular operation
SW5-2	ON Trial operation mode / cooling
OFF	Trial operation mode / heating
SW5-3	ON Pump down operation
OFF	Regular operation
SW5-4	Spare
SW5-5	ON Superlink communication
OFF	Superlink communication
SW5-6-8	OFF Regular operation
SW6-1-3	Spare
SW6-4	ON High Head
OFF	Standard
SW7	Data clear / insert
SW8	7-segment indicate (unit's place)
SW9	7-segment indicate (ten's place)

Mark	Parts name
TB1.2	Terminal block
Tho-A	External air thermistor
Tho-C1	Under-dome thermistor
Tho-D1	Discharge pipe thermistor
Tho-H	Sub-cooling coil thermistor 2
Tho-P1	Power transistor thermistor
Tho-R1	Heat exchanger thermistor (exhaust)
Tho-R2	Heat exchanger thermistor (exhaust)
Tho-R3	Heat exchanger thermistor (inlet)
Tho-R4	Heat exchanger thermistor (inlet)
Tho-S	Suction pipe thermistor
Tho-SC	Sub-cooling coil thermistor 1
20S	4way valve
5ZX1-1-14	Solenoid for CM
63H1-1	High pressure switch (for protection)
7SEG1	7-segment L.E.D. (function indication)
7SEG2	7-segment L.E.D. (data indication)

PCB004Z083

2.4 Noise level

Measured based on JIS B 8616

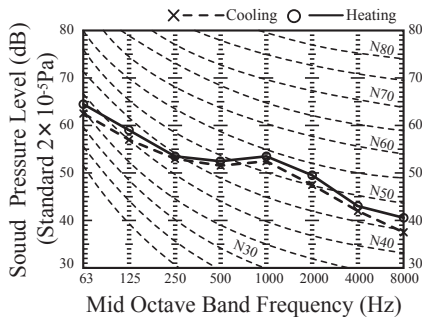
Mike position as highest noise level in position as below

Distance from front side 1m

Height 1m

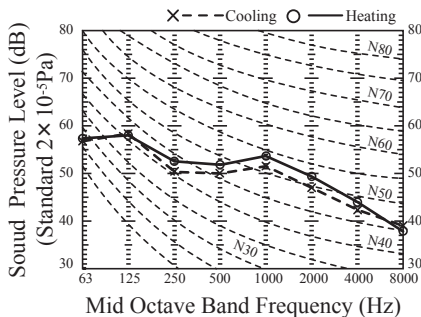
Model FDCB224KXZE1

Noise level 56 dB (A) at cooling
57 dB (A) at heating



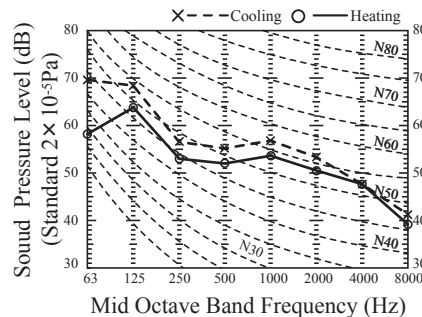
Model FDCB280KXZE1

Noise level 55 dB (A) at cooling
57 dB (A) at heating



Model FDCB335KXZE1

Noise level 61 dB (A) at cooling
58 dB (A) at heating



3. RANGE OF USAGE & LIMITATIONS

• Single use (also for combination use)

System		FDCB224KXZE1	FDCB280KXZE1	FDCB335KXZE1
Item				
Indoor air temperature (Upper, lower limits)		Refer to page 15		
Outdoor air temperature (Upper, lower limits)				
Indoor units that can be used in combination	Number of connected units	1 to 19 units	1 to 24 units	1 to 29 units
	Connectable capacity	180 - 291	224 - 364	268 - 435
Total piping length ⁽¹⁾		1000m or less		
Main pipe length		130m or less		
Single direction piping length		Actual length : 160m or less, Equivalent length : 185m or less		
Allowable pipe length from the first branching		90m or less (However, difference between the longest and shortest piping : 40m or less ⁽⁵⁾)		
Elevation difference between the first branching point and the indoor unit		18m or less		
Difference in height between indoor and outdoor units	Outdoor unit is higher	50m or less (Max. 70m or less) ^{(4), (6)}		
	Outdoor unit is lower	40m or less ⁽²⁾		
Difference in the elevation of indoor units in a system		18m or less		
Indoor unit atmosphere (behind ceiling) temperature and humidity (Only models FDT, FDTC, FDTW, FDTS, FDTQ, FDU, FDUM, FDUT, FDUH, FDU-F)		Dew point temperature 28 °C or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU, FDFW : Dew point temperature 23 °C or less, relative humidity 80% or less)		
Compressor stop/start frequency	1 cycle time	5 min or more (from stop to stop or from start to start)		
	Stop time	3 min or more		
Power source voltage	Voltage fluctuation	Within ±10% of rated voltage		
	Voltage drop during start	Within -15% of rated voltage		
	Phase unbalance	Within 3%		

Note (1) When the pipe extension length exceeds 510 m, additional refrigerant oil must be charged (1,000 cc).

(2) It must be less than 30 m when conducting the cooling operation with the outdoor air temperature lower than 10 °C.

(3) If Superlink I (previous Superlink) is selected, all the range of usage and limitations, not only the limitations of connectable indoor capacity and connectable number of indoor unit but also of the piping length, operating temperature range and etc., become same as those of KX4 (See technical manual '07-KX-KXR-T-114). In addition to above limitations, all of new functions for KX6 and KXZ such as automatic address setting function for multiple refrigerant systems and etc. will be cancelled.

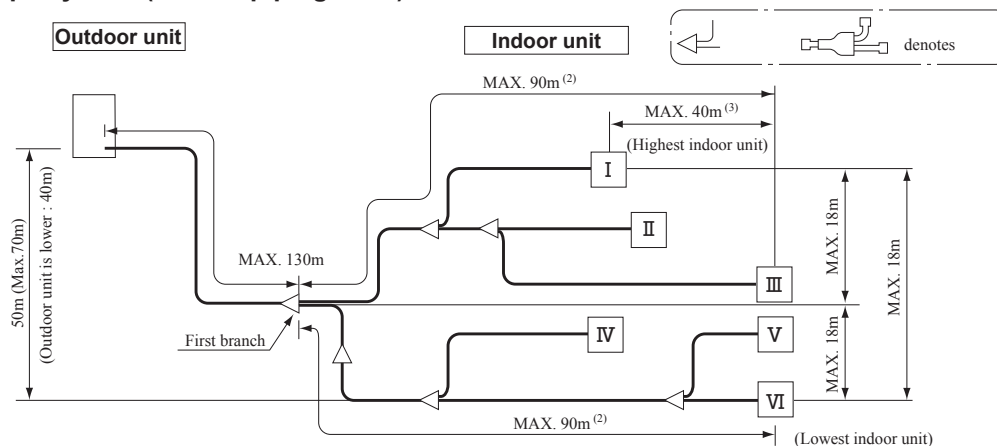
(4) When it is required to install in a range of 50 to 70 m, the limitation of use, etc. are different from those described here. For details, refer to page 16.

(5) When it is required to install in the difference between the longest and shortest piping more than 40m, refer to page 17.

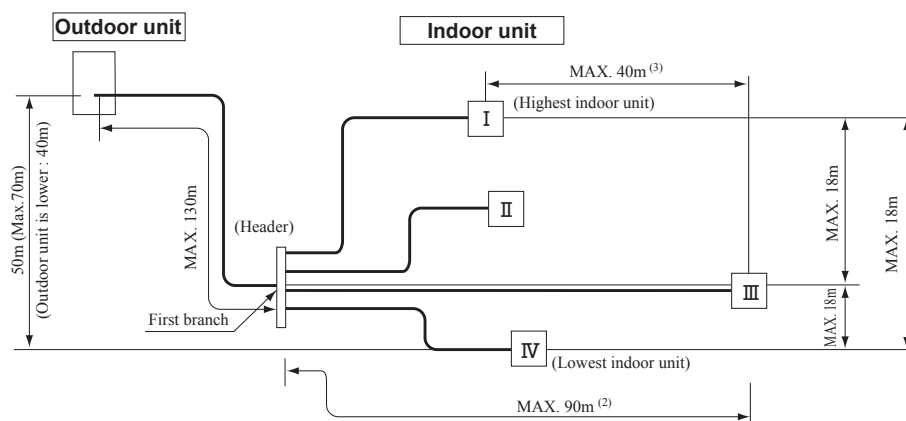
(6) The elevation difference must be less than 40m, when it is required to use at the outdoor air temperature of 46 °C or more.

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

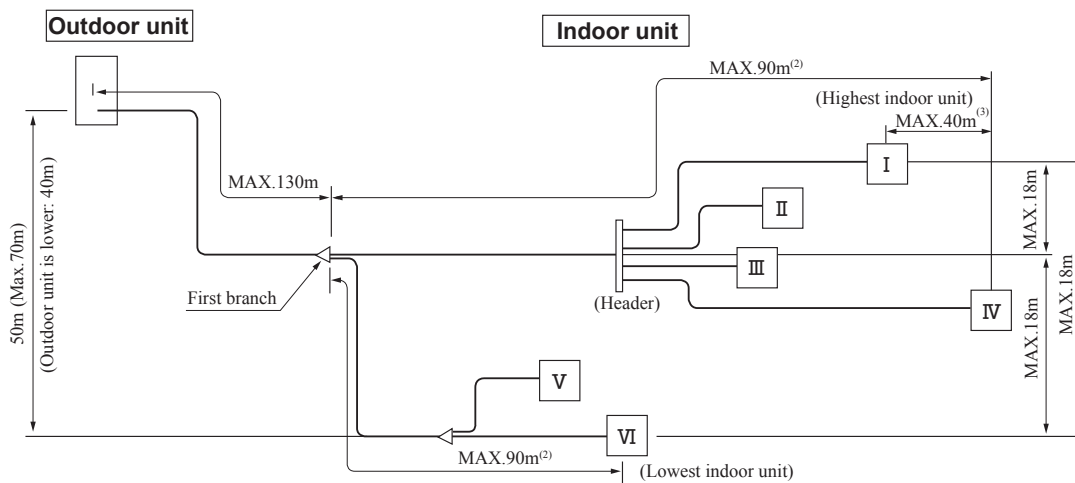
(1) Branch pipe system (Branch piping used)



(2) Header system (Header used)



(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 ⁽³⁾)
- (3) When it is required to install the difference between the longest and shortest piping more than 40m, refer to page 17.

Important

When the Additional refrigerant quantity (P+I) is over the following table, please separate the refrigerant line.

Outdoor unit	P+I (kg)
224-335	40

P: Additional refrigerant quantity for piping (kg)

I: Additional refrigerant quantity for indoor units (kg)

• Combination use

System		FDCB450KXZE1	FDCB500KXZE1	FDCB560KXZE1	FDCB615KXZE1	FDCB670KXZE1
Item						
Indoor air temperature (Upper, lower limits)		Refer to page 15				
Outdoor air temperature (Upper, lower limits)						
Indoor units that can be used in combination	Number of connected units	2 to 39 units	2 to 43 units	2 to 48 units	2 to 53 units	2 to 58 units
	Connectable capacity	360 – 585	400 – 650	448 – 728	492 – 799	536 – 871
Total piping length ⁽¹⁾		1000m or less				
Single direction piping length		Actual length : 160m or less, Equivalent length : 185m or less				
Main pipe length		130m or less				
Allowable pipe length from the first branching		90m or less (However, difference between the longest and shortest piping : 40m or less ⁽⁵⁾)				
Elevation difference between the first branching point and the indoor unit		18m or less				
Difference in height between indoor and outdoor units	Outdoor unit is higher	50m or less (Max.70m or less) ^{(4), (6)}				
	Outdoor unit is lower	40m or less ⁽²⁾				
Difference in the elevation of indoor units in a system		18m or less				
Difference in height between outdoor units (Same system)		MAX. 0.4m				
Difference between an outdoor unit and on outdoor unit side branch pipe		MAX. 5m				
Length of oil equalization piping		MAX. 10m				
Indoor unit atmosphere (behind ceiling) temperature and humidity Only models FDT, FDTC, FDTW, FDTS, FDTQ, FDU, FDUM, FDUT, FDUH, FDU-F		Dew point temperature 28 °C or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU, FDFW : Dew point temperature 23 °C or less, relative humidity 80% or less)				
Compressor stop/start frequency	1 cycle time	5 min or more (from stop to stop or from start to start)				
	Stop time	3 min or more				
Power source voltage	Voltage fluctuation	Within ±10% of rated voltage				
	Voltage drop during start	Within -15% of rated voltage				
	Phase unbalance	Within 3%				

Note (1) When the pipe extension length exceeds 510 m, additional refrigerant oil must be charged (1,000 cc).

(2) It must be less than 30 m when conducting the cooling operation with the outdoor air temperature lower than 10 °C .

(3) If Superlink I (previous Superlink) is selected, all the range of usage and limitations, not only the limitations of connectable indoor capacity and connectable number of indoor unit but also of the piping length, operating temperature range and etc., become same as those of KX4 (See technical manual '07-KX-KXR-T-114). In addition to above limitations, all of new functions for KX6 and KXZ such as automatic address setting function for multiple refrigerant systems and etc. will be cancelled.

(4) When it is required to install in a range of 50 to 70 m, the limitation of use, etc. are different from those described here. For details, refer to page16.

(5) When it is required to install in the difference between the longest and shortest piping more than 40m, refer to page 17.

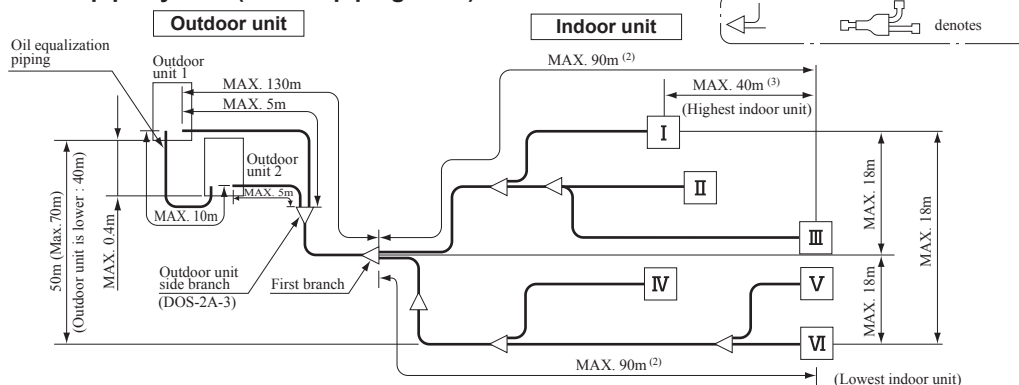
(6) The elevation difference must be less than 40m, when it is required to use at the outdoor air temperature of 46 °C or more.

		System					
Item		FDCB735KXZE1	FDCB800KXZE1	FDCB850KXZE1	FDCB900KXZE1	FDCB950KXZE1	FDCB1000KXZE1
Indoor air temperature (Upper, lower limits)		Refer to page 15					
Outdoor air temperature (Upper, lower limits)							
Indoor units that can be used in combination	Number of connected units	3 to 63 units	3 to 69 units	3 to 73 units	3 to 78 units	3 to 80 units	3 to 80 units
	Connectable capacity	588 – 955	640 – 1040	680 – 1105	720 – 1170	760 – 1235	800 – 1300
Total piping length ⁽¹⁾		1000m or less					
Single direction piping length		Actual length : 160m or less, Equivalent length : 185m or less					
Main pipe length		130m or less					
Allowable pipe length from the first branching		90m or less (However, difference between the longest and shortest piping : 40m or less ⁽⁵⁾)					
Elevation difference between the first branching point and the indoor unit		18m or less					
Difference in height between indoor and outdoor units	Outdoor unit is higher	50m or less (Max.70m or less) ^{(4), (6)}					
	Outdoor unit is lower	40m or less ⁽²⁾					
Difference in the elevation of indoor units in a system		18m or less					
Difference in height between outdoor units (Same system)		MAX. 0.4m					
Difference between an outdoor unit and on outdoor unit side branch pipe		MAX. 5m					
Length of oil equalization piping		MAX. 10m					
Indoor unit atmosphere (behind ceiling) temperature and humidity Only models FDT, FDTC, FDTW, FDTS, FDTQ, FDU, FDUM, FDUT, FDUH, FDU-F		Dew point temperature 28 °C or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU, FDFW : Dew point temperature 23 °C or less, relative humidity 80% or less)					
Compressor stop/start frequency	1 cycle time	5 min or more (from stop to stop or from start to start)					
	Stop time	3 min or more					
Power source voltage	Voltage fluctuation	Within ±10% of rated voltage					
	Voltage drop during start	Within -15% of rated voltage					
	Phase unbalance	Within 3%					

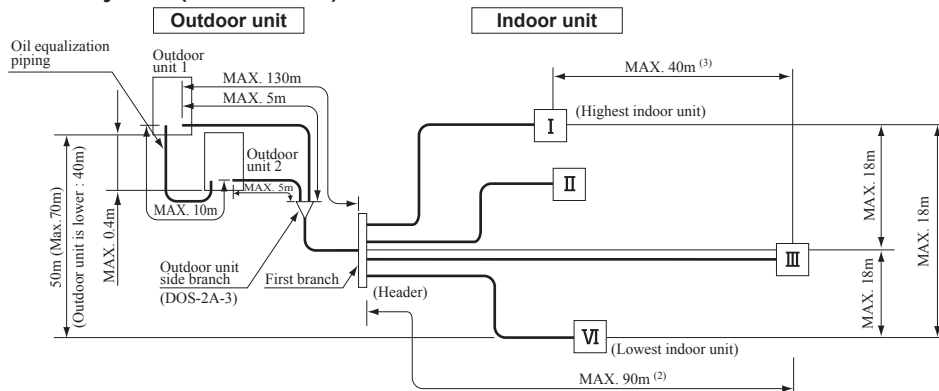
- Note (1) When the pipe extension length exceeds 510 m, additional refrigerant oil must be charged (1,000 cc).
 (2) It must be less than 30 m when conducting the cooling operation with the outdoor air temperature lower than 10 °C.
 (3) If Superlink I (previous Superlink) is selected, all the range of usage and limitations, not only the limitations of connectable indoor capacity and connectable number of indoor unit but also of the piping length, operating temperature range and etc., become same as those of KX4 (See technical manual '07-KX-KXR-T-114). In addition to above limitations, all of new functions for KX6 and KXZ such as automatic address setting function for multiple refrigerant systems and etc. will be cancelled.
 (4) When it is required to install in a range of 50 to 70 m, the limitation of use, etc. are different from those described here. For details, refer to page 16.
 (5) When it is required to install in the difference between the longest and shortest piping more than 40m, refer to page 17.
 (6) The elevation difference must be less than 40m, when it is required to use at the outdoor air temperature of 46 °C or more.

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

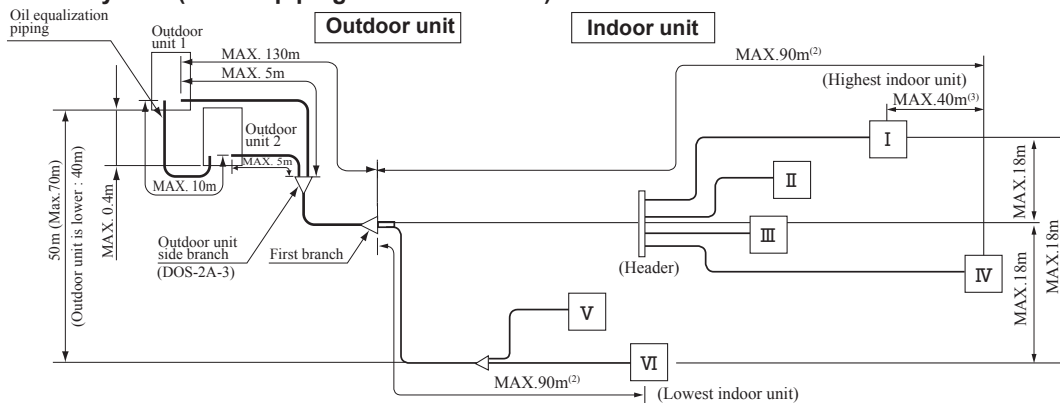
(1) Branch pipe system (Branch piping used)



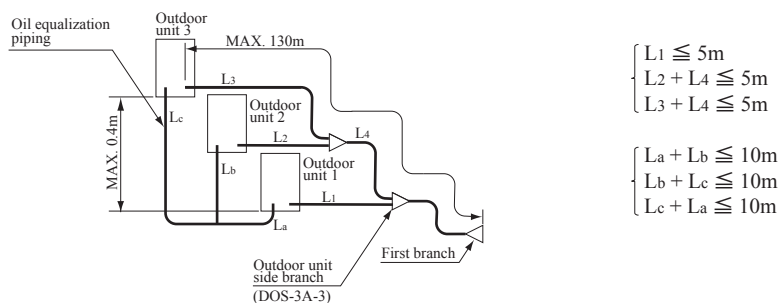
(2) Header system (Header used)



(3) Mixed system (Branch piping and header used)



(4) Pipe system for combination of 3 outdoor units (Displaying only outdoor units)



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⁾)

(3) When it is required to install the difference between the longest and shortest piping more than 40m, refer to page 17.

Important

When the Additional refrigerant quantity (P+I) is over the following table, please separate the refrigerant line.

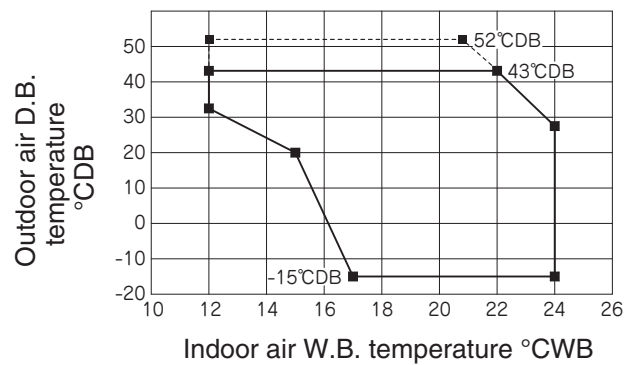
Outdoor unit	P + I (kg)
450-670	40
735-1000	80

P: Additional refrigerant quantity for piping (kg)

I: Additional refrigerant quantity for indoor units (kg)

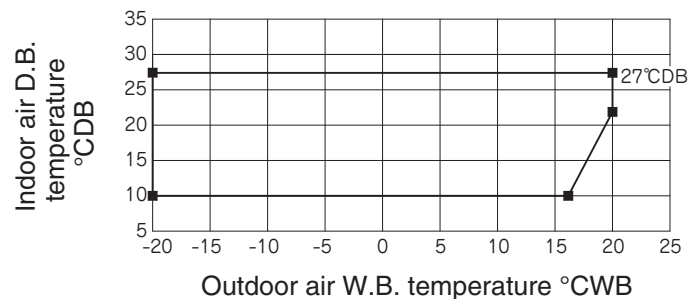
Operating temperature range

Cooling operation



*In case it is the promised installation location that the outdoor unit is used on conditions with the ambient temperature of 43°C or more, refer to page 7 (2.2 Exterior dimensions).

Heating operation



“CAUTION” Cooling operation under low outdoor air temperature conditions

KXZ 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.

Specification for installation with large head difference (Applicable to: FDCB224 - 1000KXZE1)

In case when the outdoor unit is installed at a higher place and **the difference in the elevation between the indoor and the outdoor units is larger than 50 m and smaller than 70 m**, the limitation on application differs partially from ordinary applications and, instead, the following specification applies. The pipe size, refrigerant amount and way of switch setting become also different.

In the range of use, **the outdoor air temperature (lower limit), indoor units allowed to combine, total piping length and difference in the elevation between indoor units in the same system** are different from ordinary applications.

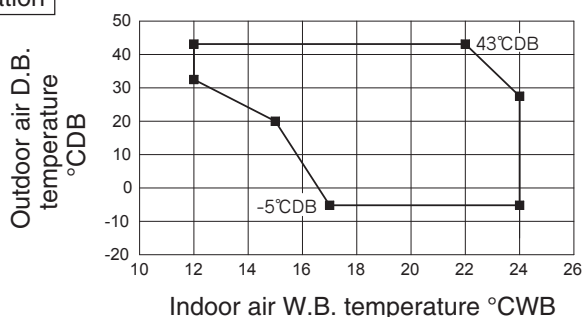
Table 1 Range of use

Item		FDCB224-1000KXZE1
Indoor air temperature (Upper, lower limits)		Refer to Table 2
Outdoor air temperature (Upper, lower limits)		
Indoor units that can be used in combination	Number of connected units	Refer to Table 3
	Connectable capacity	
Total piping length		510m or less
Main pipe length		130m or less
Single direction piping length		Actual length : 160m or less, Equivalent length : 185m or less
Allowable pipe length from the first branching		90m or less (However, difference between the longest and shortest piping : 40m or less)
Allowable difference in the elevation	Elevation difference between the first branching point and the indoor unit	18m or less
	Outdoor unit is higher	50m or more-70m or less
	Outdoor unit is lower	40m or less
	Difference in the elevation of indoor units in a system	15m or less
Limitation on piping from outdoor unit to branching pipe at outdoor unit side	Difference in the elevation	0.4m or less
	Elevation from outdoor unit to branching pipe at outdoor unit side	5m or less
	Oil equalizing pipe length	10m or less
	Length between outdoor branching pipes for a combination of 3 units	5m or less
Indoor unit atmosphere (behind ceiling) temperature and humidity Only models FDT,FDTC,FDTW,FDTQ,FDTS,FDU,FDUM,FDUH,FDUT		Dew point temperature 28°C or less, relative humidity 80% or less (FDE,FDK,FDL,FDU,FDW : Dew point temperature 23°C or less, relative humidity 80% or less)
Compressor stop/start frequency	1 cycle time	5 min or less (from stop to stop or from start to start)
	Stop time	3 min or more
Power source voltage	Voltage fluctuation	Within ±10% of rated voltage
	Voltage drop during start	Within -15% of rated voltage
	Phase unbalance	Within 3%

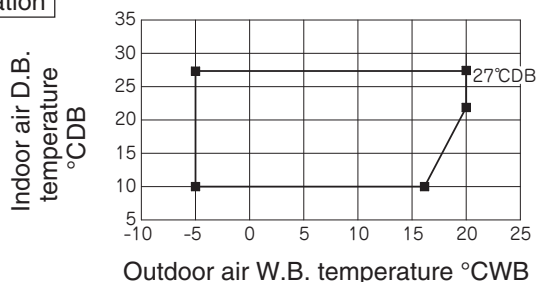
Table 2 Indoor air temperature/Outdoor air temperature

Table 3 Number of connectable indoor units and capacity range

Cooling operation



Heating operation



Model/Item	Number of connectable units	Connectable capacity
FDCB224KXZE1	1 to 14	180 - 224
FDCB280KXZE1	1 to 18	224 - 280
FDCB335KXZE1	1 to 22	268 - 335
FDCB450KXZE1	2 to 30	360 - 450
FDCB500KXZE1	2 to 33	400 - 500
FDCB560KXZE1	2 to 37	448 - 560
FDCB615KXZE1	2 to 41	492 - 615
FDCB670KXZE1	2 to 44	536 - 670
FDCB735KXZE1	3 to 49	588 - 735
FDCB800KXZE1	3 to 53	640 - 800
FDCB850KXZE1	3 to 56	680 - 850
FDCB900KXZE1	3 to 60	720 - 900
FDCB950KXZE1	3 to 63	760 - 950
FDCB1000KXZE1	3 to 66	800 - 1000

<Pipe size selection>

In the figure for pipe selection, sizes of main pipe and the pipe between the branch at the indoor side and the indoor unit are selected on the basis different from normal practice.

- (1) Main pipe (branch of the outdoor unit – first branch at the indoor side)

Size of liquid pipe is different. Change the size of main pipe according to Table 4.

When the maximum length (from the outdoor unit to the furthest indoor unit) is larger than 90 m (actual length), change the size of main pipe according to Table 4.

Table 4 Main pipe size

Outdoor unit	Main pipe size (normal)		Pipe size for an actual length of 90m or longer	
	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe
224	$\phi 19.05 \times t 1.0$	$\phi 12.7 \times t 0.8$	$\phi 22.22 \times t 1.0$	$\phi 12.7 \times t 0.8$
280	$\phi 22.22 \times t 1.0$		$\phi 25.4 \times t 1.0$	
335	$\phi 28.58 \times t 1.0$	$\phi 15.88 \times t 1.0$		$\phi 31.8 \times t 1.1$
450				
500				
560				
615				
670	$\phi 31.8 \times t 1.1$	$\phi 19.05 \times t 1.0$	$\phi 38.1 \times t 1.35$	$\phi 19.05 \times t 1.0$
735				
800				
850				
900				
950	$\phi 38.1 \times t 1.35$	$\phi 19.05 \times t 1.0$	$\phi 38.1 \times t 1.35$	$\phi 19.05 \times t 1.0$
1000				

- (2) Between branch at the indoor side and indoor unit

Size of gas pipe for indoor unit with capacity larger than 112 is different. Change the size of pipe connected to indoor unit according to Table 5.

Table 5 Indoor unit connecting pipe size

Indoor unit	Capacity	Gas pipe	Liquid pipe
		15,22,28	$\phi 9.52 \times t 0.8$
36,45,56		$\phi 12.7 \times t 0.8$	
71,90		$\phi 15.88 \times t 1.0$	
112,140,160		$\phi 19.05 \times t 1.0$	$\phi 9.52 \times t 0.8$
224		$\phi 22.22 \times t 1.0$	
280		$\phi 25.4 \times t 1.0$	

- (3) Refrigerant quantity

In addition to normal charge quantity for refrigerant pipes, charge quantity for the difference in capacity between the indoor and the outdoor units, and standard additional refrigerant quantity, measure and charge the additional refrigerant quantity for the installation with the difference in the elevation being over 50 m and less than 70 m.

Table 6 Additional refrigerant quantity for the installation with the difference in the elevation being over 50 m and less than 70 m

Outdoor unit	(kg)	Outdoor unit	(kg)
224	0.2	670	1.0
280	0.3	735	1.1
335	0.5	800	1.2
450	0.7	850	1.3
500	0.8	900	1.4
560	0.9	950	1.6
615	0.8	1000	1.6

- (4) Microcomputer control

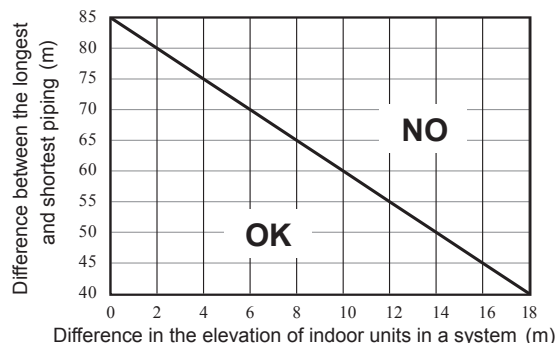
Setting of microcomputer control needs to be changed when the outdoor unit is installed upwards and the difference in elevation is larger than 50 m and less than 70 m. Make sure to set SW6-4 at ON position on both the master and slave units, before turning the power on.

Specification for installation with the difference between the longest and shortest piping more than 40m

When the difference between the longest and shortest piping is longer than 40 m, adjust the difference in the elevation of indoor units in a system such that it will fall in the OK range on the following graph.

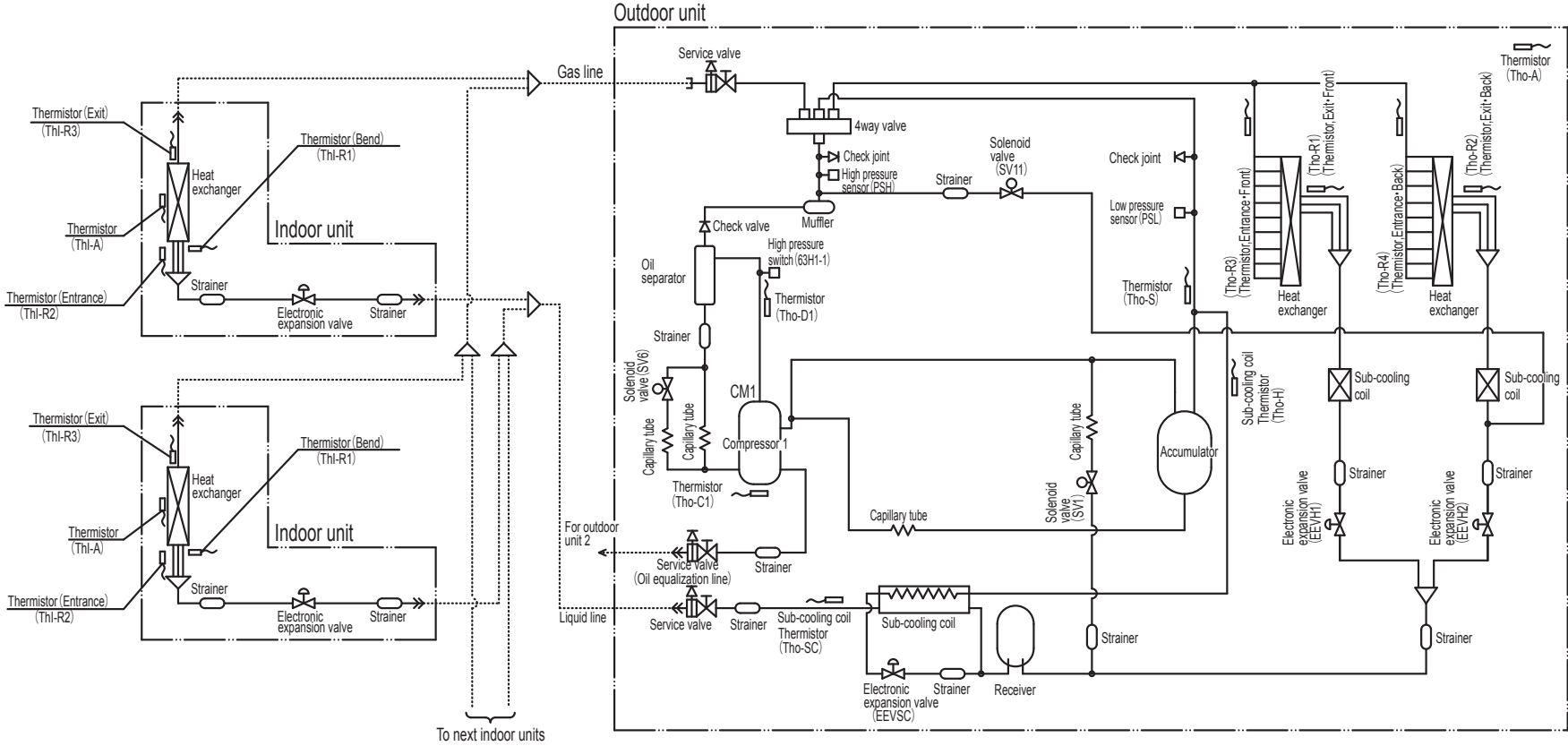
When the difference in the elevation between the indoor and the outdoor units is 50 m – 70 m, the difference between the longest and shortest piping cannot exceed 40 m. Reduce it to less than 40 m.

If the refrigerant quantity over occurs when the difference between the longest and shortest piping is longer than 40 m, there is a risk that the heating capacity becomes insufficient. Take sufficient care to adjust the additional refrigerant quantity at correct value.



4. PIPING SYSTEM

Models FDCB224KXZE1, 280KXZE1, 335KXZE1



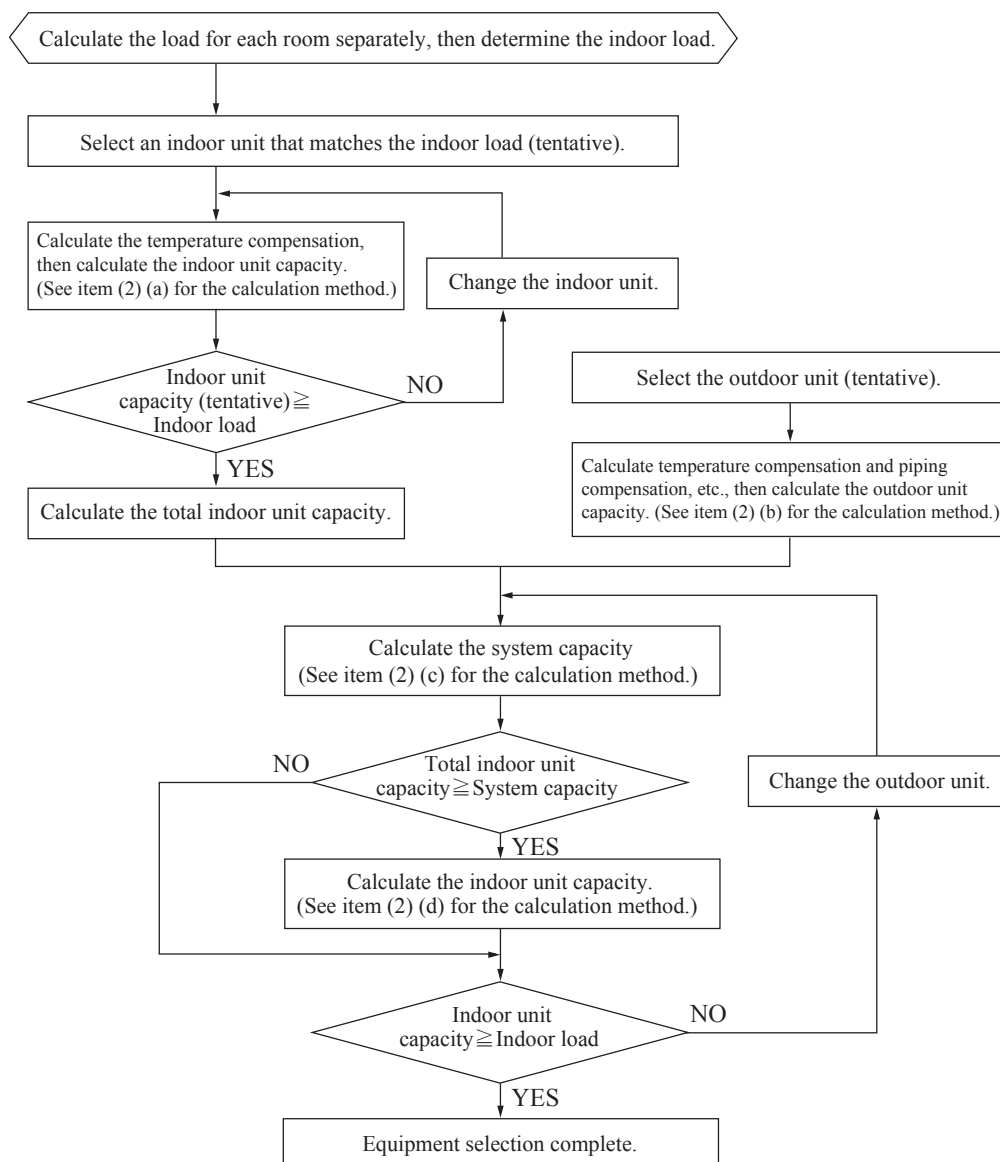
- Notes (1) Preset point of protective devices
 63H1-1 : Open 4.15MPa, Close 3.15MPa
 (For protection)
- (2) Function of thermistor
 PSH : For compressor control
 3.70MPa ON
 PSL : ON 0.18MPa, OFF 0.20MPa
 (For compressor control)
 ON 0.134MPa, OFF 0.18MPa
 (For protection)

- 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-D : For control of discharge pipe temperature
 Tho-C : 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-R3, R4 : Electronic expansion valve (EEVH1, 2) control of heating operation
 Tho-SC : Electronic expansion valve (EEVSC) control of cooling operation
 Tho-H : For super heat control of sub-cooling coil

PCB004Z084

5. SELECTION CHART

(1) Equipment selection flow



(2) Capacity calculation method

(a) Calculating the indoor unit capacity compensation

$$\text{Indoor unit capacity (cooling, heating)} = \text{Indoor unit total rated capacity} \\ \times \text{Capacity compensation coefficient according to temperature conditions}$$

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

(b) Calculating the outdoor unit capacity compensation

$$\text{Outdoor unit capacity (Cooling, Heating)} = \text{Outdoor unit rated capacity (rated capacity when 100\% connected)} \\ \times \text{Capacity compensation coefficient according to temperature conditions} \\ \times \text{Capacity compensation coefficient according to piping length} \\ \times \text{Capacity compensation coefficient according to height difference} \\ \times \text{Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger} \\ \times \text{Capacity compensation coefficient according to indoor unit connection capacity} \\ \times \text{Correction of cooling capacity in relation to the anti-frost on the indoor unit heat exchanger}$$

- ① See item (3) (a) concerning the capacity compensation coefficient according to temperature conditions.
- ② See item (3) (b) concerning the capacity compensation coefficient according to piping length.
- ③ See item (3) (c) 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) (d) 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) (e) 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.
- ⑥ See item (3) (f) correction of cooling capacity in relation to the anti-frost on the indoor unit heat exchanger. This compensation should be carried out only when calculating the cooling capacity.

(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) ① only]

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%)

- Outdoor unit FDCB450KXZE1 FDCB224KXZE1 × 2 units
- Indoor unit FDT56KXE6F 7 units (All fan tap : PHi)
- Piping length 60m (Equivalent length)
- Indoor, outdoor unit height difference 15m (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 22)
Indoor unit cooling capacity : 5.6 kW × 1.02 ≒ 5.7 kW
- Indoor unit total cooling capacity calculation ;
Indoor unit total cooling capacity : 5.7 kW × 7 units = 39.9 kW

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

- Outdoor unit rated cooling capacity : 45.0 kW
- Capacity compensation coefficient according to temperature conditions :
1.02 (Calculated according to Indoor 19°C WB / Outdoor 33°C DB) ; (See page 22)
Outdoor unit cooling capacity: 45.0 kW × 1.02 = 45.9 kW
- Capacity compensation coefficient according to piping length : 0.94 (Calculated according to 60m length) ; (See page 24)
45.9 kW × 0.94 ≒ 43.1 kW
- Correction of cooling capacity in relation to the anti-frost : 1.0 (Calculated according to outdoor 33°C DB, Total capacity of concurrently operating indoor unit : (56 × 7) / 450 ≒ 87%) ; (See page 34)
Outdoor unit cooling capacity : 43.1 kW × 1.0 = 43.1 kW
- Capacity compensation coefficient according to height difference : 0.97 (Calculated according to 15m difference) ; (See page 26)
43.1 kW × 0.97 ≒ 41.8 kW
- Capacity compensation coefficient according to indoor unit connected total capacity : 1.0 ← (56 × 7) / 450 < 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 : 39.9 kW
 - Outdoor unit maximum cooling capacity : 41.8 kW
- ⇒ System cooling capacity : 39.9 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 FDCB450KXZE1 FDCB224KXZE1 × 2 units
- Indoor unit FDT56KXE6F 10 units (All fan tap : PHi)
- Piping length 60m (Equivalent length)
- Indoor, outdoor unit height difference 15m (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°C WB / Outdoor 35°C DB) ; (See page 22)
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 × 10 units = 53.0 kW

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

- Outdoor unit rated cooling capacity : 45.0 kW
- Capacity compensation coefficient according to temperature conditions :
0.95 (Calculated according to Indoor 18°C WB / Outdoor 35°C DB) ; (See page 22)
Outdoor unit cooling capacity : 45.0 kW × 0.95 ≐ 42.8 kW
- Capacity compensation coefficient according to piping length : 0.94 (Calculated according to 60m length) ; (See page 24)
42.8 kW × 0.94 ≐ 40.2 kW
- Collection of cooling capacity in relation to the anti-frost : 1.0 (Calculated according to outdoor 35°C DB, Total capacity of concurrently operating indoor unit : (56 × 10) / 450 ≐ 124%)
40.2 kW × 1.0 = 40.2 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 : 1.04 ← (56 × 10) / 450 ≐ 124% (See page 28)
40.2 kW × 1.04 ≐ 41.8 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 : 53.0 kW
 - Outdoor unit maximum cooling capacity : 41.8 kW
- ⇒ System cooling capacity : 41.8 kW

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

$$\frac{41.8 \text{ kW} \times 5.3 \text{ kW}}{53.0 \text{ kW}} \cong \underline{4.2 \text{ kW}}$$

Example 3

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

- Outdoor unit FDCB450KXZE1 FDCB224KXZE1 × 2 units
- Indoor unit FDT56KXE6F 10 units
- Piping length 60m (Equivalent length)
- Indoor, outdoor unit height difference 20m (Outdoor unit is higher)
- 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 temperature conditions :
1.04 (Calculated according to Outdoor 6°C WB / Indoor 19°C DB) ; (See page 23)
Indoor unit heating capacity : 6.3 kW × 1.04 ≐ 6.6 kW
- Indoor unit total heating capacity calculation ;
Indoor unit total heating capacity : 6.6 kW × 10 units = 66.0 kW

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

- Outdoor unit rated heating capacity : 50.0 kW
- Capacity compensation coefficient according to temperature conditions :
1.04 (Calculated according to Outdoor 6°CWB / Indoor 19°C DB) ; (See page 23)
Outdoor unit heating capacity : 50.0 kW × 1.04 ≐ 52.0 kW
- Capacity compensation coefficient according to piping length : 0.982 (Calculated according to 60m length) ; (See page 26)
52.0 kW × 0.982 ≐ 51.0 kW
- Capacity compensation coefficient according to height difference : 0.96 (Calculated according to 20m difference) ; (See page 26)
51.0 kW × 0.96 ≐ 49.0 kW
- Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger :
1.0 (Calculated according to 6°CWB) ; (See page 26)
49.0 kW × 1.0 = 49.0 kW
- Capacity compensation coefficient according to indoor unit connected total capacity : 1.0 ← (56 × 10) / 450 ≐ 124% ; (See page 28)
49.0 kW × 1.0 = 49.0 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 : 66.0 kW
 - Outdoor unit maximum heating capacity : 49.0 kW
- ⇒ System heating capacity: 49.0 kW

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

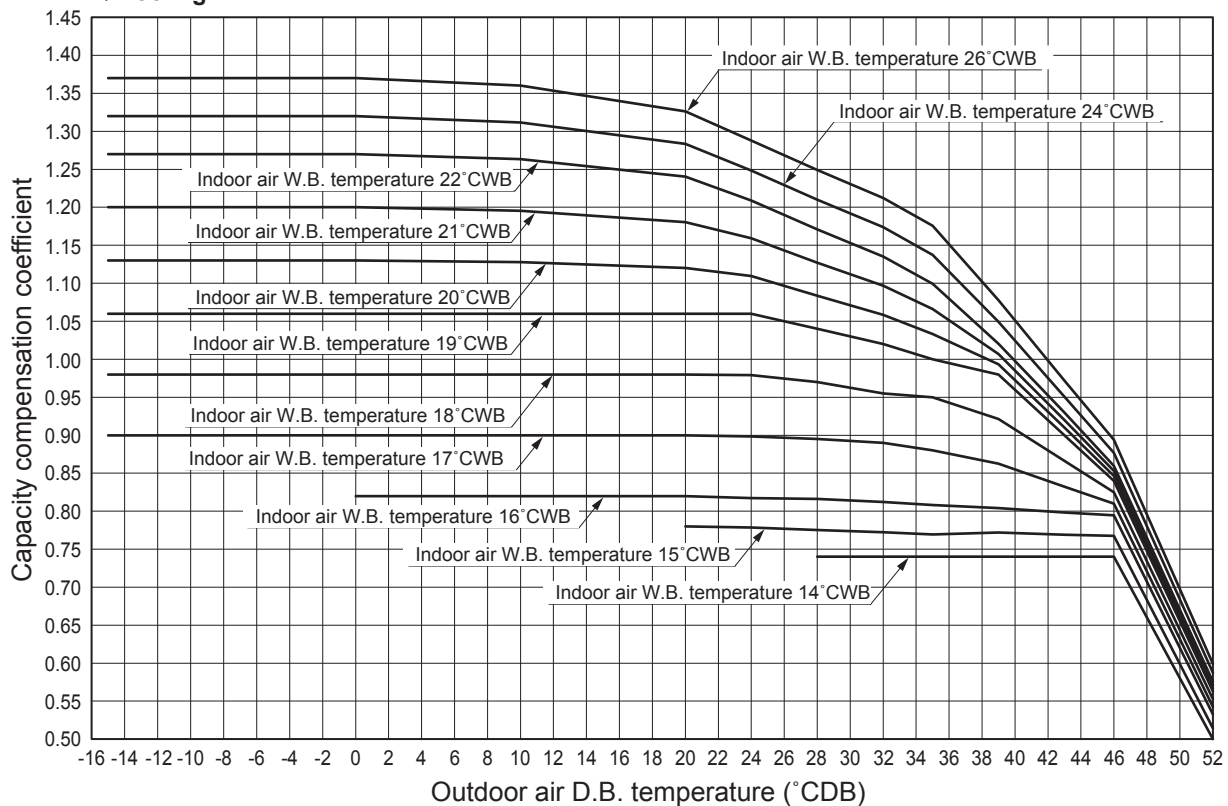
$$\frac{49.0 \text{ kW} \times 6.6 \text{ kW}}{66.0 \text{ kW}} = 4.9 \text{ kW}$$

(3) Capacity compensation coefficient

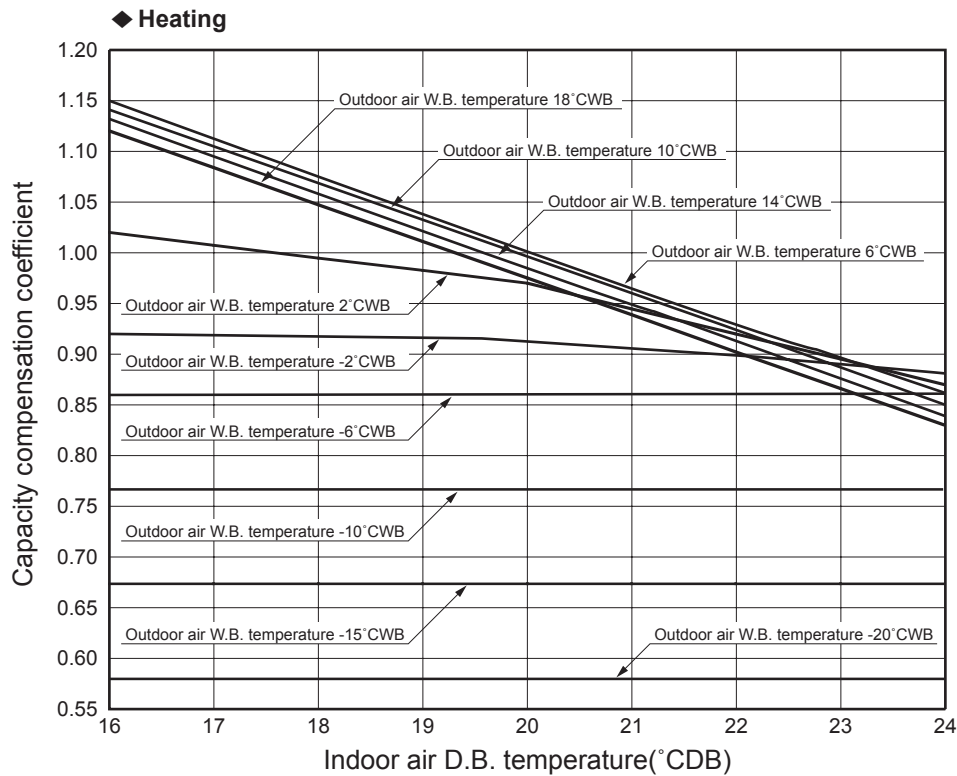
(a) Capacity compensation coefficient and power consumption compensation coefficient according to indoor and outdoor temperature conditions

1) Capacity compensation coefficient

◆ Cooling

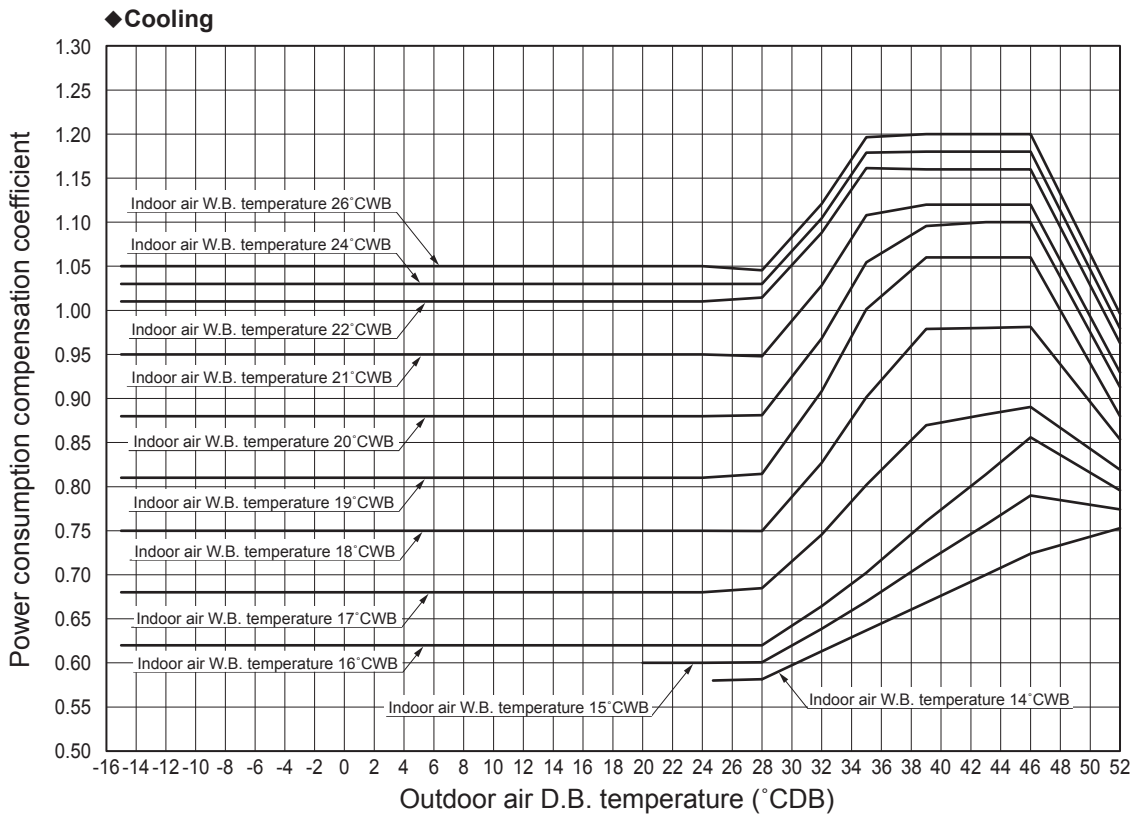


- Note(1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.
 (2) When performing the cooling operation with the outdoor air temperature being -5°C or under, a windbreak fence must be installed.
 (3) The cooling capacity may decrease by frequent actuation of anti-frost control in low outdoor temperature. Please avoid using the air-conditioners for computer rooms or industrial uses which require annual cooling operation.

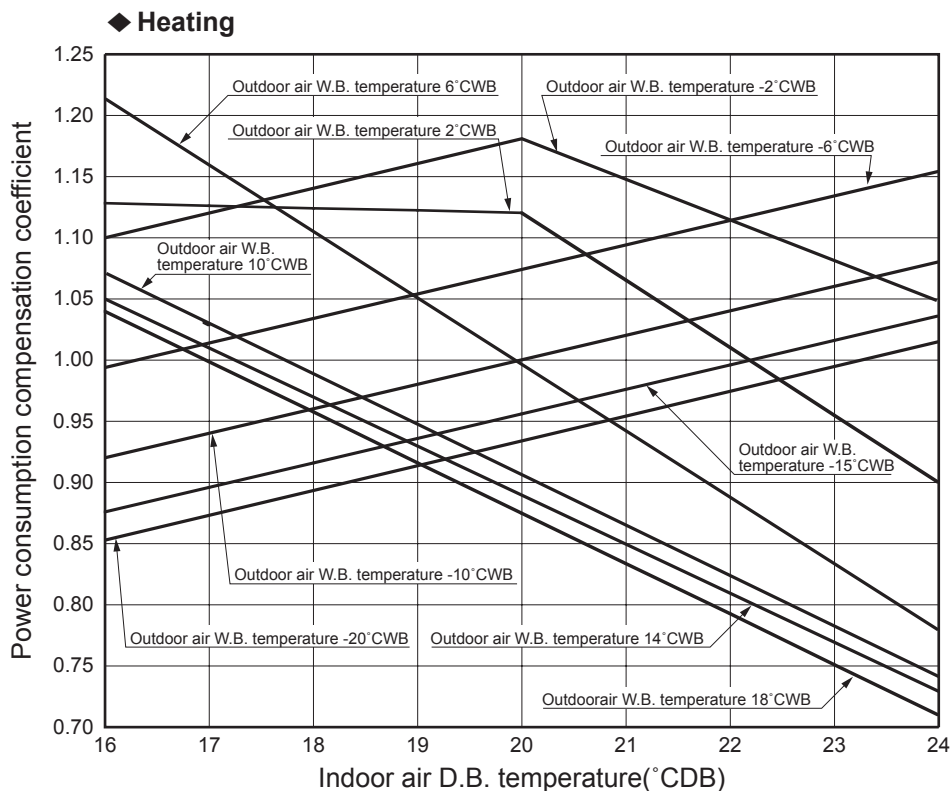


Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.

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.

