Service Manual

KXL DCI Series

Indoor Units	Outdoor Units
KXL 24DCI	GC 24 DCI
KXL 30 DCI	GC 30 DCI

REFRIGERANT	HEATPUMP
R410A	

REV: 0	March 2006

Table of Contents

1. INTRODUCTION

1.1 General

The new **KXL DCI** split cassette range comprise the following RC(heat pump) models:

- **KXL 24 DCI**
- **KXL 30 DCI**

The New DCI KN units can be easily fitted to residential and commercial applications featuring esthetic design, compact dimensions, and low noise operation.

1.2 Main Features

The DCI KN series benefits from the most advanced technological innovations, namely:

- DC inverter technolegy
- R410a
- High COP
- Lego Concept
- Pre-Charged units up to the max' allowing tubing distance
- Networking system connectivity
- A dry contract for presence detector or power shedding functions(configurable)
- Cooling operation at outdoor temprature down to -10°C
- Heating operation at outdoor temprature down to -15°C
- Supports Indoor Air Quality features, such as – Ionizer, Active Electro-Static Filter
- Indoor large diameter cross flow fan, allowing low noise level operation
- Bended indoor coil with treated aluminum fins and coating for improved efficiency
- Easy access to the interconnecting tubing and wiring connections, so that removing the front grill or casing is not necessary
- Refrigerant pipes can be connected to the indoor unit from 6 different optional directions
- Water condensate tray is equipped with two optional drain connections
- Automatic treated air sweep.
- Low indoor and outdoor noise levels.
- Easy installation and service.

1.3 Control

The microprocessor indoor controller, and an infrared remote control, supplied as standard, provide complete operating function and programming.
Remote controlers:RC-3/4,µBMS
Networking system Airconet version 4.2 and up MIU SW version H8 and up.
For further details please refer to the Operation Manual, Appendix A.

1.4 Outdoor Unit

DCI outdoor units can be installed as floor or wall mounted units by using a wall supporting bracket. The metal sheets are protected by anti- corrosion paint work allowing long life resistance. All outdoor units are pre-charged. For further information please refer to the Product Data Sheet, Chapter 2.

·DCI 24
·DCI 30

Outdoor Unit Feature

Feature	DCI 24,30
Display	4 LED's
Outdoor Fan	Variable speed DC Inverter
M2L cable Port	No

1.5 Tubing Connections

Flare type interconnecting tubing to be produced on site.
For further details please refer to the Installation Manual,

1.6 Inbox Documentation

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

2. PRODUCT DATA SHEET

2.1 KXL 24 DCI

Model Indoor Unit				**KXL 24 DCI**	
Model Outdoor Unit				**GC 24 DCI**	
Installation Method of Pipe				Flared	
Characteristics			**Units**	**Cooling**	**Heating**
Capacity (4)			Btu/hr	24550(5110~27280)	27280(5110~30000)
			kW	7.2(1.5-8.0)	8.0(1.5~8.8)
Power input (4)			kW	2.39(0.5-3.2)	2.22(0.5~3.1)
EER (Cooling) or COP(Heating) (4)			W/W	3.01	3.63
Energy efficiency class				B	A
Power supply			V/Ph/Hz	220-240V/Single/50Hz	
Rated current			A	10.4	9.7
Starting current			A	15	
Circuit breaker rating			A	20	
INDOOR	Fan type & quantity			Centrifugal x 1	
	Fan speeds	H/M/L	RPM	740/700/620	740/700/620
	Air flow (1)	H/M/L	m3/hr	1230/1120/980	1300/1200/1050
	External static pressure	Min-Max	Pa	0	
	Sound power level (2)	H/M/L	dB(A)	61/59/56	
	Sound pressure level(3)	H/M/L	dB(A)	52/50/47	
	Moisture removal		l/hr	2.5	
	Condenstate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	840*840*230	
	Weight		kg	36	
	Package dimensions	WxHxD	mm	1011*931*263	
	Packaged weight		kg	40	
	Units per pallet		units	6	
	Stacking height		units	6 levels	
OUTDOOR	Refrigerant control			EEV	
	Compressor type,model			Two Rotary,Mitsubishi TNB220F	
	Fan type & quantity			Propeller(direct) x 1	
	Fan speeds	H/L	RPM	850	
	Air flow	H/L	m3/hr	3600	
	Sound power level	H/L	dB(A)	66	
	Sound pressure level(3)	H/L	dB(A)	56	
	Dimensions	WxHxD	mm	950x412x835	
	Weight		kg	65.5	
	Package dimensions	WxHxD	mm	1080x477x910	
	Packaged weight		kg	73	
	Units per pallet		Units	2	
	Stacking height		units	2 levels	
	Refrigerant type			R410A	
	Refrigerant chargless distance		kg/m	2.45kg/7.5m	
	Additional charge per 1 meter		g/m	No Need	
	Connections between units	Liquid line	In.(mm)	3/8"(9.53)	
		Suction line	In.(mm)	5/8"(15.88)	
		Max.tubing length	m.	Max.30	
		Max.height difference	m.	Max.15	

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).
(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 KXL 30 DCI

Model Indoor Unit				**KXL 30 DCI**	
Model Outdoor Unit				**GC 30 DCI**	
Installation Method of Pipe				Flared	
Characteristics			**Units**	**Cooling**	**Heating**
Capacity (4)			Btu/hr	27280(6800~30000)	30690(5110~34100)
			kW	8.0(2.0-8.8)	9.0(1.5~10.0)
Power input (4)			kW	2.65(0.5-3.2)	2.60(0.5~3.1)
EER (Cooling) or COP(Heating) (4)			W/W	3.01	3.46
Energy efficiency class				B	B
Power supply			V/Ph/Hz	220-240V/Single/50Hz	
Rated current			A	11.5	11.3
Starting current			A	15	
Circuit breaker rating			A	20	
INDOOR	Fan type & quantity			Centrifugal x 1	
	Fan speeds	H/M/L	RPM	580/540/500	580/540/500
	Air flow (1)	H/M/L	m3/hr	1200/1100/1000	1270/1170/1070
	External static pressure	Min-Max	Pa	0	
	Sound power level (2)	H/M/L	dB(A)	53/51/49	
	Sound pressure level(3)	H/M/L	dB(A)	46/44/42	
	Moisture removal		l/hr	3	
	Condenstate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	840*840*300	
	Weight		kg	48	
	Package dimensions	WxHxD	mm	1011*931*333	
	Packaged weight		kg	54	
	Units per pallet		units	5	
	Stacking height		units	5 levels	
OUTDOOR	Refrigerant control			EEV	
	Compressor type,model			Two Rotary,Mitsubishi TNB220F	
	Fan type & quantity			Propeller(direct) x 1	
	Fan speeds	H/L	RPM	850	
	Air flow	H/L	m3/hr	3600	
	Sound power level	H/L	dB(A)	66	
	Sound pressure level(3)	H/L	dB(A)	56	
	Dimensions	WxHxD	mm	950x412x835	
	Weight		kg	66	
	Package dimensions	WxHxD	mm	1080x477x910	
	Packaged weight		kg	73.5	
	Units per pallet		Units	2	
	Stacking height		units	2 levels	
	Refrigerant type			R410A	
	Refrigerant chargless distance		kg/m	2.75kg/7.5m	
	Additional charge per 1 meter		g/m	No Need	
	Connections between units	Liquid line	In.(mm)	3/8"(9.53)	
		Suction line	In.(mm)	5/8"(15.88)	
		Max.tubing length	m.	Max.30	
		Max.height difference	m.	Max.15	

(1) Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).
(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.

3. RATING CONDITIONS

Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

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

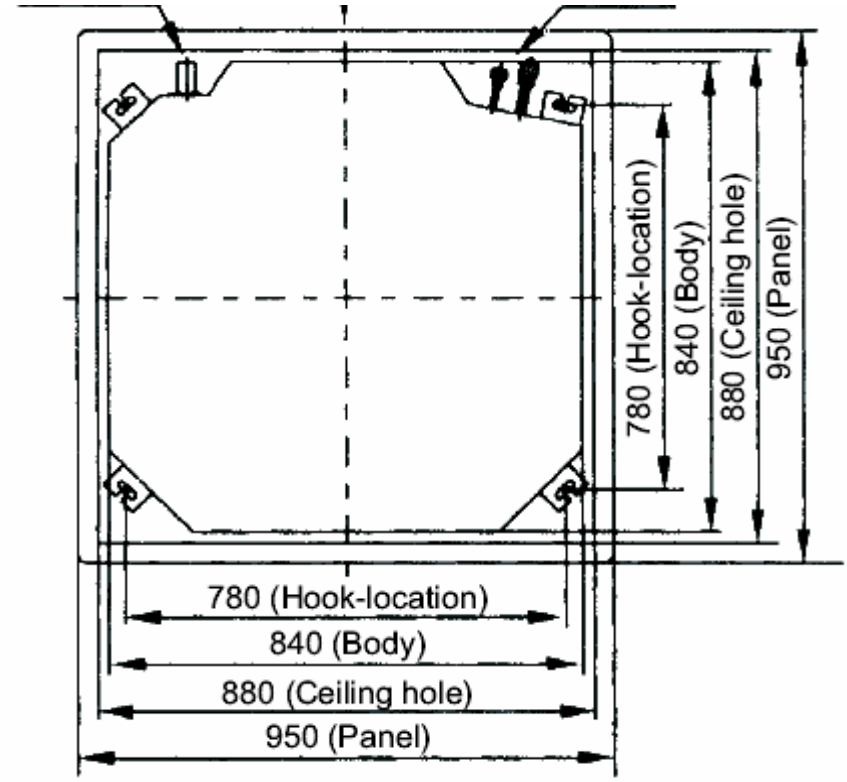
Heating:
Indoor: 20°C DB
Outdoor: 7°C DB 6°C WB

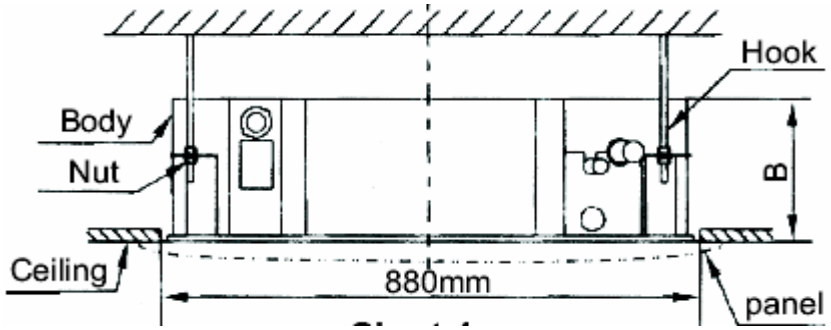
3.1 Operating Limits

		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

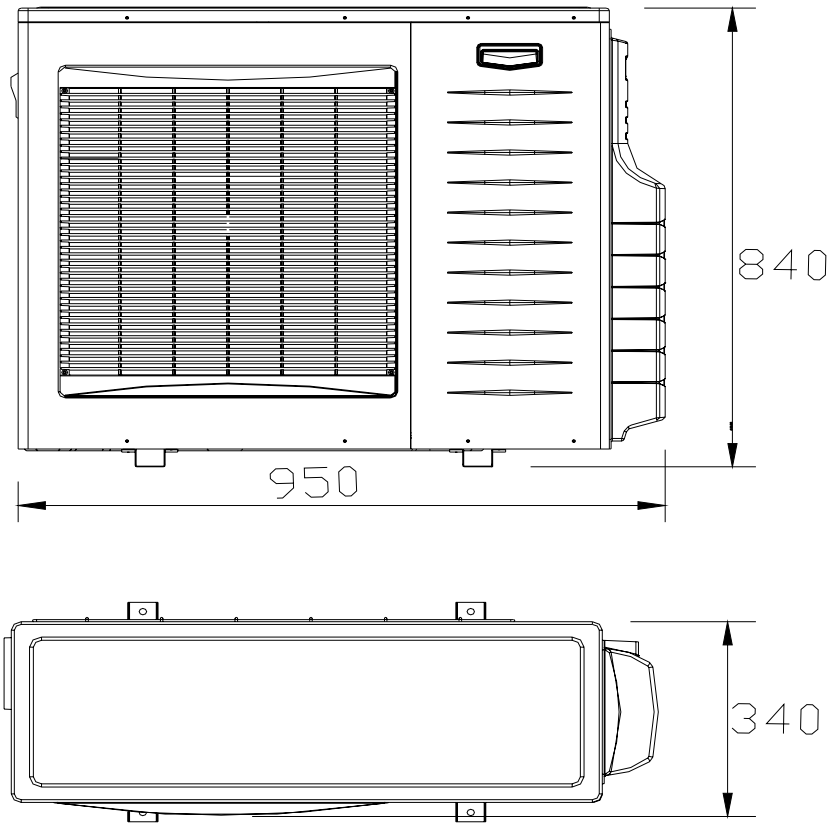




KXL 24 DCI: B=240mm
KXL 30 DCI: B=310mm

Outdoor Unit

4.1.1 GC 24, 30 DCI



5. PERFORMANCE DATA

5.1 KXL 24 DCI

5.1.1 Cooling Capacity (kW)-Run Mode

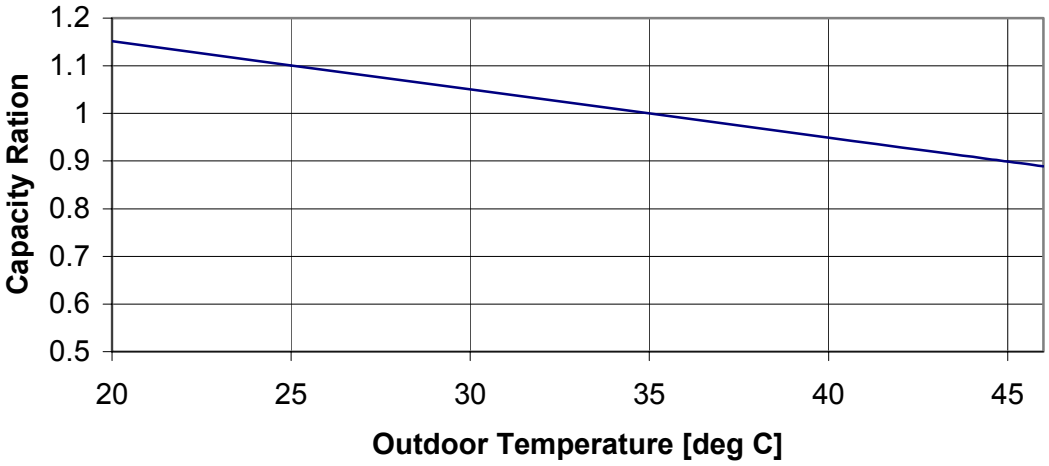
OD COIL ENTERING AIR DB TEMPERATURE [C^0]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [C^0]				
		22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	7.09	7.51	7.93	8.34	8.76
	SC	6.09	6.19	6.28	6.37	6.46
	PI	1.81	1.85	1.89	1.93	1.97
30	TC	6.73	7.15	7.56	7.98	8.40
	SC	5.86	5.95	6.04	6.13	6.22
	PI	2.06	2.10	2.14	2.18	2.22
35	TC	6.36	6.78	7.20	7.62	8.04
	SC	5.62	5.71	5.80	5.89	5.98
	PI	2.31	2.35	2.39	2.43	2.47
40	TC	6.00	6.42	6.84	7.25	7.67
	SC	5.38	5.47	5.56	5.65	5.74
	PI	2.56	2.60	2.64	2.68	2.72
46	TC	5.56	5.98	6.40	6.82	7.24
	SC	5.10	5.19	5.28	5.37	5.46
	PI	2.86	2.90	2.94	2.98	3.02

