ELECTRA

Service Manual

Multi Split DUO 50 DCI

Indoor Units	Outdoor Units
WNG 25 DCI	DUO 50 DCI
WNG 35 DCI	
K 25 DCI	
K 35 DCI	
PXD 25 DCI	
PXD 35 DCI	
LS 35 DCI	

REFRIGERANT

R410A

HEAT PUMP

SM DUODCI 1-E.1 GB

SEPTEMBER — 2008

CONTENT

LIST OF EFFECTIVE PAGES

Note: Changes in the pages are indicated by a “Revision#” in the footer of each effected page (when none indicates no changes in the relevant page). All pages in the following list represent effected/ non effected pages divided by chapters.

Dates of issue for original and changed pages are:

Original ..... 0 ..... January 2005

Total number of pages in this publication is 56 consisting of the following:

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*Due to constant improvements please note that the data on this service manual can be modified with out notice.
**Photos are not contractual

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1. INTRODUCTION

1.1 General

The new **DUO50 DCI** is a high efficiency inverter technology outddor unit,
since it's a lego concept unit, it can be matched to several types of inverter indoors, such as:
wall mounted, cassette , floor/ceiling units, with a capacity range of 2.5 – 3.5 Kw for each single indoor unit.

1.2 Main Features

- DC Inverter
- R410A
- High COP (A class energy rating)
- Lego Concept
- Pre-Charged
- Dry contact inputs:
  - STBY – when shorted, will force all indoors to STBY.
  - Night – when shorted, will force outdoor fan to low speed (in cool mode only)
- Dry contact output – Alarm. Will be closed system is faulty.
- Base heater connection.
- Cooling operation at outdoor temperature down to -10^{0}C.
- Heating operation at outdoor temperature down to -15^{0}C.
- 10 LED's, shows both indoor and outdoor diagnostics.
- Variable Speed DC Inverter outdoor fan.
- M2L diagnostics softwear cable Port (for PC).
- Low noise level

1.3 Tubing Connections

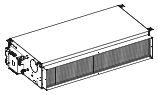
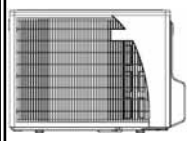
Flare type interconnecting tubing to be produced on site.
For further details please refer to APPENDIX A on this manual, and to the relevant indoor service Manual,

1.4 Inbox Documentation

Each indoor unit is supplied with its own installation and operation manuals.

1.5 Matching Table

1.5.1 R410A

OUTDOOR UNITS			INDOOR UNITS						
									
	MODEL	REFRIGER.	WNG25	WNG35	K25	K35	PXD25	PXD35	LS35
	DUO50 DCI	R410A	√		√		√		
		R410A		√		√		√	√

2. PRODUCT DATA SHEET

2.1 Outdoor Unit DUO 50 DCI Specifications.

Model				DUO-50 DCI R410A	
Function				Cooling	Heating
Capacity(1)			Kcal/hr	4300(1030~5570)	5330(820~6670)
			Btu/hr	17050(4090~22100)	21140(3240~26430)
			W	5000(1200~6480)	6200(950~7750)
Total Input(1)			W	1470(420~2160)	1670(375~2050)
E.E.R (Cooling) / C.O.P (Heating)(1)			W/W	3.4	3.71
Running Current			A	6.7	7.7
Starting Current			A	10.5	
Inrush Current			A	35	
Power Supply			V/Ph/Hz	230V/ 1PH / 50Hz	
OUTDOOR UNIT	Refrigerant control			Electronic expansion valve	
	Compressor type			Scroll DC Inverter	
	Model			Panasonic 5CS130XCC03	
	Starter type			---	
	Protection device			Outdoor SW control	
	Heat exchanger			Hydrophilic flat fin ,Grooved tube coil	
	Fan (drive) x No.			Propeller x 1	
	Airflow		m^3/hr	2160	
	Motor output		W	40	
	Defrost method			Reverse cycle	
	Noise level	Pressure(4)	dB(A)	52	53
		Power		62	63
	Dimensions	W*D*H	mm	795*290*610	
	Weight		kg	43	
	Packing dimensions	W*D*H	mm	945 * 395 * 655	
	Unit stacking		units	3	
TUBING	Refrigerant			R410A	
	Charge(7.5m connection tube)		kg	1500	
	Fresh Air			NO	
	Tube size	liquid	mm	6.35	
	O.D.	suction	mm	9.53	
	Connection method between the indoor and outdoor units	indoor & outdoor		Flared	
		height difference between indoor units		Max.5m	
		height difference between indoor & outdoor		Max.10m	
		tubing length		Standard 7.5m Max.25m for one unit and 30m for total	
		additional charge		No need	

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

2.2 Indoor Units Data

2.2.1 WNG 25 DCI Specifications

Model Indoor Unit / Type				WNG 25 DCI / Wall Mounted		
Installation Method				FLARE		
Fan Motor Output			W	20		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Crossflow *1		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	530/570	430/460	330/350
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	39-50 / 39-51		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	26-38 / 26-39		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	810	285	202
	Weight		kg	11		
	Package Dimensions	W/H/D	mm	885	360	285
	Stacking Height		Units	7		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1		

2.2.2 WNG 35 DCI Specifications

Model Indoor Unit / Type				WNG 35 DCI / Wall Mounted		
Installation Method				FLARE		
Fan Motor Output			W	20		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Crossflow *1		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	550/580	450/480	350/370
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	39-52 / 39-52		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	26-39 / 26-40		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	810	285	202
	Weight		kg	11		
	Package Dimensions	W/H/D	mm	885	360	285
	Stacking Height		Units	7		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1.5		

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

2.2.3 K 25 DCI Specifications

Model Indoor Unit / Type				K 25 DCI / Cassette		
Installation Method				FLARE		
Fan Motor Output			W	36		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Centifugal *1		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	530/600	500/530	435/450
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	42-48 / 42-47		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	32-38 / 32-37		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	571	287	571
	Weight		kg	22.7		
	Package Dimensions	W/H/D	mm	685	415	685
	Stacking Height		Units	5		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1		

2.2.4 K 35 DCI Specifications

Model Indoor Unit / Type				K 35 DCI / Cassette		
Installation Method				FLARE		
Fan Motor Output			W	36		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Centifugal *1		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	580/620	510/560	435/450
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	42-49 / 42-48		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	32-38 / 32-38		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	571	287	571
	Weight		kg	24.4		
	Package Dimensions	W/H/D	mm	685	415	685
	Stacking Height		Units	5		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1.5		

NOTE:

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

2.2.5 PXD 25 DCI Specifications

Model Indoor Unit / Type				PXD 25 DCI / Cassette		
Installation Method				FLARE		
Fan Motor Output			W	36		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Centifugal *2		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	400	350	300
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	47-50		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	35-39		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	820	630	190
	Weight		kg	21		
	Package Dimensions	W/H/D	mm	890	710	280
	Stacking Height		Units	7		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1		

2.2.6 PXD 35 DCI Specifications

Model Indoor Unit / Type				PXD 35 DCI / Cassette		
Installation Method				FLARE		
Fan Motor Output			W	36		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Centifugal *2		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	450	400	300
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	51-56		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	45-38		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	820	630	190
	Weight		kg	22		
	Package Dimensions	W/H/D	mm	890	710	280
	Stacking Height		Units	7		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1.9		

NOTE:

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

2.2.7 LS 35 DCI Specifications

Model Indoor Unit / Type				LS 35 DCI / Cassette		
Installation Method				FLARE		
Fan Motor Output			W	36		
Power Supply			V/Ph/Hz	220-240 / 1/ 50		
INDOOR	Fan Type & Quantity			Centifugal *2		
	Airflow(2) Cooling / Heating	H/M/L	m^3/hr	830	700	530
	Sound Power Level(3) Cooling / Heating	L - H	dB (A)	52-59		
	Sound Pressure Level (4) Cooling / Heating	L - H	dB (A)	35-42		
	Condensate Drain Tube I.D.		mm	16		
	Dimensions	W/H/D	mm	860	245	680
	Weight		kg	30.0		
	Package Dimensions	W/H/D	mm	1055	305	728
	Stacking Height		Units	6		
Heating Elements			kW	N/A		
Moisture Removal			L/hr	1.3		

NOTE:

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units) and EN14511.
(2) Airflow in ducted units; at nominal external static pressure.
(3) Sound power in ducted units is measured at air discharge.
(4) Sound pressure level measured at 1 meter distance from unit.

2.3 Data For Outdoor Unit DUO 50 DCI Combinations (Based on WNG)

Indoor Units Combinations	Cooling				Heating			
	Room A	Room B	Total Capacity	Power Input	Room A	Room B	Total Capacity	Power Input
	[W]	[W]	[W]	[W]	[W]	[W]	[W]	[W]
25	2500	-	2500 (1220 - 3700)	680 (420 - 980)	3400	-	3400 (950 - 4000)	1135 (375 - 1250)
35	3500	-	3500 (1220 - 4350)	1030 (420 - 1275)	4200	-	4200 (950 - 5200)	1575 (375 - 1760)
25+25	2500	2500	5000 (1400 - 6000)	1470 (410 - 2100)	3100	3100	6200 (1250 - 7100)	1670 (320 - 1960)
25+35	2500	3000	5500 (1400 - 6240)	1850 (410 - 2130)	3100	3450	6550 (1250 - 7400)	1760 (320 - 2020)
35+35	3000	3000	6000 (1400 - 6480)	2040 (410 - 2160)	3450	3450	6900 (1250 - 7750)	1970 (320 - 2050)

2.3.1 Correction Factors:

	Capacity		Power input	
Model	Cooling	Heating	Cooling	Heating
PXD25 DCI	1.0	0.95	1.0	1.08
PXD35 DCI	1.02	0.96	1.0	1.08
LS35 DCI	1.02	0.95	1.0	0.91
K25 DCI	1.02	1.01	1.01	1.01
K35 DCI	1.06	0.97	1.05	0.99

2.3.2 Calculation Example.

WNG25+K35 Cooling Mode:

Indoor Unit	Cooling Capacity [W]	Power Input [W]
Room A – WNG25	2500	1850 x (2500/5000) = 840
Room B – K35	(3000 x 1.06) = 3180	1850 x (3000/5000) x 1.05 = 1059
Total	(2500+3180) = 5680	840+1059 = 1899

2.3.3 K35+K35 Heating Mode:

Indoor Unit	Heating Capacity [W]	Power Input [W]
Room A – K35	(3000 x 0.97) = 2910	(2040 x 0.99) = 2019
Room B – K35	(3000 x 0.97) = 2910	(2040 x 0.99) = 2019
Total	(2910+2910) = 5820	(2019+2019) = 4038

3. RATING CONDITIONS

Standard conditions in accordance with ISO 5151, ISO 13253 (for ducted units) and EN 14511.

Cooling:
Indoor: 27°C DB 19°C WB
Outdoor: 35 °C DB

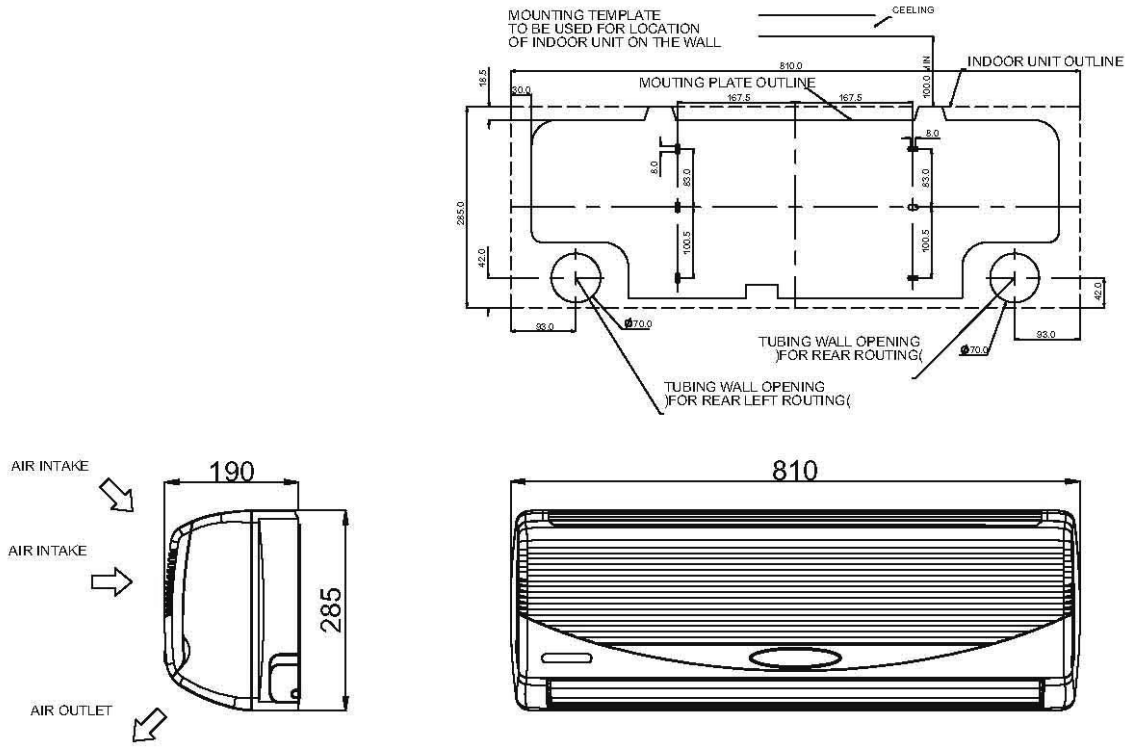
Heating:
Indoor: 20°C DB
Outdoor: 7°C DB 6°C WB

3.1 Operating Limits

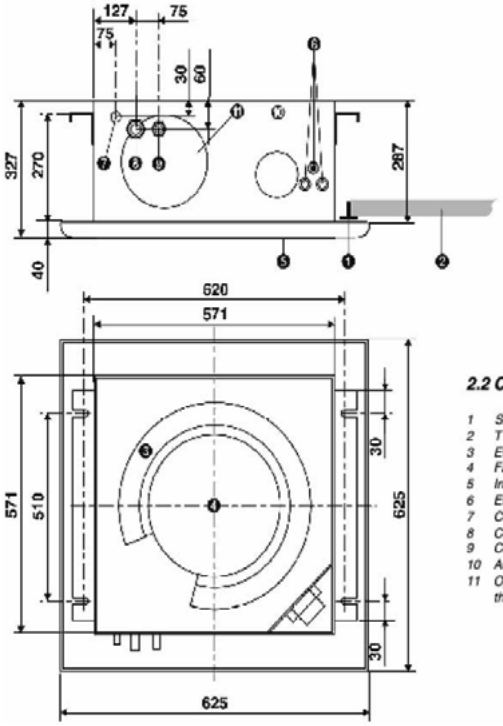
		Indoor	Outdoor
Cooling	Upper limit	32°C DB 23°C WB	46°C DB
	Lower limit	21°C DB 15°C WB	-10°C DB
Heating	Upper limit	27°C DB	24°C DB 18°C WB
	Lower limit	10°C DB	-15°C DB -16°C WB
Voltage	1PH	198 – 264 V	
	3PH	N/A	