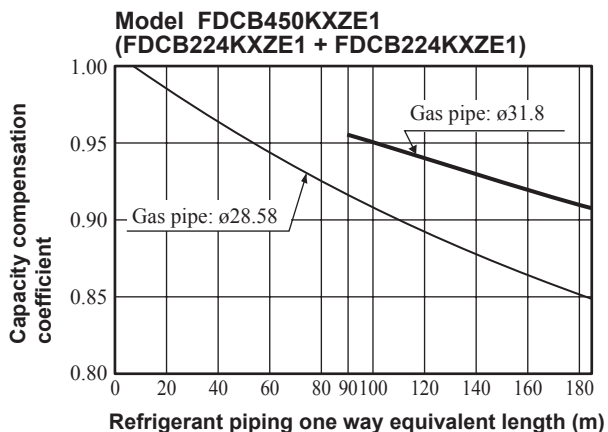
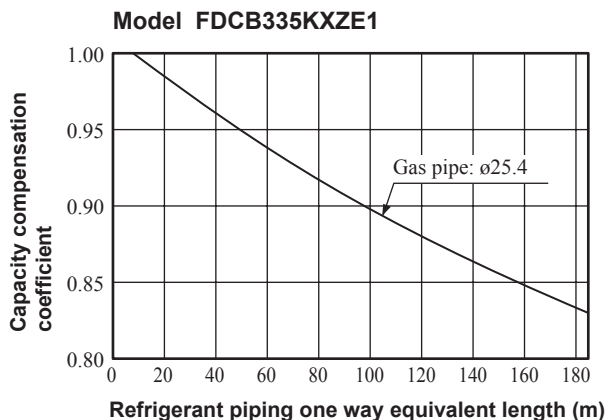
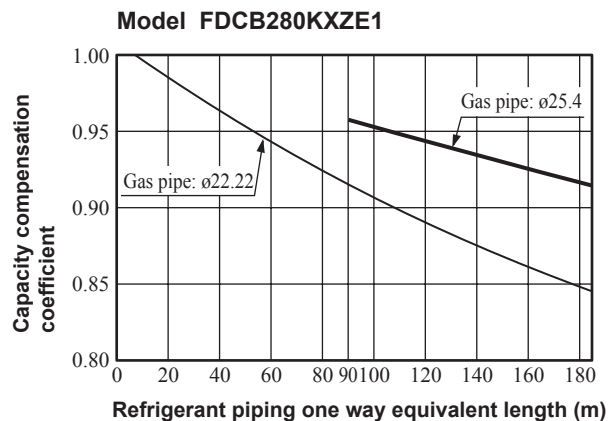
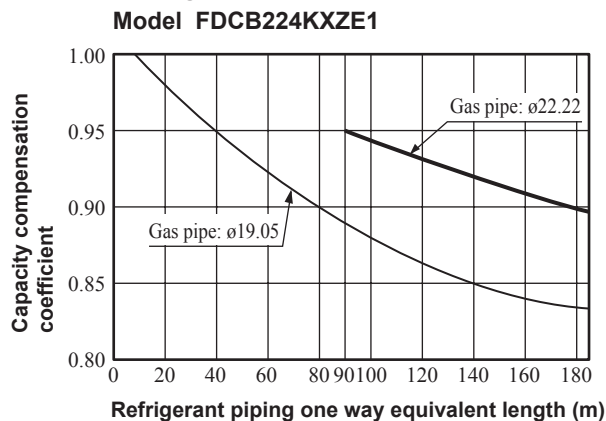


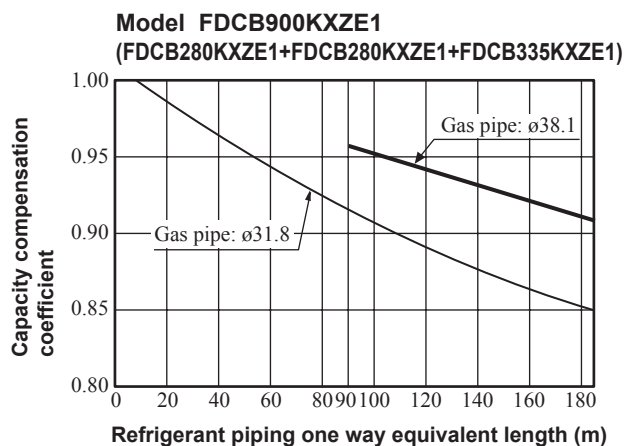
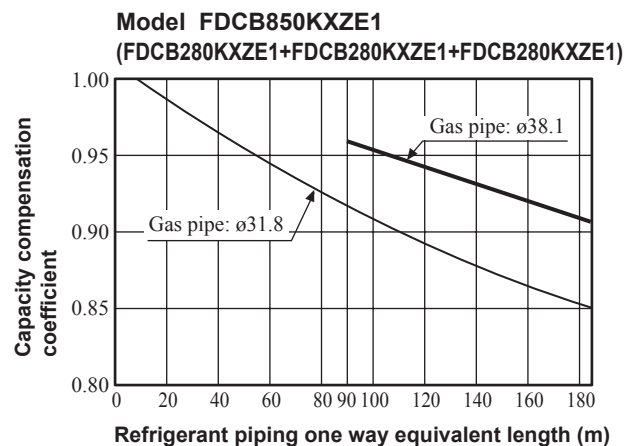
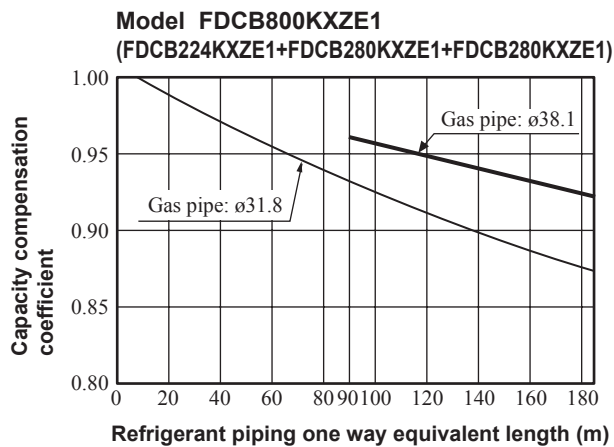
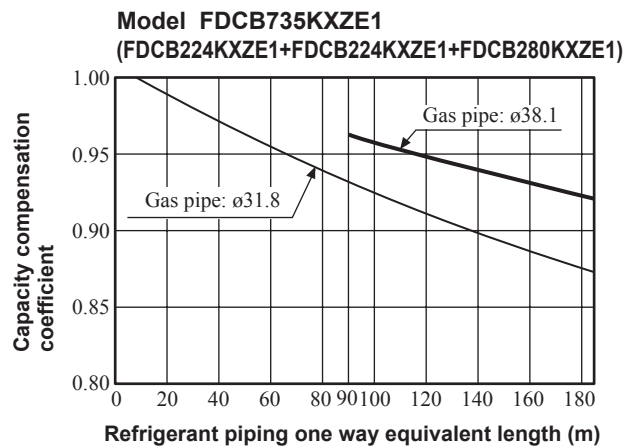
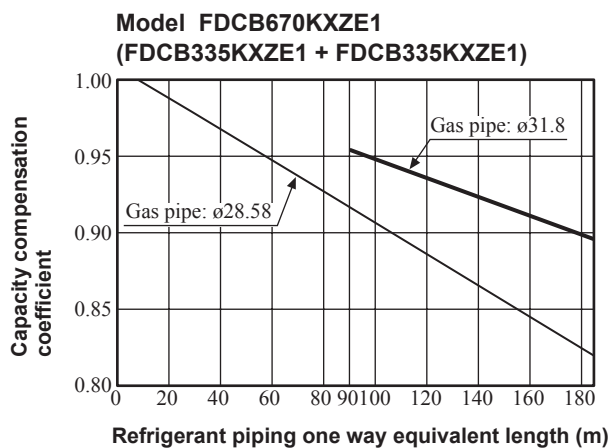
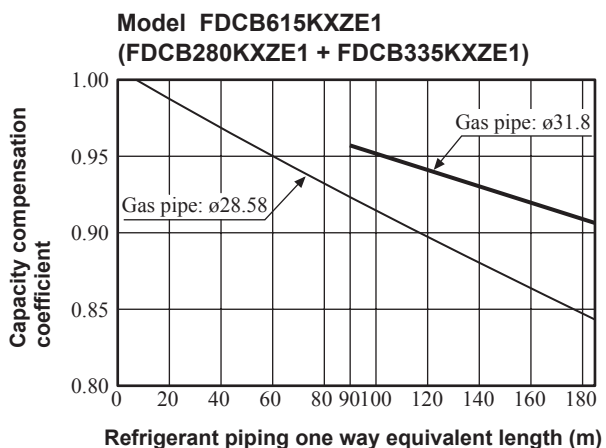
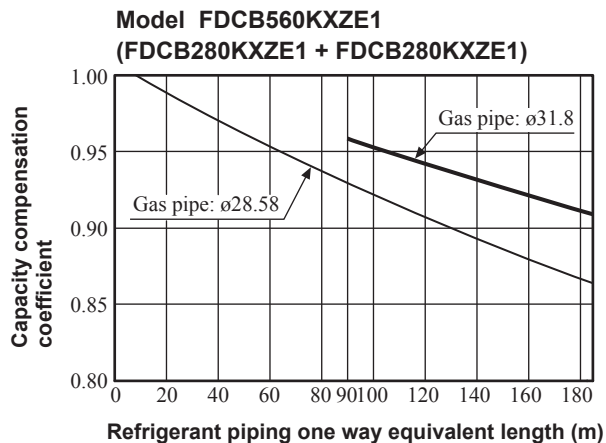
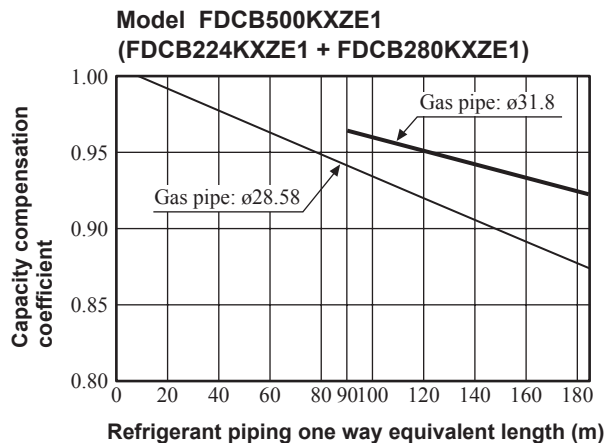
Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.

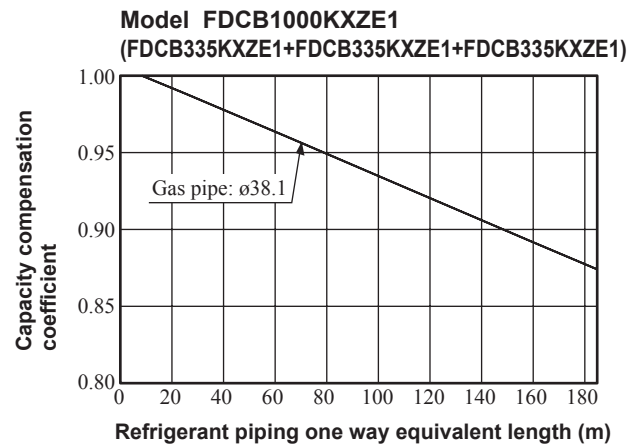
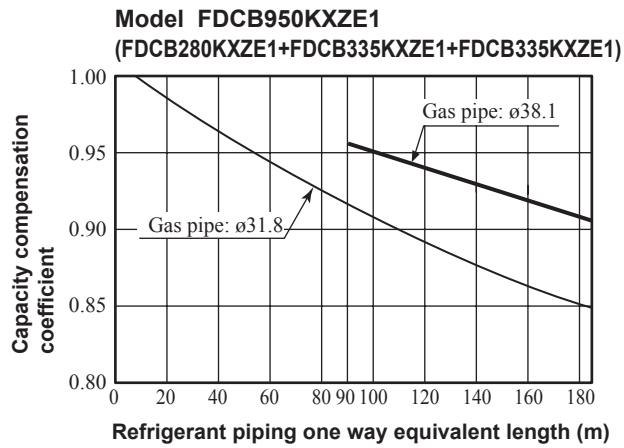
(b) Correction of cooling and heating capacity in relation to one way length of refrigerant piping

(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.

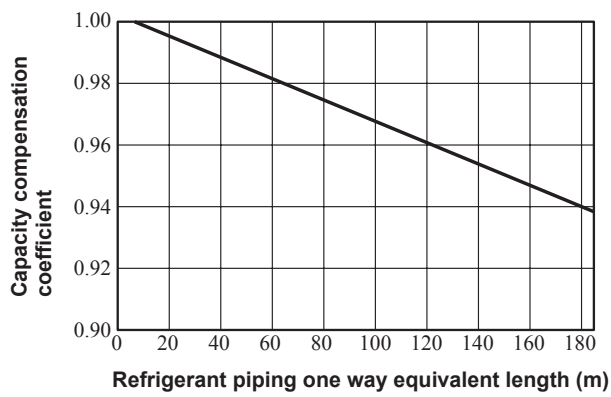
1) Cooling







2) Heating



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

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

Equivalent length of each joint

Unit : m/one part

Gas piping size	φ15.88	φ19.05	φ22.22	φ25.4	φ28.58	φ31.8	φ38.1
Joint (90° elbow)	0.25	0.30	0.35	0.40	0.45	0.55	0.65

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

Height difference between the indoor unit and outdoor unit in the vertical height difference	5 m	10 m	15 m	20 m	25 m	30 m	35 m
Adjustment coefficient	0.99	0.98	0.97	0.96	0.95	0.94	0.93

Height difference between the indoor unit and outdoor unit in the vertical height difference	40 m	45 m	50 m	55 m	60 m	65 m	70 m
Adjustment coefficient	0.92	0.91	0.90	0.89	0.88	0.87	0.86

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

Air inlet temperature of outdoor unit in °C WB	-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

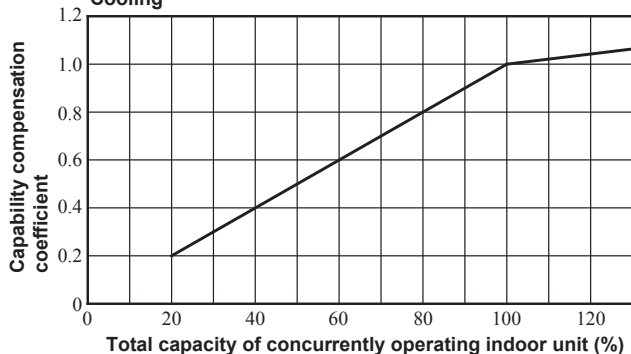
The correction factors will change drastically according to weather conditions. So necessary adjustment should be made empirically according to the weather data of the particular area.

(e) The capacity compensation coefficient and power consumption compensation coefficient vary according to the total capacity of concurrently operating indoor units, as shown below

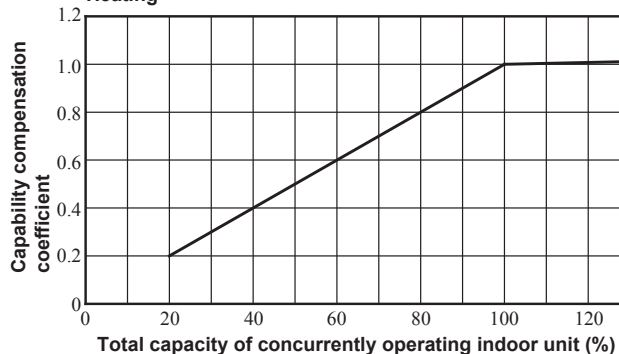
(Note) This table shows typical values.

Model FDCB224KXZE1

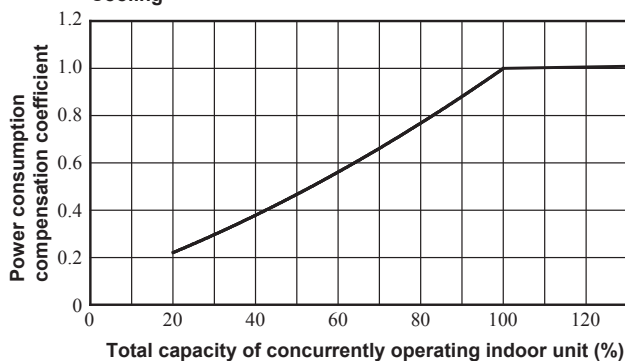
◆ **Capability compensation coefficient**
Cooling



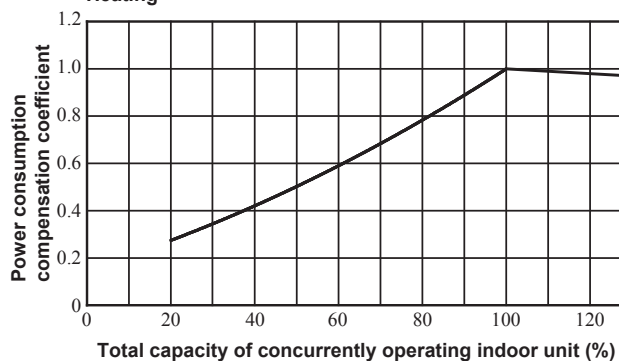
Heating



◆ **Power consumption compensation coefficient**
Cooling

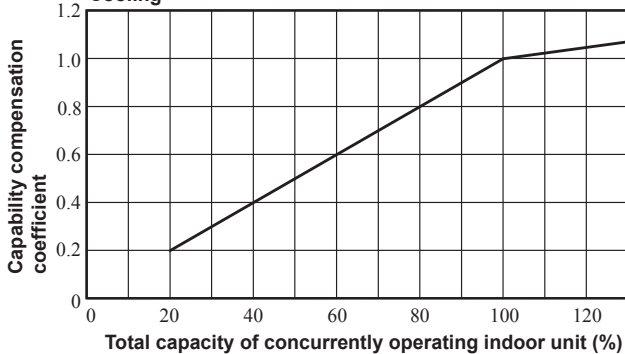


Heating

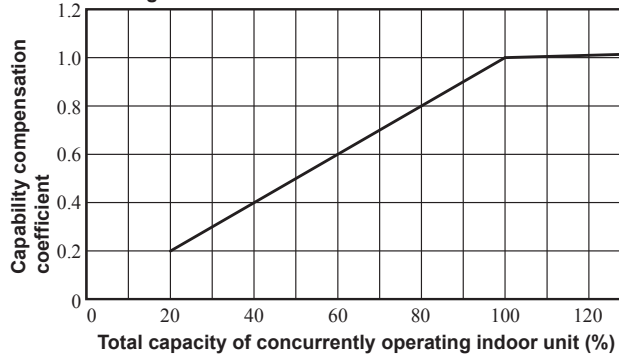


Model FDCB280KXZE1

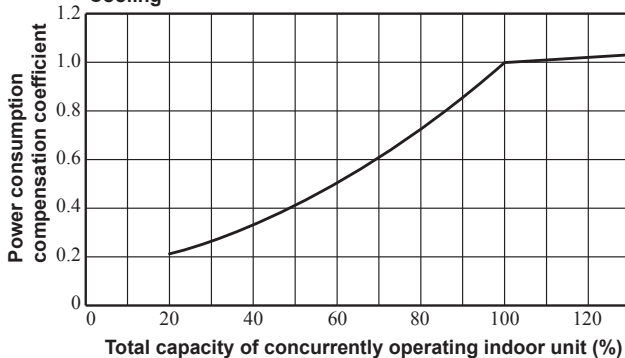
◆ **Capability compensation coefficient**
Cooling



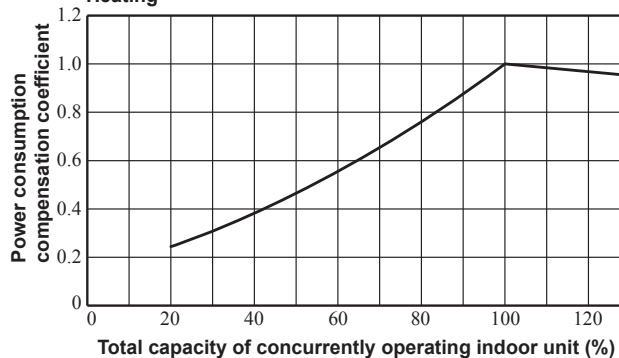
Heating



◆ **Power consumption compensation coefficient**
Cooling

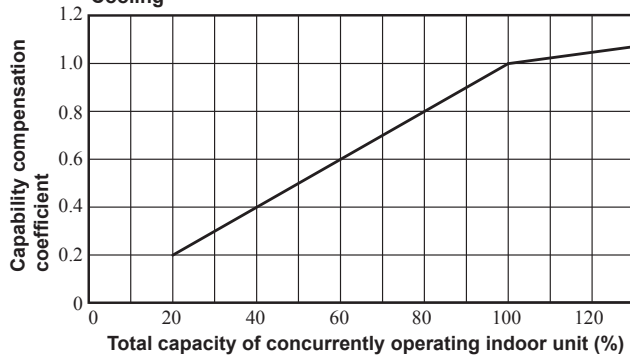


Heating

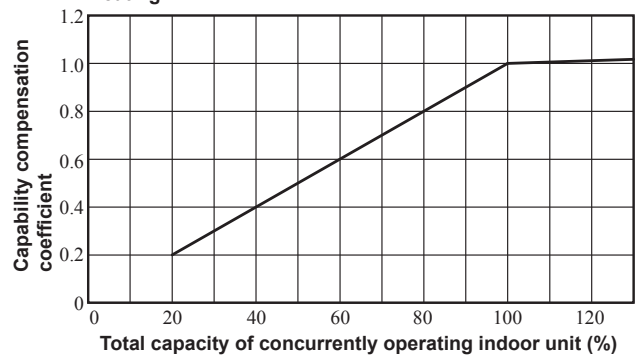


Model FDCB335KXZE1

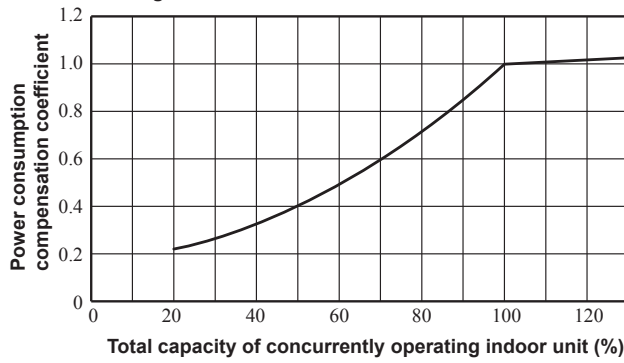
◆ **Capability compensation coefficient**
Cooling



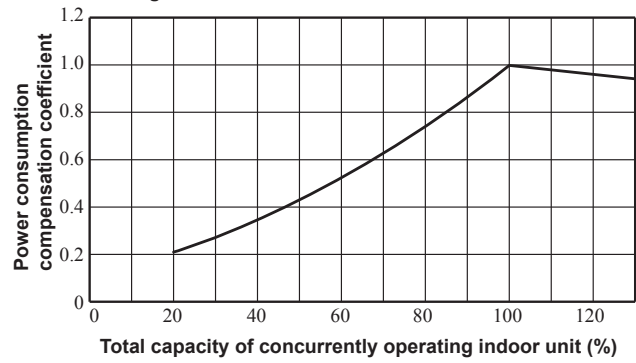
Heating



◆ **Power consumption compensation coefficient**
Cooling

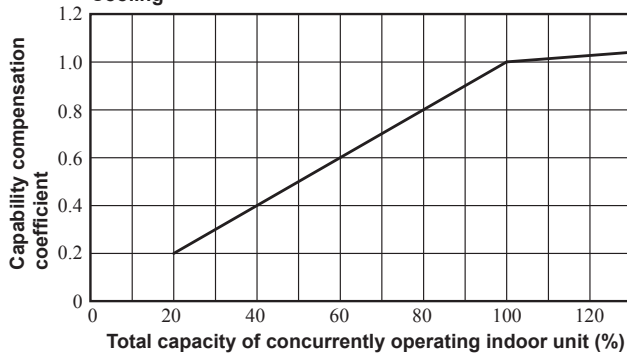


Heating

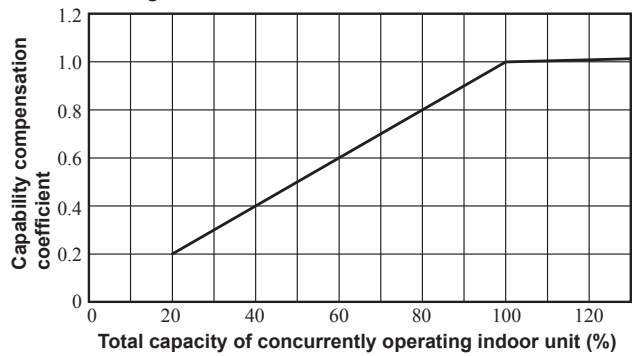


Model FDCB450KXZE1

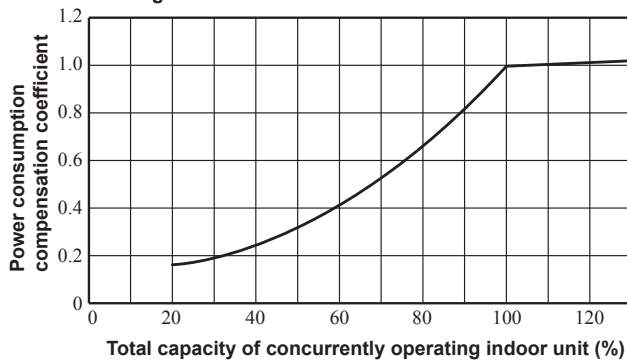
◆ **Capability compensation coefficient**
Cooling



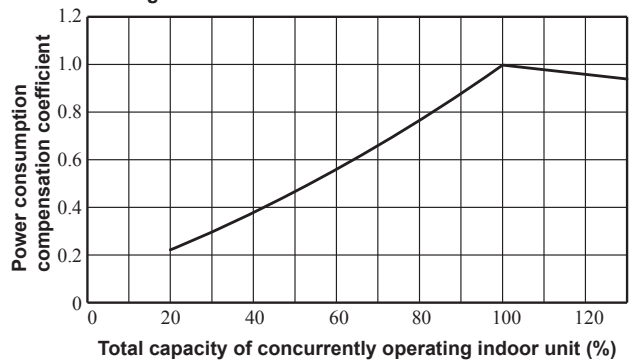
Heating



◆ **Power consumption compensation coefficient**
Cooling

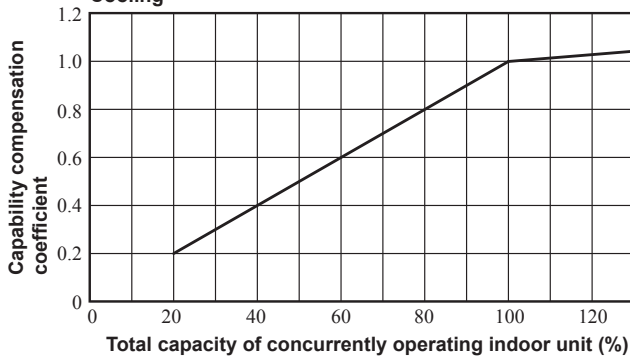


Heating

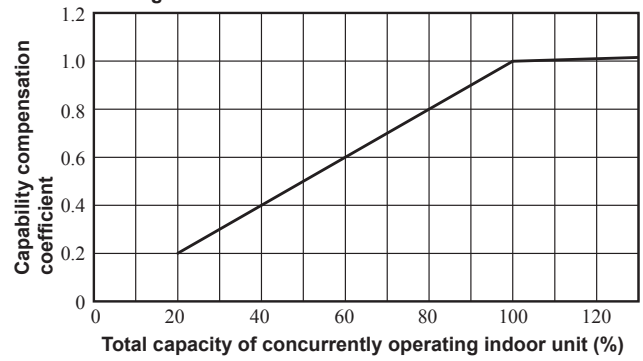


Model FDCB500KXZE1

◆ **Capability compensation coefficient**
Cooling

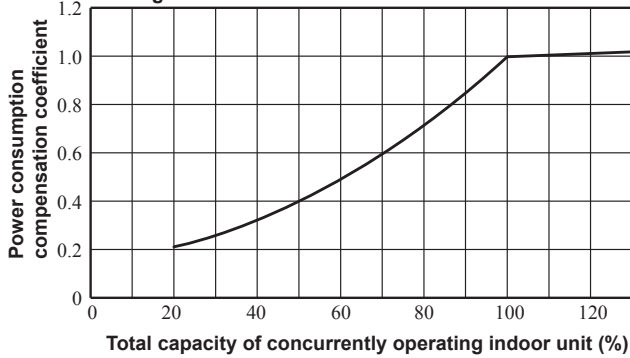


Heating

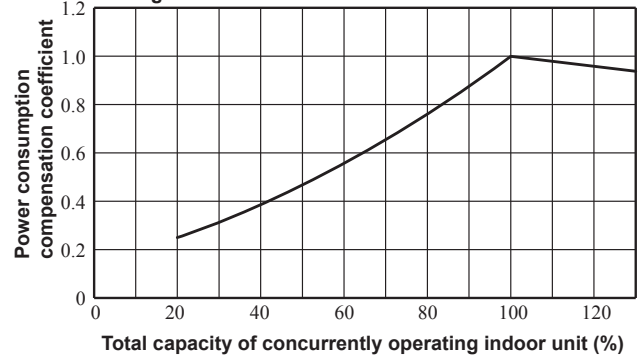


◆ **Power consumption compensation coefficient**

Cooling

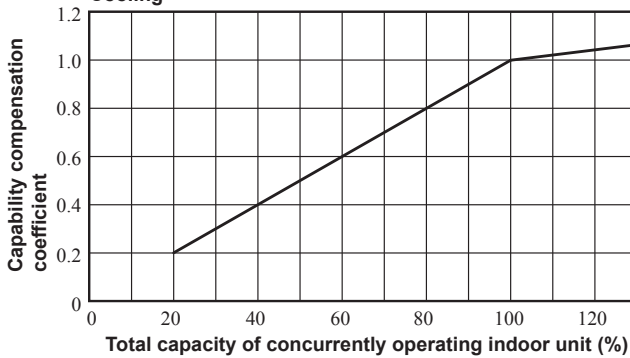


Heating

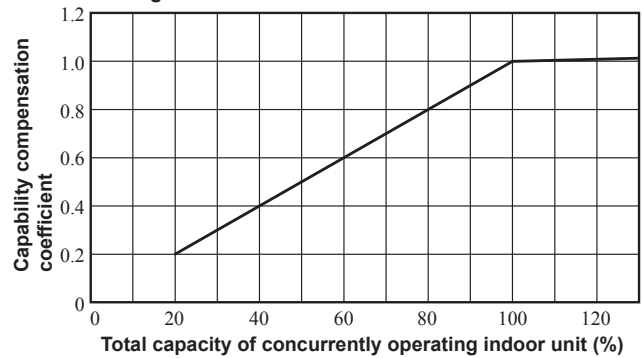


Model FDCB560KXZE1

◆ **Capability compensation coefficient**
Cooling

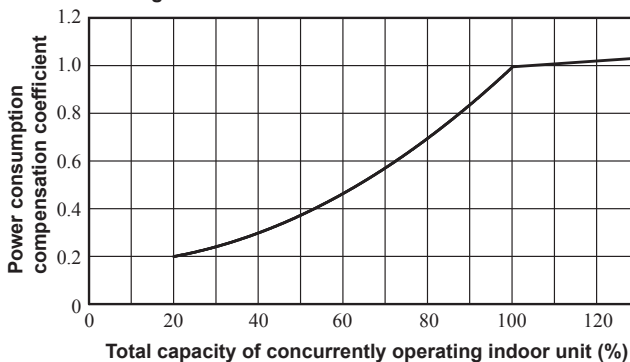


Heating

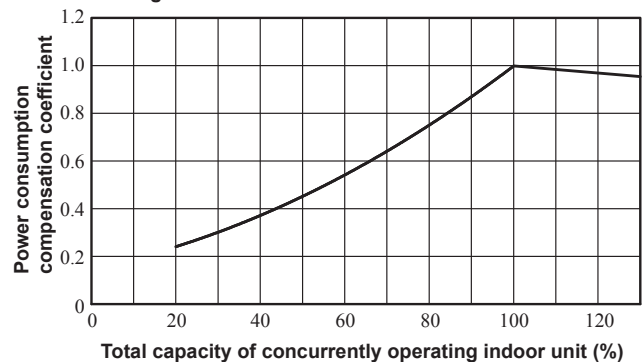


◆ **Power consumption compensation coefficient**

Cooling

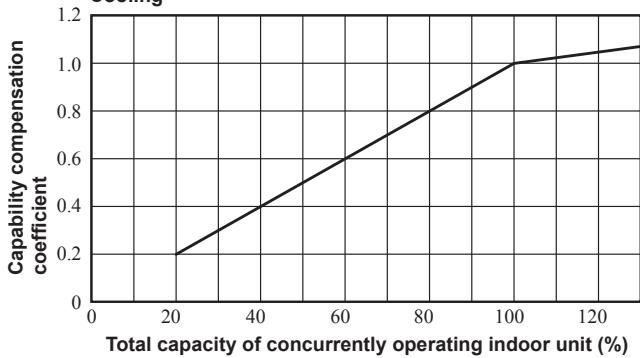


Heating

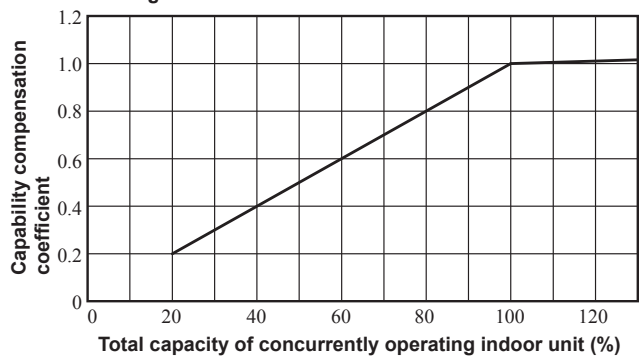


Model FDCB615KXZE1

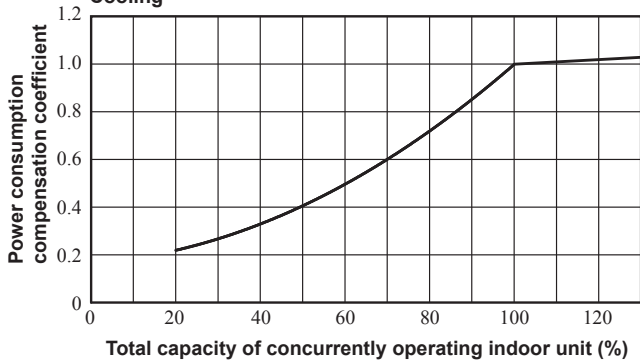
◆ **Capability compensation coefficient**
Cooling



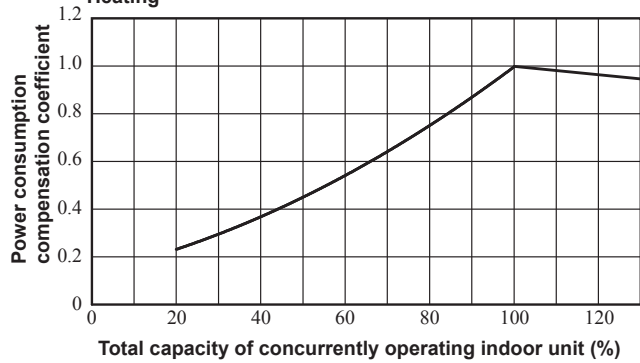
Heating



◆ **Power consumption compensation coefficient**
Cooling

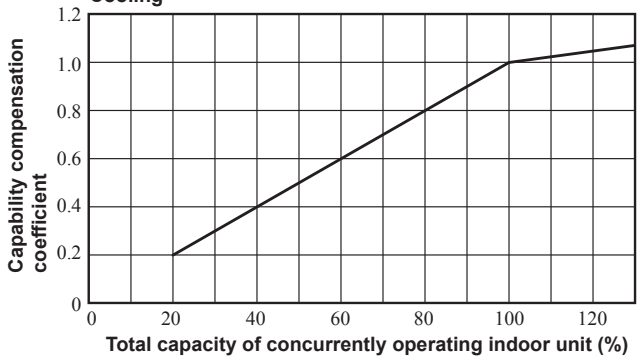


Heating

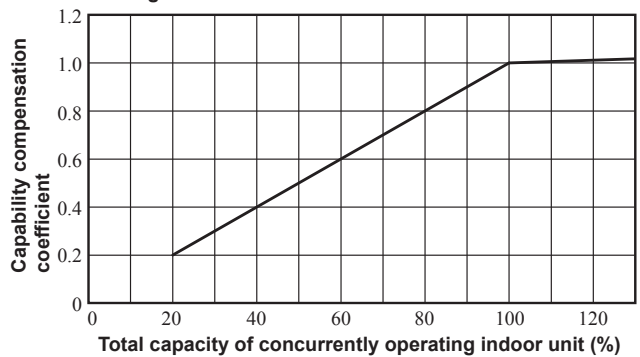


Model FDCB670KXZE1

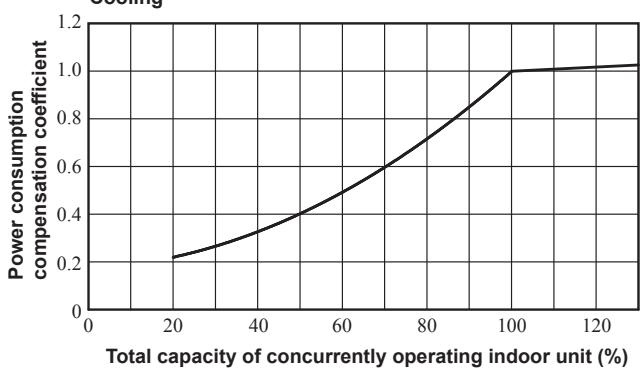
◆ **Capability compensation coefficient**
Cooling



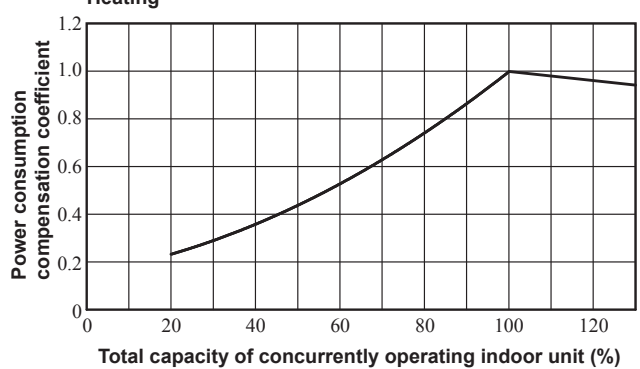
Heating



◆ **Power consumption compensation coefficient**
Cooling

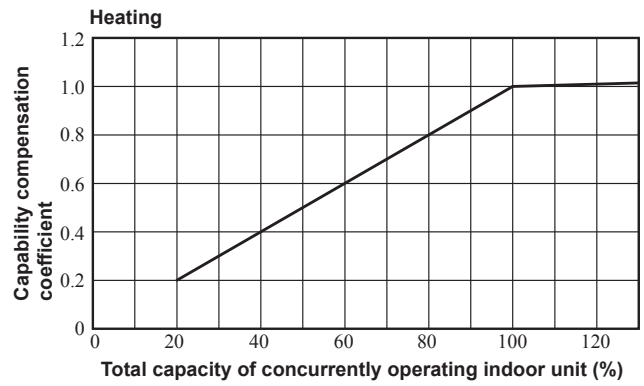
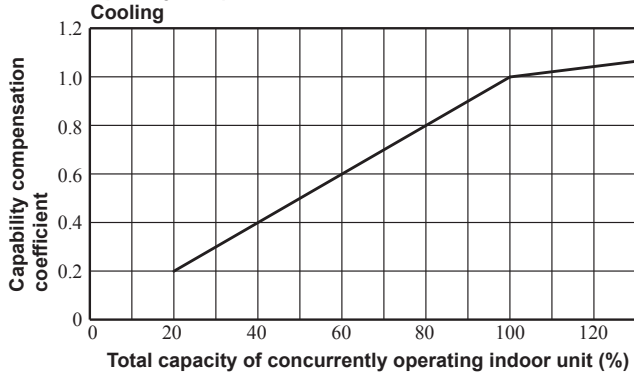


Heating

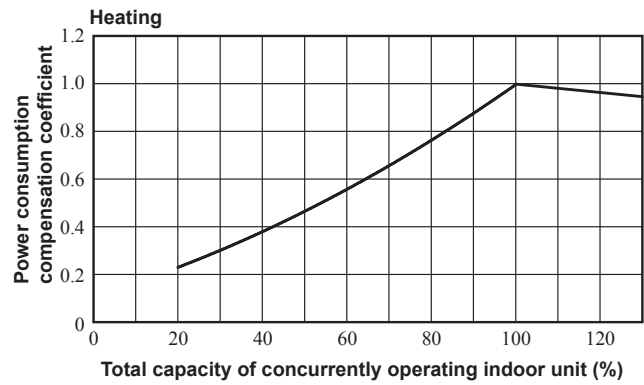
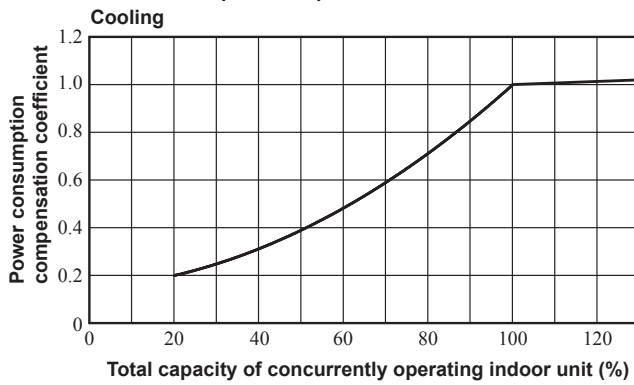


Model FDCB735KXZE1

◆ **Capability compensation coefficient**

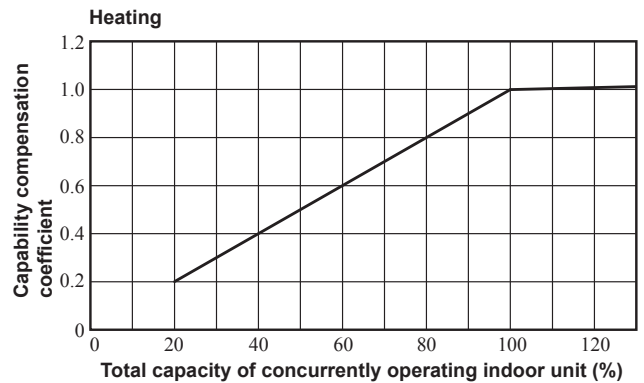
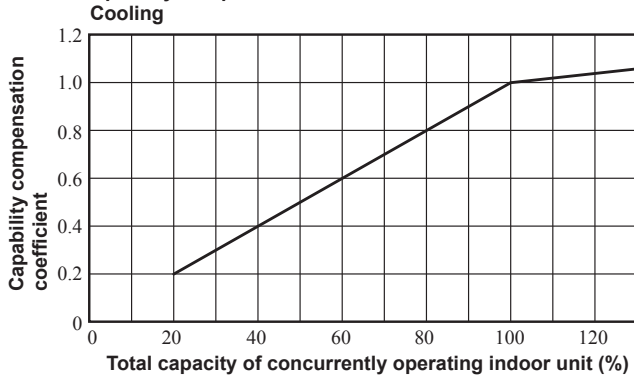


◆ **Power consumption compensation coefficient**

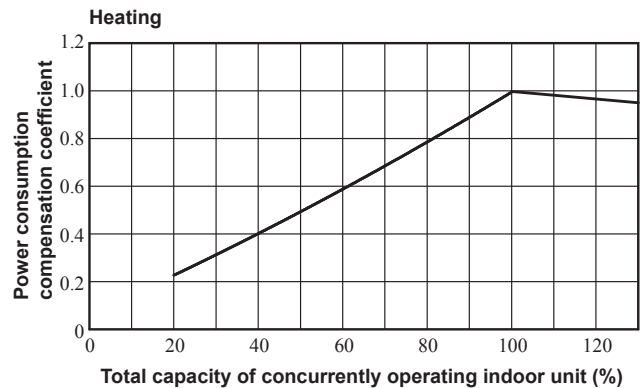
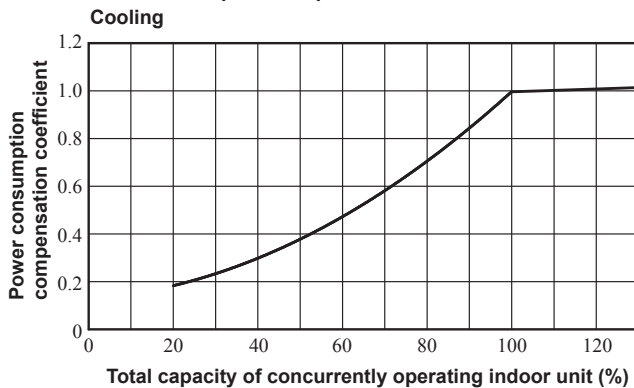


Model FDCB800KXZE1

◆ **Capability compensation coefficient**

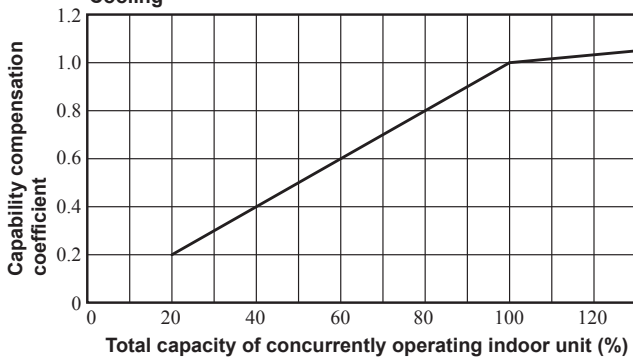


◆ **Power consumption compensation coefficient**

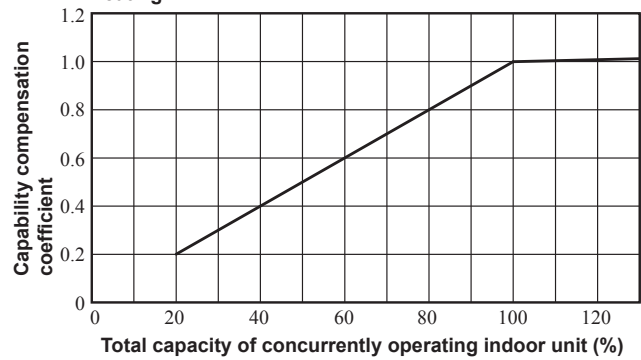


Model FDCB850KXZE1

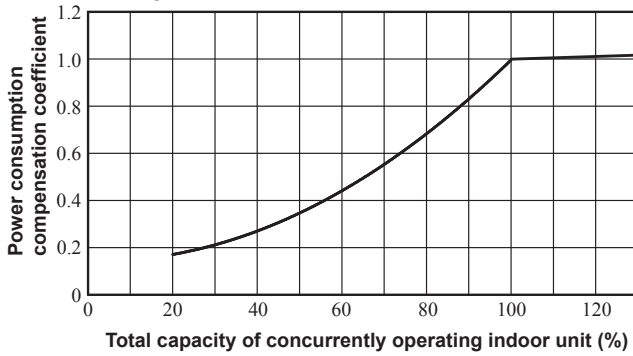
◆ **Capability compensation coefficient**
Cooling



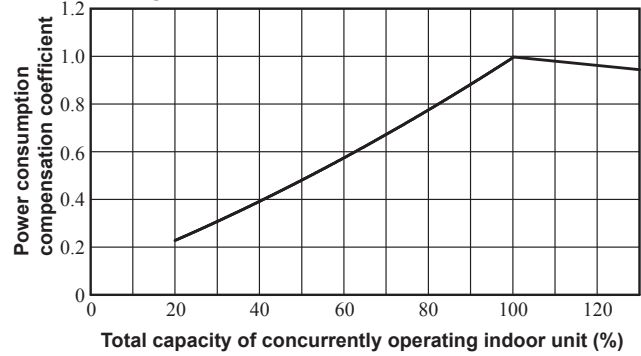
Heating



◆ **Power consumption compensation coefficient**
Cooling

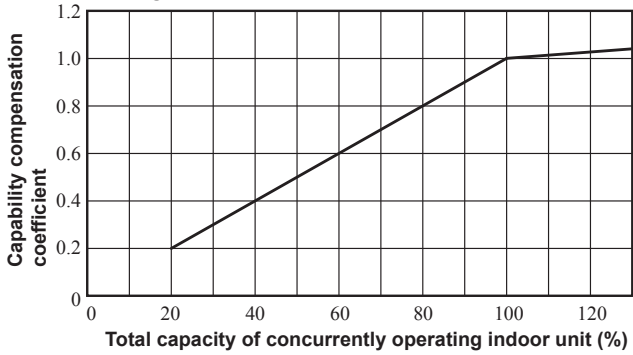


Heating

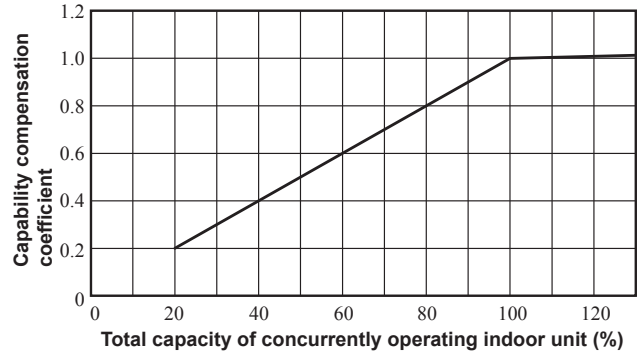


Model FDCB900KXZE1

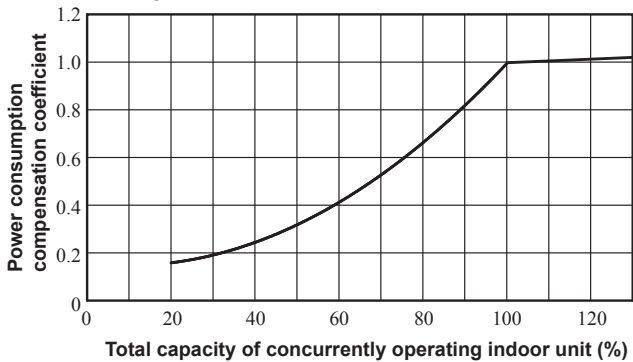
◆ **Capability compensation coefficient**
Cooling



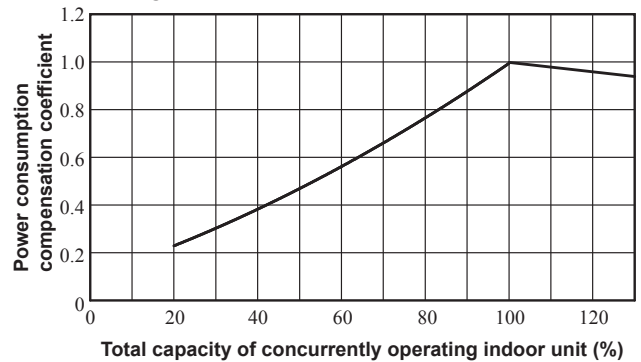
Heating



◆ **Power consumption compensation coefficient**
Cooling

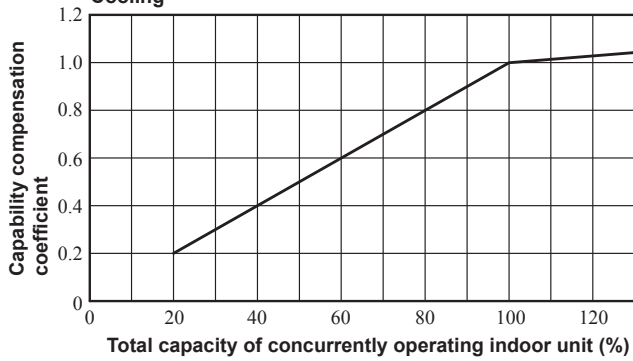


Heating

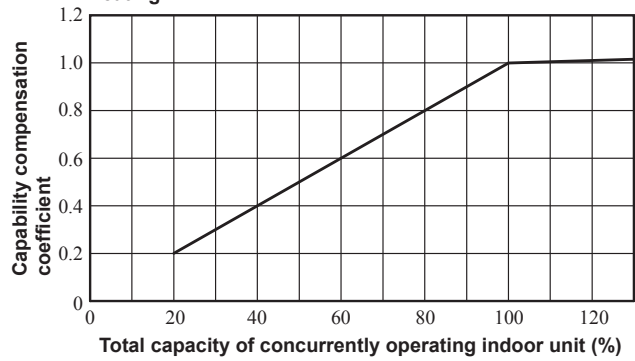


Model FDCB950KXZE1

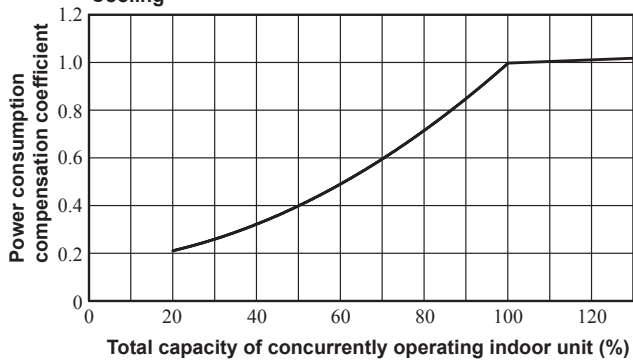
◆ **Capability compensation coefficient**
Cooling



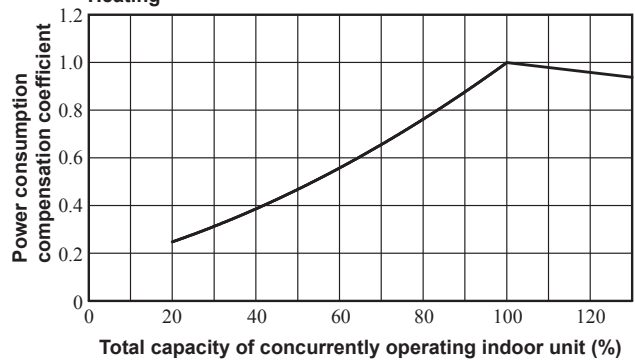
Heating



◆ **Power consumption compensation coefficient**
Cooling

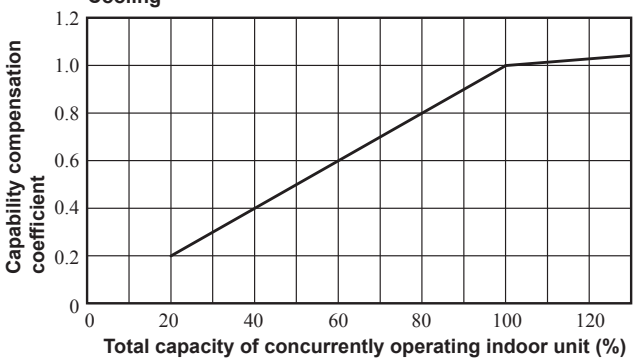


Heating

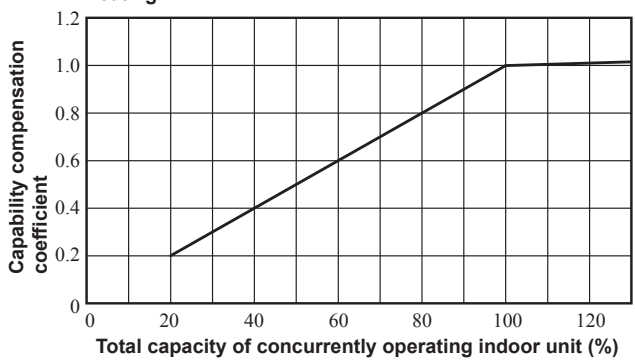


Model FDCB1000KXZE1

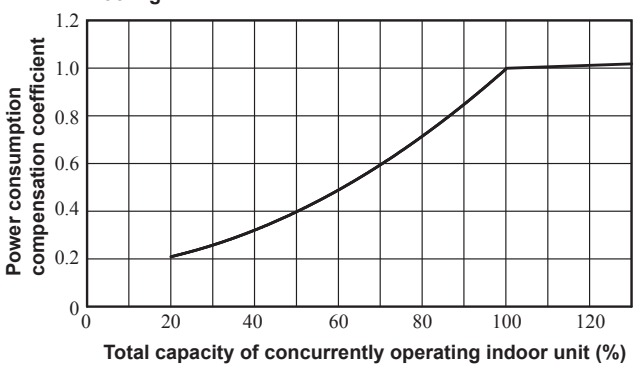
◆ **Capability compensation coefficient**
Cooling



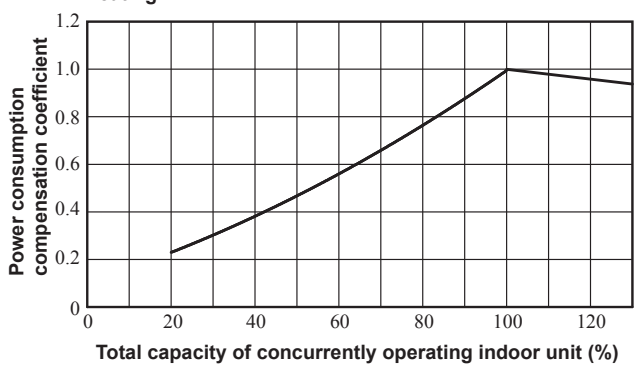
Heating



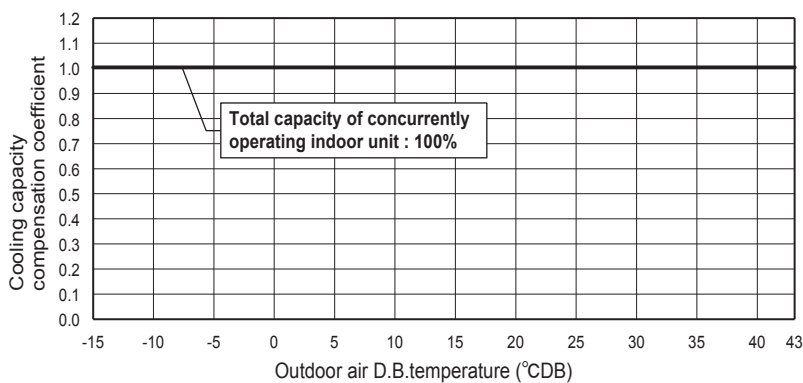
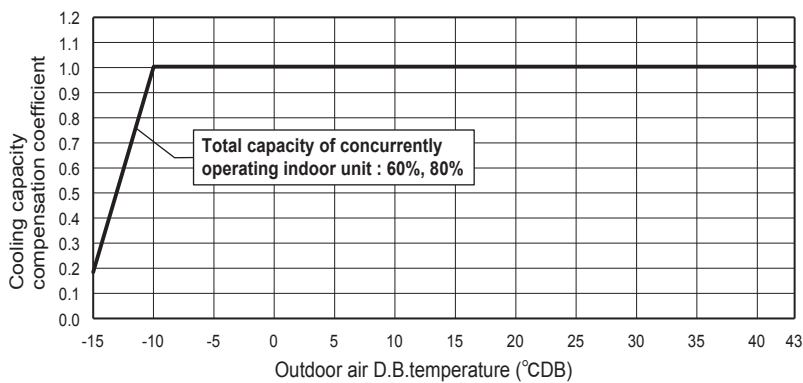
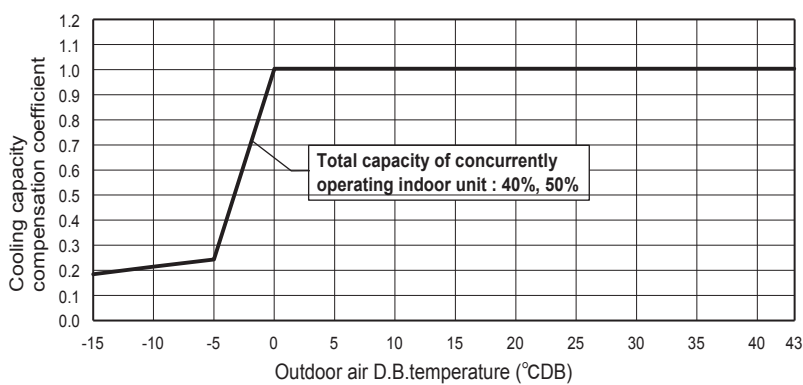
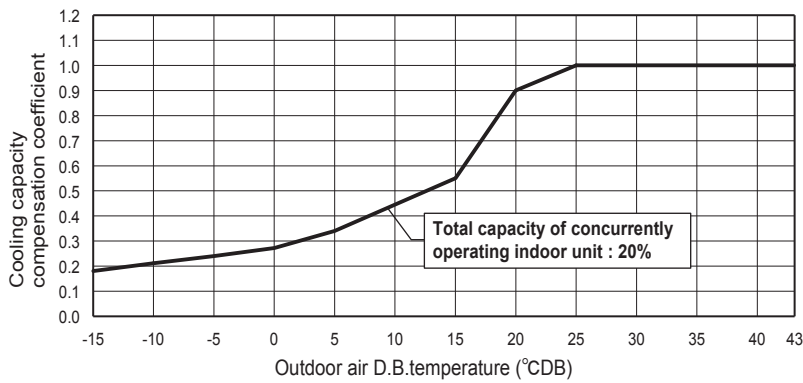
◆ **Power consumption compensation coefficient**
Cooling



Heating

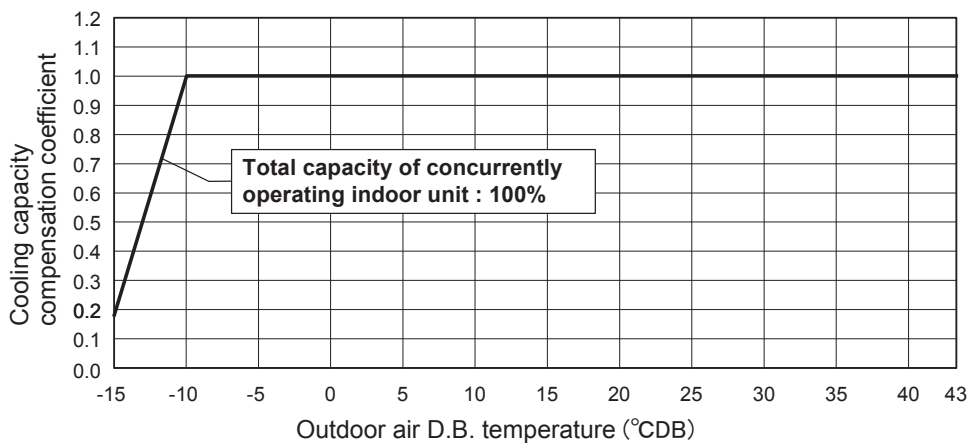
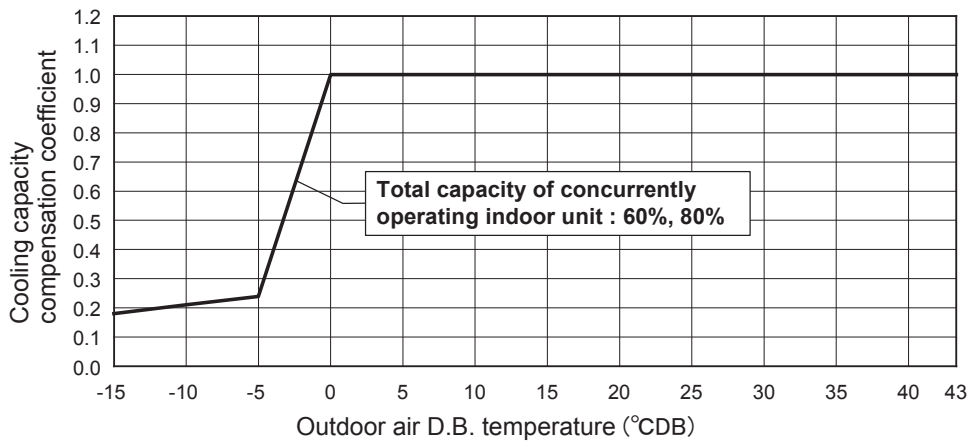
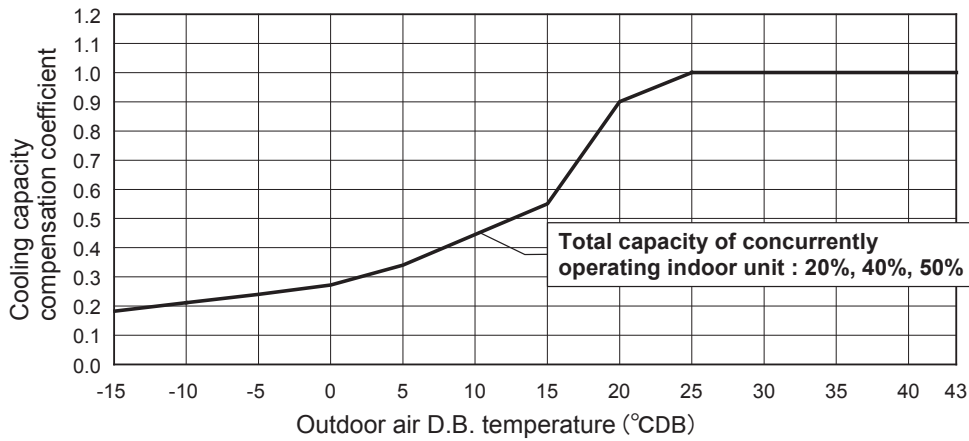


(f) The capacity compensation coefficient:
 Cooling capacity in low temperature under operation of anti-frost control
 (i) Indoor fan tap: PHI



Capacity compensation coefficient is that of cooling capacity at each fan-tap.
 (Condition) Room temp: 27°CDB/19°CWB
 (*) If room temp. is lower than 27°CDB/19°CWB, cooling capacity ratio tends to be smaller than values shown in graph.
 The lowest fan tap in the operating indoor units should be selected on above graph.

