Manual No. '14・KX-DB-203

MHI

DATA BOOK

VRF INVERTER MULTI-SYSTEM AIR-CONDITIONERS

KXZ Outdoor units

Hi-COP series

- **Single use (Used also for combination)**
  FDC224KXZXE1, 280KXZXE1, 335KXZXE1
- **Combination use**
  FDC450KXZXE1, 500KXZXE1, 560KXZXE1, 615KXZXE1, 670KXZXE1, 735KXZXE1, 800KXZXE1, 850KXZXE1, 900KXZXE1, 950KXZXE1, 1000KXZXE1

・Note:
(1) Regarding the indoor unit series, refer to the No.'14・KX-DB-206.

MITSUBISHI HEAVY INDUSTRIES, LTD.

PREFACE

Combination table for KX4, KX6 and KXZXE1 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	KXE4R KXE4BR KXE5R	
			2-wire type	RC-E3 RC-E4 RC-E5 RC-EX1A				KXE6 KXE6A KXE6B KXE6D KXE6F	KXE6 KXE6A KXE6B KXE6D KXE6F		KXE6 KXE6A KXE6B KXE6D KXE6F	KXE6 KXE6A KXE6B KXE6D KXE6F
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]
	FDC-KXZXE1	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	KXZXE1	KXE6		Ⅱ (New)	New (for KXZXE1/KXE6)	New (for KXZXE1/KXE6)
YES[B]*2	KXE6	KXE6		Ⅱ (New)	New (for KXZXE1/KXE6)	New (for KXZXE1/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 KXZXE1 (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.

CONTENTS

1. GENERAL INFORMATION

1.1 Specific features

Connectable indoor capacity

Capacity from 80% to 200% or 160% is possible.

Item / Model	Number of connectable units	Connectable capacity
FDC224KXZXE1	1 to 29	180 — 448
FDC280KXZXE1	1 to 37	224 — 560
FDC335KXZXE1	1 to 44	268 — 670
FDC450KXZXE1	2 to 60	360 — 900
FDC500KXZXE1	2 to 53	400 — 800
FDC560KXZXE1	2 to 59	448 — 896
FDC615KXZXE1	2 to 65	492 — 984
FDC670KXZXE1	2 to 71	536 — 1072
FDC735KXZXE1	3 to 78	588 — 1176
FDC800KXZXE1	3 to 80	640 — 1280
FDC850KXZXE1	3 to 80	680 — 1360
FDC900KXZXE1	3 to 80	720 — 1440
FDC950KXZXE1	3 to 80	760 — 1520
FDC1000KXZXE1	3 to 80	800 — 1600

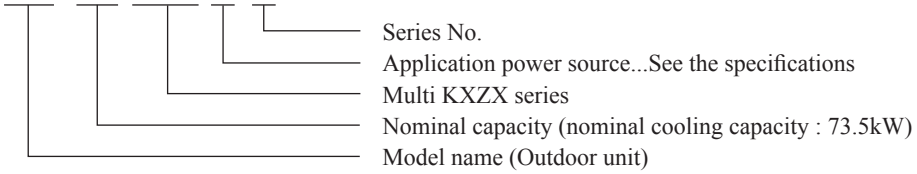
Note

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

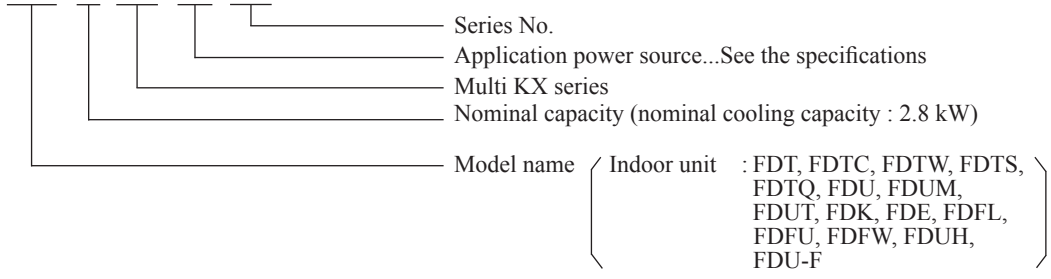
(1) Outdoor unit

Example: FDC 735 KXZX E 1



(2) Indoor unit

Example: FDT 28 KX E 6F



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 (FDFL)							○						
Floor standing (without casing) type (FDFU)			○		○	○	○						
Floor standing-2 way type (FDFW)		○		○	○								
Duct connected-compact and Flexible type (FDUH)		○	○	○									
Outdoor air processing unit (FDU-F)								○ (500)		○ (850)		○ (1300)	○ (1800)
Outdoor units to be combined (FDC)	FDC224KXZXE1-FDC1000KXZXE1												

Note (1) Reference No. of data book : ’14·KX-DB-206

1.4 Outdoor units combination table

Item / Models	Combination outdoor unit models			Indoor unit	
	FDC224 KXZXE1	FDC280 KXZXE1	FDC335 KXZXE1	Connectable capacity	Number of connectable units
FDC450KXZXE1	2	-	-	360 – 900	2 to 60 units
FDC500KXZXE1	1	1	-	400 – 800	2 to 53 units
FDC560KXZXE1	-	2	-	448 – 896	2 to 59 units
FDC615KXZXE1	-	1	1	492 – 984	2 to 65 units
FDC670KXZXE1	-	-	2	536 – 1072	2 to 71 units
FDC735KXZXE1	2	1	-	588 – 1176	3 to 78 units
FDC800KXZXE1	1	2	-	640 – 1280	3 to 80 units
FDC850KXZXE1	-	3	-	680 – 1360	3 to 80 units
FDC900KXZXE1	-	2	1	720 – 1440	3 to 80 units
FDC950KXZXE1	-	1	2	760 – 1520	3 to 80 units
FDC1000KXZXE1	-	-	3	800 – 1600	3 to 80 units

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

Outdoor unit	Branch pipe set
For two units (for FDC450KXZXE1-670KXZXE1)	DOS-2A-3
For three units (for FDC730KXZXE1-1000KXZXE1)	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 Specifications

• **Single use (Used also for combination)**

Models			FDC224KXZXE1	FDC280KXZXE1	FDC335KXZXE1
Nominal cooling capacity *1		kW	22.4	28.0	33.5
Nominal heating capacity *2		kW	25.0	31.5	37.5
Power source			3 Phase 380-415V 50Hz / 380V 60Hz		
Power consumption	Cooling	kW	4.98	6.95	8.68
	Heating		5.56	6.83	8.39
Running current	Cooling	A	8.7 / 8.0	11.7 / 10.7	14.7 / 13.4
	Heating		9.6 / 8.8	11.7 / 10.7	14.3 / 13.1
Power factor	Cooling	%	87 / 87	90 / 90	90 / 90
	Heating		88 / 88	89 / 89	89 / 89
Sound pressure level		dB(A)	56 / 57	56 / 56	62 / 57
Exterior dimensions Height × Width × Depth		mm	1690×1350×720	2048×1350×720	
Net weight		kg	280	325	
Refrigerant equipment Compressor type & Q'ty			GTC5150NC47LF×1	GUC5185ND47V×1	
Motor		kW	3.23×1	4.60×1	5.72×1
Starting method			Direct line starting		
Crankcase heater		W	33×1	40×1	
Refrigerant equipment Heat exchanger			M fin & inner grooved tubing		
Refrigerant control			Electronic expansion valve		
Refrigerant			R410A		
Quantity		kg	11.0	11.5	
Refrigerant oil		l	2.25(M-MA32R)	2.9(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)		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 Refrigerant piping size		mm(in)	Liquid line:φ9.52(3/8")		Liquid line:φ12.7(1/2")
			Gas line:φ19.05(3/4")	Gas line:φ22.22(7/8")	Gas line:φ25.4(1") (φ22.22(7/8"))
Connecting method			Gas line:Brazing / Liquid line:Flare		
MAX. Pressure		MPa	High 4.15 Low 2.21		
Drain			Hole for drain (φ20 × 10pcs , φ45 × 3pcs)		
Insulation for piping			Necessary (both Liquid & Gas lines)		
Accessories			-	-	-
Exterior dimensions			PCB003Z858	PCB003Z859	PCB003Z859
Electrical wiring			PCB003Z860	PCB003Z861	PCB003Z861

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

Item	Indoor air temperature		Outdoor air temperature		Standards
Operation	DB	WB	DB	WB	
Cooling*1	27 ℃	19 ℃	35 ℃	24 ℃	ISO-T1
Heating*2	20 ℃	-	7 ℃	6 ℃	

Adapted to RoHS directive

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

(3) Refrigerant piping size applicable to European installations are shown in parentheses.

PCB003Z839

Models			FDC450KXZXE1	FDC500KXZXE1	FDC560KXZXE1	FDC615KXZXE1	FDC670KXZXE1
Combination unit			FDC224KXZXE1	FDC224KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC335KXZXE1
			FDC224KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC335KXZXE1	FDC335KXZXE1
Power source			3 Phase 380-415V 50Hz / 380V 60Hz				
Nominal cooling capacity *1		kW	45.0	50.0	56.0	61.5	67.0
Nominal heating capacity *2		kW	50.0	56.0	63.0	69.0	75.0
Power consumption	Cooling	kW	10.0	11.8	13.9	15.6	17.4
	Heating	kW	11.1	12.3	13.7	15.2	16.8
Running current	Cooling	A	17.5 / 16.0	20.0 / 18.5	23.5 / 21.5	26.4 / 24.1	29.3 / 26.8
	Heating	A	19.2 / 17.6	21.2 / 19.4	23.3 / 24.4	26.0 / 23.8	28.6 / 26.2
Power factor	Cooling	%	87 / 87	89 / 89	90 / 90	90 / 90	90 / 90
	Heating	%	88 / 88	88 / 88	89 / 89	89 / 89	89 / 89
Net weight		kg	560	605	650	650	650
Refrigerant piping size	Liquid line	mm	ϕ12.7				
	Gas line	mm	ϕ28.58				
	Oil equalization	mm	ϕ9.52				

Models			FDC735KXZXE1	FDC800KXZXE1	FDC850KXZXE1	FDC900KXZXE1	FDC950KXZXE1	FDC1000KXZXE1
Combination unit			FDC224KXZXE1	FDC224KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC335KXZXE1
			FDC224KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC335KXZXE1	FDC335KXZXE1
			FDC280KXZXE1	FDC280KXZXE1	FDC280KXZXE1	FDC335KXZXE1	FDC335KXZXE1	FDC335KXZXE1
Power source			3 Phase 380-415V 50Hz / 380V 60Hz					
Nominal cooling capacity*1		kW	73.5	80.0	85.0	90.0	95.0	100.0
Nominal heating capacity*2		kW	82.5	90.0	95.0	100.0	106.0	112.0
Power consumption	Cooling	kW	17.1	19.3	21.1	22.7	24.3	25.9
	Heating	kW	18.2	19.7	20.6	21.9	23.5	25.1
Running current	Cooling	A	29.4 / 27.0	32.9 / 30.1	35.6 / 32.6	38.4 / 35.1	41.0 / 37.6	43.7 / 40.0
	Heating	A	31.4 / 28.7	33.5 / 30.7	35.2 / 32.2	37.4 / 34.3	40.1 / 36.7	42.8 / 39.2
Power factor	Cooling	%	88 / 88	89 / 89	90 / 90	90 / 90	90 / 90	90 / 90
	Heating	%	88 / 88	89 / 89	89 / 89	89 / 89	89 / 89	89 / 89
Net weight		kg	885	930	975	975	975	975
Refrigerant piping size	Liquid line	mm	ϕ15.88					
	Gas line	mm	ϕ31.75(ϕ34.92)					ϕ38.1
	Oil equalization	mm	ϕ9.52					

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

Item	Indoor air temperature		Outdoor air temperature		Standards
Operation	DB	WB	DB	WB	
Cooling*1	27 ℃	19 ℃	35 ℃	24 ℃	ISO-T1
Heating*2	20 ℃	-	7 ℃	6 ℃	

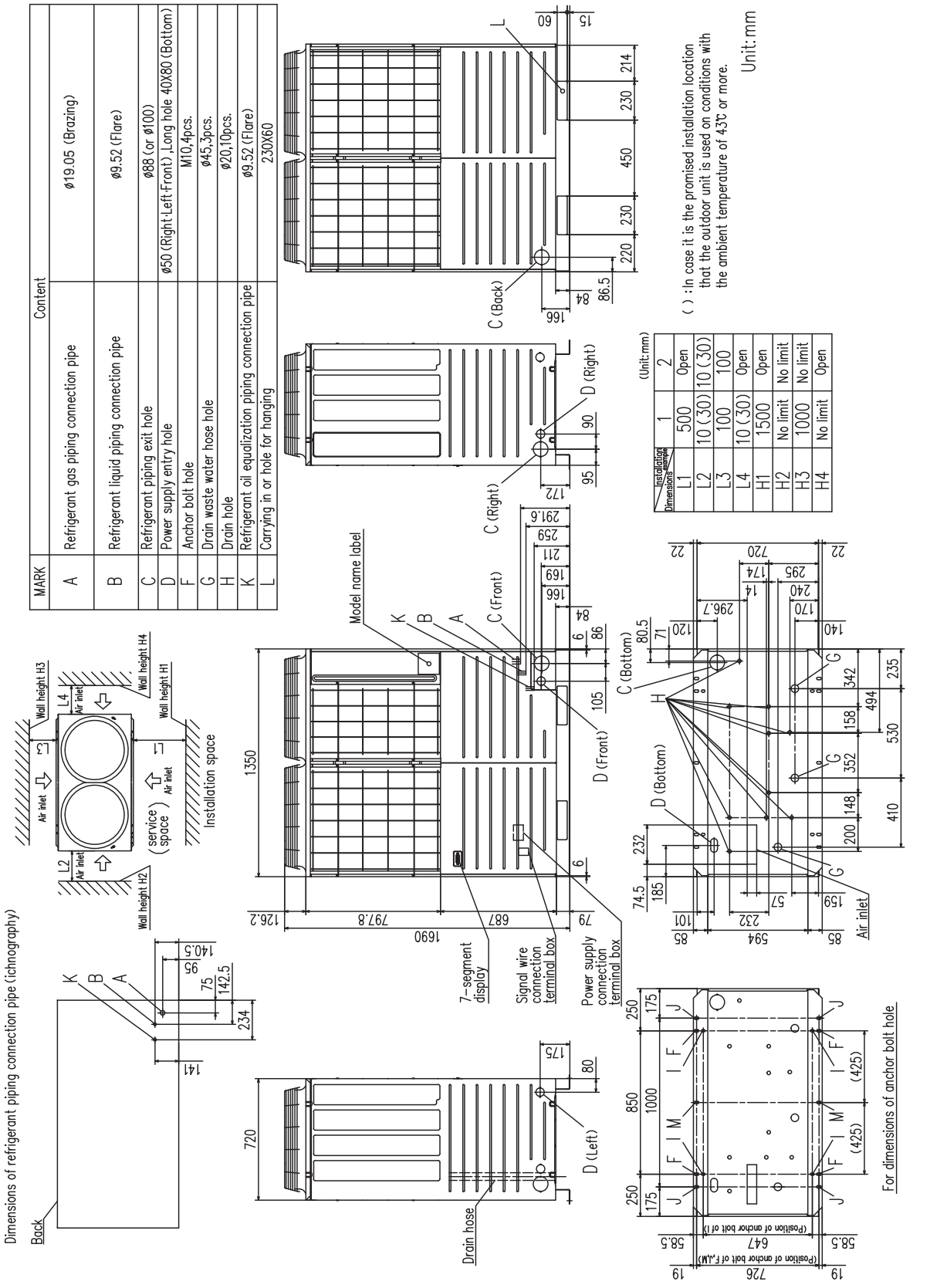
Adapted to RoHS directive

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

(3) Refrigerant piping size applicable to European installations are shown in parentheses.

