

# Airwell

# Service Manual

## HAF Series

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Indoor Units	Outdoor Units
<i>HAF 18</i>	<i>YAF018</i>
<i>HAF 24</i>	<i>GCN 24</i>



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**REFRIGERANT**

**R410A**

**COOLING ONLY**

**HEAT PUMP**

SM HAFRPM 2-A.1 GB

**FEBRUARY - 2010**

**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.

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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 HAF series is split wall mounted type indoor unit.

It has innovative flat design with background display.

The models as below:

**HAF 18**

**HAF 24**

### 1.2 Main Features

The **HAF** series benefits from the most advanced technological innovations, namely:

- R410A refrigerant
- Micro processor control.
- Innovative flat panel.
- Background display.
- Fresh air system as an option.
- Refrigerant pipes can be connected to the indoor unit from 4 different optional directions.
- Easy installation and service.

### 1.3 Indoor Unit

The indoor unit is wall mounted, and can be easily fitted to many types of residential and commercial applications.

It includes:

- Casing with air inlet and outlet grills.
- A large-diameter tangential fan.
- Bended coil with treated aluminum fins.
- Advanced electronic control box assembly.
- Interconnecting wiring terminal block.
- Mounting plate.

### 1.4 Control

The microprocessor indoor controller, and an infrared remote control, supplied as standard, provide complete operating function and programming. For further details please refer to the Operation Manual, Appendix A.

### 1.5 Outdoor Unit

The **HAF** 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.

It includes :

- Compressor mounted in a soundproofed compartment.
- Axial fan.
- Outdoor coil with hydrophilic louver fins for RC units.
- Outlet air fan grill.
- Service valves ” flare” type connection.
- Interconnecting wiring terminal block.
- Fresh air motor for HAF(optional).

### 1.6 Tubing Connections

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


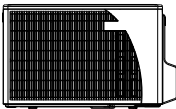
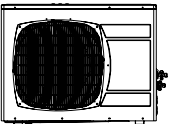
### 1.7 Accessories

Remote Control

### 1.8 Inbox Documentation

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

### 1.9 Matching Table

OUTDOOR UNITS			INDOOR UNIT	
				
OUTLINE	MODEL	REFRIGER.	HAF 18	HAF 24
	YAF018	R410A	√	
	GCN 24	R410A		√

## 2. PRODUCT DATA SHEET

### 2.1 HAF 18 | YAF018

Model Indoor Unit			HAF 18		
Model Outdoor Unit			YAF018		
Installation Method of Pipe			Flared		
Characteristics		Units	Cooling Only	Cooling	Heating
Capacity <sup>(4)</sup>		Btu/hr	17880	17880	18080
		kW	5.24	5.24	5.30
Power input <sup>(4)</sup>		kW	1.63	1.63	1.46
EER (Cooling) or COP(Heating) <sup>(4)</sup>		W/W	3.22	3.22	3.62
Energy efficiency class			A	A	A
Power supply		V	220-240		
		Ph	1		
		Hz	50		
Rated current		A	7.5	7.5	6.7
Power factor			0.95	0.95	0.95
Prated (IDU)		W	49		
Prated (IDU+ODU)		W	2150		
Starting current		A	32		
Circuit breaker rating		A	15		
INDOOR	Fan type & quantity		Centrifugal x 1		
	Fan speeds	H/M/L	RPM	1200/1100/1000	
	Air flow <sup>(1)</sup>	H/M/L	m3/hr	890/800/700	
	External static pressure	Min	Pa	0	
	Sound power level <sup>(2)</sup>	H/M/L	dB(A)	57/54/52	
	Sound pressure level <sup>(3)</sup>	H/M/L	dB(A)	44/41/38	
	Moisture removal		l/hr	2	
	Condensate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	1060X295X221	
	Net Weight		kg	14	
	Package dimensions	WxHxD	mm	1125X360X295	
	Packaged weight		kg	17	
	Units per pallet		units	14	
	Stacking height		units	7	
	OUTDOOR	Refrigerant control		Capillary tube	
Compressor type,model		Rotary,TOSHIBA PA200X2CS-4KT1			
Fan type & quantity		Propeller(direct) x 1			
Fan speeds		H	RPM	910	
Air flow		H	m3/hr	2160	
Sound power level		H	dB(A)	64	65
Sound pressure level <sup>(3)</sup>		H	dB(A)	53	54
Dimensions		WxHxD	mm	795X610X290	
Net Weight			kg	42	43
Package dimensions		WxHxD	mm	970X650X394	
Packaged weight			kg	45	46
Units per pallet			Units	9	
Stacking height			units	3	
Refrigerant type				R410A	
Standard charge			kg(7.5m)	1.42	
Additional charge			4m=£Lin=S10m:+0g 10m<Lin^15m:+150g		
Connections between units	Liquid line	In.(mm)	1/4"(6.35)		
	Suction line	In.(mm)	1/2"(12.7)		
	Max.tubing length	m.	15		
	Max.height difference	m.	7		
Operation control type			Remote control		
Heating elements (Option)		kW	N/A		
Others					