(ii) Indoor fan tap: Lo



Capacity compensation coefficient is that of cooling capacity at each fan-tap.
 (Condition) Room temp: 27°CDB/19°CWB
 (*) If room temp. is lower than 27°CDB/19°CWB, cooling capacity ratio tends to be smaller than values shown in graph.
 The lowest fan tap in the operating indoor units should be selected on above graph.

6. WARNINGS ON REFRIGERANT LEAKAGE

Check of concentration limit

The room in which the air-conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its concentration will not exceed a set limit.

The refrigerant R410A which is used in the air-conditioner is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws to be imposed which protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its concentration should rise excessively.

Suffocation from leakage of R410A is almost nonexistent. With the recent increase in the number of high concentration buildings, however, the installation of multi air-conditioner systems is on the increase because of the need for effective use of floor space, individual control, energy conservation by curtailing heat and carrying power etc.

Most importantly, the multi air-conditioner system is able to replenish a large amount of refrigerant compared with conventional individual air-conditioners. If a single unit of the multi conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its concentration does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

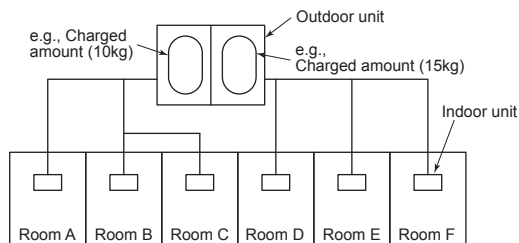
In a room where the concentration may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device.

The concentration is as given below.

$$\frac{\text{Total amount of refrigerant (kg)}}{\text{Min. volume of the indoor unit installed room (m}^3\text{)}} \leq \text{Concentration limit (kg/m}^3\text{)}$$

The concentration limit of R410A which is used in multi air-conditioners is 0.42kg/m³. (ISO5149)

Note(1) If there are 2 or more refrigerating systems in a single refrigerating device, the amounts of refrigerant should be as charged in each independent device.

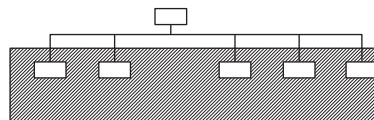


For the amount of charge in this example:
 The possible amount of leaked refrigerant gas in rooms A, B and C is 10kg.
 The possible amount of leaked refrigerant gas in rooms D, E and F is 15kg.

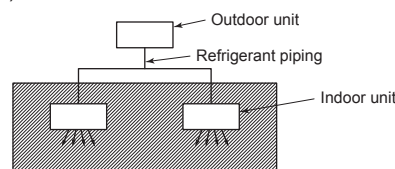
Important

Note(2) The standards for minimum room volume are as follows.

① No partition (shaded portion)

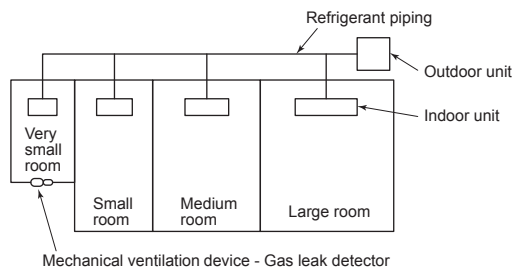


② When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).

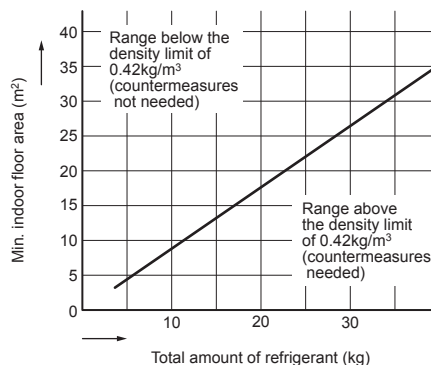


③ If an indoor unit is installed in each partitioned room and the refrigerant tubing is interconnected, the smallest of course becomes the object.

But when a mechanical ventilation is installed interlocked with a gas leakage detector in the smallest room where the density limit is exceeded, the volume of the next smallest room becomes the object.



Note(3) The minimum indoor floor area compared with the amount of refrigerant is roughly as follows: (When the ceiling is 2.7m high)



7. APPLICATION DATA

7.1 Installation of outdoor unit

Designed for R410A refrigerant

PSC012D031G

Outdoor unit capacity
FDCB224-1000KXZE1

- ⊙ 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.
- ⊙ Please read this manual carefully before you set to installation work and carry it out according to the instructions contained in this manual.

Precautions for safety

- 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.
- The meanings of "Marks" used here are as shown on the right: **⊘ Never do it under any circumstances.** **⚠ Always do it according to the instruction.**
- 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.
- FDC 224, 280 and 335 comply 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.

⚠ WARNING

- Installation must be carried out by the qualified installer.
If you install the system by yourself, it may cause serious trouble such as water leaks, electric shocks, fire and personal injury, as a result of a system malfunction.
- Install the system in full accordance with the instruction manual.
Incorrect installation may cause bursts, personal injury, water leaks, electric shocks and fire.
- Use the original accessories and the specified components for installation.
If parts other than those prescribed by us are used, it may cause fall of the unit, water leaks, electric shocks, fire, refrigerant leak, substandard performance, comfort failure and personal injury.
- When installing in small rooms, take prevention measures not to exceed the density limit of refrigerant in the event of leakage accordance with ISO5149.
Consult the expert about prevention measures. If the density of refrigerant exceeds the limit in the event of leakage, lack of oxygen can occur, which can cause serious accidents.
- Ventilate the working area well in the event of refrigerant leakage during installation.
If the refrigerant comes into contact with naked flames, poisonous gas is produced.
- After completed installation, check that no refrigerant leaks from the system.
If refrigerant leaks into the room and comes into contact with an oven or other hot surface, poisonous gas is produced.
- Hang up the unit at the specified points with ropes which can support the weight in lifting for portage. And to avoid jolting out of alignment, be sure to hang up the unit at 4-point support.
An improper manner of portage such as 3-point support can cause death or serious personal injury due to falling of the unit.
- Install the unit in a location with good support.
- Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.
- Ensure the unit is stable when installed, so that it can withstand earthquakes and strong winds.
- Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.
- The electrical installation must be carried out by the qualified electrician in accordance with "the norm for electrical work" and "national wiring regulation", and the system must be connected to the dedicated circuit.
Power source with insufficient capacity and incorrect function done by improper work can cause electric shocks and fire.
- Be sure to shut off the power before starting electrical work.
Failure to shut off the power can cause electric shocks, unit failure or incorrect function of equipment.
- Be sure to use the cables conformed to safety standard and cable capacity for power distribution work.
Unconformable cables can cause electrical leak, anomalous heat production or fire.
- Use the prescribed cables for electrical connection, tighten the cables securely in terminal block and relieve the cables correctly to prevent overloading the terminal blocks.
Loose connections or cable mountings can cause anomalous heat production or fire.
- Arrange the wiring in the control box so that it cannot be pushed up further into the box. Install the service panel correctly.
Incorrect installation may result in overheating and fire.
- In connecting the power cable, make sure that no anomalies such as dust deposits, socket clogging or wobble are found and insert the plug securely.
Accumulation of dust, clogging on the socket, or looseness of plugging can cause electric shocks and fire.
- Be sure not to reuse existing refrigerant pipes.
Conventional refrigerant oil or chlorine contained in the conventional refrigerant which is remaining in the existing refrigerant pipes can cause deterioration of refrigerant oil of new unit. And 1.6 times higher pressure of R410A refrigerant than conventional one can cause burst of existing pipe, personal injury or serious accident.
- Do not perform brazing work in the airtight room
It can cause lack of oxygen.
- Use the prescribed pipes, flare nuts and tools for R410A.
Using existing parts (for R22 or R407C) can cause the unit failure and serious accidents due to burst of the refrigerant circuit.
- Tighten the flare nut by using double spanners and torque wrench according to prescribed method. Be sure not to tighten the flare nut too much.
Loose flare connection or damage on the flare part by tightening with excess torque can cause burst or refrigerant leaks which may result in lack of oxygen.
- Do not open the service valves for liquid line and gas line until completed refrigerant piping work, air tightness test and evacuation.
If the compressor is operated in state of opening service valves before completed connection of refrigerant piping work, you may incur frost bite or injury from an abrupt refrigerant outflow and air can be sucked into refrigerant circuit, which can cause burst or personal injury due to anomalously high pressure in the refrigerant.
- Do not put the drainage pipe directly into drainage channels where poisonous gases such as sulphide gas can occur.
Poisonous gases will flow into the room through drainage pipe and seriously affect the user's health and safety. It can also cause the corrosion of the indoor unit and resultant unit failure or refrigerant leak.
- Only use prescribed option parts. The installation must be carried out by the qualified installer.
- If you install the system by yourself, it can cause serious trouble such as water leaks, electric shocks, fire.
- Do not perform any change of protective device itself or its setup condition
The forced operation by short-circuiting protective device of pressure switch and temperature controller or the use of non specified component can cause fire or burst.
- Be sure to switch off the power source in the event of installation, inspection or servicing.
If the power source is not shut off, there is a risk of electric shocks, unit failure or personal injury due to the unexpected start of fan.
- Consult the dealer or an expert regarding removal of the unit.
Incorrect installation can cause water leaks, electric shocks or fire.
- Stop the compressor before closing valve and disconnecting refrigerant pipes in case of pump down operation.
If disconnecting refrigerant pipes in state of opening service valves before compressor stopping, you may incur frost bite or injury from an abrupt refrigerant outflow and air can be sucked, which can cause burst or personal injury due to anomalously high pressure in the refrigerant circuit.
- Ensure that no air enters in the refrigerant circuit when the unit is installed and removed.
If air enters in the refrigerant circuit, the pressure in the refrigerant circuit becomes too high, which can cause burst and personal injury.
- Do not run the unit with removed panels or protections
Touching rotating equipments, hot surfaces or high voltage parts can cause personal injury due to entrapment, burn or electric shocks.
- Be sure to fix up the service panels.
Incorrect fixing can cause electric shocks or fire due to intrusion of dust or water.
- Do not perform any repairs or modifications by yourself. Consult the dealer if the unit requires repair.
If you repair or modify the unit, it can cause water leaks, electric shocks or fire.

⚠ CAUTION

- Use the circuit breaker for all pole with correct capacity.
Using the incorrect circuit breaker, it can cause the unit malfunction and fire.
- Take care when carrying the unit by hand.
If the unit weights more than 20kg, it must be carried by two or more persons. Do not carry by the plastic straps, always use the carry handle when carrying the unit by hand. Use gloves to minimize the risk of cuts by the aluminum fins.
- Dispose of any packing materials correctly.
Any remaining packing materials can cause personal injury as it contains nails and wood. And to avoid danger of suffocation, be sure to keep the plastic wrapper away from children and to dispose after tear it up.
- Pay attention not to damage the drain pan by weld spatter when welding work is done near the indoor unit.
If weld spatter entered into the indoor unit during welding work, it can cause pin-hole in drain pan and result in water leakage. To prevent such damage, keep the indoor unit in its packing or cover it.
- Be sure to insulate the refrigerant pipes so as not to condense the ambient air moisture on them.
Insufficient insulation can cause condensation, which can lead to moisture damage on the ceiling, floor, furniture and any other valuables.
- Be sure to perform air tightness test by pressurizing with nitrogen gas after completed refrigerant piping work.
If the density of refrigerant exceeds the limit in the event of refrigerant leakage in the small room, lack of oxygen can occur, which can cause serious accidents.
- Perform installation work properly according to this installation manual.
Improper installation can cause abnormal vibrations or increased noise generation.
- Carry out the electrical work for ground lead with care.
Do not connect the ground lead to the gas line, water line, lightning conductor or telephone line's ground lead. Incorrect grounding can cause unit faults such as electric shocks and fire due to short-circuiting. Never connect the grounding wire to a gas pipe because if gas leaks, it could cause explosion or ignition.
- Earth leakage breaker must be installed.
If the earth leakage breaker is not installed, it can cause fire or electric shocks.
- Do not use any materials other than a fuse with the correct rating in the location where fuses are to be used.
Connecting the circuit with copper wire or other metal thread can cause unit failure and fire.
- Do not install the unit near the location where leakage of combustible gases can occur.
If leaked gases accumulate around the unit, it can cause fire.
- Do not install the unit where corrosive gas (such as sulfuric acid gas etc.) or combustible gas (such as thinner and petroleum gases) can accumulate or collect, or where volatile combustible substances are handled.
Corrosive gas can cause corrosion of heat exchanger, breakage of plastic parts and etc. And combustible gas can cause fire.
- Secure a space for installation, inspection and maintenance specified in the manual.
Insufficient space can result in accident such as personal injury due to falling from the installation place.
- When the outdoor unit is installed on a roof or a high place, provide permanent ladders and handrails along the access route and fences and handrails around the outdoor unit.
If safety facilities are not provided, it can cause personal injury due to falling from the installation place.
- Do not install nor use the system close to the equipment that generates electromagnetic fields or high frequency harmonics
Equipment such as inverters, standby generators, medical high frequency equipments and telecommunication equipments can affect the system, and cause malfunctions and breakdowns. The system can also affect medical equipment and telecommunication equipment, and obstruct its function or cause jamming.
- Do not install the outdoor unit in a location where insects and small animals can inhabit.
Insects and small animals can enter the electric parts and cause damage or fire. Instruct the user to keep the surroundings clean.
- Do not use the base flame for outdoor unit which is corroded or damaged due to long periods of operation.
Using an old and damaged base flame can cause the unit falling down and cause personal injury.
- Do not install the unit in the locations listed below.
 - Locations where carbon fiber, metal powder or any powder is floating.
 - Locations where any substances that can affect the unit such as sulphide gas, chloride gas, acid and alkaline can occur.
 - Vehicles and ships
 - Locations where cosmetic or special sprays are often used.
 - Locations with direct exposure of oil mist and steam such as kitchen and machine plant.
 - Locations where any machines which generate high frequency harmonics are used.
 - Locations with salty atmospheres such as coastlines
 - Locations with heavy snow (If installed, be sure to provide base flame and snow hood mentioned in the manual)
 - Locations where the unit is exposed to chimney smoke
 - Locations at high altitude (more than 1000m high)
 - Locations with ammoniac atmospheres (e.g. organic fertilizer).
 - Locations with calcium chloride (e.g. snow melting agent).
 - Locations where heat radiation from other heat source can affect the unit
 - Locations without good air circulation.
 - Locations with any obstacles which can prevent inlet and outlet air of the unit
 - Locations where short circuit of air can occur (in case of multiple units installation)
 - Locations where strong air blows against the air outlet of outdoor unit
It can cause remarkable decrease in performance, corrosion and damage of components, malfunction and fire.
- Do not install the outdoor unit in the locations listed below.
 - Locations where discharged hot air or operating sound of the outdoor unit can bother neighborhood.
 - Locations where outlet air of the outdoor unit blows directly to an animal or plants. The outlet air can affect adversely to the plant etc.
 - Locations where vibration can be amplified and transmitted due to insufficient strength of structure.
 - Locations where vibration and operation sound generated by the outdoor unit can affect seriously.
(on the wall or at the place near bed room)
 - Locations where an equipment affected by high harmonics is placed. (TV set or radio receiver is placed within 5m)
 - Locations where drainage cannot run off safely.
It can affect surrounding environment and cause a claim
- Do not use the unit for special purposes such as storing foods, cooling precision instruments and preservation of animals, plants or art. It can cause the damage of the items.
- Do not touch any buttons with wet hands
It can cause electric shocks
- Do not shut off the power source immediately after stopping the operation.
Wait at least 5 minutes, otherwise there is a risk of water leakage or breakdown.
- Do not control the system with main power switch.
It can cause fire or water leakage. In addition, the fan can start unexpectedly, which can cause personal injury.
- Do not touch any refrigerant pipes with your hands when the system is in operation.
During operation the refrigerant pipes become extremely hot or extremely cold depending the operating condition, and it can cause burn injury or frost injury.
- Do not operate the outdoor unit with any article placed on it.
You may incur property damage or personal injury from a fall of the article.
- Do not step onto the outdoor unit.
You may incur injury from a drop or fall.

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 cylinder containing R410A has a pink indication mark on the top.
- A unit designed for R410A has adopted a different size indoor unit service valve charge port and a different size check joint provided in the unit to prevent the charging of a wrong refrigerant by mistake. The processed dimension of the flared part of a refrigerant pipe and a 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 table on the right before installing or servicing this unit.
- 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 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)


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

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

CAUTION

- Please read this manual without fail before you set to installation work and carry it out according to this manual.
- For the installation of an indoor unit, please refer to the installation manual of an indoor unit.
- For piping work, option distribution parts (branching pipe set, header set) are necessary. Please refer to our catalog, etc.
- Never fail to install an earth leakage breaker. (Please use one tolerable to harmonic components)
- Operating the unit with the outlet pipe thermistor, the inlet pipe thermistor, the pressure sensor, etc. removed can result in a compressor burnout. Avoid operation under such conditions in any circumstances.
- 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	Usage location	
Wiring 	2	In operating the unit in the silent mode or the forced cooling/heating mode, insert it to the outdoor unit board's CNG.	It is supplied with the unit. You can find it taped inside the control box.
Instruction manual	1	When the installation work is completed, give instructions to the customer and ask him/her to keep it.	Attached on the side panel below the operation valve.

COMBINATION PATTERNS

- The possible outdoor unit combinations and the number and the total capacity of indoor units that can be connected in a system are shown in the table below.
- Please always use indoor units designed exclusively for R410A. For connectable indoor unit model names, please check with our catalog, etc.
- It can be used in combination with the following indoor unit.

Indoor unit	Remote control	Connection OK/NO
FD○△△KXE6	RC-E3(2 cores), RC-E4(2 cores), RC-E5 (2 cores), RC-EX1A (2 cores)	OK
FD○A△△KXE4R, KXE4BR, KXE5R	RC-E1R(3 cores)	NO
FD○A△△KXE4, KXE4(A), KXE4A	RC-E1(3 cores)	NO

Notabilia

The same outdoor unit is used whether it is used alone or in combination with another unit.

- Please note that an installation involving a combination other than those listed below is not operable. (For example, you cannot operate 280 and 400 in combination)

Outdoor unit		Indoor unit	
Capacity	Combination patterns	Number of connectable units (units)	Range of the total capacity of indoor units connected in a system
224	Single	1~19	180~291
280	Single	1~24	224~364
335	Single	1~29	268~435
450	Combination (224+224)	2~39	360~585
500	Combination (224+280)	2~43	400~650
560	Combination (280+280)	2~48	448~728
615	Combination (280+335)	2~53	492~799
670	Combination (335+335)	2~58	536~871
735	Combination (224+224+280)	3~63	588~955
800	Combination (224+280+280)	3~69	640~1040
850	Combination (280+280+280)	3~73	680~1105
900	Combination (280+280+335)	3~78	720~1170
950	Combination (280+335+335)	3~80	760~1235
1000	Combination (335+335+335)	3~80	800~1300

[Option parts]

Refrigerant distribution piping components supplied as option parts will become necessary in installing the unit.

As refrigerant distribution piping components, branching pipe sets (model type: DOS) for the outdoor unit side piping, branching pipe sets (model type: DIS) and header sets (model type: HEAD) for the outdoor unit side piping are available.

Select according to the application. Please refer to "4. Refrigerant piping work" in selecting.

If you are uncertain, please do not hesitate to consult with your distributor or the manufacturer.

Please use refrigerant branching sets and header sets designed exclusively for R410A without fail.

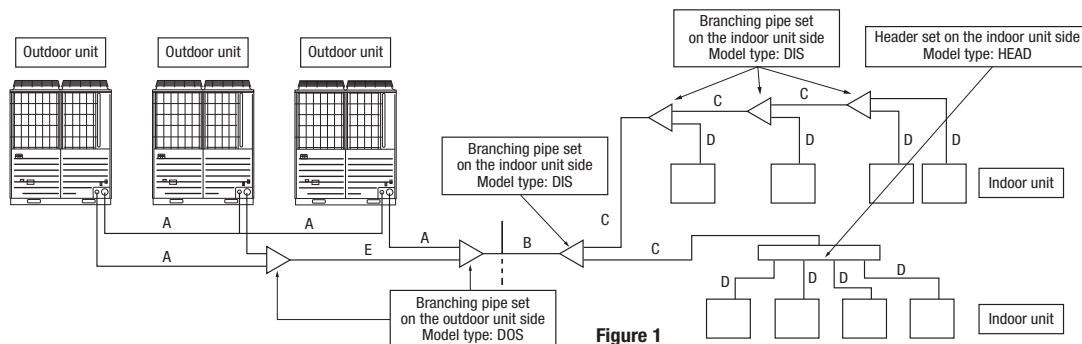


Figure 1

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 wind does not hinder the intake and outlet pipes.
- Out of the heat range of other heat sources.
- Where strong winds will not blow against the outlet pipe.
- A place where stringent regulation of electric noises is not applicable.
- Where it is safe for the drain water to be discharged.
- Where noise and hot air will not bother neighboring residents.
- Where snow will not accumulate.
- 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)
- Do not install the unit in places which exposed to sea breeze (e.g. coastal area) or calcium chloride (e.g. snow melting agent), exposed to ammonia substance (e.g. organic fertilizer).

Please note

- a) A four-sided enclosure cannot be used. Leave a space of at least 1m above the unit.
- b) If there is a danger of a short-circuit, then install a wind direction variable adapter.
- c) When installing multiple units, provide sufficient intake space so that a short-circuit does not occur.
- d) 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)
- e) Do not install the equipment in areas where there is a danger for potential explosive atmosphere.

* Please ask your distributor about optional parts such as wind vane adapters, snow guard hoods, etc.

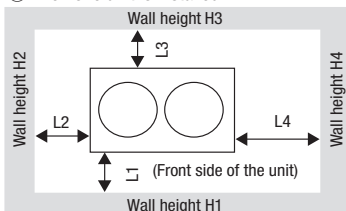
CAUTION

Please leave sufficient clearance around the unit without fail. Otherwise, a risk of compressor and/or electric component failure may arise.

2-2. Installation space (service space) example

Please secure sufficient clearance (room for maintenance work, passage, draft and piping). (If your installation site does not fulfill the installation condition requirements set out on this drawing, please consult with your distributor or the manufacturer)

① When one unit is installed



Example installation	I	II	III
Dimensions			
L1	500	500	Open
L2	10 (30)	50	10 (30)
L3	100	50	100
L4	10 (30)	50	Open
H1	1500	1500	Open
H2	No limit	No limit	No limit
H3	1000	1000	No limit
H4	No limit	No limit	Open

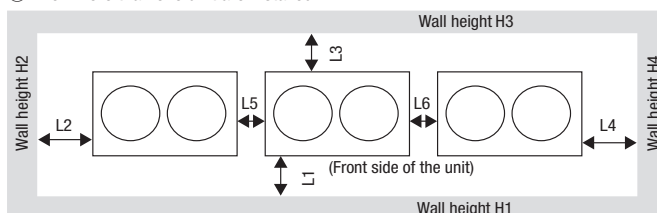
() : In case it is the promised installation location that the outdoor unit is used on conditions with the ambient temperature of 43°C or more.

For a normal installation, leave a 10 mm or wider space on both sides of the unit (L5 and L6) as workspace. It is also possible to install at a 0mm interval (continuous installation) with future renewal, etc. in mind.

For your information:

the footprint of an outdoor unit is 1350x720 for all models throughout the series (280-560).

② When more than one unit are installed



Example installation	I	II
Dimensions		
L1	500	Open
L2	10 (30)	200
L3	100	300
L4	10 (30)	Open
L5	10 (30)	400
L6	10 (30)	400
H1	1500	Open
H2	No limit	No limit
H3	1000	No limit
H4	No limit	Open

() : In case it is the promised installation location that the outdoor unit is used on conditions with the ambient temperature of 43°C or more.

3. Unit delivery and installation

CAUTION When a unit is hoisted with slings for haulage, please take into consideration the offset of its gravity center position. If not properly balanced, the unit can be thrown off-balance and fall.

3-1. Delivery

- By defining a cartage path, carry in the entire package containing a unit to its installation point.
- In slinging a unit, use two canvas belts with plates, cloth pads or other protections applied to the unit to prevent damage.

Please note

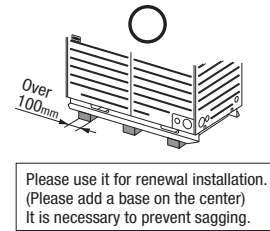
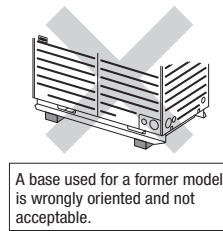
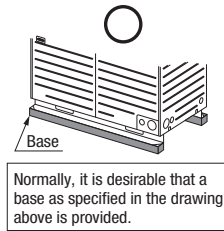
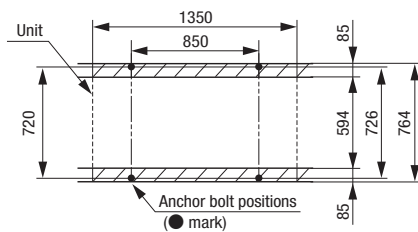
- a) Please do not fail to put belts through the rectangular holes of a unit's anchoring legs.
- b) Apply cloth pads between a canvas belt and a unit to prevent damage.



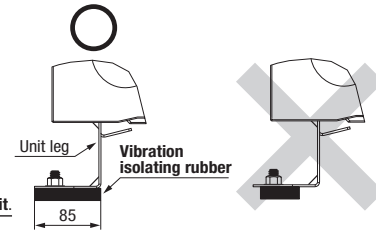
3-2. Notabilia for installation

- (1) Anchor bolt positions
 - Use four anchor bolts (M10) to fix an outdoor unit's anchoring legs at all times. Ideally, an anchor bolt should protrude 20mm.





- (2) Base
- Please install a unit after ascertaining that the bases have been made to sufficient strength and level to ensure the unit against vibration or noise generation.
 - Please construct a base to the size of a shadowed area (the entire bottom area of an outdoor unit's anchoring leg) shown on the above drawing or larger.
 - Please orient a base in the traversal direction (direction of W1350mm) of an outdoor unit as illustrated in the drawing above.
- (3) Vibration isolating rubber
- A vibration isolating rubber must support an outdoor unit's anchoring leg by its entire bottom area.



Please note

- 1) Install a vibration isolating rubber in such a manner that the entire bottom area of an outdoor unit's anchoring leg will rest on it.
- 2) Do not install an outdoor unit in such a manner that a part of the bottom area of its anchoring leg is off a vibration isolating rubber.

4. REFRIGERANT PIPING

4-1. Restrictions on the use of pipes

(1) Limitation on use of pipes

• In installing pipes, always observe the restrictions on the use of pipes specified in this Section (1) including Maximum length, Total pipe length, Allowable pipe length from the first branching, and Allowable elevation difference (head difference).

- Please avoid forming any trap () or bump () in piping as they can cause fluid stagnation.
- Maximum length (from an outdoor unit to the farthest indoor unit) 160 m or less as actual pipe length (185 m or less as equivalent pipe length)
(When an actual pipe length exceeds 90m, however, it is necessary to change the pipe size. Please determine the main pipe size by consulting with the Main Selection Reference Table set out in Section (3) (b).

- Total pipe length 1000 m or less
- Main pipe length 130 m or less
- Allowable pipe length from the first branching 90 m or less
(However, difference between the longest and shortest piping 40 m or less (Max 85 m or less*1))

*1 When it is required to install in a range of 40 to 85 m, limitation of use, etc. are different from those described here. Refer to technical documents.

• Allowable elevation difference (head difference)

- (a) When an outdoor unit is installed above 50 m or less (Max 70 m or less)*2*3

*2 When it is required to install in a range of 50 to 70 m, limitation of use, etc. are different from those described here. Refer to technical documents.
*3 The elevation difference must be less than 40 m, when it is required to use at the outdoor air temperature of 46°C or more.

- (b) When an outdoor unit is installed below 40 m or less*4

*4 It must be less than 30 m when conducting the cooling operation with the outdoor air temperature lower than 10°C.

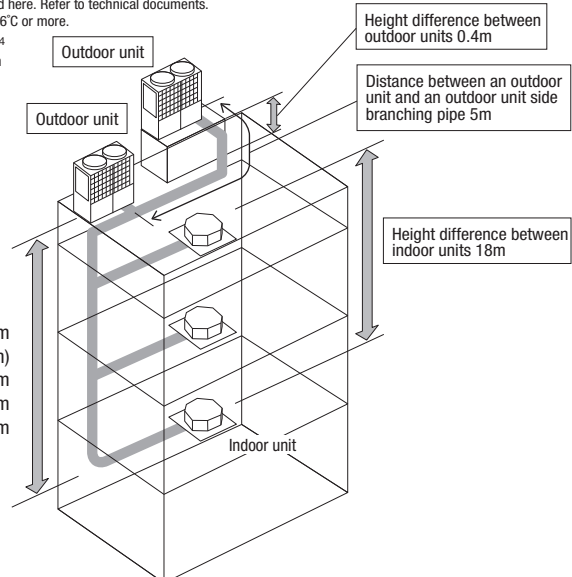
- (c) Difference in the elevation of indoor units in a system 18 m or less
- (d) Elevation difference between the first branching point and the indoor unit 18 m or less

• Restrictions on piping applicable to the section between an outdoor unit and an outdoor unit side branching pipe (combination unit)

- (a) Difference in the elevation 0.4 m or less
- (b) Distance between an outdoor unit and an outdoor unit side branching pipe 5 m or less
- (c) Length of oil equalization piping 10 m or less

CAUTION

An installation not conforming to these restrictions can induce a compressor failure, which shall be excluded from the scope of warranty. Always observe the restrictions on the use of pipes in developing a system.



Important

When the Additional refrigerant quantity (P+I) is over the following table, please separate the refrigerant line.

Outdoor unit	P+I (kg)
224-670	40
735-1000	80

Difference in the elevation	50m (Max 70m)
Actual length	160m
Equivalent length	185m
Total length	1000m

(2) Piping material selection

- Please use pipes clean on both the inside and outside and free from contaminants harmful to operation such as sulfur, oxides, dust, chips, oil, fat and water.
- Use the following material for refrigerant piping.
Material: phosphorus deoxidized seamless copper pipe (C1120T-0, 1/2H, JIS H 3300)
Use C1220T-1/2H for ϕ 19.05 or larger, or C1220T-0 for ϕ 15.88 or smaller
- Do not use ϕ 28.58 x t1.0, ϕ 31.8 x t1.1, ϕ 34.92 x t1.2 and ϕ 38.1 x t1.35 as a bent pipe.
- Thickness and size: Please select proper pipes according to the pipe size selection guideline.
(Since this unit uses R410A, always use 1/2H pipes of a specified minimum thickness or thicker for all pipes of ϕ 19.05 or larger, because the pressure resistance requirement is not satisfied with O-type pipes).
- For branching pipes, use a genuine branching pipe set or header set at all times. (option parts)
- For the handling of service valves, please refer to P.9 4-3(4) Method of operating service valves.
- In installing pipes, observe the restrictions on the use of pipes set out in Section 1 (Maximum length, total pipe length, allowable pipe length from the first branching, allowable elevation difference (head difference)) without fail.
- Install a branching pipe set, paying attention to the direction of attachment, after you have perused through the installation manual supplied with it.

(3) Pipe size selection

(a) Outdoor unit – Outdoor unit side branching pipe: Section A in Figure 1

Please use a pipe conforming to the pipe size specified for outdoor unit connection.
Indoor unit connecting pipe size table

Outdoor unit	Outdoor unit outlet pipe specifications					
	Gas pipe	Connection method	Liquid pipe	Connection method	Oil equalizing pipe	Connection method
224	$\phi 19.05 \times t 1.0$		Blazed		$\phi 9.52 \times t 0.8$	
280	$\phi 22.22 \times t 1.0$					
335	$\phi 25.4 \times t 1.0$					

Pipe sizes applicable to European installations are shown in parentheses.

Please use C1220T-1/2H for $\phi 19.05$ or larger pipes.

※1: Please connect the master and slave units with an oil equalization pipe, when they are used in a combined installation.

(It is not required, when a unit is used as a standalone installation)

When three outdoor units combination, please connect using a tee joint. (If contains in a branching pipe set for three units.)

(b) Main (Outdoor unit side branching pipe – Indoor unit side first branching pipe): Section B in Figure 1

If the longest distance (measured between the outdoor unit and the farthest indoor unit) is 90m or longer (actual length), please change the main pipe size according to the table below.

Outdoor unit	Main pipe size (normal)		Pipe size for an actual length of 90m or longer	
	Gas pipe	Liquid pipe	Gas pipe	Liquid pipe
224	$\phi 19.05 \times t 1.0$	$\phi 9.52 \times t 0.8$	$\phi 22.22 \times t 1.0$	$\phi 12.7 \times t 0.8$
280	$\phi 22.22 \times t 1.0$		$\phi 25.4 \times t 1.0$	
335	$\phi 25.4 \times t 1.0$			
450	$\phi 28.58 \times t 1.0$	$\phi 12.7 \times t 0.8$	$\phi 31.8 \times t 1.1$	$\phi 15.88 \times t 1.0$
500				
560				
615				
670				
735	$\phi 31.8 \times t 1.1$	$\phi 15.88 \times t 1.0$	$\phi 38.1 \times t 1.35$	$\phi 19.05 \times t 1.0$
800				
850				
900				
950				
1000				

Please use C1220T-1/2H for $\phi 19.05$ or larger pipes.

(c) Indoor unit side first branching pipe – Indoor unit side branching pipe: Section C in Figure 1

Please choose from the table below an appropriate pipe size as determined by the total capacity of indoor units connected downstream, provided, however, that the pipe size for this section should not exceed the main size (Section B in Figure 1).

Total capacity of indoor units	Gas pipe	Liquid pipe
Less than 70	$\phi 12.7 \times t 1.0$	$\phi 9.52 \times t 0.8$
70 or more but less than 180	$\phi 15.88 \times t 1.0$	
180 or more but less than 371	$\phi 19.05 \times t 1.0$ *1	$\phi 12.7 \times t 0.8$
371 or more but less than 540	$\phi 25.4 \times t 1.0$	$\phi 15.88 \times t 1.0$
540 or more but less than 700	$\phi 28.58 \times t 1.0$	
700 or more but less than 1100	$\phi 31.8 \times t 1.1$	$\phi 19.05 \times t 1.0$
1100 or more	$\phi 38.1 \times t 1.35$	

Please use C1220T-1/2H for $\phi 19.05$ or larger pipes.

*1: When connecting indoor units of 280 at the downstream and the main gas pipe is of $\phi 22.22$ or larger, use the pipe of $\phi 22.22 \times t 1.0$.

(d) Indoor unit side branching pipe – Indoor unit: Section D in Figure 1

Indoor unit connection pipe size table

Indoor unit	Capacity	Gas pipe	Liquid pipe
		15, 22, 28	$\phi 9.52 \times t 0.8$
36, 45, 56		$\phi 12.7 \times t 0.8$	
71, 90, 112, 140, 160		$\phi 15.88 \times t 1.0$	$\phi 9.52 \times t 0.8$
224		$\phi 19.05 \times t 1.0$	
280		$\phi 22.22 \times t 1.0$	

Please use C1220T-1/2H for $\phi 19.05$ or larger pipes.

(e) Selection of pipe between outdoor branch pipes for 3-unit combination: Section E in Figure 1

Size of pipe between outdoor branch pipes varies depending on the capacity of outdoor unit which is connected to second branch pipe in the outdoors. Select it from the following table.

Total capacity of outdoor units connected to second branch pipe in the outdoors	Size of pipe between branch pipes	
	Gas pipe	Liquid pipe
500	φ 28.58 × t 1.0	φ 12.7 × t 0.8
560		
615		
670		

Use C1220T-1/2H material for φ 19.05 or larger.

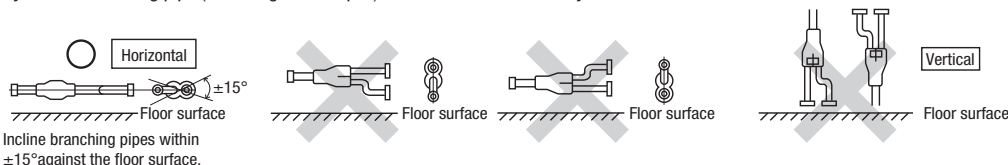
(4) Selection of an outdoor unit side branching pipe set

This branching pipe set will always become necessary when units are used in combination. (When a unit is used as a standalone installation, it is not required)

Outdoor unit	Branching pipe set
For two units (for 450 – 670)	DOS-2A-3
For three units (for 735 – 1000)	DOS-3A-3

Please note

- a) In connecting an outdoor unit, please use a pipe conforming to the pipe size specified for outdoor unit connection.
- b) Choose a different-diameter pipe joint matching a main pipe size specified in the above section in installing pipes (= main pipes) on the outdoor unit side.
- c) Always install branching pipe (for both gas and liquid) in such a manner that they form correct horizontal branch.



(5) Selection of an indoor unit side branching pipe set

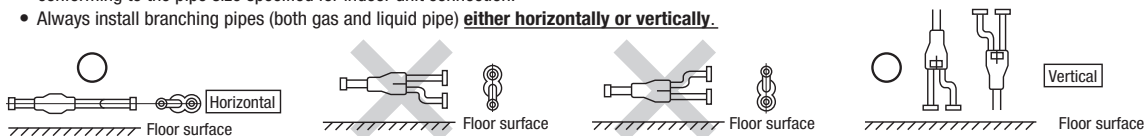
(a) Method of selecting a branching pipe set

- As an appropriate branching pipe size varies with the connected capacity (total capacity connected downstream), determine a size from the following table.

Total capacity downstream	Branching pipe set
Less than 180	DIS-22-1G
180 or more but less than 371	DIS-180-1G
371 or more but less than 540	DIS-371-1G
540 or more	DIS-540-3

Please note

- In connecting an indoor unit with the indoor unit side branching pipe set, please use a pipe conforming to the pipe size specified for indoor unit connection.
- Always install branching pipes (both gas and liquid pipe) **either horizontally or vertically.**



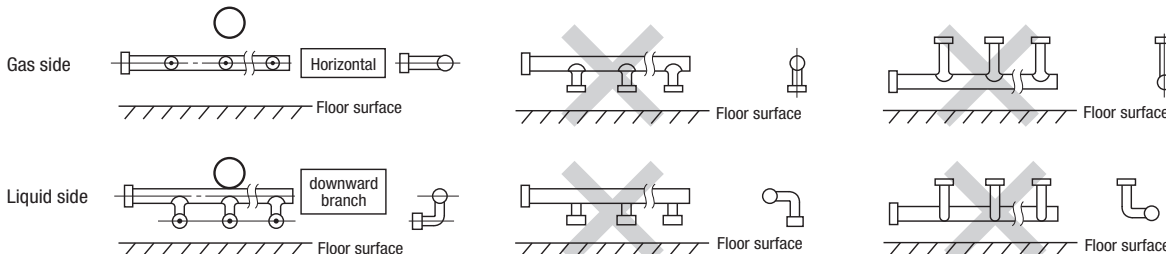
(b) Header Method

- 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 (option part).

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
371 or more but less than 540	HEAD8-371-2	8 branches at the most
540 or more	HEAD8-540-3	8 branches at the most

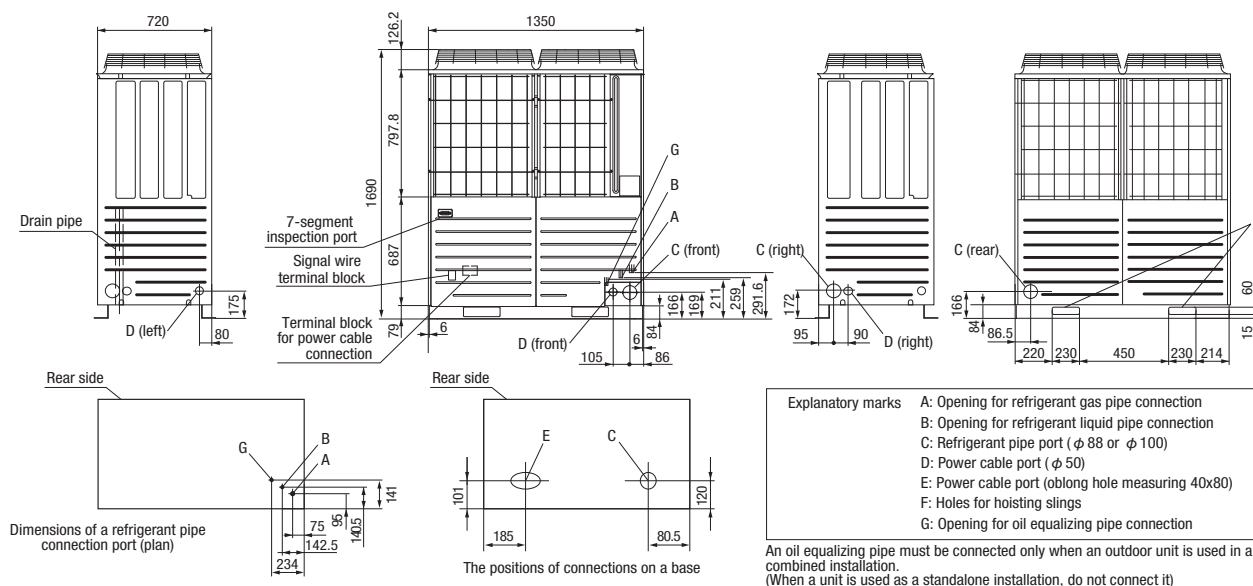
Please note

- a) In connecting a header with an indoor unit, please use a pipe conforming to the pipe size specified for indoor unit connection.
- b) **In installing a header, always arrange a gas-side header to branch horizontally and a liquid-side header to branch downward.**
- c) Indoor units 224 and 280 can not be connected to the header.

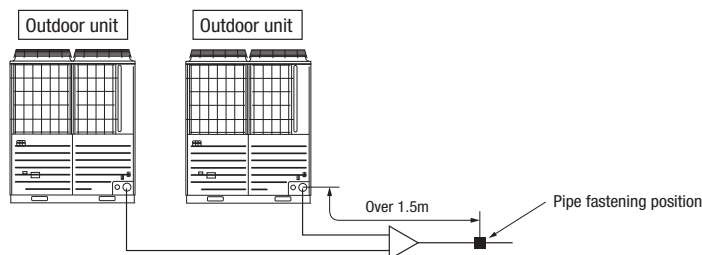


4-2. Pipe connection position and pipe direction

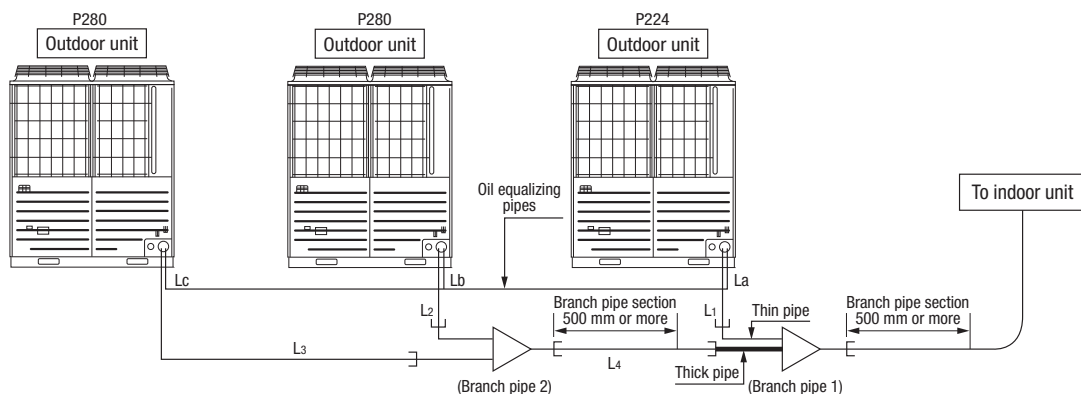
(1) Pipe connecting position and pipe outgoing direction



- A pipe can be laid through the front, right, bottom or rear of a unit as illustrated on the above drawings.
- In laying pipes on the installation site, cut off the casing's half blank (φ 88 or φ 100) that covers a hole for pipe penetration with nippers.
- When there is a danger that a small animal enters from the pipe port, cover the port with appropriate blocking materials (to be arranged on the user's part).
- 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.)
- The pipe should be anchored every 1.5m or less to isolate the vibration.



- Connect pipes between combined units, with care for the followings.
 - On combination units, it must be secured a straight pipe section of 500 mm or more before a branch pipe (Type DOS) for both gas pipe and liquid pipe as shown below.
 - On the pipe connection system of combination units, place the outdoor unit of which the capacity is the smallest among combined outdoor units, closer to the indoor unit, and place the outdoor unit of which the capacity is the largest among combined outdoor units, far from the indoor unit. (Connecting positions are not specified when the capacities are same.)
(Example) As shown below, in case of P800 (P224 + P280 + P280), place the outdoor unit P224 closer to the indoor unit and place the outdoor unit P280 far from the indoor unit in the pipe connection system.
 - On the pipe connection system for combination of 3 units, use a branch pipe of which the pipe diameter is different after the pipe branching, for the branch pipe (branch pipe 1) located the closest to the indoor unit. It is necessary also to connect a thin pipe to the outdoor unit and to connect a thick pipe to next branch pipe.
 - It must be no longer than 5m the length of pipe from the branching pipe 1 to the outdoor unit. ($L_1 \leq 5$ m, $L_2 + L_4 \leq 5$ m, $L_3 + L_4 \leq 5$ m) It must be no longer than 10 m the length of oil equalizing pipes between outdoor units. ($L_a + L_b \leq 10$ m, $L_b + L_c \leq 10$ m, $L_a + L_c \leq 10$ m)
 In case of P800 three combination unit:



(2) Piping work

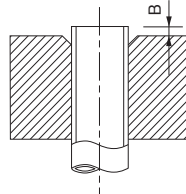
Important

- Please take care so that installed pipes may not touch components within a unit.
- **In laying pipes on the installation 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 liquid pipe and liquid 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.
- Tighten a flare joint securely **with two spanners**. Observe flare nut tightening torque specified in the table below.

CAUTION

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

Flared pipe end: A (mm)	
Copper pipe outer diameter	A
φ 6.35	9.1
φ 9.52	13.2
φ 12.7	16.6
φ 15.88	19.7



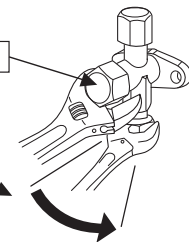
Copper pipe outer diameter	Copper pipe protrusion for flaring: B (mm)	
	In the case of a rigid (clutch) type	
	With an R410A tool	With a conventional tool
φ 6.35	0~0.5	0.7~1.3
φ 9.52		
φ 12.7		
φ 15.88		

Tightening torque (N·m)

Service valve size (mm)	Tightening torque (N·m)	Tightening angle (°)	Recommended length of tool handle (mm)
φ 6.35 (1/4")	14~18	45~60	150
φ 9.52 (3/8")	34~42	30~45	200
φ 12.7 (1/2")	49~61	30~45	250
φ 15.88 (5/8")	68~82	15~20	300
φ 19.05 (3/4")	100~120	15~20	450

Do not hold the valve cap area with a spanner.

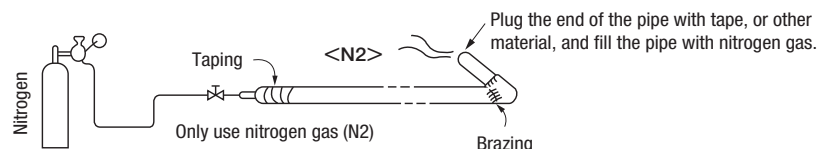
Use a torque wrench. If a torque wrench is not available, fasten the flare nut manually first and then tighten it further, using the left table as a guide.



- Do not apply any oil on a flare joint.
- Pipes are to be blazed to connect an outdoor unit's gas pipe with refrigerant piping or refrigerant piping with a branching pipe set.
- **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

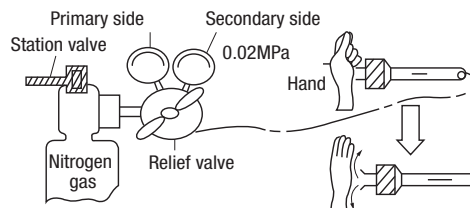
- ① **In laying pipes on the installation site, keep the service valves shut all the time.**
- ② **Blazing must be performed under a nitrogen gas flow.** Without nitrogen gas, a large quantity of foreign matters (oxidized film) are created, causing a critical failure from capillary tube or expansion valve clogging.



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



- 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).



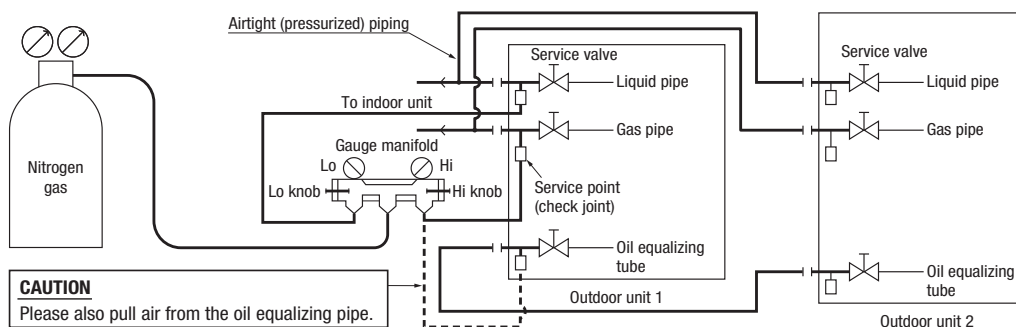
- ⑤ In brazing an service valve and a pipe, **brazed them with the valve main body cooled with a wet towel or the like.**

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 to 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 and oil equalizing 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 (4.15 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 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.

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



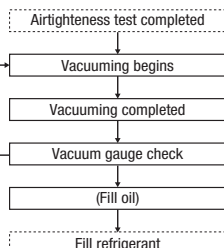
(2) Vacuuming

Please pull air **from the check joints of the service valves on both liquid and gas sides.**
 Please also **pull air from the oil equalizing pipe.** (Please pull air separately from the rest of the piping by using the oil equalizing valve check joint)

< Work flow >

When the system has remaining moisture inside or a leaky point, the vacuum gauge indicator will rise. Check the system for a leaky point and then draw air to create a vacuum again.

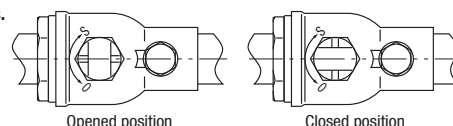
Please run the vacuum pump for at least one hour after the vacuum gauge shows -101kPa or lower. (-755mmHg or lower)
 Confirm that the vacuum gauge indicator does not rise **after leaving the system for an hour or more.**



CAUTION
Insufficient vacuuming may result in poor performance falling short of the design capacity, pipe clogging due to residue moisture and/or a compressor failure.

Pay attention to the following points in addition to the above for the R410A and compatible machines.

- To prevent a different oil from entering, please assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R407C, etc.).
- Use a counterflow prevention adapter to prevent vacuum pump oil from entering the refrigerant system.



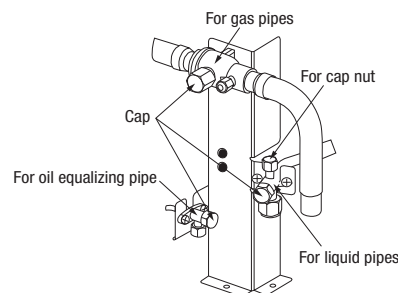
(3) Additional oil charge

When the total pipe length is longer than 510 m, charge 1,000 cc of M-MA32R refrigeration machine oil from the check joint of gas pipe service valve after the vacuuming.