4. OUTLINE DIMENSIONS

4.1 Indoor Unit: WNG 25 / 35 DCI



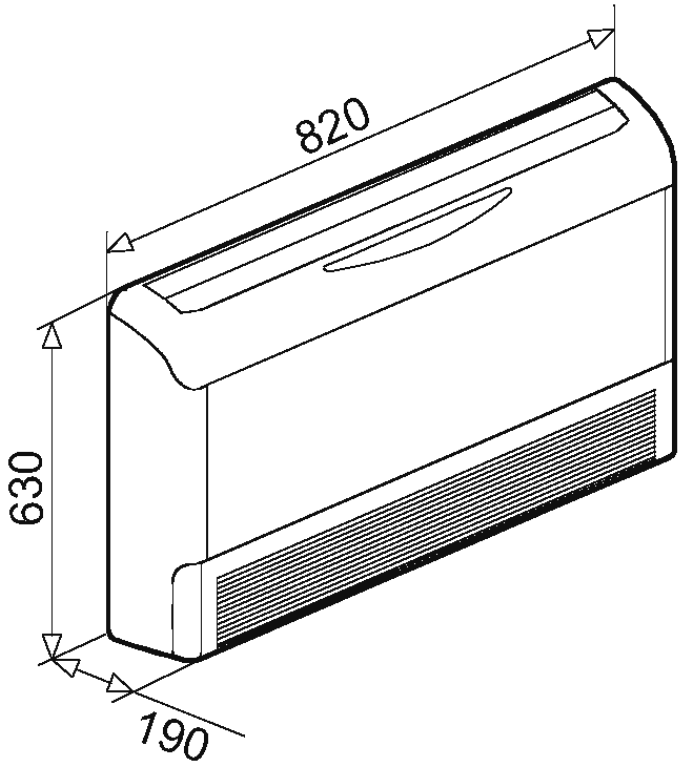
4.2 Indoor Unit: K25 / 35 DCI



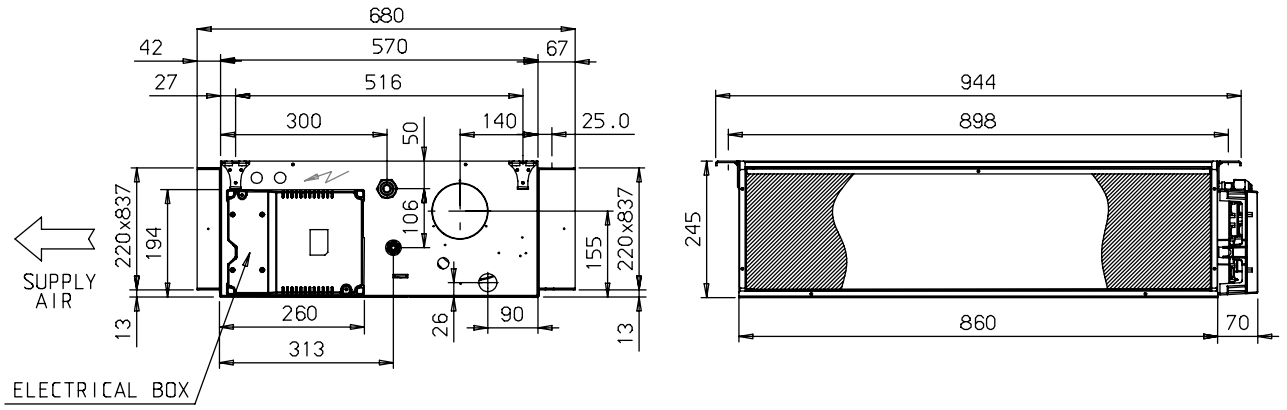
2.2 CASSETTE DIMENSIONS

1 *Suspended ceiling*
2 *T bar (suspended ceiling)*
3 *Evaporator*
4 *Fan*
5 *Intake grille*
6 *Electrical connection*
7 *Condensate evacuation Ø 15*
8 *Connection GAS*
9 *Connection LIQUID*
10 *Air inlet*
11 *Opening for ducted air distribution into the adjacent room (ready to punch out)*

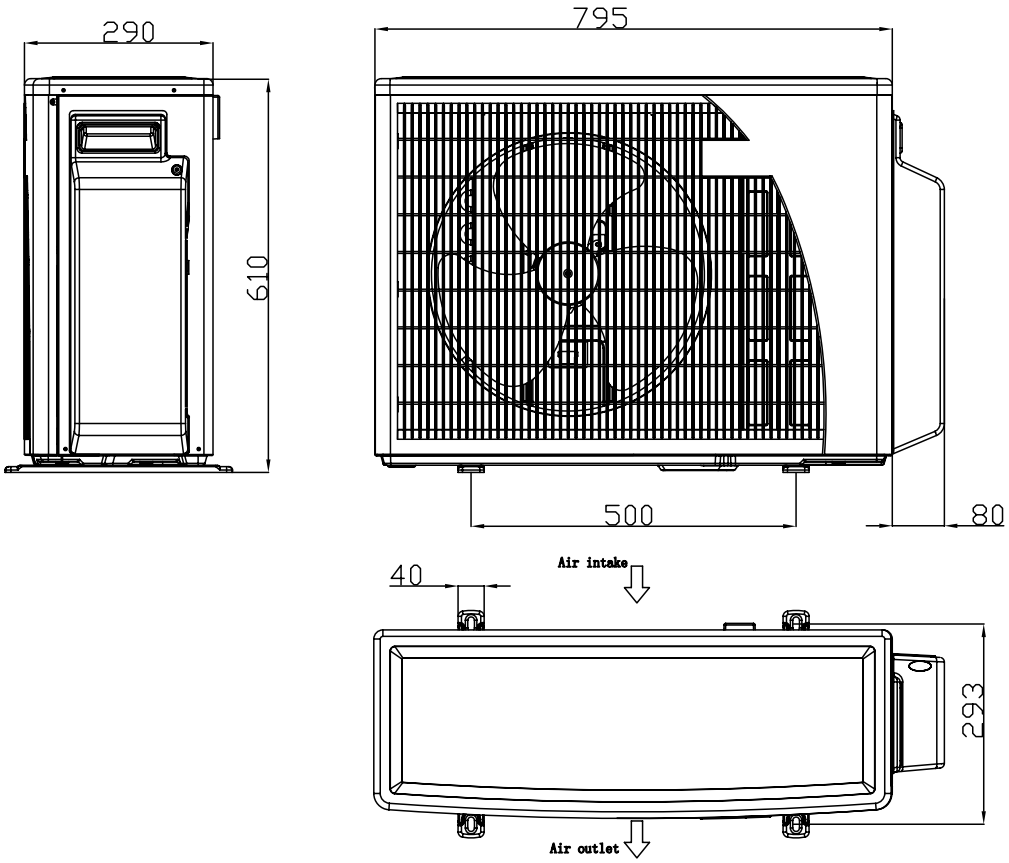
4.3 Indoor Unit: PXD 25 / 35 DCI



4.4 Indoor Unit: LS 35 DCI



4.3 Outdoor Unit: DUO 38 DCI / Delta



5. PERFORMANCE DATA

5.1 WNG 25 DCI

5.1.1 Cooling Capacity (kW) - Run Mode (Unit A or B)

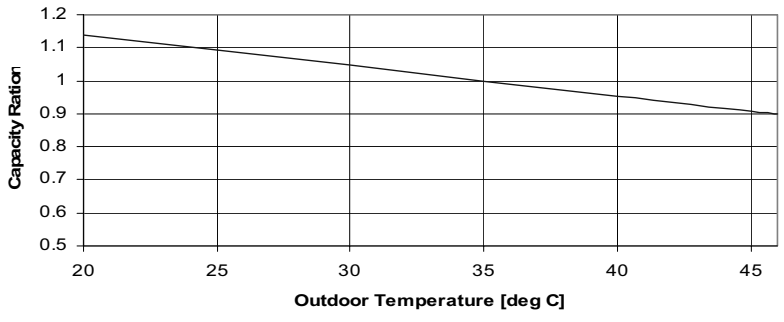
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C] 22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.42	2.57	2.73	2.89	3.05
	SC	1.72	1.75	1.79	1.82	1.86
	PI	0.58	0.59	0.60	0.61	0.62
30	TC	2.30	2.46	2.62	2.77	2.93
	SC	1.67	1.71	1.74	1.78	1.81
	PI	0.65	0.66	0.67	0.68	0.69
35	TC	2.18	2.34	2.50	2.66	2.82
	SC	1.63	1.66	1.70	1.74	1.77
	PI	0.71	0.72	0.74	0.75	0.76
40	TC	2.07	2.23	2.38	2.54	2.70
	SC	1.59	1.62	1.66	1.69	1.73
	PI	0.78	0.79	0.80	0.81	0.82
46	TC	1.93	2.09	2.24	2.40	2.56
	SC	1.53	1.57	1.60	1.64	1.67
	PI	0.86	0.87	0.88	0.89	0.91

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.1.2 Capacity Correction Factors



5.1.3 Heating Capacity (kW) - Run Mode(Unit A or B)

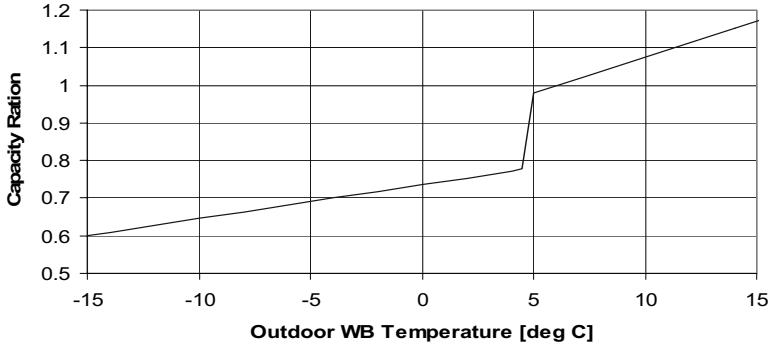
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [°C]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	**DATA**	**15**	**20**	**25**
-15/-16	TC	1.97	1.84	1.70
	PI	0.50	0.55	0.60
-10/-12	TC	2.20	2.06	1.92
	PI	0.60	0.65	0.71
-7/-8	TC	2.36	2.23	2.09
	PI	0.68	0.73	0.78
-1/-2	TC	2.45	2.31	2.17
	PI	0.72	0.77	0.82
2/1	TC	2.50	2.37	2.23
	PI	0.75	0.80	0.85
7/6	TC	3.24	3.10	2.96
	PI	0.78	0.84	0.89
10/9	TC	3.42	3.28	3.14
	PI	0.83	0.88	0.93
15/12	TC	3.60	3.46	3.32
	PI	0.88	0.93	0.98
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.1.4 Capacity Correction Factors



5.2 WNG 35 DCI

5.2.1 Cooling Capacity (kW) - Run Mode (Unit A or B)

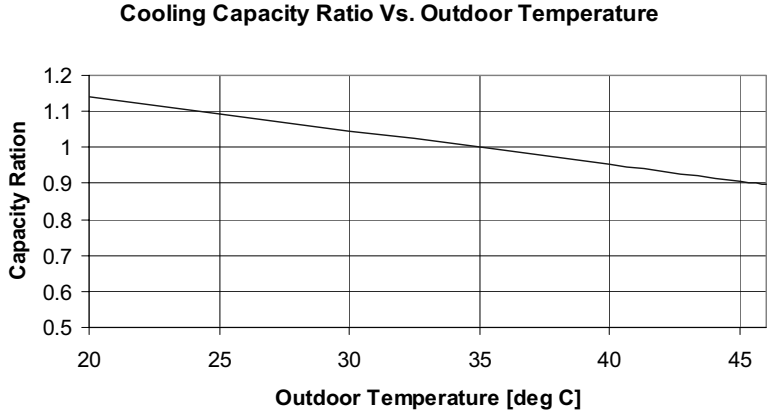
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB/WB TEMPERATURE [^{0}C]				
OD COIL ENTERING AIR DB TEMPERATURE [^{0}C]	**DATA**	**22/15**	**24/17**	**27/19**	**29/21**	**32/23**
-10 - 20 (protection range)	**TC**	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	**TC**	2.90	3.09	3.28	3.47	3.66
	SC	2.06	2.10	2.14	2.19	2.23
	PI	0.80	0.82	0.83	0.85	0.86
30	**TC**	2.76	2.95	3.14	3.33	3.52
	SC	2.01	2.05	2.09	2.13	2.18
	PI	0.90	0.91	0.93	0.94	0.96
35	**TC**	2.62	2.81	3.00	3.19	3.38
	SC	1.96	2.00	2.04	2.08	2.12
	PI	0.99	1.00	1.02	1.04	1.05
40 (Protection Range)	**TC**	2.48	2.67	2.86	3.05	3.24
	SC	1.90	1.95	1.99	2.03	2.07
	PI	1.08	1.10	1.11	1.13	1.14
46 (Protection Range)	**TC**	2.31	2.50	2.69	2.88	3.07
	SC	1.84	1.88	1.93	1.97	2.01
	PI	1.20	1.21	1.23	1.24	1.26

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (^{o}C)
DB – Dry Bulb Temp., (^{o}C)
ID – Indoor
OD – Outdoor

5.2.2 Capacity Correction Factors



5.2.3 Heating Capacity (kW) - Run Mode(Unit A or B)

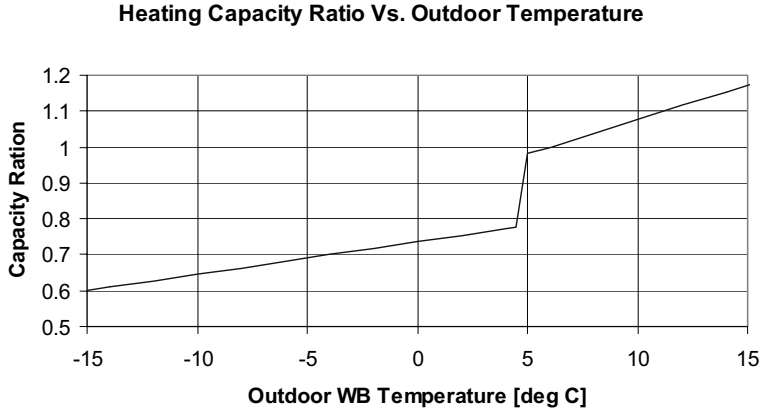
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [°C]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	**DATA**	**15**	**20**	**25**
-15/-16	TC	2.20	2.04	1.89
	PI	0.59	0.65	0.71
-10/-12	TC	2.44	2.29	2.14
	PI	0.71	0.77	0.83
-7/-8	TC	2.63	2.48	2.32
	PI	0.80	0.86	0.92
-1/-2	TC	2.72	2.57	2.42
	PI	0.85	0.91	0.97
2/1	TC	2.79	2.63	2.48
	PI	0.88	0.94	1.00
7/6	TC	3.60	3.45	3.30
	PI	0.92	0.99	1.05
10/9	TC	3.80	3.65	3.50
	PI	0.98	1.04	1.10
15/12	TC	4.00	3.85	3.69
	PI	1.04	1.10	1.16
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.3.4 Capacity Correction Factors



5.3 K 25 DCI

5.3.1 Cooling Capacity (kW) - Run Mode(Unit A or B)

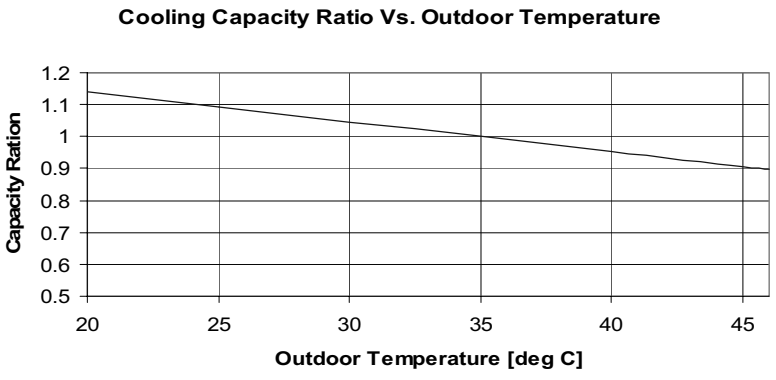
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
OD COIL ENTERING AIR DB TEMPERATURE [°C]	**DATA**	**22/15**	**24/17**	**27/19**	**29/21**	**32/23**
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.46	2.63	2.79	2.95	3.11
	SC	1.75	1.79	1.82	1.86	1.89
	PI	0.58	0.59	0.61	0.62	0.63
30	TC	2.35	2.51	2.67	2.83	2.99
	SC	1.71	1.74	1.78	1.81	1.85
	PI	0.65	0.66	0.67	0.68	0.70
35	TC	2.23	2.39	2.55	2.71	2.87
	SC	1.66	1.70	1.73	1.77	1.81
	PI	0.72	0.73	0.74	0.75	0.76
40	TC	2.11	2.27	2.43	2.59	2.75
	SC	1.62	1.65	1.69	1.73	1.76
	PI	0.79	0.80	0.81	0.82	0.83
46	TC	1.97	2.13	2.29	2.45	2.61
	SC	1.57	1.60	1.64	1.67	1.71
	PI	0.87	0.88	0.89	0.90	0.91

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.3.2 Capacity Correction Factors



5.3.3 Heating Capacity (kW) - Run Mode(Unit A or B)

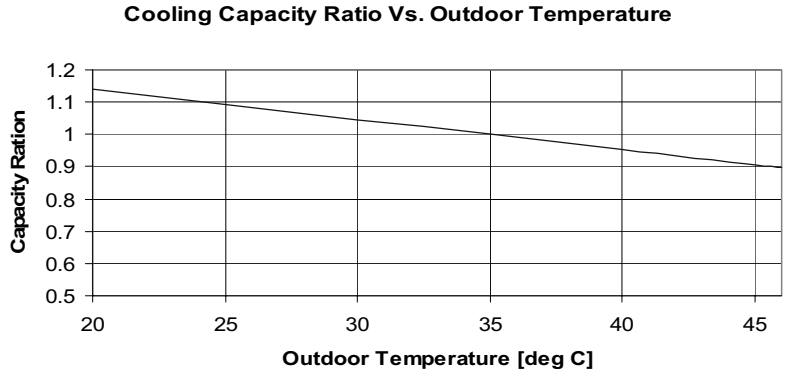
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [°C]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	**DATA**	**15**	**20**	**25**
-15/-16	TC	1.99	1.85	1.71
	PI	0.52	0.57	0.62
-10/-12	TC	2.22	2.08	1.94
	PI	0.62	0.67	0.73
-7/-8	TC	2.39	2.25	2.11
	PI	0.70	0.75	0.81
-1/-2	TC	2.47	2.33	2.19
	PI	0.74	0.79	0.85
2/1	TC	2.53	2.39	2.25
	PI	0.77	0.82	0.87
7/6	TC	3.27	3.13	2.99
	PI	0.81	0.86	0.91
10/9	TC	3.45	3.31	3.17
	PI	0.86	0.91	0.96
15/12	TC	3.63	3.49	3.35
	PI	0.90	0.96	1.01
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.3.4 Capacity Correction Factors



5.4 K 35 DCI

5.4.1. Cooling Capacity (kW) - Run Mode (Unit A or B)

230[V] : Indoor Fan at High Speed.