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

(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 HAF 24 | GCN 24

Model Indoor Unit		HAF 24		
Model Outdoor Unit		GCN 24		
Installation Method of Pipe		Flared		
Characteristics	Units	Cooling Only	Cooling	Heating
Capacity <sup>(4)</sup>	Btu/hr	23100	23100	22840
	kW	6.77	6.77	6.70
Power input <sup>(4)</sup>	kW	2.12	2.12	2.09
EER (Cooling) or COP(Heating) <sup>(4)</sup>	W/W	3.20	3.20	3.20
Energy efficiency class		B	B	D
Power supply	V	220-240		
	Ph	1		
	Hz	50		
Rated current	A	9.7	9.7	9.6
Power factor		0.95	0.95	0.95
Prated (IDU)	W	58		
Prated (IDU+ODU)	W	3100		
Starting current	A	62		
Circuit breaker rating	A	15		
INDOOR	Fan type & quantity		Centrifugal x 1	
	Fan speeds	H/M/L	RPM	1300/1200/1100
	Air flow <sup>(1)</sup>	H/M/L	m3/hr	910/820/740
	External static pressure	Min	Pa	0
	Sound power level <sup>(2)</sup>	H/M/L	dB(A)	60/57/55
	Sound pressure level <sup>(3)</sup>	H/M/L	dB(A)	47/44/42
	Moisture removal		l/hr	2.40
	Condensate drain tube I.D		mm	16
	Dimensions	WxHxD	mm	1060X295X221
	Net Weight		kg	15
	Package dimensions	WxHxD	mm	1125X360X295
	Packaged weight		kg	18
	Units per pallet		units	16
	Stacking height		units	8
	OUTDOOR	Refrigerant control		Capillary tube
Compressor type,model		Rotary		
Fan type & quantity		Propeller(direct) x 1		
Fan speeds		H	RPM	850
Air flow		H	m3/hr	3100
Sound power level		H	dB(A)	67
Sound pressure level <sup>(3)</sup>		H	dB(A)	59
Dimensions		WxHxD	mm	900X680X340
Net Weight			kg	78
Package dimensions		WxHxD	mm	985X730X435
Packaged weight			kg	82
Units per pallet			Units	6
Stacking height			units	2
Refrigerant type		R410A		
Standard charge		kg(7.5m)	1.9	
Additional charge		4m=£Lengths£10m: +0g; 10m<Lengths£15m: +255g		
Connections between uniit		Liquid line	In.(mm)	3/8"
	Suction line	In.(mm)	5/8"	
	Max.tubing length	m.	15	
	Max.height difference	m.	7	
Operation control type		Remote control		
Heating elements (Option)		kW	N/A	
Others				