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
OU – Outdoor

5.1.2 Capacity Correction Factors

Cooling Capacity Ratio Vs. Outdoor Temperature



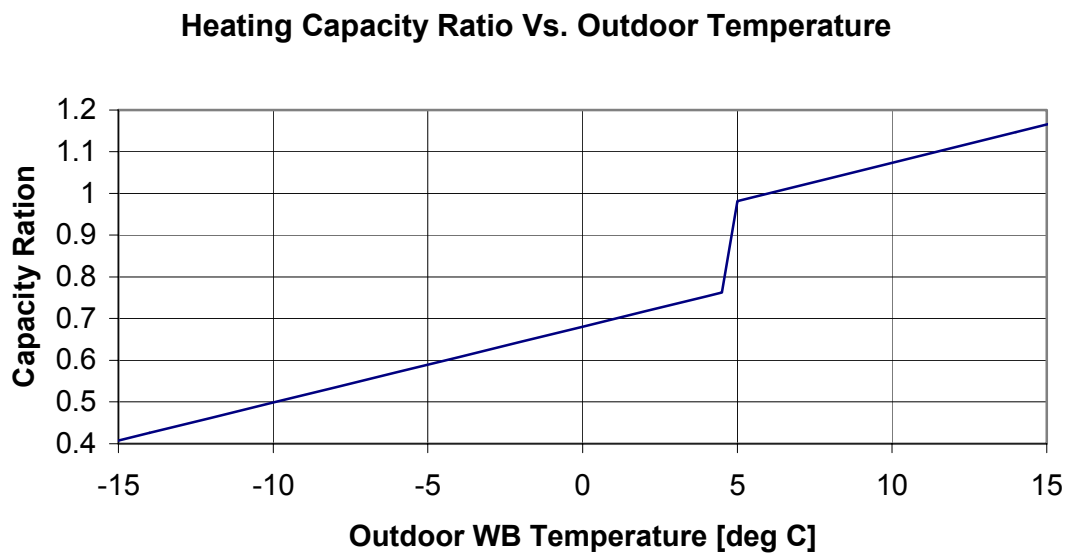
5.1.3 Heating Capacity (kW)-Run Mode

OD COIL ENTERING AIR DB/WB TEMPERATURE [C^0]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [C^0]		
		15	20	25
-15/-16	TC	3.64	3.12	2.59
	PI	1.55	1.66	1.77
-10/-12	TC	4.81	4.28	3.76
	PI	1.75	1.87	1.98
-7/-8	TC	5.68	5.16	4.63
	PI	1.91	2.02	2.13
-1/-2	TC	6.12	5.59	5.07
	PI	1.98	2.09	2.20
2/1	TC	6.41	5.88	5.36
	PI	2.03	2.14	2.26
7/6	TC	8.52	8.00	7.48
	PI	2.11	2.22	2.33
10/9	TC	8.97	8.44	7.92
	PI	2.15	2.26	2.37
15/12	TC	9.41	8.88	8.36
	PI	2.19	2.30	2.41
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

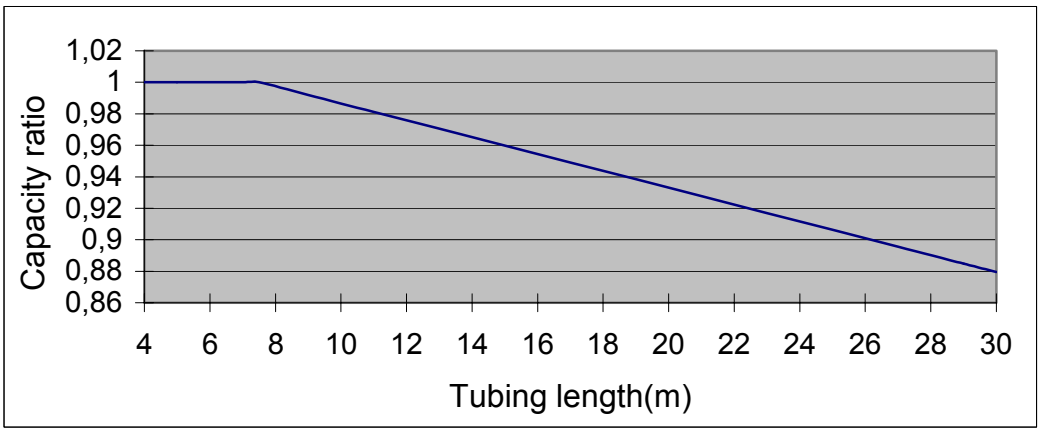
TH – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.1.4 Capacity Correction Factors

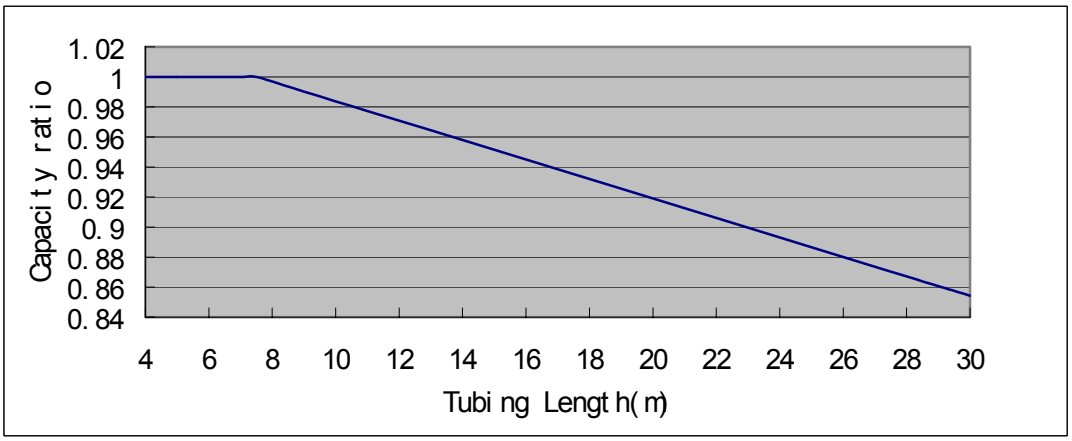


5.1.5 Capacity Correction Factor Due to Tubing Length

Cooling mode



Heating mode

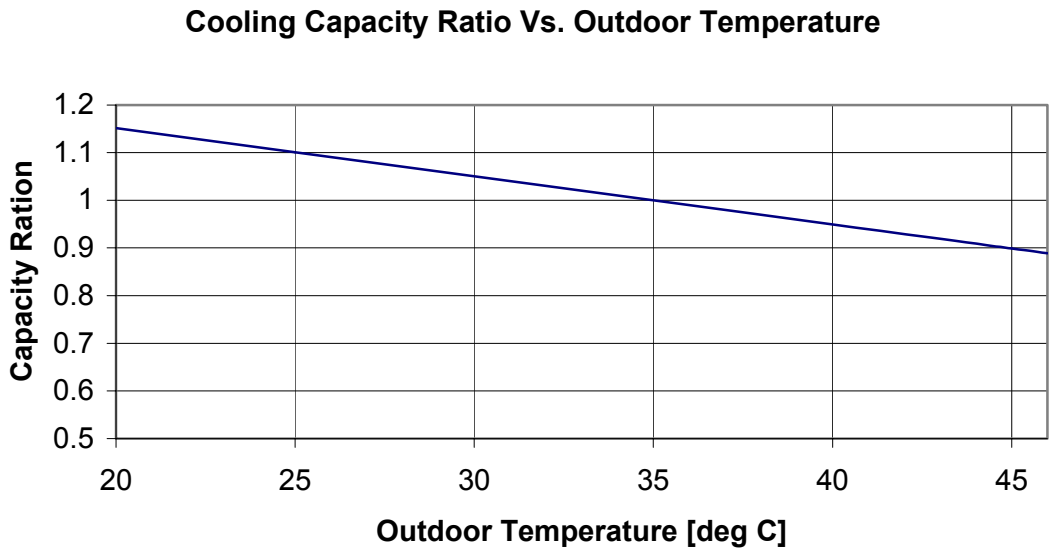


5.2 KXL 30 DCI

5.2.1 Cooling Capacity (kW)-Run Mode

OD COIL ENTERING AIR DB TEMPERATURE [C^0]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [C^0]				
		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	7.88	8.34	8.81	9.27	9.74
	SC	6.41	6.51	6.60	6.70	6.79
	PI	2.00	2.05	2.09	2.14	2.18
30	TC	7.48	7.94	8.40	8.87	9.33
	SC	6.16	6.25	6.35	6.45	6.54
	PI	2.28	2.33	2.37	2.42	2.46
35	TC	7.07	7.54	8.00	8.46	8.93
	SC	5.91	6.00	6.10	6.20	6.29
	PI	2.56	2.60	2.65	2.70	2.74
40	TC	6.67	7.13	7.60	8.06	8.52
	SC	5.66	5.75	5.85	5.95	6.04
	PI	2.84	2.88	2.93	2.97	3.02
46	TC	6.18	6.65	7.11	7.58	8.04
	SC	5.36	5.45	5.55	5.64	5.74
	PI	3.17	3.22	3.26	3.31	3.35

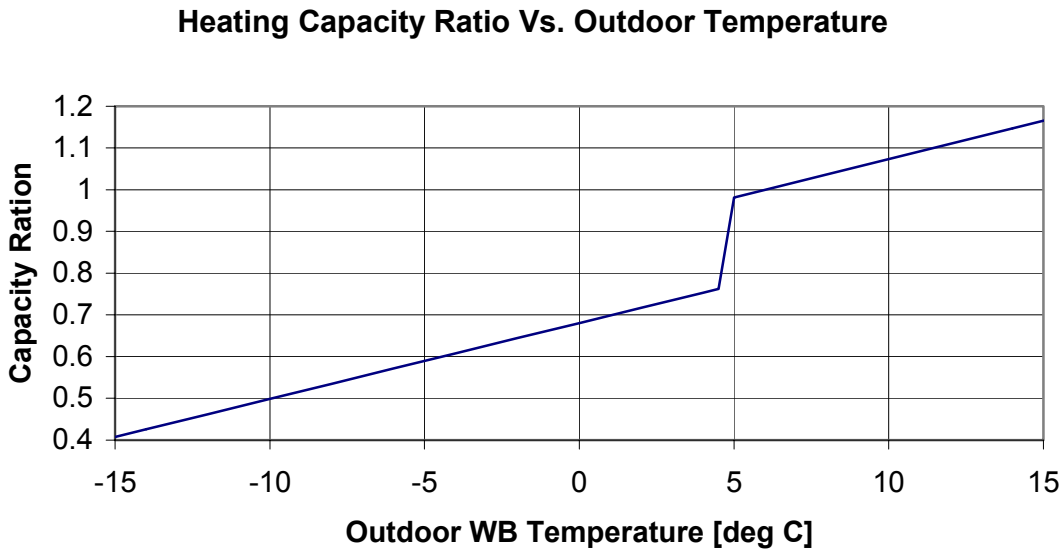
5.2.2 Capacity Correction Factors



5.2.3 Heating Capacity (kW)-Run Mode

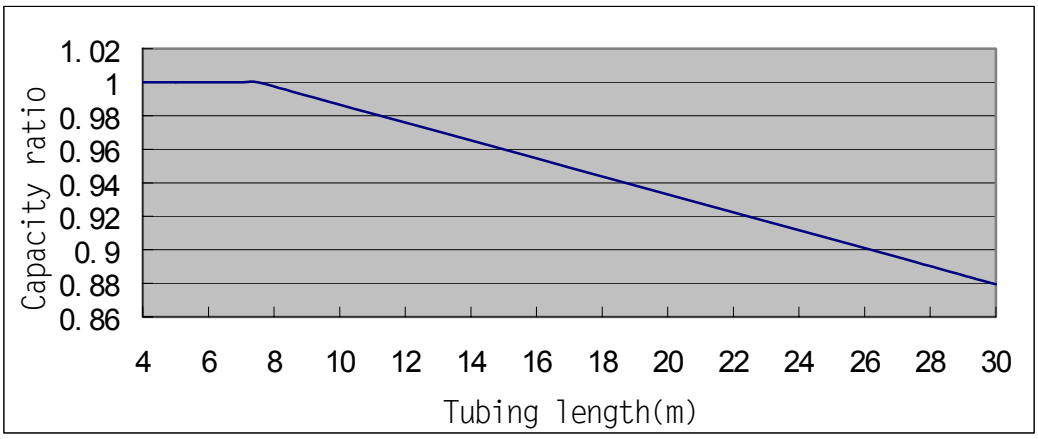
OD COIL ENTERING AIR DB/WB TEMPERATURE [C^0]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [C^0] 15	20	25
-15/-16	TC	4.10	3.51	2.92
	PI	1.82	1.95	2.08
-10/-12	TC	5.41	4.82	4.23
	PI	2.06	2.19	2.32
-7/-8	TC	6.39	5.80	5.21
	PI	2.23	2.36	2.49
-1/-2	TC	6.88	6.29	5.70
	PI	2.32	2.45	2.58
2/1	TC	7.21	6.62	6.03
	PI	2.38	2.51	2.64
7/6	TC	9.59	9.00	8.41
	PI	2.47	2.60	2.73
10/9	TC	10.09	9.50	8.91
	PI	2.52	2.65	2.78
15/12	TC	10.58	9.99	9.40
	PI	2.57	2.70	2.83
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