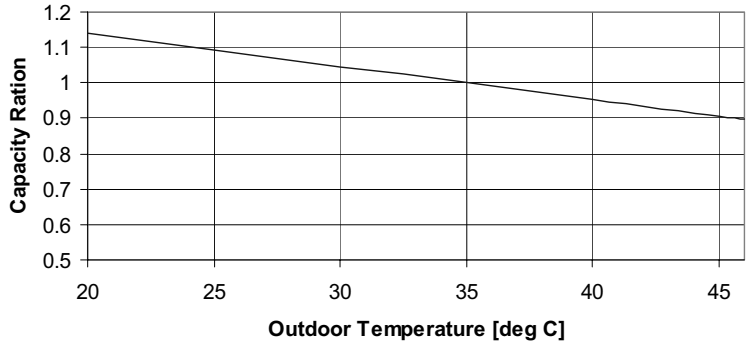
		ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	**22/15**	**24/17**	**27/19**	**29/21**	**32/23**
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	3.07	3.27	3.48	3.68	3.88
	SC	2.18	2.23	2.27	2.31	2.36
	PI	0.84	0.86	0.87	0.89	0.91
30	TC	2.93	3.13	3.33	3.53	3.73
	SC	2.13	2.17	2.22	2.26	2.30
	PI	0.94	0.96	0.97	0.99	1.00
35	TC	2.78	2.98	3.18	3.38	3.58
	SC	2.07	2.12	2.16	2.20	2.25
	PI	1.04	1.05	1.07	1.09	1.10
40	TC	2.63	2.83	3.03	3.23	3.43
	SC	2.02	2.06	2.10	2.15	2.19
	PI	1.14	1.15	1.17	1.18	1.20
46	TC	2.45	2.65	2.85	3.06	3.26
	SC	1.95	1.99	2.04	2.08	2.13
	PI	1.25	1.27	1.29	1.30	1.32

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.4.2 Capacity Correction Factors

Cooling Capacity Ratio Vs. Outdoor Temperature



5.4.3 Heating Capacity (kW) - Run Mode (Unit A or B)

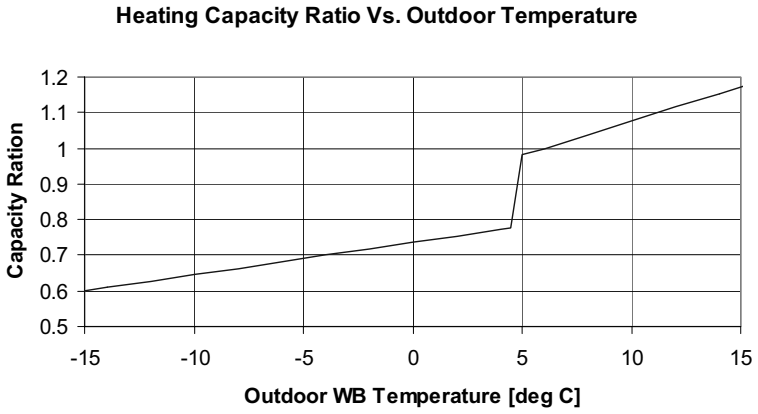
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [°C]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	**DATA**	**15**	**20**	**25**
-15/-16	TC	2.13	1.98	1.83
	PI	0.59	0.64	0.70
-10/-12	TC	2.37	2.22	2.08
	PI	0.71	0.76	0.82
-7/-8	TC	2.55	2.41	2.26
	PI	0.80	0.85	0.91
-1/-2	TC	2.64	2.50	2.35
	PI	0.84	0.90	0.96
2/1	TC	2.71	2.56	2.41
	PI	0.87	0.93	0.99
7/6	TC	3.50	3.35	3.20
	PI	0.92	0.98	1.03
10/9	TC	3.69	3.54	3.39
	PI	0.97	1.03	1.09
15/12	TC	3.88	3.74	3.59
	PI	1.02	1.08	1.14
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.4.4 Capacity Correction Factors



5.5 PXD 25 DCI

5.5.1. Cooling Capacity (kW) - Run Mode (Unit A or B)

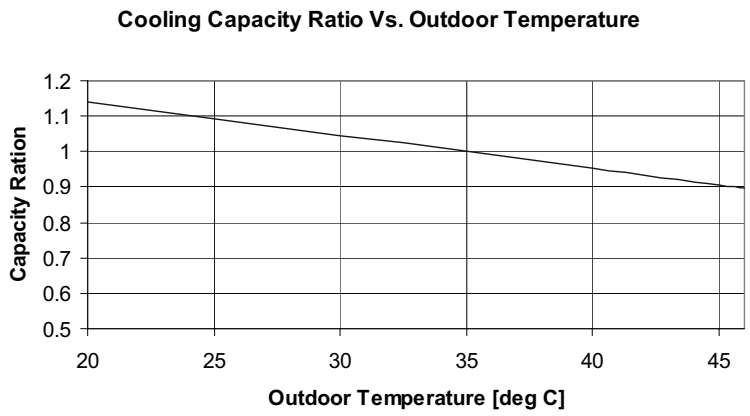
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB/WB TEMPERATURE [ºC]				
OD COIL ENTERING AIR DB TEMPERATURE [ºC]	**DATA**	**22/15**	**24/17**	**27/19**	**29/21**	**32/23**
-10 - 20 (protection range)	**TC**	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	**TC**	2.42	2.57	2.73	2.89	3.05
	SC	1.72	1.75	1.79	1.82	1.86
	PI	0.58	0.59	0.60	0.61	0.62
30	**TC**	2.30	2.46	2.62	2.77	2.93
	SC	1.67	1.71	1.74	1.78	1.81
	PI	0.65	0.66	0.67	0.68	0.69
35	**TC**	2.18	2.34	**2.50**	2.66	2.82
	SC	1.63	1.66	**1.70**	1.74	1.77
	PI	0.71	0.72	**0.74**	0.75	0.76
40	**TC**	2.07	2.23	2.38	2.54	2.70
	SC	1.59	1.62	1.66	1.69	1.73
	PI	0.78	0.79	0.80	0.81	0.82
46	**TC**	1.93	2.09	2.24	2.40	2.56
	SC	1.53	1.57	1.60	1.64	1.67
	PI	0.86	0.87	0.88	0.89	0.91

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (ºC)
DB – Dry Bulb Temp., (ºC)
ID – Indoor
OD – Outdoor

5.5.2 Capacity Correction Factors



5.5.3 Heating Capacity (kW) - Run Mode (Unit A or B)

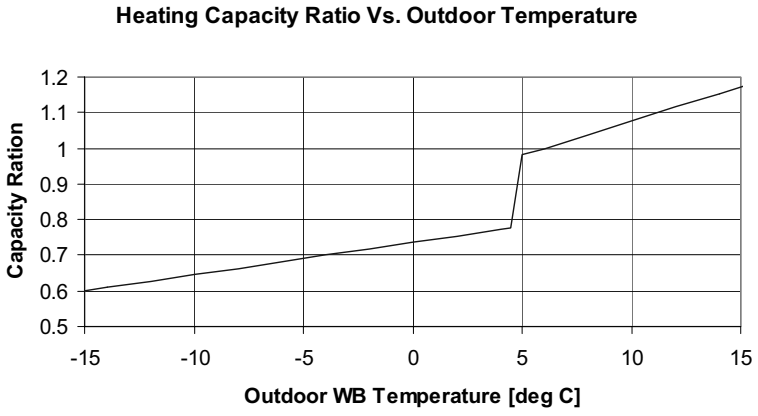
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [ºC]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [ºC]	**DATA**	**15**	**20**	**25**
-15/-16	**TC**	1.87	1.74	1.61
	PI	0.54	0.60	0.65
-10/-12	**TC**	2.08	1.95	1.82
	PI	0.65	0.71	0.76
-7/-8	**TC**	2.24	2.11	1.98
	PI	0.73	0.79	0.84
-1/-2	**TC**	2.32	2.19	2.06
	PI	0.78	0.83	0.89
2/1	**TC**	2.37	2.24	2.11
	PI	0.80	0.86	0.91
7/6	**TC**	3.07	**2.94**	2.81
	PI	0.85	**0.90**	0.95
10/9	**TC**	3.24	3.11	2.98
	PI	0.90	0.95	1.01
15/12	**TC**	3.41	3.28	3.15
	PI	0.95	1.00	1.06
15-24 (Protection Range)	**TC**	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (ºC)
DB – Dry Bulb Temp., (ºC)
ID – Indoor
OU – Outdoor

5.5.4 Capacity Correction Factors



5.6 PXD 35 DCI

5.6.1. Cooling Capacity (kW) - Run Mode (Unit A or B)

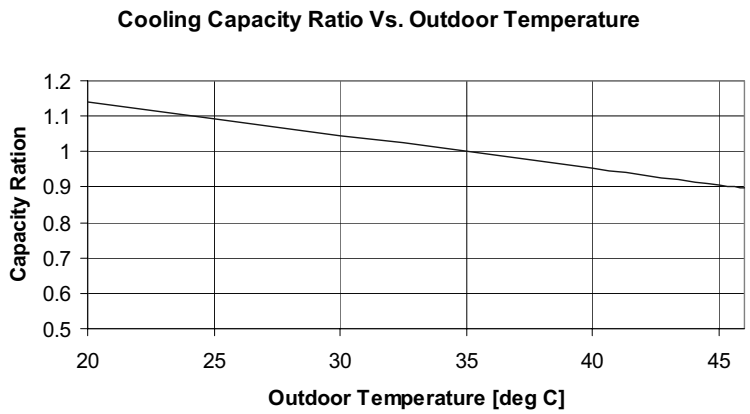
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [ºC]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [ºC] 22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.96	3.15	3.34	3.54	3.73
	SC	2.06	2.10	2.14	2.19	2.23
	PI	0.80	0.82	0.83	0.85	0.86
30	TC	2.82	3.01	3.20	3.40	3.59
	SC	2.01	2.05	2.09	2.13	2.18
	PI	0.90	0.91	0.93	0.94	0.96
35	TC	2.67	2.87	**3.06**	3.25	3.45
	SC	1.96	2.00	**2.04**	2.08	2.12
	PI	0.99	1.00	**1.02**	1.04	1.05
40	TC	2.53	2.72	2.92	3.11	3.30
	SC	1.90	1.95	1.99	2.03	2.07
	PI	1.08	1.10	1.11	1.13	1.14
46	TC	2.36	2.55	2.75	2.94	3.13
	SC	1.84	1.88	1.93	1.97	2.01
	PI	1.20	1.21	1.23	1.24	1.26

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (ºC)
DB – Dry Bulb Temp., (ºC)
ID – Indoor
OD – Outdoor

5.6.2 Capacity Correction Factors



5.6.3 Heating Capacity (kW) - Run Mode (Unit A or B)

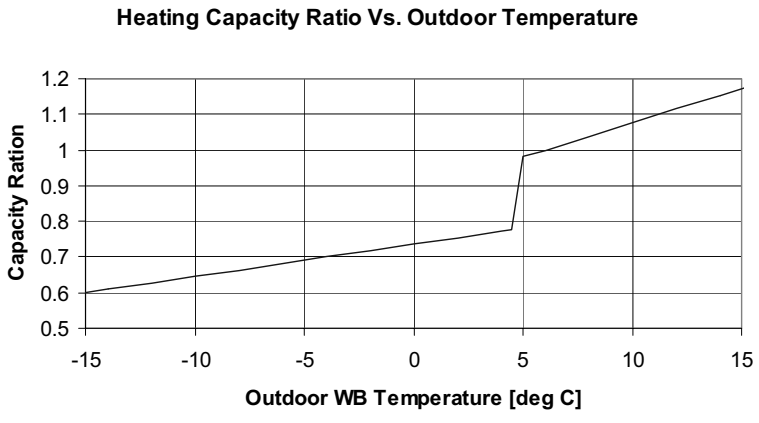
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [ºC]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [ºC]	**DATA**	**15**	**20**	**25**
-15/-16	**TC**	2.11	1.96	1.81
	PI	0.64	0.70	0.77
-10/-12	**TC**	2.35	2.20	2.05
	PI	0.77	0.83	0.90
-7/-8	**TC**	2.52	2.38	2.23
	PI	0.87	0.93	1.00
-1/-2	**TC**	2.61	2.47	2.32
	PI	0.92	0.98	1.05
2/1	**TC**	2.67	2.53	2.38
	PI	0.95	1.01	1.08
7/6	**TC**	3.46	**3.31**	3.16
	PI	1.00	**1.06**	1.13
10/9	**TC**	3.65	3.50	3.35
	PI	1.06	1.12	1.19
15/12	**TC**	3.84	3.69	3.54
	PI	1.12	1.18	1.25
15-24 (Protection Range)	**TC**	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (ºC)
DB – Dry Bulb Temp., (ºC)
ID – Indoor
OU – Outdoor

5.6.4 Capacity Correction Factors



5.7 LS 35 DCI

5.7.1. Cooling Capacity (kW) - Run Mode (Unit A or B)

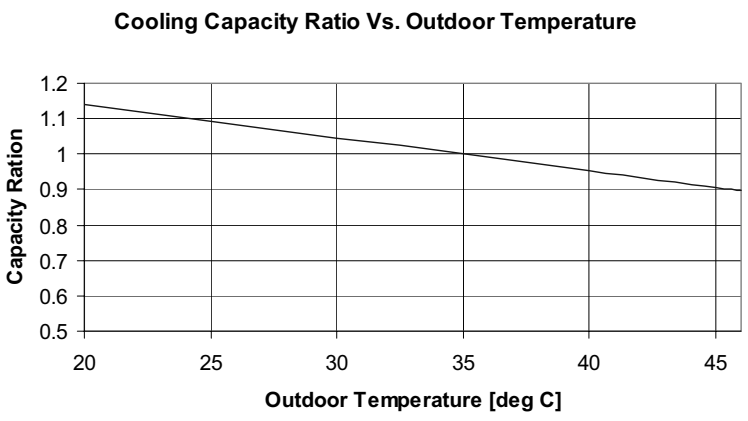
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [ºC]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [ºC]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	2.96	3.15	3.34	3.54	3.73
	SC	2.06	2.10	2.14	2.19	2.23
	PI	0.80	0.82	0.83	0.85	0.86
30	TC	2.82	3.01	3.20	3.40	3.59
	SC	2.01	2.05	2.09	2.13	2.18
	PI	0.90	0.91	0.93	0.94	0.96
35	TC	2.67	2.87	**3.06**	3.25	3.45
	SC	1.96	2.00	**2.04**	2.08	2.12
	PI	0.99	1.00	**1.02**	1.04	1.05
40	TC	2.53	2.72	2.92	3.11	3.30
	SC	1.90	1.95	1.99	2.03	2.07
	PI	1.08	1.10	1.11	1.13	1.14
46	TC	2.36	2.55	2.75	2.94	3.13
	SC	1.84	1.88	1.93	1.97	2.01
	PI	1.20	1.21	1.23	1.24	1.26

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (ºC)
DB – Dry Bulb Temp., (ºC)
ID – Indoor
OD – Outdoor

5.7.2 Capacity Correction Factors



5.7.3 Heating Capacity (kW) - Run Mode (Unit A or B)

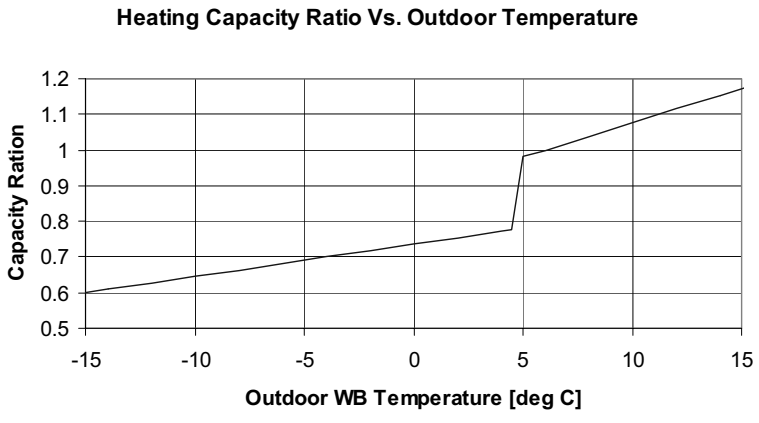
230[V] : Indoor Fan at High Speed.