(4) Method of operating service valves

Method of opening/closing a valve

- Remove the cap, turn the gas pipe side until it comes to the "Open" position as indicated in the drawing on the right.
 - For the liquid side pipe and oil equalizing pipe side, turn with a hexagonal wrench until the shaft stops. If excessive force is applied, the valve main body can be damaged. Always use a dedicated special tool.
 - Tighten the cap securely.
- For tightening torque, refer to the table below.



		Tightening torque N · m		
		Shaft (valve main body)	Cap (lid)	Cap nut (check joint section)
For gas pipes		7 or less	30 or less	13
For liquid pipes	φ 9.52	6~8	20~30	10~12
	φ 12.7	14~16	25~35	
For oil equalizing pipe		6~8	20~30	10~12

For fastening torque of a flare nut, please refer to Section 4-2 (2) Piping work on site.

4-4. Additional refrigerant charge

Charge additional refrigerant **in the liquid state**.

Be sure to measure the quantity **with a scale in adding refrigerant**.

If you cannot charge all refrigerant with the outdoor unit lying idle, charge it with the unit running in the test run mode. (For the test run method, please refer to Section 8) If operated for a long time with insufficient refrigerant the compressor will be damaged. (In particular, when adding refrigerant during operation, complete the job within 30min.)

This unit contains **<224-335 : 11.0 kg, 450-670 : 22.0kg, 735-1000 : 33.0 kg> of refrigerant**.

Determine the amount of refrigerant to be charged additionally using the following formula and put down the amount of refrigerant added on the refrigerant charge volume recording plate provided on the back the front panel.

● Adding additional refrigerant

Charge additional refrigerant according to the size and length of the liquid piping and unit capacity.

Determine additional charge volume by rounding to the nearest 0.1 kg.

$$\text{Additional fill quantity (kg)} = P + I$$

P: Additional refrigerant quantity for piping (kg)

$$P = (L1 \times 0.37) + (L2 \times 0.26) + (L3 \times 0.18) + (L4 \times 0.12) + (L5 \times 0.059) + (L6 \times 0.022)$$

L1 : φ22.22 total length (m) L2 : φ19.05 total length (m) L3 : φ15.88 total length (m)

L4 : φ12.7 total length (m) L5 : φ9.52 total length (m) L6 : φ6.35 total length (m)

Refrigerant liquid pipe size	φ22.22	φ19.05	φ15.88	φ12.7	φ9.52	φ6.35
Additional fill quantity (kg/m)	0.37	0.26	0.18	0.12	0.059	0.022

I: Additional refrigerant quantity for indoor units (kg)

If the **total indoor units capacity is larger than outdoor unit capacity**, then calculate the additional refrigerant quantity for indoor units.

$$D = \{(\text{Total indoor units capacity}) - (\text{outdoor unit capacity})\}$$

$$I = D \times 0.01$$

When $D > 0$, calculate I using the above equation;

When $D \leq 0$, take it as $I = 0$.

<Example>

When you connect FDC400 to FDT140 x 3 units:

$$D = 140 \times 3 - 400 = 20 (> 0)$$

$$I = 20 \times 0.01 = 0.2 \text{ (kg)}$$

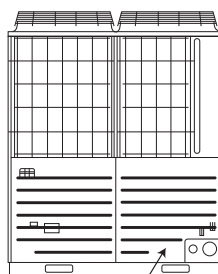
Important When the Additional refrigerant quantity (P+I) is over the following table, please separate the refrigerant line.	Outdoor unit	P+I (kg)
	224-670	40
	735-1000	80

Pay attention to the following points in addition to the above for the R410A and compatible machines.

- To prevent a different oil from entering, please assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R407C, etc.).
- Refrigerant types are indicated by color at the top of the cylinder 5. (Pink for R410A). Always confirm this.
- Do not use a charge cylinder under any circumstances. There is a danger that the composition of the refrigerant will change when R410A is transferred to a cylinder.
- When charging refrigerant, use liquid refrigerant from a cylinder. If refrigerant is charged in a gas form, the composition may change considerably.

Please note

Put down on the refrigerant charge volume recording plate provided on the back of the front panel the amount of refrigerant calculated from the pipe length.

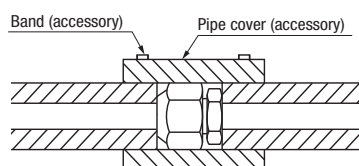
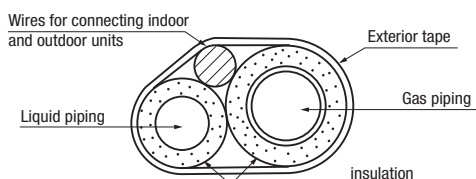


It is located in back of this front panel.

CAUTION
Be sure to record the refrigerant volume, because the information is necessary to perform the installation's maintenance service.

4-5. Heating and condensation prevention

- 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.
 - a) The gas pipe can cause during a cooling operation dew condensation, which will become drain water causing a possible water-leak accident, or reach during a heating operation as high a temperature as 60°C to 110°C, posing a risk of burns, when touched accidentally. So, do not fail to dress it with a heat insulation material.
 - b) Wrap indoor units' flare joints with heat insulating parts (pipe cover) for heat insulation (both gas and liquid pipes).
 - c) 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.
 - d) Although this air-conditioning unit has been tested under the JIS condensation test conditions, the dripping of water may occur when it is operated in a high-humidity atmosphere (23°C or a higher dew point temperature). In such a case, apply an additional heat insulation material of 10 to 20 mm thick to dress an indoor unit body, piping and drain pipes. When the ambient dew point temperature becomes 28°C or higher, or the relative humidity becomes 80% or higher, add further 10 to 20 mm thick heat insulation material.



5. Drainage

- Where water drained from the outdoor unit may freeze, connect the drain pipe using optional drain elbow and drain grommet.

6. ELECTRICAL WIRING WORK

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.

(Since this 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.

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 sources for the indoor and outdoor units.**

c) A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power cable.

d) **The power sources for indoor units in the same system should turn on and off simultaneously.**

e) Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire.

If improperly grounded, an electric shock or malfunction may result.

Never connect the grounding wire to a gas pipe because if gas leaks, it could cause explosion or ignition.

f) **The installation of an impulse withstanding 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.

g) 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)

h) For power source cables, use conduits.

i) Please **do not lay electronic control cables (remote control and signaling wires) and other high current cables together outside the unit.** Laying them together can result in malfunctioning or a failure of the unit due to electric noises.

j) Power cables and signaling wires must always be connected to the power cable terminal block and secured by cable fastening clamps provided in the unit.

k) Fasten cables so that they may not touch the piping, etc.

l) **When cables are connected, please make sure that all electrical components within the electrical component box are free of loose connector coupling or 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.)

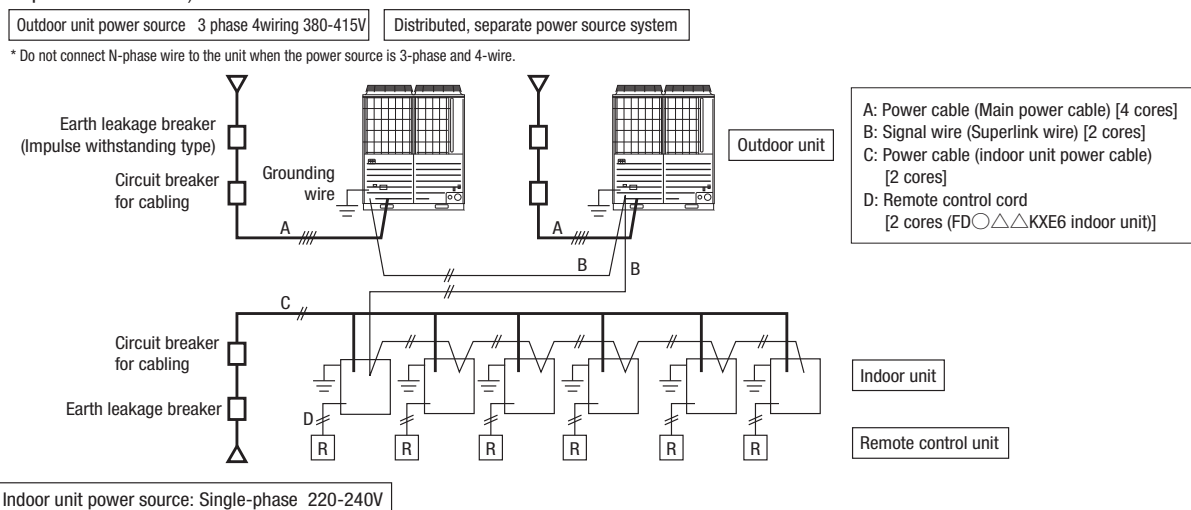
m) Make sure to use circuit breakers (earth leakage breaker and circuit breaker) of proper capacity. Use of breakers of larger capacity could result in trouble on components or fire accident. The circuit breaker should isolate all poles under over current.

n) Install isolator or disconnect switch on the power source wiring in accordance with the local codes and regulations. The isolator should be locked in OFF state in accordance with EN60204-1.

o) 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 diagrams

(Example of combination)



CAUTION

If the earth leakage breaker is exclusively for ground fault protection, then you will need to install a circuit breaker for wiring work.

6-2. Method of connecting power cables

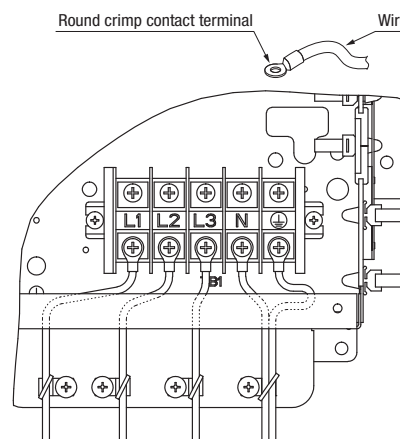
(1) Method of leading out cables

- As shown on the drawing in Section 4-2 (1), cables can be laid through the front, right, left or bottom casing.
- In wiring on the installation site, cut off a half-blank (ϕ 50 or oblong hole measuring 40x80) covering a penetration of the casing with nippers.

(2) Notabilia in connecting power cables

Power cables must always be connected to the power cable terminal block and clamped outside the electrical component box. In connecting to the power cable terminal block, use round solderless terminals.

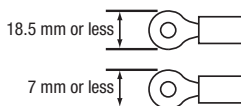
- Connect the ground wire before you connect the power cable. When you connect a grounding wire to a terminal block, use a grounding wire longer than the power cable so that it may not be subject to tension.
- Do not turn on power until installation work is completed. Turn off power to the unit before 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.
- 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.
- For the tightening torque of terminals, refer to the list shown at right.
- 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.



Tightening torque (N · m)		
M3.5	Outdoor signal line terminal block	0.9~1.2
M6	Power cable terminal block, Earth wire	2.5~2.8

Request

- When connecting to the power source terminal block, use the crimp terminals for M6 as shown at right.
- When connecting to the signal terminal block, use the crimp terminals for M3.5 as shown at right.



(3) Outdoor unit power source specifications

Model	Power source	Cable size for power source (mm ²)	Wire length (m)	Moulded-case circuit breaker (A)		Earth leakage breaker	Earth wire	
				Rated current	Switch capacity		Size (mm ²)	Screw type
224	3 phase 4 wire 380-415V	8	74	30	30	30A30mA less than 0.1 sec	3.5	M6
280								
335	50Hz/380V60Hz	8	74	30	30	30A30mA less than 0.1 sec	3.5	M6

Please note

- 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)
- In the case of distributed, separate power source system, the listed data represent those of an outdoor unit.
- For details, please refer to the installation manual supplied with the indoor unit.

(4) Indoor unit power source specifications : Single phase 220-240V

Combined total capacity of indoor units	Cable size for power source (mm ²)	Wire length (m)	Moulded-case circuit breaker (For ground fault, overload and short circuit protection)	Signal wire size (mm ²)
Less than 7A	2	21	20A 100mA less than 0.1 sec	2cores x 0.75-2.0 *
Less than 11A	3.5	21	20A 100mA less than 0.1 sec	
Less than 12A	5.5	33	20A 100mA less than 0.1 sec	
Less than 16A	5.5	24	30A 100mA less than 0.1 sec	
Less than 19A	5.5	20	40A 100mA less than 0.1 sec	
Less than 22A	8	27	40A 100mA less than 0.1 sec	
Less than 28A	8	21	50A 100mA less than 0.1 sec	

※ Please use a shielded cable.

Please note

- 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)
- Wire length in the table above is the value for when the indoor unit is connect to the power cable in series also the wire size and minimum length when the power drop is less than 2% are shown. If the current exceeds the value in the table above, change the wire size according to the indoor wiring regulations. (Please adapt it to the regulations in effect in each country)
- For details, please refer to the installation manual supplied with the indoor unit.
- Wires connected to indoor units are allowed up to 5.5 mm². For 8 mm² or more, use a dedicated pull box and branch to indoor units with 5.5 mm² or less.

6-3. Method of connecting signaling wires

The communication protocol can be chosen 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 central control. When signal cables are connected into a network involving outdoor units, indoor units or central 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 units in a network	Max. 48	Max. 32
Signal cable (total length)	Up to 1000m	Up to 1,500 m for 0.75 mm ² shielding wire (MVVS) Up to 1,000 m for 1.25 mm ² shielding wire (MWS)
Signal cable (furthest length)	Up to 1000m	Up to 1000m
Connectable units to a network	Units not supporting new SL (FD○A△△KXE4-5 series) Units supporting new SL (FD○△△KXE6 series, FD○△△KXZ series) Can be used together.	Units supporting new SL (FD○△△KXE6 series, FD○△△KXZ 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 AC220/240 V or 380/415 V.** Protective fuse on the PCB will trip.

- ① Confirm that signal cables are prevented from applying AC220/240 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 source cables may be connected to the signal cable terminal block.

When units of FD○△△KXE6 Series, FD○△△KXE1 series are connected:

Standard resistance value=5,100/Number of connected units.

When units of FD○A△△KXE4 and 5 Series only are connected:

Standard resistance value=9,200/Number of connected units.

When units of FD○△△KXE6 Series, FD○△△KXE1 series and units of FD○A△△KXE4 and 5 Series are connected in a mixture:

Standard resistance value=46,000/[(Number of connected FD○A△△KXE4 and 5 Series units x 5) + (Number of connected FD○△△KXE6 and KXZ Series units x 9)]

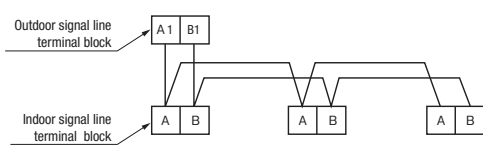
The number of connected units includes those of indoor units, outdoor units and SL devices.

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.

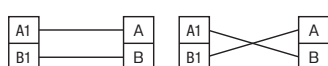
Indoor and outdoor units signal cables

- Connect the signal cable between indoor and outdoor units and the signal cable between outdoor units belonging to the same refrigerant line to A1 and B1.
- Connect the signal line between outdoor units on different refrigerant lines 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.

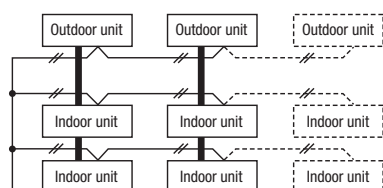
(1) When one outdoor unit is used.



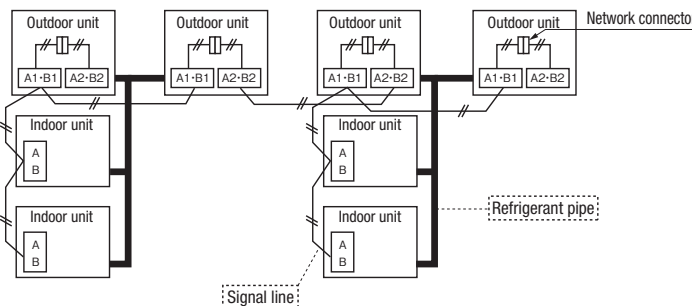
○ Indoor and outdoor signal lines do not have a polarity. Any of the connections in the following illustration can be made.



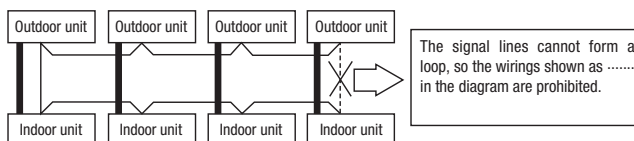
(3) The signal lines can also be connected using the method shown below.



(2) When plural outdoor units are used



Important ○ Loop wiring prohibited.



Remote control wiring specifications

(1) **A standard remote control wire is 0.3mm² x 2 cores.** It can be extended **up to 600m.** For a remote control wire exceeding 100m, please upgrade wire size as specified in the table below.

Length (m)	Wire size
100 to 200	0.5mm ² × 2 cores
To 300	0.75mm ² × 2 cores
To 400	1.25mm ² × 2 cores
To 600	2 mm ² × 2 cores

(2) When the remote control wire runs parallel to another power source wire or when it is subject to outside noise, such as from a high-frequency device, use shielded wire. (Be sure to ground only one end of the shielded wire.)

CAUTION In addition to a possible wiring error between indoor and outdoor units, there are other possibilities of erroneous wiring as illustrated below.

① Wrong wiring between signaling wires and remote control wires.

② Connecting power cables to the signaling wire terminal block.

It will result in a blown signal line fuse (CNK).

7. CONTROL SETTINGS

7-1. Unit address setting

This control system controls the controls 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 controls. 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 to the indoor units and the central control to be connected.

When signal cables are connected into a network involving outdoor units, indoor units or central 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

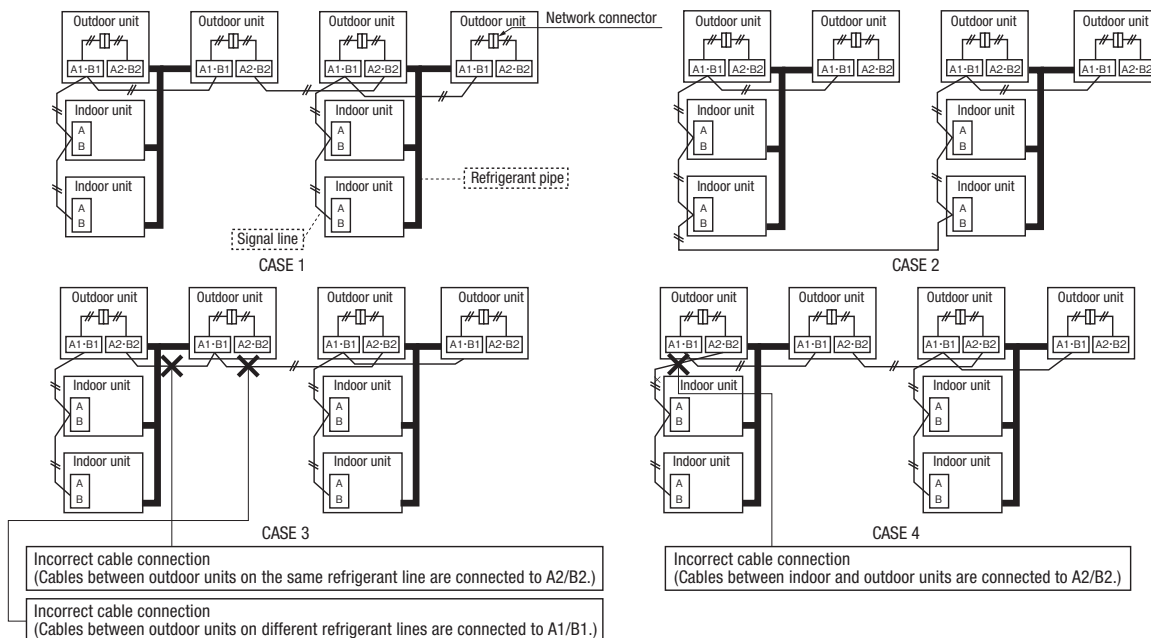
The following address setting methods can be used. The procedure for automatic address setting is different from the conventional one. Please use the automatic address setting function after reading this manual carefully.

Communication protocol Address setting method		new SL		previous SL	
		Automatic	Manual	Automatic	Manual
When plural refrigerant systems are linked with signal lines (e.g., to implement central control)	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)	OK*1	OK	×	OK
	Case 2 When signal lines linking plural refrigerant systems are provided between indoor units.	×	OK	×	OK
When only one refrigerant system is involved (signal lines do not link plural refrigerant systems)		OK	OK	OK	OK

※1 Do not connect the signal line between outdoor units on the different refrigerant lines to A1 and B1. Do not connect the signal line between outdoor units on the same refrigerant line to A2 and B2. 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)

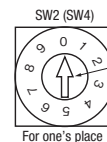
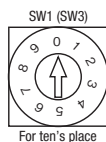
※2 In Case 2, automatic address setting is not available. Set addresses manually.



●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.

Indoor PCB	SW1, 2 (blue)	For setting indoor No. (The ten's and one's)
	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)



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 address 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	×	×	×

Do 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 FD○A△△KXE4-5 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 Address setting of outdoor unit Before turning on the power, set as follows. The outdoor address is registered when the power is turned on.

Set the **outdoor No. switches** in a range of **00 – 31 [or 00 – 47 for old SL]**.

Take care not to duplicate with other outdoor unit No. on the network.

In the same way also on the master unit of combination, set the rotary switch for outdoor No. **in a range of 00 – 31 [or 00 – 47 for old SL]**

For slave units of combination, set the rotary switches for outdoor No. **at the same outdoor No. as the master unit of combination.**

When 2 units are combined, set the dip switch SW4-7 of slave unit to ON. When 3 units are combined, set the dip switch SW4-7 of slave unit 1 to ON and the dip switch SW4-8 of slave unit 2 to ON. (Use same setting for outdoor No. of master unit and slave unit.)

- ② Address setting of indoor unit Before turning on the power, set as follows. Indoor address is registered when the power is turned on.

Set the **indoor No. switch** in a range of **000 – 127 [or 00 – 47 for old SL]**.

For the **outdoor No. switches**, set corresponding outdoor No. in a range of **00 – 31 [or 00 – 47 for old SL]**.

Set with care not to duplicate with other indoor No. on the network.

Refrigerant system	Outdoor unit	SW1	SW2	SW4-7	Address on network
A	Master	2	2	OFF	22
	Slave	2	2	ON	23
B	Master	2	4	OFF	24
	Slave	2	4	ON	25
C	Master	3	1	OFF	31
	Slave	3	1	ON	00

Above list is an example. **The address on the network is master unit +1 for the slave unit.**

If the slave unit address is larger than 31 [or 47 for old SL], the address is assigned sequentially starting from 00.

When setting sequential addresses, take care not to duplicate the master unit address in the refrigerant system B with addresses of slave units in the refrigerant system A.

Refrigerant system	Outdoor unit	SW1	SW2	SW4-7	SW4-8	Address on network
A	Master	2	2	OFF	OFF	22
	Slave 1	2	2	ON	OFF	23
	Slave 2	2	2	OFF	ON	24
B	Master	2	5	OFF	OFF	25
	Slave 1	2	5	ON	OFF	26
	Slave 2	2	5	OFF	ON	27
C	Master	3	1	OFF	OFF	31
	Slave 1	3	1	ON	OFF	00
	Slave 2	3	1	OFF	ON	01

Note:

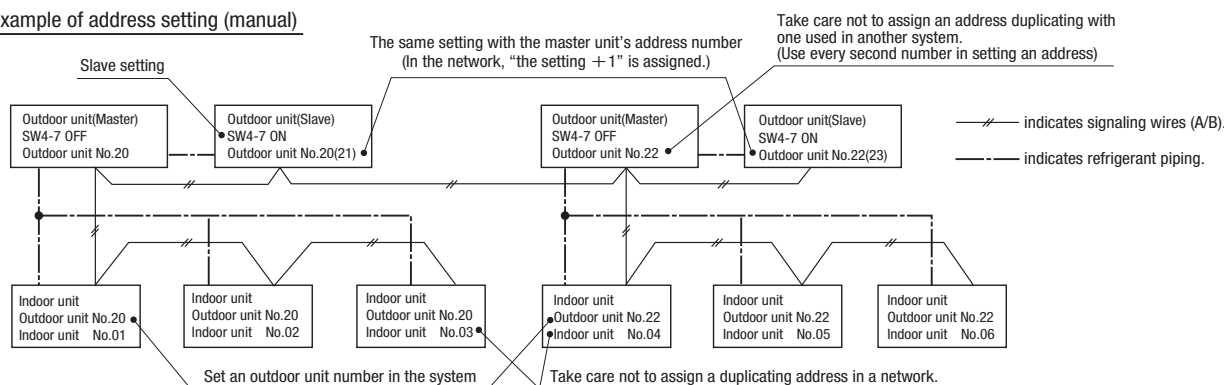
Slave unit address is master unit +1. Address of second slave unit is master unit +2. When setting the address for master unit, take care to avoid duplication with other systems. Otherwise, it cannot operate. (Error: E-31)

- 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.

Example of address setting (manual)



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 Address setting of outdoor unit Before turning on the power, set as follows.
 Confirm that **the outdoor No. switch** is set at **49 by the default**.
 • **In the same way also on the master unit of combination**, confirm that the rotary switch for outdoor No. is set at **49 by the default**.
 • **In the same way also on the slave unit of combination**, confirm that the rotary switch for outdoor No. is set at **49 by the default**.
When 2 units are combined, set the dip switch SW4-7 of slave unit to ON. When 3 units are combined, set the dip switch 4-7 of slave unit 1 to ON and the dip switch SW4-8 of slave unit 2 to ON.

Outdoor unit	SW1	SW2	SW4-7	Address on network
Master	4	9	OFF	49
Slave	4	9	ON	00

Outdoor unit	SW1	SW2	SW4-7	SW4-8	Address on network
Master	4	9	OFF	OFF	49
Slave 1	4	9	ON	OFF	00
Slave 2	4	9	OFF	ON	01

CAUTION
 If the slave unit is not specified, a compressor failure may result.

- 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 Address setting of outdoor unit Before turning on the power, set as follows.
 Set **the outdoor No. switches** in a range of **00 - 31**.
 Take care not to duplicate with other outdoor unit No. on the network.
In the same way also on the master unit of combination, set the rotary switch for outdoor No. **in a range of 00 - 31**.
For slave units of combination, set the rotary switches for outdoor No. at **the same outdoor No. as the master unit of combination**.
When 2 units are combined, set the dip switch SW4-7 of slave unit to ON. When 3 units are combined, set the dip switch SW4-7 of slave unit 1 to ON and the dip switch SW4-8 of slave unit 2 to ON. (Use same setting for outdoor No. of master unit and slave unit.)
 ② Address setting of indoor unit Before turning on the power, set as follows.
 Make sure that the **Indoor Unit No. switch** 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 (master unit in case of combination) 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 (master unit in case of combination).
 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 (master unit in case of combination). Please input the number of connected indoor units (on the same refrigerant line in case of combination) 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.

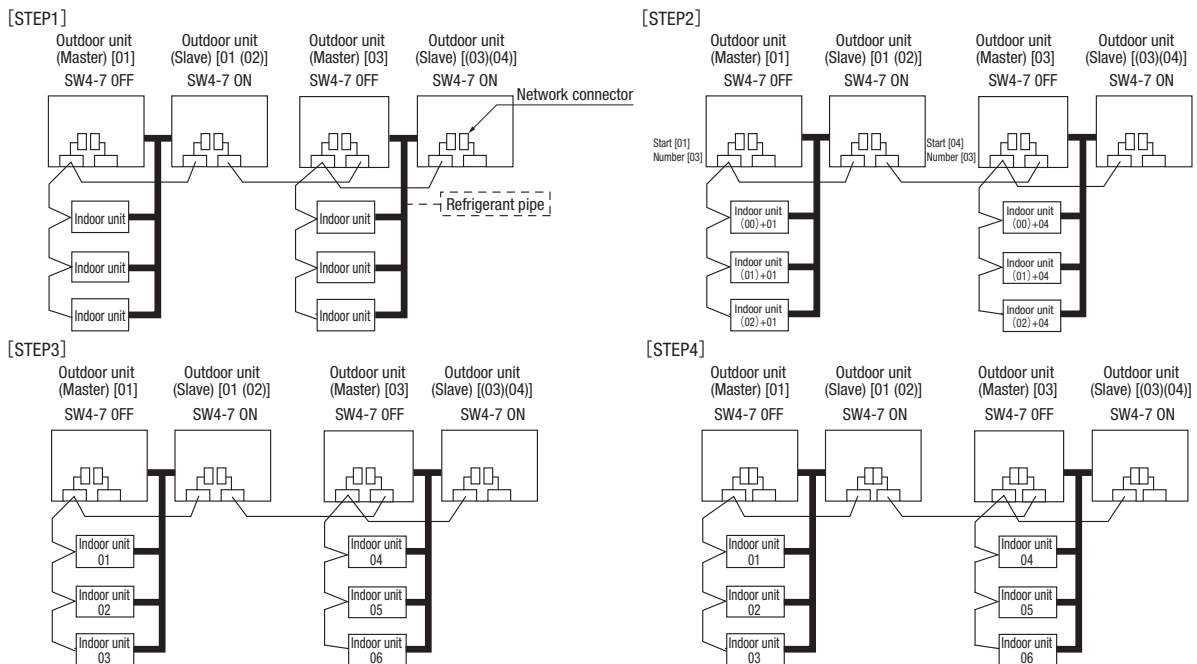
[STEP3] (Automatic address setting completion check)

- 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 "A○○."
 Check the 7-segment display panel of each outdoor unit (master unit in case of combination).
 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, select and enter "1" in P34 on the 7-segment display panel of **any outdoor unit (on only 1 unit : master unit in case of combination)** to specify network polarity.
 ⑪ 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	② OFF	④ ON	—	—
Outdoor unit power source	① OFF	④ ON	—	—
Indoor unit (indoor/outdoor No.SW)	② indoor000/outdoor 49 (factory setting)	—	—	—
Outdoor unit (outdoor No.SW)	① 01,03(Ex)	—	—	—
Network connectors	③ Disconnect(each outdoor unit)	—	—	⑨ Connect(each outdoor unit)
Start automatic address setting	—	⑤ Select "Automatic Address Start" on each outdoor unit.	—	—
Set starting address	—	⑥ outdoor 01:[01](Ex) outdoor 03:[04](Ex)	—	—
Set the number of indoor unit	—	⑦ outdoor 01:[03](Ex) outdoor 03:[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○○" in error events.	⑪ [End]



- 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. and the outdoor unit address No. displayed on the remote control unit by pressing its CHECK button.
- Automatic address setting can be used for an installation in which plural 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 address setting		Outdoor unit address setting
	Indoor No.SW	Outdoor No.SW	Outdoor No.SW
Automatic address setting for single refrigerant system installation	000	49	49
Automatic address setting for multiple refrigerant systems installation	000	49	00~31

If "CHANGE ADD. ▼" is selected with some addresses falling outside these conditions, the following indication will appear for 3 seconds on the remote control "INVALID OPER".

Operating procedure




















When the eco touch remote control is connected, refer to the installation setting in the installation manual which is packed along with the remote control.


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

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 ◀ 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.	[I/U 001 O/U 01] (1sec) → [◀ SET I/U ADD.] (1sec) → [I/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.	[I/U 002] (2sec Lighting) → [◀ SET O/U ADD.] (1sec) → [O/U 01 ▶] (Blink)
	⑦ Set 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.	[O/U 00 ▲] ↔ [O/U 01 ▶] ↔ [O/U 02 ▶] ↔ . . . ↔ [O/U 31 ▼]
	⑧ After selecting an address, press the SET switch, and then the outdoor unit No. and the indoor unit No. are defined.	[I/U 002 O/U 02] (2sec Lighting) → [SET COMPLETE] (2sec Lighting) → Returns to normal condition.

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

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  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 O/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 control and the unit No.'s of the outdoor units connected with them.	[I/U 001 O/U 01▲] ⇔[I/U 002 O/U 01 ] ⇔[I/U 003 O/U 01 ] ⇔ . . . ⇔[I/U 016 O/U 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."	[ 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.	[I/U 000▲] ⇔[I/U 001 ] ⇔[I/U 002 ] ⇔ . . . ⇔[I/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.	⑧ The display will indicate the determined indoor address No. for 2 seconds and then switch to the "  SET O/U ADD." screen. A default value shown on the display is the current address.	[I/U 002] (2sec lighting) ⇔[ SET O/U ADD.] (1sec) ⇔[O/U 01 ] (Blink)
	⑨ Set 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.	[O/U 00▲] ⇔[O/U 01 ] ⇔[O/U 02 ] ⇔ . . . ⇔[O/U 31▼]
	⑩ After selecting an address, press the SET switch. Then the address of the indoor unit and outdoor unit are determined.	[I/U 002 O/U 02] (2sec lighting) →[ SELECT] (1sec lighting) →[I/U SELECTION▼] (lighting)
	⑪ 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	⑫ If you want to end the session (and reflect new address settings) In Step ⑩, 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 control display will change to the normal state.	[END▲] →[SET COMPLETE] (2~10sec lighting) →Normal state
	⑬ 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. is registered.

NOTICE Turn on power to central 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: Previous SL mode (The communication protocol is displayed ; display only) 1: New SL mode
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 definition 0: Network polarity not defined. 1: Network polarity defined.

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
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 previous SL setting unit from the network Arrange all units to operate in the new SL.

Error indication

Code	Contents of a display	Cause
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. Change of control

Contents of control for outdoor unit can be changed with dipperswitches on PCB and P $\bigcirc\bigcirc$ on 7-segment indicator.

When changing P $\bigcirc\bigcirc$ on 7-segment indicator, it can be set by holding down SW8 (7-segment indicator UP: Ones digit), SW9 (7-segment indicator UP: Tens digit) and SW7 (Data write/Enter)

Method to change control	P $\bigcirc\bigcirc$ setting on 7-segment	Contents of control change
SW setting on PCB	P $\bigcirc\bigcirc$ setting on 7-segment	
SW3-7 to ON*1	Set external input function allocation to "2". *1	Forced cooling/heating mode (It can be fixed at cooling with external input terminals open, or at heating with them closed.)
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 service valve on outdoor unit and set as follows: (1) SW5-2 of PCB to ON (2) SW5-3 of PCB to ON (3) SW5-1 of PCB to ON	—	Pump-down operation
SW5-5	—	Communication method select ON: Previous SL communication, OFF: New SL communication (SLII)
J13: Shorted (Factory default), J13: Open	—	External input switing (CnS1, CnS2 only) shorted: Level input, open: Pulse input
J15: Shorted (Factory default), J15: Open	—	Defrost start temperature shorted : normal, open: Cold weather district.
—	P01	Operation priority select 0: First push preferred (Factory default) 1: Last push preferred
—	P02	Outdoor fan snow protection control 0: Control invalid (Factory default) 1: Control valid
—	P03	Outdoor fan snow protection ON time setting 30 sec (Factory default) 10, 30 to 600 sec
—	P04	Demand ratio change value OFF: Invalid (Factory default) 000, 040, 060, 080 [%]
—	P05	Silent 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
—	P14	2-step demand OFF: Invalid (Factory default) 000, 040, 060, 080 [%]
—	P15	3-step demand OFF: Invalid (Factory default) 000, 040, 060, 080 [%]

*1 When both of external input function assignment (P07 – 10) and SW are changed, the control is changed.

(Ex: When CnS1 is used for the input of forced cooling/cooling mode, set P07 at 2 and SW3-7 to ON. When CnS2 is used for the input of forced cooling/cooling mode, set P08 at 2 and SW3-7 to ON)

*2 Under the energy save control, the capacity control becomes valid even if no signal is input to the external input terminal.

By changing the allocation of external input function (P07-10) on the 7-segment, functions of external input terminal may be selected. Inputting signals to external input terminals enable the following functions.

Setting value for external input function assignment	External input terminal shorted	External input terminal open
"0" : External operation input	Permitted	Prohibited
"1" : Demand input	*3	*3
"2" : Cooling / heating force input	Heating	Cooling
"3" : Silent mode 1 *1	Valid	Invalid
"4" : Spare		
"5" : Outdoor fan snow control input	Valid	Invalid
"6" : Test run external input 1 (SW5-1 equivalent)	Test run start	Normal
"7" : Test run external input (SW5-2 equivalent)	Cooling	Heating
"8" : Silent mode 2 *2	Valid	Invalid
"9" : Demand input	*3	*3
"10" : AF periodic inspection display	Valid	Invalid
"11" : AF error display	Valid	Invalid
"12" : Building multi energy save control	Valid	Invalid

*1 Valid/invalid is changed depending on outdoor air temperatures.

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

*3 According to the demand setting table.

External output function of CnZ1 can be changed by changing P06 on 7-segment indicator.

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

*3 Demand setting table

Demand control	Function assignment 1	Function assignment 9
None (Normal)	Shorted	Shorted
1-step	Open	Shorted
2-step	Open	Open
3-step	Shorted	Open

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 (NACHIATSU) B02B-XAMK-1 (LF) (SN)
External input CnS2	Demand input (Short-circuited at shipping)	Non-voltage contactor (DC12V)	J. S. T (NACHIATSU) B02B-XARK-1 (LF) (SN)
External input CnG1	Cooling / Heating forced input (Open at shipping)	Non-voltage contactor (DC12V)	J. S. T (NACHIATSU) B02B-XAEK-1 (LF) (SN)
External input CnG2	Silencing mode input (Open at shipping)	Non-voltage contactor (DC12V)	J. S. T (NACHIATSU) B02B-XASK-1 (LF) (SN)
External output CnH	Operation output	DC12V output	MOLEX 5286-02A-BU
External output CnY	Error output	DC12V output	MOLEX 5266-02A

8. TEST OPERATION AND TRANSFER

8-1. Before starting operation

- (1) **Make sure that a measurement between the power source terminal block and ground, when measured with a 500V megger, 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 source and grounding decreases to 1MΩ or around.
When the insulation resistance is 1MΩ or more, the insulation resistance will rise with crank case heater power ON for 6 hours or more because the refrigerant in the compressor is evaporated.
- (2) Please check the resistance of the signaling wire terminal block before power is turned on. If a resistance measurement is 100Ω or less, it suggests a possibility that power cables are connected to the signaling wire terminal block. (Please refer to 6-3. Standard resistance value.)
- (3) **Be sure to turn on the crank case heater 6 hours before operation.**
- (4) **Make sure that the bottom of the compressor casing is warm.** (higher than outdoor air temperature +5°C)
- (5) Be sure to fully open the service valves (liquid,gas and equalizer oil piping (for a combined installation only)) for the outdoor unit.
Operating the outdoor unit with the valves closed may damage the compressor.
- (6) **Check that the power to all indoor units has been turned on. If not, water leakage may occur.**

CAUTION

Please make sure that the service valves (gas, liquid, oil equalizing pipe (for a combined installation only)) are full open before a test run. Conducting a test run with any of them in a closed position can result in a compressor failure.

8-2. Check operation

It is recommended to practice the check operation in precedent to the test run.

[Even if the check operation is not practiced, the test run and normal operations can be performed.]

For further details regarding the check operation refer to the technical data.

Important

- Practice the check operation after completing the address setting for the indoor and outdoor units and also after charging the refrigerant.
- To assure accurate checking, proper amount of refrigerant must be retained.
- Check operation cannot be done when the system is stopped by an error.
- Check operation cannot be done when the total capacity of connected indoor units is less than 80% of the outdoor unit capacity.
- Check operation cannot be done when the system communication method is previous SL.
- Don't perform the check operation simultaneously on more than one refrigerant line. Accurate checking cannot be obtained.
- Practice the check operation within the operation temperature ranges (Outdoor temperature: 0 – 43°C, room temperature: 10 – 32°C). Check operation will not start out of these ranges.
- Outdoor air processing unit cannot be checked. (It is possible to check indoor units other than the outdoor air processing unit of the same refrigerant line.)

(1) Check items

Check operation allows proving the following points.

- Whether or not the service valve is left open (Service valve open/close check). (In case of combination, however, all service valves need to be closed on master and slave units to obtain accurate judgment.)
- Whether or not the refrigerant pipes and signal cables are connected properly between indoor and outdoor units. (Mismatch check)
- Whether or not the indoor expansion valve operates properly. (Expansion valve failure check)

(2) Method of check operation

(a) Starting the check operation

- Confirm that all of the following switches are turned OFF: SW3-2 (Auto backup operation), SW3-6 (Pipe wash mode), SW3-7 (Forced cooling/heating mode), SW5-1 (Test run), SW5-2 (Test run cooling setting), SW5-3 (Pump-down operation) and SW5-6, -7, -8 (Capacity measurement mode). (In case of combination, on both main and slave units)
- At the next, turn the SW3-5 (Check operation) OFF → ON (only on master unit in case of combination) so that the check operation will start.
- It takes 15 – 30 minutes normally (max. 80 min) from the start to the end of check operation.

(b) End the check operation and the result display

- When the check operation is over, the system stops automatically. The 7-segment indicator shows the result (only on master unit in case of combination).

<Normal ending>

- 7-segment indicator shows "CHO End".
- Return the SW3-5 to OFF. The 7-segment indicator returns to normal display.

<Abnormal ending>

- 7-segment indicator shows an error alarm.
- Referring to the section [Inspect here], repair the faulty section and return the SW3-5 to OFF.
- At the next, repeat the check operation from the Step (2) above.

Display on 7-segment indicator during check operation

Code indicator	Data indicator	Display contents
H1	Max. remaining time	Check operation preparation on. Indicates max. remaining time (min). (In case of combination, indicated on master unit only.)
H2	Max. remaining time	Check operation on. Indicates max. remaining time (min). (In case of combination, indicated on master unit only.)
CHO	End	Normal ending of check operation. (In case of combination, indicated on master unit only.)

Error display on 7-segment indicator after ending the check operation

Code indicato	Data indicator	Display contents	Check following points
CHL	---	Service valve is closed. (Refrigerant circuit is shut off partially.)	<ul style="list-style-type: none"> • Isn't the service valve of outdoor unit left open? • Is the low pressure sensor normal? (Detected pressure can be seen on the 7-segment indicator.) • Is the connector of indoor unit expansion valve coil connected? • Isn't the indoor unit expansion valve coil disconnected from the expansion valve body? • Is the indoor unit heat exchanger sensor normal? (Check if the sensor is disconnected.)
CHU	Abnormal indoor unit No.	Mismatch between refrigerant pipes and signal cables. Refrigerant is not circulated to the indoor unit of which No. is displayed.	<ul style="list-style-type: none"> • Are the refrigerant pipes and signal cables connected properly between the indoor and outdoor units? • Is the connector of indoor unit expansion valve coil connected? • Isn't the indoor unit expansion valve coil disconnected from the expansion valve body? • Is the indoor unit heat exchanger sensor normal? (Check if the sensor is disconnected.)
CHJ	Abnormal indoor unit No.	Expansion valve on the indoor unit of which No. is displayed is not operating properly.	<ul style="list-style-type: none"> • Is the connector of indoor unit expansion valve coil connected? • Isn't the indoor unit expansion valve coil disconnected from the expansion valve body? • Is the indoor unit heat exchanger sensor normal? (Check if the sensor is disconnected.)
CHE	---	Abnormal ending of check operation.	<ul style="list-style-type: none"> • Isn't any error displayed (E??) on the indoor unit or outdoor unit? • Are signal cables connected without play? • Hasn't the SW setting been changed during the check operation?

※ When any error is detected, errors other than those listed above may be displayed. In such occasion, refer to the separate technical data.

8-3. Refrigerant quantity check

Refrigerant quantity check tells you whether the refrigerant quantity is excessive (over) or insufficient (low).

(Even if the check operation is not practiced, the test run and normal operation can be performed.)

For further details regarding the check operation refer to the technical data.

It must be noted that, during the check operation, the outdoor units and the indoor units are operated automatically.

Important

- Practice the refrigerant quantity check operation only after charging the measured quantity of additional refrigerant.
- It is necessary to add or reduce the refrigerant depending on the result of refrigerant quantity check. Even when it has been judged that proper quantity of refrigerant is retained, the result could become inadequate if the operating conditions are changed.
- It should be noted, therefore, that a result under particular conditions cannot cover all operating conditions.

(1) Guideline of accuracy

Guidelines of judgment on the refrigerant quantity are as shown below.

It should be noted that the result of judgment could vary depending on the conditions of judgment.

Refrigerant quantity over	+10 kg (Single machine) +20 kg (Combination machine)
Low refrigerant quantity	20% of the additional refrigerant quantity for piping (P)

(2) Confirmation before implementing the refrigerant quantity check

Confirm on all of the followings before starting the refrigerant quantity check.

- Confirm that it has been completed all works up to "8-1 Before starting operation".
- Check operation cannot be done when the total capacity of connected indoor units is less than 80% of the outdoor unit capacity.
- Check operation cannot be done when the system communication method is that of previous SL.
- Check operation cannot be done when the system is stopped by an error.
- Practice the check operation within applicable operation air temperature range (Outdoor air temperature: 10 - 43°C, indoor air temperature: 15 - 32°C). Check operation will not start out of these ranges.
- Start the check operation only at 5 minutes after stopping all indoor units.

(3) Method of refrigerant quantity check operation**(a) Starting the refrigerant quantity check operation**

- Confirm that all of the following switches are turned OFF; SW3-2 (Auto backup operation), SW3-6 (Pipe wash mode), SW3-7 (Forced cooling/heating mode), SW5-1 (Test run), SW5-2 (Test run cooling setting), SW5-3 (Pump-down operation) and SW5-6, 7, 8 (Capacity measurement mode). (In case of combination, on both master/slave units)
- At the next, turn the SW3-4 (Refrigerant quantity check operation) OFF → ON (only on master unit in case of combination) so that the check operation will start.
- It takes 60 ~ 75 minutes normally from the start to the end of check operation.

(b) End of refrigerant quantity check operation and result display

- When the check operation is over, the system stops automatically, and the result is displayed on the 7-segment indicator. (Only on master unit in case of combination)

< Normal ending >

- 7-segment indicator shows “Co End”.
- Return the SW3-4 to OFF. 7-segment indicator returns to normal display.

< Abnormal ending >

- 7-segment indicator shows an error alarm.
- Repair the faulty section referring to the guidance, and return the SW3-4 to OFF.
- At the next, repeat the check operation from the Step (2) above.

(4) After the refrigerant quantity check operation

Following codes may be displayed at the end of check operation, other than “Co End”.

Check and take action according to the contents of remedy. And then, repeat the check operation.

Display on 7-segment indicator after the check operation (Displayed on master unit only in case of combination.)

Code indicator	Data indicator	Meaning	Remedy
Co	Hi	Refrigerant quantity over	① Too much refrigerant is charged. Reduce the quantity. < Guidelines of reduction > • Single machine:10 kg • Combination machine:20 kg Make sure to recover the refrigerant from the check joint of liquid pipe operation valve using the refrigerant recovery device.
Co	Lo	Low refrigerant quantity	① Refrigerant quantity is insufficient. Recharge the refrigerant. < Guideline of recharge> • 20% of the additional refrigerant quantity for piping* (Upper limit: 5 kg) Recharge the refrigerant in the liquid state from the check joint of low pressure line. Make sure to measure the quantity before recharging.
Co	H_L	Couldn't judge.	It cannot judge (a state that it cannot judge properly). State of refrigerant might have been unstable during the check operation due to influence of wind, temperature change, etc. ① Check the expansion valve of indoor unit (disconnected coil, disconnected connector or faulty expansion valve). ② Implement at a later date by changing the conditions.
Co	---	Judgment was interrupted.	Check the following points. ① Haven't you changed the setting of dip switches after the start? Return them to original setting. ② Is any error code (E??) displayed? If Yes, refer to the troubleshooting section in the technical data.
Co	HE	Starting conditions are not satisfied.	Starting conditions are not satisfied so that it cannot start the check operation. Refer to “(2) Confirmation before implementing the refrigerant quantity check”.

※ “Additional refrigerant quantity for piping” means the value of “Additional refrigerant quantity for piping (P)+(I)” in the Section 4-4 Additional refrigerant charge.

Other errors than above may also be displayed if errors are detected. In such occasion, inspect by referring to the separate technical data.

8-4. Test operation

(1) Test run from an outdoor unit.

Whether external inputs are 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 board.

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 central 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.

Select the "COOLING" mode with the **MODE** button.

Press the **TEST RUN** button for 3 seconds or longer.

The screen display will be switched from "Select with ITEM◆" → "Determine with **SET**" → "Cooling test run▼."

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.

Notes : for engineers undertaking piping or electrical installation work

When a test run is completed, please make sure again that the electrical component box cover and the main body panel have been attached before you turn the unit over to the customer.

8-5. TRANSFER

Use the instruction manual that came with the outdoor unit to explain the operation method to the customer.

Please ask the customer to keep this installation manual together with the operation manual of his indoor units.

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 refrigerant 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, airtightness testing, vacuuming, and refrigerant charging, refer to section 3, Refrigerant piping.

(4) Diagnostic Inspection Procedures

For the meanings of failure diagnosis messages, please refer to the nameplate provided on the unit (on the back of the control lid)

(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 cable name plate attached on the unit. (On the face of the control lid)

(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.

7.2 Instructions for installing the branch pipe set

PSB012D855D

- ⊙ 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 is completed, 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
Branching pipe set	DIS-22-1G			None
	DIS-180-1G			
	DIS-371-1G			
	DIS-540-3			
Outdoor unit's branching pipe set	DOS-2A-3			
	DOS-3A-3	<p>Branch pipe 1</p> <p>Branch pipe 2</p>	<p>Branch pipe 1</p> <p>Branch pipe 2</p>	

Branching pipe set type	Gas side	Liquid side	Different diameter pipe joint
HEAD4-22-1G			None
HEAD6-180-1G			
HEAD8-371-2			
HEAD8-540-3			

INSTALLATION PROCEDURE

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

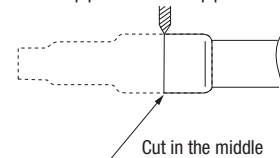
- ① Use a pipe conforming to a pipe size specified for indoor unit connection for the section between an indoor unit and a branching pipe.
- ② Use a pipe conforming to a pipe size specified for outdoor unit connection for the section between an outdoor branching pipe and an outdoor unit.

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.

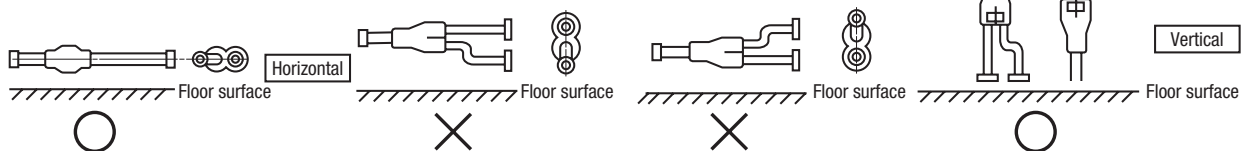
Attention

- ① In cutting pipes, always use a pipe cutter. Remove burrs from a cut end when you cut a pipe. In doing so, keep a cut end downward so that no chips or burrs may enter the pipe.
- ② Take utmost care so that no foreign matter such as dust or water may enter piping during installation work.
 - Please cover all the open ends of piping until installation work is completed. Particularly, any openings in the section of piping laid outdoors should be sealed stringently.
 - As long as possible, avoid open ends left facing upward. Make them face either horizontally or downward.
- ③ A branching joint (for both gas and liquid) must always be positioned in such a way that it branches either horizontally or vertically.

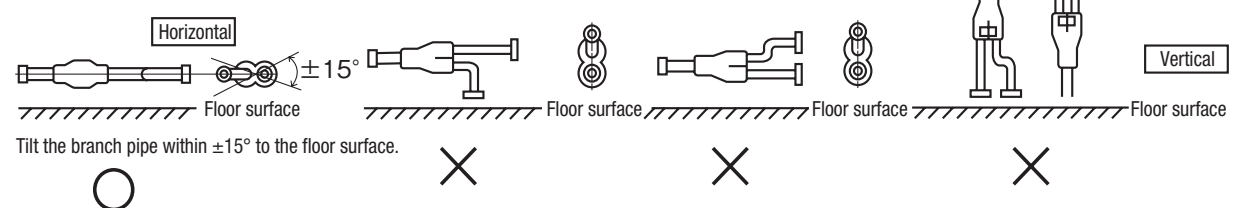
Use pipe cutter to cut pipes.



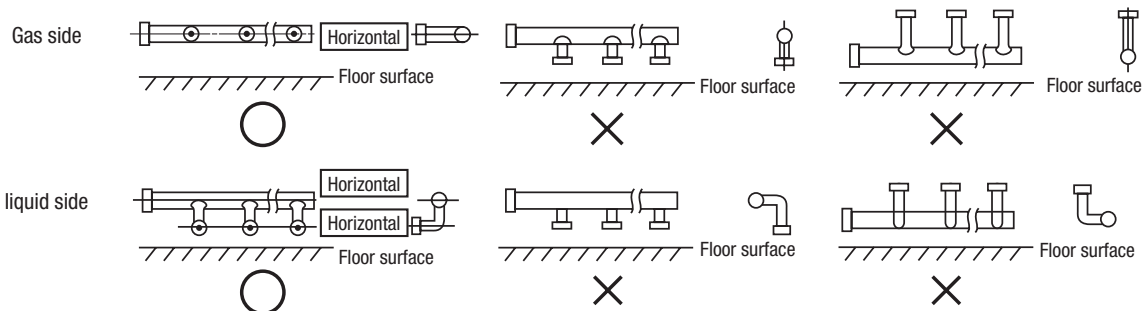
• In the case of a branching pipe set (model type DIS)



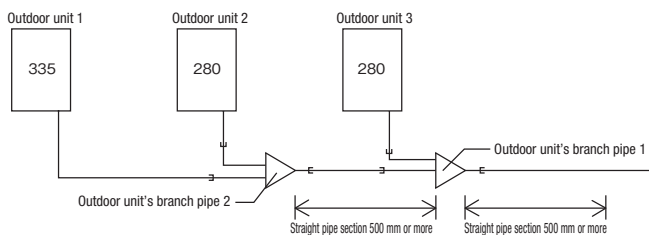
• In the case of a outdoor unit's branching pipe set (model type DOS)



• In the case of a header set (model type HEAD)



④ When using the outdoor unit's branch pipe set, make sure to secure a straight section of 500 mm or more for both the gas and liquid pipes before branching them.



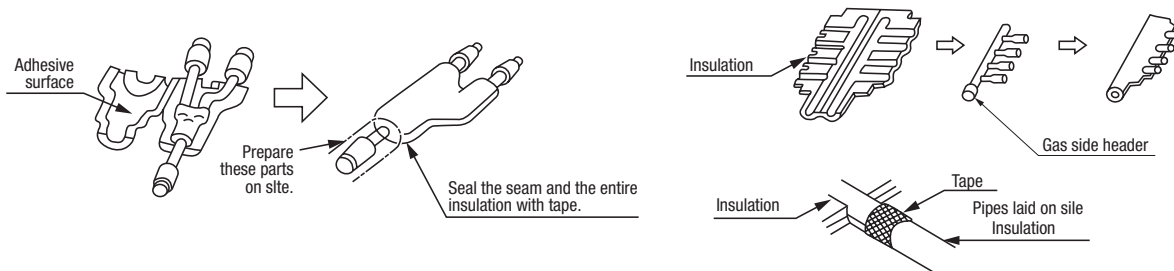
⑤ Always apply nitrogen gas when soldering joints. If nitrogen gas is not applied, a large amount of film oxide will be formed which could lead to a critical failure in the unit. Use caution to prevent moisture or any foreign matters from entering the pipe when connecting pipe ends.
For the method of air tightness testing and pulling air, please refer to the installation manual of the outdoor unit.

⑥ 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) Method to select a branch pipe set (Type DIS)

- 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.
- In the case of a 140/160 (5/6HP) outdoor unit, however, select DIS-22-1G. (Even if the capacity of connected indoor units reaches 180 or more, select DIS-22-1G.)

Total capacity downstream	Branching pipe set model type
less than 180	DIS-22-1G
180 or more – less than 371	DIS-180-1G
371 or more – less than 540	DIS-371-1G
540 or more	DIS-540-3

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 (option part).
- In the case of a 140/160 (5/6HP) outdoor unit, however, select HEAD4-22-1G. (Even if the capacity of connected indoor units reaches 180 or more, select HEAD4-22-1G.)

Total capacity downstream	Header set model type	Number of branches
less than 180	HEAD4-22-1G	Up to 4 branches
180 or more – less than 371	HEAD6-180-1G	Up to 6 branches
371 or more – less than 540	HEAD8-371-2	Up to 8 branches
540 or more	HEAD8-540-3	Up to 8 branches

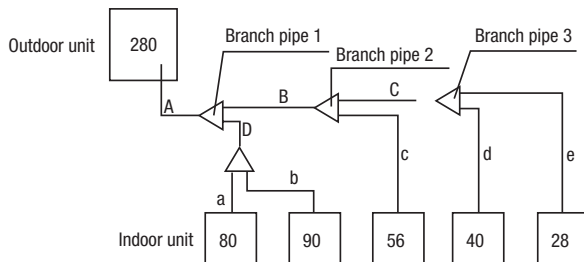
Attention

- 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.