5.2.4 Capacity Correction Factors

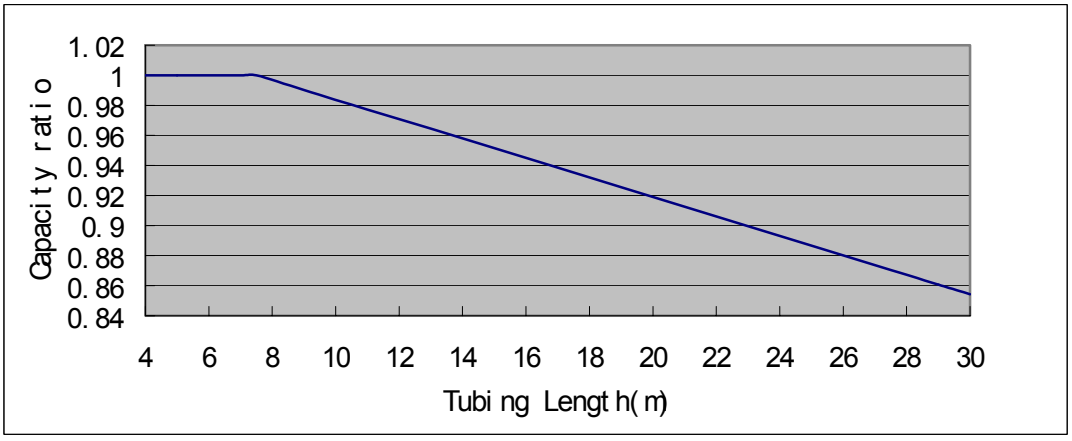


5.2.5 Capacity Correction Factor Due to Tubing Length

Cooling mode



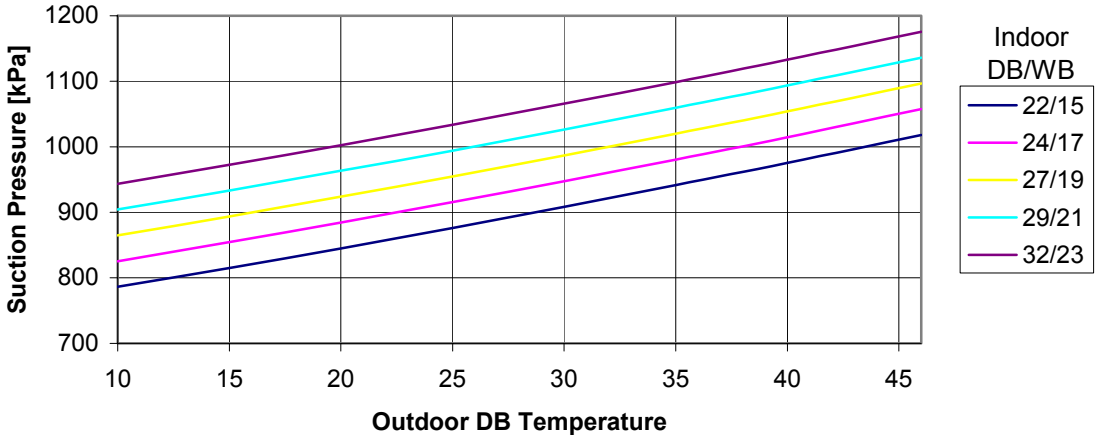
Heating mode

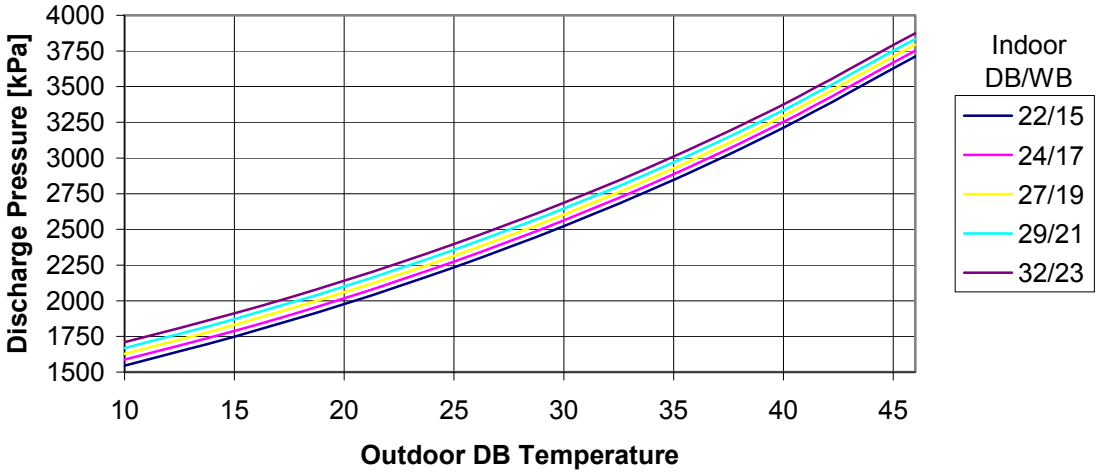


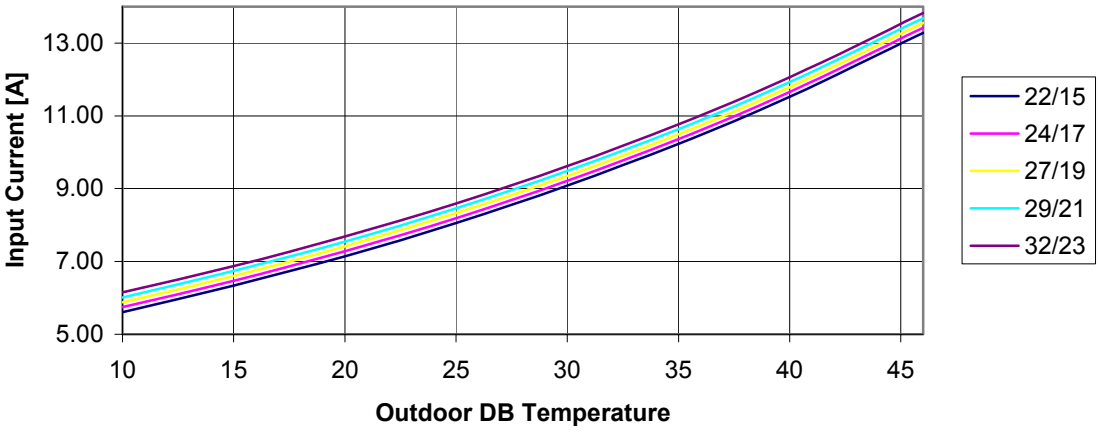
6. OPERATING CURVES

6.1 Model: KXL 24 DCI

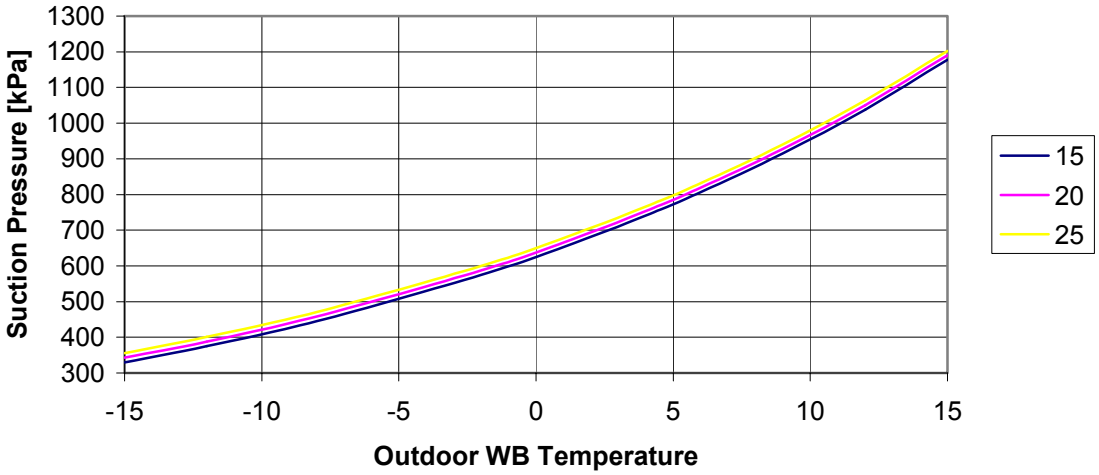
6.1.1 Cooling –Test Mode

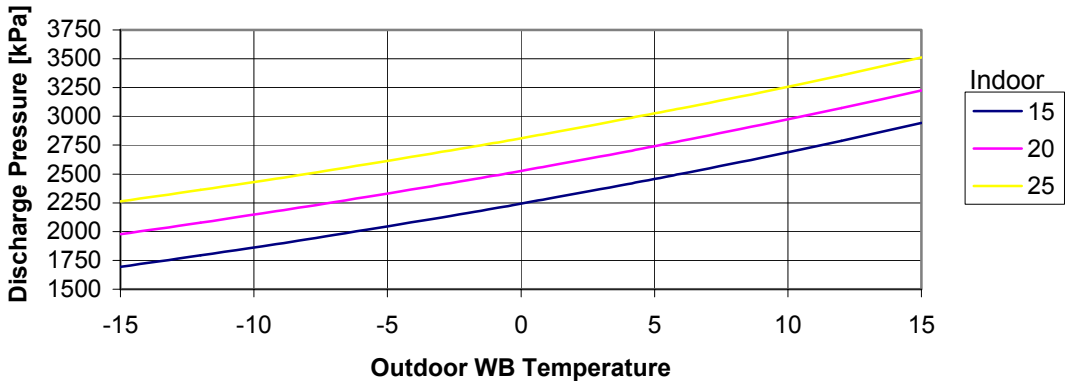


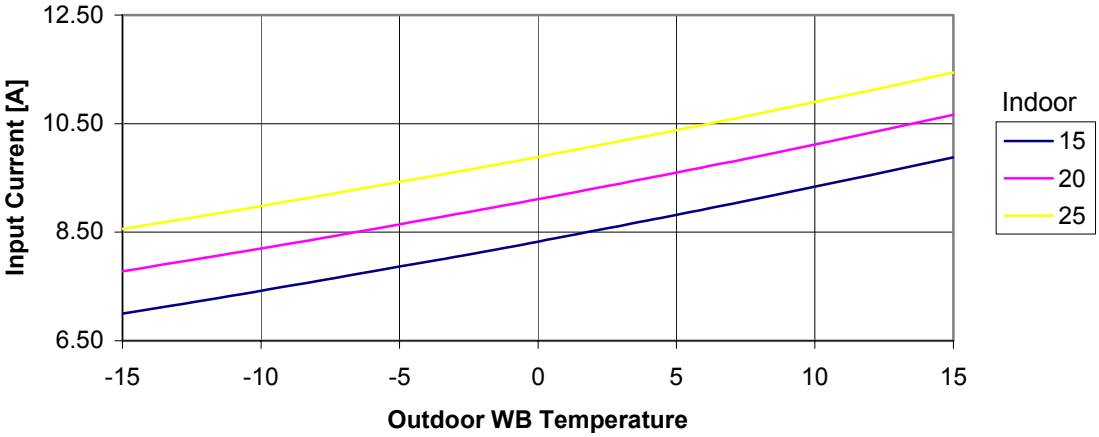




6.1.2 Heating –Test Mode

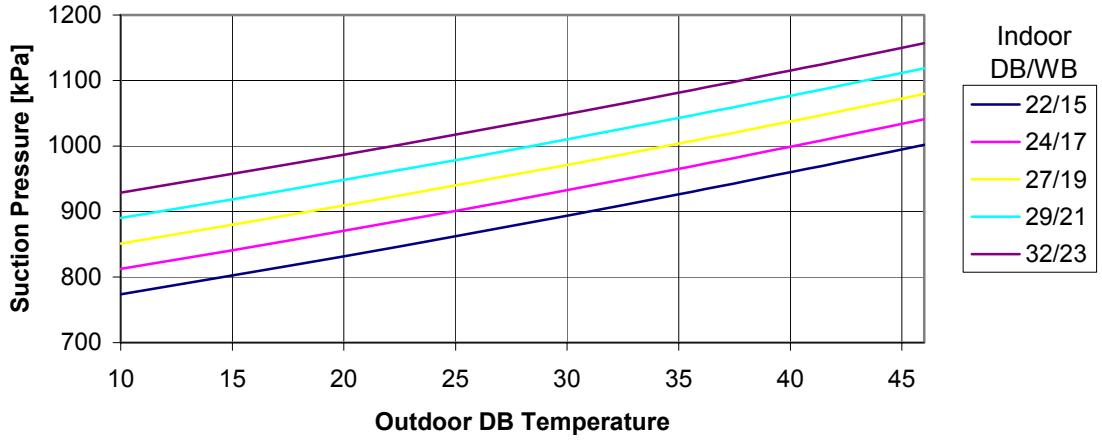


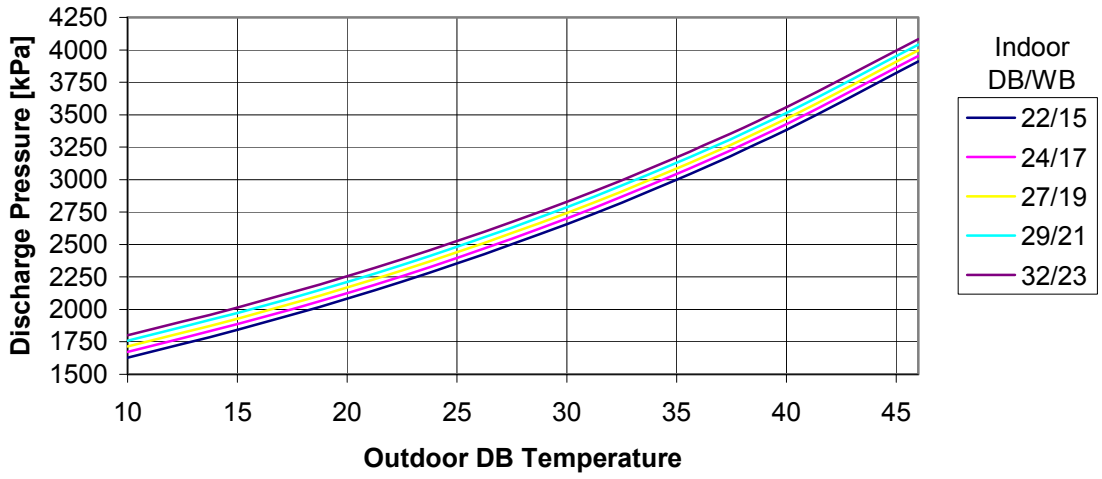


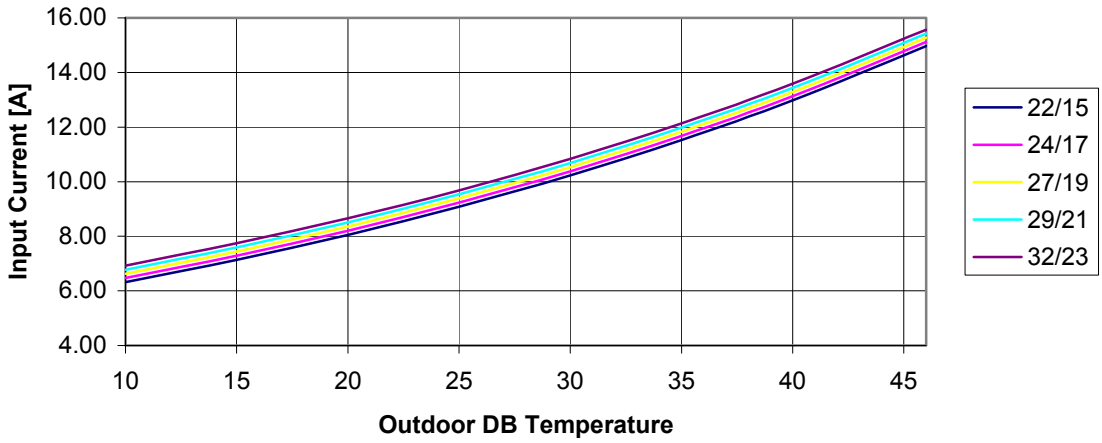


6.2 Model: KXL 30 DCI

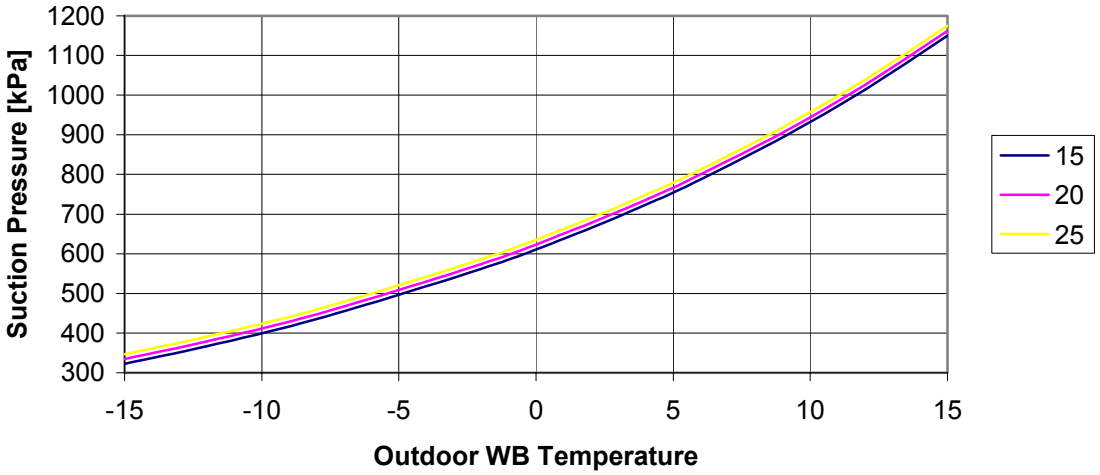
6.2.1 Cooling –Test Mode

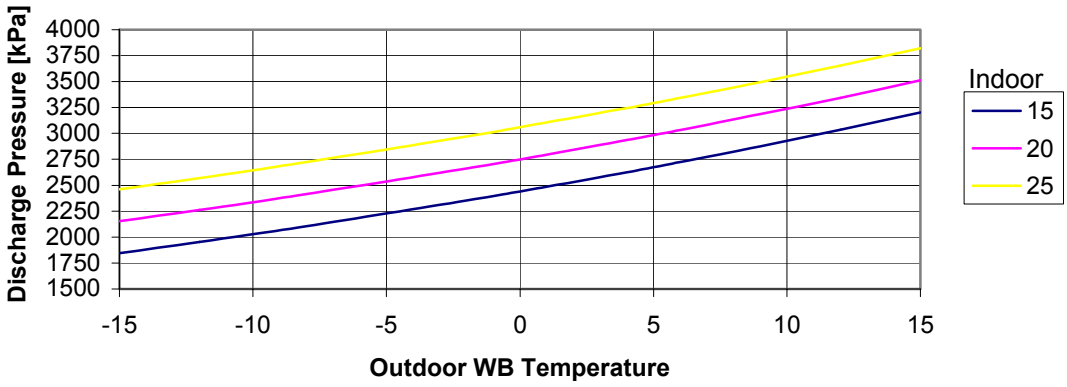


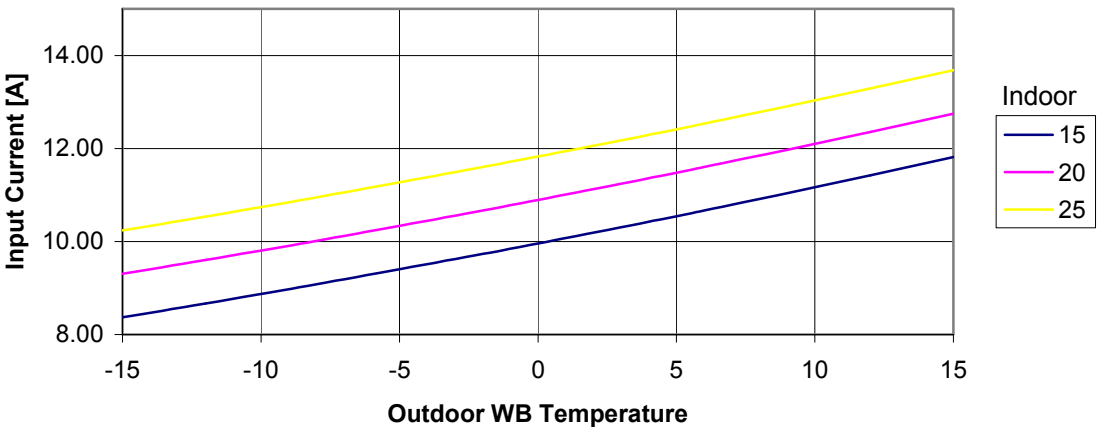