2.2 Exterior dimensions

Models FDC224KXZXE1



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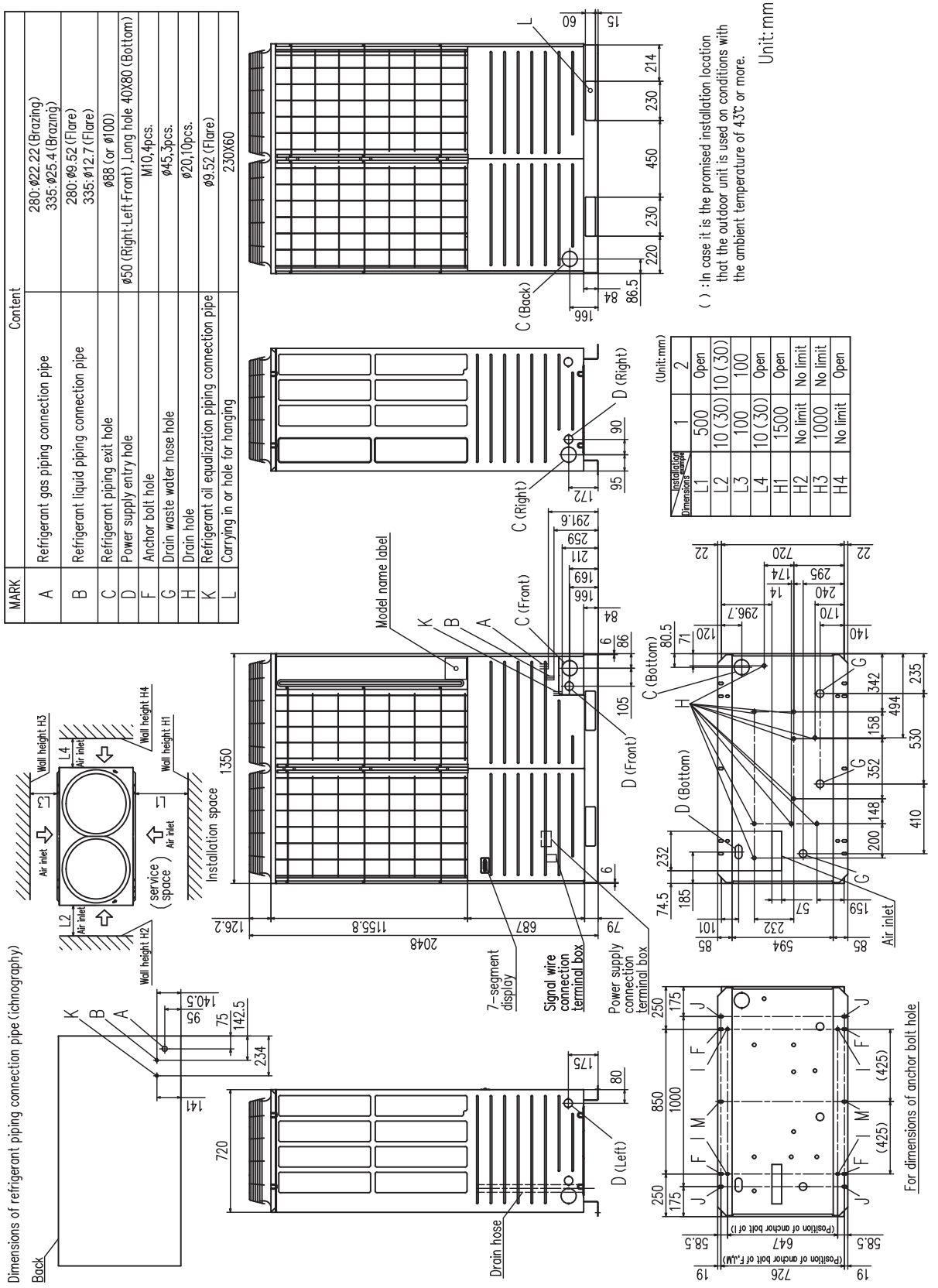
Models FDC280KXZXE1, 335KXZXE1



MARK	Content	
A	Refrigerant gas piping connection pipe	280: ø22.22 (Brazing) 335: ø25.4 (Brazing)
B	Refrigerant liquid piping connection pipe	280: ø9.52 (Flare) 335: ø12.7 (Flare)
C	Refrigerant piping exit hole	ø88 (or ø100)
D	Power supply entry hole	ø50 (Right·Left·Front) ,Long hole 40X80 (Bottom)
F	Anchor bolt hole	M10,4pcs.
G	Drain waste water hose hole	ø45.3pcs.
H	Drain hole	ø20.10pcs.
K	Refrigerant oil equalization piping connection pipe	ø9.52 (Flare)
L	Carrying in or hole for hanging	230X60

(Unit: mm)

Installation Dimensions example	1	2
L1	500	Open
L2	10 (30)	10 (30)
L3	100	100
L4	10 (30)	Open
H1	1500	Open
H2	No limit	No limit
H3	1000	No limit
H4	No limit	Open

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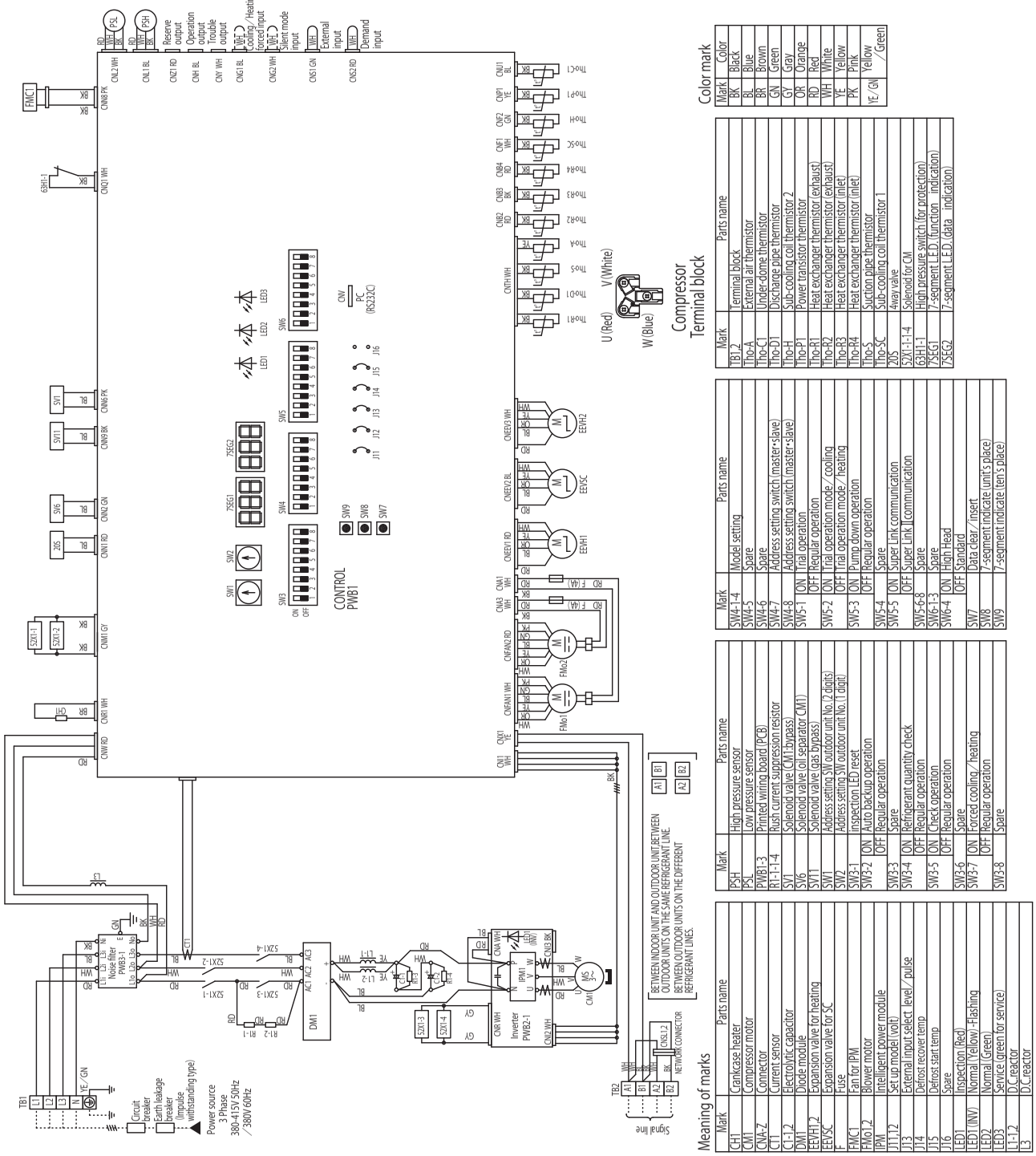
2.3 Electrical wiring

Models FDC224KXZXE1



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 reactor
L3	D.C reactor

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	ON Auto backup operation
	OFF Regular operation
SW3-3	Spare
SW3-4	ON 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 Super Link communication
	OFF Super Link communication
SW5-6-8	Spare
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)

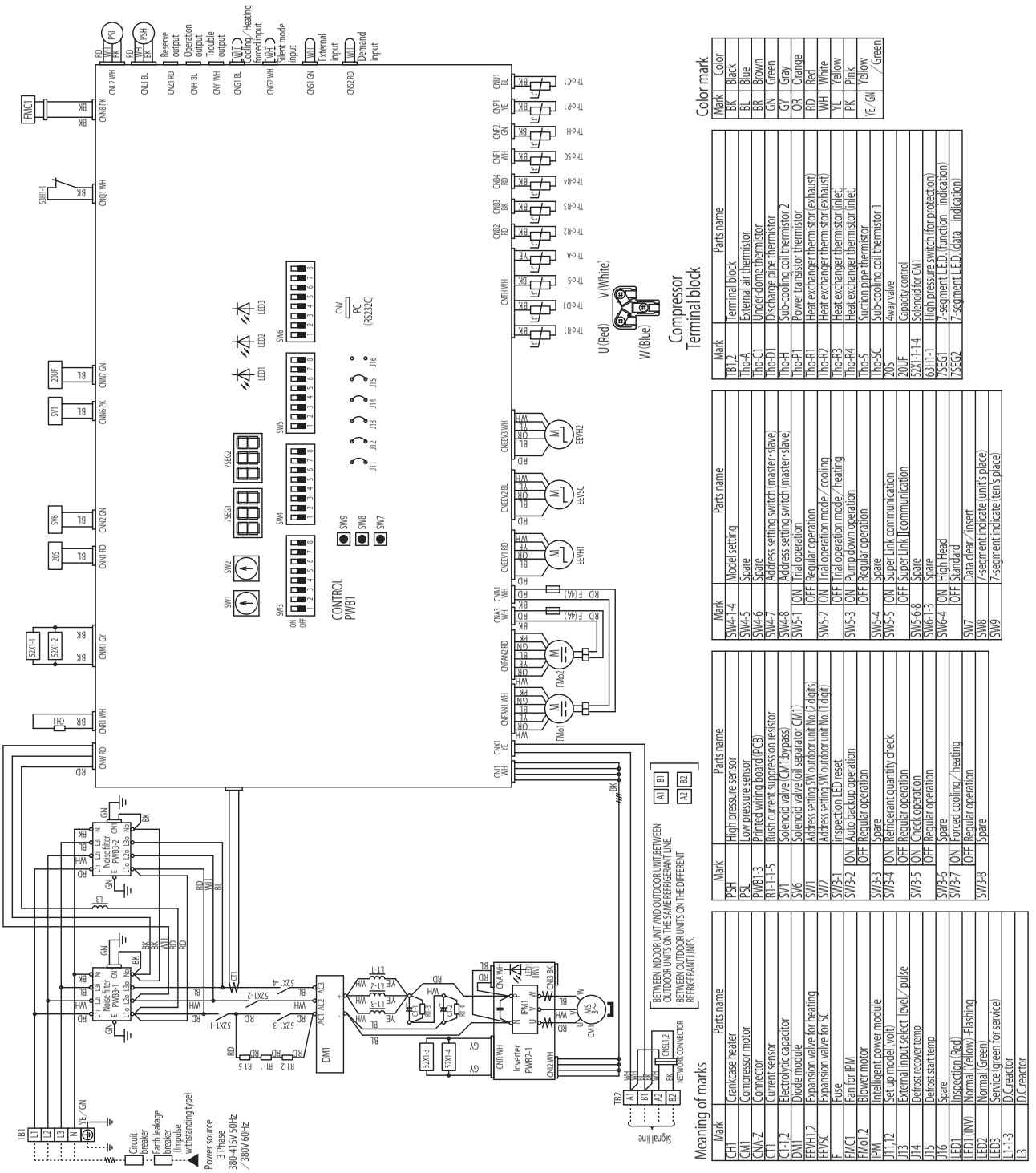
Mark	Parts name
TB1,2	Terminal block
Tho-A	External air thermistor
Tho-C1	Under-dome thermistor
Tho-D1	Discharge pipe thermistor
Tho-H	Sub-cooling coil thermistor 2
Tho-P1	Power transistor thermistor
Tho-R1	Heat exchanger thermistor (exhaust)
Tho-R2	Heat exchanger thermistor (exhaust)
Tho-R3	Heat exchanger thermistor (inlet)
Tho-R4	Heat exchanger thermistor (inlet)
Tho-S	Suction pipe thermistor
Tho-SC	Sub-cooling coil thermistor 1
20S	4way valve
52X1-1-1-4	Solenoid for CM
63H1-1	High pressure switch (for protection)
7SEG1	7-segment LED (function indication)
7SEG2	7-segment LED (data indication)

Color mark

Mark	Color
BK	Black
BL	Blue
BR	Brown
GN	Green
GY	Gray
OR	Orange
RD	Red
WH	White
YE	Yellow
PK	Pink
YE / GN	Yellow / Green

PCB003Z860

Models FDC280KXZXE1, 335KXZXE1



Meaning of marks

Mark	Parts name
CH1	Crankcase heater
CM1	Compressor motor
CN4-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)
L1-1-3	D.C reactor
L3	D.C reactor

Mark	Parts name
PSH	High pressure sensor
PSL	Low pressure sensor
PWB1-3	Printed wiring board (PCB)
RT-1-1-5	Rush current suppression resistor
SV1	Solenoid valve (CM1 bypass)
SV6	Solenoid valve (oil separator CM1)
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	ON Auto backup operation
	OFF Regular operation
SW3-3	Spare
SW3-4	ON 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 Super Link communication
	OFF Super Link Ⅱ communication
SW5-6-8	Spare
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
20UF	Capacity control
52X1-1-1-4	Solenoid for CM1
63H1-1	High pressure switch (for protection)
7SEG1	7-segment L.E.D. (function indication)
7SEG2	7-segment L.E.D. (data indication)

Color mark

Mark	Color
BK	Black
BL	Blue
BR	Brown
GN	Green
GY	Gray
OR	Orange
RD	Red
WH	White
YE	Yellow
PK	Pink
YE / GN	Yellow / Green

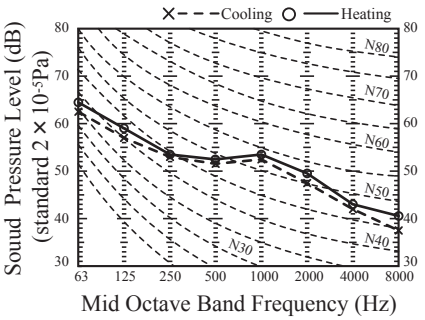
PCB003Z861

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

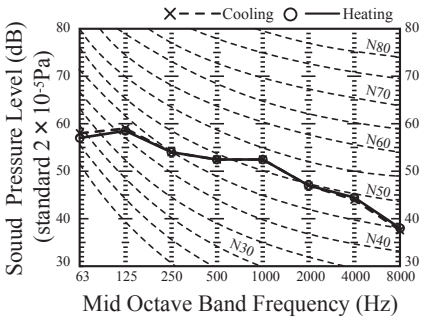
Model FDC224KXZXE1

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



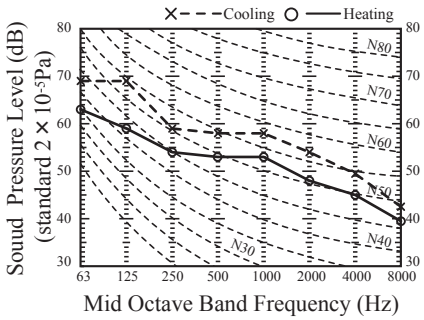
Model FDC280KXZXE1

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



Model FDC355KXZXE1

Noise level 62 dB (A) at cooling
57 dB (A) at heating



3. RANGE OF USAGE & LIMITATIONS

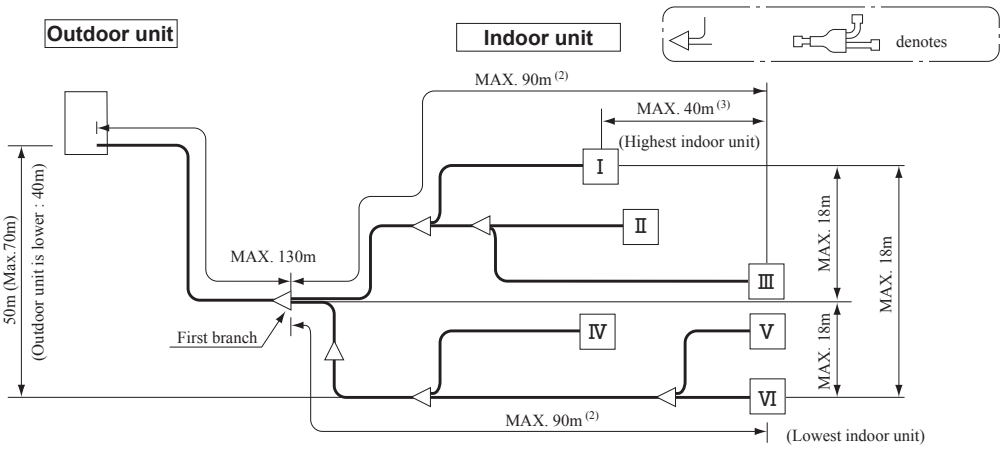
• Single use (also for combination use)

Item \ System		FDC224KXZXE1	FDC280KXZXE1	FDC335KXZXE1
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 29 units	1 to 37 units	1 to 44 units
	Connectable capacity (1)	180 – 448	224 – 560	268 – 670
Total piping length (2)		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(6))		
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) (5)		
	Outdoor unit is lower	40m or less (3)		
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 ℃ or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU, FDFW : Dew point temperature 23℃ 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%		

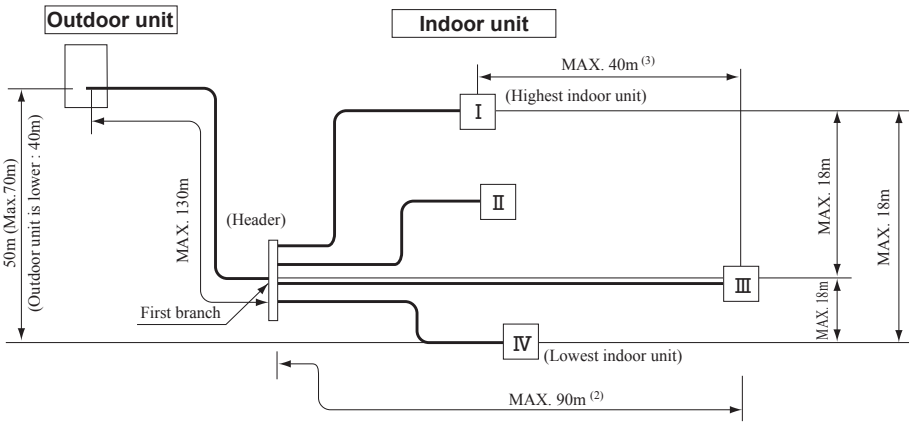
Note (1) When connecting the indoor unit type FDK, FDFL, FDFU or FDFW series, limit the connectable capacity not higher than 130%.
(2) When the pipe extension length exceeds 510 m, additional refrigerant oil must be charged (1,000 cc).
(3) It must be less than 30 m when conducting the cooling operation with the outdoor air temperature lower than 10 ℃.
(4) 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.
(5)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.
(6)When it is required to install in the difference between the longest and shortest piping more than 40m, refer to page 17.