		ID COIL ENTERING AIR DB TEMPERATURE [ºC]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [ºC]	**DATA**	**15**	**20**	**25**
-15/-16	**TC**	2.09	1.94	1.80
	PI	0.54	0.60	0.65
-10/-12	**TC**	2.32	2.18	2.03
	PI	0.65	0.71	0.76
-7/-8	**TC**	2.50	2.36	2.21
	PI	0.73	0.79	0.84
-1/-2	**TC**	2.59	2.44	2.30
	PI	0.78	0.83	0.89
2/1	**TC**	2.65	2.50	2.36
	PI	0.80	0.86	0.91
7/6	**TC**	3.43	**3.28**	3.13
	PI	0.85	**0.90**	0.95
10/9	**TC**	3.61	3.47	3.32
	PI	0.90	0.95	1.01
15/12	**TC**	3.80	3.66	3.51
	PI	0.95	1.00	1.06
15-24 (Protection Range)	**TC**	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (ºC)
DB – Dry Bulb Temp., (ºC)
ID – Indoor
OU – Outdoor

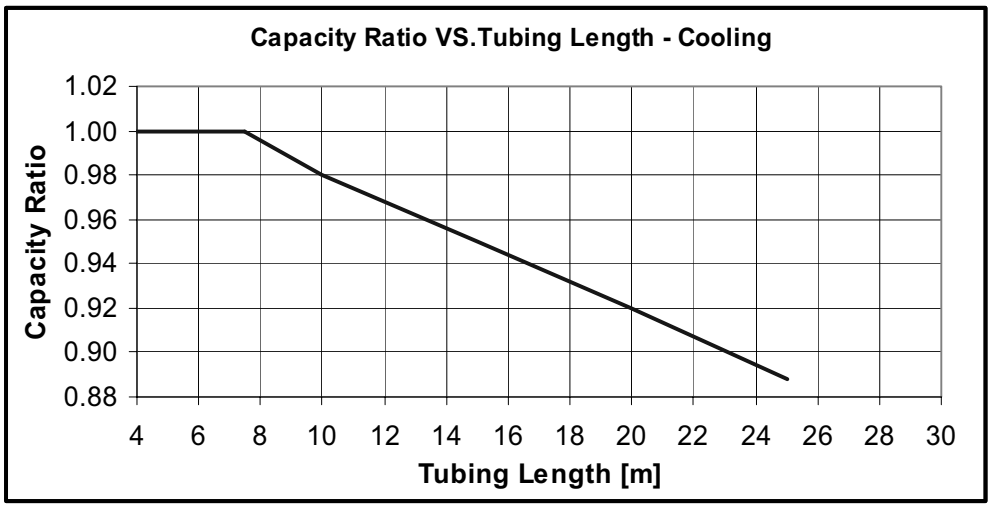
5.7.4 Capacity Correction Factors



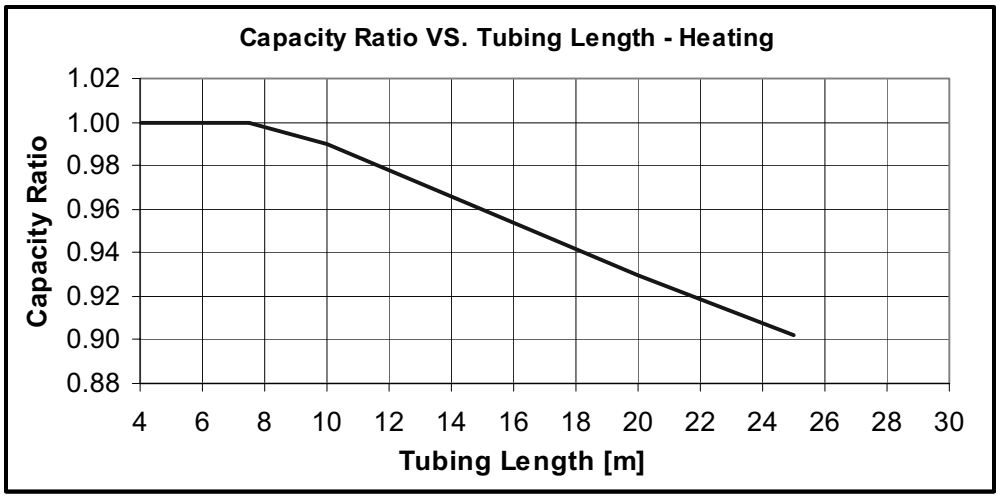
5.8 Capacity Correction Factor Due to Tubing Length (OneWay)

5.8.1 WNG25, WNG35, K25, K35

5.8.2 Cooling



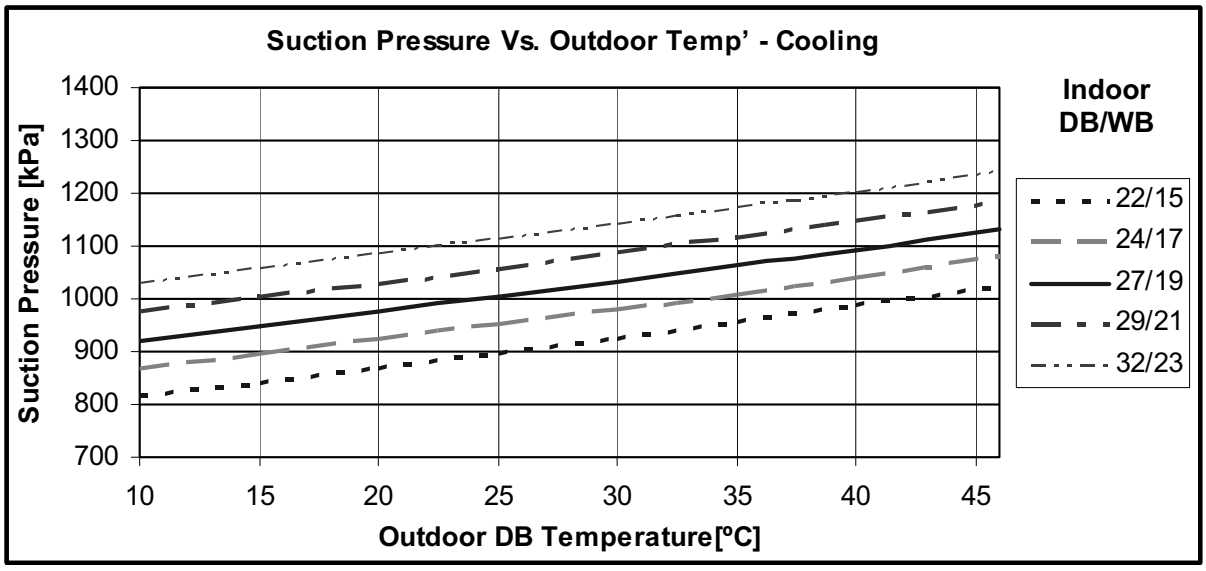
5.8.3 Heating

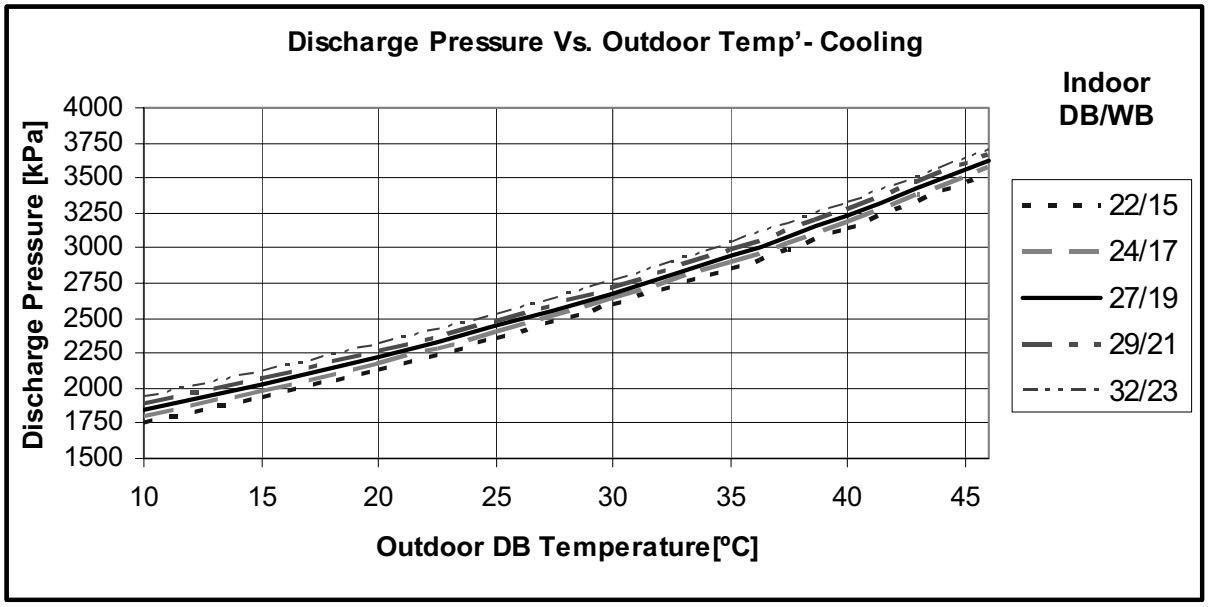


6. PRESSURE CURVES

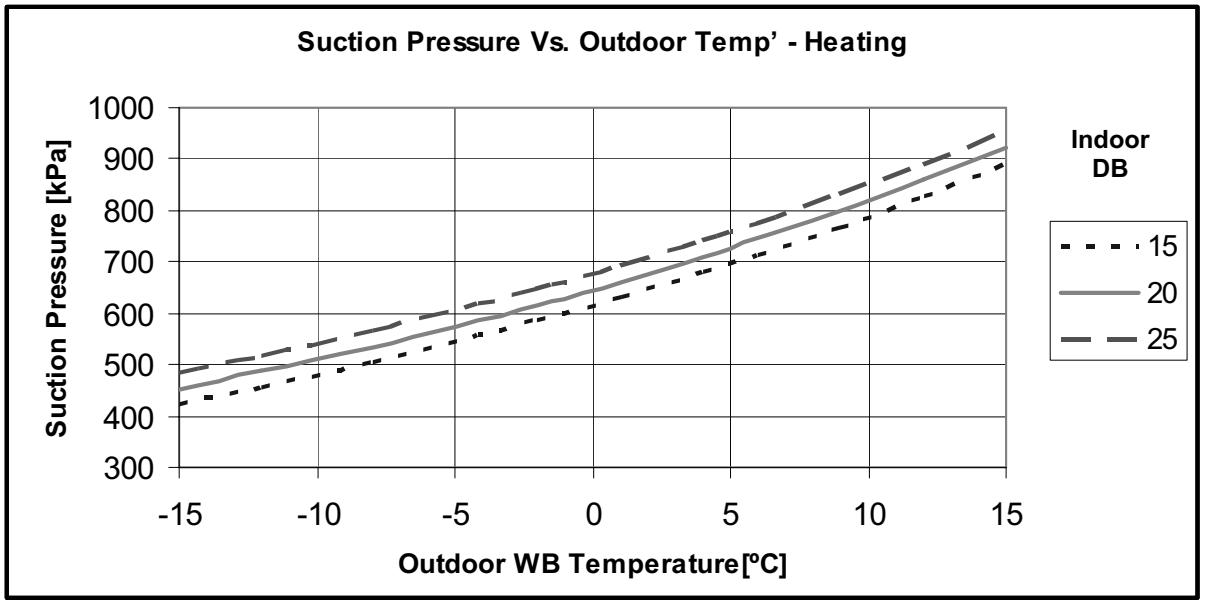
6.1 Model: WNG 25+25 DUO 50 DCI

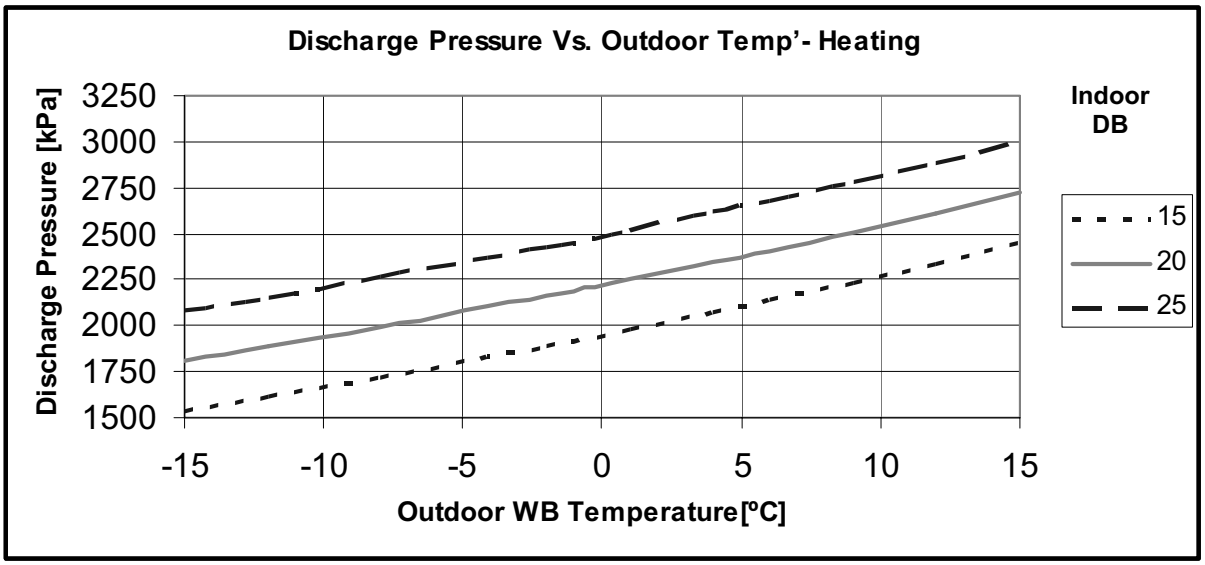
6.1.1 Cooling – Test Mode





6.1.2 Heading – Test Mode





7. ELECTRICAL DATA

Power Supply	1 PH, 220-240 VAC, 50Hz
Connected to	Outdoor
Maximum Current	13.7 A
Inrush Current	35 A
Starting Current	10 A
Circuit breaker	16 A
Power supply wiring - No. x cross section	3 X 2.5 mm^2
Interconnecting cable - No. x cross section	2 X 4 X 1.5 mm^2

Note:

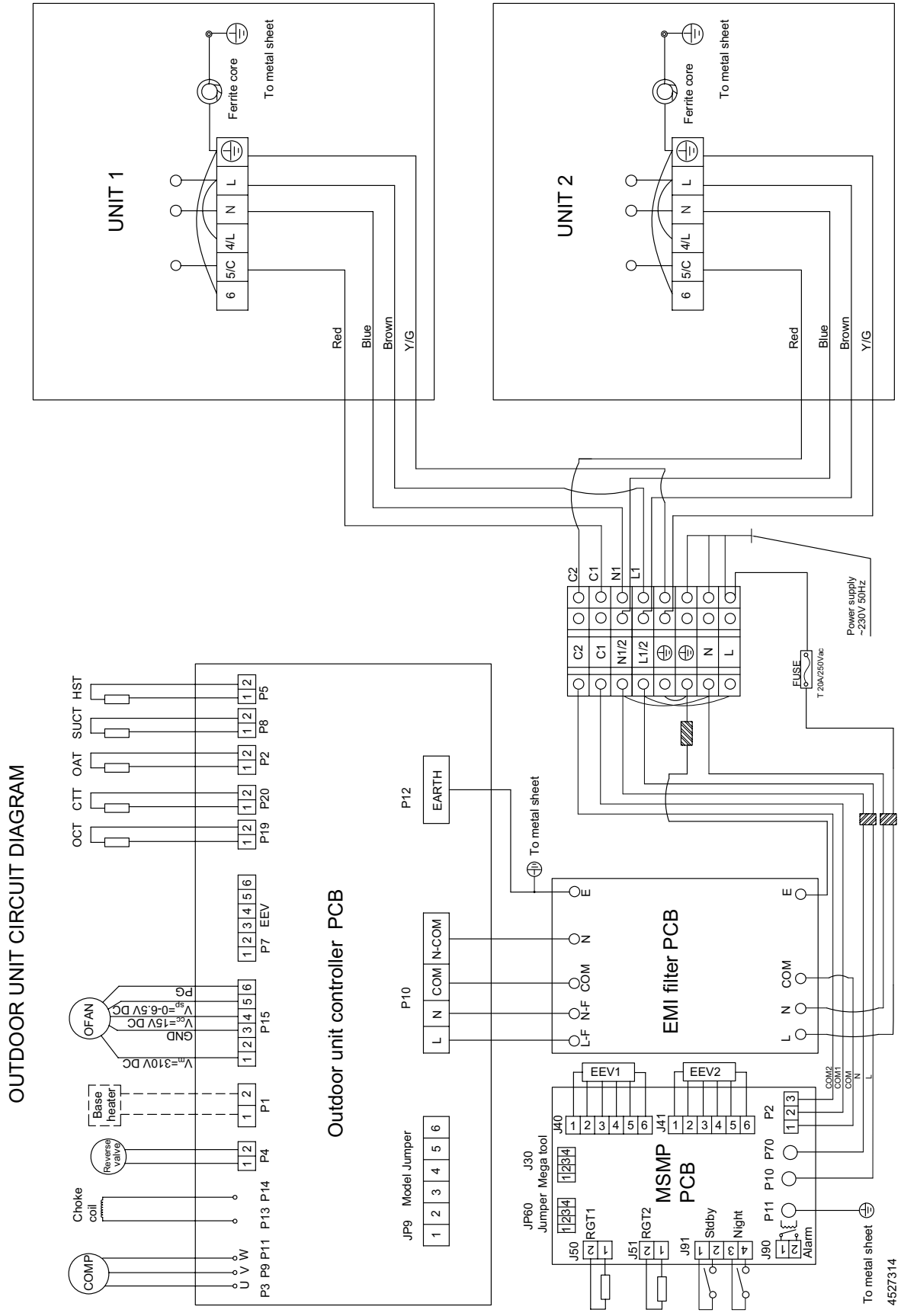
- Inrush current is the current when power is up. (charging the DC capacitors at outdoor unit controller).
- Starting current is the current when starting the compressor

NOTE

Power wiring cord should comply with local lows and electrical regulations requirements.