6.2.2 Heating –Test Mode







7. SOUND LEVEL CHARACTERISTICS

7.1 Indoor Unit Sound Pressure Level

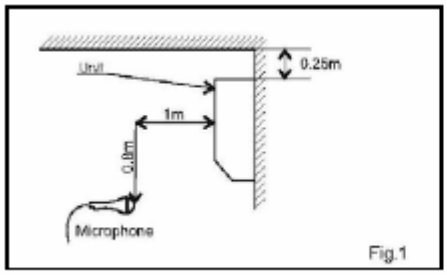


Figure 1. Wall Mounted

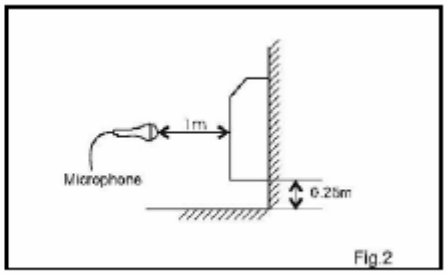


Figure 2. Floor Mounted

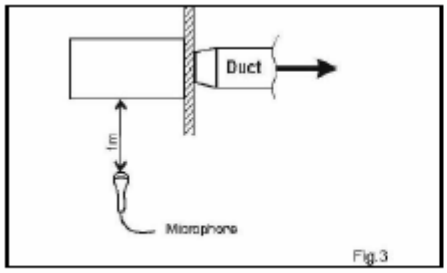


Figure 3. Ducted

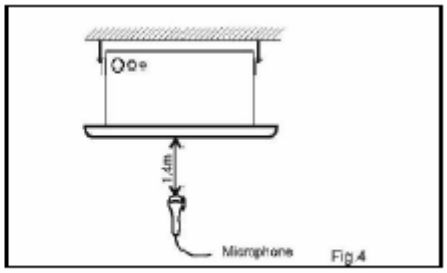
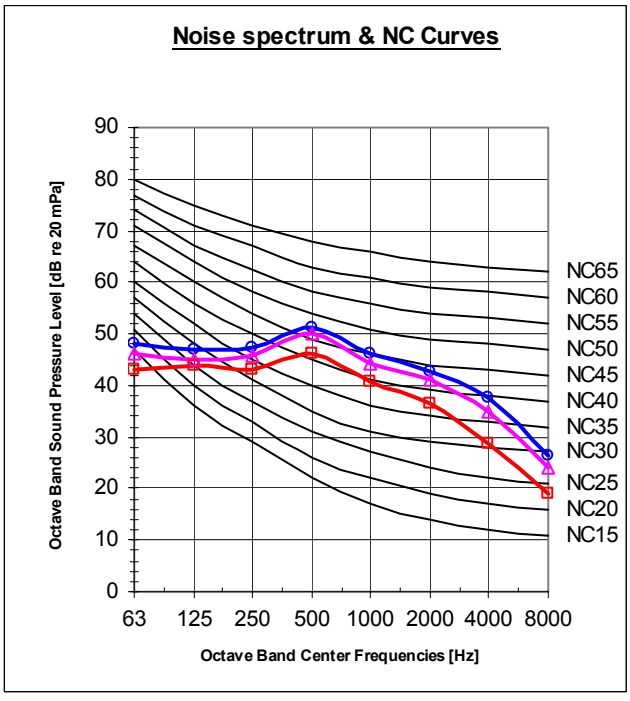


Figure 4. Cassette

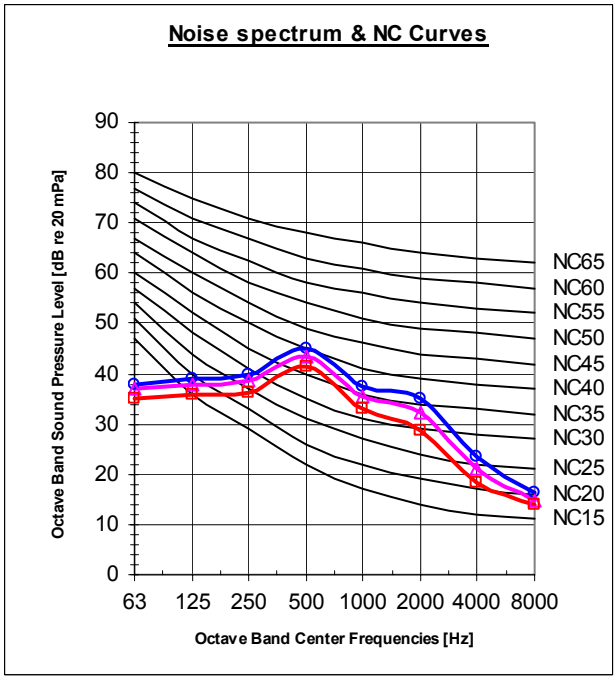
7.2 Indoor Unit Soud Pressure Level Spectrum (Measured as Figure 4)

KXL 24 DCI



FAN SPEED	LINE
HI	
ME	
LO	

KXL 30 DCI



7.3 Outdoor units

MODEL		SPL dB(A)	SPW dB(A)
Indoor	Outdoor	Cooling/Heating	Cooling/Heating
KXL 24 DCI	GC 24 DCI	55/55	65/65
KXL 30 DCI	GC 30 DCI		

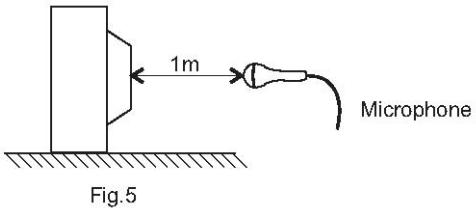
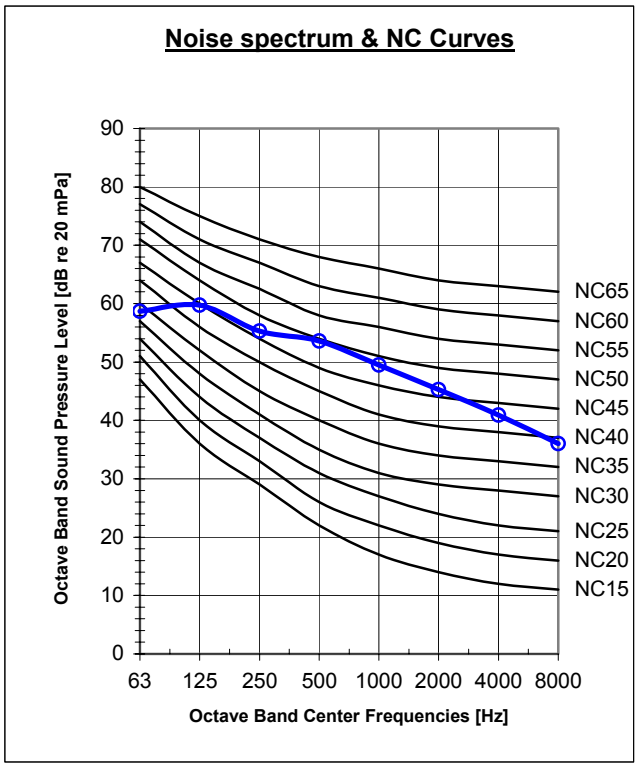