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

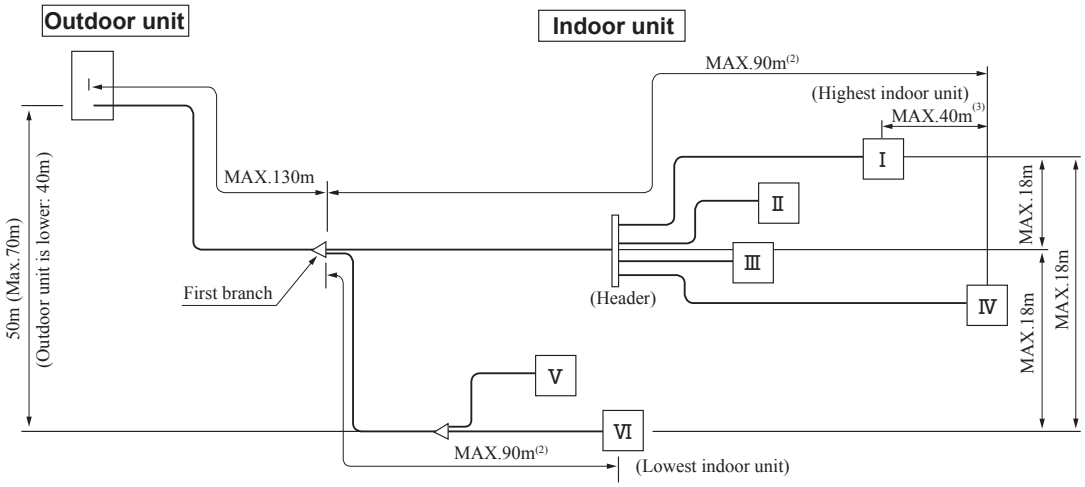
(1) Branch pipe system (Branch piping used)



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

Outdoor unit	S+P+I (kg)
224-670	45
735-1000	90

S: Standard additional refrigerant quantity (kg)
P: Additional refrigerant quantity for piping (kg)
I : Additional refrigerant quantity for indoor units (kg)

• Combination use

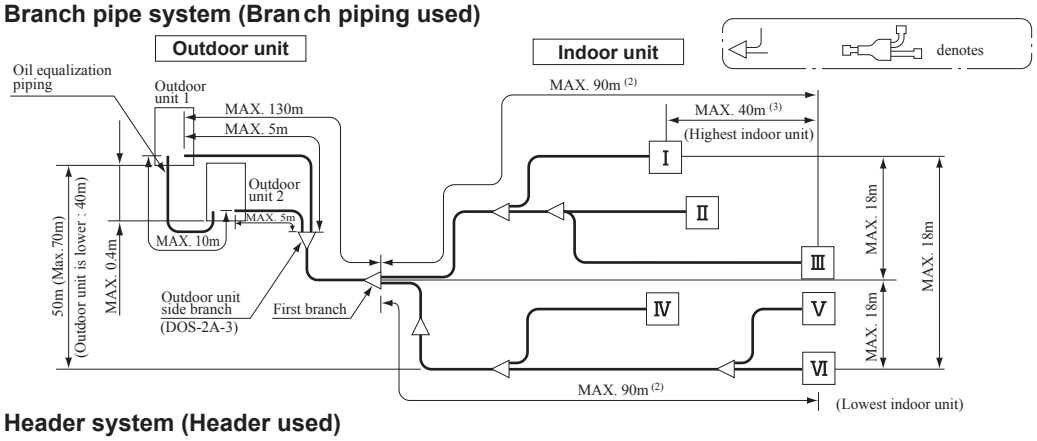
Item \ System		FDC450KXZXE1	FDC500KXZXE1	FDC560KXZXE1	FDC615KXZXE1	FDC670KXZXE1
Indoor air temperature (Upper, lower limits)		Refer to page 15				
Outdoor air temperature (Upper, lower limits)						
Indoor units that can be used in combination	Number of connected units	2 to 60 units	2 to 53 units	2 to 59 units	2 to 65 units	2 to 71 units
	Connectable capacity (1)	360 – 900	400 – 800	448 – 896	492 – 984	536 – 1072
Total piping length (2)		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 (6))				
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) (5)				
	Outdoor unit is lower	40m or less (3)				
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 ℃ or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU, FDFW : Dew point temperature 23 ℃ 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%				

Item \ System		FDC735KXZXE1	FDC800KXZXE1	FDC850KXZXE1	FDC900KXZXE1	FDC950KXZXE1	FDC1000KXZXE1
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 78 units	3 to 80 units	3 to 80 units	3 to 80 units	3 to 80 units	3 to 80 units
	Connectable capacity	588 – 1176	640 – 1280	680 – 1360	720 – 1440	760 – 1520	800 – 1600
Total piping length (2)		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 (6))					
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) (5)					
	Outdoor unit is lower	40m or less (3)					
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 ℃ or less, relative humidity 80% or less (FDE, FDK, FDFL, FDFU,FDFW : Dew point temperature 23 ℃ 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%					

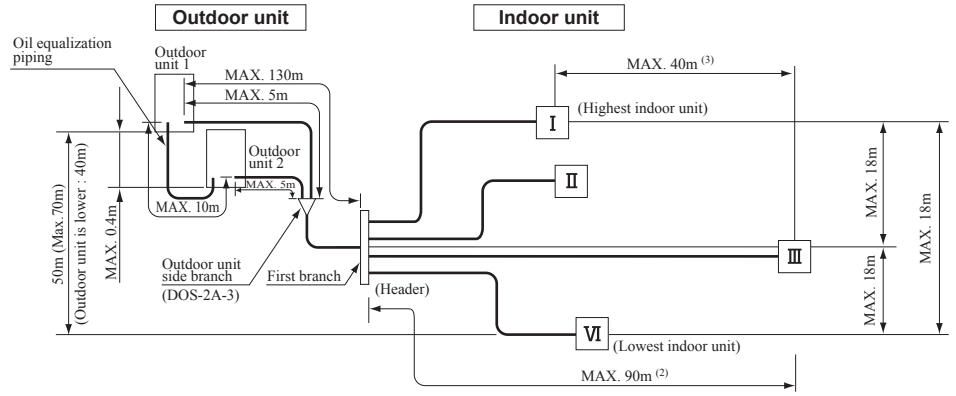
Note (1) When connecting the indoor unit type FDK, FDFL, FDFU or FDFW series, limit the connectable capacity not higher than 130%.
(2) When the pipe extension length exceeds 510 m, additional refrigerant oil must be charged (1,000 cc).
(3) It must be less than 30 m when conducting the cooling operation with the outdoor air temperature lower than 10 ℃ .
(4) 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.
(5)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.
(6)When it is required to install in the difference between the longest and shortest piping more than 40m, refer to page 17.

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

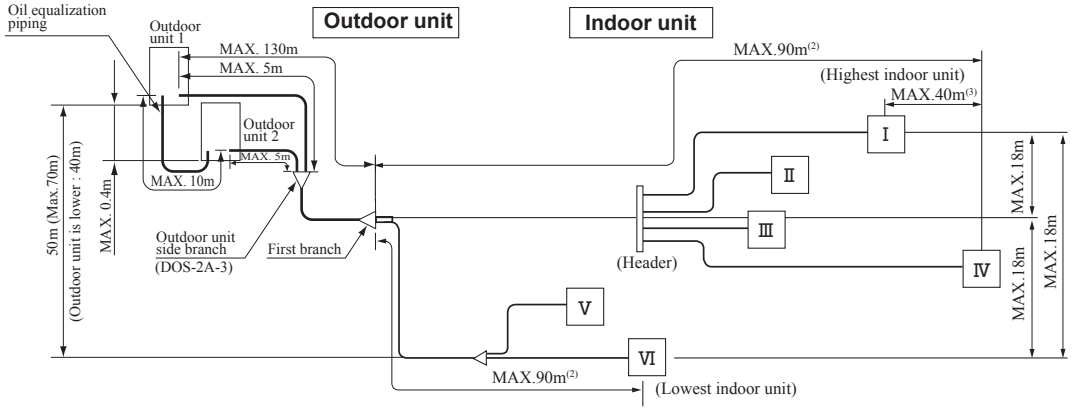
(1) Branch pipe system (Branch piping used)



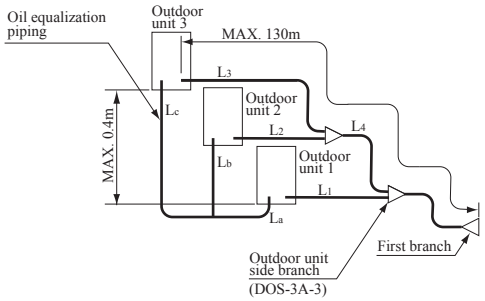
(2) Header system (Header used)



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



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



$\begin{cases} L_1 \leqq 5m \\ L_2 + L_4 \leqq 5m \\ L_3 + L_4 \leqq 5m \end{cases}$

$\begin{cases} L_a + L_b \leqq 10m \\ L_b + L_c \leqq 10m \\ L_c + L_a \leqq 10m \end{cases}$

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.

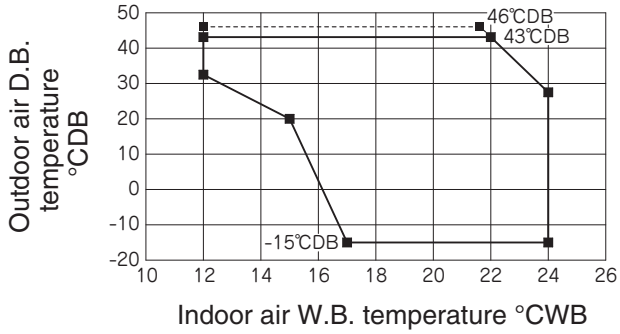
Important — When the Additional refrigerant quantity (S+P+I) is over the following table, please separate the refrigerant line.

Outdoor unit	S+P+I (kg)
224-670	45
735-1000	90

S: Standard additional refrigerant quantity (kg)
P: Additional refrigerant quantity for piping (kg)
I : Additional refrigerant quantity for indoor units (kg)

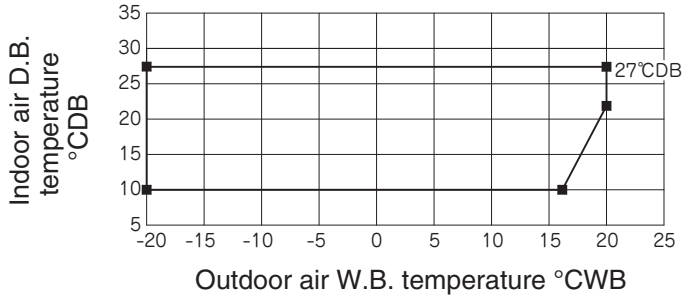
Operating temperature range

Cooling operation



∗In case it is the promised installation location that the outdoor unit is used on conditions with the ambient temperature of 43℃ or more, refer to page 6 (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: FDC224 - 1000KXZXE1)

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.

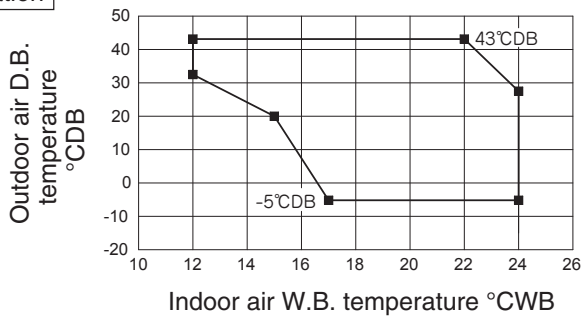
In the range of use, **the outdoor air temperature (lower limit), indoor units allowed to combine, total piping length and difference in the elevation between indoor units in the same system** are different from ordinary applications.

Table 1 Range of use

Item		FDC224-1000KXZXE1
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 (FDT,FDK,FDFL,FDFU,FDFW : Dew point temperature 28°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

Cooling operation



Heating operation

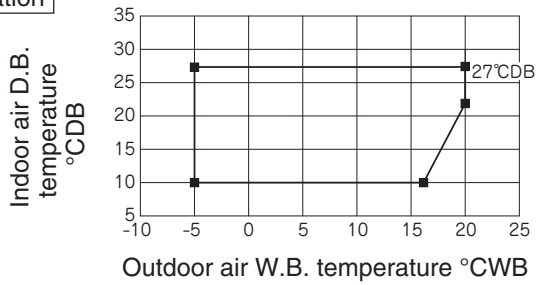


Table 3 Number of connectable indoor units and capacity range

Model/Item	Number of connectable units	Connectable capacity
FDC224KXZXE1	1 to 14	180 - 224
FDC280KXZXE1	1 to 18	224 - 280
FDC335KXZXE1	1 to 22	268 - 335
FDC450KXZXE1	2 to 30	360 - 450
FDC500KXZXE1	2 to 33	400 - 500
FDC560KXZXE1	2 to 37	448 - 560
FDC615KXZXE1	2 to 41	492 - 615
FDC670KXZXE1	2 to 44	536 - 670
FDC735KXZXE1	3 to 49	588 - 735
FDC800KXZXE1	3 to 53	640 - 800
FDC850KXZXE1	3 to 56	680 - 850
FDC900KXZXE1	3 to 60	720 - 900
FDC950KXZXE1	3 to 63	760 - 950
FDC1000KXZXE1	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	ϕ 19.05 × t 1.0	**ϕ 12.7 × t 0.8**	ϕ 22.22 × t 1.0	**ϕ 12.7 × t 0.8**
280	ϕ 22.22 × t 1.0		ϕ 25.4 (ϕ 22.22) × t 1.0	
335	ϕ 25.4 (ϕ 22.22) × t 1.0			
450	ϕ 28.58 × t 1.0	**ϕ 15.88 × t 1.0**	ϕ 31.8 × t 1.1 (ϕ 28.58 × t 1.0)	**ϕ 15.88 × t 1.0**
500				
560				
615				
670				
735	ϕ 31.8 × t 1.1 (ϕ 34.92 × t 1.2)	**ϕ 19.05 × t 1.0**	ϕ 38.1 × t 1.35 (ϕ 34.92 × t 1.2)	**ϕ 19.05 × t 1.0**
800				
850				
900				
950				
1000	ϕ 38.1 × t 1.35 (ϕ 34.92 × t 1.2)			

(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

Capacity		Gas pipe	Liquid pipe
Indoor unit	15,22,28	ϕ 9.52 × t0.8	ϕ 6.35 × t0.8
	36,45,56	ϕ 12.7 × t0.8	
	71,90	ϕ 15.88 × t1.0	ϕ 9.52 × t0.8
	112,140,160	**ϕ 19.05 × t1.0**	
	224	**ϕ 22.22 × t1.0**	
	280	**ϕ 25.4 × t1.0**	

(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

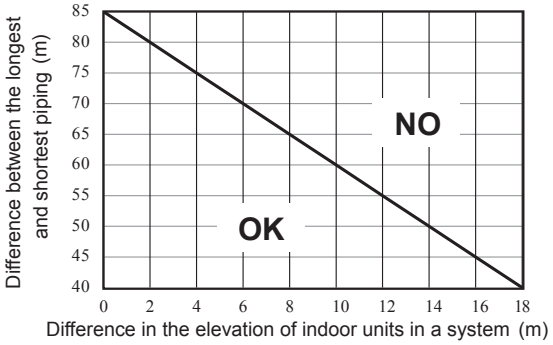
Outdoor unit	(kg)	Outdoor unit	(kg)
224	0.2	670	1.0
280	0.3	735	1.1
335	0.5	800	1.2
450	0.7	850	1.3
500	0.8	900	1.4
560	0.9	950	1.6
615	0.8	1000	1.6