5. Example of piping

Example 1: Branching type configuration

Connected capacity: 294

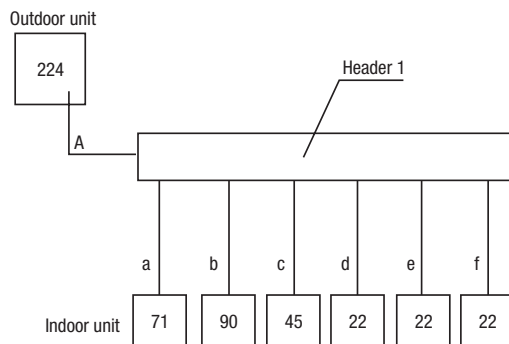


Selection of a branching pipe set

Mark	Selection procedure	Branching pipe set
Branch pipe 1	Combined total capacity of indoor units connected downstream (80+90+56+40+28)=294	DIS-180-1G
Branch pipe 2	Combined total capacity of indoor units connected downstream (56+40+28)=124	DIS-22-1G
Branch pipe 3	Combined total capacity of indoor units connected downstream (40+28)=68	DIS-22-1G

Example 2: Header type configuration

Connected capacity: 272

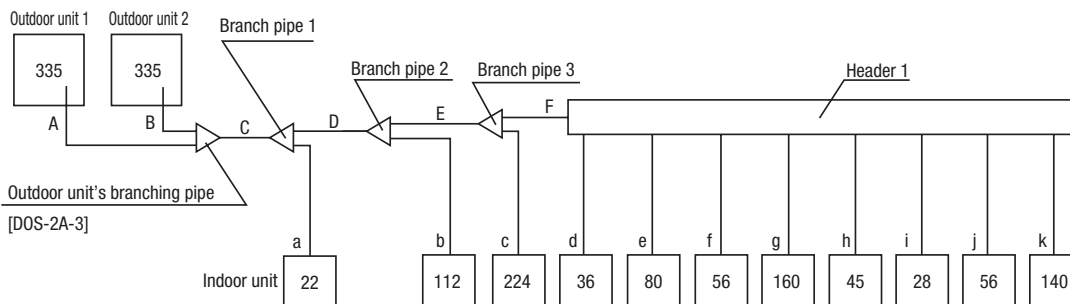


Selection of a header set

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

Example 3: Branching + Header mixed type configuration

Connected capacity: 1394



Selection of a branching pipe set

Mark	Selection procedure	Branching pipe set
Branch pipe 1	Combined total capacity of indoor units connected downstream (22+112+224+36+180+56+160+45+28+56+140)=959	DIS-540-3
Branch pipe 2	Combined total capacity of indoor units connected downstream (112+224+36+80+56+160+45+28+56+140)=937	DIS-540-3
Branch pipe 3	Combined total capacity of indoor units connected downstream (224+36+80+56+160+45+28+56+140)=825	DIS-540-3

Selection of a header set

Mark	Selection procedure	Header set
Header 1	Combined total capacity of indoor units connected downstream (36+80+56+160+45+28+56+140)=601	HEAD8-540-3

8. OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

(A) Normal control

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

Functional Components \ Operation mode	Cooling		Fan	Heating			Dehumidifying
	Thermostat ON	Thermostat OFF		Thermostat ON	Thermostat OFF	Defrost	
Indoor unit fan	Remote control command	Remote control command	Remote control command	Remote control command	Intermittent operation	○ → ×	○ / ×
Indoor unit electronic expansion valve	Superheating control response	Fully closed	Fully closed	Outlet temperature control response	Slight opening control	Model-specific aperture opening angle	Superheating control response
Compressor [CM1]	○	×	×	○	×	○	○ / ×
Magnetic contactor CM1 [52X1]	○	○	× / ○	○	○	○	○
Outdoor unit fan [FMO-1]	○ / ×	×	× / ○	○ / ×	×	○ → ×	○ / ×
Outdoor unit fan [FMO-2]	○	×	× / ○	○	×	○ → ×	○
Inverter cooling fan [FMC1]	○ / ×	○ / ×	×	○ / ×	○ / ×	○ / ×	○ / ×
4 way valve [20S]	×	×	×	○	○	○ → ×	×
Electronic expansion valve for heating [EEVH1, 2]	Fully open ※3	※1	※2	Superheating ※4 control response	※2	Fully closed / Fully open	Fully open ※3
Electronic expansion valve for sub-cooling [EEVSC]	Opening pulse control	Fully closed	Fully closed	Fully closed	Fully closed	Fully closed	Opening pulse control
Solenoid valve [SV1]	○ / ×	×	×	○ / ×	×	○ / ×	○ / ×
Solenoid valve [SV6]	○ / ×	×	×	○ / ×	×	○ / ×	○ / ×
Solenoid valve [SV11]	×	×	×	○ / ×	×	×	×
Crankcase heater [CH1]	○ / ×	○ / ×	○ / ×	○ / ×	○ / ×	○ / ×	○ / ×

Notes(1) ○ : ON, × : OFF, ○/×, ×/○: ON or OFF

(2) ※1: The EEVH1, 2 of master unit are fully opened and those of slave unit are fully closed.

(3) ※2: When the unit is stopped from cooling operation, the EEVH1, 2 of master unit are fully opened and those of slave unit are fully closed.

When the unit is stopped from heating operation, the EEVH1, 2 of both master and slave units are fully closed unless the opening degree is specified by the low pressure protective control.

(4) ※3: When the operation mode is changed from heating to cooling/dehumidifying, EEVH1, 2 are maintained at fully closed position and EEV of only one indoor unit keeps 60 pulse until 20S is turned OFF.

(5) ※4: When the operation mode is changed from cooling/dehumidifying to heating, EEVH1, 2 are maintained at fully opened position and EEVs of all indoor units keep 0 pulse until 20S is turned ON.

(6) This shows the state of output when all indoor units are in the same operation mode.

(2) Compressor control (Master unit/slave unit)

(a) Starting compressor

(i) Compressor starting order

After turning the power on, firstly CM1 compressor starts. (In case of the combination use, it is CM01 of master unit) And corresponding to the condition of under-dome temperature and to the required capacity of indoor units thermostat ON, the next compressor will start sequentially, and finally maximum 6 compressors (in case of 3 outdoor units combination use) will start simultaneously.

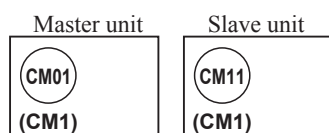
1) Single use (Models FDCB 224, 280, 335)



Range of the compressor operation speed relative to load is as follows.

System load range (Number of operating outdoor units)	0	1
Local load range (Number of compressors operating in outdoor units)	0	1
CM1	0rps	20-120rps

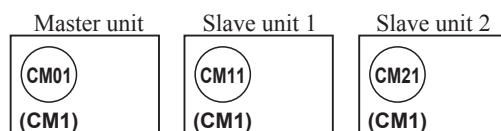
2) 2 outdoor units combination use (Models FDCB 450, 500, 560, 615, 670)



Range of the compressor operation speed relative to load is as follows. Following table is applicable when CM01 starts initially.

System load range	0	1	2	
Local load range	0	1	1	
Master unit	CM01	0rps	20-112rps	31-120rps
Slave unit	CM11	0rps	0rps	31-120rps

3) 3 outdoor units combination use (Models FDCB 735, 850, 900, 950, 1000)



Range of the compressor operation speed relative to load is as follows. Following table is applicable when CM01 starts initially.

System load range	0	1	2	3	
Local load range	0	1	1	1	
Master unit	CM01	0rps	20-112rps	31-112rps	31-120rps
Slave unit 1	CM11	0rps	0rps	31-112rps	31-120rps
Slave unit 2	CM21	0rps	20-112rps	31-112rps	31-120rps

(ii) Rotation of compressor start/stop order

- 1) The compressors will be changed over by determining the start/stop order in each heat load zone.
- 2) In case of combination use, the starting order of master and slave units will be changed over on each occasion when the master unit or slave unit stops all independently.

Starting order of outdoor units

- Master→Slave→Master (2 outdoor units)
- Master→Slave1→Slave2→Master (3 outdoor units)

(3) Outdoor fan control (Master unit/slave unit)**(a) Outdoor fan speed and fan motor rotation speed**Unit : min⁻¹

Fan tap	Cooling		Heating		Remarks
	FMo1	FMo2	FMo1	FMo2	
0th speed	0	0	0	0	stop
1st speed	0	160	0	160	Min. speed at 1 FM operation
2nd speed	200	200	0	400	Max. speed at 1 FM operation (During heating)
3rd speed	300	300	160	160	Min. speed at 2 FM operation (During heating)
4th speed	400	400	880	880	Max. speed at 2 FM operation (During heating) Rated speed of heating
5th speed	500	500	–	–	
6th speed	600	600	–	–	
7th speed	700	700	–	–	
8th speed	800	800	–	–	
9th speed	880(900)	880(900)	–	–	
10th speed*	1000	1000	–	–	
11th speed*	1100	1100	–	–	
12th speed*	1140	1140	–	–	Rated speed of cooling

Notes (1) Value in () is for the model FDCB335.

(2) * mark is model FDCB335 only.

(b) Outdoor fan control in cooling mode

Fan speed is controlled based on the high pressure during cooling/dehumidifying (detected with PSH) and the outdoor air temperature (detected with Tho-A).

(i) Initial fan speed is as follows.

Initial cooling speed of outdoor fan

Outdoor temperature $\leq 10^{\circ}\text{C}$	$10^{\circ}\text{C} \leq$ Outdoor temperature $< 15^{\circ}\text{C}$	$15^{\circ}\text{C} \leq$ Outdoor temperature
2nd speed	4th speed	6th speed

(ii) Speed changes depending on high pressure values.

(c) Outdoor fan control in heating mode

Fan speed is controlled based on the low pressure (detected with PSL) during heating operation.

(i) Speed changes depending on low pressure values.

(ii) Under normal condition, the stepless fan control between 1st speed and 4th speed is performed.

(4) Defrost operation (Master unit/Slave unit)

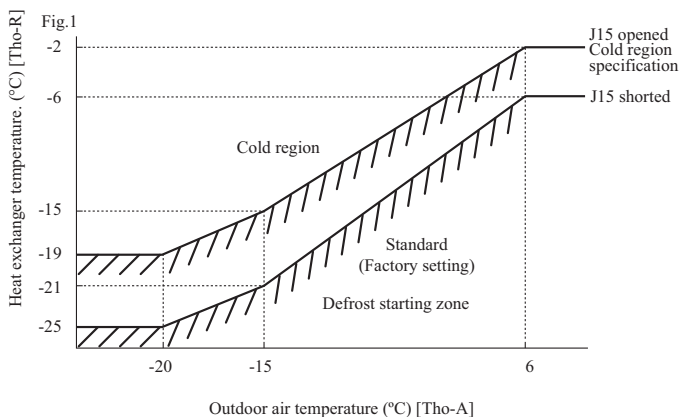
If the defrost starting conditions at the outdoor heat exchanger are established, defrost operation starts.

(a) Temperature conditions for defrost operation

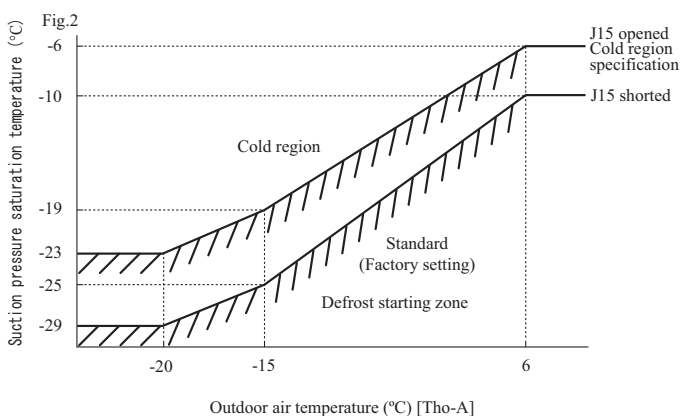
(i) Starting conditions

When all of following conditions are satisfied, defrost operation will be started.

- 1) When the accumulative operation time of the compressor becomes 33 minutes after completion of previous defrost operation, or it becomes 33 minutes after heating operation starts.
- 2) When 8 minutes have elapsed after one compressor is turned ON from the state of all compressors OFF.
- 3) When 8 minutes have elapsed after one outdoor fan is turned ON from the state of all outdoor fan OFF.



- 4) When either of following conditions is established after all of the above conditions are satisfied.
 - a) When the temperatures detected with the outdoor heat exchanger temperature thermistor (Tho-R1,-R2) and outdoor air temperature thermistor (Tho-A) are below the defrost starting temperature mentioned in the above graph continuously for 3 minutes.
 - b) When the suction pressure saturation temperature has continued for 3 minutes in the defrost zone which is determined by the outdoor air temperature sensor (Fig. 2)



(ii) Ending condition

- 1) Standard (J14 is shorted)

When any of the following conditions is satisfied the defrost ending operation starts.

- a) When the temperature detected with both outdoor heat exchanger temperature thermistors (Tho-R1 and Tho-R2) is higher than 9°C
- b) When 12 minutes have elapsed since defrost operation started.

- 2) Cold region setting (J14 is open)

- a) When $(\text{Tho-R1 and Tho-R2}) \geq 9^\circ\text{C}$ is satisfied, after 2 minutes and 30 seconds have elapsed since defrost operation started, and when either of following conditions is satisfied, the defrost ending operation starts.
 - i) 2 minutes and 30 seconds have elapsed since the temperature of either Tho-R1 or Tho-R2 was 14°C or higher
 - ii) The temperature of either Tho-R1 or Tho-R2 is 30°C or higher.
 - iii) 14 minutes have elapsed since defrost operation started.
- b) When $(\text{Tho-R1 and Tho-R2}) < 9^\circ\text{C}$ is satisfied, after 2 minutes and 30 seconds have elapsed since defrost operation started, and when either of following conditions is satisfied, the defrost ending operation starts.
 - i) 5 minutes have elapsed since the temperature of either Tho-R1 or Tho-R2 was 14°C or higher.
 - ii) The temperature of either Tho-R1 or Tho-R2 is 30°C or higher.
 - iii) 14 minutes have elapsed since defrost operation started.

(5) Protective control**(a) High pressure protective control/error**

If the high pressure exceeds 3.7 MPa, the compressor speed is reduced gradually.

It reduces to 20 rps at the lowest.

If the high pressure still rises to 4.15 MPa, the compressor stops.

(b) Low pressure protective control/error

If the low pressure drops below 0.18 MPa, the compressor speed is reduced gradually.

It reduces to 20 rps at the lowest.

If the low pressure still drops below 0.134 MPa, the compressor stops.

(c) Discharge pipe temperature control/error

If discharge pipe temperatures (detected with Tho-D 1) exceed 120°C, the compressor speed is reduced gradually. (To 20 rps at the lowest) If the temperatures still continue to rise beyond 130°C, the compressor stops.

(d) Compressor compression ratio protective control

If the compressor compression ratio exceeds the setting value, the compressor speed is reduced gradually.

It reduces to 20 rps at the lowest.

(e) Current safe control

(i) The current safe control monitors current values at L3 phase of inverter. If the value exceeds the setting value, the compressor speed is reduced.

If the value is higher than the setting value even if the speed is reduced, the speed is reduced further.

(ii) This control is reset if the current value at L3 phase of inverter becomes lower than the setting value – 1 A for 3 minutes continuously or lower than the setting value for 6 minutes continuously.

(f) Current cut control

(i) Current sensor built in the power transistor monitors current values output from the inverter. If the value exceeds 88 A, the current cut control stops the compressor. The compressor starts automatically 3 minutes after the stop.

(ii) If the above control activates 4 times within 15 minutes, 52X1 is turned off, and the operation is stopped with the error stop.

State of the error continues for 3 minutes after the error stop. The error can be reset by operating the inspection reset from the remote control.

(g) Power transistor temperature (PT) protective control

If temperatures on the power transistor exceed the setting value, the compressor speed is reduced gradually.

It reduces to 20 rps at the lowest.

(h) Under-dome temperature protective control

If the under-dome temperature exceeds the setting value, the compressor speed is reduced gradually.

It reduces to 20 rps at the lowest.

(i) Protection for combination of outdoor units (Master unit)

The capacity of connectable outdoor units is checked when the communication check is performed after turning the power ON.

If the checked result is other than the allowable combinations mentioned in the following table ① it is prohibited to start operation due to outdoor unit combination error.

When this error occurs, the error code mentioned in the following table ② is displayed on the 7-segment display.

Table① combination list

Capacity	Combination patterns
FDCB450	Combination (224+224)
FDCB500	Combination (224+280)
FDCB560	Combination (280+280)
FDCB615	Combination (280+335)
FDCB670	Combination (335+335)

Capacity	Combination patterns
FDCB735	Combination (224+224+280)
FDCB800	Combination (224+280+280)
FDCB850	Combination (280+280+280)
FDCB900	Combination (280+280+335)
FDCB950	Combination (280+335+335)
FDCB1000	Combination (335+335+335)

Table② Contents displayed on 7-segment display at the combination error

Code display area	Data display area	Contents of invalid operation
oPE	3	Invalid combination of outdoor units

(6) Auto backup operation**(a) Classification of auto backup operations**

When the auto backup operation is enabled, anomaly stops are classified as follows and countermeasures are provided for respective categories.

System stop: All stop including master/slave units

Unit stop: Stop in the unit of outdoor unit

Compressor stop: Stop in the unit of compressor

(b) Control contents of auto backup operation

- (i) Condition of auto backup operation is established when the dip switch SW3-2 on the PCB of master unit is turned ON (selected).
- (ii) However, the switching of SW3-2 is effective only at the power on. (It does not become effective unless the power source is reset.)
- (iii) Anomaly contents in the following table are invalid and are not detected when the auto backup is effective.

Anomaly detection invalid code	SW3-2ON	Anomaly detection invalid code	SW3-2ON
E32: Open L3 phase on power source at primary side	○	E45: Communication error between inverter PCB and outdoor control PCB	○
E36: Discharge pipe temperature error	○	E48: Outdoor DC fan motor anomaly	○
E37: Outdoor heat exchanger and sub-cooling coil temperature thermistor anomaly	○	E51: Power transistor overheat (Continuousness)	○
E38: Outdoor air temperature thermistor anomaly	○	E53: Suction pipe temperature thermistor anomaly	○
E39: Discharge pipe temperature thermistor anomaly	○	E55: Under-dome temperature thermistor anomaly	○
E40: High pressure anomaly	○	E56: Power transistor temperature thermistor anomaly	○
E41: Power transistor overheat	○	E58: Anomalous compressor by loss synchronism	○
E42: Current cut	○	E59: Compressor startup failure	○
E44: Liquid flooding anomaly	○	E60: Rotor position detection failure	○

- (iv) If any anomaly occurs when the auto backup is effective, the operation output (CnH), Anomaly output (CnY), 7-segment display and LED show as follows.
 - 1) At the system stop
Operation output on the master unit is turned OFF, the anomaly output is turned ON, 7-segment display and LED show the anomaly, and the remote control displays E??. (To reset the anomaly, it is necessary to reset the inspection from the remote control.)
 - 2) At the unit stop
On the anomaly occurred unit only, the operation output is turned OFF, the anomaly output is turned ON, 7-segment display and LED show the anomaly and normal units continue their operation ON(or stop).
To reset the state of anomaly on the unit the anomaly occurred, it depends on the condition to reset the state of each anomaly.
 - 3) At the compressor stop
Only the compressor concerned stops, previous states are maintained on the operation output, anomaly output, 7-segment display and LED. To reset the state of anomaly on the compressor, it depends on the condition to reset the state of each anomaly.

Remote control error display	Anomaly contents	Anomalous stop of master outdoor unit			Anomalous stop of slave outdoor unit		
		System stop	Unit stop	Compressor stop	System stop	Unit stop	Compressor stop
E31	Duplicated outdoor unit address No.	○					
E32	Open L3 phase on power source at primary side		○			○	
E36	Discharge pipe temperature error			○			○
E37	Outdoor heat exchanger and subcooling coil temperature thermistor anomaly		○			○	
E38	Outdoor air temperature thermistor anomaly		○			○	
E39	Discharge pipe temperature thermistor anomaly			○			○
E40	High pressure anomaly		○			○	
E41	Power transistor overheat			○			○
E42	Current cut			○			○
E43	Excessive number of indoor unit connected, excessive to tal capacity of connection	○			—	—	—
E44	Liquid flooding anomaly			○			○
E45	Communication error between inverter PCB and outdoor control PCB		○			○	
E48	Outdoor DC fan motor anomaly		○			○	
E49	Low pressure error	○			○		
E51	Power transistor overheat (continuousness)			○			○
E53	Suction pipe temperature thermistor anomaly		○			○	
E54	High pressure sensor/Low pressure sensor anomaly	○			○		
E55	Under-dome temperature thermistor anomaly			○			○
E56	Power transistor temperature thermistor anomaly			○			○
E59	Compressor startup failure			○			○
E60	Rotor position detection failure			○			○
E61	Communications error between the master unit and slave units	○			—	—	—
E63	Emergency stop	○			○		

(c) Prohibiting conditions of auto backup operation

- (i) When the conditions of oil return control are not established
- (ii) When the backup operation time has exceeded the limit value

(d) Control after the conditions to prohibit the auto backup operation have been established

All compressor stop, and the error display [EXX] is shown on the 7-segment display and the remote control.

In this state, the inspection reset of remote control is effective. → [EXX] is displayed continuously on the remote control.

Backup operation function is only for emergency purpose when one of compressors or one of units is damaged. If backup operation is performed continuously for long period, it may cause the damage of good compressors. Accordingly be sure to repair the damaged unit or to replace the damaged compressor and to cancel the backup operation within 48 hours after starting backup operation.

(7) Test run**(a) This control can be performed from the master unit, not from the slave unit.**

If this control is done from the slave unit, the following display is shown on the 7-segment display.

The display returns to normal display if the test run control switch is reset.

Code indicator	Data indicator	Contents of invalid operation
oPE	10	Slave setting is invalid.

(b) Test run from master outdoor units with dip switches SW5-1 and SW5-2.

SW5-1	ON	SW5-2	OFF	Test run for heating
			ON	Test run for cooling
OFF	Normally operation and after test operation			

Take note that this operation has priority over other option devices such as central control and etc.

This operation status is transmitted to the option devices.

(Note) Test run operation by external input is also available with following method. (Refer next page for detail)

- Select the external input terminal (CnS1) and set 7-segment [P11]-[6] for the function of SW5-1, and select the external input terminal (CnS2) and set 7-segment [P12]-[7] for the function of SW5-2.

CnS1	Shorted	CnS2	Open	Test run for heating
			Shorted	Test run for cooling
Open	Normal operation and after test operation			

- Other combination of external input terminals (CnS1, CnS2, CnG1, CnG2) and of setting function with 7-segment ([P11], [P12], [P13], [P14] and -[6], -[7]) are available to use.

(c) Starting conditions of test run operation

- Dip switch SW5-1 is turned ON. However the input before the power ON is invalid.
- The dip switches SW3 and SW5, other than SW5-1 and SW5-2, should be turned OFF.
However, regarding the dip switch SW3-2 for automatic backup operation, it is invalid during test run operation regardless whether SW3-2 is turned ON (valid) or OFF (invalid).→In order to check trouble during test run operation.

(d) Control during test run (If indoor units are normal)

- Heating operation is performed with SW5-2 OFF, while cooling operation is performed with SW5-2 ON.
- Indoor EEV control at the end of test run is depended on the specifications of the indoor unit.
- Cooling operation: Compressor frequency control is depended on the cooling low pressure control.
- Heating operation: Compressor frequency control is depended on the heating high pressure control.

(e) Ending conditions of test run operation

Test run operation is terminated if one of following conditions is satisfied.

- Test run operation ends when the dip switch SW5-1 is turned OFF.
- When the operation is stopped by the error control during test run, the error is displayed same as the normal operation and the state of error stop is retained even if SW5-1 is turned OFF.

(B) Option controls

• **External input terminal**

- ① 4 External input terminals (CnS1, CnS2, CnG1 and CnG2) are provided. (See Fig-1)
- ② Each external input terminal can be changed its function by allotting the external input function No. of P07-P10 selected with 7-segment respectively. (External input functions of the code P07-P10 are shown in Fig-2)

External input terminal			External input function allotment of 7-segment		
Terminal	Specification	Factory setting	Code	Function No.	Factory setting
CnS1	No voltage contact (DC12V)	Shorted	P07	"0"- "9"	"0"
CnS2	No voltage contact (DC12V)	Shorted	P08	"0"- "9"	"1"
CnG1	No voltage contact (DC12V)	Open	P09	"0"- "9"	"2"
CnG2	No voltage contact (DC12V)	Open	P10	"0"- "9"	"3"

Fig-1

- ③ The following function is effective, when the external input function of PXX-"X" is allotted and the signal is input to the external terminal of CnX.

(Example) If CnS1 terminal is used for demand control (pulse input), allot the "1" of P07 and open J13, and if CnS2 terminal is used for demand control (level input), allot the "1" of P08 and short J13.

By changing the allocation of external input function (P07-P10) on the 7-segment, functions of external input terminal may be selected. Inputting signals to external input terminals enable the following functions.

Setting value for external input function assignment	External input terminal shorted	External input terminal open
"0" : External operation input	Permitted	Prohibited
"1" : Demand input	*3	*3
"2" : Cooling / heating force input	Heating	Cooling
"3" : Silent mode 1 *1	Valid	Invalid
"4" : Spare		
"5" : Outdoor fan snow control input	Valid	Invalid
"6" : Test run external input 1 (SW5-1 equivalent)	Test run start	Normal
"7" : Test run external input (SW5-2 equivalent)	Cooling	Heating
"8" : Silent mode 2 *1	Valid	Invalid
"9" : Demand input	*3	*3
"10" : AF periodic inspection display	Valid	Invalid
"11" : AF error display	Valid	Invalid
"12" : Building multi energy save control	Valid	Invalid

*3 Demand setting table

Demand control	Function assignment 1	Function assignment 9
None (Normal)	Shorted	Shorted
1-step	Open	Shorted
2-step	Open	Open
3-step	Shorted	Open

*1 Valid/invalid is changed depending on outdoor air temperatures.
 *2 It is always Valid, regardless of outdoor air temperature.
 *3 According to the demand setting table.

Fig-2

- ④ J13: Switching of CnS1,S2 input method (CnS1, S2 only)

J13 shorted: Level input by CnS1, S2
 J13 open : Pulse input by CnS1, S2

*1 "Setting" means;

Master : Set only the master unit. (No necessary to set the slave unit)

Master/Slave: Set both master/slave unit same.

(1) External input and demand input (Master unit/Slave unit)

(a) Operation permission or prohibition mode

(Note) Following explanation is based on using CnS1 terminal and setting function [P07]-[0] with 7-segment display.

However other terminals can be used with following function setting of 7-segment display.

CnS2: [P08]-[0] CnG1: [P09]-[0] CnG2: [P10]-[0]

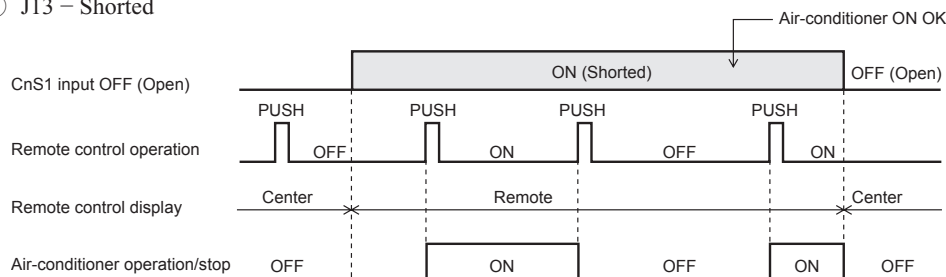
- 1) Operation permission or prohibition mode is switched with the connector (CnS1) and the Jumper wire (J13) on the outdoor control PCB after setting function [P07]-[0] (Factory setting) with 7-segment display
- 2) Operation permission/prohibition control by the external input CnS1 to outdoor unit.

Input: CnS1	Switching CnS1 input method:J13	CnS1: Switching operation permission/prohibition mode
	Shorted (Level input)	Operation prohibition mode → Operation permission mode
	Open (Pulse input)	Switching operation permission/ Operation prohibition mode (Reversal)
	Shorted (Level input)	Operation permission mode → Operation prohibition mode
	Open (Pulse input)	— (NOP)

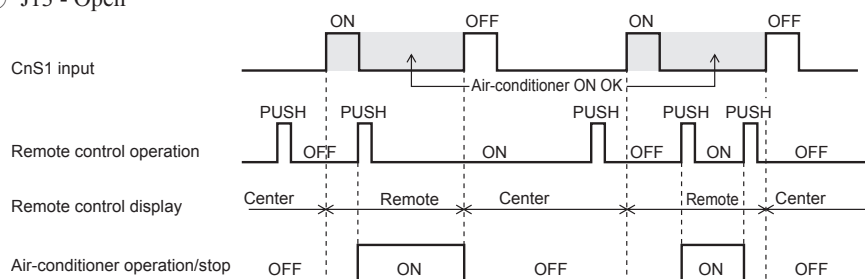
Note (1) Factory setting J13: Shorted, CnS1: Shorted (Short pin is connected)

- 3) The operation condition is displayed on the LCD of remote control and it is transferred to option central control.
- 4) When the operation command from remote control is not accepted by this control, "Center" is displayed on the LCD of remote control. (See item 5 mentioned next page.)
- 5) CnS1 performs the following operation according to switching the jumper wire (J13) shorted or open. In case of pulse input, the pulse width is 500ms or larger.

① J13 – Shorted



② J13 - Open



- 6) After changing mode from operation prohibition mode to permission mode, the indoor units operation status can be select by 7-segment [P17] setting.
 7-segment [P17] =0 → Keeping STOP
 7-segment [P17] =1 → Automatically RUN

(b) Demand control

(Note) Following explanation is based on using CnS2 terminal and setting function [P08]-[1] with 7-segment display.

However other terminals can be used with following function setting of 7-segment display

CnS1: [P07]-[1] CnG1: [P09]-[1] CnG2: [P10]-[1]

- 1) Demand control or normal control is switched with the connector (CnS2) and the jumper wire (J13) on the outdoor control PCB after setting function [P08]-[1] (Factory setting) with 7-segment display.

J13: Switching of CnS2 input method

J13 shorted: Level input by CnS2

J13 open : Pulse input by CnS2

- 2) Demand control/Normal operation by the external input CnS2 to outdoor unit.

Input: CnS2	Switching CnS2 input method:J13	CnS2: Switching operation permission/prohibition mode
	Shorted (Level input)	Demand control → Normal operation
	Open (Pulse input)	Switching Demand control/ Normal operation (Reversal)
	Shorted (Level input)	Normal control → Demand operation
	Open (Pulse input)	(NOP)

Note (1) Factory setting J13: Shorted, CnS2: Shorted (Short pin is connected)

- 3) The operation condition is displayed on the LCD of remote control and it is transferred to option central control.

4) Demand control

Demand ratio can be changed with the 7-segment "P04" on the outdoor control PCB.

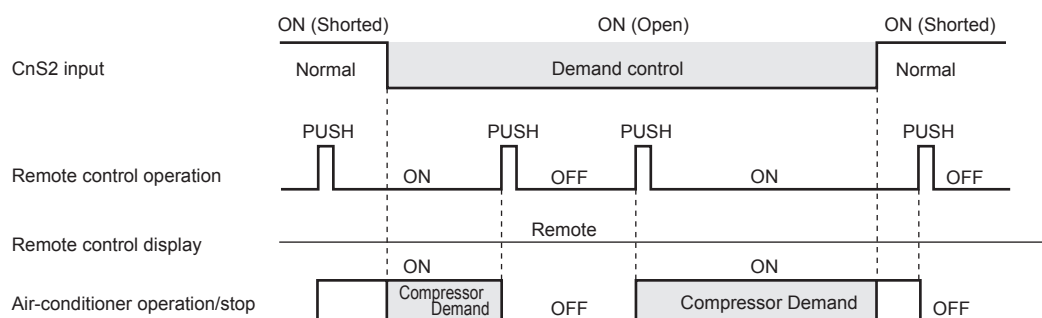
P04 setting	Compressor output (%)
080(Factory default)	80
060	60
040	40
000	0

5) This control has priority over the controls of 4-way valve safeguard, compressor protective start operation, defrost operation, oil equalized operation, oil return operation, pump-down operation for replacement, Start/Stop pump-down operation and check operation.

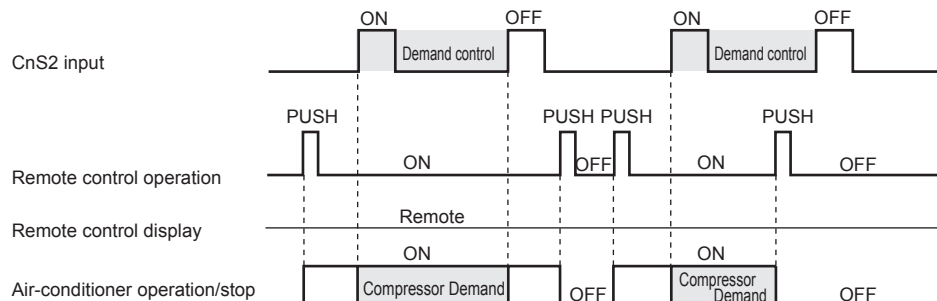
6) CnS2 performs the following operation according to switching the jumper wire (J13) shorted or open.

In case of pulse input, the pulse width is 500ms or larger.

① J13 – Shorted



② J13 - Open



(c) 3 step demand control

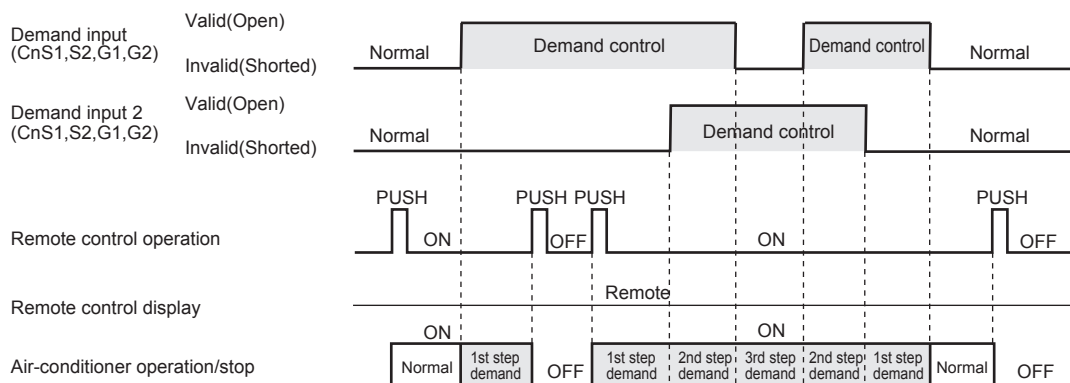
1) Starting condition

When the "Demand input 2" via the external input terminal of outdoor unit (master unit) has become valid.

2) Contents of control

The demand control is performed at the demand rate which has been set with [P14] and [P15] according to the demand input or the demand input 2.

Demand control	Following is assigned to one of P07 - P10.		Demand rate setting
	Demand input (Function assignment: 1)	Demand input 2 (Function assignment: 9)	
None (Normal)	Shorted	Shorted	—
1st step demand	Open	Shorted	P04
2nd step demand	Open	Open	P14
3rd step demand	Shorted	Open	P15



3) Ending condition

When the starting conditions have been lost.

(d) Demand control from indoor unit

1) Starting condition

- ① When a demand ratio (“80%”, “60%”, “40%” or “0%”) has been transmitted from an indoor unit of “Peak-cut timer” function.
- ② Normal demand of Item (b) is not activated.
- ③ This control is performed on the RC-EX1A remote control.

2) Contents of control

- ① Compressor’s upper limit speed is restricted according to the demand restriction rate.
- ② The demand ratio controlled by the restriction rate which is transmitted from an indoor unit.
- ③ If the demand control rate signals are received from two or more indoor units, the control takes the lowest rate.
- ④ When the demand rate is other than 0%, this control is superseded by the controls of 4-way valve safeguard, defrost operation, oil return operation, oil equalized operation, pump-down operation for replacement, Start/Stop pump-down operation and check operation.

3) Ending condition

When the starting conditions have been lost.

(2) Silent mode control

(Note) With CnG2 terminal and 7-segment display [P10]-[3] for silent mode 1 (Factory default) or with CnG2 terminal and 7-segment display [P10]-[8] for silent mode 2 (Setting on site) It is also available to use other terminals as follows.

CnS2: [P08]-[3] or -[8] CnS1: [P07]-[3] or -[8] CnG1: [P09]-[3] or -[8]

- (a) Silent mode is commanded either from the indoor unit (remote control setting) or from the master outdoor unit (CnG2).
- (b) When the "Silent mode start" signals is received from one of indoor units, it enters the silent mode operation.
- (c) When CnG2 of master unit is shorted after setting function [P10]-[3] (Silent mode 1) or [P10]-[8] (Silent mode 2) with 7-segment display, it enters the silent mode operation. (If the signal is input to the slave unit, it is invalid)

(Note) Silent mode 1 and 2 can not be set at same time

- (d) When the "Silent mode start" signal from indoor unit and the "Silent mode" signal from outdoor unit are received, it enters the silent mode operation under "or" condition.
- (e) When silent mode signals from all indoor units become "Silent mode end" and when silent mode signal input to CnG2 on outdoor unit becomes open, the silent mode operation is reset.
- (f) The operation of silent mode 1 is effective within the following temperature range.

(Note) In case of external input of silent mode 2, following temperature conditions are disregarded.

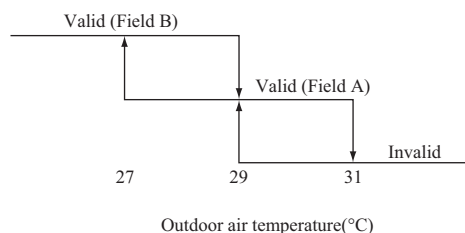
- (i) Silent mode 0,1 : Effect on field A,B
- (ii) Silent mode 2,3 : Effect on field B

(g) Silent mode setting

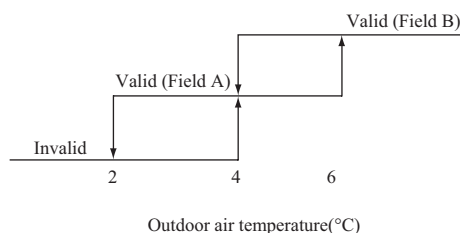
Silent mode setting can be changed with 7-segment “P05” on the outdoor control PCB.

P05 setting	Silent mode setting
000 (Factory default)	Silent mode setting 0
001	Silent mode setting 1
002	Silent mode setting 2
003	Silent mode setting 3

• Cooling



• Heating



(h) Sound level (Reference data)

Model	SPL Sound pressure level for cooling	SPL Sound pressure level for heating	SPL Silent mode setting 0	SPL Silent mode setting 1	SPL Silent mode setting 2	SPL Silent mode setting 3	PWL Cooling	PWL Heating
	(dB(A))	(dB(A))	(dB(A))	(dB(A))	(dB(A))	(dB(A))	(dB(A))	(dB(A))
FDCB224	56	57	56	51	47	43	74	76
FDCB280	55	57	55	51	47	43	75	76
FDCB335	61	58	61	57	53	49	81	78

(3) Outdoor fan snow protection control (Master unit/Slave unit)

(Note) Following explanation is based on setting function with 7-segment display [P02].

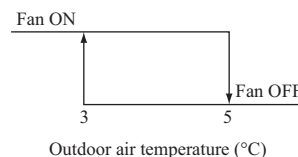
However the following terminals and 7-segment function settings are available to use.

CnS1: [P07]-[5] CnS2: [P08]-[5] CnG1: [P09]-[5] CnG2: [P10]-[5]

- (a) The setting of this control should be done not only on the master unit but also on the slave unit, because the fans of master unit and the slave unit are controlled independently.
- (b) The control is enabled /disabled by selecting [0] or [1] displayed at 7-segment LED of master/slave units.
- (c) Operation method of outdoor fan snow protection control
 - (i) Set the code [P02] on 7-segment display
 - (ii) “0” or “1” is displayed at the data display area of 7-segment LED.
 - “0”: Outdoor fan snow protection control is disabled (Factory setting)
 - “1”: Outdoor fan snow protection control is enabled
 - (iii) Press SW7 (Data write/delete) for 3 seconds continuously
 - (iv) “0” or “1” blinks every 0.5 second at the data display area of 7-segment LED.
 - (v) Press SW8 (one digit) to toggle the display between “0” and “1”.
 - (vi) If SW7 is pressed for 3 seconds continuously while “0” and “1” are blinking, “0” or “1” at the data display area of 7-segment LED stops blinking.

With this operation, the enabled/disabled setting of outdoor fan snow protection control is saved in the memory of EEPROM, and henceforth the outdoor fan is controlled according to the contents of memory.
 - (vii) Contents of outdoor fan snow protection control are retained even if the power is turned off and backed on again.

- (d) Contents of outdoor fan snow protection control
 - (i) At the status of all stop or emergency stop, if the outdoor air temperature drops 3°C or lower, all of outdoor fans are operated at the maximum speed (4th speed) once every 10 minutes.
 - (ii) The outdoor fan runs for 30 minutes
 - (iii) During this snow protection control, the relay 52X1 of the compressor is ON



(4) Outdoor operation mode

On the standard models of 2 pipe system, the outdoor operation mode of Stop/Cooling/Heating is selected based on the information of indoor units, and then respective controls are performed.

<Contents of control>

- (a) Determination of outdoor operation mode

Operation mode of outdoor unit is determined based on respective signals of Operation/Stop and Cooling/Heating.
- (b) Type of outdoor operation mode
 - 1) Outdoor operation mode - Stop
 - 2) Outdoor operation mode - Cooling
 - 3) Outdoor operation mode - Heating
- (c) Priority in operation mode selection.
 - 1) First priority is given to the forced cooling/heating operation.
 - 2) Second priority is given as follows

Priority in the operation mode selection can be changed using the 7-segment setting [P01].

P01 setting	Mode
0 (Factory default)	First unit's operation mode
1	Last unit's operation mode
2	Priority of master unit's setting operation mode
3	Priority of required major operation mode

- First unit's operation mode: Operation mode of the indoor unit which is operated first time after stop of the outdoor unit operation mode
 - Last unit's operation mode: Operation mode of the indoor unit which is operated at the last time
 - Priority of master unit's setting operation mode: Operation mode of indoor unit of which the address No. is smallest (Master indoor unit). When the master indoor unit is turned off, it become valid the first push priority on other indoor units' remote controls.
 - Priority of required major operation mode: Operation mode of which the total capacity of operating indoor units is larger. There is no renewed judgment for 10 minutes after a change on the operation mode.

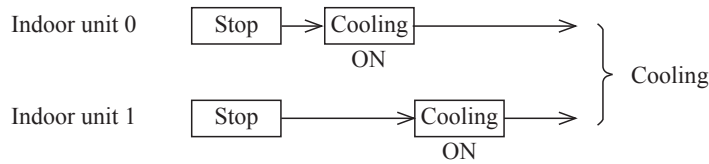
The judgment, however, is renewed in following cases.

 - At the stop
 - When the P01 setting is changed.
- 3) In the event that agreement of operation mode is lost between indoor units and outdoor units by selecting the first or second priority after determining the operation mode, it is changed forcibly to the "Fan" mode. The operation mode LCD flickers to warn the "Mode unmatched"

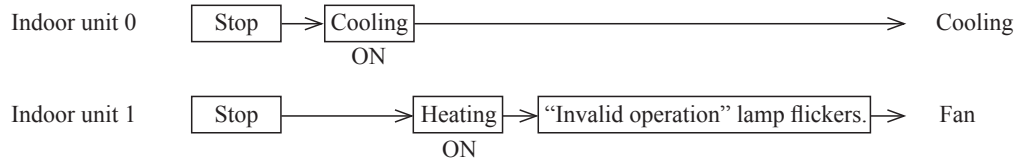
4) Example of operation mode selection

<First unit's operation mode>

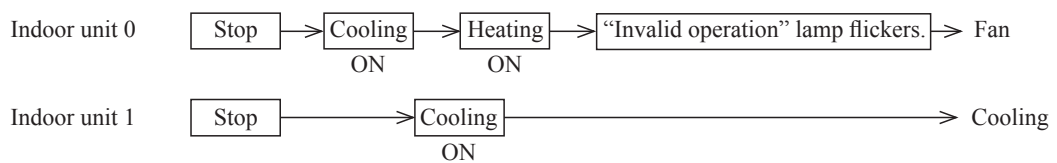
① If both of indoor units 0 and 1 have the same operation mode, it operates with the mode.



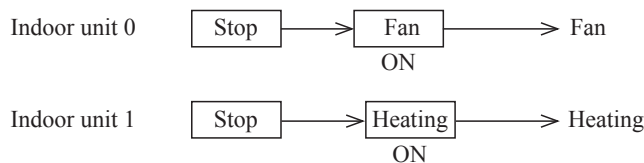
② Cooling does not match on indoor units 0 and 1 (Priority is given to previous operation.)



③ When it is changed from same mode to unmatch.

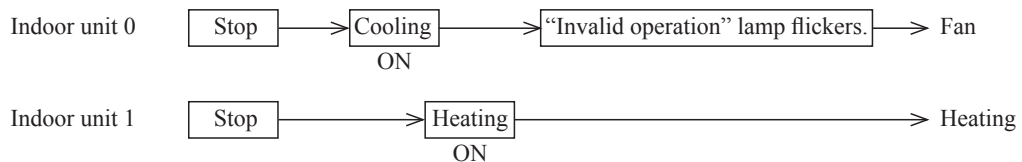


④ Operation mode is prepared for change in the fan mode.

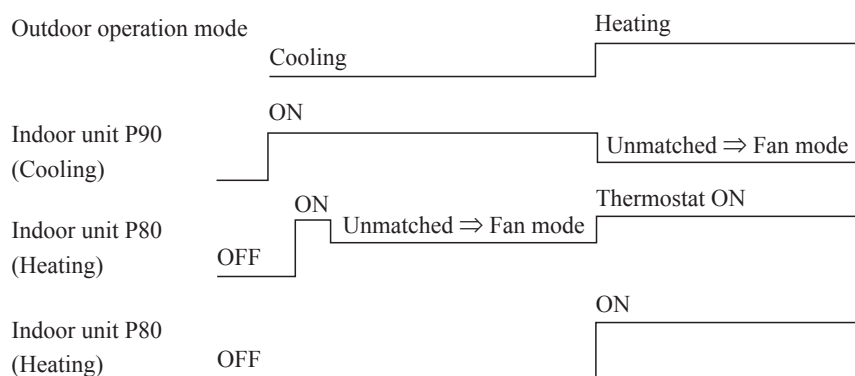


<Last unit's operation mode>

① If the indoor unit 1 of which operation mode is different has joined in when the indoor units 0 is operating.



<Priority of required major operation mode>



5) Reset of unmatched condition (Cooling/heating unmatched)

When unmatched occurs among indoor units, it can be reset by either one of followings.

① If the operation mode of outdoor unit is matched with that of indoor unit.

② If the operation mode is changed to "Fan" or "Stop" on the indoor units on which cooling/heating is unmatched.

(d) Forced cooling /heating operation (Master unit)

(Note) Following explanation is based on using CnG1 terminal and setting function [P09]-[2] with 7-segment display.

However other terminals can be used with following function setting of 7-segment display.

CnS1: [P07]-[2] CnS2: [P08]-[2] CnG2: [P10]-[2]

- 1) When SW3-7 on the outdoor control PCB is turned ON after setting function [P09]-[2] with 7-segment display, if CnG1 is shorted, forced heating operation is performed, but if CnG1 is open, forced cooling operation is performed.
- 2) If the different mode from the forced operation mode is commanded from indoor unit, the "mode unmatched" message is displayed on the LCD of remote control and the operation is entered in FAN mode.

SW3-7	ON	CnG1	Open	Operation in cooling only
			Shorted	Operation in heating only
	OFF	Normal operation		

- 3) With the forced mode from indoor unit, if a different operation mode is commanded, following operations take place based on the forced cooling/heating operation set with the 7-segment [P18].

P18 = 0: The operation mode unmatched is displayed on the remote control, etc., and it is changed to the fan operation.

P18 = 1: It is operated with the forced cooling/heating operation mode.

Setting temperature for cooling ... 28°C

Setting temperature for heating ... 20°C

(5) Emergency stop control

When one of indoor units receives the emergency stop signal through CnT terminal on the indoor control PCB from the device like as refrigerant leakage detector and that information is transmitted to the outdoor unit, the outdoor unit stops operation and emergency stop error message transmitted to all indoor units running.

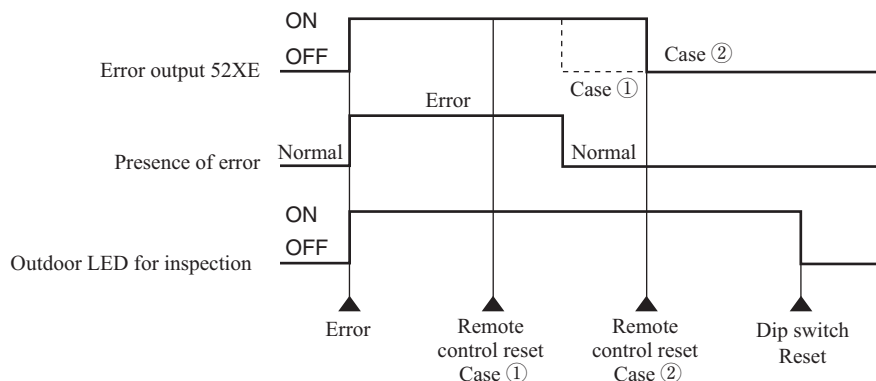
It is able to make the emergency stop function effective by remote control indoor function setting.

- (a) When the outdoor unit receives the "Emergency stop" command from the indoor unit, it makes all stop by error.
- (b) And the "Emergency stop" command is transmitted to all indoor units and error code "E63" is displayed.
- (c) When the outdoor unit receives the "Emergency stop reset" command from the indoor unit, the "Emergency stop reset" command is transmitted to all indoor units.

(6) Operation and error signal output (Master unit/Slave unit)

This is the function to retrieve and display the operation and error information on the outdoor unit as a batch.. Although indoor units also have the function to retrieve the operation and error information, this function is designed to retrieve the whole information of each refrigeration system connected to the outdoor unit.

- (a) The terminals for the operation and error outputs at the outdoor unit side are provided on the outdoor control PCB.
- (b) Diagram of output relay operations



- (c) The error output relay (52XE) is turned ON when the error stop occurs, and is turned OFF when the error reset is done from remote control by pressing "Check" and "Reset" button simultaneously after recovery from the error (Remote control reset case ②).
Before recovery from the error, if the error reset is done from remote control, 52XE is not turned OFF, but it will be turned OFF automatically after the error is recovered subsequently (Remote control reset case ①).
- (d) If at least one of connected indoor units is operating, the operation output relay (52XR) is turned ON. (Operation means the state that remote control is turned ON, in which the fan operation and the thermostat OFF is included, but the error stop is excluded.)
- (e) Output relay (52XR, 52XE) of DC12V should be prepared in the field. The maximum load of relay is LY2F (Omron).
- (f) The output connectors (CnH, CnY) to be connected to the relays for operation output (52XR) and for error output (52XE) is mounted on the outdoor control PCB.
- (g) If CPU goes out of control, this function becomes disable.
- (h) When the automatic backup operation is effective, there is no error display for any error on the compressor stopping by detecting its anomaly.

(7) External output

This function is used in order to operate the external option devices in conjunction with relay output of the respective operational information from outdoor unit.

However, since these models do not have dedicated output, it makes switchable by using the existing 52XR relay in order to comply with various usages.

This control is done for master unit and slave unit independently.

[External output function]

External output function of CnH can be switched by changing of [P06] of 7-segment display from "0" to "5" as mentioned below.

0: Operation output [Factory default]

1: Error output

·It is turned on at anomalous stop, and turned OFF when "CHECK" and "RESET" buttons on remote control are pressed simultaneously 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 No.1 speed command > 0, or the outdoor fan No.2 speed command > 0.

4: Oil return operation output

·It is turned ON at oil return operation in cooling or at oil return operation in heating, or at defrost operation in heating.

5: When HP is relatively high

·Signal is output in order to operate a sprinkler system for cooling down the outdoor heat exchanger.

It is turned ON, when high pressure > 3.3MPa in cooling mode

If once starting operation of sprinkler system, it shall be kept operation for 30sec at least.

(8) Pump down control for replacement (Master unit/slave unit)

This control is for recovering refrigerant to outdoor unit quickly in case of replacement or relocation of the outdoor unit.

- (a) This control is performed from the master unit side. It cannot be controlled from the slave unit side. If this control is attempted from the slave unit side, the following codes are displayed on the 7-segment LED of the slave unit.

Code display area	Data display area	Contents of invalid operation
OPE	10	Setting from the slave unit is invalid

Note (1) The display returns to normal if the pump-down control switch is reset.

- (b) Pump down operation can be performed with the operation of 3 dip switches SW5-1(Test run switch), SW5-2 (Test run operation mode) and SW5-3 (Pump down switch)

(c) Pump down procedure

- 1) Shut the liquid side service valve on the outdoor units
- 2) Turn SW5-2 (test run operation mode) ON (cooling)
- 3) Turn SW5-3 (pump down switch) ON
- 4) Turn SW5-1 (test run switch) ON

(d) Ending condition

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

- (i) When the low pressure (LP) is preset value or less, this control ends normally, and indicates followings
 - ① Red LED: Keeps lighting
 - ② Green LED: Keeps flashing
 - ③ 7-segment display: PdE
 - ④ Remote control: Stop
- (ii) Anomalous all stop by the error detection control
- (iii) If the cumulative compressor operation time under pump down control is 15minutes (End control because time is up), this control ends and indicates followings
 - ① Red LED: Stays OFF
 - ② Green LED: Keeps flashing
 - ③ 7-segment display: No display
 - ④ Remote control: Stop
- (iv) When any of setting switch (SW5-1, SW5-2, SW5-3) is turned OFF during pump down control.

(Note) Even if only SW5-3 is turned OFF, it is not recognized as the cooling test run mode and it stops.

(9) Pump-down operation by external input

If an error stop is raised by an external input by refrigerant leaking alarm unit, the pump-down operation is performed at the outdoor unit side in order to prevent the refrigerant from leaking.

They are local arrangements.

- ① Refrigerant leaking alarm unit
- ② Valve to shut liquid pipe
- ③ Valve to shut gas pipe

Valves of ② and ③ should be selected what the pressure loss of refrigerant piping doesn't increase.

(a) Status 1: Pump-down operation

(i) Starting condition

- ① When the external input function is assigned to "0: External operation input" and the external input terminal is open (by refrigerant leaking alarm unit).
- ② If the pump-down control is valid when the error stop is raised by the setting on 7-segment. ([P19] = "1")

(ii) Contents of control

- ① ON is output on CnY, and the liquid service valve is shut down if it is connected on CnY.
- ② The pump-down operation for replacement is performed.

(iii) Ending condition

- ① When starting conditions are lost.
- ② When the pump-down operation has ended.

(b) Status 2: Emergency stop operation

(i) Starting condition

- ① When the pump-down operation has ended in the status 1.

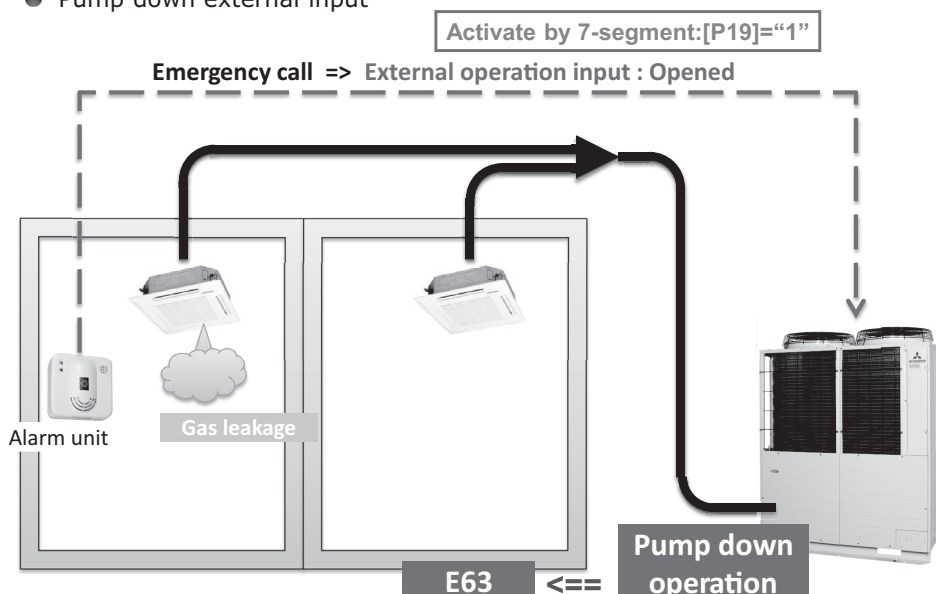
(ii) Contents of control

- ① ON is output to CnZ1, and the gas service valve is shut down if it is connected on CnZ1.
- ② Operation stops with the error full stop. ([E63] is displayed.)

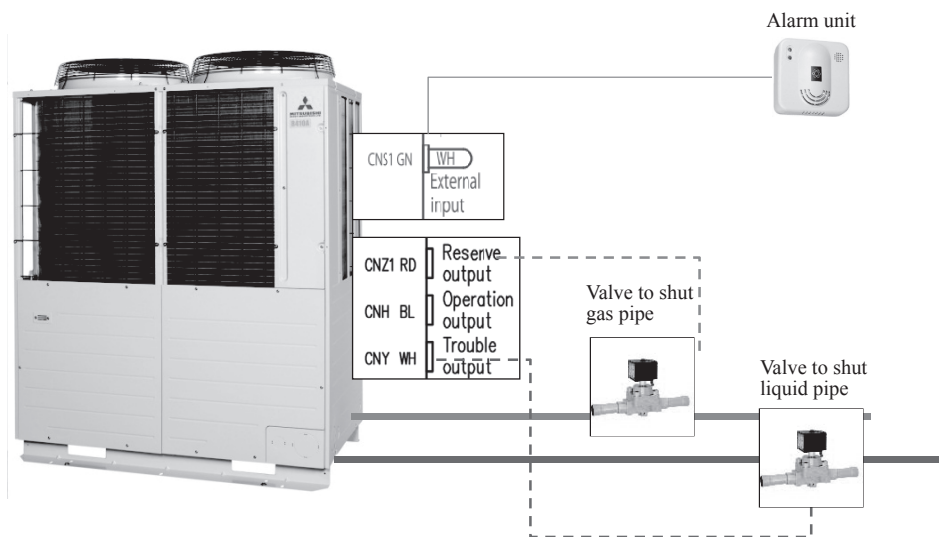
(iii) Ending condition

- ① When starting conditions for the status 1 are lost.
- ② State of error continues for 3 minutes after the error full stop. It cannot be reset in this condition from the remote control. If the starting conditions for Status 1 are not yet established later, this can be reset by the remote control inspection reset.