Figure 5. Microphone Distance from Unit

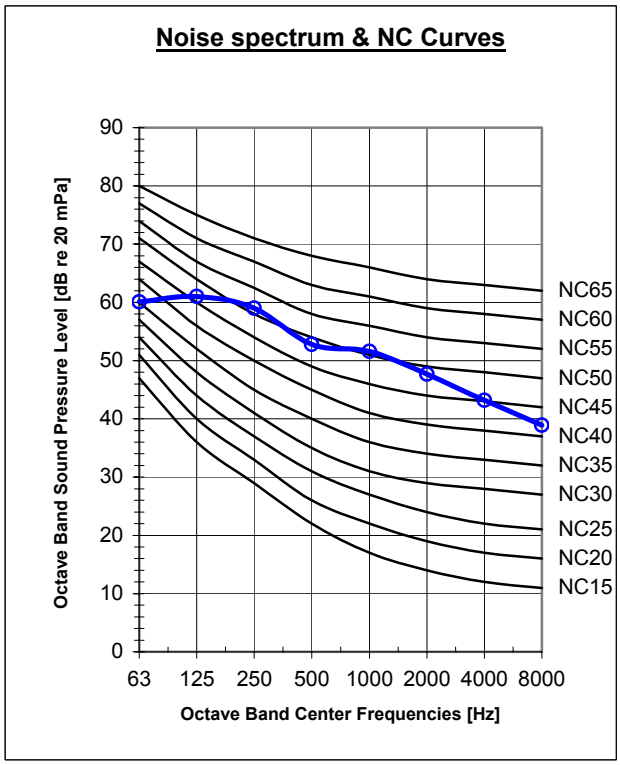
7.4 Outdoor units Sound Pressure Level Spectrum (Measured as Figure 5)

7.4.1 GC 24,30 DCI

Cooling



Heating



8. ELECTRICAL DATA

8.1 Single Phase Unit

Model	GC 24 DCI	GC 30 DCI
Power Supply	1 PH ,220-240VAC ,50HZ	
Connected to	Indoor	
Circuit breaker rating	20A	
Starting Current○,b	15 A	
Power Supply Wiring no xcross section	3X 2.5 mm²	
Interconnecting cable no xcross section	4X 2.5 mm²	

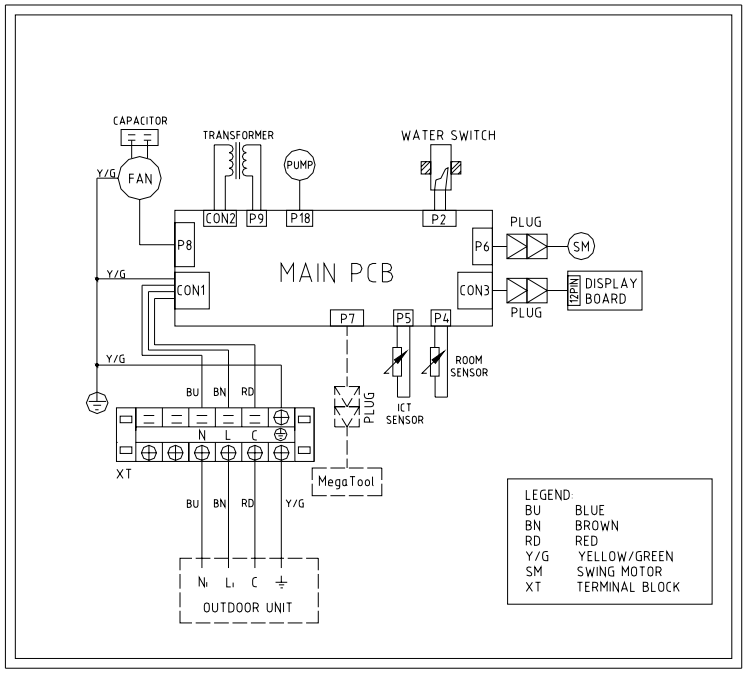
Starting current is the current when starting the compressor.

NOTE

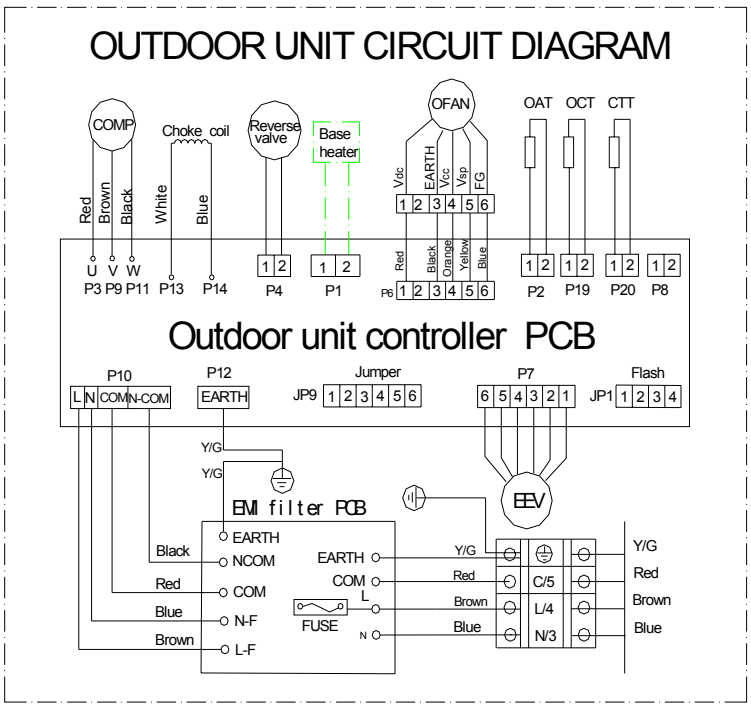
Power wiring cord should comply with local lows and electrical regulations requirements.