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

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

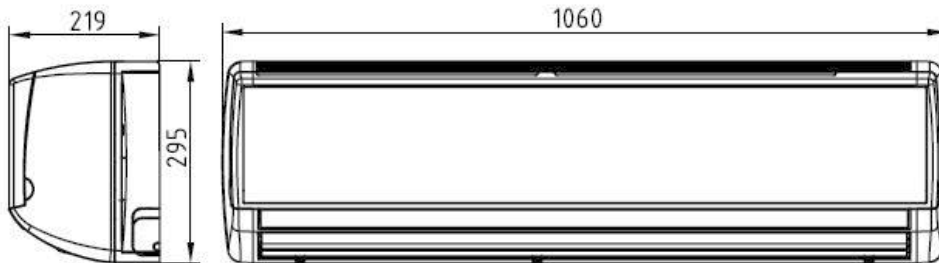
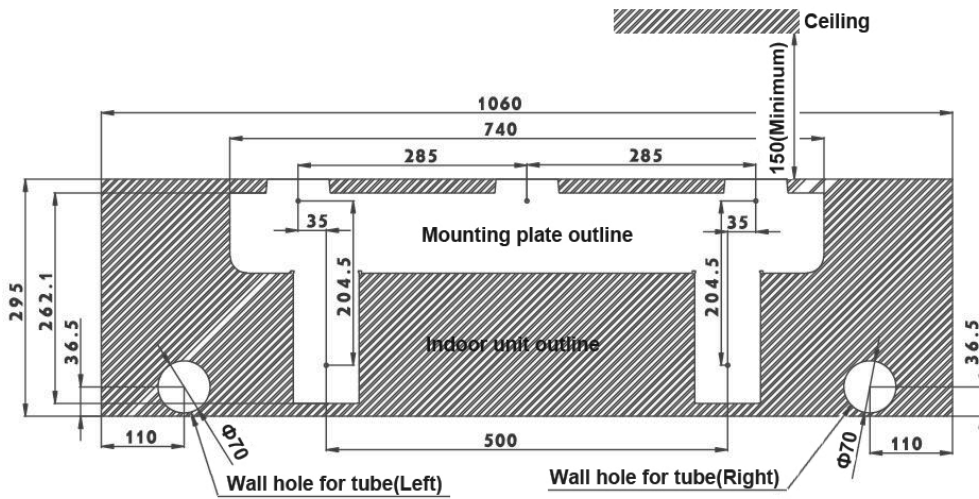
##### 3.1.1 R410A

		Indoor	Outdoor
<b>Cooling</b>	Upper limit	32°C DB 23°C WB	46°C DB
	Lower limit	21°C DB 15°C WB	10°C DB
<b>Heating</b>	Upper limit	27°C DB	24°C DB 18°C WB
	Lower limit	10°C DB	-15°C DB -10°C WB
<b>Voltage</b>		198 – 264 V	