8. WIRING DIAGRAMS

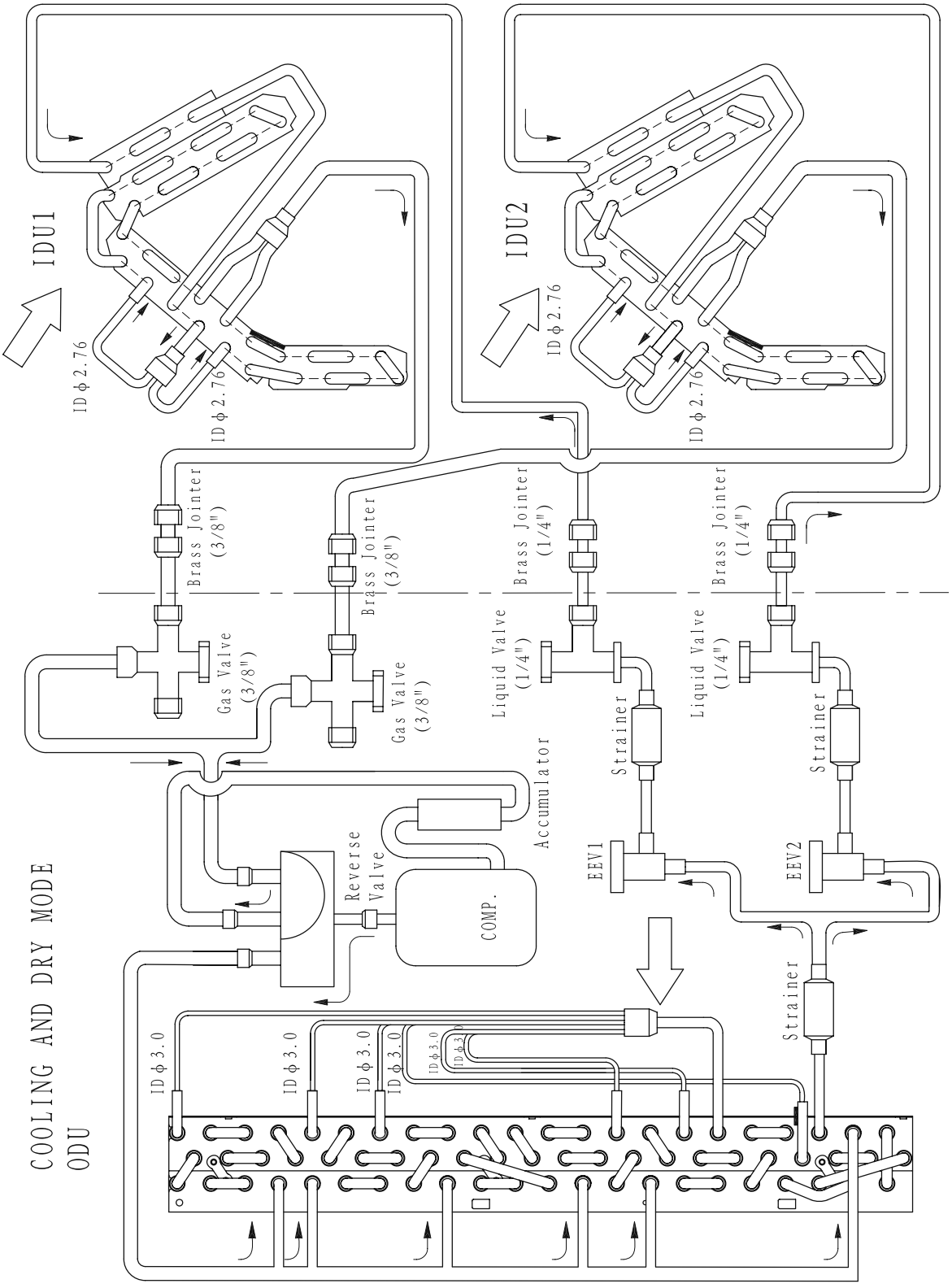
8.1 DUO 50 DCI Wiring Diagram



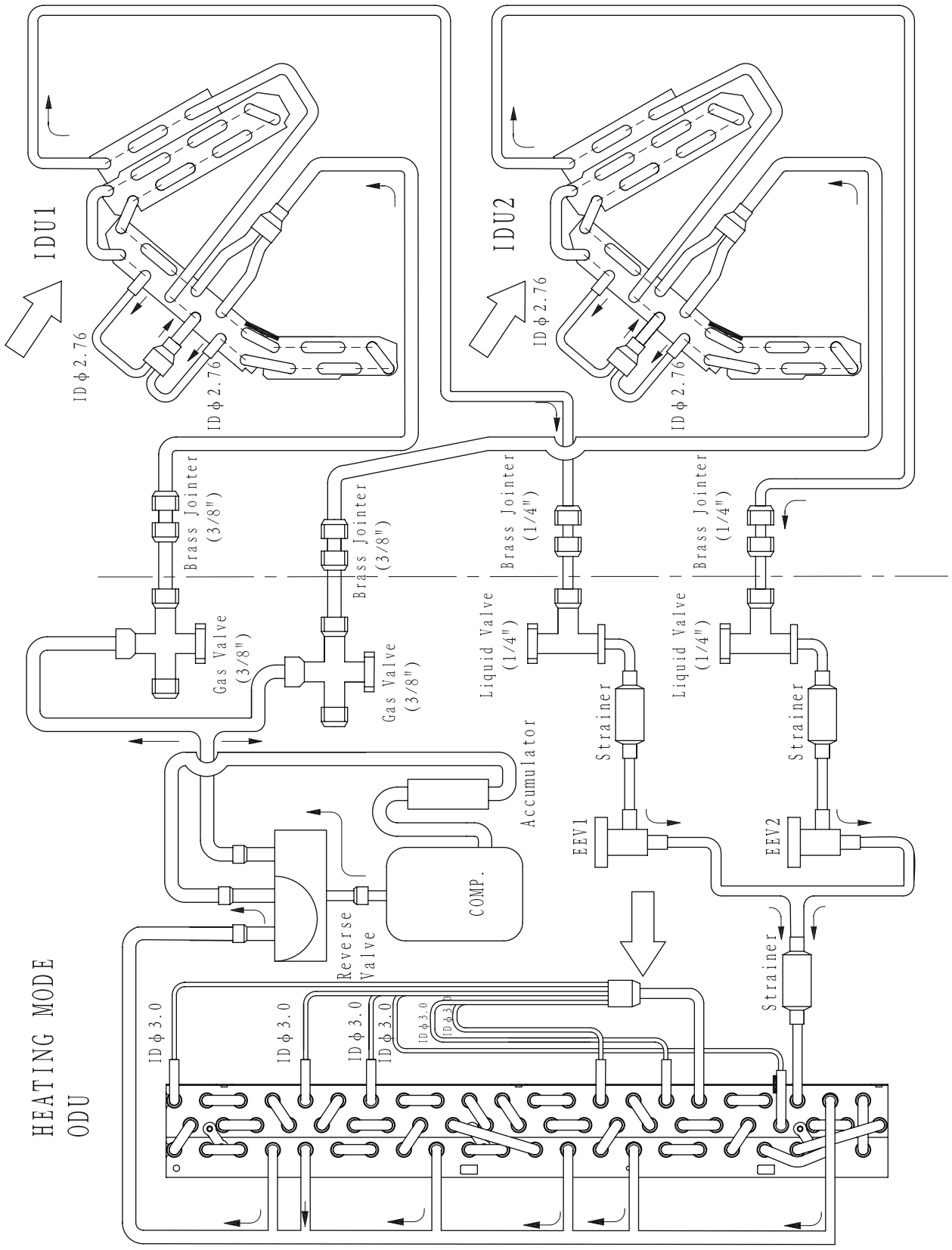
9. REFRIGERATION DIAGRAMS

9.1 Heat Pump Models

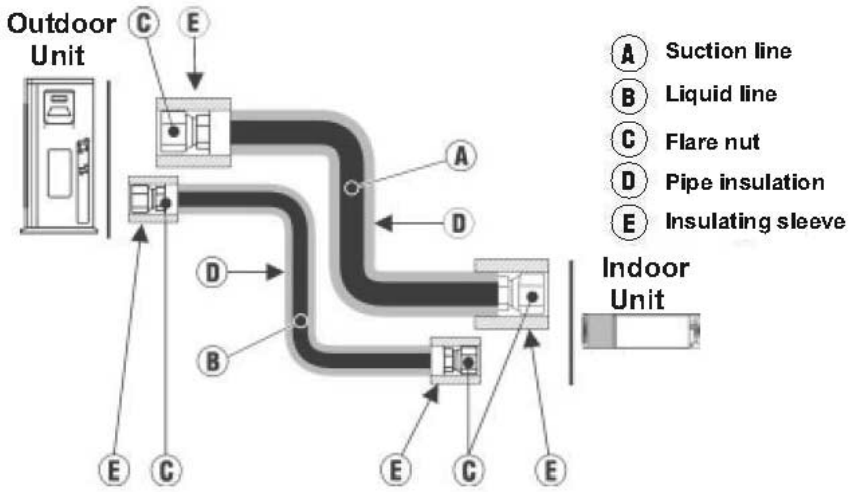
9.1.1 DUO 50 DCI => Cooling Mode

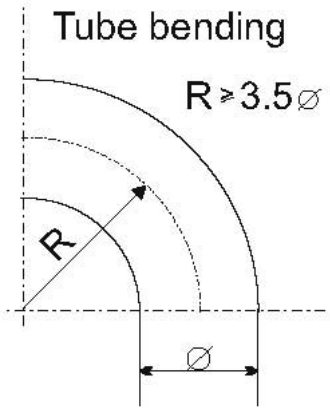


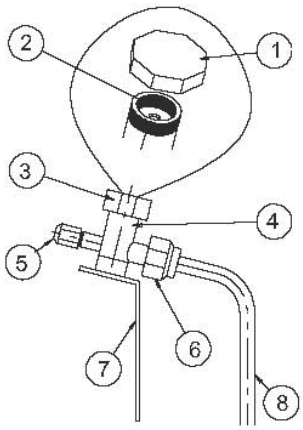
9.1.2 DUO 50 DCI => Heating Mode



10. TUBING CONNECTIONS



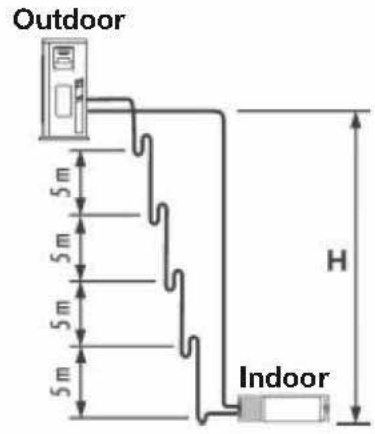




TUBE (Inch) / TORQUE (Nm)	1/4"	3/8"	1/2"	5/8"	3/4"
Flare Nuts	11-13	40-45	60-65	70-75	80-85
Valve Cap	13-20	13-20	18-25	18-25	40-50
Service Port Cap	11-13	11-13	11-13	11-13	11-13

1. Valve Protection Cap-end
2. Refrigerant Valve Port (use Allen wrench to open/close)
3. Valve Protection Cap
4. Refrigerant Valve
5. Service Port Cap
6. Flare Nut
7. Unit Back Side
8. Copper Tube

When the outdoor unit is installed above the indoor unit an oil trap is required every 5m along the suction line at the lowest point of the riser. Incase the indoor unit is installed above the outdoor, no trap is required.



11. CONTROL SYSTEM

11.1 General Functions and Operating Rules (for single split models)

The DCI software is fully parametric.
All the model dependent parameters are shown in Blue color and with Italic style [*parameter*].
The parameters values are given in the last section of this control logic chapter of the service manual.

11.2 System Operation Concept

The control function is divided between indoor and outdoor unit controllers. Indoor unit is the system 'Master', requesting the outdoor unit for cooling/heating capacity supply. The outdoor unit is the system 'Slave' and it must supply the required capacity unless it enters into a protection mode avoiding it from supplying the requested capacity.

The capacity request is transferred via indoor to outdoor communication, and is represented by a parameter called 'NLOAD'. NLOAD is an integer number with values between 0 and 127, and it represents the heat or cool load felt by the indoor unit.

11.3 Compressor Frequency Control

11.3.1 NLOAD setting

The NLOAD setting is done by the indoor unit controller, based on a PI control scheme.
The actual NLOAD to be sent to the outdoor unit controller is based on the preliminary LOAD calculation, the indoor fan speed, and the power shedding function.

NLOAD limits as a function of indoor fan speed:

Indoor Fan Speed	Maximum NLOAD Cooling	Maximum NLOAD Heating
Low	*Max NLOADIF1C*	127
Medium	*Max NLOADIF2C*	127
High	*Max NLOADIF3C*	127
Turbo	*Max NLOADIF4C*	127
Auto	*Max NLOADIF5C*	127

NLOAD limits as a function of power shedding:

Mode	Power Shedding OFF	Power Shedding ON
Cool	No limit	Nominal Cooling
Heat	No limit	Nominal Heating

11.3.2 Target Frequency Setting

The compressor target frequency is a function of the NLOAD number sent from the indoor controller and the outdoor air temperature.
Basic Target Frequency Setting:

NLOAD	Target Frequency
127	*Maximum frequency*
10 < NLOAD < 127	Interpolated value between minimum and maximum frequency
10	*Minimum frequency*
0	Compressor is stopped

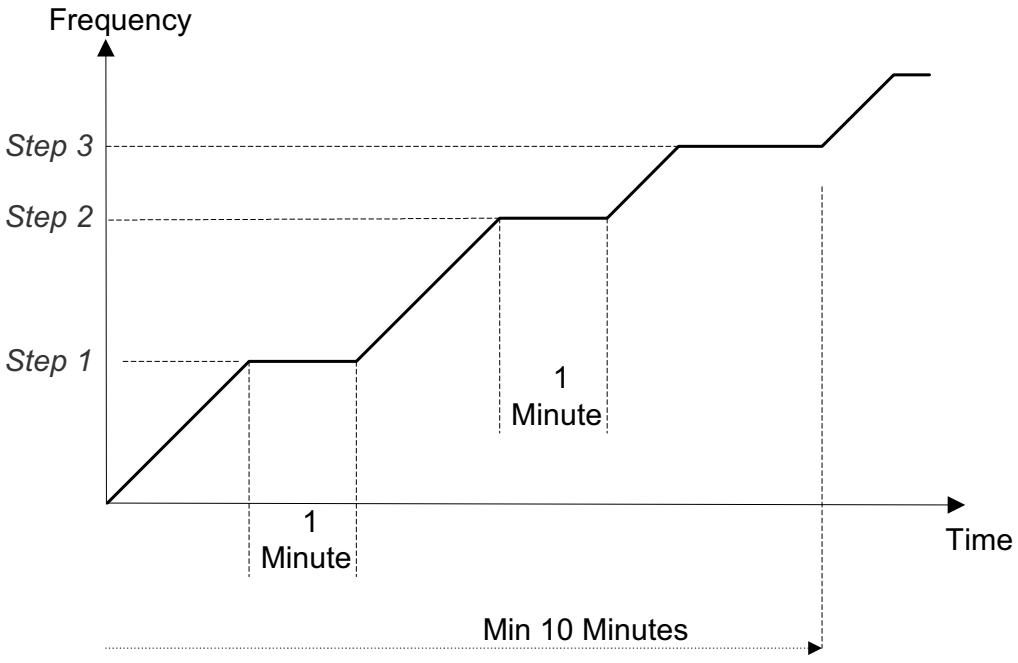
Target frequency limits as a function of outdoor air temperature (OAT):

OAT Range	Cool mode limits	Heat mode limits
OAT < 6	*MaxFreqAsOATC*	No limit
6 ≤ OAT < 15		*MaxFreqAsOAT1H*
15 ≤ OAT < 24		*MaxFreqAsOAT2H*
24 ≤ OAT	No limit	

11.3.3 Frequency Changes Control

Frequency change rate is 1 Hz/sec.