(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

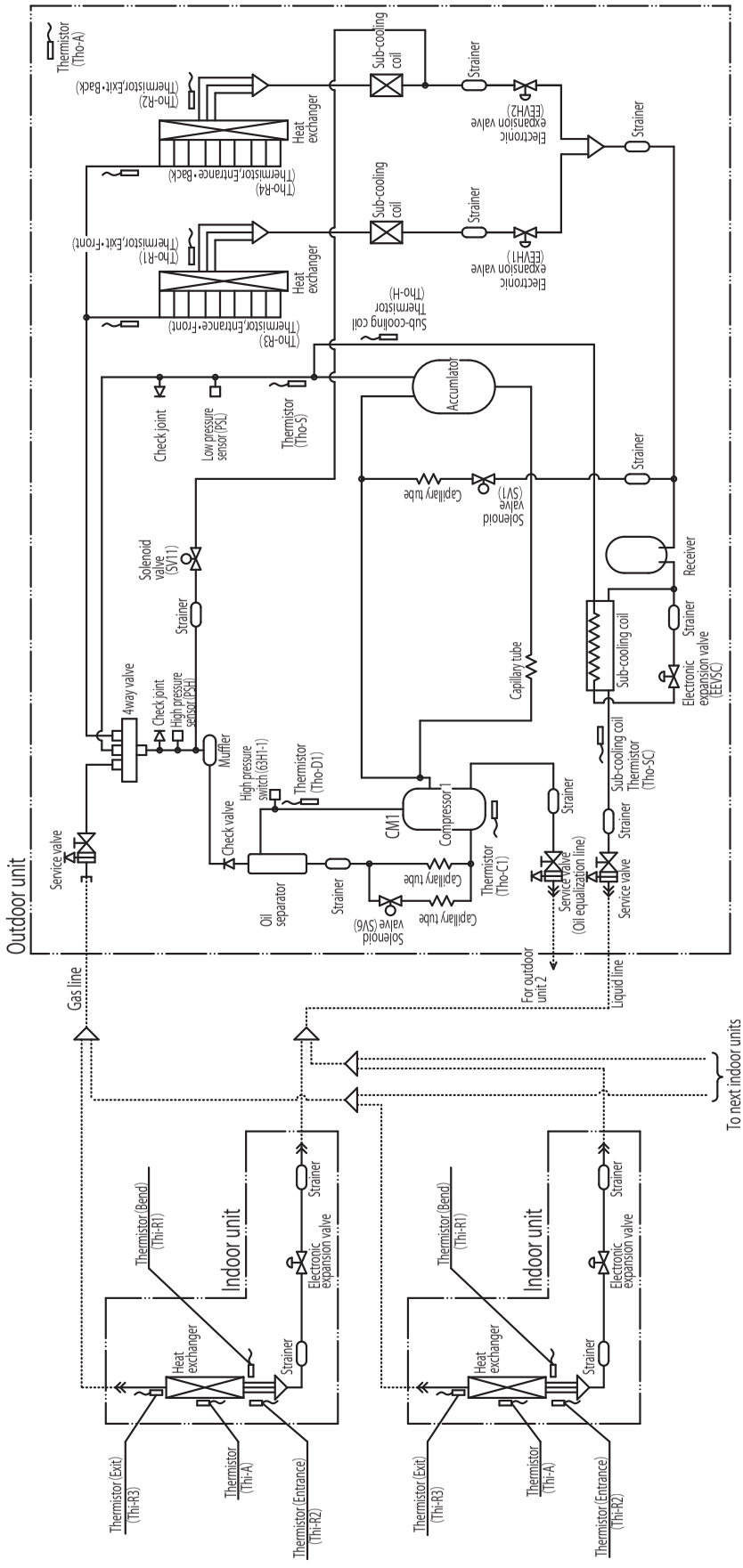
When the difference between the longest and shortest piping is longer than 40 m, adjust the difference in the elevation of indoor units in a system such that it will fall in the OK range on the following graph.
When the difference in the elevation between the indoor and the outdoor units is 50 m – 70 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 ongest 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 FDC224KXZXE1



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
3.70 ON (MPa)

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.

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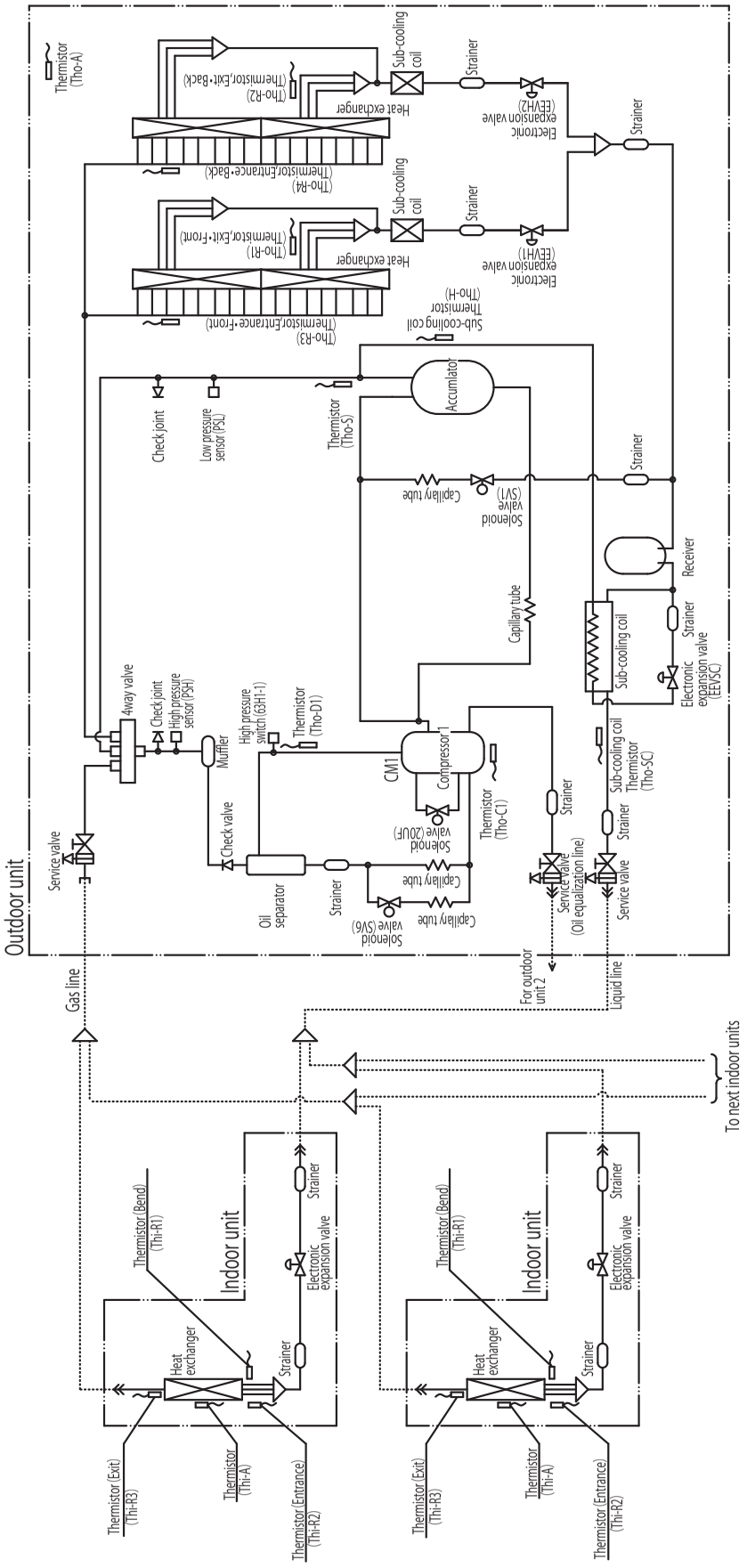
Models FDC280KXZXE1, 335KXZXE1



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
3.70 ON (MPa)
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.

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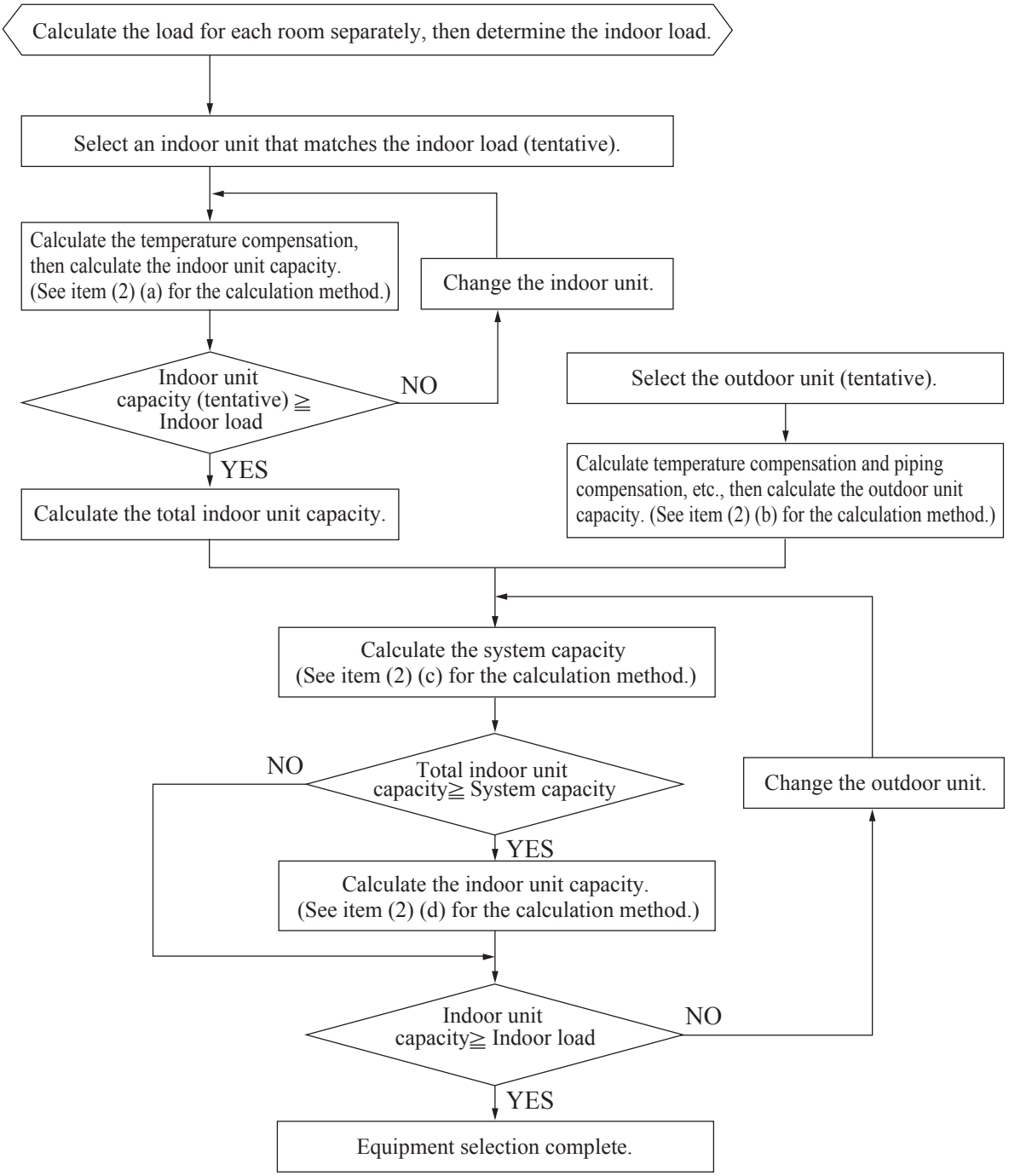
5. SELECTION CHART

(1) Equipment selection flow



(2) Capacity calculation method

(a) Calculating the indoor unit capacity compensation

Indoor unit capacity (cooling, heating) = Indoor unit total rated capacity
× Capacity compensation coefficient according to temperature conditions

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

(b) Calculating the outdoor unit capacity compensation

Outdoor Unit Capacity (cooling, heating) = Outdoor unit rated capacity (rated capacity when 100% connected)
× Capacity compensation coefficient according to temperature conditions
× Capacity compensation coefficient according to piping length
× Capacity compensation coefficient according to height difference
× Correction of heating capacity in relation to the frost on the outdoor unit heat exchanger
× Capacity compensation coefficient according to indoor unit connection capacity

① See item (3) (a) concerning the capacity compensation coefficient according to temperature conditions.
② See item (3) (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.

(c) Calculating system capacity

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

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

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

Indoor unit capacity (cooling, heating) = System capacity (cooling, heating)
× [(Indoor unit capacity) / (Indoor unit total capacity)]

Capacity calculation examples

Example 1

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

- Outdoor unit FDC450KXZXE1 ..... FDC224KXZXE1 × 2 units
- Indoor unit FDT56KXE6F ..... 7 units
- Piping length ..... 60 m (Equivalent length)
- Indoor, outdoor unit height difference ..... 15 m (Outdoor unit is lower)
- Temperature conditions ..... Outdoor temperature: 33˚C DB
- Temperature conditions ..... Indoor temperature: 19˚C WB

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

- Indoor unit rated cooling capacity: 5.6 kW
- Capacity compensation coefficient according to temperature conditions:
  1.02 (Calculated according to Indoor 19˚C WB / Outdoor 33˚C DB); (See page 23)
  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 23)
  Outdoor unit cooling capacity: 45.0 kW × 1.02 ≒ 45.9 kW
- Capacity compensation coefficient according to piping length: 0.94 (calculated according to 60 m length); (See page 25)
  45.9 kW × 0.94 ≒ 43.1 kW

• Capacity compensation coefficient according to height difference: 0.97 (calculated according to 15 m difference); (See page 27)
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 ⇨ System cooling capacity: 39.9 kW
• Outdoor unit maximum cooling capacity: 41.8 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 FDC450KXZXE1 ..... FDC224KXZXE1 × 2 units
• Indoor unit FDT56KXE6F ..... 10 units
• Piping length ..... 60 m (Equivalent length)
• Indoor, outdoor unit height difference ..... 15 m (Outdoor unit is higher)
• Temperature conditions ..... Outdoor temperature: 35˚C DB
• Temperature conditions ..... Indoor temperature: 18˚C WB

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

• Indoor unit rated cooling capacity: 5.6 kW
• Capacity compensation coefficient according to temperature conditions:
0.95 (Calculated according to Indoor 18˚C WB / Outdoor 35˚C DB); (See page 23)
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 23)
Outdoor unit cooling capacity: 45.0 kW × 0.95 ≒ 42.8 kW
• Capacity compensation coefficient according to piping length: 0.94 (calculated according to 60 m length); (See page 25)
42.8 kW × 0.94 ≒ 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: 1.05 ← (56 × 10) / 450 ≒ 124%) (See page 29)
40.2 kW × 1.05 ≒ 42.2 kW

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

Compare the indoor unit total cooling capacity and the outdoor unit maximum cooling capacity. The smaller value is the actual system cooling capacity.
• Indoor unit total cooling capacity : 53.0 kW ⇨ System cooling capacity: 42.2 kW
• Outdoor unit maximum cooling capacity : 42.2 kW

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

$$\frac{42.2\ \text{kW} \times 5.3\ \text{kW}}{53.0\ \text{kW}} \fallingdotseq 4.2\ \text{kW}$$

Example 3

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

• Outdoor unit FDC450KXZXE1 ..... FDC224KXZXE1 × 2 units
• Indoor unit FDT56KXE6F ..... 10 units
• Piping length ..... 60 m (Equivalent length)
• Indoor, outdoor unit height difference ..... 20 m (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 temprature conditions:
1.04 (Calculated according to Outdoor 6˚C WB / Indoor 19˚C DB); (See page 24)
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˚C WB / Indoor 19˚C DB); (See page 24)
  Outdoor unit heating capacity: 50.0 kW × 1.04 = 52.0 kW
- Capacity compensation coefficient according to piping length: 0.982 (calculated according to 60 m length); (See page 27)
  52.0 kW × 0.982 ≒ 51.0 kW
- Capacity compensation coefficient according to height difference: 0.96 (calculated according to 20 m difference); (See page 27)
  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˚C WB); (See page 27)
  49.0 kW × 1.0 ≒ 49.0 kW.
- Capacity compensation coefficient according to indoor unit connected total capacity: 1.01 ← (56 × 10) / 450 ≒ 124%) (See page 29)
  49.0 kW × 1.01 ≒ 49.5 kW.