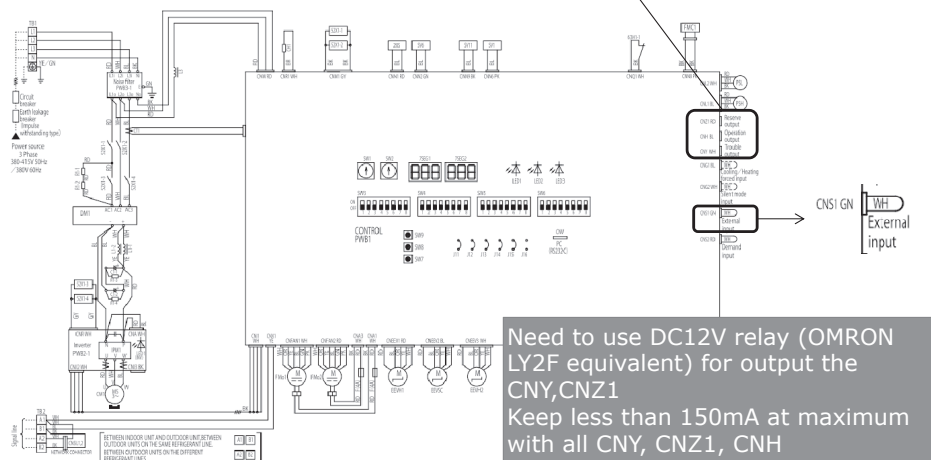
● Pump down external input



● Sample of system configuration



Output for valve to shut liquid pipe : CNY
 Wiring part no. PCZ006A051A
 Output for valve to shut gas pipe : CNZ1
 Wiring part no. PCZ006A051B



(10) VTCC : Variable temperature and capacity control (VRF inverter Multi-system energy save control)

On the Multi-system, target pressures are set uniformly so that indoor units operate with a constant capacity and repeat the ON/OFF control with which thermostats are turned OFF when temperatures become near the setting temperature.

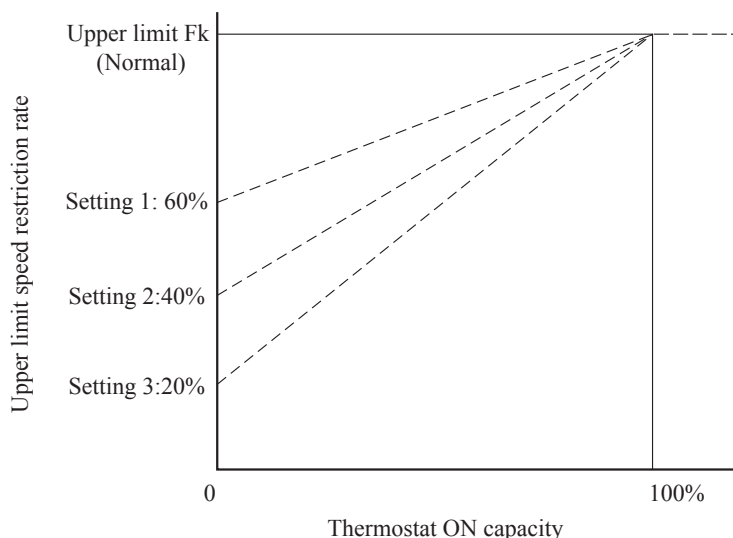
Owing to the tuning of target high/low pressure near the setting temperature, it becomes possible to perform the high efficiency operation near the setting temperature.

For this reason, duration of time for highly efficient operation is increased by providing the compressor upper limit speed according to the thermostat ON capacity.

- Thermostat ON capacity ... Total capacity of indoor units which are operating with the thermostat ON

- (a) Correction of target high/low pressure
- (i) Starting condition (either of ① or ②)
- ① When the external input function assignment [P07] - [P10]: Multi-system energy save control = Valid
 - ② When 7-segment [P69] (Multi-system energy save control I) = ON, if the external input function assignment [P07] - [P10] is not assigned this control.
- (ii) Contents of control
- ① During the outdoor unit operation mode at cooling
 - Indoor load more than 50% → Corrected to the target cooling low pressure lower.
 - Indoor load less than 50% → Corrected to the target cooling low pressure higher.
 - ② During the outdoor unit operation mode at heating
 - Indoor load more than 50% → Corrected to the target heating high pressure higher.
 - Indoor load less than 50% → Corrected to the target heating high pressure lower.
- (Note) Indoor load condition (%) = $\frac{\text{(Total capacity of indoor units of which load is high)}}{\text{Total capacity of indoor units with the thermostat ON}}$
- (iii) Ending condition
- ① When the starting conditions are lost.

- (b) Compressor upper limit speed restriction for each operation capacity
- (i) Starting condition (either of ① or ②)
- ① When the external input assignment [P07] – [P10]: Multi-system energy save operation = Valid and 7-segment [P16] (Multi-system energy save control II) = 1 or 2 or 3
 Factory default: 0 (OFF)/1 (Setting 1), 2 (Setting 2), 3 (Setting 3)
 - ② 7-segment [P16] = 1 or 2 or 3, if the external input function assignment [P07] – [P10] is not assigned this control.
- (ii) Contents of control
- ① Compressor upper limit speed is the value obtained by multiplying with the upper limit speed restriction rate according to the thermostat ON capacity.
 - ② The upper limit restriction rate is divided to the following 3 steps according to each setting of [P16] as follows.



- ③ Following controls supersede this control.
 - 4-way valve safeguard
 - Oil return operation
 - Pump-down operation for replacement
 - Defrost operation
 - Oil equalized operation
 - Start/Stop pump-down operation
- (iii) Ending condition
- ① When the starting conditions are lost.

(C) Data output**(1) 7-segment display and operation data retention****(a) 7-segment display**

The 7-segment LED displays operation information such as input data to the microcomputer, contents of outdoor unit control, registered data of indoor units, or other, which assist to identify causes of troubles encountered during the operation data check at testrun or during servicing.

- (i) Operation information display
 - 1) Each item is displayed on the 7-segment display (3-digit×2) on the outdoor control PCB.
 - 2) Use following buttons to control the display.
 - SW9: The button to set the ten's place of code display
 - SW8: The button to set the one's place of code display
 - SW7: Data delete/write button
 - 3) Press SW9 to select the ten's place, or SW8 to select the one's place, for the code No. of each item.

Following alphabets identify the code display sections.

“C”: [C00] – [C99]

“P”: [P00] – [P99]
 - 4) Code No. [C96] allows deleting contents of retained operation data (data for 30 minutes before the error stop) by the following reset operation.

<Reset operation>

 - a) Select the code No. [C96]. If any error data is retained, the data display [dEL] is displayed.
 - b) Pressing SW7 for 3 seconds deletes the RAM memory data.

(EEPROM data are not deleted.)
 - c) As the data is deleted, [- - -] is displayed on the data display.

[- - -] is displayed also when no error data is retained.
 - d) Data are retained unless it is reset. If normal operation is resumed without resetting the data and the error stop occurs again, therefore, new data is not retained but the initial error data is retained.
 - 5) SW8 (order of 1) displays in the order of $0 \Rightarrow 1 \Rightarrow 2 \dots 9 \Rightarrow 0$.
 - 6) Pressing SW9 (order of 10) makes it jump to the leading code of each order of 10.

The data display [CXX] and the setting value display [PXX] are taken to be continued.

Example) Pressing SW9 for the code 07 displays the code 10.

Pressing SW9 for [C90] displays [P00].
 - 7) Code No. [C44] or [C45] allows deleting (resetting) the accumulated operation time of compressor, which corresponds to the code No., with the following resetting operation. (Operation time reset after replacing the compressor)

<Reset operation>

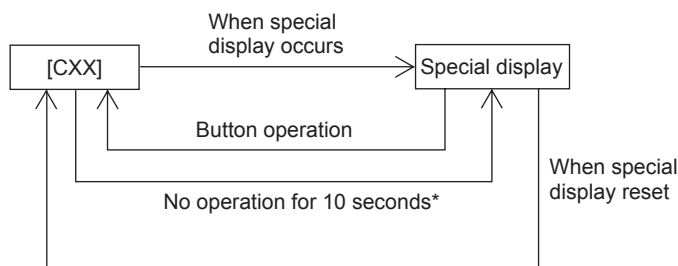
 - a) Select the code No. [C44] or [C45]. Accumulated operation time of compressor till now are displayed alternately as the data display.
 - b) Pressing SW7 for 3 seconds deletes the memory data.

Accumulated operation time of compressor in the 30-minute log data for the operation data retained before the deletion, however, is not deleted.
 - 8) The data display section of spare items is skipped.
- (ii) When temperatures below -10.0°C are displayed for the discharge pressure saturation temperature or suction pressure saturation temperature, the figure after the decimal point is rounded off.

(Because the range of 7-segment display is 3 digits.)
- (iii) The error No. display after an error is returned to normal display by turning the dipswitch SW3-1 to ON.
- (iv) Priority order of display
 - 1) [EXX] > [Related to check operation [CHJ] > [(CHU)]] > [PdS] > PdE > [oPE-X] > [CXX], [PXX]
 - 2) If the state is released from the display of 1) above, it changes to the auto display.
 - 3) Pressing SW8 or SW9 from the display of 1) above changes the display to [C00].

If there is no switch input as above for 10 seconds, it is displayed in the priority order of 1).
 - 4) Display change

Special displays are other than CXX and PXX.



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

< Individual definition of display contents >

[C49] Sub-cooling degree at cooling mode

- = High pressure saturated temperature (°C) detected with high pressure sensor (PHS)
- Sub-cooling coil temperature (°C) detected with sub-cooling temperature thermistor (Tho-SC)

During heating mode this data might be unreliable as sub-cooling degree, but the result is displayed as it is.

[C50] Suction superheat degree

- = Suction pipe temperature (°C) detected with suction pipe temperature thermistor (Tho-S)
- Low pressure saturated temperature (°C) detected with low pressure sensor (PLS)

[C51] Superheat degree of sub-cooling coil

- = Sub-cooling coil temperature (°C) detected with sub-cooling coil temperature thermistor (Tho-H)
- Low pressure saturated temperature (°C) detected with low pressure sensor (PLS)

[C52] Superheat degree of under-dome

- = Under-dome temperature (°C) detected with under-dome temperature thermistor (Tho-C)
- Low pressure saturated temperature (°C) detected with low pressure sensor (PLS)

< Operation information >
 (There is no CM2 in this series)

Code No.	Contents of display	Data display range	Minimum unit	Remarks
Unusual code	[EXX]			
Warning code	[oPX][oPE-X]			
Special code	[PdS][PdE] [CH][CHF][CO][HE][PCL][dLP]			
< Information for sensor or actuator value >				
C00	CM1 operating frequency	0 - 130	1Hz	
C01	CM2 operating frequency	0 - 130	1Hz	
C02	Tho-A Outdoor air temperature	L,-25 - 70	1°C	
C03	Tho-R1 Heat exchanger temperature 1 (Exit. Front)	L,-40 - 75	1°C	
C04	Tho-R2 Heat exchanger temperature 2 (Exit. Rear)	L,-40 - 75	1°C	
C05	Tho-R3 Heat exchanger temperature 3 (Entrance. Front)	L,-40 - 75	1°C	
C06	Tho-R4 Heat exchanger temperature 4 (Entrance. Rear)	L,-40 - 75	1°C	
C07	Tho-D1 Discharge pipe temperature (CM1)	L,-20 - 140	1°C	
C08	Tho-D2 Discharge pipe temperature (CM2)	L,-20 - 140	1°C	
C10	Tho-C1 Under-dome temperature (CM1)	L,-30 - 90	1°C	
C11	Tho-C2 Under-dome temperature (CM2)	L,-30 - 90	1°C	
C12	Tho-P1 Power transistor temperature (CM1)	L,-20 - 140	1°C	
C13	Tho-P2 Power transistor temperature (CM2)	L,-20 - 140	1°C	
C14	Tho-SC Sub-cooling coil temperature1	L,-40 - 75	1°C	
C15	Tho-SC Sub-cooling coil temperature2	L,-40 - 75	1°C	
C16	Tho-S Suction pipe temperature	L,-40 - 75	1°C	
C18	CT1 Current (CM1)	0 - 50	1A	
C19	CT2 Current (CM2)	0 - 50	1A	
C20	EEVH1 Heating expansion valve opening angle	0 - 500	1 Pulse	
C21	EEVH2 Heating expansion valve opening angle	0 - 500	1 Pulse	
C22	Opening angle of EEVSC Sub-cooling coil expansion valve	0 - 500	1 Pulse	
C23	FM01 Number of rotations	0 - 999	10 min ⁻¹	
C24	FM02 Number of rotations	0 - 999	10 min ⁻¹	
C25	PSH High pressure sensor	0 - 4.15	0.01MPa	
C26	PSL Low pressure sensor	0 - 1.70	0.01MPa	
C30	High pressure switch	0,1	-	Order of 100 : 63H1-1, 2 Order of 10 : 63H1-R Order of 1 : Spare (0: Close, 1: Open)

Code No.	Contents of display	Data display range	Minimum unit	Remarks
C31	External input	0,1	–	Order of 100 : CNS1 Order of 10 : CNS2 Order of 1 : CNG1 (0: Close, 1: Open)
C32	External input / output of relay	0,1	–	Order of 100 : CNG2 Order of 10 : SV8 Order of 1 : SV10 (0: Close, 1: Open)
C33	Output of relay	0,1	–	Order of 100 : 52C1 Order of 10 : 52C2 Order of 1 : CH1 (0: Close, 1: Open)
C34	Output of relay	0,1	–	Order of 100 : CH2 Order of 10 : 20S Order of 1 : 20SL (0: Close, 1: Open)
C35	Output of relay	0,1	–	Order of 100 : FMC1,2 Order of 10 : Spare Order of 1 : Spare (0: Close, 1: Open)
C36	Output of relay	0,1	–	Order of 100 : SV1 Order of 10 : SV2 Order of 1 : SV3 (0: Close, 1: Open)
C37	Output of relay	0,1	–	Order of 100 : SV4 Order of 10 : SV6 Order of 1 : SV7 (0: Close, 1: open)
C38	Output of relay	0,1	–	Order of 100 : SV11 Order of 10 : Spare Order of 1 : 52X3 (0: Close, 1: Open)
C39	External output	0,1	–	Order of 100 : CNZ1(External output) Order of 10 : CNH(Operation output) Order of 1 : CNY(Error output) (0: Close, 1: Open)
<Information for outdoor unit>				
C40	Number of connected indoor unit	0-80	1	
C41	Capacity of connected indoor unit	0-999	1%	
C42	Number of operation indoor unit	0-50	1	
C43	Required Fk total	0-999	1Hz	
C44	Compressor cumulative operating time (CM1)	0-655	100h	
C45	Compressor cumulative operating time (CM2)	0-655	100h	
C46	Discharge pressure saturation temperature	-50-70	0.1°C	Minimum unit 1°C at -10°C or lower
C47	Suction pressure saturation temperature	-50-30	0.1°C	Minimum unit 1°C at -10°C or lower
C48	Tho-SC1 saturated pressure	-0.68-4.15	0.01MPa	
C49	Cooling operation subcooling	0-50	0.1deg	
C50	Superheat	0-50	0.1deg	
C51	Superheat of subcooling coil	0-50	0.1deg	
C52	Tho-C1 Superheat	0-50	0.1deg	
C53	Tho-C2 Superheat	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 operating frequency command	0-130	1Hz	
C58	Inverter 2 operating frequency command	0-180	1Hz	

Code No.	Contents of display	Data display range	Minimum unit	Remarks
C59	FMo1 operating revolution command	0-999	10min ⁻¹	
C60	FMo2 operating revolution command	0-999	10min ⁻¹	
C61	Demand ratio	0-100	1%	
<Control status>				
C65	Outdoor operating mode pattern	0-127	1	
C66	Control status	0-127	1	See table on page 92.
C67	Protection control status	0-127	1	See table on page 93.
C68	Compressor stop causes	0-127	1	See table on page 93.
C69	Time elapsed after compressor stop cause	0-255	1h	
C70	Protection control causes 1	0-127	1	Displays No. of the protection control of which effect is the strongest among those occurred from the start of operation after the power on.
C71	Protection control causes 2	0-127	1	Displays No. of the protection control of which effect is stronger secondly among those occurred from the start of operation after the power on.
C72	Protection control causes 3	0-127	1	Displays No. of the protection control of which effect is stronger thirdly among those occurred from the start of operation after the power on.
C73	Compressor error causes 1	0-127	1	Displays No. of the error detection of which effect is the strongest among those occurred from the start of operation after the power on.
C74	Compressor error causes 2	0-127	1	Displays No. of the error detection of which effect is stronger secondly among those occurred from the start of operation after the power on.
C75	Compressor error causes 3	0-127	1	Displays No. of the error detection of which effect is stronger thirdly among those occurred from the start of operation after the power on.
C80	Counter · Current cut (CM1)	0-255	1	EEPROM memory. Resettable.
C81	Counter · Current cut 1(CM2)	0-255	1	EEPROM memory. Resettable.
C82	Counter · Power transistor overheat 1 (CM1)	0-255	1	EEPROM memory. Resettable.
C83	Counter · Power transistor overheat 2 (CM2)	0-255	1	EEPROM memory. Resettable.
C84	Counter · Compressor startup failure (CM1)	0-255	1	EEPROM memory. Resettable.
C85	Counter · Compressor startup failure (CM2)	0-255	1	EEPROM memory. Resettable.
C86	Counter · Anomalous compressor by loss of synchronism (CM1)	0-255	1	EEPROM memory. Resettable.
C87	Counter · Anomalous compressor by loss of synchronism (CM2)	0-255	1	EEPROM memory. Resettable.
C88	Counter · Communication error between inverter PCB and outdoor control (CM1)	0-255	1	EEPROM memory. Resettable.
C89	Counter · Communication error between inverter PCB and outdoor control (CM2)	0-255	1	EEPROM memory. Resettable.
C90	Counter · Anomalous FMo1	0-255	1	EEPROM memory. Resettable.
C91	Counter · Anomalous FMo2	0-255	1	EEPROM memory. Resettable.
C92	Counter · Indoor-outdoor communications error	0-255	—	EEPROM memory. Resettable.
C93	Counter · CPU reset	0-255	—	EEPROM memory. Resettable.

Code No.	Contents of display	Data display range	Minimum unit	Remarks
C94	Auto back up capable time	0 - 80	1h	
< The other >				
C96	Data reset	—	—	
C97	Program sub-version	000 - 991	—	
C98	Program POL version	0.00 - 9.99	0.01	
C99	Auto send display	—	—	
< User setting >				
P01	Switching to operation priority	<u>0: (Factory default)</u> 0, 1, 2, 3	1	0: First push priority 1: Last push priority 2: Director mode 3: Operation mode capacity priority
P02	Outdoor fan snow protection control	<u>0: (Factory default)</u> 0, 1	—	0: Invalid 1: Valid
P03	Outdoor fan snow protection control ON time setting	<u>30: (Factory default)</u> 10,30-600(sec)	30	Changes to 10, 30, 60, 90 ... 600.
P04	Many steps demand setting (1st step demand)	<u>80: (Factory default)</u> 0,40,60,80	—	
P05	Silent mode setting	<u>0: (Factory default)</u> 0 - 9	1	
P06	CNZ1 function assignment	<u>0: (Factory default)</u> 0 - 9	1	
P07	CNS1 function assignment	0 - 12	1	0: External operation input 1: Demand input 2: Cooling/heating forced operation input 3: Silent mode input 1 4: —
P08	CNS2 function assignment	0 - 12	1	5: Outdoor fan snow protection control input 6: Test run external input 1 (SW5-1 equivalent) 7: Test run external input 2 (SW5-2 equivalent) 8: Silent mode input 2
P09	CNG1 function assignment	0 - 12	1	10: AF periodic inspection display 11: AF error display
P10	CNG2 function assignment	0 - 12	1	12: Building multi energy save control 9, 13 - 20:Spare
P11	Switching to heating air outlet temperature save priority	<u>0: (Factory default)</u> 0, 1	—	0: Heating air outlet temperature save control invalid (Factory default) 1: Heating air outlet temperature save control valid
P12	Capacity ratio of thermostat ON admission for heating air outlet temperature save	<u>110: (Factory default)</u> 110,100,090,080	—	
P13	Number of thermostat ON indemnification for heating air outlet temperature save	<u>0: (Factory default)</u> 0 - 9	1	
P14	Many steps demand setting. (2nd step demand)	<u>60: (Factory default)</u> 0,40,60,80	—	
P15	Many steps demand setting. (3rd step demand)	<u>40: (Factory default)</u> 0,40,60,80	—	
P16	Multi-system energy save control II	<u>0: (Factory default)</u> 0, 1, 2, 3	1	
P17	After changing mode from operation prohibition mode	<u>0: (Factory default)</u> 0, 1	1	
P18	Mode unmatched indoor unit setting in forced mode	<u>0: (Factory default)</u> 0, 1	1	
P19	Pump-down operation by external input	<u>0: (Factory default)</u> 0, 1	1	

Code No.	Contents of display	Data display range	Minimum unit	Remarks
<New Superlink setting>				
P30	Superlink communication status	0, 1	—	0: Current Superlink 1: New Superlink
P31	Start automatic address setting	0: (Factory default) 0, 1	—	0: Automatic address setting standby 1: Automatic address setting start
P32	Input stating indoor address	0: (Factory default) 1 - 127	1	Specify the starting indoor address connected in one refrigerant system for automatic address setting.
P33	Input the number of connected indoor units	24: (Factory default) 1 - 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 definition	0: (Factory default) 0, 1	—	0: Network polarity not defined 1: Network polarity defined
P69	Multi-system energy save control I	0: (Factory default) 0, 1	1	0: Invalid 1: Valid
AUX	Auto address setting on			
AUE	Indoor unit address No. assignment normal ending			
A01	Indoor unit address No. assignment error 1			
A02	Indoor unit address No. assignment error 2			
A03	Indoor unit address No. assignment error 3			
A04	Superlink setting error			

[C66] Control status**<Definition of signal>**

Shows the status of control in operation currently.

If two or more controls among the following protection controls are established simultaneously, No. of the control of which number is larger is displayed.

	Protection control status	Number
Ordinary control	Remote control all stop	0
	Ordinary cooling control	1
	Ordinary heating control	2
Operating control	Pump down control at start/stop	10
	Indoor heat exchanger refrigerant purge control	11
	Outdoor heat exchanger refrigerant purge control	12
	Oil return control	13
	Defrost control	14
	Oil equalization rotation control	15
	Oil equalization control	16
Special control	Test run control	20
	Pump down control for replacement	21
	Demand control	22
	Silent mode control	23
	Capacity measurement mode control	24
	Outdoor air intake unit control	25
	Low outdoor temperature control	26
	Cooling unusual low pressure return control	27
Compressor dilution protection control	28	

[C67] Protection control status**<Definition of signal>**

Shows the status of protection control in operation currently.

If two or more controls among the following protection controls are established simultaneously, No. of the control of which number is larger is displayed.

	Protection control status	Number
Ordinary control	No operation of protective control	0
Protection control	During high pressure (HP)	1
	Spare	2
	During low pressure (LP)	3
	During discharge pipe temperature (Td)	4
	During compressor ratio protective	5
	During under-dome temperature (Tc)	6
	During current safe (CS)	7
	During power transistor temperature (PT)	8

[C68] Compressor stop causes**<Definition of signal>**

Shows the latest compressor stop cause counted from right now.

(Excluding the ordinary stop, etc.)

Output of the No. is retained till next compressor stop cause occurs.

	Compressor stop causes	Number
	No history	0
Sensor wire breakage	Tho-A	1
	Tho-R1	2
	Tho-R2	3
	Tho-R3	4
	Tho-R4	5
	Tho-D1	6
	Tho-D2	7
	Tho-SC	8
	Tho-H	9
	Tho-S	10
	Tho-C1	11
	Tho-C2	12
	Tho-P1	13
	Tho-P2	14
	High pressure sensor	15
	Low pressure sensor	16
System error	High pressure anomaly	20
	Low pressure anomaly	21
	Discharge temperature error (Tho-D1)	22
	Discharge temperature error (Tho-D2)	23
	Liquid flooding anomaly (CM1)	24
	Liquid flooding anomaly (CM2)	25
	Spare	26

	Compressor stop causes	Number
Fan • Compressor Communication error	Outdoor DC fan motor anomaly (FMo1)	30
	Outdoor DC fan motor anomaly (FMo2)	31
	Current cut (CM1)	32
	Current cut (CM2)	33
	Power transistor overheat (CM1)	34
	Power transistor overheat (CM2)	35
	Compressor startup failure (CM1)	36
	Compressor startup failure (CM2)	37
	Communication error between inverter PCB and outdoor control (CM1)	38
	Communication error between inverter PCB and outdoor control (CM2)	39
	Anomalous compressor by loss of synchronism (CM1)	40
	Anomalous compressor by loss of synchronism (CM2)	41
	Communication error between the master unit and slave units	42
	Compressor stop by control	Operation mode change
Differential pressure startup prevention control		51
Protect for heating overload		52
Spare		53

(c) Saving of operation data

For the purpose to investigate the cause of trouble in the field, the operation data are always saved in the memory, and if the trouble occurs, the data writing is stopped and the operation data prior to the trouble occurrence are recorded. These data can be retrieved to personal computer through RS232C connector on the outdoor control PCB and utilized for probing the cause.

- (i) Operation data for a period of 15 minutes prior to the present operation are saved and updated sequentially.
- (ii) If an anomalous stop occurs, the data are not updated any more.
- (iii) Data are written in at 2-minute interval and following data will be transmitted to PC upon demand.

Data	Data Range	Example
Software version	Ascii 15 byte	KV1C218##### (#: NULL)
PID (program ID)	Ascii 2 byte	5D
Outdoor unit capacity	Ascii 3 byte	As shown in table at right
Power source frequency	Ascii 2 byte	60
Outdoor address	Ascii 2 byte	00 – 3F
Indoor address × 16 units	Ascii 2 byte × 16 units	40 – 7F
Indoor capacity × 16 units	Ascii 3 byte × 16 units	022 – 280

Outdoor unit capacity data	Outdoor unit capacity data	Remarks
Single type	Example: 12HP - [S12]	S: Display with Horse Power of single type or single use of combination type
Master unit of combination type	Example: 24HP - [S24]	S: Display with Horse Power of master unit of combination type
Slave unit of combination type	Example: 12HP - [C12]	C: Display with Horse Power of slave unit of combination type

- (iv) Error retention and monitoring data

< Indoor unit indicate data >

Code No.	Write-in contents	Record data				
		Data write-in range	Write-in unit	Number of bytes	Contents	
00	Indoor unit 1 ThI-A	-10-52	1°C	1	Air inlet temperature	
01	Indoor unit 1 ThI-R1	-19-71	1°C	1	Heat exchanger temperature 1	
02	Indoor unit 1 ThI-R2	-19-71	1°C	1	Heat exchanger temperature 2	
03	Indoor unit 1 ThI-R3	-19-71	1°C	1	Heat exchanger temperature 3	
04	Indoor unit 1 EEV	0-470	1 pulse	2		
05	Indoor unit I setting temperature	0-127	0.5°C	1	05H command	
06	Indoor unit I Operation mode/Air capacity	0-500	-	2	0	Not used (Data not received)
					100	Dehumidifying stop 0-speed
					110	Dehumidifying operation 0-speed
					111	Dehumidifying operation 1-speed
					112	Dehumidifying operation 2-speed
					113	Dehumidifying operation 3-speed
					114	Dehumidifying operation 4-speed
					115	Dehumidifying operation 5-speed
					116	Dehumidifying operation 6-speed
					200	Cooling stop 0-speed
					210	Cooling operation 0-speed
					211	Cooling operation 1-speed
					212	Cooling operation 2-speed
					213	Cooling operation 3-speed
					214	Cooling operation 4-speed
					215	Cooling operation 5-speed
					216	Cooling operation 6-speed
					300	Fan stop 0-speed
					310	Fan operation 0-speed
					311	Fan operation 1-speed
312	Fan operation 2-speed					
313	Fan operation 3-speed					
314	Fan operation 4-speed					
315	Fan operation 5-speed					
316	Fan operation 6-speed					
400	Heating stop 0-speed					
410	Heating operation 0-speed					

Code No.	Write-in contents	Record data			
		Data write-in range	Write-in unit	Number of bytes	Contents
					411 Heating operation 1-speed 412 Heating operation 2-speed 413 Heating operation 3-speed 414 Heating operation 4-speed 415 Heating operation 5-speed 416 Heating operation 6-speed
07	Indoor unit 1 Demand frequency	0-255	1 Hz	1	
08	Indoor unit 1 Answer frequency	0-255	1 Hz	1	
09	Indoor unit 1 Indoor local	—	—	1	Bit0 Anti-frost
					Bit1 Aperture command ON
10	Indoor unit 1 Thi spare	-10-52	1°C	1	Air outlet temperature
11	Indoor unit 1 Model	0-85	—	1	0 FDT
					1 FDK
					2 other
					3 FDE
					4 FDTC
					5 Outdoor air intake unit
					6 Spacious area
					7 Outdoor air treatment
12	Indoor unit 1 PID	—	—	1	
Data contents for indoor 2 to 16 are same as above.					

<Outdoor unit indicate data>

Code No.	Write-in contents	Record data			
		Data write-in range	Write-in unit	Number of bytes	Contents
00	Anomalous code	00-99	—	1	00: No anomalous, outdoor unit all anomalous
01	Address of unit where trouble occurred	00-FF	—	1	00-3F: Outdoor unit side, 40-6F: Indoor unit side
<Thermistor mesurement value>					
02	Tho-A Outdoor air temperature	-25-70	0.01°C	2	
03	Tho-R1 Heat exchanger temperature 1	-40-75	0.01°C	2	
04	Tho-R2 Heat exchanger temperature 2	-40-75	0.01°C	2	
05	Tho-R3 Heat exchanger temperature 3	-40-75	0.01°C	2	
06	Tho-R4 Heat exchanger temperature 4	-40-75	0.01°C	2	
07	Tho-D1 Discharge pipe temperature (CM1)	-20-140	0.01°C	2	
08	Tho-D2 Discharge pipe temperature (CM2)	-20-140	0.01°C	2	
09	Tho-C1 Under-dome temperature (CM1)	-30-90	0.01°C	2	
10	Tho-C2 Under-dome temperature (CM2)	-30-90	0.01°C	2	
11	Tho-P1 Power transistor temperature (Heat dissipation fin)	-20-140	0.01°C	2	
12	Tho-P2 Power transistor temperature (Heat dissipation fin)	-20-140	0.01°C	2	
13	Tho-S Suction pipe temperature	-40-75	0.01°C	2	
14	Tho-SC Subcooling coil temperature 1	-40-75	0.01°C	2	

Code No.	Write-in contents	Record data				
		Data write-in range	Write-in unit	Number of bytes	Contents	
15	Tho-H Sub cooling coil temperature 2	-40-75	0.01℃	2		
16	Injection suction pipe temperature 1 (spare)	-40-75	0.01℃	2		
17	Receiver liquid surface detection temperature 1	-40-75	0.01℃	2		
18	CT1 Current	0-50	0.01A	2		
19	CT2 Current	0-50	0.01A	2		
20	Inverter secondary current 1	0-50	0.01A	2		
21	Inverter secondary current 2	0-50	0.01A	2		
22	High pressure sensor	0.00-4.15	0.001MPa	2		
23	Low pressure sensor	0.00-1.70	0.001MPa	2		
24	Liquid pipe pressure sensor	0.00-4.15	0.001MPa	2		
<Information for outdoor unit>						
25	Indoor unit connection number	0-127	1 unit	1		
26	Indoor unit connection capacity	0-65535	—	2		
27	Indoor unit thermostat ON number	0-255	1 unit	1		
28	Indoor unit cooling thermostat ON capacity	0-65535	—	2		
29	Indoor unit heating thermostat ON capacity	0-65535	—	2		
30	Operation mode	0-2	—	1	0	Stop
					1	Cooling
					2	Heating
31	Outdoor unit operation pattern	0-255	1	1	Real range is 1-17	
32	CM1 frequency	0-255	1Hz	1		
33	CM2 frequency	0-255	1Hz	1		
34	FM01 Number of rotations	0-2550	10 min ⁻¹	1		
35	FM02 Number of rotations	0-2550	10 min ⁻¹	1		
36	Required Hz total	0-65535	1Hz	2		
37	Discharge pressure saturation temperature	-50-70	0.01℃	2		
38	Intake pressure saturation temperature	-50-30	0.01℃	2		
39	Pressure ratio	1.0-10.0	0.1	1		
40	Cooling operation subcooling	0-25.5	0.1deg	1		
41	Super heat of suction pipe	0-25.5	0.1deg	1		
42	Super heat of subcooling coil	0-25.5	0.1deg	1		

Code No.	Write-in contents	Record data					
		Data write-in range	Write-in unit	Number of bytes	Contents		
43	Under-dome superheat CM1	0-25.5	0.1deg	1			
44	Under-dome superheat CM2	0-25.5	0.1deg	1			
45	Target FK	0-65535	1Hz	2			
46	Inverter CM1 operation frequency	0-255	1Hz	1			
47	Inverter CM2 operation frequency	0-255	1Hz	1			
48	FMo1 rotation command	0-2550	10 min ⁻¹	1			
49	FMo2 rotation command	0-2550	10 min ⁻¹	1			
50	EEVH1 opening angle	0-65535	1pulse	2			
51	EEVH2 opening angle	0-65535	1pulse	2			
52	EEVSC opening angle	0-65535	1pulse	2			
53	EEVD opening angle	0-65535	1pulse	2	(Spare)		
54	Target cooling low pressure of compressor	0.00-2.00	0.01MPa	1			
55	Target heating high pressure of compressor	0.00-4.15	0.01MPa	2			
56	Target differential temperature of heating CSST	0-127	1°C	1	Real range is 5-30 deg		
57	Learning primary opening angle of outdoor unit EEVH	0-255	1pulse	1			
58	Target superheat of outdoor unit EEVSC	0-25.5	0.1deg	1			
59	Count of refrigerant oil reduction (CM1)	0-2550	10cc	1	Real range is 0-1100cc		
60	Count of refrigerant oil reduction (CM2)	0-2550	10cc	1	Real range is 0-1100cc		
61	Countdown of refrigerant oil return	0-255	3minutes	1	Real range is 0-600 minutes		
<Output of PCB hardware>							
62	Output of relay	—	—	1	Bit0	52C1	0: OFF, 1: ON
					Bit1	52C2	0: OFF, 1: ON
					Bit2	CH1	0: OFF, 1: ON
					Bit3	CH2	0: OFF, 1: ON
					Bit4	20S	0: OFF, 1: ON
					Bit5	20SL	0: OFF, 1: ON
					Bit6	FMC1,2	0: OFF, 1: ON
					Bit7	FMC3	0: OFF, 1: ON
63	Output of relay	—	—	1	Bit0	SV1	0: OFF, 1: ON
					Bit1	SV2	0: OFF, 1: ON
					Bit2	SV4	0: OFF, 1: ON
					Bit3	SV6	0: OFF, 1: ON
					Bit4	SV7	0: OFF, 1: ON
					Bit5	SV8	0: OFF, 1: ON
					Bit6	SV10	0: OFF, 1: ON
					Bit7	SV11	0: OFF, 1: ON
64	Output of relay	—	—	1	Bit0	SV12	0: OFF, 1: ON
					Bit1	52X3	0: OFF, 1: ON
					Bit2	SV3	0: OFF, 1: ON
					Bit3	Spare	0: OFF, 1: ON
					Bit4	Spare	0: OFF, 1: ON
					Bit5	CNZ1	0: OFF, 1: ON
					Bit6	CnH	0: OFF, 1: ON
					Bit7	CnY	0: OFF, 1: ON
65	Compressor 1 cumulative operating time (estimate)	0-65535	1h	2			

Code No.	Write-in contents	Record data			
		Data write-in range	Write-in unit	Number of bytes	Contents
66	Compressor 2 cumulative operating time (estimate)	0-65535	1h	2	
67	Compressor 1 start times	0-65535	20 times	2	
68	Compressor 2 start times	0-65535	20 times	2	
69	Control status CM1 3-minute delay timer	0-180	1 second	1	
70	Control status CM2 3-minute delay timer	0-180	1 second	1	
71	CH compressor protection timer (count down)	0-360	2 minutes	1	
72	Control status CH compressor protective start	0-15	—	1	15 Protective start end
					0-14 During protective start
73	Control status Oil equalization	0-127	—	1	0 None
					1 Oil equalized rotation
					10 Oil equalized operation 1
					20 Oil equalized operation 2
					30 Oil equalized operation 3
					41 Oil equalized operation 4-1
					42 Oil equalized operation 4-2
					51 Oil equalized operation 5-1
					52 Oil equalized operation 5-2
					61 Oil equalized operation 6-1
					62 Oil equalized operation 6-2
					71 Oil equalized operation 7-1
					72 Oil equalized operation 7-2
					81 Oil equalized operation 8-1
82 Oil equalized operation 8-2					
91 Oil equalized operation 9-1					
74	Control status Oil return	0-2	—	1	0 None
					1 Oil return (cooling)
					2 Oil return (gas cycle)
75	Control status Defrost kinds + defrost status	0-127	—	1	0 None
					11 Thermal condition defrost status 1
					12 Thermal condition defrost status 2
					13 Thermal condition defrost status 3
					14 Thermal condition defrost status 4
					21 Strength type thermal condition defrost status 1
					22 Strength type thermal condition defrost status 2
					23 Strength type thermal condition defrost status 3
					24 Strength type thermal condition defrost status 4
					31 Time condition defrost status 1
					32 Time condition defrost status 2
					33 Time condition defrost status 3
					34 Time condition defrost status 4
					76
1 Compressor OFF					
2 For 70 seconds after compressor ON					
3 After 70 to 180 seconds after compressor ON					
4 After 180 to 195 seconds after compressor ON					
77	Control status 1	—	—	1	Bit0 Superlink communication state 0: SL I (old SL) 1: SL II (new SL)
					Bit1 In trial operation control 0: Normal 1: Practice
					Bit2 In demand control 0: Normal 1: Practice
					Bit3 Silent mode 0: Normal 1: Practice
					Bit4 Spare 0: Normal 1: Practice
					Bit5 In outdoor air intake unit control 0: Normal 1: Practice
					Bit6 In outdoor air intake unit control 0: Normal 1: Practice
					Bit7 In pump-down control at Start/Stop 0: Normal 1: Practice
78	Control status 2	—	—	1	Bit0 In low outdoor temperature control 0: Normal 1: Practice
					Bit1 In for replacement pump-down control 0: Normal 1: Practice
					Bit2 Compressor dilution protection 0: Normal 1: Practice
					Bit3 Outdoor heat exchanger refrigerant purge 0: Normal 1: Practice
					Bit4 Indoor heat exchanger refrigerant purge 0: Normal 1: Practice
					Bit5 Spare 0: Normal 1: Practice

Code No.	Write-in contents	Record data					
		Data write-in range	Write-in unit	Number of bytes	Contents		
					Bit6	Spare	0: Normal 1: Practice
					Bit7	Spare	0: Normal 1: Practice
79	Control status 3	—	—	1	Bit0	Auto backup operation	0: Normal 1: Practice
					Bit1	Spare	0: Count 1: Count up
					Bit2	Spare	0: Count 1: Count up
					Bit3	Spare	0: Count 1: Count up
					Bit4	Spare	0: Count 1: Count up
					Bit5	Spare	0: Count 1: Count up
					Bit6	Spare	0: Count 1: Count up
					Bit7	Spare	0: Count 1: Count up
81	Backup cumulative time	0-127	1 hour	1			
82	Check operation status	0-7	—	1	0	Normal	
					1	Insufficient check operation start condition	
					2	Check operation warm-up	
					3	Check operation ON	
					4	Check operation stop	
					5	Service valve is closed	
					6	Indoor unit abnormal	
					7	Normal ending of check operation	
83	Spare						
84	Spare						
<Protection control status>							
85	Protection control status 1	—	—	1	Bit0	HP protection 1 Compressor capacity control	0: Normal 1: Practice
					Bit1	HP protection 2 Gas bypass control	0: Normal 1: Practice
					Bit2	HP protection 3 Heating stop indoor unit slight opening control	0: Normal 1: Practice
					Bit3	LP protection 1 Compressor capacity control	0: Normal 1: Practice
					Bit4	LP protection 2 Compressor rising rate control	0: Normal 1: Practice
					Bit5	LP protection 3 Outdoor unit EEV control	0: Normal 1: Practice
					Bit6	LP protection 4 Oil separator SV control	0: Normal 1: Practice
					Bit7	Td protection 1 Compressor capacity control	0: Normal 1: Practice
86	Protection control status 2	—	—	1	Bit0	Td protection 2-1 EEVSC-Td cooling control	0: Normal 1: Practice
					Bit1	Td protection 2-2 EEVH-Td cooling control	0: Normal 1: Practice
					Bit2	Td protection 4 Heating stop indoor unit slight opening control	0: Normal 1: Practice
					Bit3	Td protection 5 Outdoor unit EEV control	0: Normal 1: Practice
					Bit4	CS protection 1 Compressor capacity control	0: Normal 1: Practice
					Bit5	Tc protection 1 Compressor capacity control	0: Normal 1: Practice
					Bit6	Tc protection 2 Gas bypass control	0: Normal 1: Practice
					Bit7	Tc protection 3 CM dilution protection control	0: Normal 1: Practice
87	Protection control status 3	—	—	1	Bit0	CM protection 1 Compressor capacity control	0: Normal 1: Practice
					Bit1	CM protection 2 Outdoor unit EEV control	0: Normal 1: Practice
					Bit2	PT protection 1 Compressor capacity control	0: Normal 1: Practice
					Bit3	PT protection 2 Inverter cooling fan control	0: Normal 1: Practice
					Bit4	Dilution rate protection	0: Normal 1: Practice
					Bit5	Spare	0: Normal 1: Practice
					Bit6	Spare	0: Normal 1: Practice
					Bit7	Spare	0: Normal 1: Practice

Code No.	Write-in contents	Record data			
		Data write-in range	Write-in unit	Number of bytes	Contents
88	Protection control causes 1	0-127	—	1	
89	Protection control causes 2	0-127	—	1	
90	Protection control causes 3	0-127	—	1	
91	Compressor stop causes	0-127	—	1	
92	Compressor stop causes lapse of time	0-255	1h	1	
<Anomaly counter>					
93	Control status High pressure anomaly (63H1) counter	0-5	—	1	
94	Control status Low pressure anomaly (running) counter	0-5	—	1	
95	Control status Low pressure anomaly (starting) counter	0-5	—	1	
96	Control status Low pressure anomaly (stopped) counter	0-5	—	1	
97	Control status Discharge temperature error (Tho-D1) counter	0-5	—	1	
98	Control status Discharge temperature error (Tho-D2) counter	0-5	—	1	
99	Control status Cut off sensor counter	0-3	—	1	
100	Control status Liquid flooding anomaly counter	0-3	—	1	
101	Counter · Current cut (CM1)	0-255	—	1	
102	Counter · Current cut (CM2)	0-255	—	1	
103	Counter · Power transistor overheat (CM1)	0-255	—	1	
104	Counter · Power transistor overheat (CM2)	0-255	—	1	
105	Counter · Compressor startup failure (CM1)	0-255	—	1	
106	Counter · Compressor startup failure (CM2)	0-255	—	1	
107	Counter · Anomalous compressor by loss of synchronism (CM1)	0-255	—	1	
108	Counter · Anomalous compressor by loss of synchronism (CM2)	0-255	—	1	
109	Counter · Communication error between inverter PCB and outdoor control (CM1)	0-255	—	1	
110	Counter · Communication error between inverter PCB and outdoor control (CM2)	0-255	—	1	
111	Counter · Anomalous FMo1	0-255	—	1	
112	Counter · Anomalous FMo2	0-255	—	1	
113	Counter · Indoor-outdoor communications error	0-255	—	1	
114	Counter · CPU reset	0-255	—	1	
115	Compressor error causes 1	0-127	—	1	

Code No.	Write-in contents	Record data					
		Data write-in range	Write-in unit	Number of bytes	Contents		
116	Compressor error causes 2	0-127	—	1			
117	Compressor error causes 3	0-127	—	1			
118	INV 1 information	—	—	1	Version (Initial value FFh)		
119		—	—	1	DIP SW (Initial value FFh)		
120	Spare	—	—	1	Version (Initial value FFh)		
121	Spare	—	—	1	DIP SW (Initial value FFh)		
< Information for indoor unit >							
122	Indoor unit control status 1	—	—	1	Bit0	Indoor unit EEV full open detection control	0: Normal 1: Practice
					Bit1	Indoor unit avoidance of un-heating control	0: Normal 1: Practice
					Bit2	Indoor unit heating stop slight opening control	0: Normal 1: Practice
					Bit3	Indoor unit cooling startup control 1 (normal)	0: Normal 1: Practice
					Bit4	Indoor unit cooling startup control 2 (prevent liquid back)	0: Normal 1: Practice
					Bit5	Indoor unit heating startup control	0: Normal 1: Practice
					Bit6	Indoor unit outlet temp. of heating control assist	0: Normal 1: Practice
					Bit7	Indoor unit refrigerant withdrawing control	0: Normal 1: Practice
123	Indoor unit control status 2	—	—	1	Bit0	Outdoor air intake unit HP protection	0: Normal 1: Practice
					Bit1	Spare	
					Bit2	Indoor unit refrigerant purge control	0: Normal 1: Practice
					Bit3	Spare	
					Bit4	Spare	
					Bit5	Spare	
					Bit6	Spare	
					Bit7	Spare	
< Input of PCB hardware >							
124	External input	—	—	1	Bit0	63H1	0: OFF 1: ON
					Bit1	63H1-R	0: OFF 1: ON
					Bit2	CNS1	0: OFF 1: ON
					Bit3	CNS2	0: OFF 1: ON
					Bit4	CNG1	0: OFF 1: ON
					Bit5	CNG2	0: OFF 1: ON
					Bit6	Spare	0: OFF 1: ON
					Bit7	Spare	0: OFF 1: ON
125	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
126	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
127	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-in contents	Record data					
		Data write-in range	Write-in unit	Number of bytes	Contents		
128	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
129	Jumper SW	—	—	1	Bit0	J11	0: OFF 1: ON
					Bit1	J12	0: OFF 1: ON
					Bit2	J13	0: OFF 1: ON
					Bit3	J14	0: OFF 1: ON
					Bit4	J15	0: OFF 1: ON
					Bit5	J16	0: OFF 1: ON
					Bit6	Spare	0: OFF 1: ON
					Bit7	Spare	0: OFF 1: ON
< List of setting value >							
130	Software SW	—	—	1	Bit0	Spare	
					Bit1	Spare	
					Bit2	Spare	
					Bit3	Outdoor fan snow protection control	
					Bit4	Spare	
					Bit5	Switching to heating wind temperature security priority	
					Bit6	Spare	
					Bit7	Spare	
131	Priority operation SW	0-3	—	1	0	First push priority	
					1	Last push priority	
132	Heating setting 1 (Target exit temperature)	20-50	1°C	1			
133	Heating setting 2 (Target of high pressure)	3.65-2.75	0.05MPa	1			
134	Heating setting 3 (Judgment temperature)	20-38	1°C	1			
135	CNS1 function assignment	0-20	—	1			
136	CNS2 function assignment	0-20	—	1			
137	CNG1 function assignment	0-20	—	1			
138	CNG2 function assignment	0-20	—	1			
139	External output function assignment	0-20	—	1			
140	Spare	—	—	1			
< The others >							
141	Override	0-	—	1			

(2) Outdoor PCB setting

Code	Input	Remarks
SW1	Outdoor address No. (Order of 10)	
SW2	Outdoor address No. (Order of 1)	
SW3-1	Inspection LED reset Normal★/Reset	
SW3-2	Auto backup operation None★/With	
SW3-4	Refrigerant quantity check Normal★/Check	
SW3-5	Check operation start Normal★/Check	
SW3-7	Forced cooling/heating Normal★/Forced cooling-heating	
SW5-1	Test run SW Normal★/Test run	
SW5-2	Test run mode Heating★/Cooling	
SW5-3	Pump down SW Normal★/Pump down	
SW5-5	SL selector New SL (Auto)★/Old SL	
SW5-6	Capacity measurement mode	
SW5-7	Capacity measurement mode	
SW5-8	Capacity measurement mode	
SW6-3	High COP setting	
SW7	Data erase/write	
SW8	7-segment display code No. increasing (order of 1)	
SW9	7-segment display code No. increasing (order of 10)	
SW4-1	Model selection	See following table
SW4-2		
SW4-3		
SW4-4		
SW4-5		
SW4-6		
SW4-7	Master/slave unit setting address	See following table
SW4-8	Master/slave unit setting address	
J11	Power source voltage selection	
J12	Power source voltage selection	
J13	External input Level★/Pulse	
J14	Defrost reset temperature Normal★/Intensive	
J15	Defrost start temperature Normal★/Cold region	
J16	Spare	

Note (1) Jumper wires J13, J15 indicate short-circuit/open.

(2) Dip switch SW's indicate OFF/ON

(3) ★ indicates the factory setting (OFF).

■Model selection with SW4-1-SW4-6

Model (HP)	FDCB224 (8)	FDCB280 (10)	FDCB335 (12)
SW4-1	OFF	ON	OFF
SW4-2	OFF	OFF	ON
SW4-3	OFF	OFF	OFF
SW4-4	OFF	OFF	OFF
SW4-5	OFF	OFF	OFF
SW4-6	ON	ON	ON

■Master/slave setting with SW4-7, SW4-8

Outdoor unit	SW4-7	SW4-8
Master unit	OFF★	OFF★
Slave unit 1	ON	OFF
Slave unit 2	OFF	ON

9. SYSTEM TROUBLESHOOTING PROCEDURE

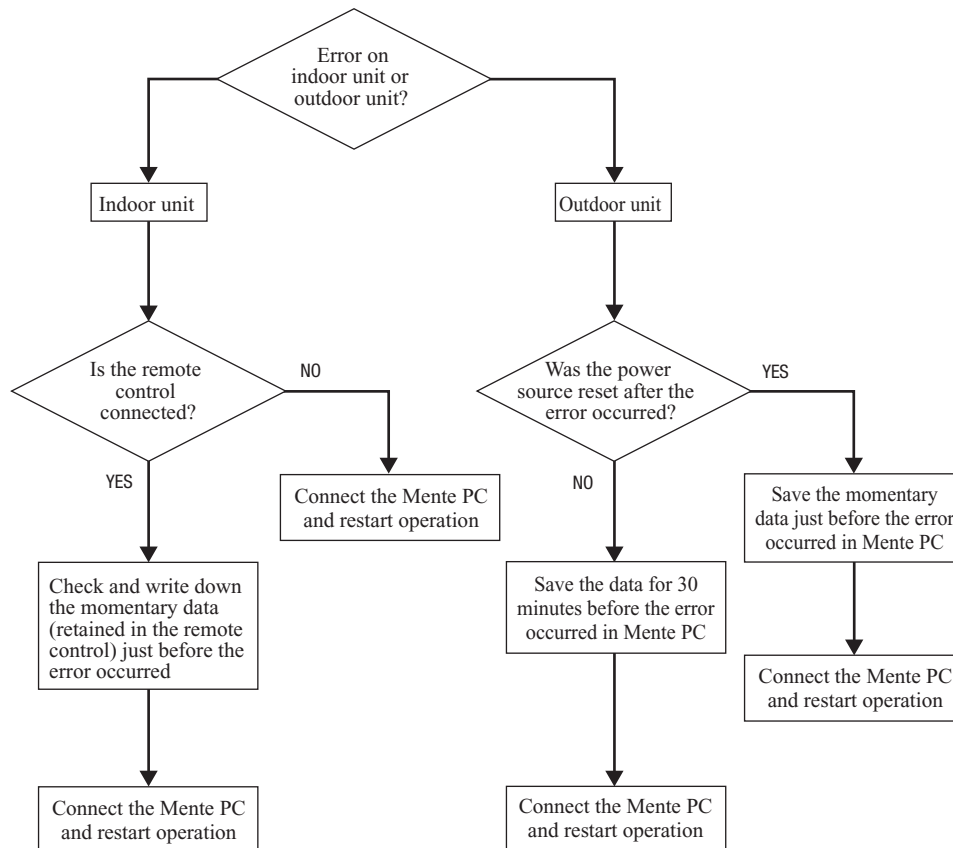
9.1 Basics of troubleshooting

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)

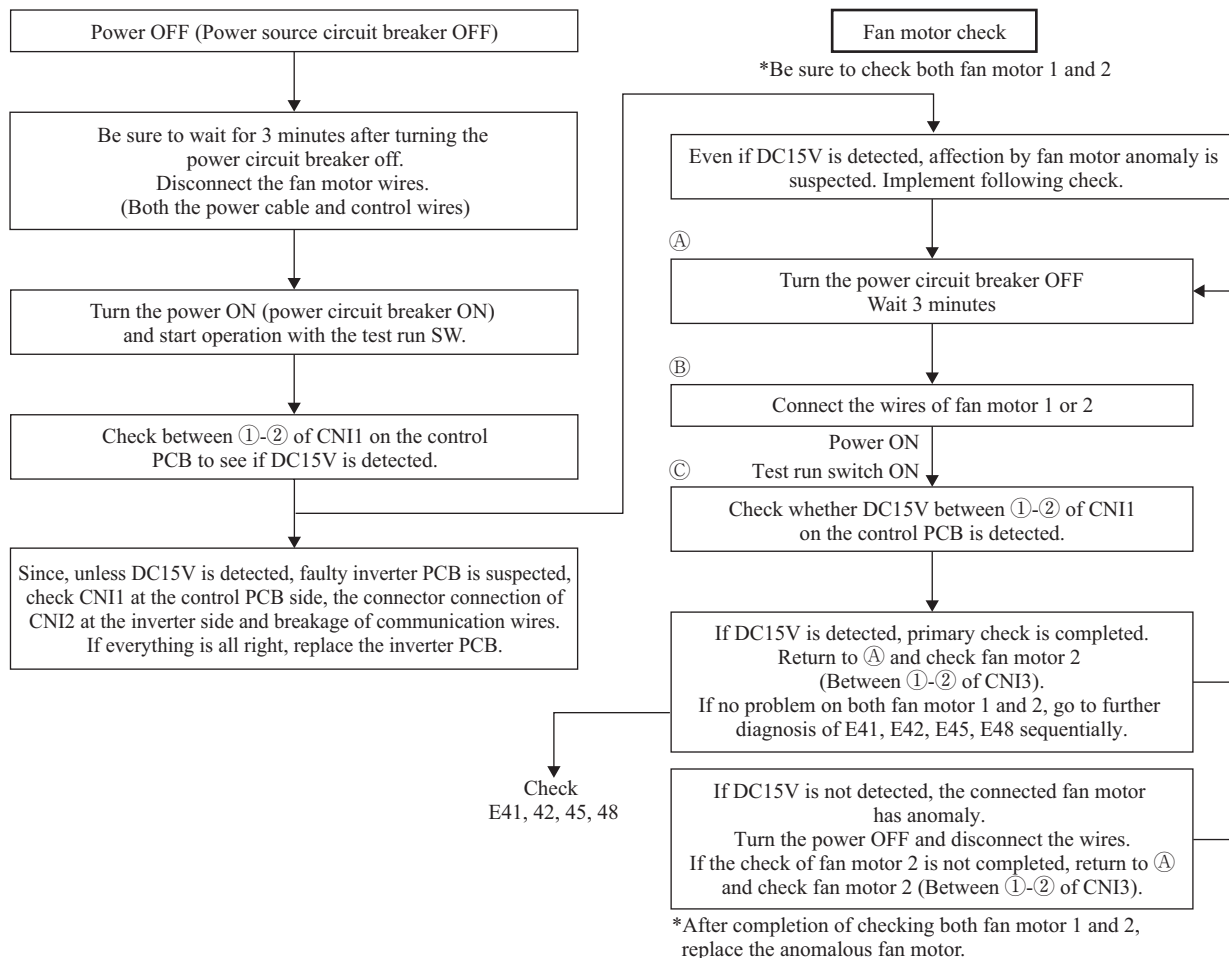
- Identify whether particular error occurred during operation or stopping.
- Is it caused by the installation conditions of outdoor/indoor unit? (Refrigerant quantity, pipe length, short-circuit, clogged filter, etc.)
- Isn't there any beginner's mistake at the installation? (Wrong address, mistake in 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



9.2 Explanation of troubleshooting

(a) Checking DC15V 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 (Ω)	
P	N	About 1M	Several 10 M
N	P	About 300-400	Several M
P	U	0	Several 10 M
P	V		
P	W		
N	U	About 1.2M	Several 100k
N	V		
N	W		
U	P	About 1.3M	Several 100k
V	P		
W	P		
U	N	0	Several 10 M
V	N		
W	N		

Note (1) When a measured value is 0 – a few kΩ, the element may be broken. Replace the power transistor part.

(c) Inverter checker for diagnosis of inverter output

● Checking method

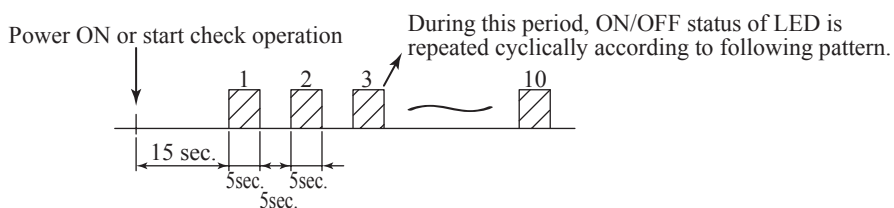
(i) Setup procedure of checker

- 1) Power OFF (Turn off the breaker).
- 2) Remove the terminal cover of compressor and disconnect the wires (U, V, W) from compressor.
- 3) Connect the wires U (Red), V (White) and W (Black) of the checker to the terminal of disconnected wires (U, V, W) from compressor respectively.

(ii) Operation for judgment

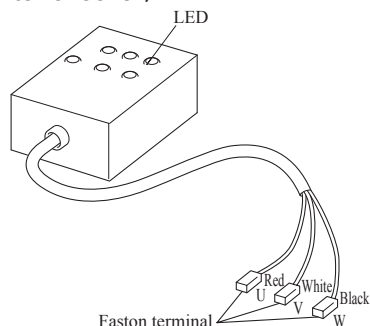
- 1) Power ON after JSW10-4 on outdoor inverter PCB was turned ON.
- 2) After 15 seconds since power has turned ON, LED start ON/OFF for 5 seconds cyclically and it repeats 10 times.
- 3) Check ON/OFF status of 6 LED's on the checker.
- 4) Judge the PCB by ON/OFF status of 6 LED's on the checker.

ON/OFF status of LED	If all of LED are ON/OFF according to following pattern	If all of LED stay OFF or some of LED are ON/OFF
Inverter PCB	Normal	Anomalous

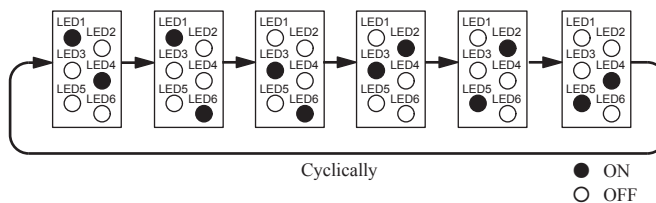


- 5) Be sure to turn off JSW10-4 on outdoor inverter PCB, after finishing the check operation.