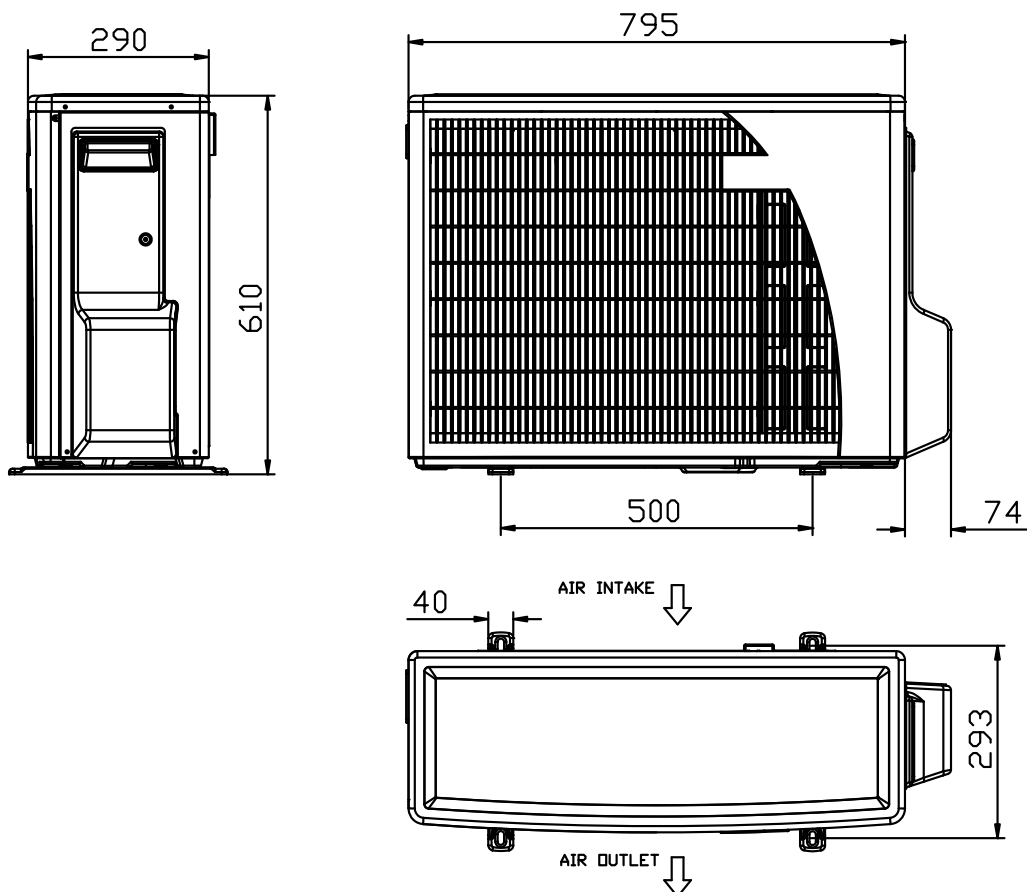


## 4. OUTLINE DIMENSIONS

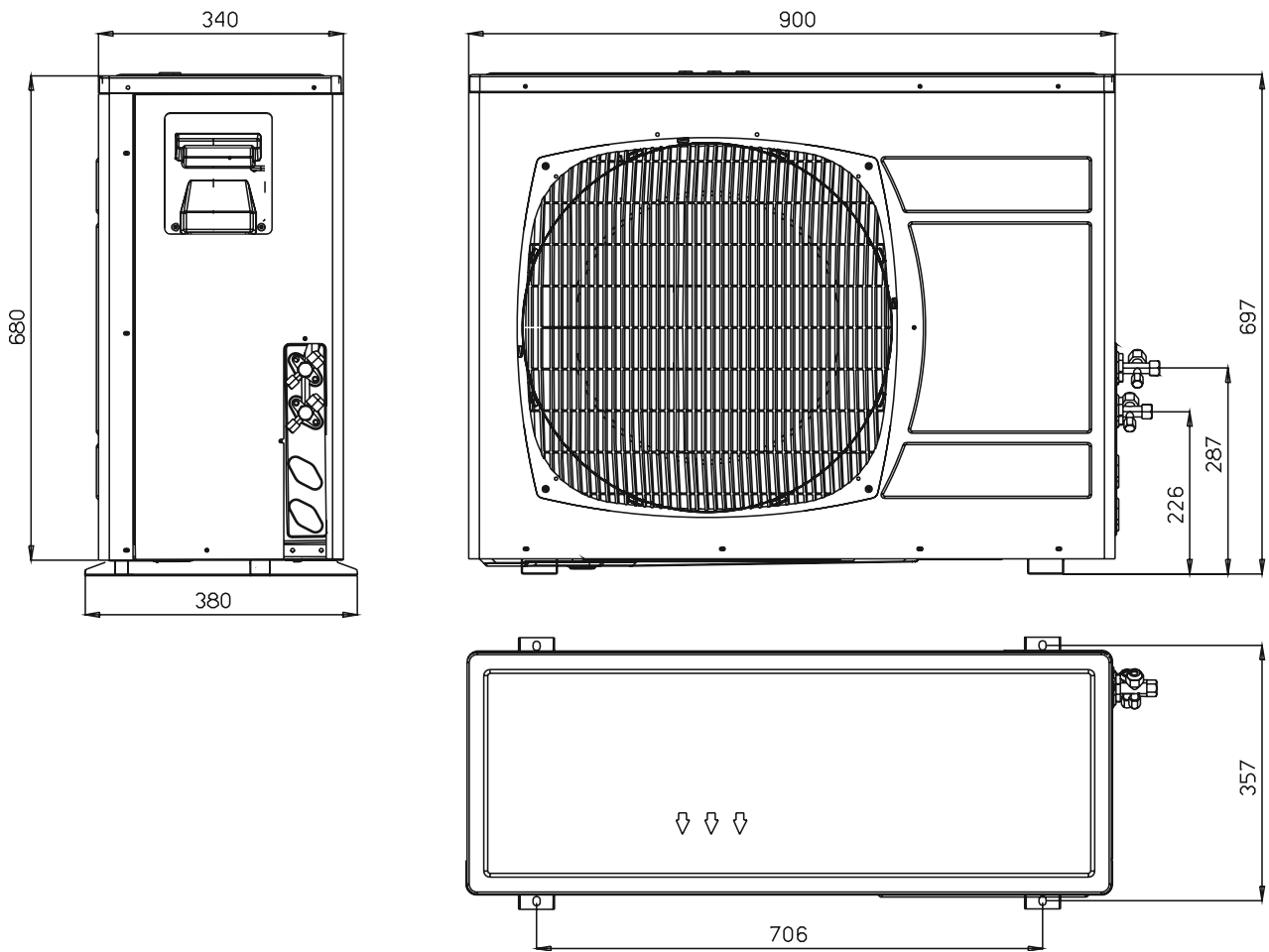
### 4.1 Indoor Unit: HAF 18, HAF 24



### 4.2 Outdoor Unit: YAF018



**4.3 Outdoor Unit: GCN 24**



## 5. PERFORMANCE DATA & PRESSURE CURVES

### 5.1 HAF 18 / YAF018

#### 5.1.1 Cooling Mode at 7.5m Tubing Connection.

230V : Indoor Fan at High Speed.

ENTERING AIR DB OD Coil(°C)	Data	ENTERING AIR WB/DB ID Coil(°C)				
		15/21	17/24	19/27	21/29	23/32
15 <sup>(1)</sup>	TC	5.34	5.66	5.92	6.18	6.39
	SC	3.83	4.06	4.27	4.18	4.25
	PI	1.16	1.16	1.16	1.17	1.17
20 <sup>(1)</sup>	TC	5.29	5.61	5.87	6.13	6.34
	SC	3.77	4.01	4.24	4.11	4.20
	PI	1.25	1.26	1.26	1.27	1.27
25	TC	5.08	5.45	5.76	6.03	6.24
	SC	3.72	3.98	4.21	4.14	4.24
	PI	1.35	1.36	1.37	1.38	1.39
30	TC	4.77	5.14	5.55	5.76	5.97
	SC	3.53	3.81	4.12	4.04	4.20
	PI	1.46	1.48	1.50	1.51	1.51
35	TC	4.40	4.77	5.24	5.50	5.71
	SC	3.33	3.62	3.96	3.91	4.07
	PI	1.58	1.60	1.63	1.64	1.65
40	TC	3.98	4.35	4.82	5.08	5.29
	SC	3.09	3.40	3.74	3.68	3.86