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

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

- Indoor unit total heating capacity : 66.0 kW ⇨ System heating capacity: 49.5 kW
- Outdoor unit maximum heating capacity : 49.5 kW

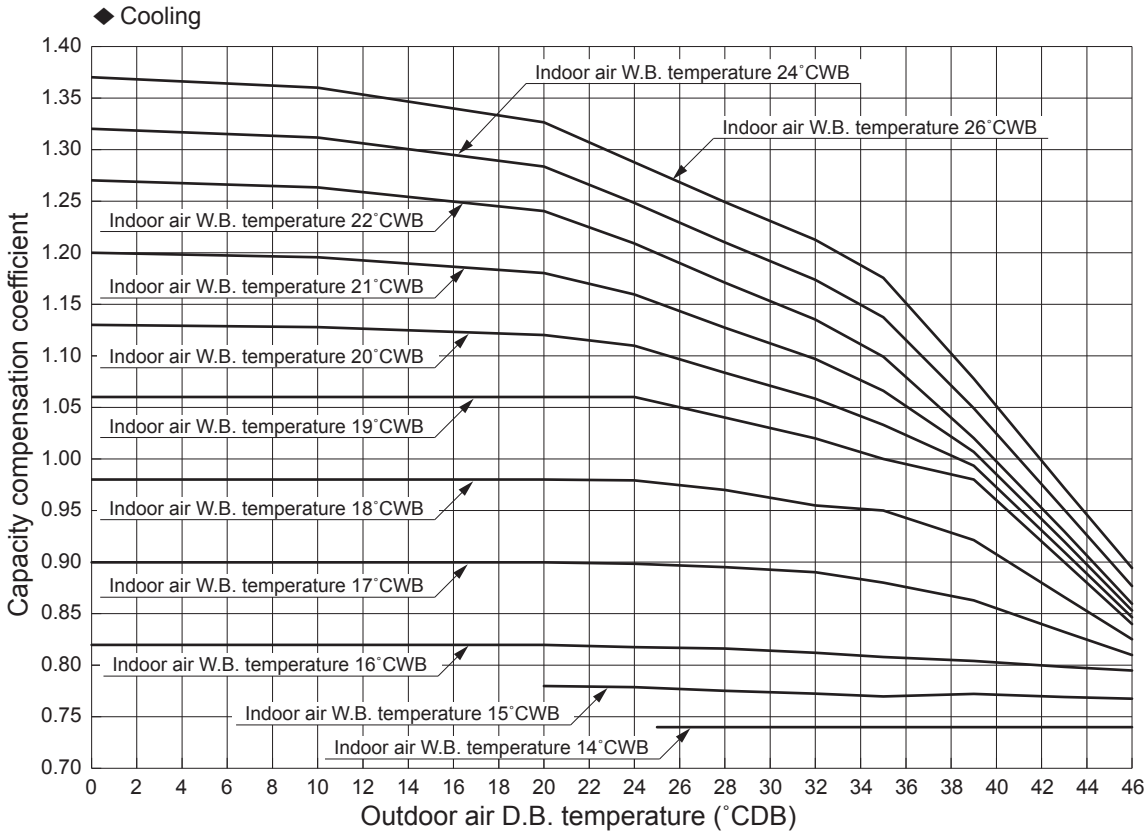
<Indoor unit heating capacity compensation> : Item (2) (d) calculation

$$\frac{49.5\ \text{kW} \times 6.6\ \text{kW}}{66.0\ \text{kW}} \fallingdotseq 5.0\ \text{kW}$$

(3) Capacity compensation coefficient

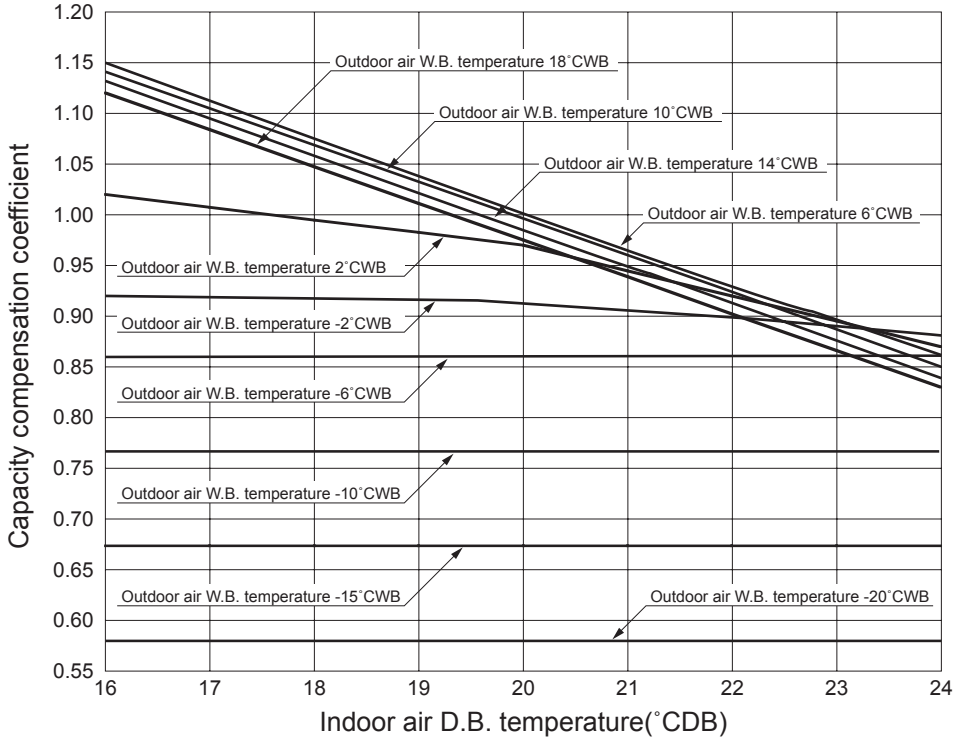
(a) Capacity compensation coefficient and power consumption compensation coefficient according to indoor and outdoor temperature conditions.

1) Capacity compensation coefficient



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

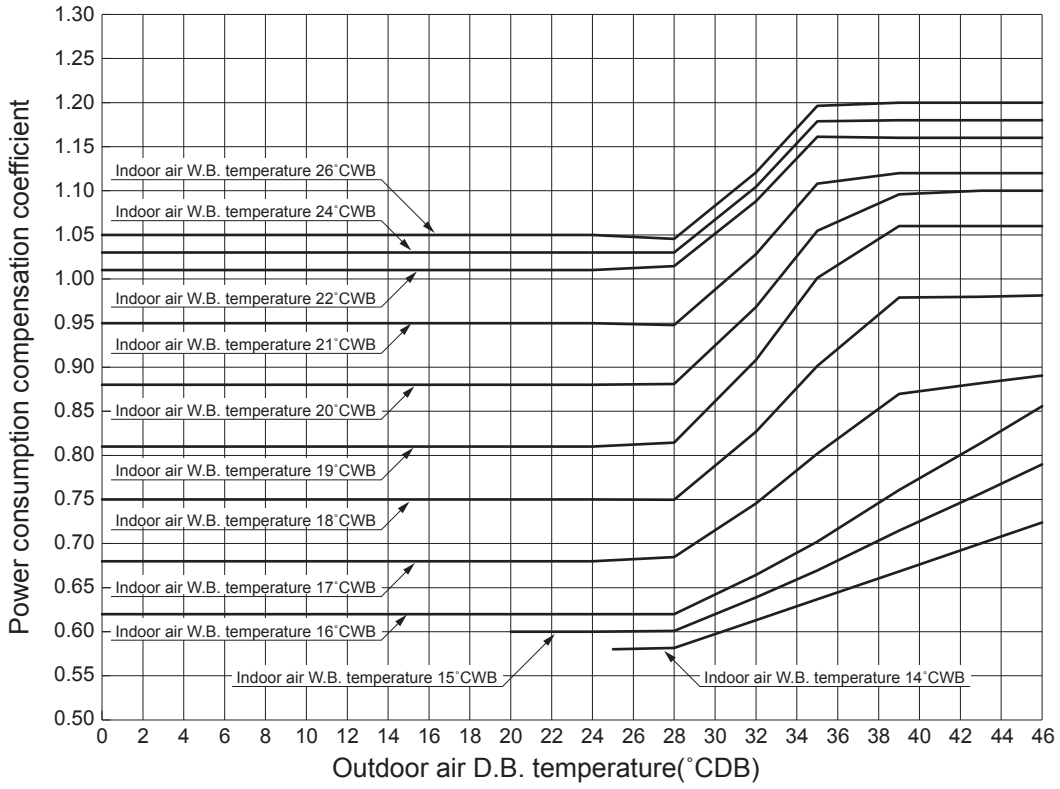
◆ **Heating**



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

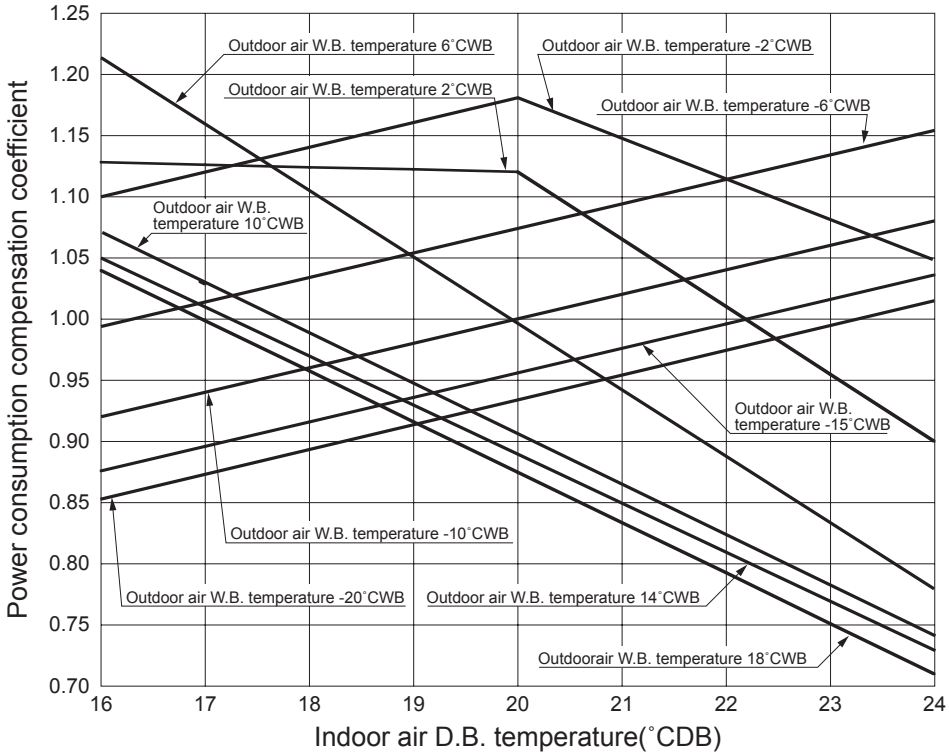
2) Power consumption correction factor

◆ **Cooling**



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

◆ **Heating**



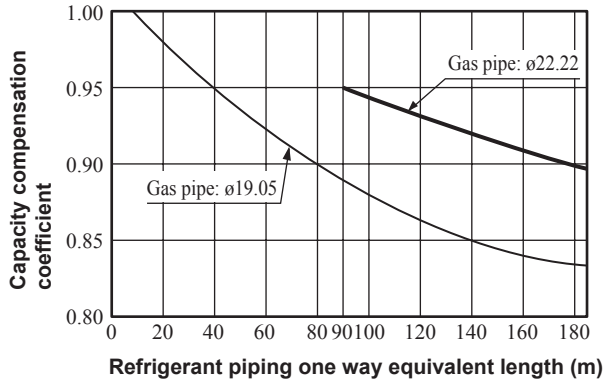
Note (1) The above-mentioned table shows a typical condition among conditions to occur via controlling an air-conditioning equipment.

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

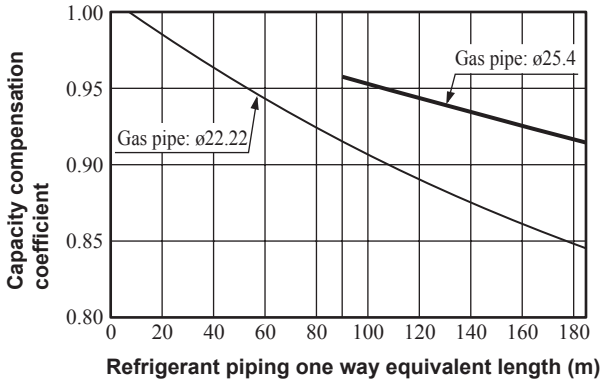
(Note) This table is for reference only. If the refrigerant piping one way equivalent after the first branch is extended longer than 40 m, it could drop further by about 10% in the worst case.

1) Cooling

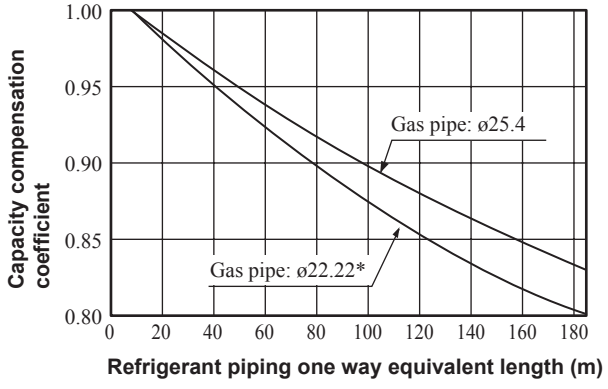
Model FDC224KXZXE1



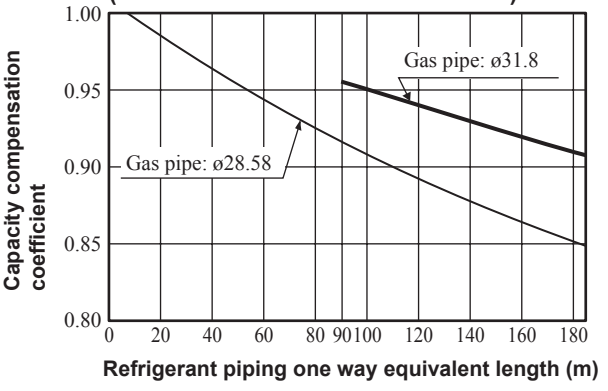
Model FDC280KXZXE1



Model FDC335KXZXE1

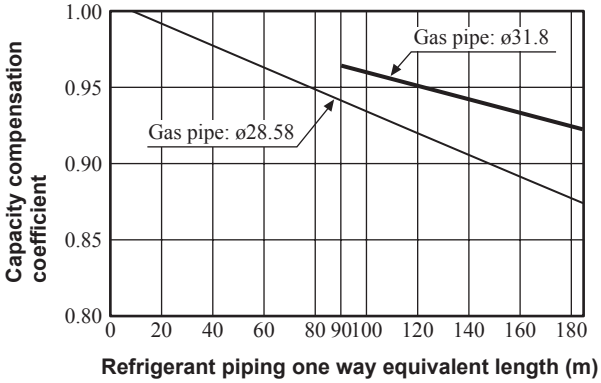


Model FDC450KXZXE1
(FDC224KXZXE1 + FDC224KXZXE1)

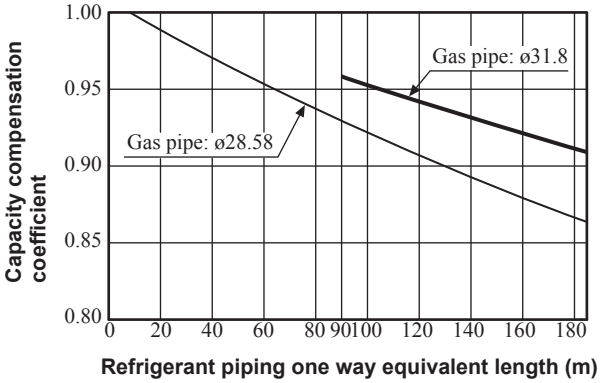


Note (1) Parts with the * mark show the piping size in case used in Europe.

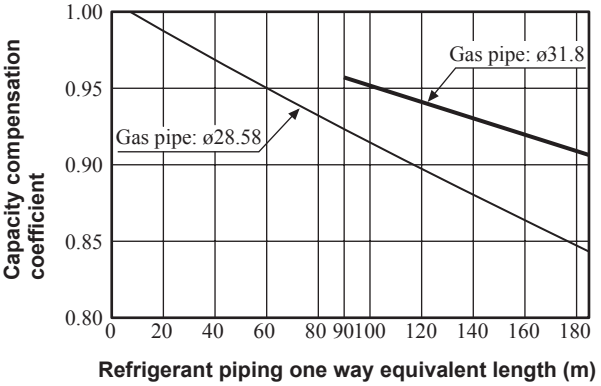
Model FDC500KXZXE1
(FDC224KXZXE1 + FDC280KXZXE1)



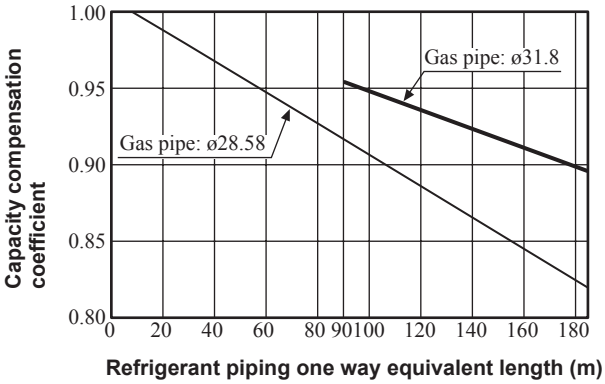
Model FDC560KXZXE1
(FDC280KXZXE1 + FDC280KXZXE1)



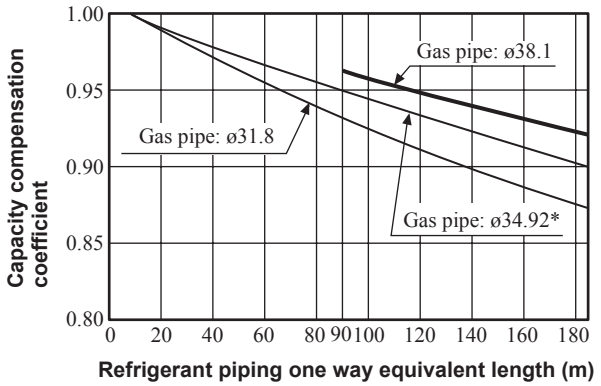
Model FDC615KXZXE1
(FDC280KXZXE1 + FDC335KXZXE1)



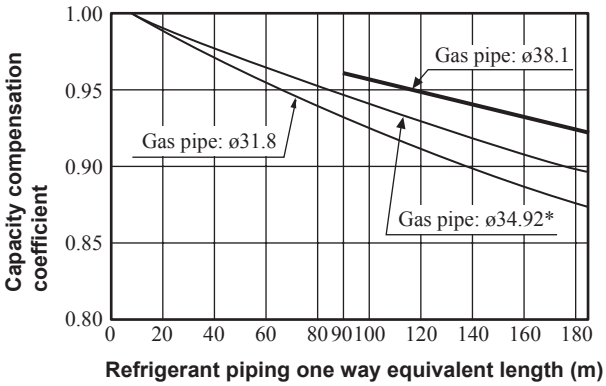
Model FDC670KXZXE1
(FDC335KXZXE1 + FDC335KXZXE1)



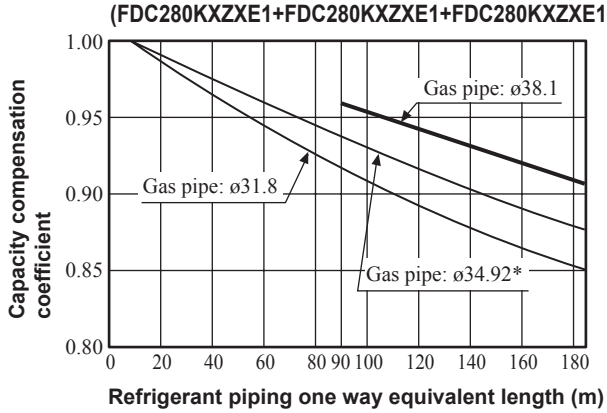
Model FDC735KXZXE1
(FDC224KXZXE1+FDC224KXZXE1+FDC280KXZXE1)