9. WIRING DIAGRAMS

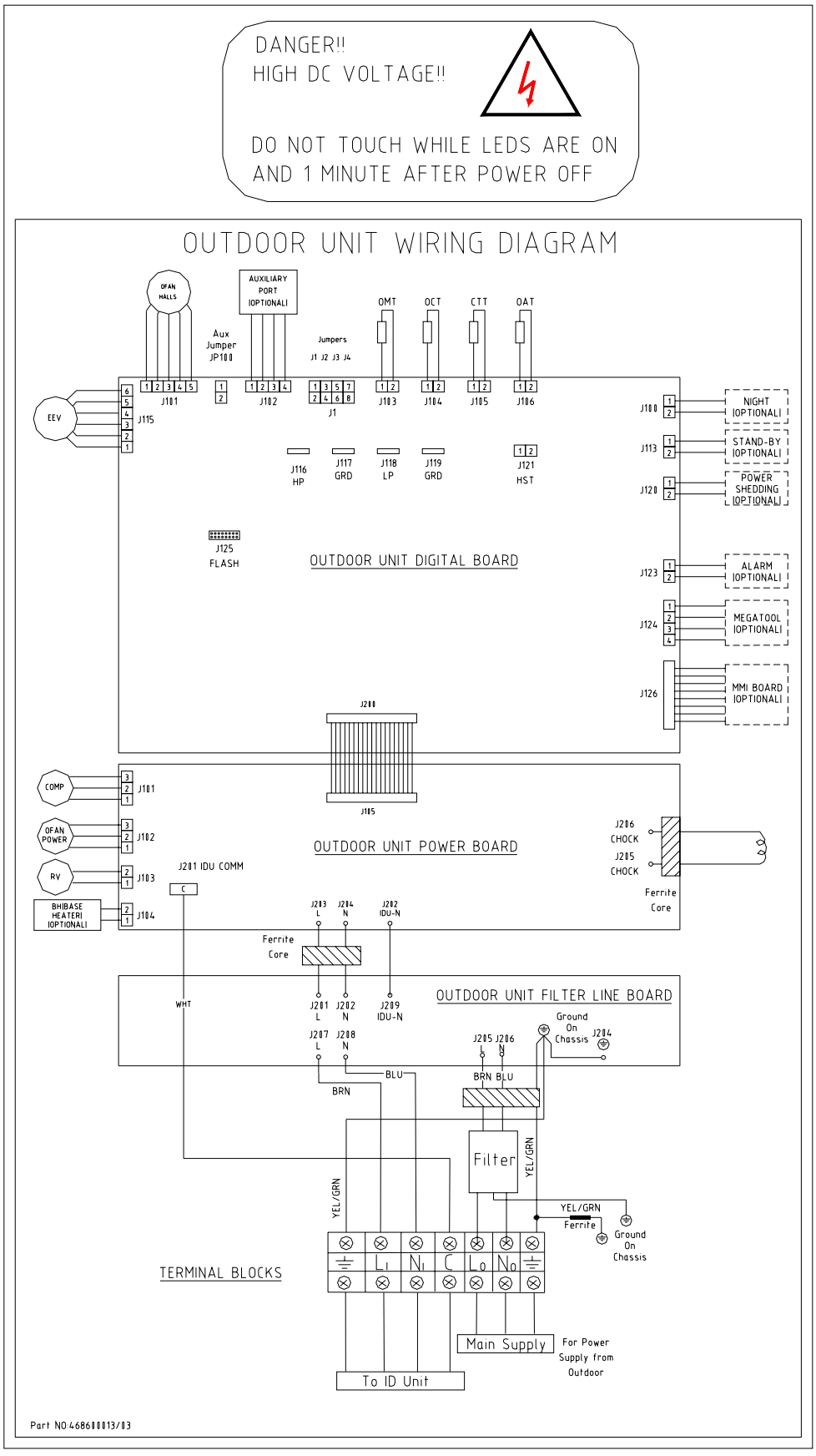
9.1 Indoor Unit



9.2 Outdoor Unit

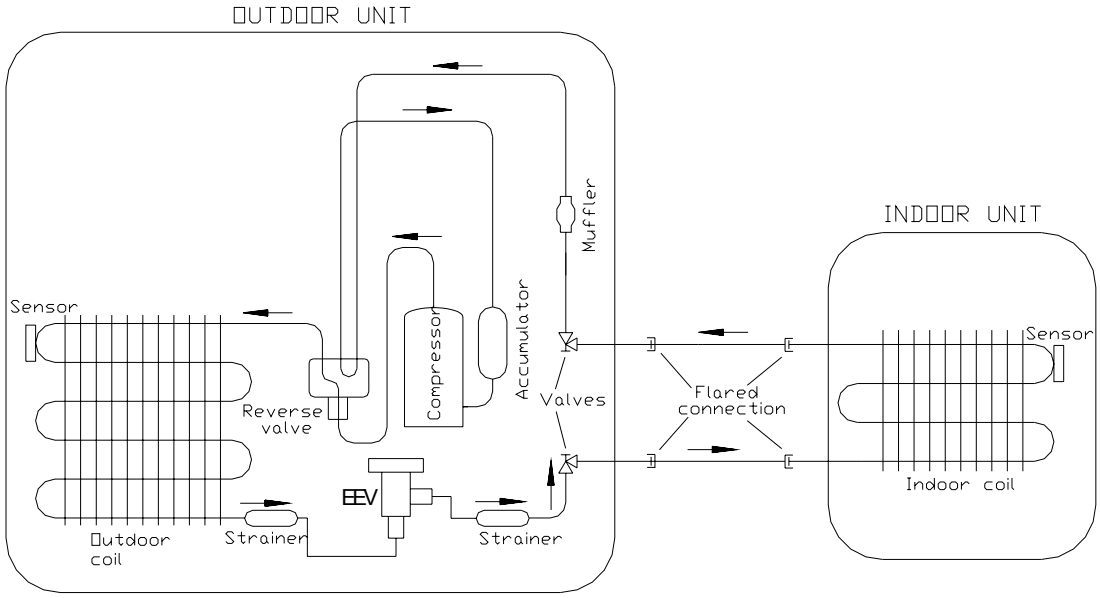


9.2.1 GC 24,30 DCI

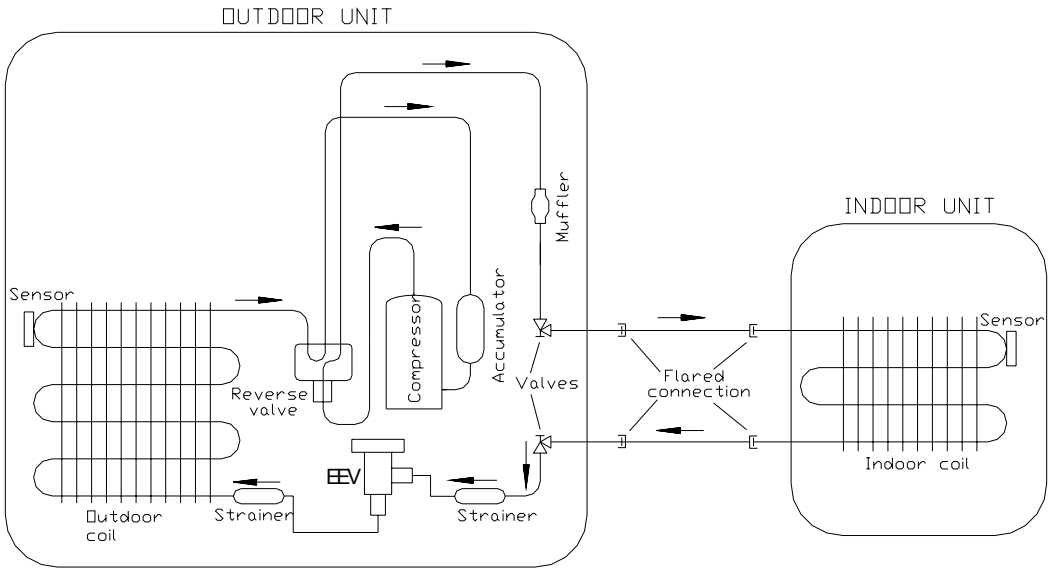


10. REFRIGERATION DIAGRAMS

10.1 Cooling mode

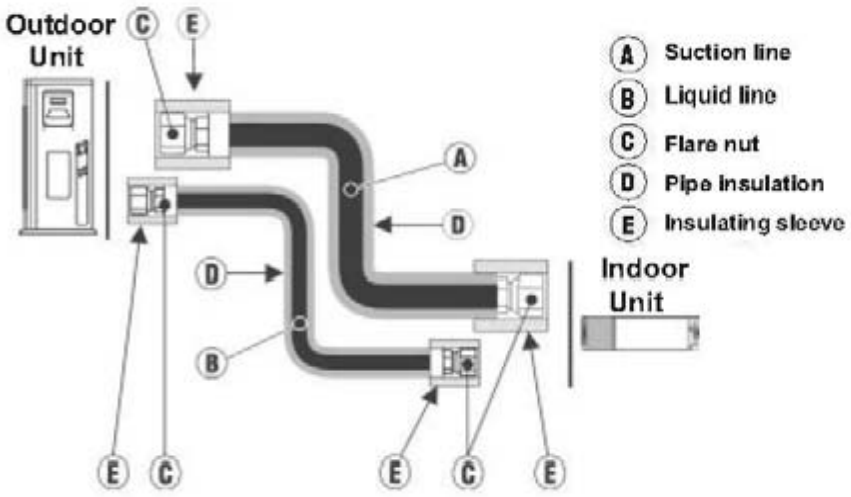


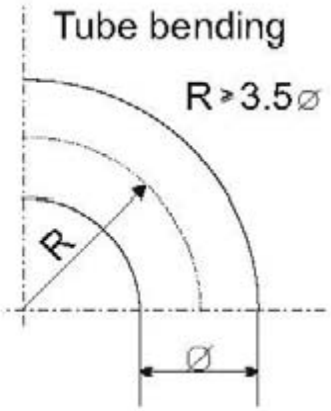
10. COOLING & DRY MODE

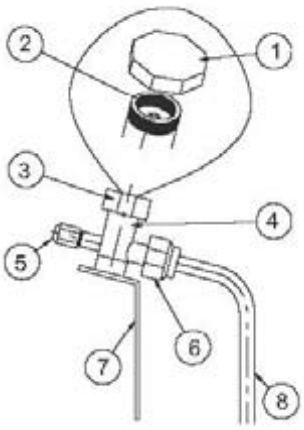


HEATING & DRY MODE

11. TUBING CONNECTIONS



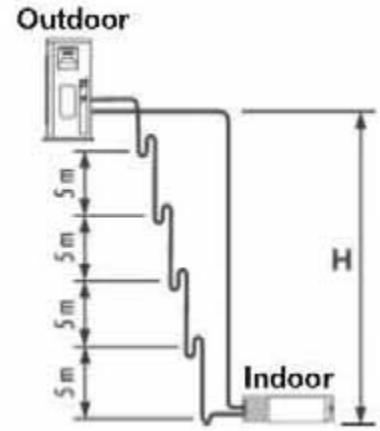




TUBE (Inch) TORQUE (Nm)	1/4"	3/8"	1/2"	5/8"	3/4"
Flare Nuts	11-13	40-45	60-65	70-75	80-85
Valve Cap	13-20	13-20	18-25	18-25	40-50
Service Port Cap	11-13	11-13	11-13	11-13	11-13

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.



12. CONTROL SYSTEM

12.1 General Functions and Operating Rules

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.

12.1.1 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.

12.1.2 Compressor Frequency Control

12.1.2.1 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

Indoor Fan Speed	Maxium NLOAD Cooling	Maxium NLOAD Heating
Low	*MaxNLOADIF1C*	*MaxNLOADIF1H*
Medium	*MaxNLOADIF2C*	*MaxNLOADIF2H*
High	*MaxNLOADIF3C*	*MaxNLOADIF3H*
Turbo	*MaxNLOADIF4C*	*MaxNLOADIF4H*
Auto	*MaxNLOADIF5C*	*MaxNLOADIF5H*

NLOAD limits as a function of power shedding:

Mode	Power Shedding OFF	Power Shedding ON
Cooling	No limit	Nominal Cooling
Heating	No limit	Nominal heating

12.1.3 Target Frequency Setting

12.1.3.1 Target Frequency Setting for DCI 50/60

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	Cooling Mode limits	Heating Mode limits
OAT < 6	***MaxFreqAsOATC***	**No limit**
6 ≤ OAT < 15		***MaxFreqAsOAT1H***
15 ≤ OAT < 28		***MaxFreqAsOAT2H***
28≤ OAT	**No limit**	

12.1.3.2 Target Frequency Setting for DCI 72/80

The compressor Target Speed is calculated according to the following formula:

$$Target\,Speed_{load} = \max\left[MinSpeed, MaxSpeed \cdot \frac{ODUNload}{127} \right]$$

$MinSpeed, MaxSpeed$ are defined as following:

When the unit is in the cool mode, $MinSpeedC = 15Hz, MaxSpeedC = 75Hz$

When the unit is in the heat mode, $MinSpeedH = 20Hz, MaxSpeedC = 95Hz$

$ODUNload$ is caculated according to the IDU NLoad:

$$ODU\ NLOAD = \min\left\{ \frac{3 * IDUNLOAD}{ODUCode}, 127 \right\}$$

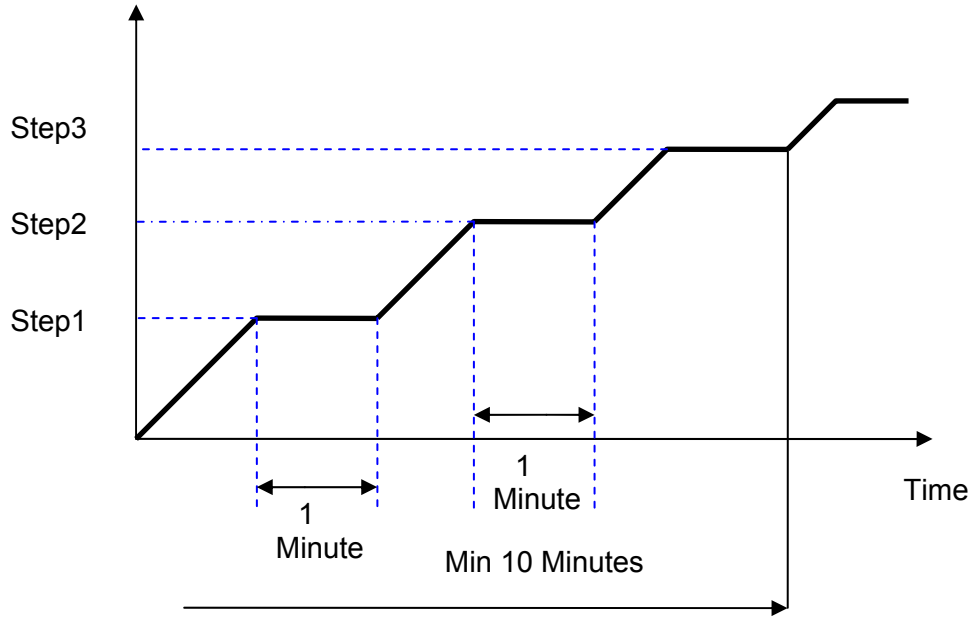
OAT	ODUCodeC	ODUCodeC	IDUNLOAD
≤-5	3	3	Refer to sect.12.1.2.1
□-5	3.8	3	

12.1.4 Frequency Changes Control

When the unit is running normally , the compressor frequency change rate is 1 Hz/sec.

12.1.5 Compressor Starting Control

12.1.5.1 Compressor starting control for DCI50/60



12.1.5.2 Compressor starting control for DCI 24/30

- **Step 1**

Whenever the compressor starts up, after it has been off for more than 45 minutes, the compressor frequency cannot go below *Step1RPS* for 3 continuous minutes (*this rule comes to ensure oil return to the compressor*).

- **Step 2**

The compressor speed cannot go above *Step2RPS* once after each compressor start up for 3 continuous minutes (*this rule comes to prevent oil exit from the compressor after its start up)*.

- **Step 3**

The speed cannot go higher than *Step3RPS* unless it was operating for more than 1 continuous minutes between *Step3RPS* – 5 and *Step3RPS* .
After passing above *Step3RPS*, this rule is re-applied when passing below *Step3RPS*-5.

12.1.6 Minimum On and Off Time

3 minutes

12.1.7 Indoor Fan Control

8 Indoor fan speeds are determined for each model. 4 speeds for cool/dry/fan modes and 4 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.

12.1.7.1 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.

12.1.8 Outdoor Fan Control

12.1.8.1 Outdoor Fan Control for DCI72/80

OFAN operates between *OFMinRPM* to *OFMaxRPM*.

Min time for speed change of OFAN *OFMinTimeReduce* (60 seconds).
There are 4 defined speeds – High, Med, Low, and Very Low.
The actual OFAN speeds in cool mode are defined according to the following table:

Freq	Outdoor air temperature (OAT)											
	-10	**-5**	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**46**
0	0	0	0	0	0	0	0	0	0	0	0	0
15	80	100	120	130	220	340	460	580	600	730	730	730
25	130	140	160	190	250	380	600	610	670	730	740	750
35	160	180	210	250	330	470	730	730	730	730	780	800
45	205	230	260	320	440	600	730	730	730	730	800	850
55	250	280	310	390	550	730	730	730	730	730	800	850
65	275	315	355	470	640	730	730	730	730	730	800	850
75	300	350	400	550	730	730	730	730	730	730	800	850
85	*325*	*395*	*445*	*630*	*730*	*730*	*730*	*730*	*730*	*730*	*800*	*850*
95	*350*	*440*	*490*	*710*	*730*	*730*	*730*	*730*	*730*	*730*	*800*	*850*

The actual OFAN speeds in heat mode are defined according to the following table

Freq	Outdoor air temperature (OAT)						
	-15	**-7**	**0**	**7**	**14**	**21**	**24**
0	0	0	0	0	0	0	0
15	850	850	750	750	500	350	300
25	850	850	750	750	520	370	320
35	850	850	750	750	540	390	340
45	850	850	750	750	560	410	360
55	850	850	750	750	580	430	380
65	850	850	750	750	600	450	400
75	850	850	750	750	620	470	420
85	850	850	750	750	640	490	440
95	850	850	750	750	650	500	450

The fan speed is also related to protections and OMT value.

12.1.9 EEV (Electronic Expansion Vavle) Control

12.1.9.1 EEV Control for DCI 24/30

The target EEV value is the sum of open loop value (OL) and a result of the accumulative correction values (CV).

$$EEV = EEV_{OL} + \sum EEV_{CV}$$

The EEV intial value(OL) is defined as follow:

EEV_{OL}= *EEVBaseOpenLoop + EEVOpenLoopCpctyCrct + EEVTubeCompnst*

EEVBaseOpenLoop Basic EEV open loop		*EEVOpenLoopCpctyCrct* Open Loop correction	*EEVTubeCompnst* EEV tube Length compensation
Mode	GC 24/30 DCI	GC 24/30 DCI	GC 24/30 DCI
COOL	220	25	0
HEAT	210	30	0

EEV_{CV} is a correction value for the EEV opening that is based on the compressor temperature, During the first 6 minutes after SB the correction is not calculated. After that the correction value is updated every *30* seconds.

- When the unit is in Cool mode, the correction is defined as follow:

	DerCTT														
	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
≥57	0	0	1	3	4	5	5	6	6	7	8	9	10	12	13
54, 56	0	0	0	2	3	4	4	5	5	6	6	8	9	11	12
51, 53	0	0	0	1	2	3	3	4	4	5	5	7	8	10	11
48, 50	0	0	0	0	1	2	2	3	3	4	5	6	7	9	10
45, 47	0	0	0	0	0	1	1	2	2	3	4	5	6	8	10
42, 44	-1	-1	0	0	0	0	1	2	2	2	3	4	6	7	9
39, 41	-1	-1	-1	0	0	0	1	2	2	2	2	4	5	7	8
36, 38	-2	-2	-1	-1	0	0	0	2	2	2	2	3	5	6	8
33, 35	-2	-2	-1	-1	0	0	0	2	2	2	2	3	4	6	8
30, 32	-2	-2	-2	-1	-1	0	0	2	2	2	2	3	4	6	7
20, 29	-3	-3	-2	-1	-1	0	0	0	2	2	2	2	4	5	7
17, 19	-4	-3	-3	-2	-2	-1	-1	-1	0	2	2	2	3	5	7
14, 16	-4	-4	-3	-2	-2	-1	-1	-1	0	1	2	2	2	4	6
11, 13	-5	-4	-3	-3	-2	-1	-1	-1	0	0	1	2	2	3	5
8, 10	-5	-5	-4	-3	-3	-2	-2	-2	0	0	0	1	2	2	3
5, 7	-6	-5	-4	-4	-3	-2	-2	-2	-1	0	0	0	1	2	2
2, 4	-6	-6	-5	-4	-4	-3	-2	-2	-1	-1	0	0	0	1	2
-1, 1	-7	-6	-6	-5	-4	-3	-3	-3	-1	-1	-1	0	0	0	1
≤-2	-8	-7	-6	-6	-5	-4	-4	-3	-2	-2	-2	0	0	0	0

CTT - OMT

- When the unit is in Heat mode, the correction is defined as follow:

CTT- ICT	DerCTT															
	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
≥49	1	1	2	3	4	5	5	6	6	7	8	9	10	12	13
46, 48	0	1	1	2	3	4	4	5	5	6	6	8	9	11	12
43, 45	0	0	1	1	2	3	3	4	4	5	5	7	8	10	11
40, 42	0	0	0	1	1	2	2	3	3	4	5	6	7	9	10
37, 39	0	0	0	0	1	1	2	3	3	3	4	5	6	8	10
34, 36	-1	-1	0	0	0	1	2	3	3	3	3	4	6	7	9
31, 33	-1	-1	-1	0	0	0	1	3	3	3	3	4	5	7	8
28, 30	-2	-2	-1	-1	0	0	0	2	3	3	3	3	5	6	8
25, 27	-2	-2	-1	-1	0	0	0	2	2	3	3	3	4	6	8
22, 24	-2	-2	-2	-1	-1	0	0	2	2	2	3	3	4	6	7
12, 21	-2	-2	-2	-1	-1	0	0	0	1	1	2	3	4	5	7
9, 11	-3	-2	-2	-1	-1	-1	-1	-1	0	0	1	2	3	5	7
6, 8	-3	-3	-2	-1	-1	-1	-1	-1	0	0	0	1	2	4	6
3, 5	-3	-3	-2	-2	-2	-2	-2	-2	0	0	0	0	1	3	5
0, 2	-3	-3	-2	-2	-2	-2	-2	-2	0	0	0	0	0	1	3
-3, -1	-3	-3	-3	-3	-3	-3	-3	-2	0	0	0	0	0	0	1
-6, -4	-4	-4	-3	-3	-3	-3	-3	-2	0	0	0	0	0	0	0
-9, -7	-5	-4	-4	-3	-3	-3	-3	-2	0	0	0	0	0	0	0
<=-10	-6	-5	-4	-4	-3	-3	-3	-3	0	0	0	0	0	0	0

12.1.10 RV(Reversing Valve) Control

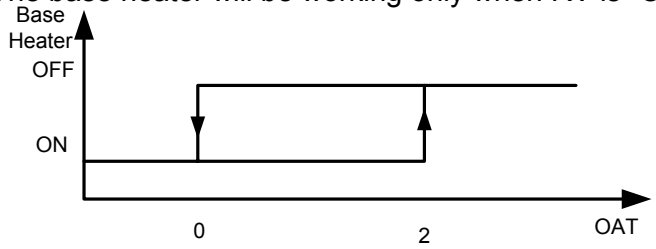
Reversing valve is on in heat mode.
Switching of RV state is done only after compressor is off for over 3 minutes.