	PI	1.70	1.73	1.76	1.78	1.79
46	TC	3.46	3.83	4.30	4.56	4.77
	SC	2.81	3.12	3.51	3.44	3.60
	PI	1.87	1.90	1.93	1.96	1.98

#### 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

(1) Marked area is below standard operating limits. For operating in low ambient conditions, an A.S.K Kit is required.

**5.1.2 Heating**

ENTERING WB OD COIL(°C)	ENTERING AIR DB ID COIL(°c)					
	15		20		25	
	TH	PI	TH	PI	TH	PI
-10	2.78	1.17	2.68	1.24	2.57	1.31
-7	2.99	1.20	2.89	1.26	2.78	1.33
-2	3.18	1.21	3.07	1.28	2.97	1.36
2	3.87	1.27	3.71	1.35	3.55	1.43
6	5.46	1.37	<b>5.30</b>	<b>1.46</b>	5.11	1.55
10	5.94	1.44	5.78	1.54	5.62	1.65
15	6.41	1.50	6.25	1.62	6.10	1.72
20	6.76	1.55	6.60	1.68	6.41	1.81

**LEGEND**

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

**5.1.3 Capacity Correction Factor Due to Tubing Length**

**Cooling**

TOTAL TUBING LENGTH								
3m	7.5m	10m	15m	20m	25m	30m	40m	50m
1.02	<b>1</b>	0.98	0.97	---	---	---	---	---

\* Minimum recommended tubing length between indoor and outdoor units is 3m.