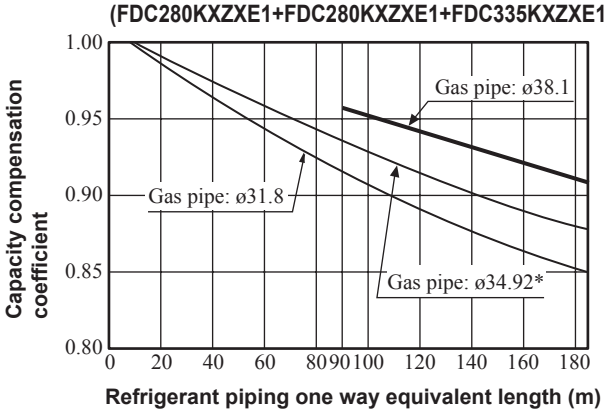
Model FDC800KXZXE1
(FDC224KXZXE1+FDC280KXZXE1+FDC280KXZXE1)



Model FDC850KXZXE1
(FDC280KXZXE1+FDC280KXZXE1+FDC280KXZXE1)

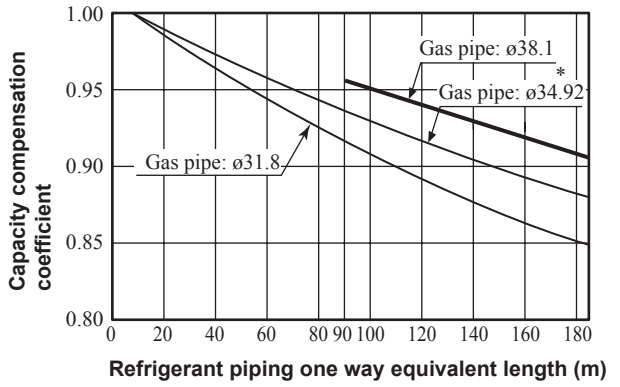


Model FDC900KXZXE1
(FDC280KXZXE1+FDC280KXZXE1+FDC335KXZXE1)

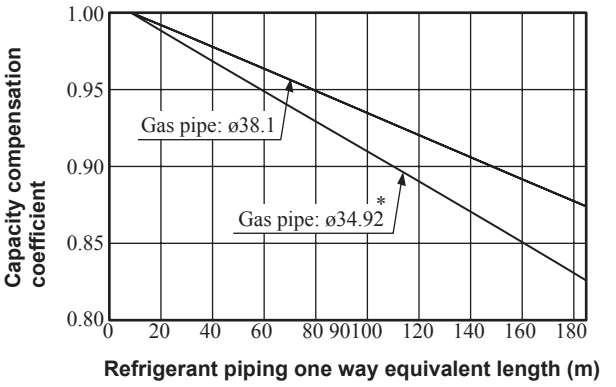


Note (1) Parts with the ∗ mark show the piping size in case used in Europe.

Model FDC950KXZXE1
(FDC280KXZXE1+FDC335KXZXE1+FDC335KXZXE1)

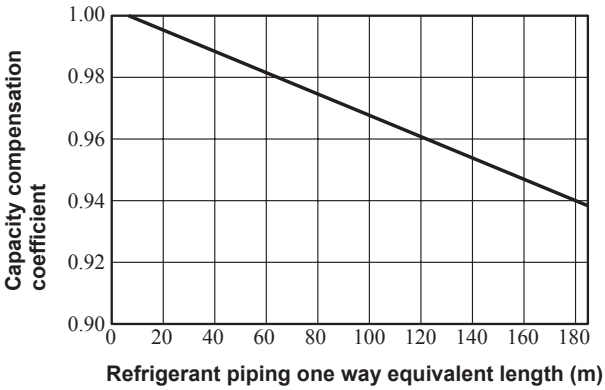


Model FDC1000KXZXE1
(FDC335KXZXE1+FDC335KXZXE1+FDC335KXZXE1)



Note (1) Parts with the * mark show the piping size in case used in Europe.

2) Heating



Note (1) Equivalent piping length can be obtained by calculating as follows.
Equivalent piping length = Real gas piping length + Number of bends in gas piping × Equivalent piping length of bends.

Equivalent length of each joint — Unit : m/one part

Gas piping size	ϕ15.88	ϕ19.05	ϕ22.22	ϕ25.4	ϕ28.58	ϕ31.8	ϕ34.92	ϕ38.1
Joint (90˚ elbow)	0.25	0.30	0.35	0.40	0.45	0.55	0.60	0.65

(c) When the outdoor unit is located at alower 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.

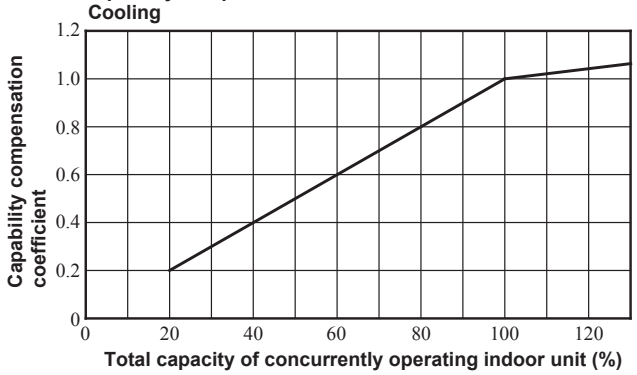
(e) The capacity compensation coefficient and power consumption compensation coefficient vary according to the total capacity of concurrently operating indoor units, as shown below.

(Note) This table shows typical values.