⟨ Inverter checker ⟩



LED ON/OFF pattern



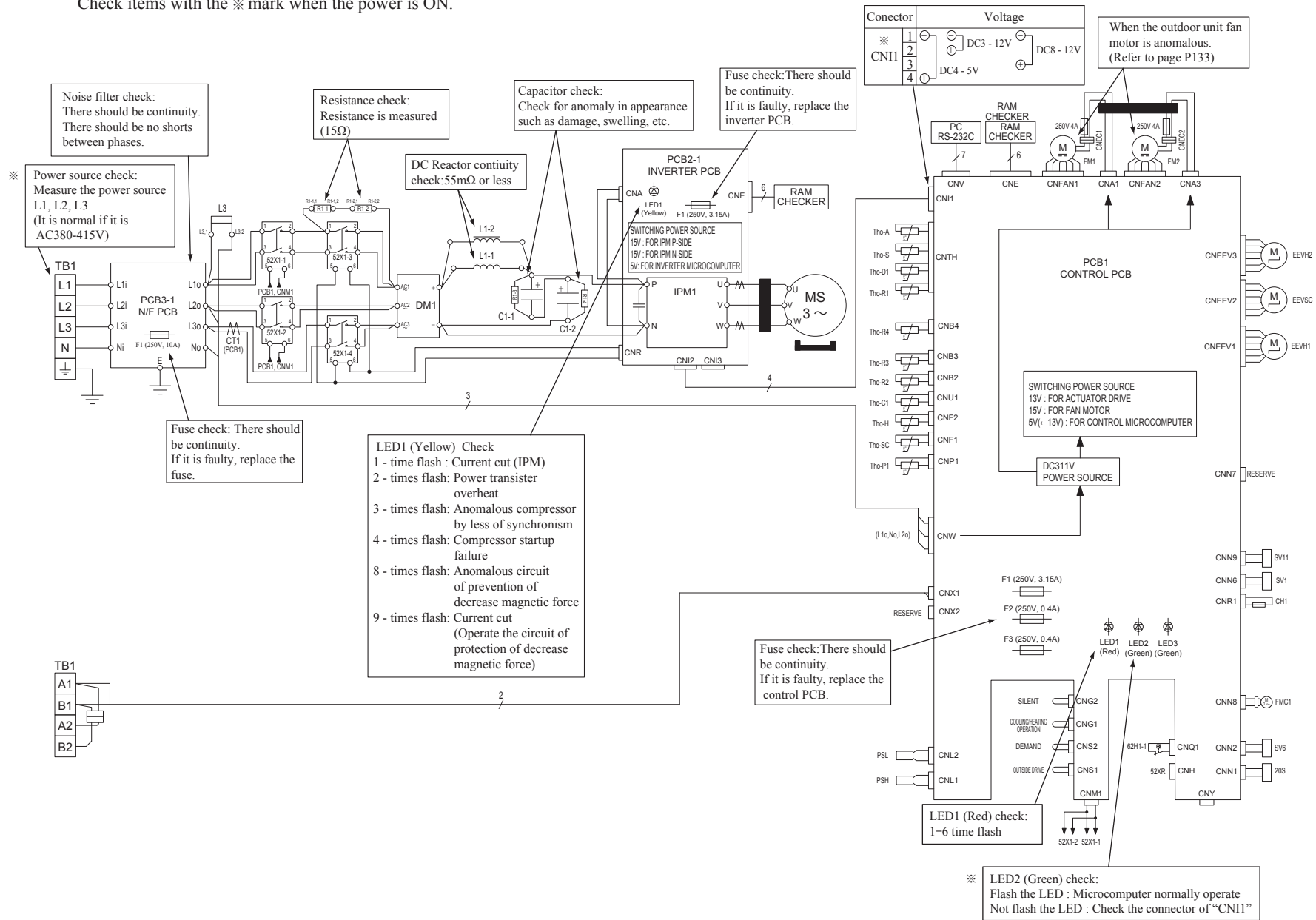
Connect to the terminal of the wires which are disconnected from compressor.

FDCB224KXZE1, 280KXZE1, 335KXZE1

•Outdoor unit check points

Check items with the ※ mark when the power is ON.

(d) Outdoor unit control failure diagnosis circuit diagram



9.3 Contents of troubleshooting

(a) List of inspection displays

Remote control error code	7-segment display	Name of inspection	Classification	Page
None	–	Operates but does not cool	System error	110
None	–	Operates but does not heat	System error	111
None	–	Excessive noise/vibration	System error	113-115
None	–	Earth leakage breaker activated	System error	112
🔊WAIT🔊	–	🔊WAIT🔊(1)	System error	116
🔊WAIT🔊	–	🔊WAIT🔊(2)	System error	117
🔊WAIT🔊	–	🔊WAIT🔊(3)	System error	118
🔊WAIT🔊	–	🔊WAIT🔊(4)	System error	119
E31	E31	Duplicated outdoor unit address No.	Address setting error	120
E32	E32	Open L3 phase on power source at primary side	Site setting error	121
E36	E36-1	Discharge pipe temperature error (Tho-D1)	System error	122
E37	E37-1, 2 E37-3, 4 E37-5, 6	Outdoor heat exchanger temperature thermistor (Tho-R) and subcooling coil temperature thermistor (Tho-SC, -H) anomaly	Thermistor wire breakage	123
E38	E38	Outdoor air temperature thermistor anomaly (Tho-A)	Thermistor wire breakage	124
E39	E39-1	Discharge pipe temperature thermistor anomaly (Tho-D1)	Thermistor wire breakage	125
E40	E40	High pressure anomaly (63H1-1 activated)	System error	126
E41 (E51)	E41 (E51)-1	Power transistor overheat	System error	127
E42	E42-1	Current cut (CM1)	System error	128
E43	E43-1 E43-2	Excessive number of indoor units connected, excessive total capacity of connection	Site setting error	129
E44	E44-1	Liquid flooding anomaly (CM1)	System error	130
E45	E45-1	Communication error between inverter PCB and outdoor control PCB	Communication error	131
E46	E46	Mixed address setting methods coexistent in same network	Address setting error	132
E48	E48-1 E48-2	Outdoor DC fan motor anomaly	DC fan motor error	133, 134
E49	E49	Low pressure anomaly	System error	135
E53(E55)	E53(E55)-1	Suction pipe temperature thermistor anomaly (Tho-S), Under-dome temperature thermistor anomaly (Tho-C1)	Thermistor wire breakage	136
E54	E54-1 E54-2	High pressure sensor anomaly (PSH) Low pressure sensor anomaly (PSL)	Thermistor wire breakage	137
E56	E56-1	Power transistor temperature thermistor anomaly (Tho-P1)	Thermistor wire breakage	138
E58	E58-1	Anomalous compressor by loss of synchronism	System error	139
E59	E59-1	Compressor startup failure (CM1)	System error	140
E61	E61-1, 2	Communication error between the master unit and slave units	System error	141
E63	E63	Emergency stop	Site setting error	142

(b) Troubleshooting

Error code Remote control: None 7-segment display: -	LED	Green	Red	Content Operates but does not cool
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	Stays OFF	

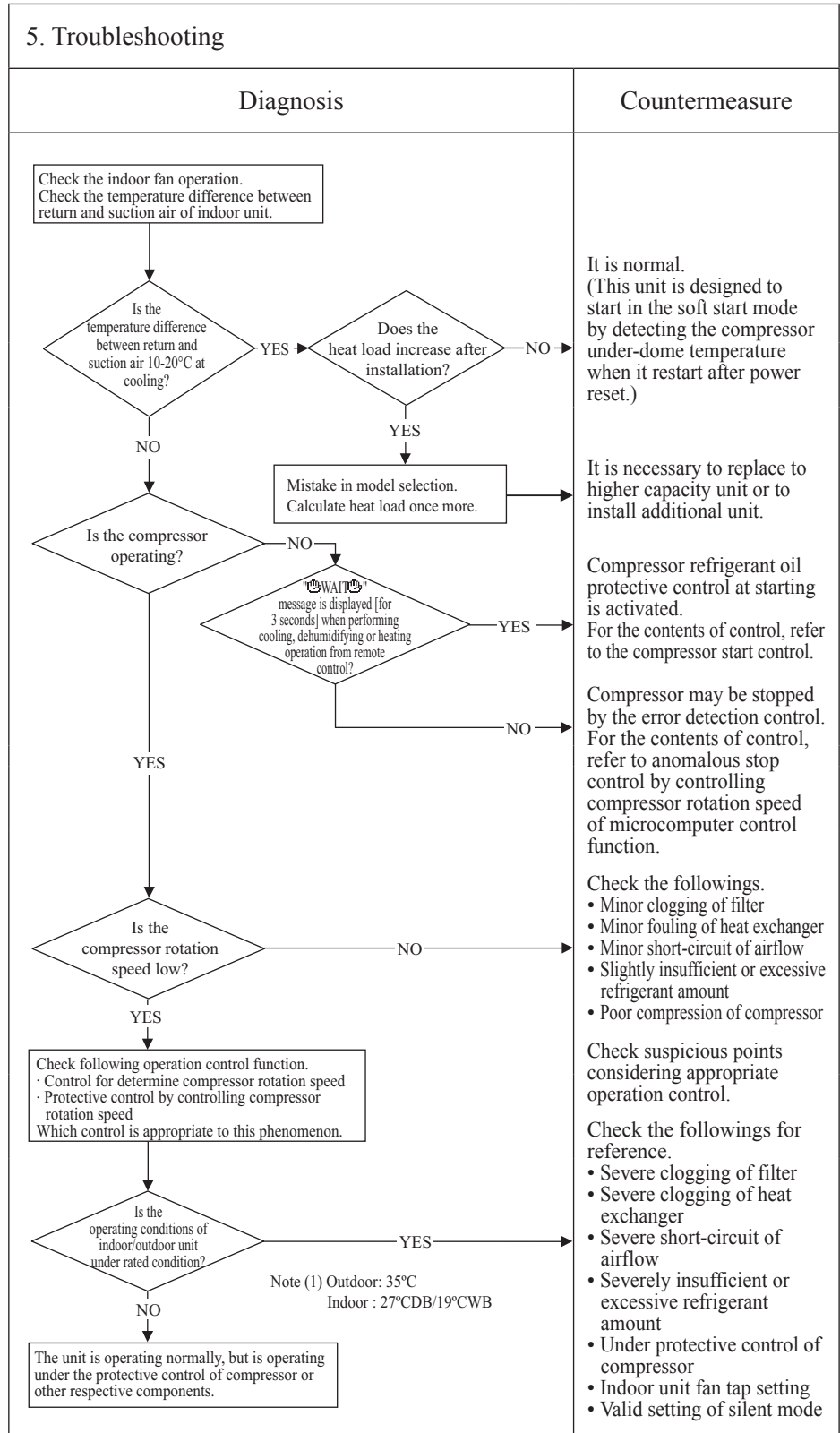
1. Applicable model
All models

2. Error detection method

3. Condition of error displayed

4. Presumable cause

- Poor compression of compressor
- Expansion valve operation anomaly



Note:

Error code Remote control:None 7-segment display: -	LED	Green	Red	Content Operates but does not heat
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	Stays OFF	

1. Applicable model
All models
2. Error detection method
3. Condition of error displayed
4. Presumable cause
<ul style="list-style-type: none"> • 4-way valve anomaly • Poor compression of compressor • Expansion valve anomaly operation

5. Troubleshooting	
Diagnosis	Countermeasure
<p>Check the indoor fan operation. Check the temperature difference between return and suction air of indoor unit.</p> <pre> graph TD Start[Check indoor fan operation and temperature difference] --> D1{Is the temperature difference between return and suction air 10-30°C at heating?} D1 -- YES --> D2{Does the heat load increase after installation?} D1 -- NO --> D3{Is the compressor operating?} D2 -- YES --> B1[Mistake in model selection. Calculate heat load once more.] D2 -- NO --> D3 B1 --> C1[It is necessary to replace to higher capacity unit or to install additional unit.] D3 -- NO --> D4{Is the compressor rotation speed low?} D3 -- YES --> D5{Is the compressor rotation speed low?} D4 --> C2[Check the followings: Minor clogging of filter, Minor fouling of heat exchanger, Minor short-circuit of airflow, Slightly insufficient or excessive refrigerant amount, Poor compression of compressor] D5 --> B2[Check following operation control function. Control for determine compressor rotation speed, Protective control by controlling compressor rotation speed. Which control is appropriate to this phenomenon.] B2 --> D6{Is the operating conditions of indoor/outdoor unit under rated condition?} D6 -- YES --> C3[Check suspicious points considering appropriate operation control. Check the followings for reference: Severe clogging of filter, Severe clogging of heat exchanger, Severe short-circuit of airflow, Severely insufficient or excessive refrigerant amount, Under protective control of compressor, Indoor unit fan tap setting, Valid setting of silent mode] D6 -- NO --> B3[The unit is operating normally, but is operating under the protective control of compressor or other respective components.] </pre>	<p>It is normal. (This unit is designed to start in the soft start mode by detecting the compressor under-dome temperature when it restart after power reset.)</p> <p>It is necessary to replace to higher capacity unit or to install additional unit.</p> <p>Compressor refrigerant oil protective control at starting is activated. For the contents of control, refer to the compressor start control.</p> <p>Compressor may be stopped by the error detection control. For the contents of control, refer to anomalous stop control by controlling compressor rotation speed of microcomputer control function.</p> <p>Check the followings.</p> <ul style="list-style-type: none"> • Minor clogging of filter • Minor fouling of heat exchanger • Minor short-circuit of airflow • Slightly insufficient or excessive refrigerant amount • Poor compression of compressor <p>Check suspicious points considering appropriate operation control.</p> <p>Check the followings for reference.</p> <ul style="list-style-type: none"> • Severe clogging of filter • Severe clogging of heat exchanger • Severe short-circuit of airflow • Severely insufficient or excessive refrigerant amount • Under protective control of compressor • Indoor unit fan tap setting • Valid setting of silent mode

Note:

Error code Remote control: None 7-segment display: -	LED	Green	Red	Content <h2 style="text-align: center;">Earth leakage breaker activated</h2>
	Indoor	Stays OFF	Stays OFF	
	Outdoor	Stays OFF	Stays OFF	

<h3>1. Applicable model</h3> <p>All models</p>	<h3>5. Troubleshooting</h3>	
<h3>2. Error detection method</h3>	<h4>Diagnosis</h4> <pre> graph TD D1{Are the insulation resistance and coil resistance of compressor OK?} -- NO --> C1[Replace compressor.*] D1 -- YES --> D2{Is insulation of respective harnesses OK?} D2 -- NO --> C2[Secure insulation resistance.] D2 -- YES --> D3{Is any harness bitten between panel and casing or etc?} D3 -- YES --> C3[Secure insulation resistance.] D3 -- NO --> P1[Check the outdoor unit grounding wire and earth leakage breaker.] </pre>	<h4>Countermeasure</h4>
<h3>3. Condition of error displayed</h3>	<div style="border: 1px solid black; padding: 5px;"> Check of the outdoor unit grounding wire and earth leakage breaker <ol style="list-style-type: none"> ① Run an independent grounding wire from the grounding screw of outdoor unit to the grounding terminal on the distribution panel. (Do not connect to another grounding wire.) ② In order to prevent malfunction of the earth leakage breaker itself, confirm the conformity of high harmonic regulation. <p>* Insulation resistance of compressor</p> <ul style="list-style-type: none"> • Immediately after installation or when the unit has been left for long period without power source, the insulation resistance may drop to a few MΩ because of refrigerant migrated in the compressor. <p>When the earth leakage breaker is activated at lower insulation resistance, check the following points.</p> <ol style="list-style-type: none"> ① 6 hours after power ON, check if the insulation resistance recovers to normal. When power ON, crankcase heater heat up compressor and evaporates the refrigerant migrated in the compressor. ② Check if the earth leakage breaker is conformed to higher harmonic regulation or not. <p>Since the unit has inverter, it is necessary to use components conformed to high harmonic regulation in order to prevent malfunction of earth leakage breaker.</p> </div>	
<h3>4. Presumable cause</h3> <ul style="list-style-type: none"> • Compressor anomaly • Noise 		

Note:

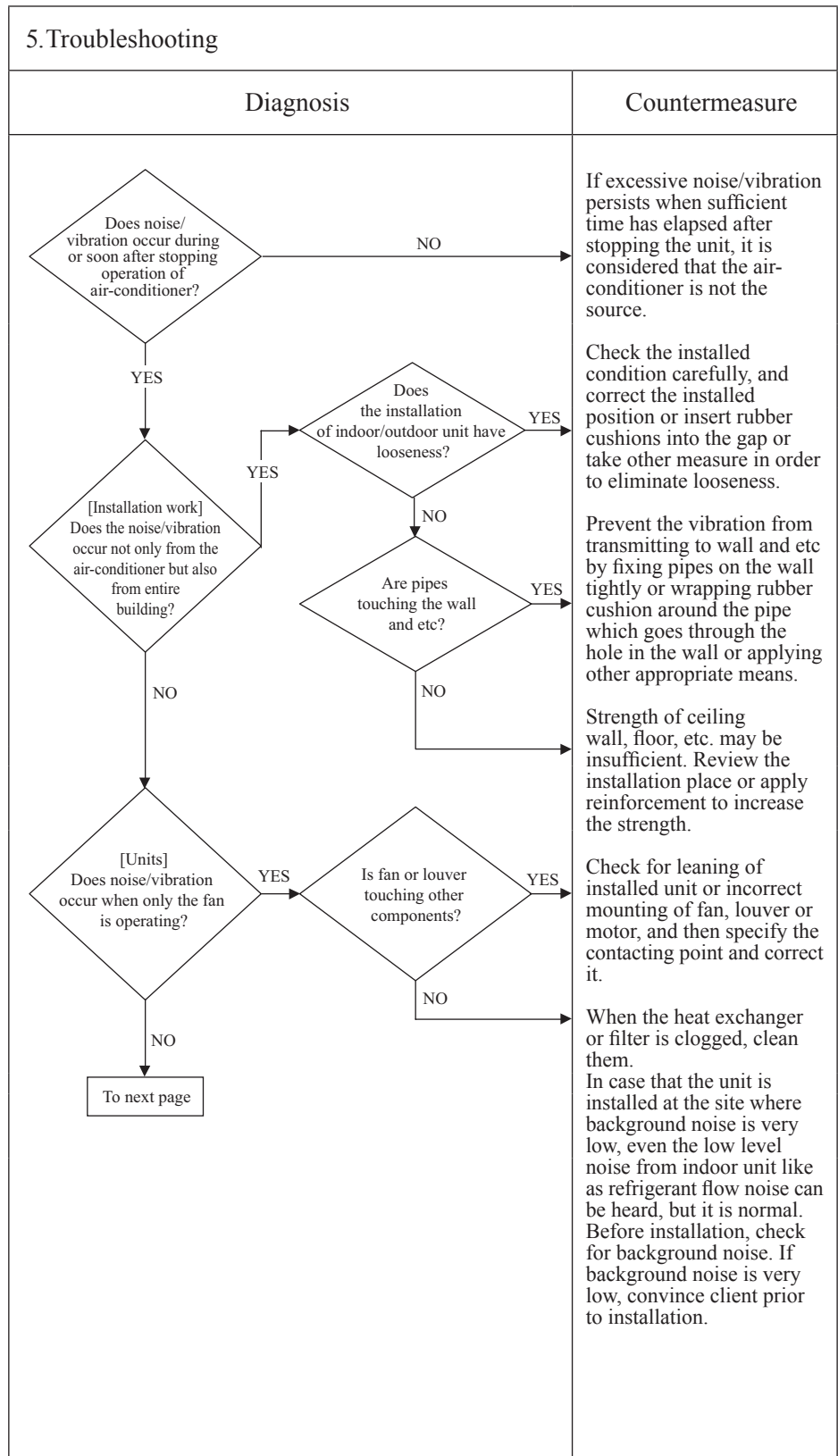
Error code Remote control:None 7-segment display: -	LED	Green	Red	Content Excessive noise/vibration (1/3)
	Indoor	-	-	
	Outdoor	-	-	

1. Applicable model
All models

2. Error detection method

3. Condition of error displayed

- 4. Presumable cause**
- ① Improper installation work
 - Improper vibration-proof work at installation
 - Insufficient strength of mounting surface
 - ② Anomaly of product
 - Before/after shipment from factory
 - ③ Improper adjustment during commissioning
 - Excessive/insufficient refrigerant.



Note:

Error code Remote control: None 7-segment display: -	LED	Green	Red	Content <h2 style="text-align: center;">Excessive noise/vibration (2/3)</h2>
	Indoor	-	-	
	Outdoor	-	-	

<h3>1. Applicable model</h3> <p>All models</p>	<h3>5. Troubleshooting</h3>	
<h3>2. Error detection method</h3>	<h4>Diagnosis</h4>	<h4>Countermeasure</h4>
<h3>3. Condition of error displayed</h3>		
<h3>4. Presumable cause</h3>		

Note:

Error code Remote control:None 7-segment display: -	LED	Green	Red	Content Excessive noise/vibration (3/3)
	Indoor	-	-	
	Outdoor	-	-	

1. Applicable model
All models
2. Error detection method
3. Condition of error displayed
4. Presumable cause

5. Troubleshooting	
Diagnosis	Countermeasure
<p>From previous page</p>	<p>If insufficient cooling/heating problem happens due to anomalous operating conditions at cooling/heating, followings are suspicious.</p> <ul style="list-style-type: none"> • Excessive charged amount of refrigerant • Insufficient charge amount of refrigerant • Intrusion of air, nitrogen, etc. <p>In such case, it is necessary to recover refrigerant, vacuum-dry and recharge refrigerant.</p> <p>* Since there could be many causes of noise/vibration, the above may not cover all. In such case, check the conditions when, where, how the noise/vibration occurs according to following check points and ask our consultation.</p> <ul style="list-style-type: none"> • Indoor/outdoor unit • Cooling/heating/fan mode • Startup/stop/during operation • Operating condition (Indoor/outdoor temperatures and pressures) • Time it occurred • Operation data retained by remote control or Mente PC such as compressor rotation speed, heat exchanger temperature, EEV opening degree and etc. • Tone (If available, record the noise) • Any other anomalies.

Note:

Error code Remote control: WAIT 7-segment display: -	LED	Green	Red	Content	WAIT (1)
	Indoor	Keeps flashing	Stays OFF		
	Outdoor	Keeps flashing	Keeps flashing		

1. Applicable model

All models

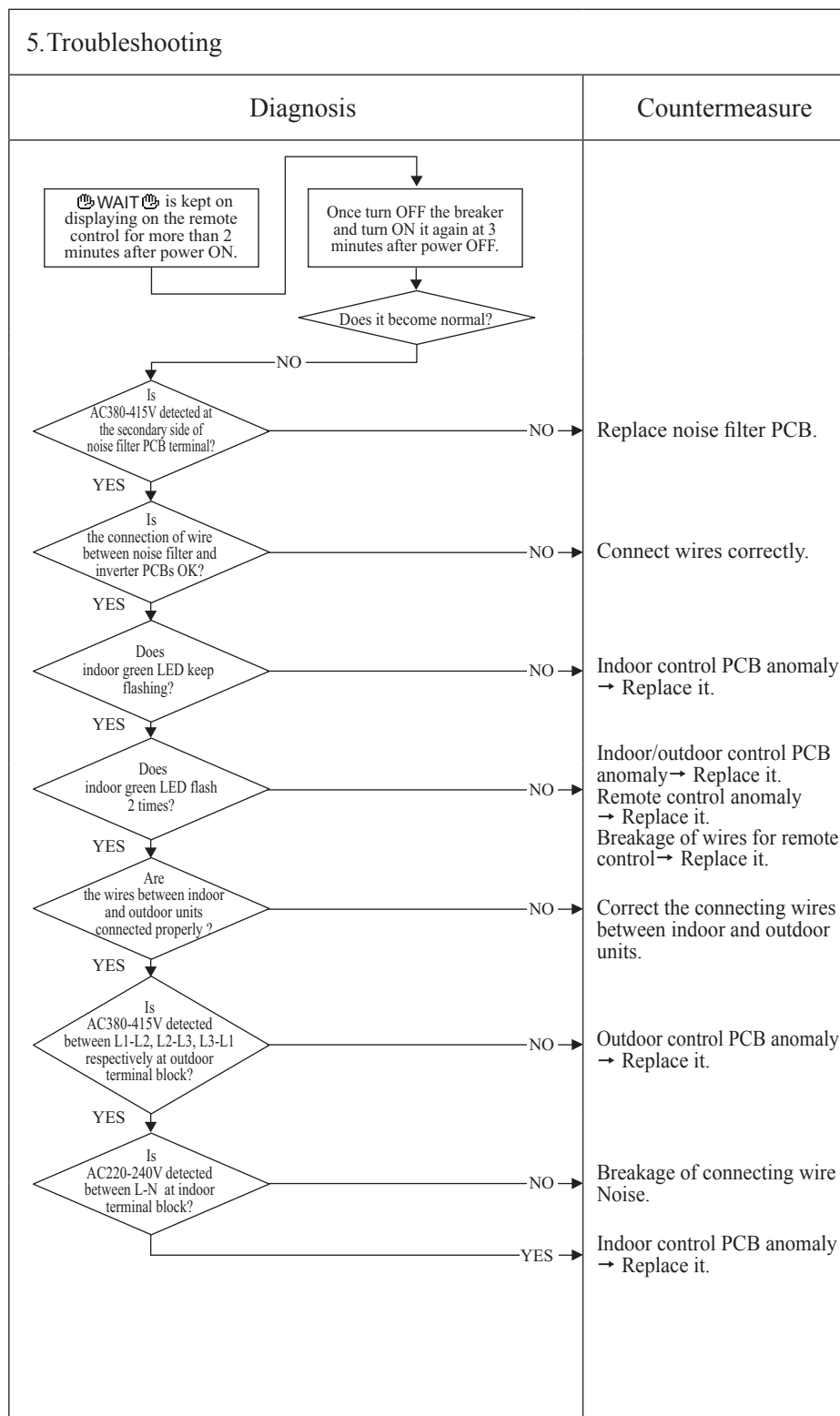
(In case that WAIT is kept on displaying on the remote control for more than 2 minutes after power ON.)

2. Error detection method

3. Condition of error displayed

4. Presumable cause

- Noise filter anomaly
- Anomalous connection of wire between PCBs
- Indoor control PCB anomaly
- Remote control anomaly
- Breakage of connecting wires of remote control
- Outdoor control PCB anomaly



Note: (1) When anomaly occurs during establishing communication between indoor and outdoor unit, error code E5 is displayed (outdoor red LED flash 2-times).
 In case of E5, the way of troubleshooting is same as above mentioned (except for checking of connecting wire).
 When reset the power after E5 occurs, if this anomaly recurs, WAIT is displayed on remote control. If power ON/OFF is repeated in a short period (within 1 minute), WAIT may be displayed. In such case, please wait for 3 minute after the power breaker OFF.

(2) If any error is detected 30 minutes after displaying “ WAIT ” on the remote control, the display changes to “INSPECT I/U”.

Error code Remote control: WAIT 7-segment display: -	LED	Green	Red	Content WAIT (2)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	Keeps flashing	

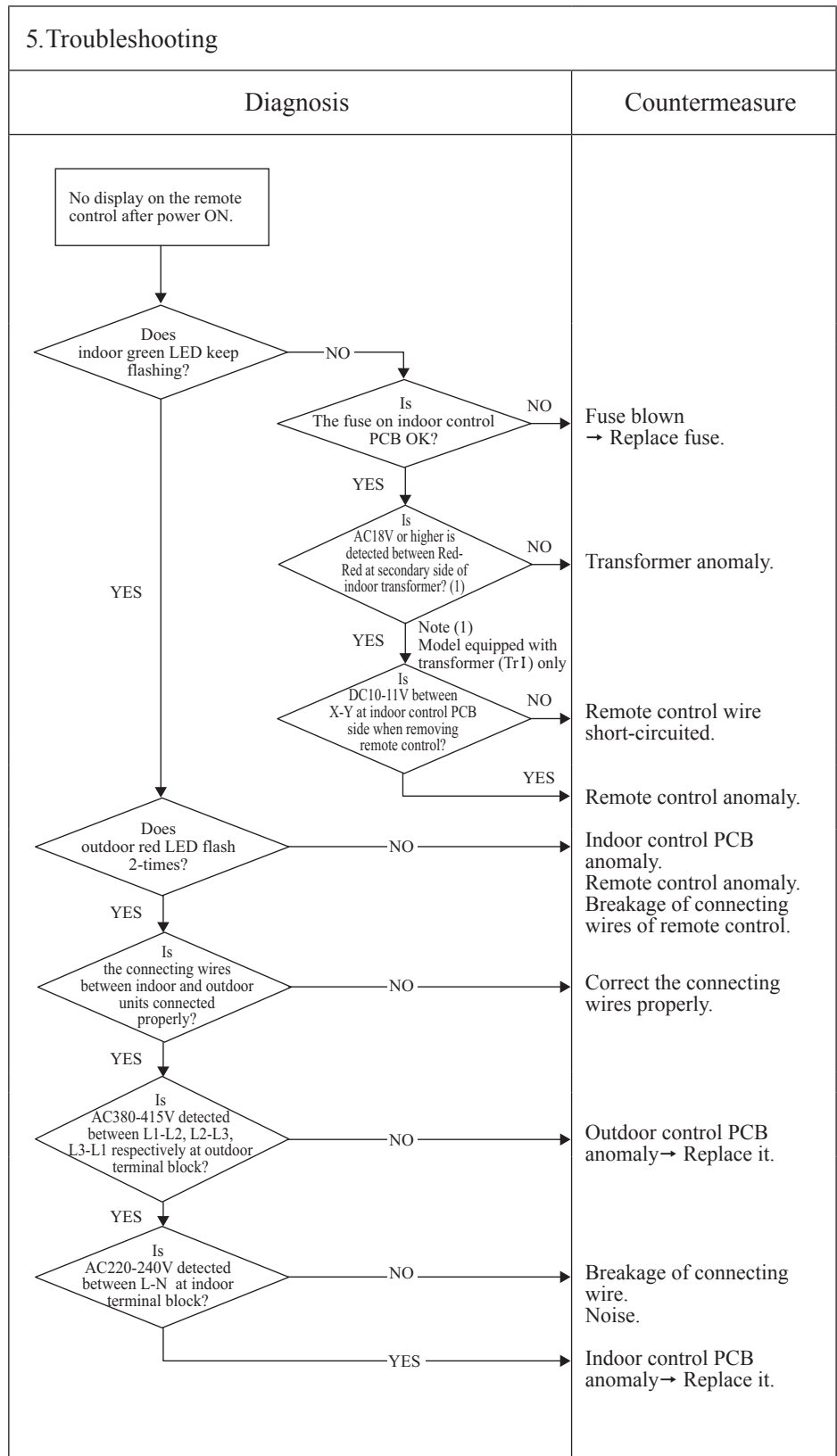
1. Applicable model

All models
(No display on the remote control after power ON.)

2. Error detection method

3. Condition of error displayed

- 4. Presumable cause**
- Fuse blown
 - Noise filter anomaly
 - Anomalous connection of wire between PCBs
 - Indoor control PCB anomaly
 - Remote control anomaly
 - Breakage of connecting wires of remote control
 - Outdoor control PCB anomaly



Note:

Error code Remote control: WAIT 7-segment display: -	LED	Green	Red	Content
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	Keeps flashing	

WAIT (3)

1. Applicable model

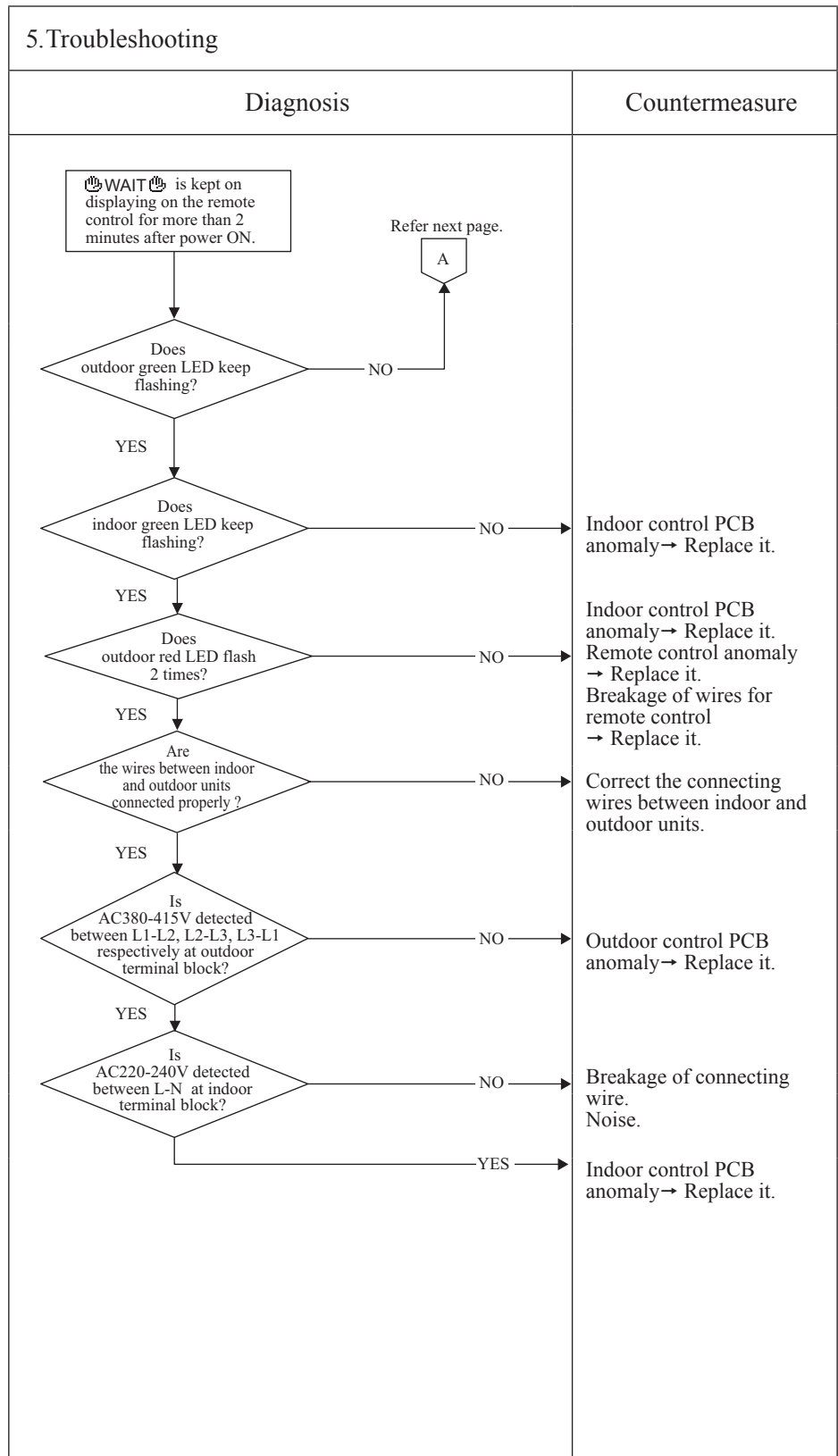
All models

(In case that WAIT is kept on displaying on the remote control for more than 2 minutes after power ON.)

2. Error detection method

3. Condition of error displayed

- 4. Presumable cause**
- Noise filter anomaly
 - Anomalous connection of wire between PCBs
 - Indoor control PCB anomaly
 - Remote control anomaly
 - Breakage of connecting wires of remote control
 - Outdoor control PCB anomaly



Note:

Error code Remote control: WAIT 7-segment display: -	LED	Green	Red	Content WAIT (4)
	Indoor	Stays OFF	Stays OFF	
	Outdoor	Stays OFF	Stays OFF	

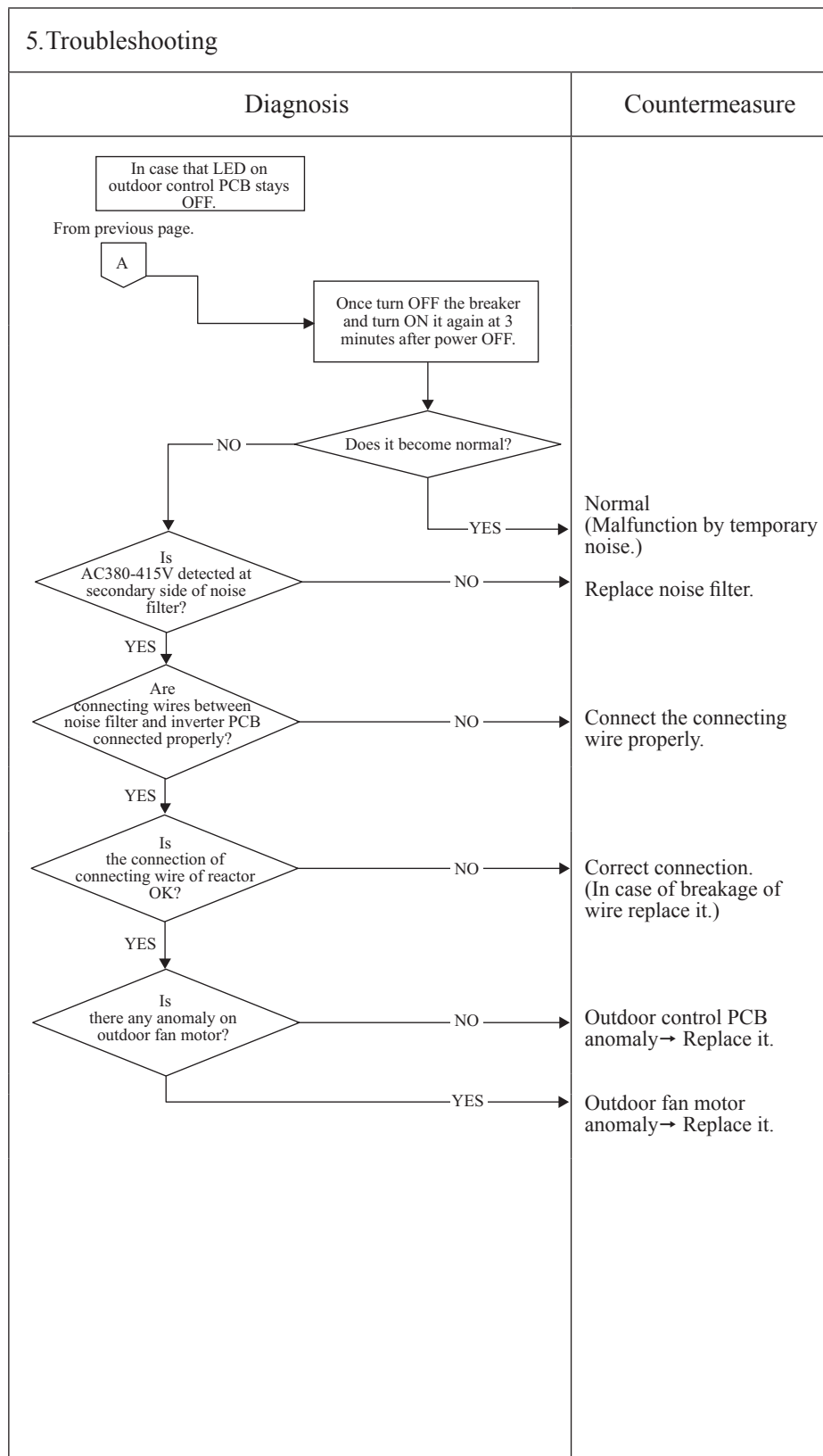
1. Applicable model

All models
(In case that LED on outdoor control PCB stays OFF.)

2. Error detection method

3. Condition of error displayed

- 4. Presumable cause**
- Noise filter anomaly
 - Anomalous connection of wire between PCBs
 - Indoor control PCB anomaly
 - Remote control anomaly
 - Breakage of connecting wires of remote control
 - Outdoor control PCB anomaly



Note:

Error code Remote control: E31 7-segment display: E31	LED	Green	Red	Content Duplicated outdoor unit address No.
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Outdoor unit
2. Error detection method
When the microcomputer of outdoor control PCB recognizes the duplicated address No. by scanning all addresses of outdoor units in the same Superlink system.
3. Condition of error displayed
When duplicated outdoor unit address No. exists in the same Superlink system.
4. Presumable cause
<ul style="list-style-type: none"> Mistake in the address setting of outdoor units More than 129 indoor units connected [Maximum number can be set by address switch is 128 units] No setting of Master/Slave setting switch for combination use

5. Troubleshooting	
Diagnosis	Countermeasure
<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <pre> graph TD A[Save data for 30 minutes before stopping in Mente PC.] --> B[Reset the power source and restart operation.] B --> C{Does E31 recur?} C -- NO --> D[Test run *No action is taken because it is judged that the power reset is not done after changing address.] C -- YES --> E[Check outdoor address Nos. in the same Superlink system.] E --> F{Does the same address No. exist?} F -- YES --> G[Correct address.] F -- NO --> H[Replace outdoor control PCB. *] I[Caution: Unless the power is reset after changing address, the set address will not be confirmed.] -.-> C </pre> </div> <div style="width: 35%; padding-left: 10px;"> <p>Check and save the data of operating condition. Check the conditions whether it occurs immediately after the power on or during operation. Check the current address Nos. of outdoor units.</p> <p>Caution: Unless the power is reset after changing address, the set address will not be confirmed.</p> <p>* Before replacement, please confirm whether the rotary switch for address setting is not damaged. (It was experienced that No. 5 on rotary switch was not recognized.)</p> </div> </div>	

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 and 4-8.

Error code Remote control: E32 7-segment display: E32	LED	Green	Red	Content <h2 style="text-align: center;">Open L3 phase on power source at primary side</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model	5. Troubleshooting		
Outdoor unit	Diagnosis	Countermeasure	
2. Error detection method	<pre> graph TD Start[Save data for 30 minutes before stopping in Mente PC.] --> D1{Is the power source voltage (between phases) at the primary side OK?} D1 -- NO --> C1[Propose an improvement to the customer.] D1 -- YES --> R1[Reset the power source and restart operation.] R1 --> D2{Does E32 recur?} D2 -- YES --> C2[Replace outdoor control PCB.] D2 -- NO --> R2[Restart operation] R2 --> D3{Does E32 recur?} D3 -- YES --> C3[Check the connection of wire.] D3 -- NO --> C4[Wait and see without taking any action.] </pre>		
By checking the power source voltage at primary side of the outdoor control PCB. (Check only L3 phase)			
3. Condition of error displayed			
When the power source voltage between L1-N or L2-N becomes 0V and/or the current of L3 decrease to 0A.			
4. Presumable cause	<ul style="list-style-type: none"> • Anomalous power source at primary side • Outdoor control PCB anomaly. 		

Note:

Error code Remote control: E36 7-segment display: E36-1	LED	Green	Red	Content Discharge pipe temperature error (Tho-D1)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

2. Error detection method

When anomalously high temperature is detected by the discharge pipe temperature thermistor (Tho-D1).

3. Condition of error displayed

When 130°C or higher is detected by the discharge temperature thermistor, the compressor stops. After 3 minutes delay, the compressor starts again automatically, but if this anomaly occurs 2 times within 60 minutes after the initial detection, or 130°C or higher is detected continuously for 60 minutes.

- 4. Presumable cause**
- Discharge pipe temperature anomaly
 - SV1 (liquid refrigerant by-pass valve) anomaly
 - Breakage of coil
 - Faulty main body.
 - Outdoor control PCB anomaly
 - Insufficient amount of refrigerant
 - Insufficient airflow volume
 - Short-circuit of airflow

5. Troubleshooting

Diagnosis	Countermeasure
Save data for 30 minutes before stopping in Mente PC.	
Is the unit installation environment within the range of limitation?	NO → Propose an improvement to the customer.
YES → Are the refrigerant amount and piping length OK?	NO → Adjust the refrigerant amount properly. (Check whether the refrigerant amount is insufficient or not.) (Check the gas leakage)
YES → Is the insertion of the thermistor connector into the connector on outdoor control PCB OK?	NO → Insert connector securely.
YES → Is the discharge pipe temperature thermistor OK?	NO → Check if the characteristics are correct by referring the characteristics chart of E39. And if necessary, replace the discharge pipe temperature thermistor.
YES → Reset the power source and restart operation.	Check it, as much as possible, under the operating conditions for 30 minutes before error occurred.
Does the error recur when restarting?	NO → Wait and see. Continue to obtain data, if possible. (Keep connecting the Mente PC)
YES → Is there AC220-240V of output signal for SV1 from outdoor control PCB?	NO → Replace outdoor control PCB.
YES → Is the coil of SV1 energized?	NO → Replace the coil SV1.
YES → Does the refrigerant flow through SV1 main body?	NO → Replace the SV1 main body. (If there is no refrigerant in liquid line, charge refrigerant additional)
YES →	Check refrigerant amount again.

Note:

Error code Remote control: E37 7-segment display: E37-1, 2, 3, 4, 5, 6*1	LED	Green	Red	Content Outdoor heat exchanger temperature thermistor (Tho-R) and subcooling coil temperature thermistor (Tho-SC, -H) anomaly
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	* 1	

*1 E37-1: 1-time flash (Tho-R1), E37-2: 2-time flash (Tho-R2), E37-3: 3-time flash (Tho-R3), E37-4: 4-time flash (Tho-R4), E37-5: 5-time flash (Tho-SC), E37-6: 6-time flash (Tho-H)

<h3>1. Applicable model</h3> <p>Outdoor unit</p>	<h3>5. Troubleshooting</h3> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 50%;">Diagnosis</th> <th style="width: 50%;">Countermeasure</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <pre> graph TD Q1{Is the connector of thermistor connected properly?} -- NO --> C1[Insert the connector securely.] Q1 -- YES --> Q2{Are the characteristics of thermistor OK? *2} Q2 -- NO --> C2[Replace thermistor. (Tho-SC, Tho-H, Tho-R)] Q2 -- YES --> C3[Replace outdoor control PCB.] </pre> </td> <td style="vertical-align: top;"> <p>Check and save the data of operating conditions. Check the conditions whether it occurs immediately after the power on or during operation or stopping. Check the sensed value. Compare the temperature on Mente PC with actual measured value.</p> </td> </tr> </tbody> </table> <p>*2 Check several times to prove any poor connection</p> <div style="text-align: center; margin-top: 20px;"> <p>Outdoor heat exchanger temperature thermistor (Tho-R1-R4) Subcooling coil thermistor (Tho-SC, Tho-H) Temperature-resistance characteristics</p> <table border="1" style="margin: 10px auto; font-size: small;"> <caption>Approximate data from the graph</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Resistance (kΩ)</th> </tr> </thead> <tbody> <tr><td>0</td><td>15</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>20</td><td>6</td></tr> <tr><td>25</td><td>5</td></tr> <tr><td>30</td><td>4</td></tr> <tr><td>40</td><td>3</td></tr> <tr><td>50</td><td>2</td></tr> </tbody> </table> </div>	Diagnosis	Countermeasure	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <pre> graph TD Q1{Is the connector of thermistor connected properly?} -- NO --> C1[Insert the connector securely.] Q1 -- YES --> Q2{Are the characteristics of thermistor OK? *2} Q2 -- NO --> C2[Replace thermistor. (Tho-SC, Tho-H, Tho-R)] Q2 -- YES --> C3[Replace outdoor control PCB.] </pre>	<p>Check and save the data of operating conditions. Check the conditions whether it occurs immediately after the power on or during operation or stopping. Check the sensed value. Compare the temperature on Mente PC with actual measured value.</p>	Temperature (°C)	Resistance (kΩ)	0	15	10	10	20	6	25	5	30	4	40	3	50	2
Diagnosis	Countermeasure																				
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Temperature (°C)	Resistance (kΩ)																				
0	15																				
10	10																				
20	6																				
25	5																				
30	4																				
40	3																				
50	2																				

2. Error detection method

Detection of anomalously low temperature (resistance) of Tho-R or Tho-SC or Tho-H.

3. Condition of error displayed

- If -50°C or lower is detected for 5 seconds continuously within 2-minutes to 2-minutes 20-seconds after the compressor ON, the compressor stops. And after 3-minutes delay, the compressor starts again automatically, but if this anomalous temperature is detected 3 times within 40 minutes after the initial detection.
- If -50°C or lower is detected for 5 seconds continuously within 20 seconds after power ON.

4. Presumable cause

- Broken thermistor harness or the internal wire of sensing section (Check the molded section as well)
- Disconnection of thermistor harness connection (connector).
- Outdoor control PCB anomaly.

Note:

Error code Remote control: E38 7-segment display: E38	LED	Green	Red	Content Outdoor air temperature thermistor anomaly (Tho-A)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

2. Error detection method

Detection of anomalously low temperature (resistance) of Tho-A

3. Condition of error displayed

- If -30°C or lower is detected for 5 seconds continuously within 2-minutes to 2-minutes 20-seconds after the compressor ON, the compressor stops. And after 3-minutes delay, the compressor starts again automatically, but if this anomalous temperature is detected 3 times within 40 minutes after the initial detection.
- If -30°C or lower is detected for 5 seconds continuously within 20 seconds after power ON.

4. Presumable cause

- Broken thermistor harness or the internal wire of sensing section (Check the molded section as well)
- Disconnection of thermistor harness connection (connector).
- Outdoor control PCB anomaly.

5. Troubleshooting

Diagnosis	Countermeasure
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <pre> graph TD A{Is the connector of thermistor connected properly?} -- NO --> B[Insert the connector securely.] A -- YES --> C{Are the characteristics of thermistor OK?*1} C -- NO --> D[Replace thermistor (Tho-A).] C -- YES --> E[Replace outdoor control PCB.] </pre> <p>*1 Check several times to prove any poor connection</p>	<p>Check and save the data of operating condition. Check the conditions whether it occurs immediately after the power on or during operation or stopping. Check the sensed value. Compare the temperature on Mente PC with actual measured value.</p>

Temperature-resistance characteristics of outdoor air temperature thermistor (Tho-A)

Temperature (°C)	Resistance (kΩ)
-20	100
-10	70
0	45
10	30
20	20
30	15
40	10
50	5

Note:

Error code Remote control: E39 7-segment display: E39-1	LED	Green	Red	Content Discharge pipe temperature thermistor anomaly (Tho-D1)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

2. Error detection method

Detection of anomalously low temperature (resistance) of Tho-D1.

3. Condition of error displayed

- If -30°C or lower is detected for 5 seconds continuously within 10-minutes to 10-minutes 20-seconds after the compressor ON, the compressor stops. And after 3-minutes delay, the compressor starts again automatically, but if this anomalous temperature is detected 3 times within 40 minutes after the initial detection.

4. Presumable cause

- Broken thermistor harness or the internal wire of sensing section. (Check the molded section as well)
- Disconnection of thermistor harness connection (connector)
- Outdoor control PCB anomaly.

5. Troubleshooting

Diagnosis	Countermeasure
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <pre> graph TD Q1{Is the connector of thermistor connected properly?} -- NO --> C1[Insert the connector securely.] Q1 -- YES --> Q2{Are the characteristics of thermistor OK? *3} Q2 -- NO --> C2[Replace thermistor (Tho-D1).] Q2 -- YES --> C3[Replace outdoor control PCB.] </pre> <p>*3 Check several times to prove any poor connection</p>	<p>Check and save the data of operating condition. Check the conditions whether it occurs immediately after the power on or during operation or stopping. Check the sensed value. Compare the temperature on Mente PC with actual measured value.</p>

Temperature-resistance characteristics of discharge pipe temperature thermistor (Tho-D1)

Temperature (°C)	Temperature thermistor resistance (kΩ)
0	180
20	100
40	60
60	40
80	30
100	25
120	22
140	21
160	20

Note:

Error code Remote control: E40 7-segment display: E40	LED	Green	Red	Content High pressure anomaly (63H1-1 activated)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

2. Error detection method

When high pressure switch 63H1-1 is activated.

3. Condition of error displayed

- If high pressure exceeds 4.15MPa
- If 63H1-1 is activated 5 times within 60 minutes
- If 63H1-1 is activated for 60 minutes continuously

4. Presumable cause

- Short-circuit of airflow at condenser side of heat exchanger/Disturbance of airflow/Clogging filter/Fan motor anomaly
- Disconnection of high pressure switch connector
- Breakage of high pressure switch harness
- Closed service valves
- High pressure sensor anomaly
- High pressure switch anomaly

5. Troubleshooting

Diagnosis	Countermeasure
<p>Save data for 30 minutes before stopping in Mente PC.</p> <pre> graph TD Q1{Was 63H1-1 activated at 4.15MPa or higher?} Q2{Does the sensed value of the high pressure sensor show 4.15MPa? (Normal?) } Q3{Are the 63H1-1 OK? Are the connector and/or harness OK? } Q4{Are the service valves fully open? } Q5{Is it stop at 4.15MPa of gauge pressure? } Q6{Is there any clogging in the refrigerant circuit? } Q1 -- YES --> Q3 Q1 -- NO --> Q2 Q2 -- YES --> Q3 Q2 -- NO --> CM1 Q3 -- YES --> Q4 Q3 -- NO --> CM2 Q4 -- YES --> B1[Connect a pressure gauge and restart operation.] Q4 -- NO --> CM3 B1 --> Q5 Q5 -- YES --> Q6 Q5 -- NO --> CM4 Q6 -- YES --> CM5 Q6 -- NO --> CM6 </pre>	<p>Check and save the data of operating condition. Check the sensed value of high pressure sensor when the 63H1-1 is activated. Check whether the high pressure switch is activated at the sensed value of high pressure sensor.</p> <p>High pressure sensor anomaly is suspicious. Check high pressure sensor itself according to the troubleshooting procedure of E54, after restarting operation. (If the high pressure sensor [PSH] fails, replace it)</p> <p>If the connector is disconnected or the harness is broken, correct it. Also check whether the high pressure switch is properly mounted or not. Check the open N phase on power source</p> <p>Open service valve.</p> <p>Check it, as much as possible, under the operating conditions for 30 minutes before error occurred.</p> <p>Replace outdoor control PCB.</p> <p>Remove clogs.</p> <p>Check items (condenser side):</p> <ul style="list-style-type: none"> • Filter clogging • Airflow volume (Fan motor) • Short-circuit of airflow

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

Error code Remote control: E41(E51) 7-segment display: E41(E51)-1	LED	Green	Red	Content <h2 style="text-align: center;">Power transistor overheat</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

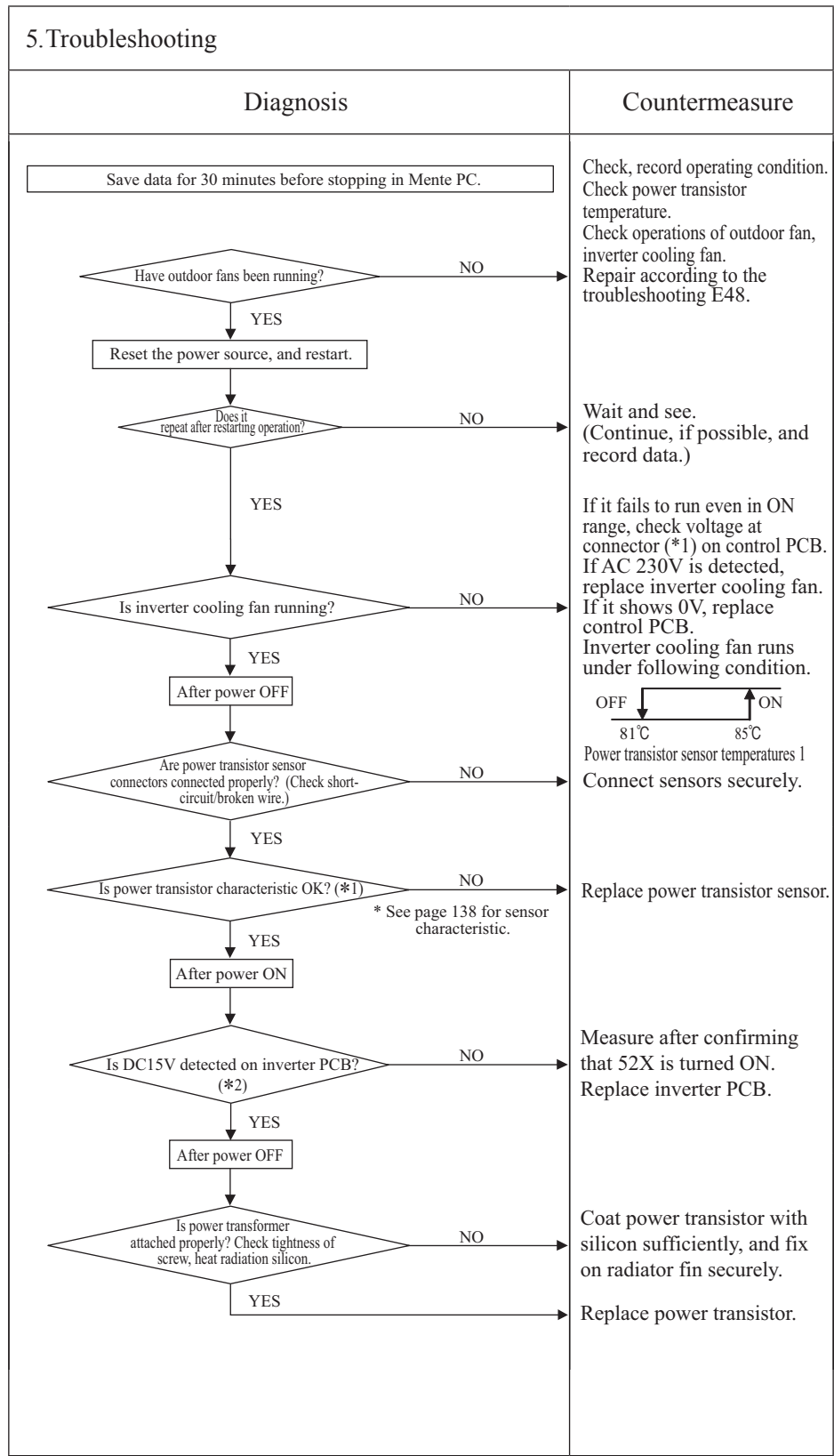
2. Error detection method

E41(E51)-1 is displayed on 7-segment LED.