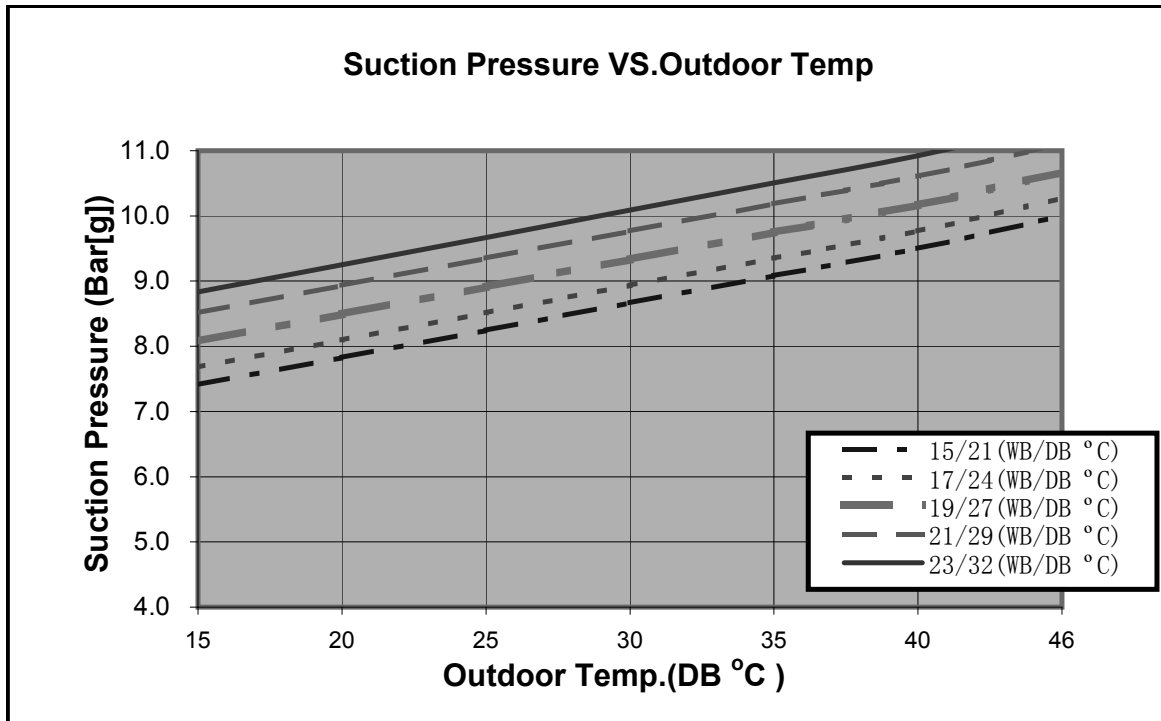
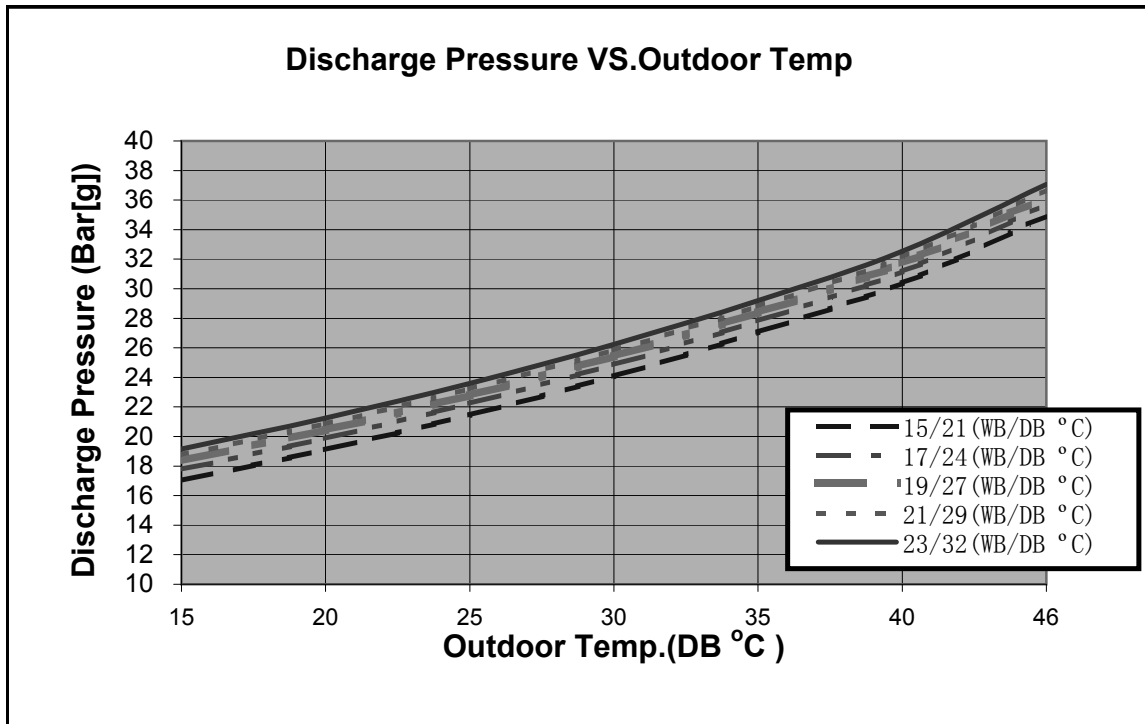
**Heating**