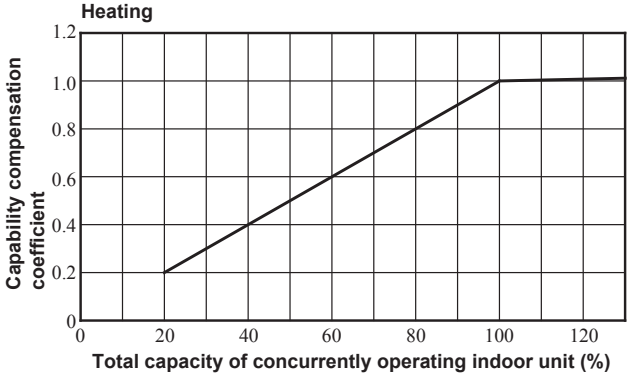
Model FDC224KXZXE1

◆ Capability compensation coefficient

Cooling

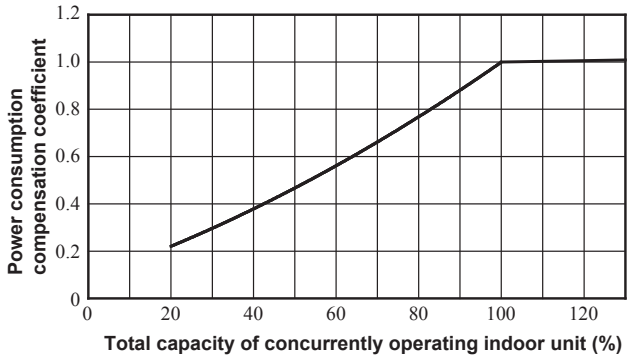


Heating

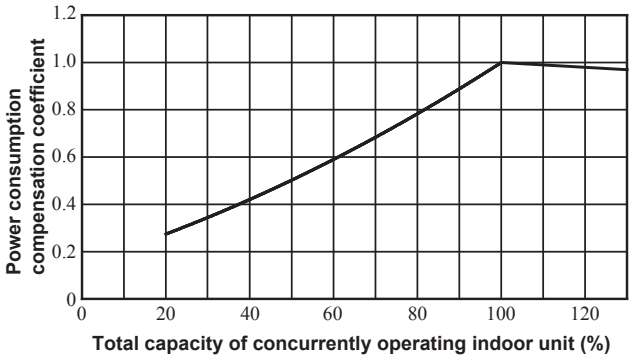


◆ Power consumption compensation coefficient

Cooling



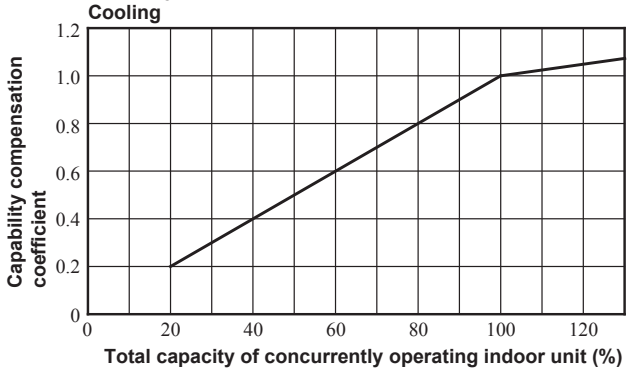
Heating



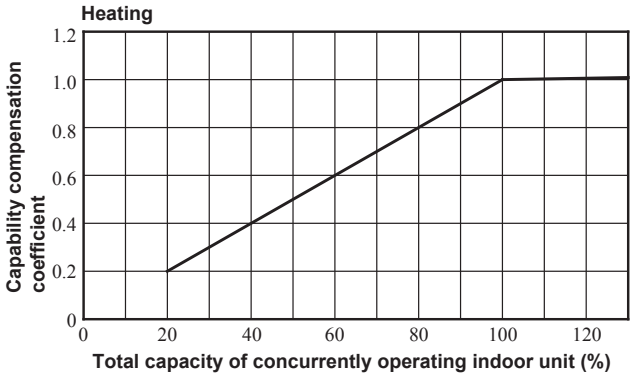
Model FDC280KXZXE1

◆ Capability compensation coefficient

Cooling

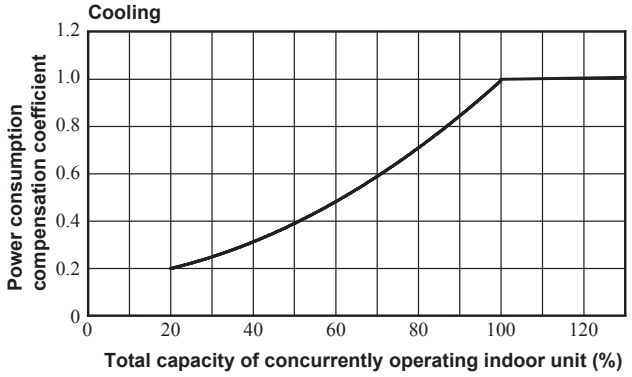


Heating

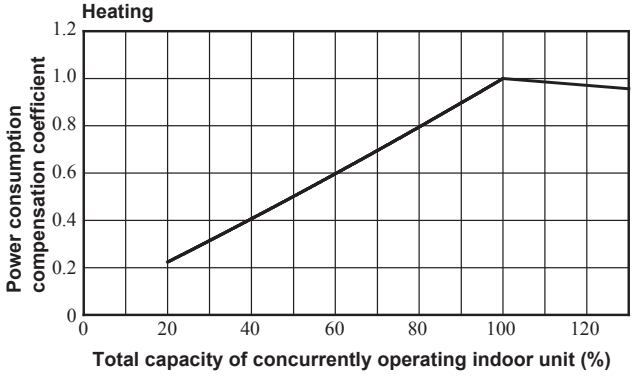


◆ Power consumption compensation coefficient

Cooling



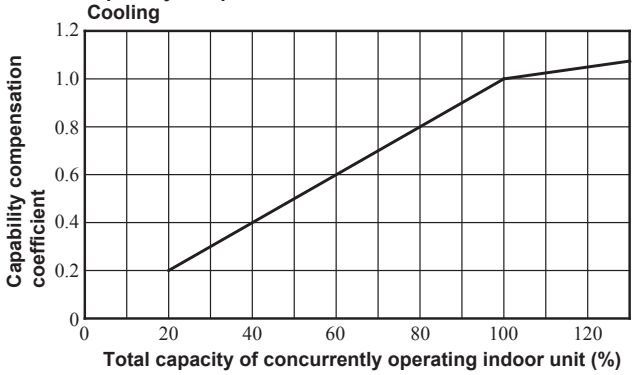
Heating



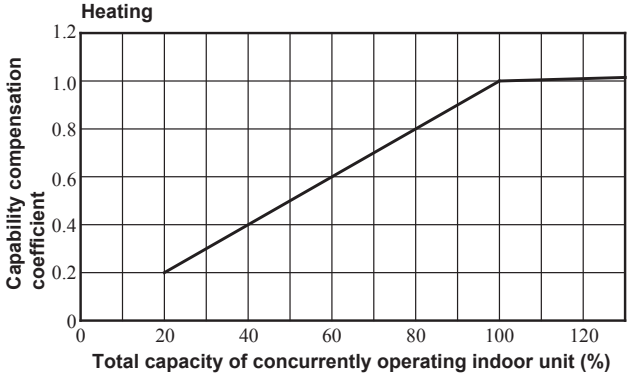
Model FDC335KXZXE1

◆ **Capability compensation coefficient**

Cooling

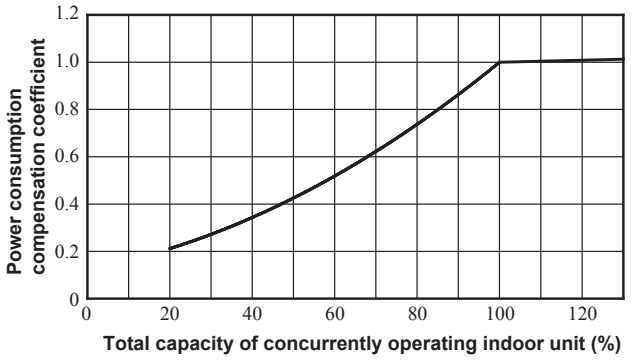


Heating

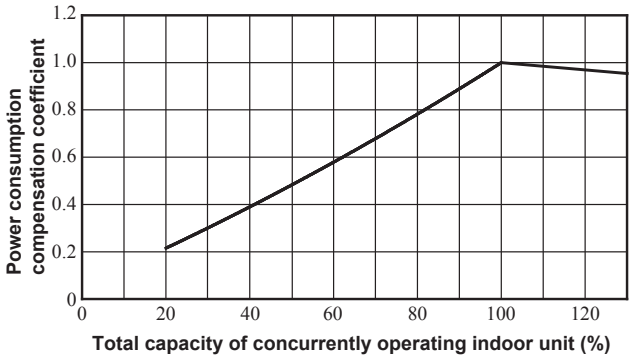


◆ **Power consumption compensation coefficient**

Cooling



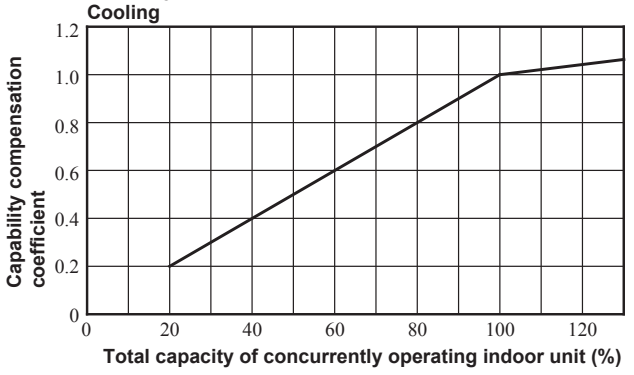
Heating



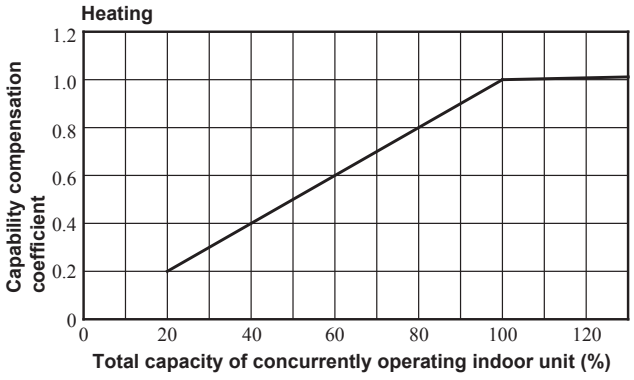
Model FDC450KXZXE1

◆ **Capability compensation coefficient**

Cooling

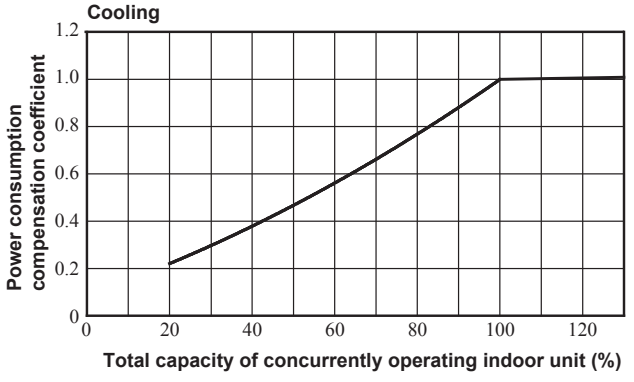


Heating

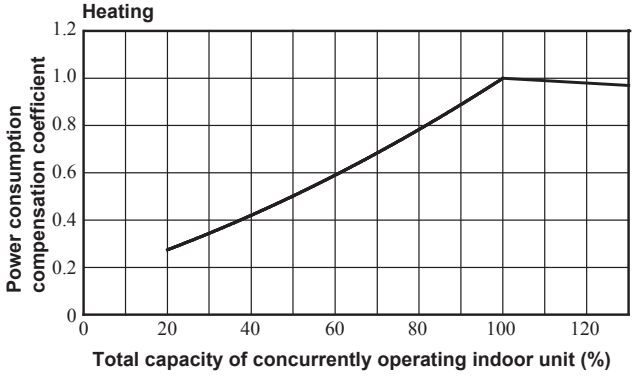


◆ **Power consumption compensation coefficient**

Cooling



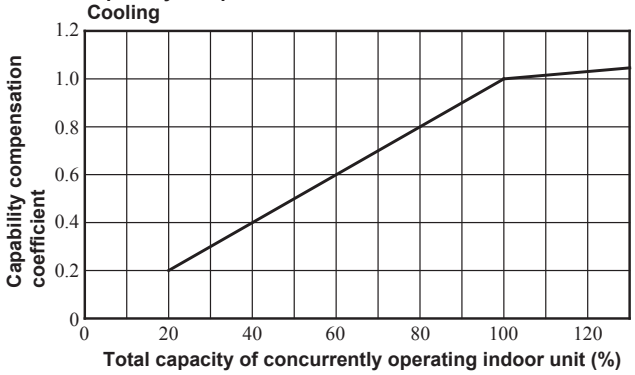
Heating



Model FDC500KXZXE1

◆ **Capability compensation coefficient**

Cooling



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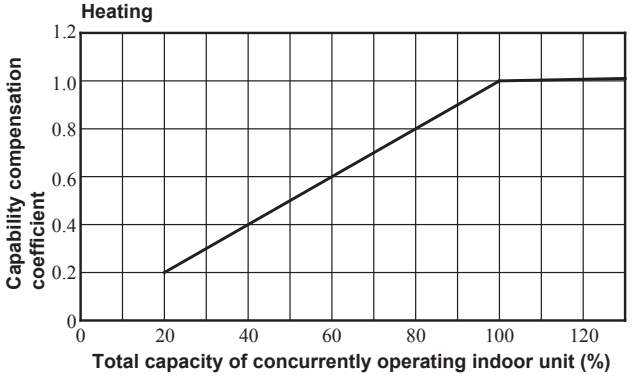
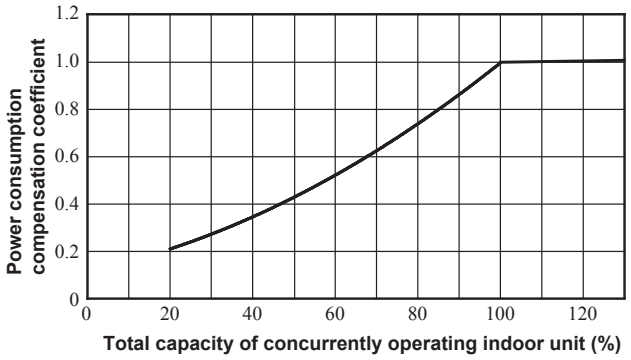
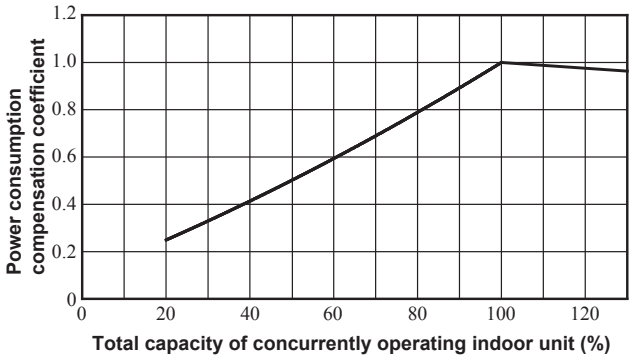