11.3.4 Compressor Starting Control



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11.3.5 Minimum On and Off Time 3 minutes

11.4 Indoor Fan Control

10 Indoor fan speeds are determined for each model. 5 speeds for cool/dry/fan modes and 5 speeds for heat mode.
When user sets the indoor fan speed to a fixed speed (Low/ Medium/ High), unit will operate constantly at set speed.
When Auto Fan is selected, indoor unit controller can operate in all speeds. The actual speed is set according to the cool/heat load.

11.4.1 Turbo Speed

The Turbo speed is activated during the first 30 minutes of unit operation when auto fan speed is selected and under the following conditions:

- Difference between set point and actual room temperature is bigger then 3 degrees.
- Room temperature > 22 for cooling, or < 25 for heating.

11.5 Heating Element Control

Heating element can be started if LOAD > 0.8 * MaximumNLOAD AND Indoor Coil temperature < 45.
The heating element will be stopped when LOAD < 0.5 * MaximumNLOAD OR if Indoor Coil temperature > 50.

11.6 Outdoor Fan Control

7 outdoor fan speeds are determined for each model. 3 speeds for cool and dry modes, and 3 speeds for heat mode, and a very low speed.
Outdoor fan speed is a function of compressor frequency and outdoor air temperature (OAT).
4 routines for fan control are determined. The control routine selection depends on operation mode, compressor speed, and outdoor air temperature (OAT) and heat sink temperature (HST).

Routine	Conditions
A	Heating with OAT < 15^0C or Cooling with OAT > 20^0C, or HST > 50^0C or Faulty OAT
B	Cooling with 20^0C > OAT > 7^0C
C	Cooling with 7^0C > OAT
D	Heating with OAT > 15^0C

Compressor Frequency (CF)	Outdoor Fan Speed			
	Routine A	Routine B	Routine C	Routine D
CF = 0	OFF	OFF	OFF	OFF
10 ≤ CF < *OFLowFreq*	Low	Low	Very Low	Low
OFLowFreq ≤ CF < *OFMedFreq*	Medium	Low	Very Low	Low
OFMedFreq ≤ CF	High	Low	Low	Medium

When compressor is switched to OFF and the heat sink temperature is above 55 degrees, the outdoor fan will remain ON in low speed for up to 3 minutes.

11.7 EEV (electronic Expansion valve) Control

EEV opening is defined as EEV = EEV_{OL} + EEV_{CV}

- EEV_{OL} is the initial EEV opening as a function of the compressor frequency, operation mode, unit model and capacity.
- EEV_{CV} is a correction value for the EEV opening that is based on the compressor temperature.
- During the first 10 minutes of compressor operation EEV_{CV} = 0.
- Once the first 10 minutes are over, the correction value is calculated as follow: $EEV_{CV}(n)$ = $EEV_{CV}(n-1)$ + EEV_{CTT}
- EEV_{CTT} is the correction based on the compressor temperature. A target compressor temperature is set depending on frequency and outdoor air temperature, and the actual compressor temperature is compared to the target temperature to set the required correction to the EEV opening.

11.8 Reversing Valve (RV) Control

Reversing valve is on in heat mode.
Switching of RV state is done only after compressor is off for over 3 minutes.

11.9 Ionizer Control

Ionizer is on when unit is on AND indoor fan is on AND Ionizer power switch (on Ionizer) is on.

11.10 Electro Static Filter (ESF) Control

ESF is on when ESF switch is on, Safety switch is pressed, unit is on, AND indoor fan is on.

11.11 Base Heater Control

When OAT is connected, Base Heater will be on when unit is in heating and OAT<2^{0}C.
When OAT is disconnected, Base Heater will be on when unit is in heating.

11.12 Fan Mode

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.
In Auto Fan user setting, fan speed will be adjusted automatically according to the difference between actual room temperature and user set point temperature.

11.13 Cool Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.
In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.
In Auto Fan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

11.14 Heat Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.
In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.
In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

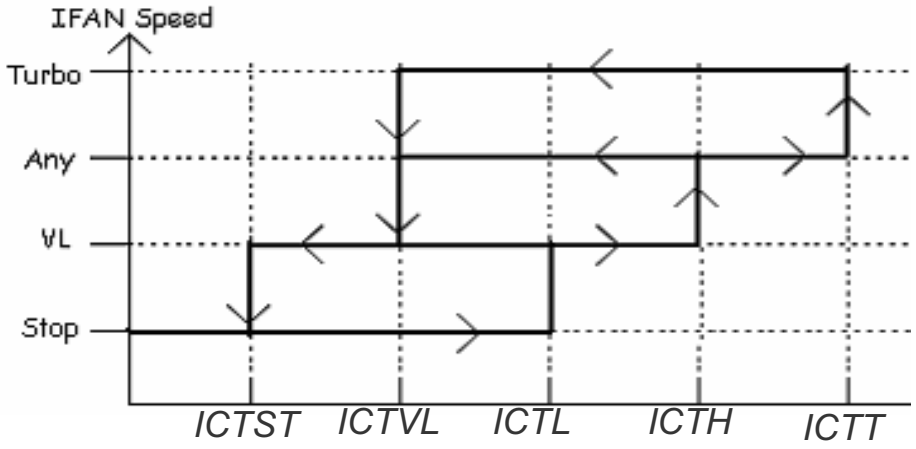
11.14.1 Temperature Compensation

In wall mounted, ducted, and cassette models, 3 degrees are reduced from room temperature reading (except when in I-Feel mode), to compensate for temperature difference between high and low areas in the heated room, and for coil heat radiation on room thermistor.
The temperature compensation can be enabled/disabled by shortening of J2 on the indoor unit controller.

Model	J2 Shorted	J2 Opened
Wall mounted	Compensation Disabled	Compensation Enabled
Cassette	Compensation Enabled	Compensation Disabled
Ducted	Compensation Enabled	Compensation Disabled
Floor/Ceiling	Compensation Disabled	Compensation Enabled

11.14.2 Indoor Fan Control in Heat Mode

Indoor fan speed depends on the indoor coil temperature:



11.15 Auto Cool/Heat Mode

When in auto cool heat mode unit will automatically select between cool and heat mode according to the difference between actual room temperature and user set point temperature (ΔT).
Unit will switch from cool to heat when compressor is off for 3 minutes, and ΔT < -3.
Unit will switch from heat to cool when compressor is off for 5 minutes, and ΔT < -3.

11.16 Dry Mode

As long as room temperature is higher then the set point, indoor fan will work in low speed and compressor will work between 0 and *MaxNLOADIF1C* Hz.
When the room temperature is lower than the set point, compressor will be switched OFF and indoor fan will cycle 3 minutes OFF, 1 minute ON.

11.17 Protections

There are 5 protection codes.
Normal (Norm) – unit operate normally.
Stop Rise (SR) – compressor frequency can not be raised but does not have to be decreased.
HzDown1 (D1) – Compressor frequency is reduced by 2 to 5 Hz per minute.
HzDown2 (D2) – Compressor frequency is reduced by 5 to 10 Hz per minute.
Stop Compressor (SC) – Compressor is stopped.

11.17.1 Indoor Coil Defrost Protection

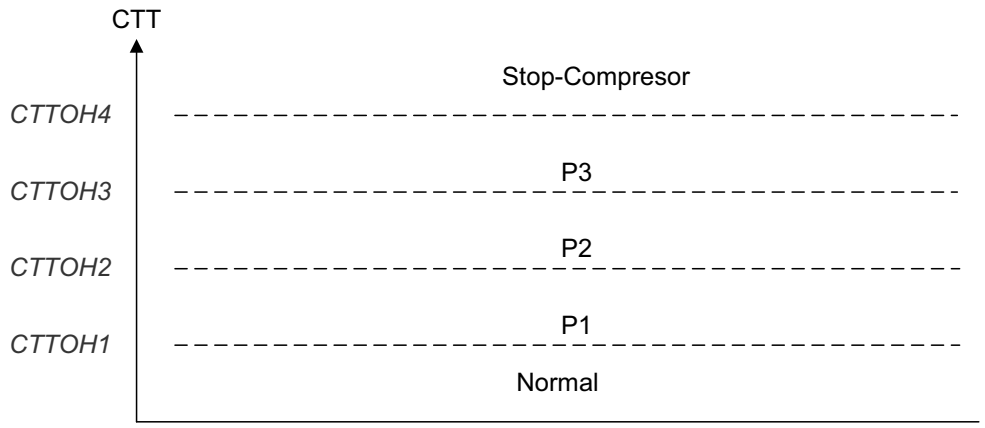
ICT	ICT Trend				
	Fast Increasing	**Increasing**	**No change**	**Decreasing**	**Fast Decreasing**
ICT < -2	SC	SC	SC	SC	SC
-2 ≤ ICT < 0	D1	D1	D2	D2	D2
0 ≤ ICT < 2	SR	SR	D1	D2	D2
2 ≤ ICT < 4	SR	SR	SR	D1	D2
4 ≤ ICT < 6	Norm	Norm	SR	SR	D1
6 ≤ ICT < 8	Norm	Norm	Norm	SR	SR
8 ≤ ICT	Normal				

11.17.2 Indoor Coil over Heating Protection

ICT	ICT Trend				
	Fast Decreasing	**Decreasing**	**No Change**	**Increasing**	**Fast Increasing**
ICT > 55	SC	SC	SC	SC	SC
53 < ICT ≤ 55	D1	D1	D2	D2	D2
49 < ICT ≤ 53	SR	SR	D1	D2	D2
47 < ICT ≤ 49	SR	SR	SR	D1	D2
45 < ICT ≤ 47	Norm	Norm	SR	SR	D1
43 < ICT ≤ 45	Norm	Norm	Norm	SR	SR
ICT ≤ 43	Normal				

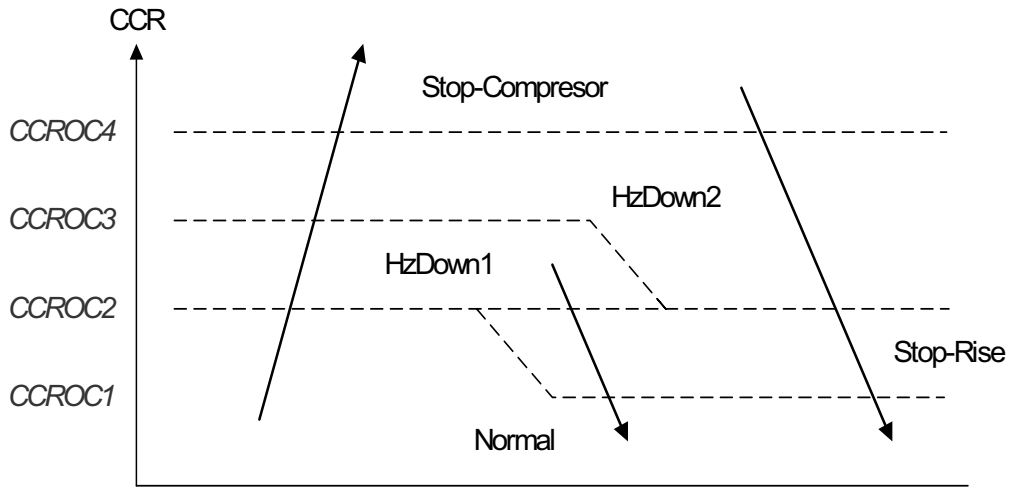
11.17.3 Compressor over Heating Protection

Compressor temperature can be in one of 5 control zones (4 in protection, and 1 normal), t.



Control Status	Compressor Temperature Increases	Else
P1	Norm	SR
P2	D1	SR
P3	D2	D1
Stop Compressor	SC	

11.17.4 Compressor over Current Protection



11.17.5 Heat Sink Over Heating Protection (NA for DCI 25 and 35)

HST	HST Trend		
	Decreasing	No Change	Increasing
HST > 90	SC	SC	SC
85 < HST ≤ 90	D1	D2	D2
82 < HST ≤ 85	SR	D1	D2
80 < HST ≤ 82	SR	SR	D1
78 < HST ≤ 80	Norm	Norm	SR
HST ≤ 78	Normal		

11.17.6 Outdoor Coil Deicing Protection

11.17.6.1 Deicing Starting Conditions

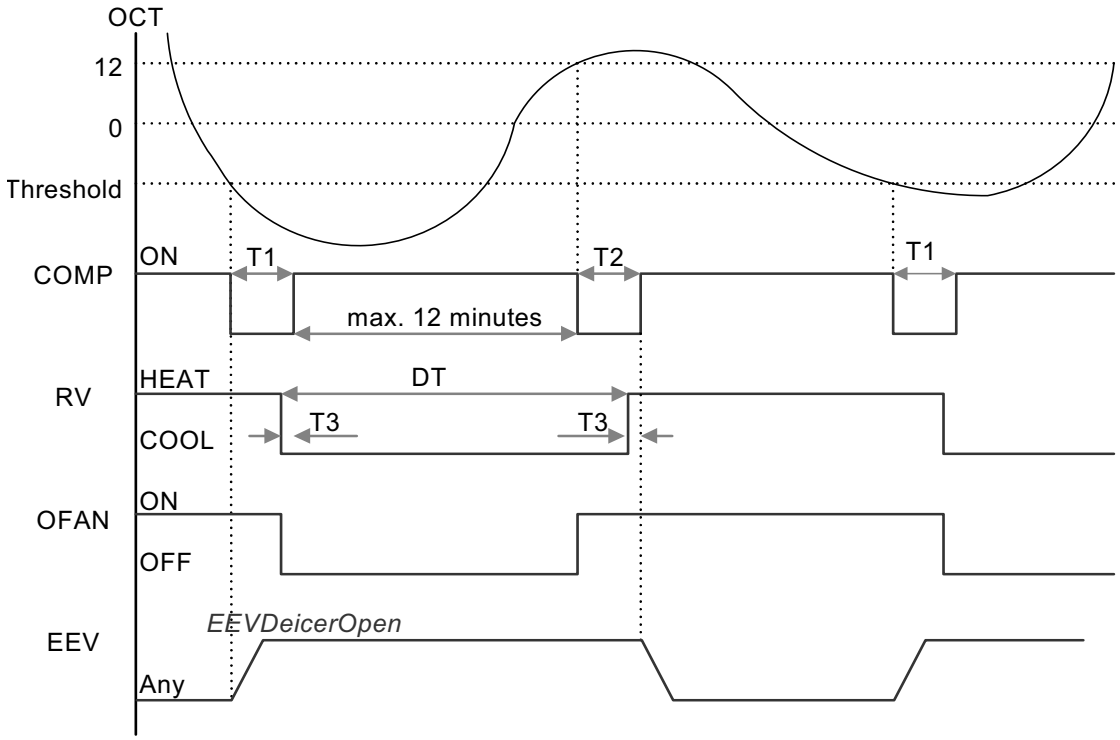
Deicing operation will start when either one of the following conditions exist:

- Case 1: OCT < OAT – 8 AND TLD > DI
- Case 2: OCT < OAT – 12 AND TLD > 30 minutes.
- Case 3: OCT is Invalid AND TLD > DI
- Case 4: Unit is just switched to STBY AND OCT < OAT – 8
- Case 5: NLOAD = 0 AND OCT < OAT -8

OCT – Outdoor Coil Temperature
OAT – Outdoor Air Temperature
TLD – Time from Last Deicing
DI – Deicing Interval (Time Interval between Two Deicing)

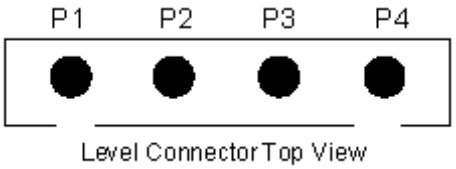
Deicing interval time when compressor is first started in heat mode, is 10 minutes if OCT < -2, and is 40 minutes in other cases.
Deicing interval time is changed (increased/ decreased in 10 minutes steps) as a function of deicing time. If deicing time is shorter then former deicing time, the deicing interval time will be increased. If deicing time is longer then former deicing time, the deicing interval time will be decreased.