TOTAL TUBING LENGTH								
3m	7.5m	10m	15m	20m	25m	30m	40m	50m
1.03	<b>1</b>	0.99	0.98	---	---	---	---	---

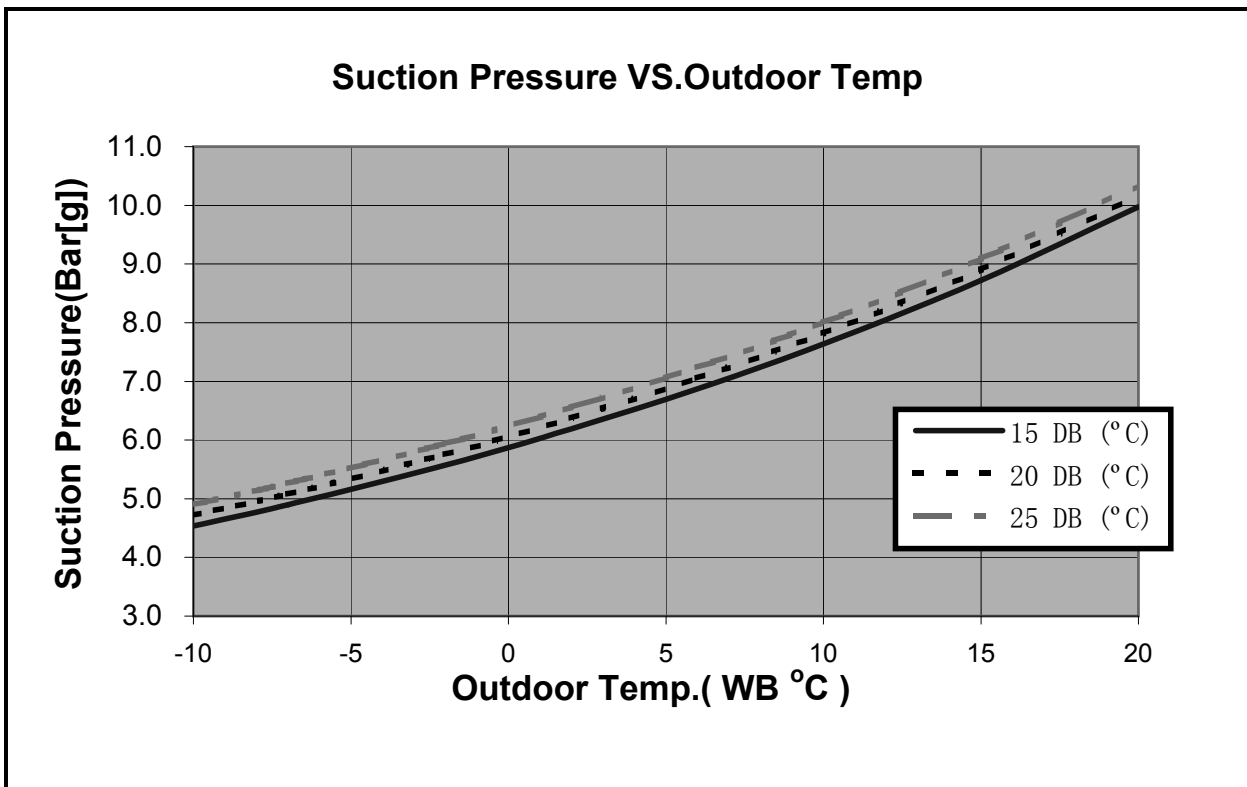