3. Condition of error displayed

Anomalously high temperature of power transistor is detected 5 times within 60 minutes (E41). Or it is detected for 15 minutes continuously (E51).

- 4. Presumable cause**
- Power transistor anomaly
 - Power transistor temperature thermistor anomaly
 - Inverter PCB anomaly
 - Outdoor fan motor anomaly
 - Anomalous cooling fan motor for inverter



Note: *1 Measurement position: Between ① – ③ pins of CNN8
 *2 Measuring position: Between + and – of C19
 If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E42 7-segment display: E42-1	LED	Green	Red	Content <h2 style="text-align: center;">Current cut (CM1)</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Outdoor unit
2. Error detection method
When anomalously high output current of inverter is detected by the current sensor mounted in the power transistor.
3. Condition of error displayed
When 88A or higher output current of inverter is detected 4 times within 15 minutes.
4. Presumable cause
<ul style="list-style-type: none"> • Compressor anomaly • Leakage of refrigerant • Power transistor module anomaly • Anomalous power source for inverter PCB • Outdoor fan motor anomaly

5. Troubleshooting		
Diagnosis	Countermeasure	
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Save data for 30 minutes before stopping in Mente PC.</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Evaluate data 30 minutes earlier.</div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Check compressor coil, resistance, megavolt, motor insulation for anomaly. </div> <div style="margin-left: 10px;"> NO → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Is outdoor fan running? </div> <div style="margin-left: 10px;"> NO → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Reset the power source, and restart. </div> <div style="margin-left: 10px;"> YES → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Does it repeat? </div> <div style="margin-left: 10px;"> NO → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Is there inverter output? </div> <div style="margin-left: 10px;"> YES → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Is DC15V detected on inverter PCB? (*1) </div> <div style="margin-left: 10px;"> NO → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Check inverter PCB for defect with the checker. </div> <div style="margin-left: 10px;"> Power transistor error → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Check resistance between power transistor modules. (Is it short-circuited?) (*2) </div> <div style="margin-left: 10px;"> Short-circuited. → </div> </div> <div style="margin-bottom: 5px;"> ↓ </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 5px; flex: 1;"> Good → </div> <div style="margin-left: 10px;"> → </div> </div>		<p>Check, record operating condition. Check, record operating condition. Check pressure for anomaly.</p> <p>Replace compressor. Check oil separator cavity strainer. (Replace if necessary.)</p> <p>Repair according to the troubleshooting E48.</p> <p>Wait and see.</p> <p>Replace compressor.</p> <p>Measure after confirming that 52X is turned ON. Replace inverter PCB.</p> <p>Replace power transistor.</p> <p>Replace power transistor.</p> <p>Replace inverter PCB.</p>

Note: *1 Measurement position: Between + and - of C19
 *2 Measurement position: Check resistance between P-U, P-V, P-W, N-U, N-V, N-W, P-N. (Disconnect compressor wires before measurement).
 If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E43 7-segment display: E43-1, 2 *1	LED	Green	Red	Content Excessive number of indoor units connected, excessive total capacity of connection
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	*1	

*1 E43-1/1-time flash: Excessive number of indoor units connected, E43-2/2-time flash: Excessive capacity of connection

1. Applicable model
Outdoor unit
2. Error detection method
When the number of connected indoor units exceeds the limitation. When the total capacity of connected indoor units exceeds the limitation.
3. Condition of error displayed
<ul style="list-style-type: none"> Excessive number of connected indoor units Excessive total capacity of connected indoor units The total capacity of connected indoor units exceeds the limitation
4. Presumable cause
<ul style="list-style-type: none"> Mistake in setting of indoor/outdoor unit addresses Mistake in signal wire connection

5. Troubleshooting	
Diagnosis	Countermeasure
Save data for 30 minutes before stopping in Mente PC.	
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Caution: Address will not be confirmed, unless the power source is reset after changing address. </div> <pre> graph TD Start([Reset the power source.]) --> D1{Is E43 displayed?} D1 -- NO --> C1[Test run. No action is taken because it is judged that the power source reset was not done after changing address.] D1 -- YES --> D2{Does the number of indoor units connected and/or total capacity exceed limitation?} D2 -- YES --> C2[Check indoor unit addresses and correct. In case that total capacity of connected indoor units exceeds the limitation, if tentative operation is required turn ON the dip switch SW5-4 on the outdoor control PCB. (However since this tentative solution could cause trouble, be sure to correct it as soon as possible)] D2 -- NO --> D3{Are there any indoor units which is not expected to exist in that signal line?} D3 -- YES --> C3[Signal wire may be connected to other outdoor unit system. Correct the signal wire.] D3 -- NO --> C4[Check the resistance between A and B of signal line as well. General checking of indoor/outdoor unit addresses by means of: Outdoor unit: Mente PC, 7-Segment display and rotary switch (SW1, 2); Indoor unit: Remote control, rotary switch (SW1, 2, 3, 4). * It is recommended to use means other than the rotary switch which could be defective.] </pre>	
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Check the connected number of indoor units with 7-segment display code C40 or Mente PC with reference to the utilities drawing. (Check not only one system, but also other systems) </div> <div style="border: 1px solid black; padding: 5px;"> Check the resistance between A and B of signal line as well. </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Test run. No action is taken because it is judged that the power source reset was not done after changing address. </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Check indoor unit addresses and correct. In case that total capacity of connected indoor units exceeds the limitation, if tentative operation is required turn ON the dip switch SW5-4 on the outdoor control PCB. (However since this tentative solution could cause trouble, be sure to correct it as soon as possible) </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Signal wire may be connected to other outdoor unit system. Correct the signal wire. </div> <div style="border: 1px solid black; padding: 5px;"> Correct addresses. (Either one of addresses is wrong.) If the address corrected with rotary switch is still wrong, replace control PCB. (Defective rotary switch) </div>
<div style="border: 1px solid black; padding: 5px;"> General checking of indoor/outdoor unit addresses by means of: ◇ Outdoor unit: Mente PC, 7-Segment display and rotary switch (SW1, 2) ◇ Indoor unit: Remote control, rotary switch (SW1, 2, 3, 4) * It is recommended to use means other than the rotary switch which could be defective. </div>	
<div style="border: 1px solid black; padding: 5px;"> * Before replacement, please confirm whether the rotary switch for address setting is not damaged. (It was experienced that No. 5 on rotary switch was not recognized.) </div>	

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

Error code Remote control: E44 7-segment display: E44-1	LED	Green	Red	Content Liquid flooding anomaly (CM1)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Outdoor units
2. Error detection method
When 5°C or lower of the under-dome temperature superheat is detected for 15 minutes continuously or for 30 minutes continuously.
3. Condition of error displayed
When above anomaly is detected 3 times within 90 minutes.
4. Presumable cause
<ul style="list-style-type: none"> • Unmatching of refrigerant piping and/or signal wiring • Overcharging of refrigerant • Anomalous control of superheat • Anomalous circuit of liquid refrigerant by-pass • Anomalous refrigerant circuit of subcooling coil • Under-dome temperature (Tho-D1) anomaly

5. Troubleshooting	
Diagnosis	Countermeasure
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Save data for 30 minutes before stopping in Mente PC.</div>	
<p>Are there any wrong connection of refrigerant piping and/or signal wiring ?</p> <ul style="list-style-type: none"> • Check the numbers of connected indoor units recognized by outdoor unit in comparison with those numbers in utility drawing. 	<p>YES → Correct the connection of refrigerant piping and/or signal wiring properly.</p>
<p>NO</p> <p>Are there any excessive refrigerant charged at site?</p> <ul style="list-style-type: none"> • Check the calculation result of additional refrigerant charging amount and the record of additional refrigerant charged amount. 	<p>YES → Adjust refrigerant amount properly.</p>
<p>NO</p> <p>Are there any leakage of refrigerant through valve sheet of SV1?</p> <ul style="list-style-type: none"> • Check the temperature difference between before and after SV1. 	<p>YES → Replace SV1. Replace the coil of SV1.</p>
<p>NO</p> <p>Are there any fault in subcooling coil circuit ?</p> <ul style="list-style-type: none"> • Check whether the EEVSC is kept open (at cooling mode) • Check whether the thermistor of Tho-H is inserted in the thermistor holder properly. • Check whether the characteristics of Tho-H and PSL is OK. 	<p>YES →</p> <ul style="list-style-type: none"> • Replace EEVSC. • Check the coil of EEVSC → Replace the coil of EEVSC • Replace Tho-H. • Replace PSL.
<p>NO</p> <p>Is the superheat control of indoor unit OK at cooling mode?</p> <ul style="list-style-type: none"> • Check whether the indoor EEV is kept open or not. • Check whether ThI-R1, R2, R3 are installed at proper position or the characteristics of them are OK. • Check whether the air filter is clogged. • Check whether the indoor fan rotates. 	<p>NO →</p> <ul style="list-style-type: none"> • Replace indoor EEV. • Check the coil of EEV → Replace the coil of EEV. • Check the installed position of ThI-R1, R2, R3 → Replace ThI-R, if necessary. • Check the air filter. • Check the connection of indoor fan motor connector. Replace indoor fan motor * By checking ThI-R1, R2, R3 from indoor unit operation data of Mente PC, specify the indoor unit which tends to be liquid flooding (ThI-R3=ThI-R2 shows the probability of liquid flooding)
<p>YES</p> <p>Is the superheat control of outdoor unit OK at heating mode?</p> <ul style="list-style-type: none"> • Check whether EEVH1 is kept open or not. • Check whether Tho-R1, R2, R3, R4 are installed at proper position or the characteristics of them are OK. • Check whether the characteristics of PSL are OK. • Check whether the fin of outdoor heat exchanger is clogged with snow, ice or dust. • Check whether the outdoor fan rotates. 	<p>NO →</p> <ul style="list-style-type: none"> • Replace EEVH1, 2. • Check the coil of EEVH1, 2 → Replace the coil of EEVH1, 2. • Check the installed position of Tho-R1, R2, R3, R4 → Replace Tho-R, if necessary. • Clean the fin of outdoor heat exchanger. • Check the connection of outdoor fan motor connector Replace outdoor fan motor.
<p>YES</p> <p>Is the characteristics of Tho-C1 OK ?</p>	<p>NO → • Replace Tho-C1.</p> <p>YES → Correct the data with Mente PC and ask our consultation.</p>

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

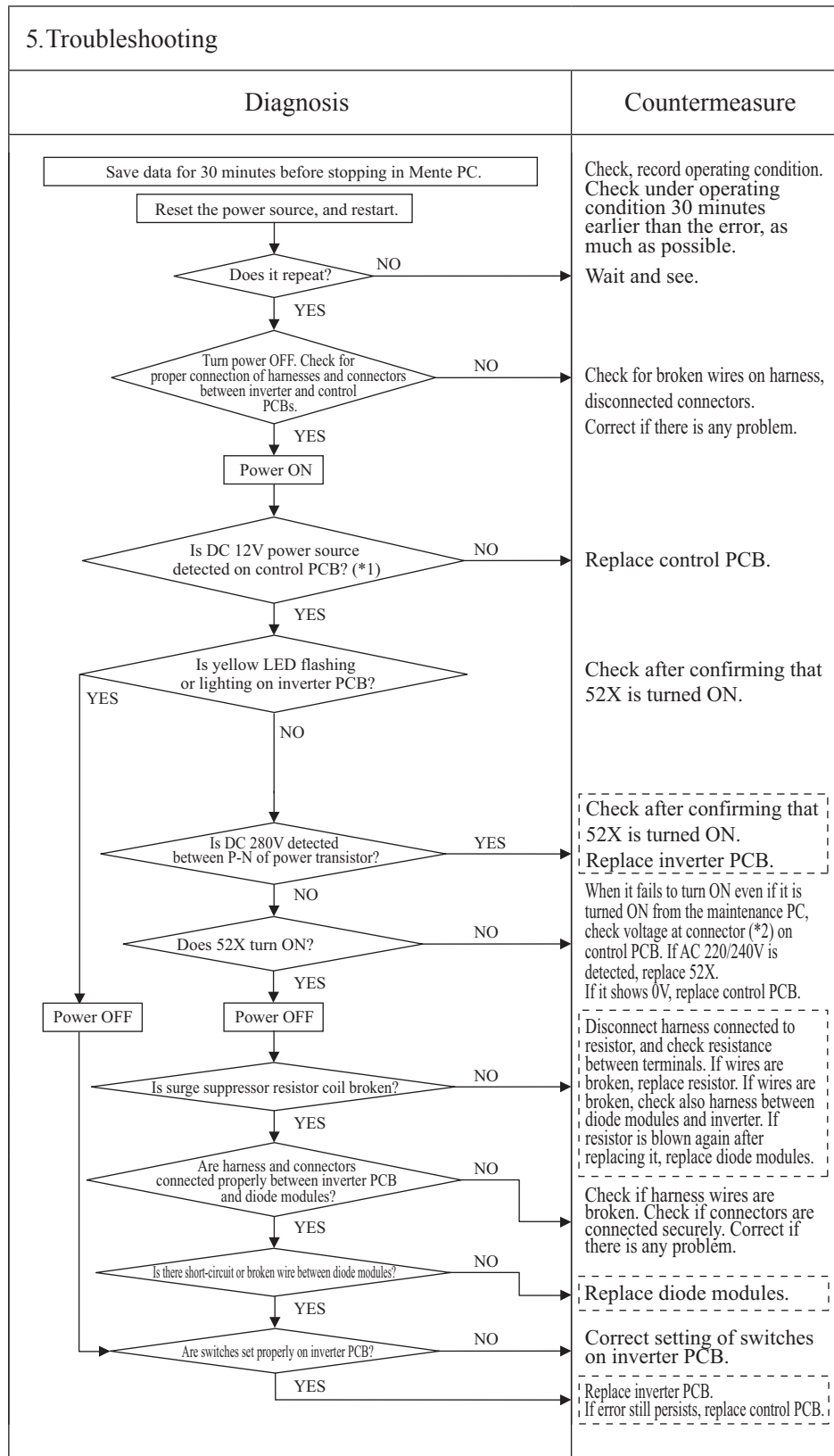
Error code Remote control: E45 7-segment display: E45-1	LED	Green	Red	Content Communication error between inverter PCB and outdoor control PCB
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Outdoor unit

2. Error detection method
E45-1 is displayed on 7-segment LED.

3. Condition of error displayed
When the communication between inverter PCB and outdoor control PCB is not established.

- 4. Presumable cause**
- Signal wire anomaly
 - Outdoor control PCB anomaly
 - Inverter PCB anomaly
 - Rush current prevention resistor anomaly
 - Defective 52X
 - Defective diode module



Note: *1 Measurement position: Between + and - of C21
 *2 Measurement position: Between pins ① - ③ of CNM1
 If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E46 7-segment display: E46	LED	Green	Red	Content Mixed address setting methods coexistent in same network
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	Stays OFF	

1. Applicable model

Outdoor unit

2. Error detection method

If the signal line of a outdoor unit system applied automatic address setting is connected to other outdoor unit system. (Detected at indoor unit side)

3. Condition of error displayed

Same as above.

4. Presumable cause

- Mistake in the address setting
- Mistake in the connection of signal wire

5. Troubleshooting

Diagnosis	Countermeasure									
<p>Save data for 30 minutes before stopping in Mente PC.</p> <p>Reset power source and restart.</p> <p>Does E46 recur?</p> <p>NO</p> <p>YES</p> <p>Isn't the signal line of a outdoor unit system applying automatic address setting connected to other outdoor unit system?</p> <p>YES</p> <p>NO</p> <p>If signal line is connected to more than 2 outdoor unit systems, address setting should be done by manually.</p> <p>Is E46 still displayed?</p> <p>NO</p> <p>YES</p> <p>Turn ON the power source of each outdoor unit one by one and search the outdoor unit that can start up with automatic address setting.</p> <p><Reference> Error display at mixed address setting</p> <table border="1"> <tr> <td></td> <td>Auto</td> <td>Manual</td> </tr> <tr> <td>Auto address setting</td> <td>E31</td> <td>E46</td> </tr> <tr> <td>Manual address setting</td> <td>E46</td> <td>Normal</td> </tr> </table>		Auto	Manual	Auto address setting	E31	E46	Manual address setting	E46	Normal	<p>Check and save the data of operating conditions. Check the address setting method of faulty network whether it is automatic setting or manual setting.</p> <p>Caution: Unless the power source is reset after changing address, the set address will not be confirmed.</p> <p>Test run. * No action is taken because it is judged that the power source rest is not done after changing address.</p> <p>Correct signal line. *In case of automatic address setting, signal line cannot be connected to other outdoor unit system.</p> <p>Test run.</p> <p>Replace outdoor control PCB*. (Rotary switch anomaly)</p> <p>* Before replacement, please confirm whether the rotary switch for address setting is not damaged. (It was experienced that No.5 on rotary switch was not recognized)</p>
	Auto	Manual								
Auto address setting	E31	E46								
Manual address setting	E46	Normal								

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

Error code Remote control: E48 7-segment display: E48-1, 2 *1	LED	Green	Red	Content <h2 style="text-align: center;">Outdoor DC fan motor anomaly(1/2)</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	*1	

*1 E48-1: 1-time flash (FMO1), E48-2 : 2-time flash (FMO2)

<p>1. Applicable model</p> <p>Outdoor unit</p>	<p>5. Troubleshooting (Inspect also the fan motor 2 even if it is E48-1.) (Inspect also the fan motor 1 even if it is E48-2.)</p>				
<p>2. Error detection method</p> <ul style="list-style-type: none"> • If 400 min⁻¹ or lower of the fan rotation command and the state of overcurrent are detected for 10 times continuously. (CNFAN terminal: Between ⑤ - ② pins ... Hi output ⇒ Overcurrent Lo output ⇒ Normal) • If 100 min⁻¹ of the actual fan rotation speed is detected for 30 seconds. 	<table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 60%;">Diagnosis</th> <th style="width: 40%;">Countermeasure</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"> </td> <td style="vertical-align: top;"> <p>Replace fan motor.</p> <p>Replace inverter PCB on 1 line. → When inverter PCB is replaced, check also items further than ※2 (see next page) (Checking of blown surge suppressor resistor coil and short-circuit on power transistor and diode).</p> <p>Replace fan motor.</p> <p>Replace faulty fan motor. If it changes E48-1 to E48-2 → Replace. If it changes E48-2 to E48-1 → Replace.</p> <p>Replace inverter PCB.</p> </td> </tr> </tbody> </table>	Diagnosis	Countermeasure		<p>Replace fan motor.</p> <p>Replace inverter PCB on 1 line. → When inverter PCB is replaced, check also items further than ※2 (see next page) (Checking of blown surge suppressor resistor coil and short-circuit on power transistor and diode).</p> <p>Replace fan motor.</p> <p>Replace faulty fan motor. If it changes E48-1 to E48-2 → Replace. If it changes E48-2 to E48-1 → Replace.</p> <p>Replace inverter PCB.</p>
Diagnosis	Countermeasure				
	<p>Replace fan motor.</p> <p>Replace inverter PCB on 1 line. → When inverter PCB is replaced, check also items further than ※2 (see next page) (Checking of blown surge suppressor resistor coil and short-circuit on power transistor and diode).</p> <p>Replace fan motor.</p> <p>Replace faulty fan motor. If it changes E48-1 to E48-2 → Replace. If it changes E48-2 to E48-1 → Replace.</p> <p>Replace inverter PCB.</p>				
<p>3. Condition of error displayed</p> <p>Speed of 400 min⁻¹ or less is commanded, and state of overcurrent is communicated.</p>	<p>4. Presumable cause</p> <ul style="list-style-type: none"> • Broken or disconnected wire • Faulty fan motor • Defective inverter PCB • Defective control PCB • Defective power transistor • Defective diode module • Defective surge suppressor resistor 				

Note: ※1 Measurement position: Between pins ① - ② of CN11 on control PCB
If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E48 7-segment display: E48-1, 2 *1	LED	Green	Red	Content <h2 style="text-align: center;">Outdoor DC fan motor anomaly(2/2)</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	*1	

*1 E48-1: 1-time flash (FMO1), E48-2 : 2-time flash (FMO2)

1. Applicable model	5. Troubleshooting (Inspect also the fan motor 2 even if it is E48-1.) (Inspect also the fan motor 1 even if it is E48-2.)		
Outdoor unit	Diagnosis	Countermeasure	
2. Error detection method	<pre> graph TD Start[From previous page] --> PowerOFF[Power OFF] PowerOFF --> D1{Does speed command voltage of control PCB rise gradually and stabilize after a rise of several V?} D1 -- NO --> C1[Replace control PCB.] D1 -- YES --> D2{Is surge suppressor resistor coil blown on any line?} D2 -- NO --> C2[Replace surge suppressor resistor on the line. (Disconnect harness from resistor, and measure resistance between terminals.)] D2 -- YES --> D3{Is power transistor or diode module short-circuited?} D3 -- NO --> C3[Replace power transistor or diode module on poorly insulated line. (For check method of short-circuit, see page 106.)] D3 -- YES --> C4[Replace No. 1 or 2 fan motor.] </pre>		
3. Condition of error displayed	Speed of 400 min ⁻¹ or less is commanded, and state of overcurrent is communicated.		
4. Presumable cause	<ul style="list-style-type: none"> • Broken or disconnected wire • Faulty fan motor • Defective inverter PCB • Defective control PCB • Defective power transistor • Defective diode module • Defective surge suppressor resistor 		

Note: ※1 Measurement position: Between + and - of C43, C45 on control PCB
 If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E49 7-segment display: E49	LED	Green	Red	Content <h2 style="text-align: center;">Low pressure anomaly</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Outdoor unit
2. Error detection method
Detection of anomalously low pressure.
3. Condition of error displayed
<ul style="list-style-type: none"> At start up after power on: When the low pressure sensor detects lower than 0.003MPa for 60 seconds continuously. And if this anomaly occurs 2 times. During operation: When the low pressure sensor detects 0.134MPa or lower for 30 seconds continuously. And if this anomaly occurs 5 times within 60 minutes.
4. Presumable cause
<ul style="list-style-type: none"> Low pressure sensor (PSL) anomaly Service valves closed EEV anomaly (EEV closed) Insufficient refrigerant amount Clogging at EEV or strainer

5. Troubleshooting	
Diagnosis	
<p>Save data for 30 minutes before stopping in Mente PC.</p> <p>Reset power source and restart.</p> <p>Does the error occur immediately after the startup?</p> <p>YES →</p> <p>NO →</p> <p>Does the low pressure fluctuate after the startup?</p> <p>NO →</p> <p>YES →</p> <p>Is the connection of sensor connector OK?</p> <p>NO →</p> <p>YES →</p> <p>Are the sensor characteristics OK?*1</p> <p>NO →</p> <p>YES →</p> <p>*1 The sensor characteristics is shown in page 137.</p> <p>Is the opening degree of EEV for evaporator side fluctuating?</p> <p>NO →</p> <p>YES →</p> <p>Is the checked result of harness and insulation of EEV coil OK?</p> <p>NO →</p> <p>YES →</p> <p>Is the connection of thermistor connector for heat exchanger OK?</p> <p>NO →</p> <p>YES →</p> <p>Are the thermistor characteristics OK?*2</p> <p>NO →</p> <p>YES →</p> <p>*2 The sensor characteristics is shown in page 123.</p> <p>Does the EEV operate normally by judging from Mente PC data, etc?</p> <p>NO →</p> <p>YES →</p> <p>Isn't EEV or strainer clogged?</p> <p>YES →</p> <p>NO →</p>	Countermeasure
	<p>Check and save the data of operating conditions Check error status. Is the refrigerant amount OK? Check additional refrigerant amount charged at site according to the piping length instructed on the label pasted on the panel of the unit.</p> <p>Check whether the service valves are open.</p> <p>Correct the connection of low pressure sensor connector.</p> <p>Replace low pressure sensor.</p> <p>Replace outdoor control PCB.</p> <p>Correct the connection of temperature thermistor connector of heat exchanger.</p> <p>Replace temperature thermistor of heat exchanger at evaporator side.</p> <p>Replace control PCB at evaporator side.</p> <p>Replace EEV coil.</p> <p>Replace EEV main body or strainer.</p> <p>Check for short circuit of airflow of heat exchanger at evaporator side and for fan motor anomaly.</p>

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.

Error code Remote control: E53/E55*1 7-segment display: E53/E55-1	LED	Green	Red	Content Suction pipe temperature thermistor anomaly (Tho-S), Under-dome temperature thermistor anomaly (Tho-C1)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

*1 E55-1 : Tho-C1

1. Applicable model Outdoor unit
2. Error detection method Detection of anomalously low temperature (resistance) of Tho-S or Tho-C1.
3. Condition of error displayed <ul style="list-style-type: none"> if -50°C or lower is detected for 5 seconds continuously within 2 minutes to 2 minutes 20 seconds after compressor ON, compressor stops. When the compressor is restarted automatically after 3-minutes delay, if this anomaly occurs 3 times within 40 minutes.
4. Presumable cause <ul style="list-style-type: none"> Broken thermistor harness or the internal wire of sensing section (Check the molded section as well) Disconnection of thermistor harness connection (connector) Outdoor control PCB anomaly

5. Troubleshooting	
Diagnosis	Countermeasure
Save data for 30 minutes before stopping in Mente PC.	
*1 Check several times to prove any poor connection.	
Temperature-resistance characteristics of suction pipe temperature thermistor (Tho-S)	Temperature-resistance characteristics of under-dome temperature thermistor (Tho-C1)

Note:

Error code Remote control: E54 7-segment display: E54-1, 2 *1	LED	Green	Red	Content High pressure sensor anomaly (PSH) Low pressure sensor anomaly (PSL)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	*1	

*1 E54-1: 1-time flash (PSL), E54-2 : 2-time flash (PSH)

1. Applicable model
Outdoor unit
2. Error detection method
Detection of anomalous pressure (voltage) of PSH or PSL. [Operation range High pressure : 0-4.15MPa Low pressure : 0-1.7MPa]
3. Condition of error displayed
If anomalous sensor output voltage (DC0V or lower or 3.49V or higher) is detected for 5 seconds within 2 minutes to 2 minutes 20 seconds after the compressor ON.
4. Presumable cause
<ul style="list-style-type: none"> • Broken sensor harness • Disconnection of sensor harness connection (connector) • Sensor (PSH, PSL) anomaly • Outdoor control PCB anomaly • Anomalous installation conditions • Insufficient airflow volume • Excessive or insufficient refrigerant amount

5. Troubleshooting	
Diagnosis	Countermeasure
<p>Save data for 30 minutes before stopping in Mente PC.</p> <p>Check the data for 30 minutes before stopping.</p> <p>Is anomalous pressure detected?</p> <p>NO → Reset the power source and restart operation.</p> <p>YES → Is the connector of the sensor inserted properly to the connector on the outdoor control PCB?</p> <p>NO → Insert the connector securely and restart operation.</p> <p>YES → Does E54 recur?</p> <p>NO → Temporary malfunction by noise. Correct if the source of noise is specified.</p> <p>YES → Does the pressure converted from the sensor output voltage match the actual pressure measure by pressure gauge?</p> <p>NO → Replace sensor (PSH, PSL)</p> <p>YES → Replace outdoor control PCB.</p>	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>High pressure sensor output characteristics</p> <p>Output voltage (V)</p> <p>Pressure (MPa)</p> </div> <div style="text-align: center;"> <p>Low pressure sensor output characteristics</p> <p>Output voltage (V)</p> <p>Pressure (MPa)</p> </div> </div> <p>Sensor output Black (GND) – White; Output voltage (Black – Red; DC5V)</p>	

Note:

Error code Remote control: E56 7-segment display: E56-1	LED	Green	Red	Content Power transistor temperature thermistor anomaly (Tho-P1)
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

2. Error detection method

Detection of anomalously low temperature (resistance) of Tho-P1.

3. Condition of error displayed

When the outdoor air temperature is above 0°C, if -10°C or lower is detected for 20 seconds continuously within 10 minutes to 10 minutes 30 seconds after compressor ON, compressor stops. When the compressor is restarted automatically after 3-minutes delay, if this anomaly occurs 3 times within 40 minutes.

- 4. Presumable cause**
- Broken thermistor harness or the internal wire of sensing section (Check the molded section as well)
 - Disconnection of thermistor harness connection (connector)
 - Outdoor control PCB anomaly

5. Troubleshooting

Diagnosis	Countermeasure																		
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <p>Is the connector of thermistor connected properly OK?</p> <p>NO → Insert the connector securely.</p> <p>YES → Are the characteristics of thermistor OK? ※1</p> <p>Note (1) Regarding the characteristics of the thermistor, see the following.</p> <p>NO → Replace power transistor temperature thermistor (Tho-P1).</p> <p>YES → Replace outdoor control PCB.</p> <p>※1 Check several times to prove any poor connection.</p> <p>Temperature-resistance characteristics of power transistor temperature thermistor (Tho-P1)</p> <table border="1"> <caption>Temperature-resistance characteristics of power transistor temperature thermistor (Tho-P1)</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature thermistor resistance (kΩ)</th> </tr> </thead> <tbody> <tr><td>0</td><td>180</td></tr> <tr><td>20</td><td>80</td></tr> <tr><td>40</td><td>40</td></tr> <tr><td>60</td><td>25</td></tr> <tr><td>80</td><td>15</td></tr> <tr><td>100</td><td>10</td></tr> <tr><td>120</td><td>8</td></tr> <tr><td>140</td><td>6</td></tr> </tbody> </table>	Temperature (°C)	Temperature thermistor resistance (kΩ)	0	180	20	80	40	40	60	25	80	15	100	10	120	8	140	6	<p>Check and save the data of operating condition. Check the conditions whether it occurs immediately after the power on or during operation or stopping. Check the sensed value. Compare the temperature of Mente PC data with actual measured value.</p>
Temperature (°C)	Temperature thermistor resistance (kΩ)																		
0	180																		
20	80																		
40	40																		
60	25																		
80	15																		
100	10																		
120	8																		
140	6																		

Note:

Error code Remote control: E58 7-segment display: E58-1	LED	Green	Red	Content <h2 style="text-align: center;">Anomalous compressor by loss of synchronism</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Outdoor unit
2. Error detection method
E58-1 is displayed on 7-segment LED.
3. Condition of error displayed
This anomaly is established 4 times within 15 minutes.
4. Presumable cause
<ul style="list-style-type: none"> • Insufficient time elapsed after the power supplied, before compressor startup. (Startup the compressor without crankcase heater ON) • Compressor anomaly • Inverter PCB anomaly • Power transistor anomaly

5. Troubleshooting	
Diagnosis	Countermeasure
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Evaluate data 30 minutes earlier.</div> <pre> graph TD Start([Start]) --> Save[Save data for 30 minutes before stopping in Mente PC.] Save --> Eval[Evaluate data 30 minutes earlier.] Eval --> Q1{Is it initial startup within 1 hour after power ON?} Q1 -- YES --> C1[Check, record operating condition.] Q1 -- NO --> Q2{Is there record of replacement of inverter PCB?} Q2 -- YES --> C2[Model setting may be wrong. Check setting of dip switches.] Q2 -- NO --> Q3{Is there poor connection on wires to compressor terminals?} Q3 -- NO --> C3[Replace wires. (If terminal block at compressor side is faulty, replace compressor.)] Q3 -- YES --> Turn[Turn power ON (after 1 hour if possible), and operate again.] Turn --> Q4{Does it repeat?} Q4 -- NO --> C4[Wait and see.] Q4 -- YES --> Q5{Is there inverter output? (*1)} Q5 -- YES --> C5[Replace compressor.] Q5 -- NO --> Q6{Is DC15V detected on inverter PCB?} Q6 -- NO --> C6[Measure after confirming that 52X is turned ON.] Q6 -- YES --> Q7{Check inverter PCB for defect with the checker.} Q7 -- Power transistor error --> C7[Replace power transistor.] Q7 -- Other (Including checker not available) --> Q8{Check resistance between power transistor modules. (Is it short-circuited?) (*2)} Q8 -- Short-circuited. --> C8[Replace power transistor.] Q8 -- Good --> C9[Replace inverter PCB.] </pre>	

Note: *1 Measurement position: Between + and - of C19
 *2 Measurement position: Check resistance between P-U, P-V, P-W, N-U, N-V, N-W, P-N. (Disconnect wires from compressor beforehand.)
 If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E59 7-segment display: E59-1	LED	Green	Red	Content <h2 style="text-align: center;">Compressor startup failure (CM1)</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model

Outdoor unit

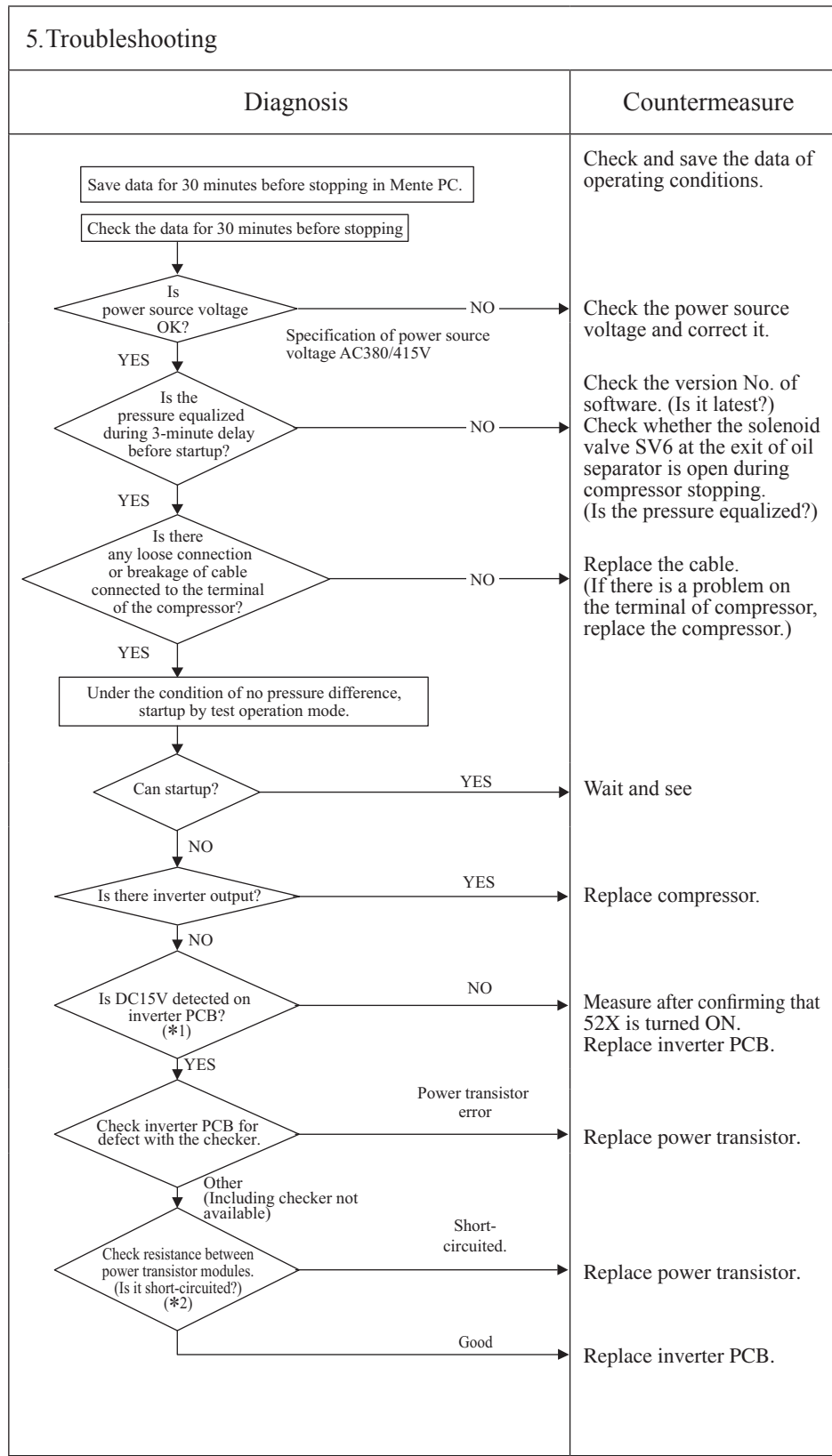
2. Error detection method

When it fails to change over to the operation for rotor position detection of compressor motor. (If the compressor speed cannot increase 11Hz or higher)

3. Condition of error displayed

If the compressor fails to startup for 20 times (10 patterns x 2 times) continuously.

- 4. Presumable cause**
- Anomalous voltage of power source
 - Anomalous components for refrigerant circuit
 - Inverter PCB anomaly
 - Loose connection of connector or cable
 - Compressor anomaly (Motor or bearing)



Note: *1 Measurement position: Between + and - of C19
 *2 Measurement position: Check resistance between P-U, P-V, P-W, N-U, N-V, N-W, P-N. (Disconnect wires from compressor beforehand.)
 If it fails to repeat, connect the Mente PC, and continue to collect data.

Error code Remote control: E61 7-segment display: E61-1, 2 *1	LED	Green	Red	Content Communications error between the master unit and slave units
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	*1	

*1 E61-1/1-time flash: Slave unit 1, E61-2/2-time flash: Slave unit 2

1. Applicable model Outdoor unit	5. Troubleshooting		
2. Error detection method E61-1,2 is displayed on 7-segment LED.	Diagnosis	Countermeasure	
3. Condition of error displayed When the communication between master unit and slave units is not established.	<pre> graph TD Q1{Is the address setting of master and slave outdoor units OK?} Q1 -- NO --> C1[Correct.] Q1 -- YES --> P1[Reset the power source and restart operation.] P1 --> Q2{Is E61 occur?} Q2 -- NO --> C2[Replace the outdoor unit PCB.] Q2 -- YES --> C3[Anomalous noise, etc.] </pre>		
4. Presumable cause <ul style="list-style-type: none"> • Signal wire anomaly • Outdoor control PCB anomaly • Inverter PCB anomaly • Rush current prevention resistor anomaly 			

Note:

Error code Remote control: E63 7-segment display: E63	LED	Green	Red	Content <h2 style="text-align: center;">Emergency stop</h2>
	Indoor	Keeps flashing	Stays OFF	
	Outdoor	Keeps flashing	1-time flash	

1. Applicable model
Indoor unit

2. Error detection method
When ON signal is inputted to the CnT terminal of indoor control PCB.

3. Condition of error displayed
Same as above

4. Presumable cause
Factors for emergency stop

5. Troubleshooting	
Diagnosis	Countermeasure
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Save data for 30 minutes before stopping in Mente PC.</div> <pre> graph TD A{Is the remote controller setting of emergency stop "Valid"?} -- NO --> B[Replace remote control PCB.] A -- YES --> C{Is ON signal inputted to the CnT terminal of indoor control PCB?} C -- NO --> D[Replace indoor control PCB.] C -- YES --> E[Check the cause of emergency stop. (It is better to have the data for 30 minutes before stopping, when instructing the installer)] </pre>	
	Check and save the data of operating conditions. Check the conditions whether it occurs immediately after the power on or during operation.

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

9.4 Outdoor unit control PCB replacement procedure

PCB012D046A

Precautions for safety

- Since the following precaution is the important contents for safety, be sure to observe them.

WARNING and CAUTION are described as follows:

⚠ WARNING

Indicates an imminently hazardous situation which will result in death or serious injury if proper safety procedures and instructions are not adhered to.

⚠ CAUTION

Indicates a potentially hazardous situation which may result in minor or moderate injury if proper safety procedures and instructions are not adhered to.

⚠ WARNING

- Securely replace PCB according to this following instruction.
If PCB is incorrectly replace, it will cause an electric shock or fire.
- Be sure to check that the power source for the outdoor unit is turned OFF before replacing PCB, The PCB replacement under current-carrying will cause an electric shock.
- After finishing PCB replacement, check that wiring is correctly connected with the PCB before power distribution.
If the PCB is incorrectly replaced, it will cause an electric shock or fire.

⚠ CAUTION

- Bundle the wiring so as not to tense because it will cause an electric shock.

Exchange the control PCB according to the following procedure.

1. Exchange the PCB **after elapsing 3 minutes from power OFF.**

(Be sure to measure voltage (DC) and check that the voltage is discharged sufficiently. (Refer to Fig.2))

2. Disconnect the connectors from the PCB.
3. Disconnect the blue wiring passing through CT1 and CT2 on the PCB before exchanging the PCB.
4. Match the setting switches (SW1-6) and jumper wires (J11-J16) with the former PCB.
5. Tighten up a screw after passing blue wiring through CT1 and CT2 of the changed. (If the CT2 is not assembled, only CT1.)
6. Connect the connectors to the PCB. (Confirm the **connectors are not half inserted.**)

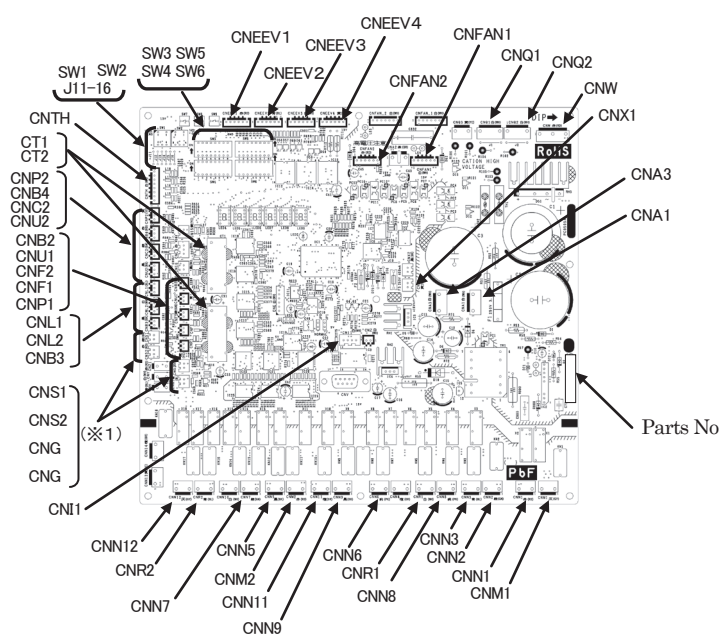


Fig.1 Parts arrangement

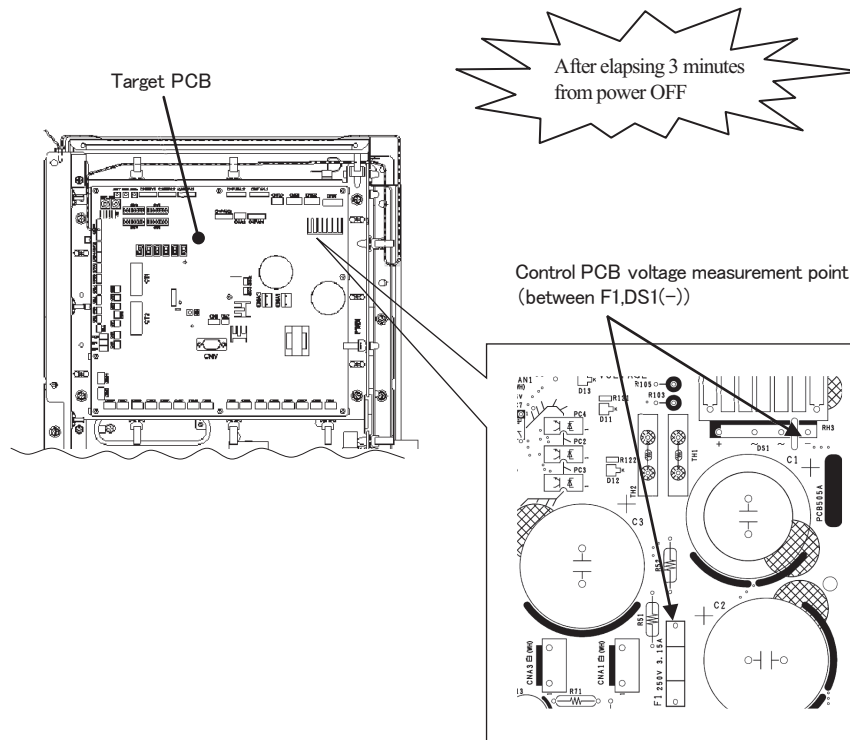


Fig.2 Voltage measurement points

※1 : Reuse the parts used before the PCB exchange.

※2 : Because spare PCB is commonized, by the model , extra connectors is implemented, compared with the former PCB.

When connecting the connectors after exchanging the PCB, check the color and name of the connectors, please note the faulty connections.



9.5 Outdoor unit inverter PCB replacement procedure

PCB012D057B

Precautions for safety

- Since the following precaution is the important contents for safety, be sure to observe them.

WARNING and CAUTION are described as follows:

-  **WARNING** Indicates an imminently hazardous situation which will result in death or serious injury if proper safety procedures and instructions are not adhered to.
-  **CAUTION** Indicates a potentially hazardous situation which may result in minor or moderate injury if proper safety procedures and instructions are not adhered to.

WARNING

- Securely replace PCB according to this procedure.
If the PCB is incorrectly replace, it will cause an electric shock or fire.
- Be sure to check that the power source for the outdoor unit is turned OFF before replacing the substrate.
The PCB replace under current-carrying will cause an electric shock of fire.
- After finishing the PCB replacement, check that wiring is correctly connected with the PCB before power distribution. If the PCB is incorrectly replaced, it will cause an electric shock or fire.

CAUTION

- Bundle the wiring so as not to tense because it will cause an electric shock.

Exchange the inverter PCB according to the following procedure.

1. Exchange the PCB after elapsing 3 minutes from power OFF.
(Be sure to measure voltage (DC) of two place ((A),(B)) and check that the voltage is discharged sufficiently.)
(Refer to Fig 3)
2. Disconnect the connectors from the PCB.
3. Exchange the PCB.
4. Match the setting switches (JSW10,11) with the former PCB.
5. Connect the connectors, wiring, and snubber capacitor. (Confirm the connectors are not half inserted.)

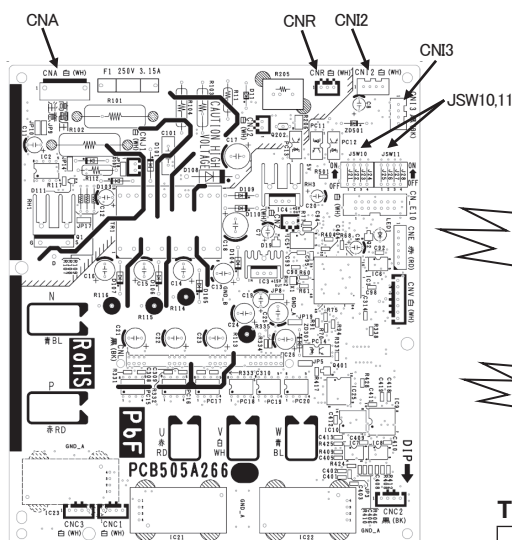


Fig.1 Parts arrangement

After elapsing 3 minutes from power OFF

Connectors are not half inserted

Table: Switch setting

JSW10	-1	OFF	JSW11	-1	ON
	-2	ON		-2	ON
	-3	OFF		-3	OFF
	-4	OFF		-4	OFF

(A) Control PCB voltage measurement points

(B) Inverter PCB (INV1,2) voltage measurement points

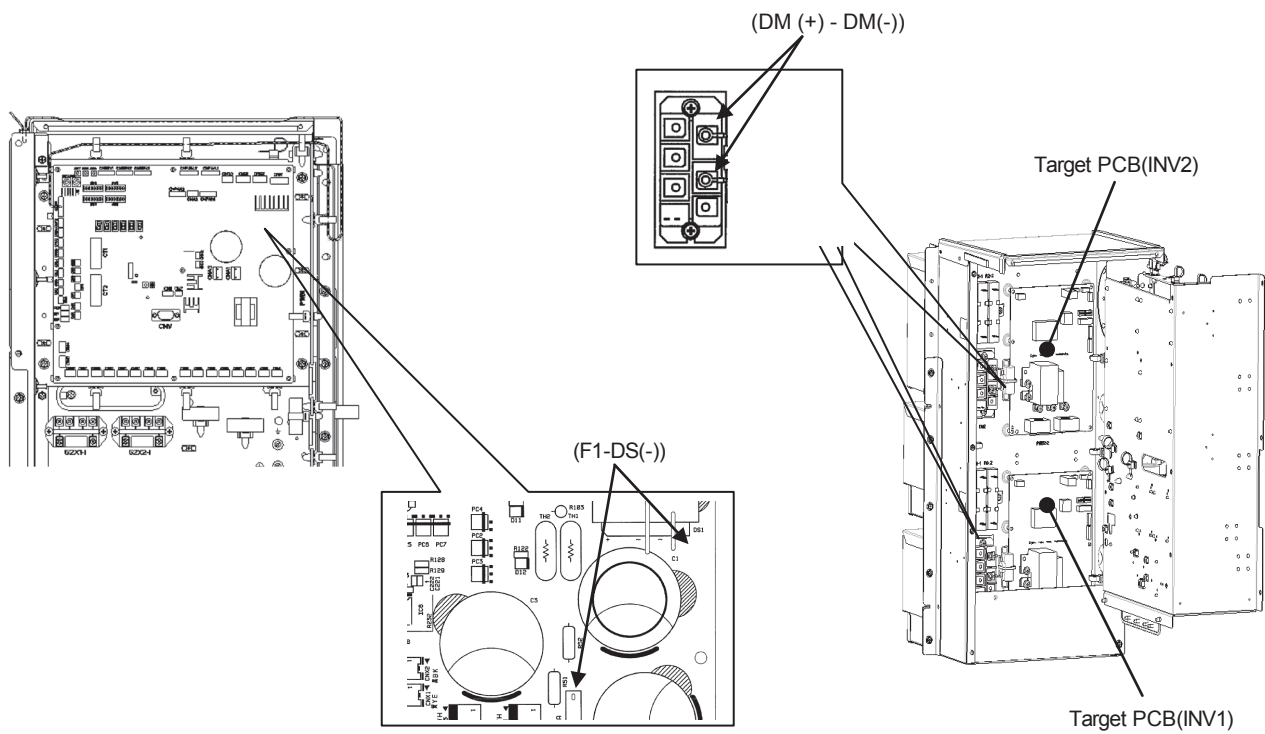
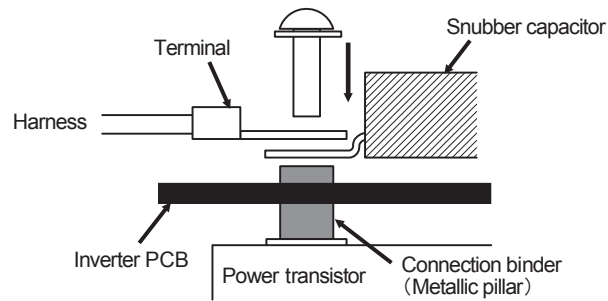


Fig.2 Voltage measurement points



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.
 (Set the harness wires to be fixed to "U" and "W" with screws in respective holes after passing them through IC21 and 22.)
 (Connect snubber capacitor with "P" and "N".)

Fig.3 Installation method to power transistor

9.6 Outdoor unit transistor module replacement procedure

PCB012D043C

Precautions for safety

- Since the following precaution is the important contents for safety, be sure to observe them.

WARNING and CAUTION are described as follows:



WARNING

Indicates an imminently hazardous situation which will result in death or serious injury if proper safety procedures and instructions are not adhered to.



CAUTION

Indicates a potentially hazardous situation which may result in minor or moderate injury if proper safety procedures and instructions are not adhered to.

⚠ WARNING

- Securely exchange the transistor module according to this procedure. If the transistor module is incorrectly exchanged, it will cause an electric shock or fire.
- Be sure to check that the power source for the outdoor unit is turned OFF before exchanging the transistor module. The transistor module exchange under current-carrying will cause an electric shock.
- After finishing the transistor module exchange, check that wiring is correctly connected with the transistor module before power distribution. If the transistor module is incorrectly exchanged, it will cause an electric shock or fire.

⚠ CAUTION

- Band the wiring so as not to tense because it will cause an electric shock.

Exchange the transistor module according to the following procedure.

- Exchange the transistor module **after elapsing 3 minutes from power OFF.**
(Be sure to measure voltage (DC) on both capacitor terminals (P, N of transistor module or connector terminals of fan motor power etc.) , **and check that the voltage is discharged sufficiently.**)
- Disassemble the control box.
- Disconnect with the wire (U, V, W, P, N) to the transistor module. (Refer to Fig.1 Parts arrangement view)
- Pull up the inverter PCB from transistor module. Remove transistor module after removing the screw for transistor module.
- Attach the transistor module. Coat the transistor module where its reverse-side all over with accessories silicone grease uniformly.
- Set the inverter PCB with make sure of connect connector.
- Connect with the wire (U, V, W, P, N) to the transistor module.
- Assemble the control box as before.

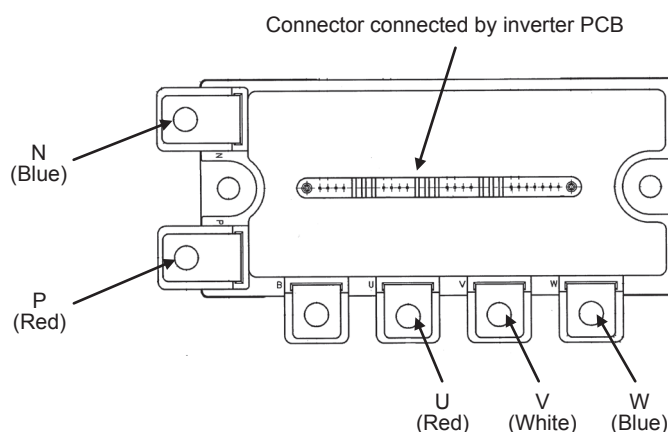


Fig.1 Parts arrangement view

■ Function of Dip switch for control (SW3, 4, 5)

- SW3 (Function setting)

Switch		Function	
SW3-1	ON	Inspection LED reset	
	OFF	Normal	
SW3-2	ON	Auto backup operation	
	OFF	Normal	
SW3-4	ON	Refrigerant quantity check	
	OFF	Normal	
SW3-5	ON	Check operation start	
	OFF	Normal	
SW3-7	ON	Forced cooling/heating	
	OFF	Normal	

■ Function of Jumper wire (J13-15) (With: Shorted / None: Opened)

Jumper		Function	
J13	With	External input	Level input
	None	External input	Pulse input
J14	With	Defrost start temperature	Normal
	None	Defrost start temperature	Intensive
J15	With	Defrost start temperature	Normal
	None	Defrost start temperature	Cold weather region

- SW4 (Model selection)

Switch Model	SW4					
	-1	-2	-3	-4	-5	-6
FDCB224	OFF	OFF	OFF	OFF	OFF	ON
FDCB280	ON	OFF	OFF	OFF	OFF	ON
FDCB335	OFF	ON	OFF	OFF	OFF	ON

- SW4 (Master/Slave setting)

Outdoor unit	SW4-7	SW4-8
Master unit	OFF	OFF
Slave unit1	ON	OFF
Slave unit2	OFF	ON

- SW5 (Function setting)

Switch		Function	
SW5-1	ON	Test run switch	Test run
	OFF	Test run switch	Normal
SW5-2	ON	Test run operation mode	Cooling
	OFF	Test run operation mode	Heating
SW5-3	ON	Pump down switch	Pump down
	OFF	Pump down switch	Normal
SW5-5	ON	Superlink protocol : Previous SL	
	OFF	Superlink protocol : New SL	

- SW1,2,7,8,9 (Function setting)

Switch	Function	
SW1	Outdoor address No.	Order of 10
SW2	Outdoor address No.	Order of 1
SW7	Data erase/data write	
SW8	7-segment display No. UP	Order of 1
SW9	7-segment display No. UP	Order of 10

■ Function of Connection

(1) Control PCB input

Mark	Connector	Function
Tho-A	CNTH	Outdoor air thermistor
Tho-R1	CNTH	Heat exchanger thermistor 1 (Exit, Front)
Tho-R2	CNB2	Heat exchanger thermistor 2 (Exit, Rear)
Tho-R3	CNB3	Heat exchanger thermistor 3 (Inlet, Front)
Tho-R4	CNB4	Heat exchanger thermistor 4 (Inlet, Rear)
Tho-D1	CNTH	Discharge pipe thermistor 1(CM1)
Tho-C1	CNU1	Under-dome thermistor 1(CM1)
Tho-P1	CNP1	Power transistor thermistor 1(CM1)
Tho-S	CNTH	Suction pipe thermistor
Tho-SC	CNF1	Subcooling coil thermistor 1
Tho-H	CNF2	Subcooling coil thermistor 2
CT1		Current sensor (CM1)
PSH	CNL1	High pressure sensor
PSL	CNL2	Low pressure sensor
63H1-1	CHQ1	High pressure switch (CM1)
	CNS1	External operation input
	CNS2	Demand input
	CNG1	Forced operation input cooling/heating
	CNG2	Silent mode input
Power source	CNW	Open phase detection 380-415V

(2) Control PCB output

Mark	Connector	Function
52X1	CNM1	Solenoid for CM1
20S	CNN1	4-way valve
SV6	CNN2	Solenoid valve (oil return CM1)
SV1	CNN6	Solenoid valve (CM1:liquid bypass)
FMC1	CNN8	Fan for IPM
SV11	CNN9	Solenoid valve (gas bypass)
CH1	CNR1	Crankcase heater (CM1)
52XR	CnH	Operation output
52XE	CnY	Error output
	CnZ1	Spare
	CnE	RAM Checker output
	CnV	For servicing (for rewriting soft ware)
LED1		Inspection (Red)
LED2		Inspection (Green)
LED3		For service (Green)
7 SEG 1		7-segment LED1 (function indication)
7 SEG 2		7-segment LED2 (data indication)
EEVH1	CNEEV1	EEVH1 for heating (Front)
EEVH2	CNEEV3	EEVH2 for heating (Rear)
EEVSC	CNEEV2	EEV-SC for Subcooling coil
Power source	CNA1,3	Fan motor

(3) Control PCB input/output

Mark	Connector	Function
FM01	CNFAN1-1	DC 15 V output (Vcc)
	-2	Reverse turn detection output (REV)
	-3	Speed command output (Vsp)
	-4	RPM monitor input (FG)
	-5	Over-current error input (OverC)
	-6	GND
FM02	CNFAN2-1	DC 15 V output (Vcc)
	-2	Reverse turn detection output (REV)
	-3	Speed command output (Vsp)
	-4	RPM monitor input (FG)
	-5	Over-current error input (OverC)
	-6	GND
	CnI1	Inverter protocol
	CnX1	Superlink protocol
	CnX2	Spare for Superlink protocol

VRF INVERTER MULTI-SYSTEM AIR-CONDITIONERS



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