11.17.6.2 Deicing Protection Procedure



T1 = T2 = 36 seconds, T3 = 6 seconds

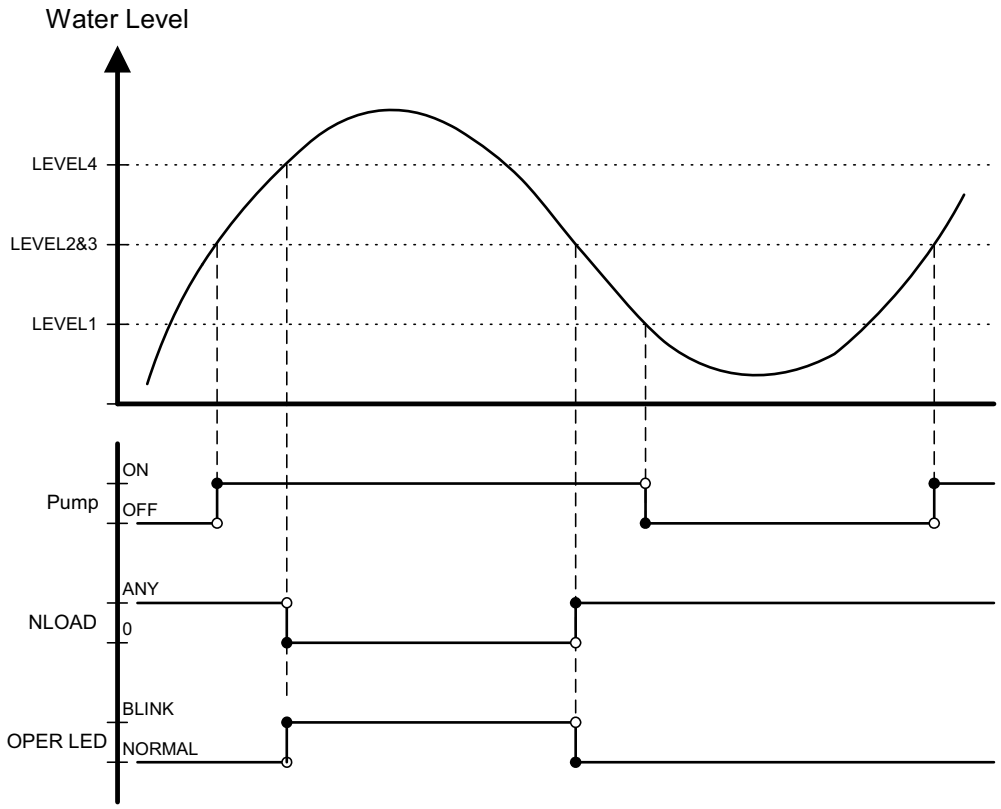
11.17.7 Condensate Water Over Flow Protection



Each of the pins P1, P2, P3 can have two options:
1 – When it is shorted with P4
0 – When it is not shorted to P4

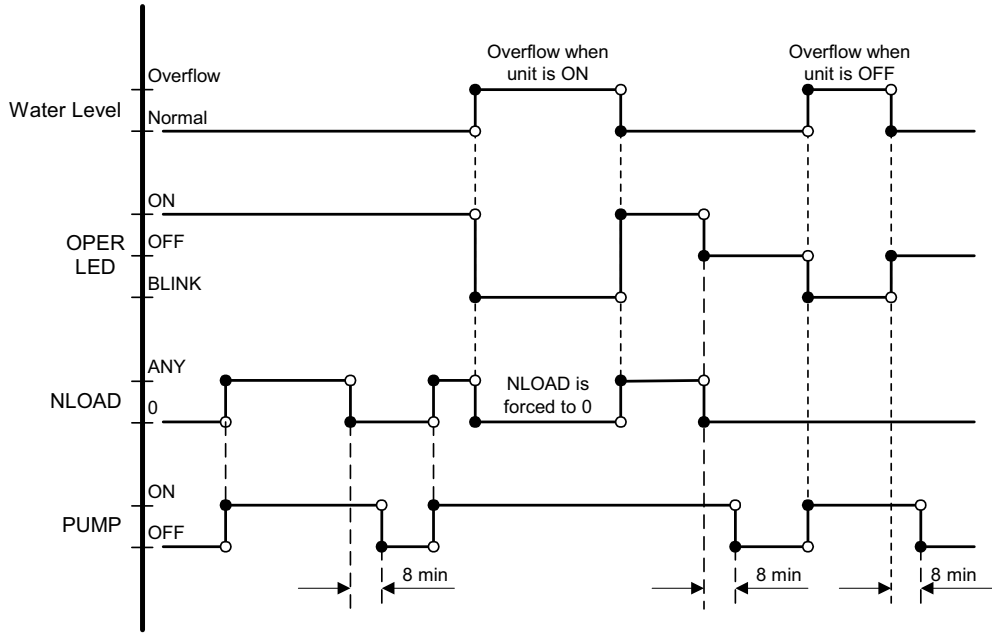
11.17.7.1 Levels Logic (used in floor/ceiling models)

P2	P3	Level
0	0	L0
1	0	L1
1	1	L2&3
0	1	L4



11.17.7.2 1 Level Logic (used in all models except for floor/ceiling models)

P2	P3	Level
Don't care	1	Normal
Don't care	0	Overflow



11.18 Indoor Unit Dry Contact

Indoor unit Dry contact has two alternative functions that are selected by J8.

Function		Contact = Open	Contact = Short
J8 = Open	Presence Detector Connection	No Limit	Forced to STBY
J8 = Short	Power Shedding Function	No Limit	Limit NLOAD

11.19 Operating the Unit from the Mode Button

Forced operation allows starting, stopping and operating in Cooling or Heating, in pre-set temperature according to the following table:

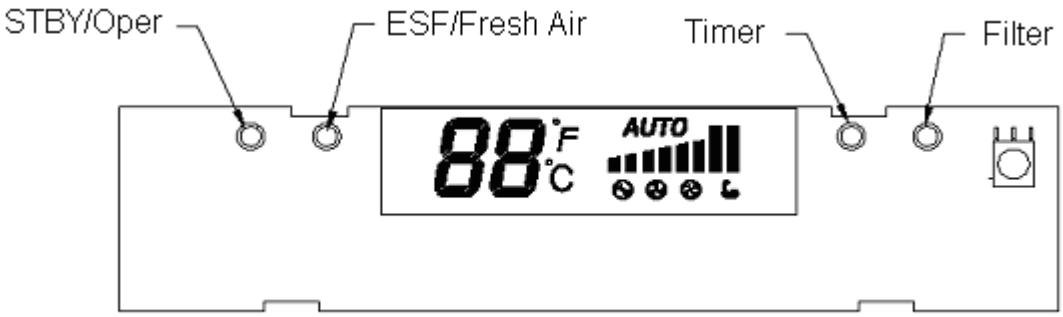
Forced operation Mode	Pre-set Temperature
Cooling	20^0C
Heating	28^0C

11.20 On Unit Controls and Indicators

11.20.1 Indoor Unit Controller Controls and Indicators for All Models Except for Floor/Ceiling model

STAND BY INDICATOR	1. Lights up when the Air Conditioner is connected to power and ready to receive the R/C commands
OPERATION INDICATOR	1. Lights up during operation. 2. Blinks for 300 msec., to announce that a R/C infrared signal has been received and stored. 3. Blinks continuously during protections (according to the relevant spec section).
TIMER INDICATOR	Lights up during Timer and Sleep operation.
FILTER INDICATOR	Lights up when Air Filter needs to be cleaned.
COOLING INDICATOR	Lights up when system is switched to Cool Mode by using the Mode Switch on the unit.
HEATING INDICATOR	Lights up when system is switched Heat Mode by using the Mode Switch on the unit.
Mode SWITCH (COOL/HEAT/OFF)	Every short pressing , the next operation mode is selected, in this order : SB → Cool Mode → Heat Mode → SB → … In long pressing system enters diagnostic mode.
RESET / FILTER SWITCH	For short pressing: When Filter LED is on - turn off the FILTER INDICATOR after a clean filter has been reinstalled. When Filter LED is off – enable/disable the buzzer announcer, if selected.

11.20.2 Indoor Unit Controls and Indicators for LCD Display



	STBY	Cool	Heat	Auto	Fan	Dry
88	OFF	SPT(1*)	SPT(1*)	SPT(1*)	SPT(1*)	SPT(1*)
°C	OFF(2*)	ON(2*)	ON(2*)	ON(2*)	ON(2*)	ON(2*)
°F	OFF(2*)	OFF(2*)	OFF(2*)	OFF(2*)	OFF(2*)	OFF(2*)
(Low)	OFF	User setting IFAN speed	User setting IFAN speed	User setting IFAN speed	User setting IFAN speed	User setting IFAN speed
(Med)	OFF					
(High)	OFF					
(Turbo)	OFF					
AUTO (Auto)	OFF					
Backlight(red)	OFF	OFF	ON(3*)	ON(3*)	ON(3*)	OFF
Backlight(green)	OFF	ON(3*)	OFF	ON(3*)	ON(3*)	ON(3*)

11.20.3 Outdoor Unit Controller Indicators

Unit has three LED's.
SB LED is ON when power is ON (230 VAC, even when no communication).
STATUS LED is ON when COMP is ON, and Blinks according to diagnostics mode definitions when either fault or protection occurs.
FAULT LED Blinks according to diagnostics mode definitions when either fault or protection occurs.

11.21 Test Mode

11.21.1 Entering Test Mode

System can enter Test mode in two ways:

- Automatically when the following conditions exists for 30 minutes continuously:
  - Mode = Cool, Set point = 16, Room temperature = 27±1, Outdoor temperature = 35±1

Or

  - Mode = Heat, Set point = 30, Room temperature = 20±1, Outdoor temperature = 7±1
- Manually when entering diagnostics with the following settings:
  - Mode = Cool, Set point = 16
  - Mode = Heat, Set point = 30

11.21.2 Unit Operation in Test Mode

In test mode, the unit will operate in fixed settings according to the indoor fan speed setting :

Indoor Fan Speed Setting	Unit Setting
Low	Minimum Capacity Setting
High	Nominal Capacity Setting
Auto	Maximum Capacity Setting

During test mode, protections are disabled, except for stop compressor status.

11.22 Additional Functions and Operating Rules (for DUAL split models)

The DCI SW is fully parametric.
All the model dependent parameters are shown in Blue color and with Italic style [*parameter*].
The parameters values are given in the last section of this control logic chapter of the service manual.

11.22.1 System Control Concept

All indoor unit related items control remains the same as in single split applications.
All outdoor unit related control logic remains the same as in single split applications.
The MSMP controller is responsible only for the following control:

- Setting of system operation mode (cool/heat)
- Setting the NLOAD for the outdoor units
- Controlling of the EEV's
- Dry contacts control

11.22.2 Compressor Frequency Control

11.22.3 Outdoor Unit NLOAD setting

The MSMP controller gets the NLOAD from each of the indoor units, and sends a combined NLOAD to the outdoor unit control. The combined NLOAD is a weighted average of the indoor units NLOAD.
The weight of the indoor units as a function of their nominal capacity:

Indoor Unit Capacity [kW] (kBtu/hr)	Capacity Code
2.5 (9000)	1
3.5 (12000)	1.5
5.0 (18000)	2
7.2 (24000)	3

11.22.4 EEV (electronic Expansion valve) Control

EEV opening is defined as EEV = EEV_{OL} + EEV_{CV}

- EEV_{OL} is the initial EEV opening as a function of the compressor frequency, operation mode, unit model and capacity.
- EEV_{CV} is a correction value for the EEV opening that is based in cooling mode on the relevant indoor unit super heat and compressor temperature.
- During the first 10 minutes of compressor operation EEV_{CV} = 0.

11.22.5 System Mode Setting and Reversing Valve (RV) Control

The first indoor unit that is causing the system to be turned ON sets the system mode.

11.22.6 Indoor Units Operation when Indoor Unit Mode is Different than Outdoor Unit Mode

- Open louvers according to user selection.
- Indoor fan is forced to OFF.

11.23 Dry Contacts Control

Dry Contact	Contact = Open	Contact = Short
STBY	No Limit	System is Forced to STBY
Night	No Limit	Outdoor fan speed reduced to low in cooling mode

A dry contact output for Alarm will be shorted when any failure exists in the system.

11.24 SW Parameters

11.24.1 Indoor Units SW Parameters

General Parameters for All Models:

Parameters defining the indoor fan speed as a function of Indoor Coil temperature in heat mode (ICT):

ICTST Speed	ICT to stop indoor fan	25
ICTVLSpeed	ICT to go down to very low speed	28
ICTLSpeed	ICT to start in very low speed	30
ICTHSpeed	ICT to start in increase speed from very low	32
ICTTSpeed	ICT to enable Turbo fan speed	40

Model Depended Parameters:

Parameter name	Wall Mounted Models	
	DCI 25	DCI 35
NLOAD limits as a function of selected indoor fan speed		
MaxNLOADIF1C	40	40
MaxNLOADIF2C	53	53
MaxNLOADIF3C	120	120
MaxNLOADIF4C	127	127
MaxNLOADIF5C	127	127
Indoor Fan speeds		
IFVLOWC	700	700
IFLOWC	800	800
IFMEDC	900	950
IFHIGHC	1050	1100
IFTURBOC	1150	1200
IFVLOWH	700	700
IFLOWH	800	850
IFMEDH	950	1000
IFHIGHH	1100	1150
IFTURBOH	1200	1250
Nominal Compressor Frequency		
NomLoadC	40	62
NomLoadH	55	67

Parameter Name	Cassette Models			
	K 25	K 35	K 35S	K 50
NLOAD limits as a function of selected indoor fan speed				
MaxNLOADIF1C	40	40	40	40
MaxNLOADIF2C	53	56	56	60
MaxNLOADIF3C	120	90	90	90
MaxNLOADIF4C	127	90	90	90
MaxNLOADIF5C	127	90	90	90
Nominal Compressor Frequency				
NomLoadC	40	60	56	63
NomLoadH	55	69	73	80

11.24.2 Outdoor Units SW Parameters:

Parameter Name	DCI25	DCI35	DCI 50	DCI50 DUO
Compressor Parameters				
MinFreqC	30	33	20	20
MaxFreqC	64	80	85	97
MinFreqH	30	35	20	26
MaxFreqH	81	93	99	106
Step1Freq	60	60	60	60
Step2Freq	70	70	70	80
Step3Freq	90	90	90	90
Frequency limits as a function of outdoor air temperature				
MaxFreqAsOATC	50	50	64	62
MaxFreqAsOAT1H	65	75	85	85
MaxFreqAsOAT2H	60	60	60	60
Compressor Over Heating Protection				
CTTOH1	94	94	94	90
CTTOH2	98	98	98	95
CTTOH3	102	102	102	102
CTTOH4	105	105	105	105
Compressor Over Current Protection [A]				
CCR01	7.1	7.1	10	10
CCR02	7.5	7.5	10.5	10.5
CCR03	7.9	7.9	10.8	10.8
CCR04	8.3	8.3	11.2	11.2
Outdoor Fan Speed (RPM)				
VL	200	200	200	200
OFLOWC	550	550	600	600
OFMEDC	700	700	760	830
OFMAXC	830	830	920	920
OFLOWH	550	550	600	600
OFMEDH	700	700	830	920
OFMAXH	830	830	1000	1000
Outdoor Fan Limit Control				
OFLowFreq	45	45	40	40
OFMedFreq	57	57	70	70

12. TROUBLESHOOTING

WARNING!!!

When Power Up – the whole outdoor unit controller, including the wiring, is under HIGH VOLTAGE!!!

Never open the Outdoor unit before turning off the Power!!!

When turned off, the system is still charged (400V)!!!

It takes about 3 Min. to discharge the system.

Touching the controller before discharging may cause an electrical shock!!!

For safe handling of the controller please refer to section 1.6 below.