12.1.11 Ioniser Control

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

12.1.12 Base Heater Control

The base heater will be working only when RV is “ON” according to the following graphics



When OAT is faulty the base heater will be “ON” continuously in HEAT mode.

12.2 Fan Mode

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 difference between actual room temperature and user set point temperature.

12.3 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 AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

12.4 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.

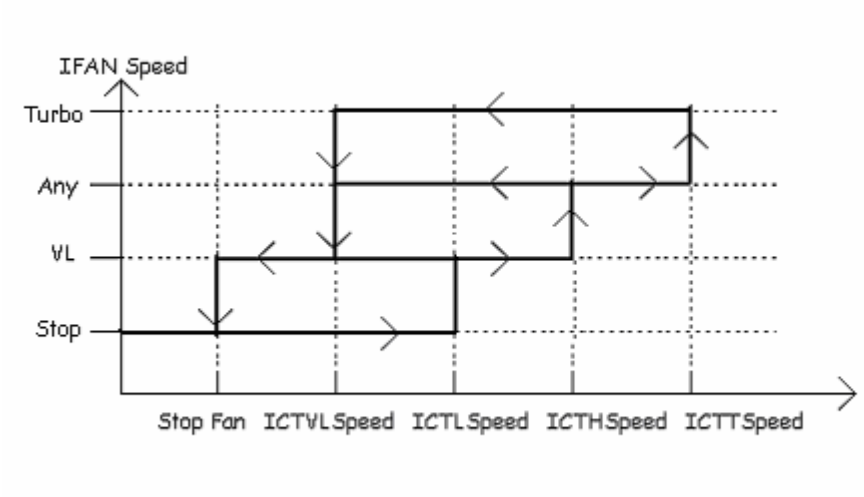
12.4.1 Temperature Compensation

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

12.4.2 Indoor Fan Control in Heating Mode

Indoor fan speed depends on the indoor coil temperature:



12.5 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 (.T).
Unit will switch from cool to heat when compressor is off for 3 minutes, and .T < -3.
Unit will switch from heat to cool when compressor is off for 5 minutes, and .T < -3.

12.6 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.

12.7 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.

12.7.1 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
ICT> *8*	Norm				

12.7.2 Indoor Coil Overheating Protection

12.7.2.1 Indoor Coil Overheating Protection For KXL 24/30 DCI

ICT	ICT Trend				
	<-2	-2	-1,0,1	2	>2
ICT >*62*	SC	SC	SC	SC	SC
60 ≤ ICT < *62*	D1	D1	D2	D2	D2
58≤ ICT <*60*	SR	SR	D1	D2	D2
56≤ ICT < *58*	SR	SR	SR	D1	D2
54≤ ICT < *56*	Norm	Norm	SR	SR	D1
52≤ ICT ≤ *54*	Norm	Norm	Norm	SR	SR
ICT <*52*	Norm				

12.7.3 Compressor Overheating Protection

12.7.3.1 Compressor Overheating Protection for GC 24/30 DCI

CTT		CTT Trend				
		Fast Decreasing	Decreasing	No Change	Increasing	Fast Increasing
Cool	Heat					
CTT >*105*	CTT >*105*	SC	SC	SC	SC	SC
100≤ CTT < *105*	*100*≤ CTT < *105*	D1	D1	D2	D2	D2
98≤CTT <*100*	*95*≤CTT <*100*	SR	SR	D1	D2	D2
93≤CTT < *100*	*85*≤CTT < *95*	SR	SR	SR	D1	D1
90≤CTT ≤ *93*	*80*≤CTT ≤ *85*	Norm	Norm	Norm	SR	SR
CTT <*90*	CTT <*80*	Norm				

12.7.4 Heat Sink Overheating Protection

12.7.4.1 Heat Sink Overheating Protection For GC 24/30 DCI

HST	Delta HST				
	<-2	-2	-1,0,1	2	>2
HST≥ *81*	SC	SC	SC	SC	SC
79 ≤ HST < *81*	D1	D1	D2	D2	D2
75 ≤ HST < *79*	SR	SR	D1	D2	D2
73≤ HST< *75*	SR	SR	SR	D1	D1
71 ≤ HST ≤ *73*	Norm	Norm	SR	SR	SR
HST < *71*	Norm				

12.7.5 System Over Power Protection Only For GC 24/30 DCI

Power		Delta PWR				
		< *-2000*	[*-2000,0*)	0	(0,*2000*]	> *2000*
PWR1	PWR2					
PWR ≥ *3500*	PWR ≥ *2900*	SC	SC	SC	SC	SC
3300≤PWR < *3500*	*2750*≤PWR < *2900*	D1	D1	D2	D2	D2
3100 ≤PWR < *3300*	*2600*≤PWR < *2750*	SR	SR	D1	D2	D2
3000≤PWR < *3100*	*2450*≤PWR < *2600*	SR	SR	SR	D1	D1
2950 ≤PWR ≤ *3000*	*2300* ≤PWR ≤ *2450*	Norm	Norm	Norm	SR	SR
PWR < *2950*	PWR < *2300*	Norm				

There are two sets of OVRPWR values, the selection of the values are set according to the state of the Power-Shed input.
Power-Shed input open → Set values 1
Power-Shed input sort → Set values 2

12.7.6 Outdoor Coil Deicing Protection

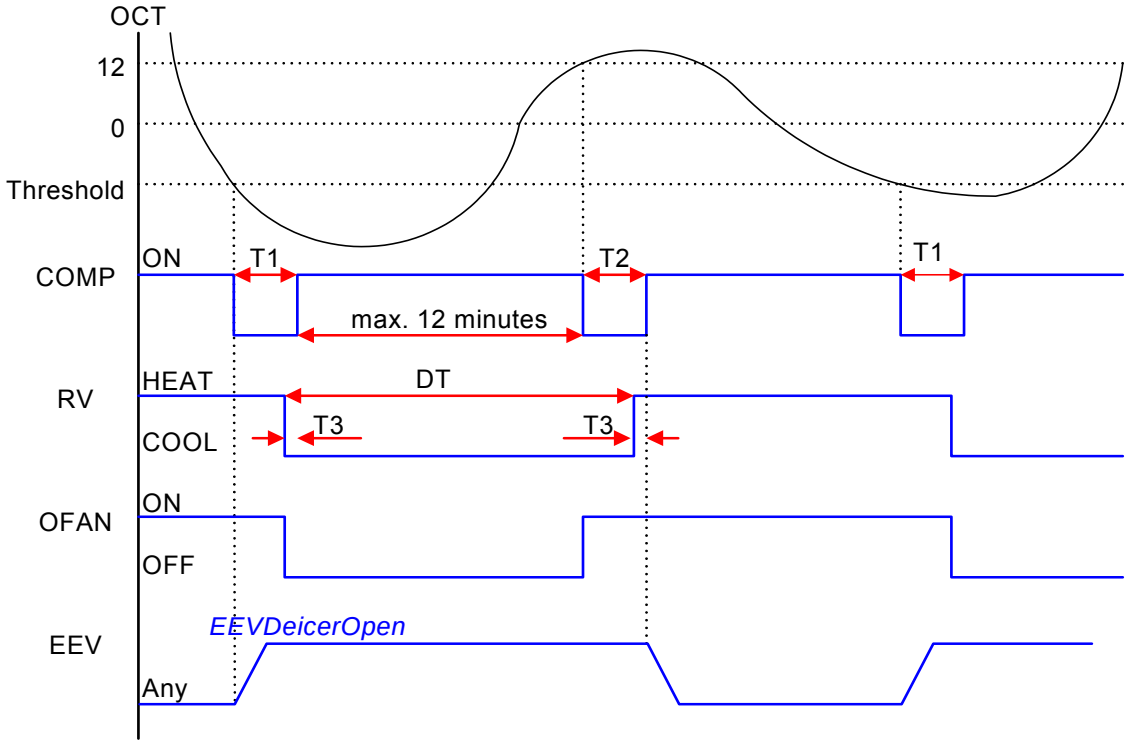
12.7.6.1 Outdoor coil Deicing Protection For GC 24/30 DCI

- **Entering Deicing 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*
Case 6: OAT is invalid AND OCT< *8* AND TLD > *DI* AND Compressor ON Time > *15* minutes
All this condition will exist during 400 seconds
OCT – Outdoor Coil Temperature
OAT – Outdoor Air Temperature
TLD – Time from Last Deicing
DI – Deicing Interval (Time Interval between Two Deicing)

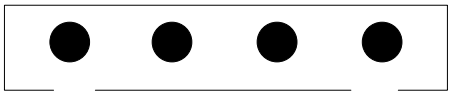
Deicing interval time when compressor is first started in heat mode, is 10 minutes if OCT < -2, and is 40 minutes in other cases.
Deicing interval time is changed (increased/ decreased in 10 minutes steps) as a function of deicing time. If deicing time is shorter then former deicing time, the deicing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

- **Deicing Operation Procedure**



T1=50 secondes;T2=36 secondes;T3=6 secondes

12.7.7 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

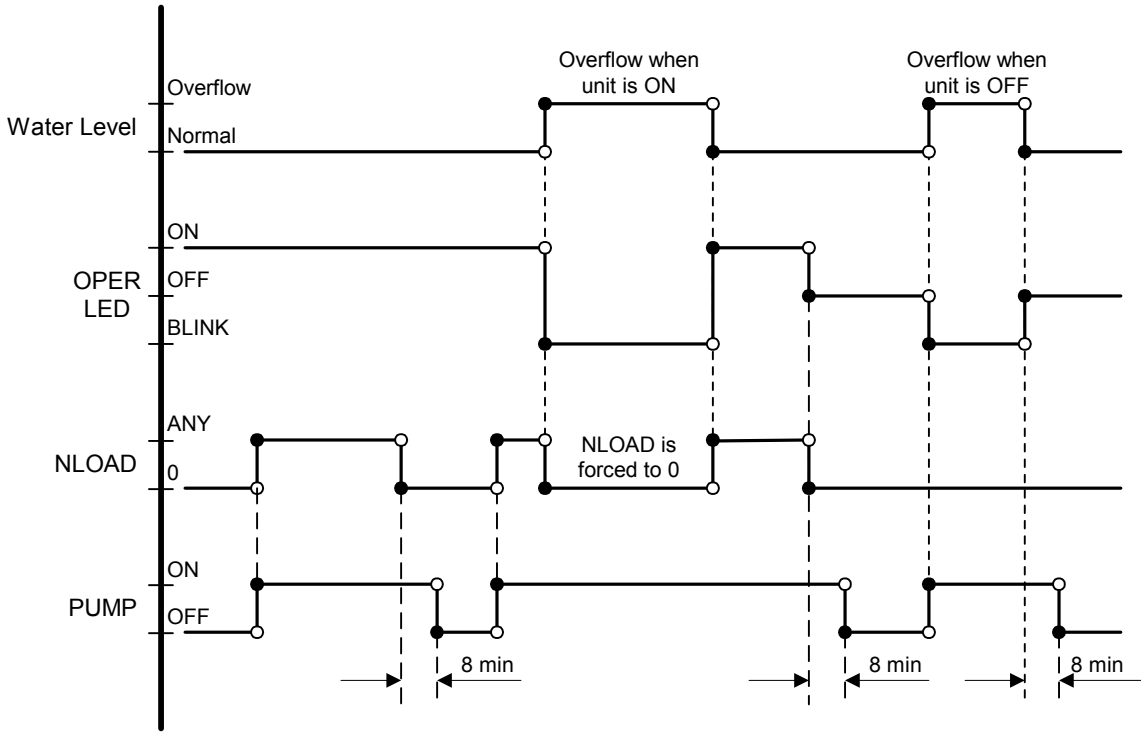
- **Water Level Protection-1 level**

P1	P2	P3	Level
Don't care	Don't care	1	Normal
Don't care	Don't care	0	Overflow

Level Connector Top View

(*) 1- Pin P1, P2, or P3 is connected to P4.

0- Pin P1, P2 or P3 is not connected to P4.



12.8 Indoor Unit Dry Contact

Indoor unit Dry contact has two alternative functions that are selected by J9.

	Function	Contact=open	Contact=short
J9=open	Presence Detector Connection	No limit	Force to STBY
J9=short	Power Shedding Function	No limit	Limit NLOAD

12.9 Operating the Unit from Mode Button

Forced operation allows to start, stop and operate in Cooling or Heating, in pre-set temperature according to the following table:

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

12.10 On Unit Controls and Indicators

12.10.1 Indoor Unit controller Controls and Indicatiors for All Models Except for Floor/Ceiling model

During OFF, Fan, Cool, Heat, Dry, and Auto modes (for operation in other modes, see at the relevant spec paragraph):

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. In long pressing system enters set up mode (if in SB).

12.10.2 Outdoor Unit controller Indicatiors

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.