◆ **Power consumption compensation coefficient**

Cooling



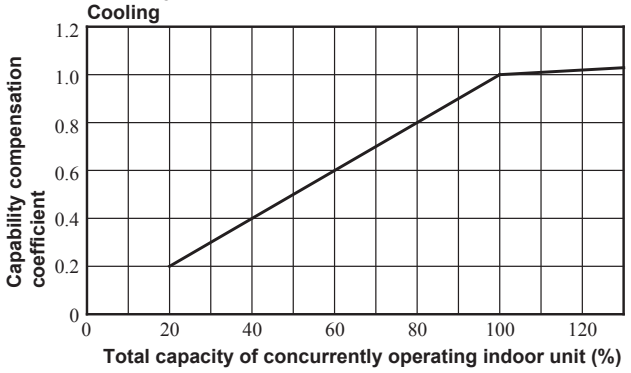
Heating



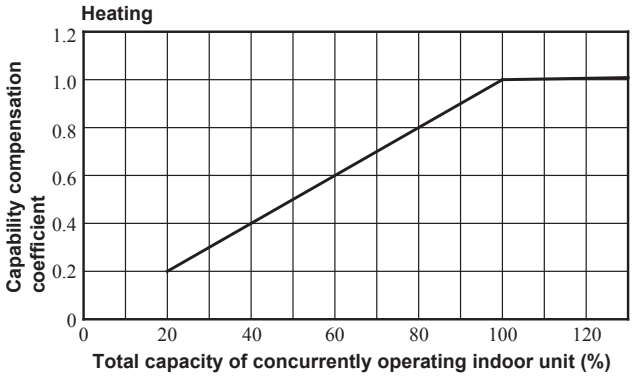
Model FDC560KXZXE1

◆ **Capability compensation coefficient**

Cooling

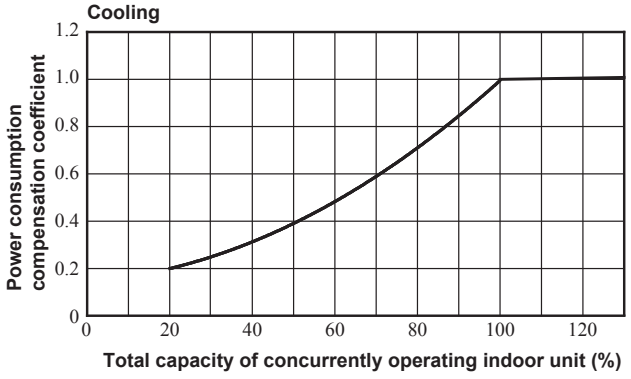


Heating

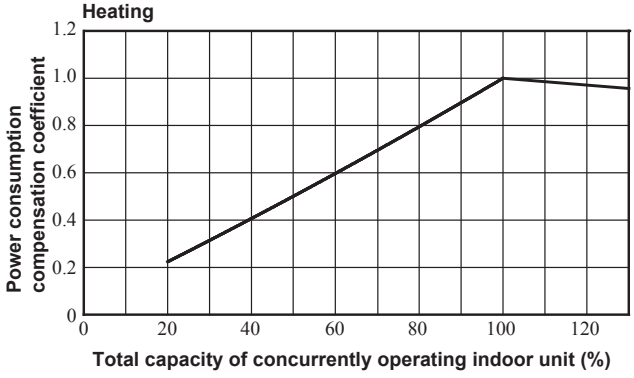


◆ **Power consumption compensation coefficient**

Cooling



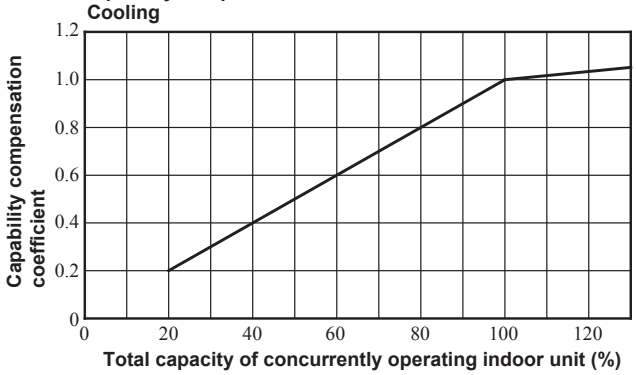
Heating



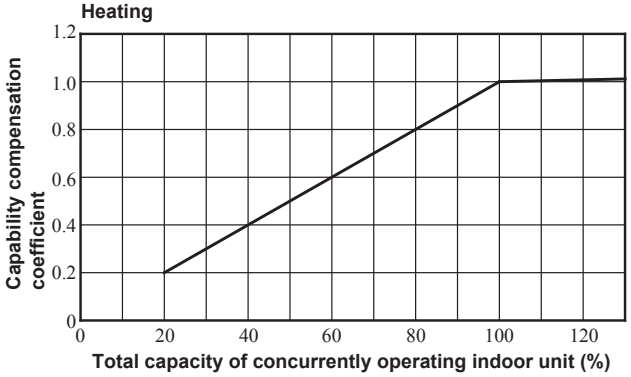
Model FDC615KXZXE1

◆ **Capability compensation coefficient**

Cooling

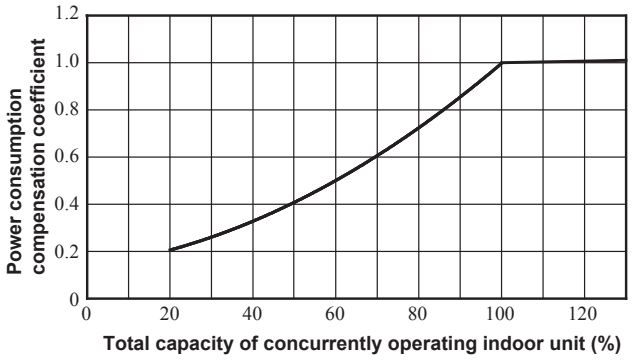


Heating

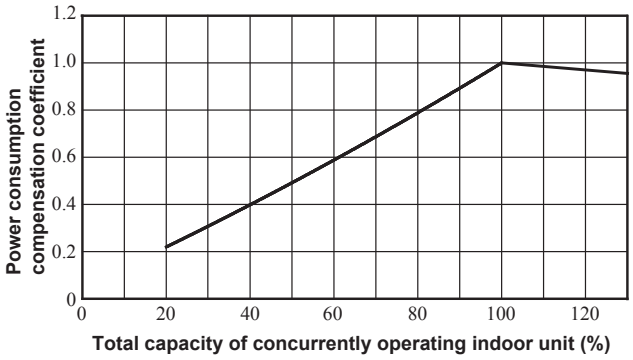


◆ **Power consumption compensation coefficient**

Cooling



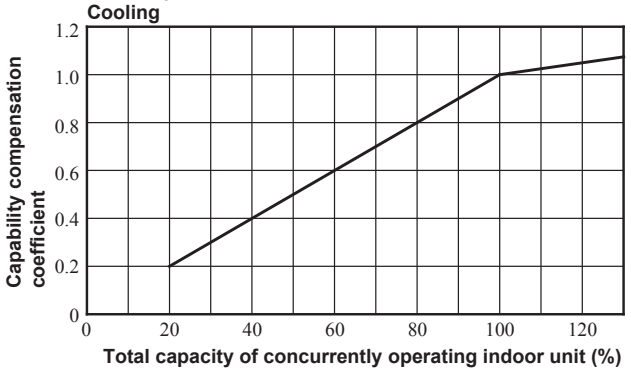
Heating



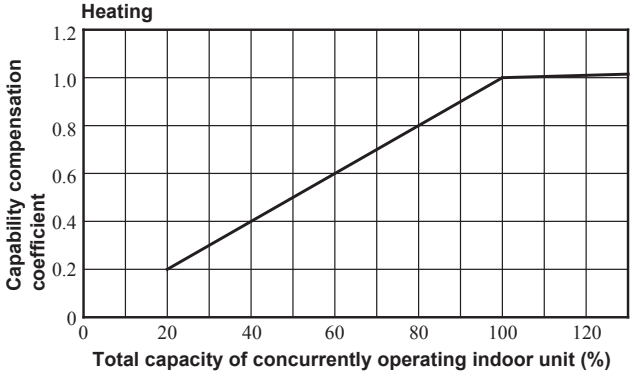
Model FDC670KXZXE1

◆ **Capability compensation coefficient**

Cooling

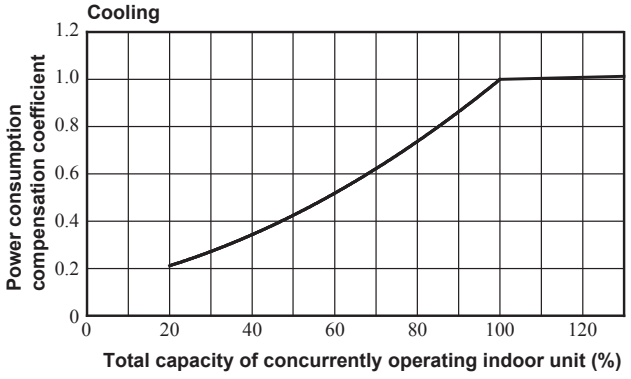


Heating

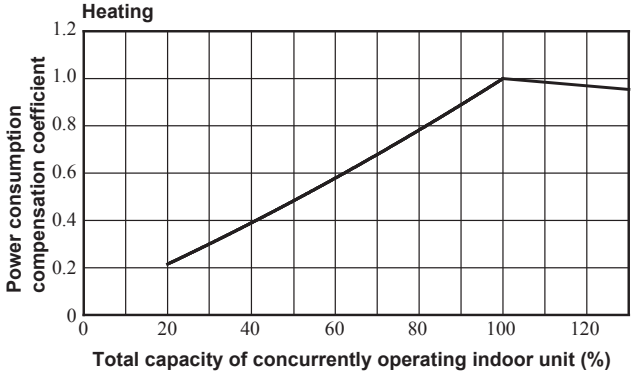


◆ **Power consumption compensation coefficient**

Cooling



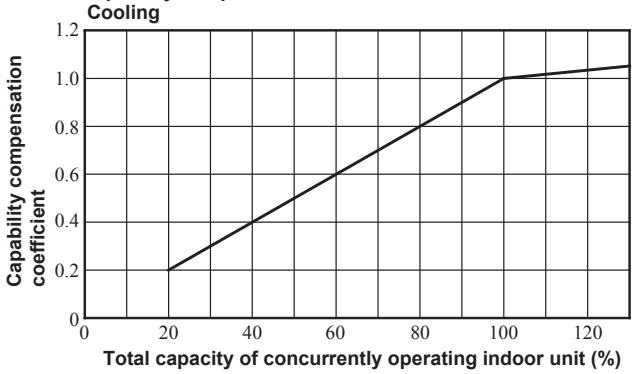
Heating



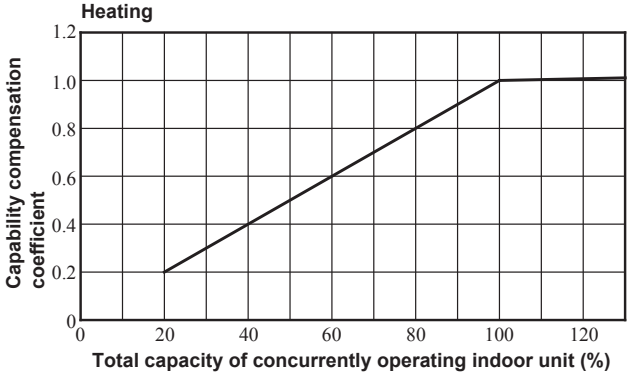
Model FDC735KXZXE1

◆ **Capability compensation coefficient**

Cooling

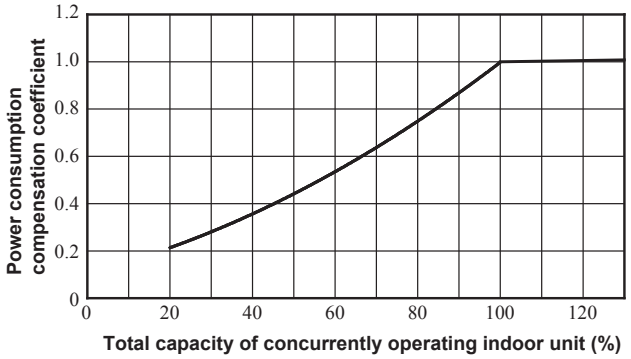


Heating

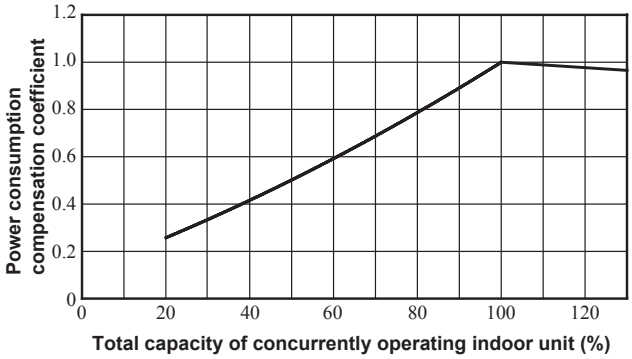


◆ **Power consumption compensation coefficient**

Cooling



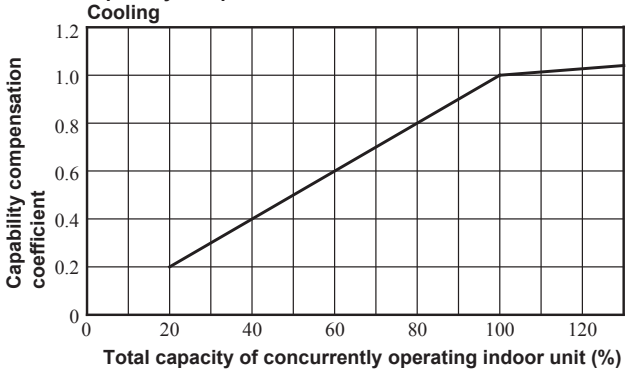
Heating



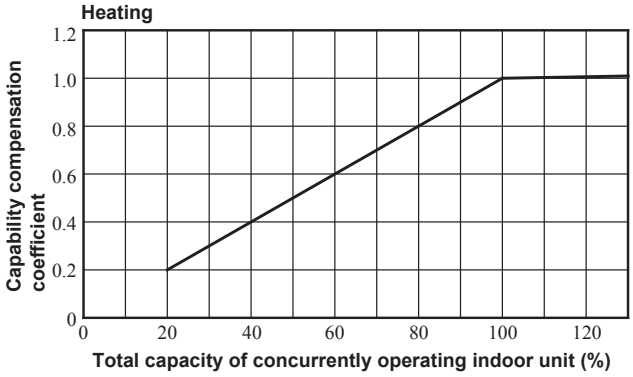
Model FDC800KXZXE1

◆ **Capability compensation coefficient**

Cooling

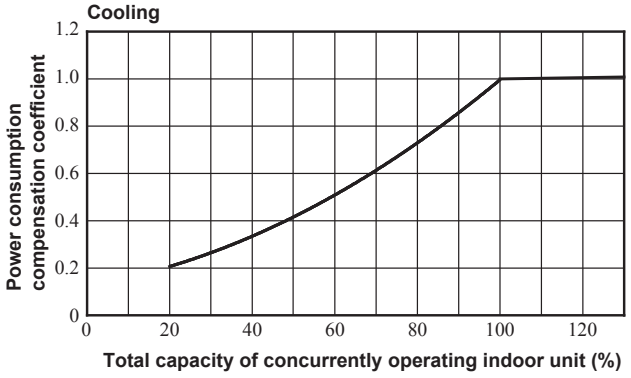


Heating

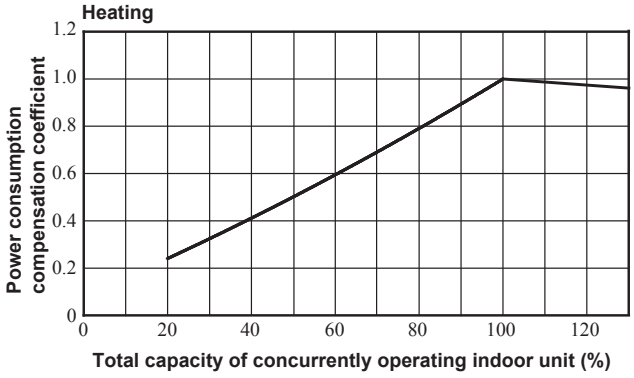


◆ **Power consumption compensation coefficient**

Cooling



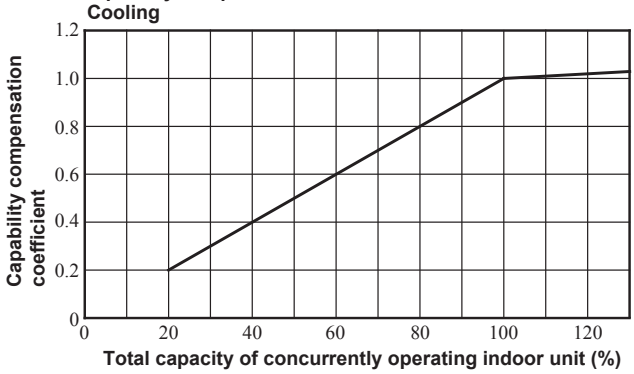
Heating



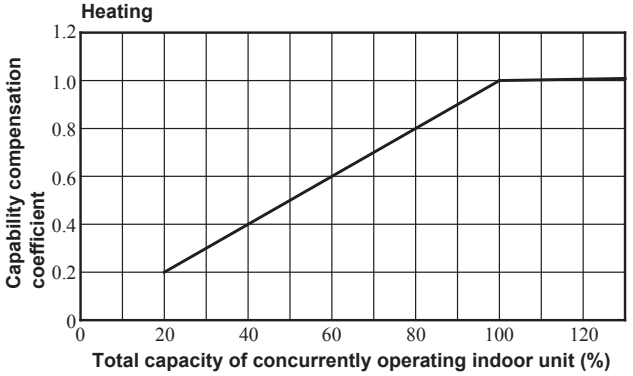
Model FDC850KXZXE1

◆ **Capability compensation coefficient**

Cooling

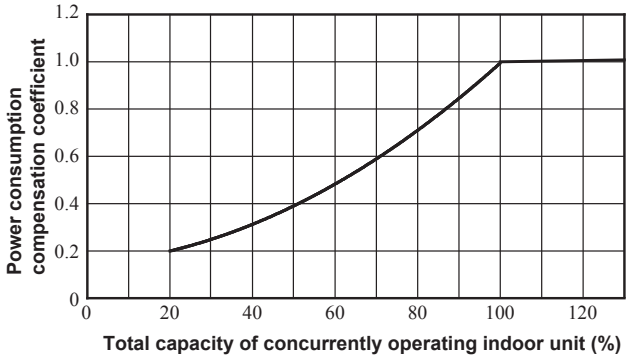


Heating

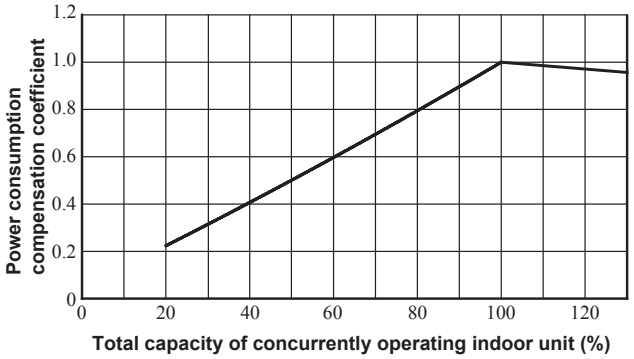


◆ **Power consumption compensation coefficient**

Cooling



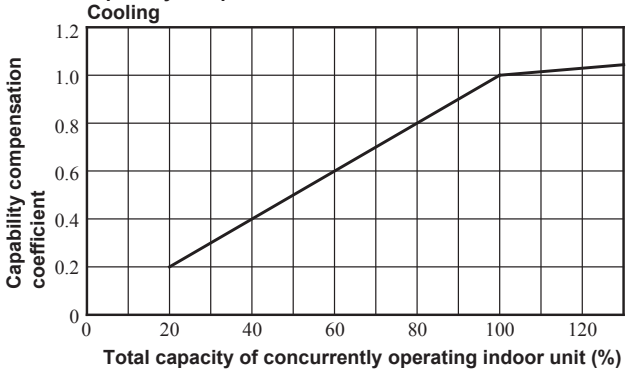
Heating



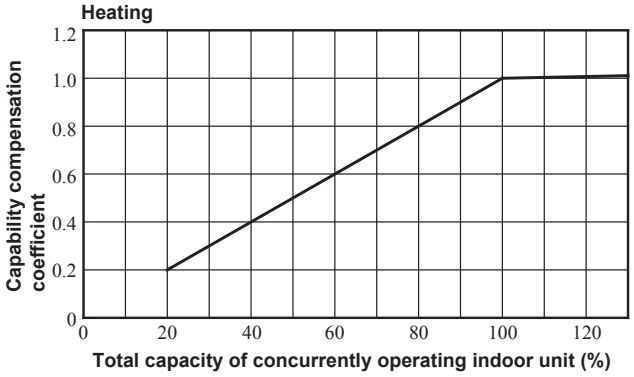
Model FDC900KXZXE1

◆ **Capability compensation coefficient**

Cooling

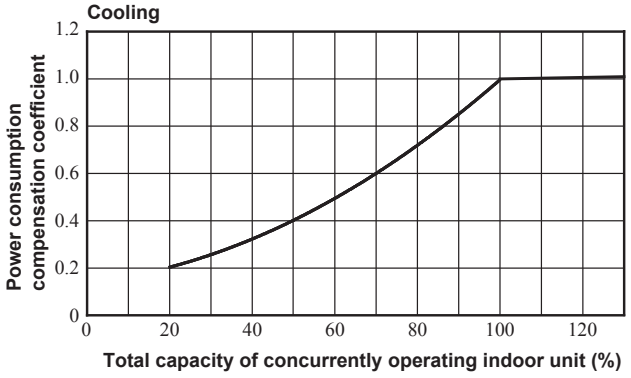


Heating

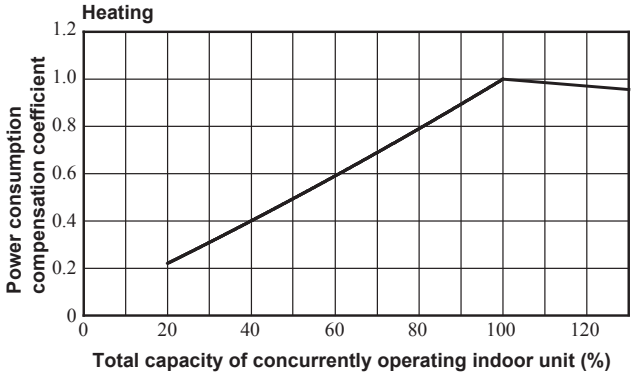


◆ **Power consumption compensation coefficient**

Cooling



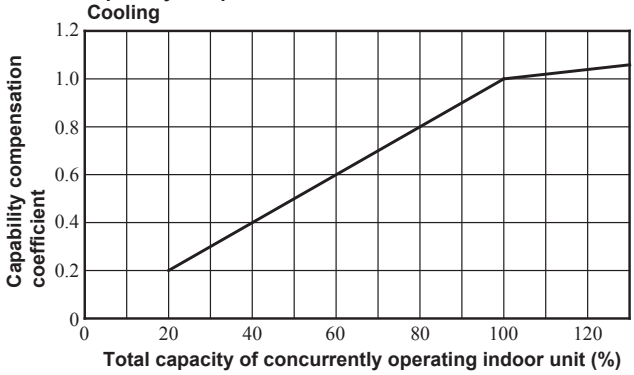
Heating



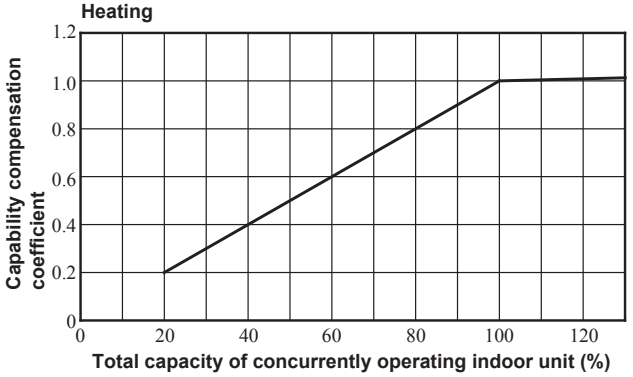
Model FDC950KXZXE1

◆ **Capability compensation coefficient**

Cooling

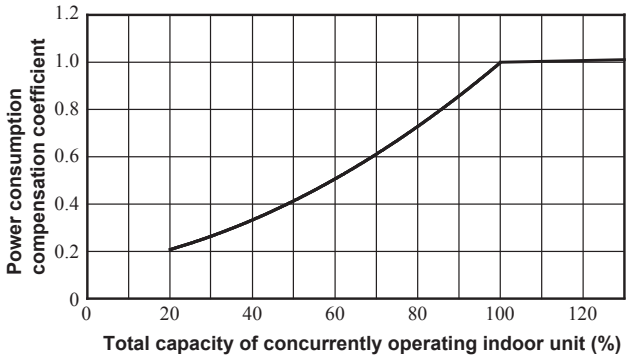


Heating

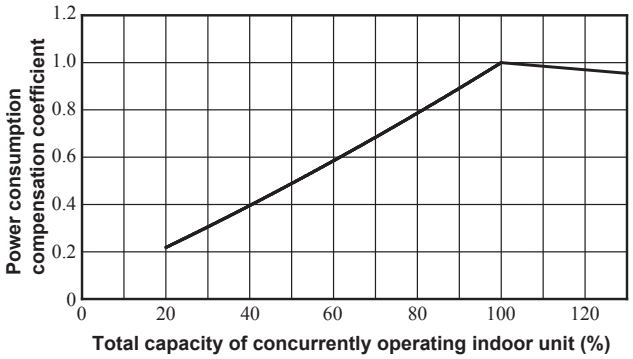


◆ **Power consumption compensation coefficient**

Cooling



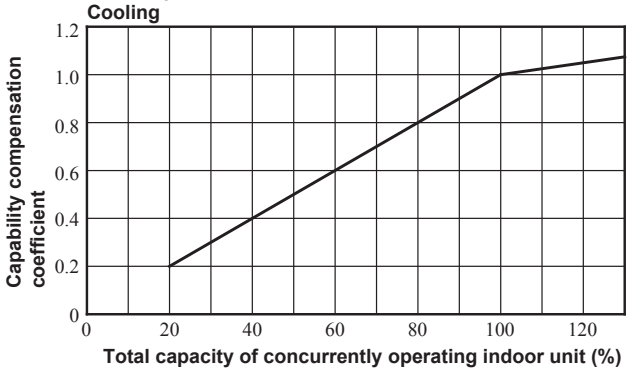
Heating



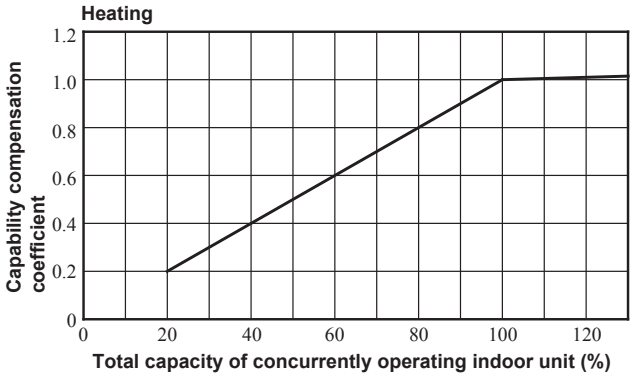
Model FDC1000KXZXE1

◆ **Capability compensation coefficient**

Cooling

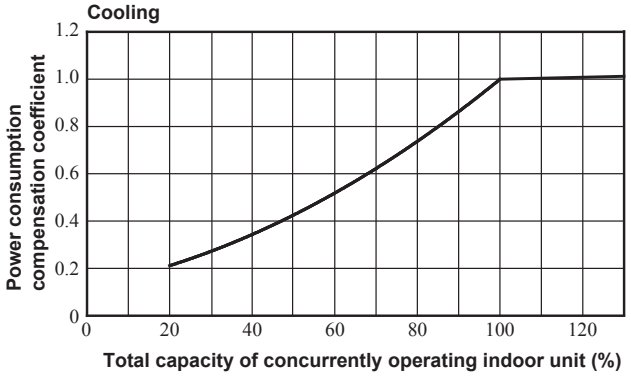


Heating

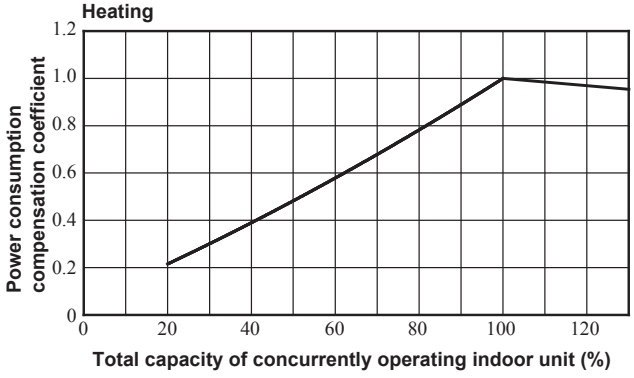


◆ **Power consumption compensation coefficient**

Cooling



Heating



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 dose not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

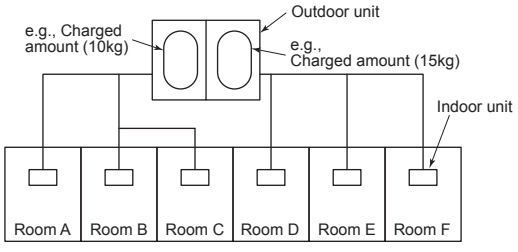
In a room where the concentration may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device.

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/m^3. (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.

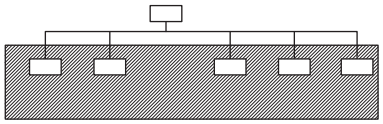


For the amount of charge in this example:
The possible amount of leaked refrigerant gas in rooms A, B and C is 10kg.
The possible amount of leaked refrigerant gas in rooms D, E and F is 15kg.

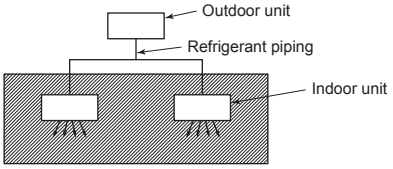
Important

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

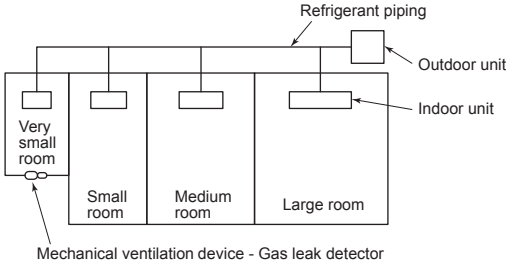
① No partition (shaded portion)



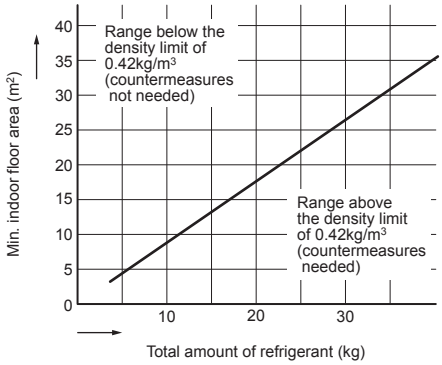
② When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door,or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).



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)



VRF INVERTER MULTI-SYSTEM AIR-CONDITIONERS

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