1.1 Dual Split System Failures and Corrective Actions

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1	Power supply indicator at indoor unit (Red LED) does not light up.	No power supply	Check power supply from the outdoor. If power supply is OK, check display and display wiring. If OK, replace controller.
2	Indoor fan does not start (louvers are opened and Green LED does light up)	Unit in heat mode and coil is still not warm.	Change to cool mode and check.
		The outdoor unit is in the opposite mode.	Change operation mode and check if fan starts.
		Problem with PCB or capacitor	Change to high speed and Check power supply to motor is higher than 130VAC (for Triac controlled motor) or higher than 220VAC for fixed speed motors, if OK replace capacitor, if not OK replace controller
3	Compressor does not start	Jumper settings of outdoor unit is not correct	Use diagnostics (see 1.2 below) information on MSMP board.
4	One indoor is operating, in cool mode, with no capacity, and the other unit has water leaks/freezing problems	The communication wires of the two indoor units are switched	Check and correct the communication wires connection
5	One indoor is operating in heat mode with a limited capacity, and the coil on the other unit is very hot.		
6	Compressor operate but unit generate no capacity	EEV is stuck in close position	Check EEV
7	One unit only is operating	Communication problems	Use diagnostics information on MSMP board (see 1.2 below).
8	All others	Specific problems of indoor or outdoor units	Use diagnostics information on MSMP board (see 1.2 below), and perform action items as recommended in single split systems

1.2 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in Test Mode (in Test mode, system operates in fixed settings). The performance curves given in this manual are given for unit performance in test mode when high indoor fan speed is selected.
Entering test mode:
Set the two indoor units to Cool/16 degrees/High indoor fan speed, or Heat/30 degrees/High indoor fan speed, and enter diagnostics. Note: the two indoor units should be set to the same mode and fan speed.

1.3 Judgment by MSMP Diagnostics

The MSMP controller has 11 LED's (1 STBY LED, 5 Unit LEDs and 5 Status/Fault LEDs).
STBY LED is ON when power is ON.
5 Unit LEDs refer to four Indoor units and one Outdoor unit. They will turn on one at a time and the corresponding Indoor/Outdoor unit status/fault code will be displayed on the Status/Fault LEDs. If the unit is normal (no fault), the unit LED and the corresponding status will be displayed for 5 seconds and move to the next unit LED. On the other hand, if the unit is in fault, the unit LED and the corresponding fault will be displayed for 10 seconds, and hence more time to read the fault code.

1.3.1 MSMP Fault Code for Outdoor unit:

No	Problem	5	4	3	2	1
1	OCT is disconnected	0	0	0	0	1
2	OCT is shorted	0	0	0	1	0
3	CTT is disconnected	0	0	0	1	1
4	CTT is shorted	0	0	1	0	0
5	HST is disconnected (when enabled)	0	0	1	0	1
6	HST is shorted (when enabled)	0	0	1	1	0
7	OAT is disconnected (when enabled)	0	0	1	1	1
8	OAT is shorted (when enabled)	0	1	0	0	0
9	TSUC is disconnected (when enabled)	0	1	0	0	1
10	TSUC is shorted (when enabled)	0	1	0	1	0
11	IPM	0	1	0	1	1
12	Bad Outdoor unit EEPROM	0	1	1	0	0
13	DC under voltage	0	1	1	0	1
14	DC over voltage	0	1	1	1	0
15	AC under voltage	0	1	1	1	1
16	Indoor / Outdoor unit Communication mismatch	1	0	0	0	0
17	No Communication	1	0	0	0	1
18	Illegal Outdoor unit Model	1	0	0	1	0
19	Bad MSMP EEPROM	1	0	0	1	1
20	Heat sink Over Heating	1	0	1	0	0
21	Deicing	1	0	1	0	1
22	Compressor Over Heating	1	0	1	1	0
23	Compressor Over Current	1	0	1	1	1
….	Reserved					
27	Bad Communication	1	1	0	1	1
…	Reserved					
29	No Fault (Heat Mode)	1	1	1	0	1
30	No Fault (Cool, Dry, Fan Mode)	1	1	1	1	0
31	No Fault (Stand By)	1	1	1	1	1

1.3.2 Outdoor unit diagnosis by MSMP and corrective actions

No.	Fault	Probable Cause	Corrective Action
1	Sensors failures of all types		Check sensors connections or replace sensors.
2	IPM Fault	Electronics HW problem	Check all wiring and jumper settings, if OK, replace electronics.
3	Bad EEPROM		No action, unless special parameters are required for unit operation.
4	DC under/over Voltage	Electronics HW problem	Check outdoor unit power supply voltage
5	AC under Voltage		Check outdoor unit power supply voltage
6	Indoor / Outdoor unit Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
7	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
8	Compressor Lock		Switch unit to STBY and restart
9	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding

1.3.3 MSMP Fault Code for Indoor unit:

No	Problem	5	4	3	2	1
1	RT-1 is disconnected	0	0	0	0	1
2	RT-1 is shorted	0	0	0	1	0
3	RT-2 is disconnected	0	0	0	1	1
4	RT-2 is shorted	0	0	1	0	0
5	RGT is disconnected	0	0	1	0	1
6	Reserved	0	0	1	1	0
7	Communication mismatch	0	0	1	1	1
8	No Communication	0	1	0	0	0
9	No Encoder	0	1	0	0	1
10	Reserved	0	1	0	1	0
11	Outdoor unit fault	0	1	0	1	1
12	Reserved	0	1	1	0	0
13	Reserved.	0	1	1	0	1
14	Reserved	0	1	1	1	0
15	Reserved	0	1	1	1	1
17	Defrost protection	1	0	0	0	1
18	Deicing Protection	1	0	0	1	0
19	Outdoor Unit Protection	1	0	0	1	1
20	Indoor Coil HP Protection	1	0	1	0	0
21	Overflow Protection	1	0	1	0	1
22	Reserved	1	0	1	1	0
23	Reserved	1	0	1	1	1
24	EEPROM Not Updated	1	1	0	0	0
25	Bad EEPROM	1	1	0	0	1
26	Bad Communication	1	1	0	1	0
27	Using EEPROM data	1	1	0	1	1
29	No Fault (Heat Mode)	1	1	1	0	1
30	No Fault (Cool, Dry, Fan Mode)	1	1	1	1	0
31	No Fault (Stand By)	1	1	1	1	1

1.3.4 Indoor unit diagnosis by MSMP and corrective actions

No.	Fault	Probable Cause	Corrective Action
1	Sensors failures of all types		Check sensors connections or replace sensors.
2	IPM Fault	Electronics HW problem	Check all wiring and jumper settings, if OK, replace electronics.
3	Bad EEPROM		No action, unless special parameters are required for unit operation.
4	DC under/over Voltage	Electronics HW problem	Check outdoor unit power supply voltage
5	AC under Voltage		Check outdoor unit power supply voltage
6	Indoor / Outdoor unit Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
7	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
8	Compressor Lock		Switch unit to STBY and restart
9	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding

1.4 Judgment by MegaTool

MegaTool is a special tool to monitor the system states.
Using MegaTool requires:

- A computer with RS232C port.
- A connection wire for MegaTool.
- A special MegaTool software.

Use MegaTool according to following procedure:

- Setup MegaTool software: copy the software to the computer.
- Connect RS232C port in computer with MegaTool port in Indoor/Outdoor unit controller by the connection wire.
- Run the software and choose the COM port, you can monitor the A/C system state in monitor tab.

1.5 Simple procedures for checking the Main Parts

1.5.1 Checking Mains Voltage.

Confirm that the Mains voltage is between 198 and 264 VAC. If Mains voltage is out of this range, abnormal operation of the system is expected. If in range check the Power (Circuit) Breaker and look for broken or loosed cable lugs or wiring mistake(s).

1.5.2 Checking Power Input.

If Indoor unit power LED is unlighted, power down the system and check the fuse of the Indoor unit. If the fuse is OK replace the Indoor unit controller. If the fuse has blown, replace the fuse and power up again.
Checking Power Input procedure for the Outdoor unit is the same as with the Indoor unit.

1.5.3 Checking the PCB.

Appearance inspect: Check discoloration, nick and connection of copper foil, short-circuit and open circuit, component soldering, bulgy and distortion of electrolytic capacitor.
Power circuit check: check voltage of every power level (5V, 12V, 15V) printed on back of PCB.

1.5.4 Checking the Outdoor Fan Motor.

Enter Test Mode (where the OFAN speed is high)
Check the voltage between lead wires according to the normal value as following:

- Between red wire and black wire: 310VDC +/- 20V
- Between orange wire and black wire: 15VDC +/- 1V
- Between yellow wire and black wire: 2-6VDC

1.5.5 Checking the Compressor.

The compressor is brushless permanence magnetic DC motor. Three coil resistances are THE same. Check the resistance between three poles.

1.5.6 Checking the Reverse Valve (RV).

Running in heating mode, check the voltage between two pins of reverse valve connector, normal voltage is 220VAC.

1.5.7 Checking the electrical expansion valve (EEV).

The EEV has two parts, drive part and valve. The drive part is a step motor; it is ringed on the valve. Check the drive voltage (12VDC). When Outdoor unit is power on, EEV shall run and have click and vibration.

1.6 Precaution, Advise and Notice Items

1.6.1 High voltage in Outdoor unit controller.

Whole controller, including the wires, connected to the Outdoor unit controller may have the potential hazard voltage when power is on. Touching the Outdoor unit controller may cause an electrical shock.
Advise: Don't touch the naked lead wire and don't insert finger, conductor or anything else into the controller when power is on.

1.6.2 Charged Capacitors

Three large-capacity electrolytic capacitors are used in the Outdoor unit controller. Therefore, charging voltage (380VDC) remains after power down. Discharging takes about three minutes after turned off. Touching the Outdoor unit controller before discharging may cause an electrical shock. When open the Outdoor unit controller cover, don't touch the soldering pin by hand or by any conductive material.
Advise: 1. Open the Outdoor unit controller cover only after five minutes from power down.
2. Measure the electrolytic capacitors voltage before farther checking controller for safety.

1.6.3 Additional advises

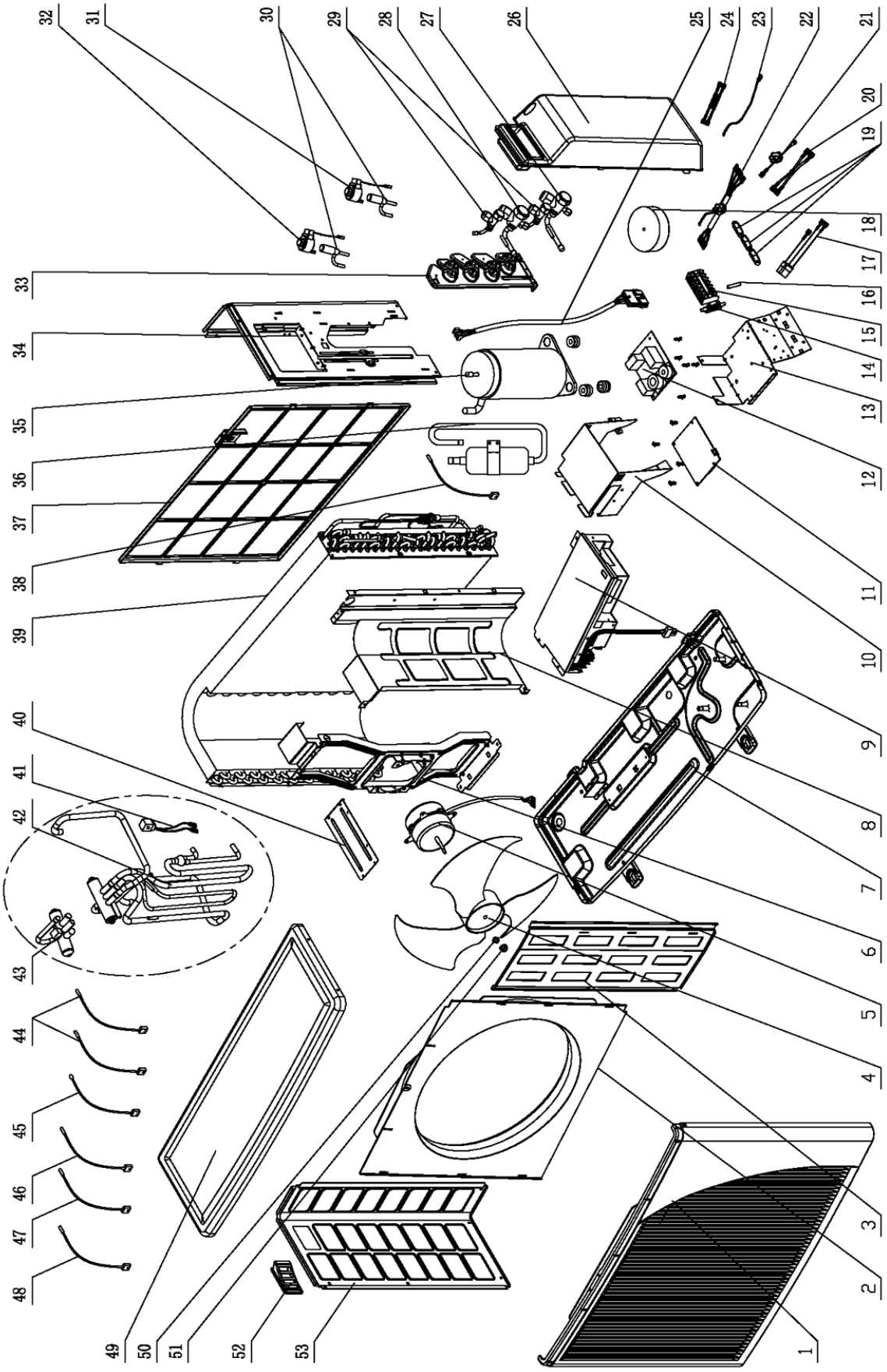
When disassemble the controller or the front panel, turn off the power supply.

When connecting or disconnecting the connectors on the PCB, hold the whole housing, don't pull the wire.

There are sharp fringes and sting on shell. Use gloves when disassemble the A/C units.

13. EXPLODED VIEWS AND SPARE PARTS LISTS

13.1 Outdoor Unit: DUO 50 DCI



14.2 Outdoor Unit: DUO 50 DCI

No.	Part No.	Description	Unit
1	433218	Front panel A	1
2	4526340	Air inlet ring-420	1
3	433223	Painting insulation plate	1
4	4526476	Axial fan OD=401	1
5	4526475	DC motor ARW 44 8p 40W	1
6	4526457	Motor support	1
7	4526482	Base painting assy	1
8	4526456	Partition	1
9	4526203	Outdoor DCI controller (English) (EHK P/N:906-097-00)	1
10	4526295	MSMP electronic box	1
11	4526227	MSMP communication board (EHK P/N:901-002-00)	1
12	4526224	EMI filter board (EHK P/N:901-098-00)	1
13	452823600	Therminal sheet assy.	1
14	4526220	Fuse stand JEF-511B (EHK P/N:105-038-00)	1
15	4527130	8 Poles terminal block	1
16	4526533	Fuse 65TS(25A,230V)	1
17	4526314	MSMP communication wire	1
18	4526396	Choke assy	1
19	204107	Cable clip	3
20	4526225	Power lead line	1
21	4526968	Grounding wire with magnetic ring	1
22	4526223	AC-IN wire	1
23	4526222	Fuse connected wire	1
24	4526226	Power connection wire	1
25	4526221	Compressor wire	1
26	433230	Valve cover	1
27	452630201	Gas valve for R410A	1
28	452630200	Gas valve for R410A	1
29	4526301	Liquid valve	2
30	4526827	Electronic expansion valve CAM-BD15 FKS-1	2
31	452682800	EEV coil (red) CAM-MD12FKS-1	1
32	452682802	EEV coil (white) CAM-MD12FKS-2	1
33	4526430	Valve support (painting plate)	1
34	4526429	Right side panel (painting plate)	1
35	4523446	Compressor assy 5CS130XCC03	1
36	452813100	Accumulator assy.	1
37	433228	Back side net	1
38	4526775	Compressor top thermistor (CTT)	1
39	4526459	Condenser soldering assy	1
40	4526298	Bridge	1
41	4522509	4-way valve coil	1
42	4526471	4-way valve soldering assy	1
43	4518952	4-way valve	1
44	4526969	Suction tube thermistor 1 (SUT1)	1
45	4526774	Outside air thermistor (OAT)	1
46	4526776	Outside coil thermistor (OCT)	1
47	4526970	Suction tube thermistor 2 (SUT2)	1
48	452911100	Suction tube thermistor 3 (SUT3)	1
49	4519614	Painting top cover	1
50	4526480	Gasket for axial fan	1
51	4519300	Nut M5 L	1
52	433225	Handle	1
53	4519607	Left side panel (painting plate)	1

APPENDIX A

INSTALLATION AND OPERATION MANUAL

► **INSTALLATION MANUAL DUO 50 DCI**