12.11 Jumper Settings

12.11.1 Indoor Unit Controller

0 = Open Jumper (disconnect jumper).
1 = Close Jumper (connect jumper).
Self test Jumper – J1

OPERATION	J1
SELF-TEST	1
NORMAL	0

Compensation Jumper – J2

Model	J2 (Default)	Compensation
WNG/WNG18/WNG30/WSA	0	Activated
PXD/AC/NPXD	1	Deactivated
LS/K/KS/AS/AD/DNG/KN	1	Activated

Family selection Jumper – J3, J4 ,J5and J6

Family	J6	J5	J 4	J3
AS	0	0	0	0
AC	0	0	0	1
AD	0	0	1	0
WNG	0	0	1	1
PXD	0	1	0	0
KS	0	1	0	1
LS	0	1	1	0
K	0	1	1	1
WNG18	1	0	0	0
WNG30	1	0	0	1
Delta 50		NA		
WSA	1	0	1	1
DNG		NA		
KN	1	1	0	1
NPXD		NA		
Reserved	1	1	1	1

DNG series are defined by “family+ model”:

Family +model	Jumper setting						New family definition	Model definition
	J8	J7	J6	J5	J4	J3		
KS+A	0	0	0	1	0	1	DNG	A
LS+A	0	0	0	1	1	0	DNG	B
KS+C	1	0	0	1	0	1	DNG	C
KS+D	1	1	0	1	0	1	DNG	D

Model selection Jumper – J7, J8

Model	J8	J7
A	0	0
B	0	1
C	1	0
D	1	1

J9- Presence Detector/Power Shedding

OPERATION	J9
Presence Detector	0
Power Shedding	1

Jumper – J10

OPERATION	J10
WNG DCI LCD	0
LED	1

12.11.2 Outdoor Unit Controller

12.11.3

12.11.3.1 Outdoor Unit Controller For DCI60

JP9 Jumper Layout

Reserved *(PIN 9)*	**ODU3** *(PIN 7)*	**ODU2** *(PIN 5)*	**ODU1** *(PIN 3)*	**ODU0** *(PIN 1)*
GND *(PIN 10)*	**GND** *(PIN 8)*	**GND** *(PIN 6)*	**GND** *(PIN 4)*	**GND** *(PIN 2)*

ODU Model Selection

ODU3	ODU2	ODU1	ODU0	ODU Model
OFF	OFF	ON (PIN3 & PIN4)	ON (PIN1 & PIN2)	C (Single DCI 50)
OFF	ON (PIN5 & PIN6)	OFF	OFF	D (Single DCI 60)

12.11.3.2 Outdoor Unit Controller For GC 24/30 DCI

OFAN Jumpers

OFAN use parameters	J2	J1
Panasonic- EHD80 (ROM)	0	0
Nideq OFAN (ROM)	0	1
Shinano (ROM)	1	0
EEPROM	1	1

Compressor Jumpers

Compressor use parameters	J3
TNB220 (ROM)	0
EEPROM	1

12.12 Test Mode

12.12.1 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/–2), Outdoor temperature = 35(+2/-1)
Or
Mode = Heat, Set point = 30, Room temperature = 20±1, Outdoor temperature = 7±(+1/-2)
Manually when entering diagnostics with the following settings:
Mode = Cool, Set point = 16
Mode = Heat, Set point = 30

12.12.2 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
Turbo	Nominal Capacity Setting
Auto	Maximum Capacity Setting

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

12.13 SW Parameters

12.13.1 Indoor Units SW Parameters

Model dependent parameters

	A (KN-60)	B (KN-72)	C (KN-80)
Cap .Group	3	4	4
NomLoadC	81	61	67
NomLoadH	77	59	67
MaxNLOADIF1C	55	50	85
MaxNLOADIF2C	70	85	102
MaxNLOADIF3C	127	120	120
MaxNLOADIF4C	127	127	127
MaxNLOADIF5C	127	127	127
MinRTC	20	20	20
MaxNLOADRTC	127	127	127
MaxNLOADIF1H	127	127	127
MaxNLOADIF2H	127	127	127
MaxNLOADIF3H	127	127	127
MaxNLOADIF4H	127	127	127
MaxNLOADIF5H	127	127	127
MaxNLOADRTH	127	127	127
MaxRTH	27	27	27
MaxNLOADPSC	81	61	67
MaxNLOADPSH	77	59	67

12.13.2 Outdoor Units SW Parameters

Model dependent parameters for GC 24/30 DCI

Compressor Parameters	Value
MinOFFTime	3
MinOnTime	3
MaxCTT1	90
MaxCTT2	90
MinSpeedAsCTT1	26
MinSpeedAsCTT2	26
MaxSpeedC	75
MaxSpeedH	95
Step1RPS	40
Step2RPS	60
Step3RPS	75
NormAcc (sec/RPS)	1
NormDec (sec/RPS)	1
Down1(Sec/RPS)	12
Down2 (Sec/RPS)	7
DeiceAcc (Sec/RPS)	0.2
DeiceDec (Sec/RPS)	0.5

EEV Parameters	Value
NormEEVRate	30
EEVCompOFFOpen	200
EEVCompOFFTime	60
EEVMaxOpen	500
EEVMinOperOpenC	60
EEVMaxOperOpenC	500
EEVMinOperOpenH	70
EEVMaxOperOpenH	500
EEVMinOperOpenHInIDU	60
EEVMaxOperOpenHInIDU	140
EEVIDUOFFOpen	130
EEVMoveSteps	20
EEVTConstC	30
EEVTConstH	30
BlncTimTrnsStC	1
BlncTimStdyStC	1
BlncTimTrnsStH	1
BlncTimStdyStH	1
CompOffTimToTrnsSt	20

13. 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 13.6 below.

ATTENTION : check for broken or loose cable lugs first.

13.1 Single Split System failures and Corrective Actions

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1	Power supply indicator (Red LED) does not light up.	No power supply	Check power supply. If power supply is OK, check display and display wiring. if OK, replace controller.
2	Unit does not respond to remote control message	Remote control message not reached the indoor unit	Check remote control batteries, if batteries are OK, check display and display wiring, if OK, replace display PCB. If still not OK replace controller.
3	Unit responds to remote control message but Operate indicator (Green LED) does not light up	Problem with display PCB	Replace display PCB. If still not OK replace controller.
4	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.
		Problem with PCB or capacitor	Change to high speed and Check power supply to motor is higher than 130VAC (for triack controlled motor) or higher than 220VAC for fixed speed motors, if OK replace capacitor, if not OK replace controller

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
5	Indoor fan works when unit is OFF, and indoor fan speed is not changed by remote control command.	PCB problem	Replace controller
6	Compressor does not start	Electronics control problem or protection	Perform diagnostics (See 13.3 below), and follow the actions described.
7	Compressor stops during operation and Green LED remains on	Electronic control or power supply problem	Perform diagnostics (See 13.3 below), and follow the actions described.
8	Compressor is on but outdoor fan does not work	Problem with outdoor electronics or outdoor fan	Check outdoor fan motor according to the procedure in section 13.5.3 below, if not OK replace controller
9	Unit works in wrong mode (cool instead of heat or heat instead of cool)	Electronics or power connection to RV	Check RV power connections, if OK, Check RV operation with direct 230VAC power supply, if OK, Replace outdoor controller.
10	All components are operating properly but no cooling or no heating	Refrigerant leak	Check refrigeration system.
11	Compressor is over heated and unit does not generate capacity	EEV problem	Check EEV
12	Units goes into protections and compressor is stopped with no clear reason	Control problem or refrigeration system problem	Perform diagnostics (See 13.3 below), and follow the actions described.
13	Compressor motor is generating noise and no suction occurs	Phase order to compressor is wrong	Check compressor phase order.
14	Water leakage from indoor unit	Indoor unit drainage tube is blocked	Check and open drainage tube.
15	Freezing of outdoor unit in heat mode and outdoor unit base is blocked with ice		Connect base heater.

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
16	Unit operates with wrong fan speeds or wrong frequency	Wrong jumper settings	Perform diagnostics (See 13.3 below), and check if units is operating by EEPROM parameters.

13.2 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 unit to Cool/16 degrees/High indoor fan speed, or Heat/30 degrees/High indoor fan speed, and enter diagnostics.

13.3 Judgment by Indoor/Outdoor Unit Diagnostics

Enter diagnostics mode - press for five seconds Mode button in any operation mode. Acknowledgment is by 3 short beeps and lights of COOL and HEAT LED's. Then, every short pressing of Mode button will scroll between Indoor and Outdoor unit diagnostic modes by the acknowledgment of 3 short beeps and lighting of COOL and HEAT LED's.

During the Outdoor unit diagnostics all four Indoor LED's (STBY, Operate, Filter and Timer) are blinking. When Indoor diagnostics is displayed, all four LED's (STBY, Operate, Filter and Timer) are ON.

When system enters diagnostics mode, only one fault code is shown. Order of priority is from the lower to the higher number. Diagnostics is continuously ON as long as power is ON. The current system operation mode will not be changed.
If no fault occurred in the system, no fault code will be displayed during normal operation mode. The last fault code will be displayed even if the system has recovered from that fault. The last fault will be deleted from the EEPROM after the system has exit diagnostics mode.

In diagnostics mode, system fault / status will be indicated by blinking of Heat & Cool LEDs. The coding method will be as follows:
Heat LED will blink 5 times in 5 seconds, and then will be shut off for the next 5 seconds. Cool LED will blink during the same 5 seconds according to the following Indoor / Outdoor unit tables:
Note: 0 – OFF, 1-ON

13.3.1 Indoor Unit Diagnostics

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	Reserved	0	0	1	0	1
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
…	Reserved					
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					
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
28	Model A	1	1	1	0	0
29	Model B	1	1	1	0	1
30	Model C	1	1	1	1	0
31	Model D	1	1	1	1	1

13.3.2 Indoor Unit Diagnostics and Corrective Actions

No.	Fault	Probable Cause	Corrective Action
1	Sensor failures of all types		Check sensor connections or replace sensor
2	Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
3	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
4	No Encoder	Indoor electronics or motor	Check motor wiring, if ok, replace motor, if still not ok, replace Indoor controller.
5	Outdoor Unit Fault	Outdoor controller problem	Switch to Outdoor diagnostics.
6	EEPROM Not Updated	System is using ROM parameters and not EEPROM parameters	No action, unless special parameters are required for unit operation.
7	Bad EEPROM		No action, unless special parameters are required for unit operation.
8	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding
9	Using EEPROM data	No problem. System is using EEPRRRROM parameters	
10	The power supply indicator (red led) doesn't light up.	There is no correct voltage between the line and neutral terminals on main P.C.B.	-If the voltage is low repair power supply. -If there is no voltage repair general wiring. -If there is correct voltage replace main or display P.C.B'S
11	The operating indicator (green led) does not light up.	The remote control batteries are discharged	-Replace batteries of the remote control
12	The operating indicator (green led) does not light up when starting from unit..	Check main P.C.B and display P.C.B.	-Replace P.C.B if necessary.

13	The indoor fan does not function correctly.	Check the voltage between indoor fan terminals on the main P.C.B	- If there is voltage replace capacitor or motor.
14	The outdoor fan does not function correctly.	Check the voltage between indoor fan terminals on the main P.C.B. There is voltage between outdoor fan terminals on the outdoor unit. There is no voltage between outdoor fan terminals on the outdoor unit.	- If there is no voltage replace main P.C.B - Replace capacitor or motor. - Check and repair electrical wiring between indoor and outdoor units.
15	The compressor does not start up.	Check voltage on compressor terminals on the outdoor unit. (with ampmeter) Check if there is correct voltage between compressor terminals on the outdoor unit.	-If no voltage replace main P.C.B. - If low voltage repair power supply. -If the voltage corrrect replace capacitor or compressor. -If there is no voltage repair electrical wiring between indoor and outdoor units.
16	The refrigeration system does not function correctly.	Check for leaks or restrictions, with ampmeter, pressure guage or surface thermometer.	- Repair refrigeration system and charge refrigerant if necessary.
17	No cooling or heating only indoor fan works.	Outdoor fan motor faulty or other fault caused, compresssor overload protection cut out.	-Replace P.C.B. - Outdoor fan blocked remove obstructions.
18	Only indoor fan and compressor working.	Outdoor fan blocked.	- Remove obstructions.
19	Only indoor fan working.	-Run capacitor of outdoor fan motor faulty. -Windings of outdoor fan are shorted.	- Replace capacitor. -Replace motor.

20	No cooling or heating takes place, indoor and outdoor fans working.	- Overload safety device on compressor is cut out (low voltage or high temperature) - Compressor run capacitor faulty. - Compressor windings are shorted.	- Check for proper voltage, switch off power and try again after one hour. - Replace compressor capacitor. - Replace compressor.
21	No air supply at indoor unit, compressor operates.	-Indoor fan motor is blocked or turns slowly. -indoor fan run capacitor faulty. - motor windings are shorted.	- Check voltage,repair wiring if necessary. -Check fan wheel if it is tight enough on motor shaft,tighten if necessary. -Replace indoor fan motor.

22	Partial, limited air supply at indoor indoor unit.	Lack of refrigerant (will accompanied by whisteling noise) cause ice formation on indoor unit coil in cooling mode.	-Charge the unit after localizing leak.
23	Water accumulates and overflow from indoor unit section.	Drain tube or spout of drain pan clogged.	-Disasemble plastic drain tube from spout of indoor unit drain pan.
24	Water dripping from outdoor unit base. (in heating mode)	Water drain outlet is clogged.	-Open outdoor unit cover clean out water outlet ,clean the base inside througly.
25	Freeze-up of outdoor coil in heating mode, poor heating effect in room, indoor fan operates.	-Faulty outdoor thermistor. -Faulty control cable. - Outdoor temperature is too low (below -2°C) -Outdoor unit air outlet is blocked.	-Replace thermistor. - Repair control cable. - Shut unit off, outdoor temp. is below design conditions and cannot function properly. -Remove obstructions.

13.3.3 Outdoor Unit Diagnostics

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 Fault	0	1	0	1	1
12	Bad 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	Reserved	1	0	0	1	0
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
24	No OFAN Feedback	1	1	0	0	0
25	OFAN locked	1	1	0	0	1
26	Compressor Lock	1	1	0	1	0
27	Bad Communication	1	1	0	1	1

13.3.4 Outdoor Unit Diagnostics and Corrective Actions

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

13.4 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.

13.5 Simple procedures for checking the Main Parts

13.5.1 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).

13.5.2 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.

13.5.3 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

13.5.4 Checking the Compressor.

The compressor is brushless permanence magnetic DC motor. Three coil resistance is same. Check the resistance between three poles. The normal value should be below 0.5 ohm (TBD).

13.5.5 Checking the Reverse Valve (RV).

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

13.5.6 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.

13.6 Precaution, Advise and Notice Items

13.6.1 High voltage in Outdoor unit controller.

Whole controller, including the wires that are 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.

13.6.2 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 four minutes after power is off. Touching the Outdoor unit controller before discharging may cause an electrical shock.

13.6.3 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.