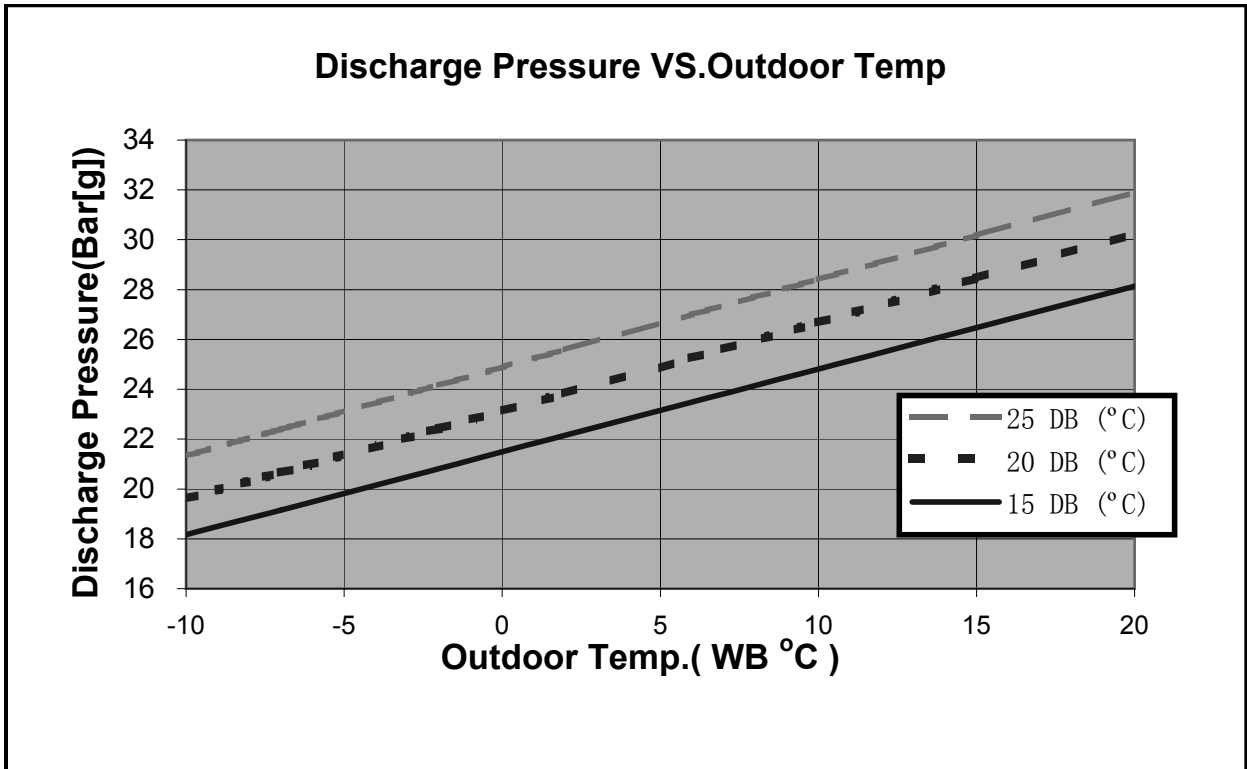
\* Minimum recommended tubing length between indoor and outdoor units is 3m.

5.2 Model: HAF 18 / YAF018

5.2.1 Cooling

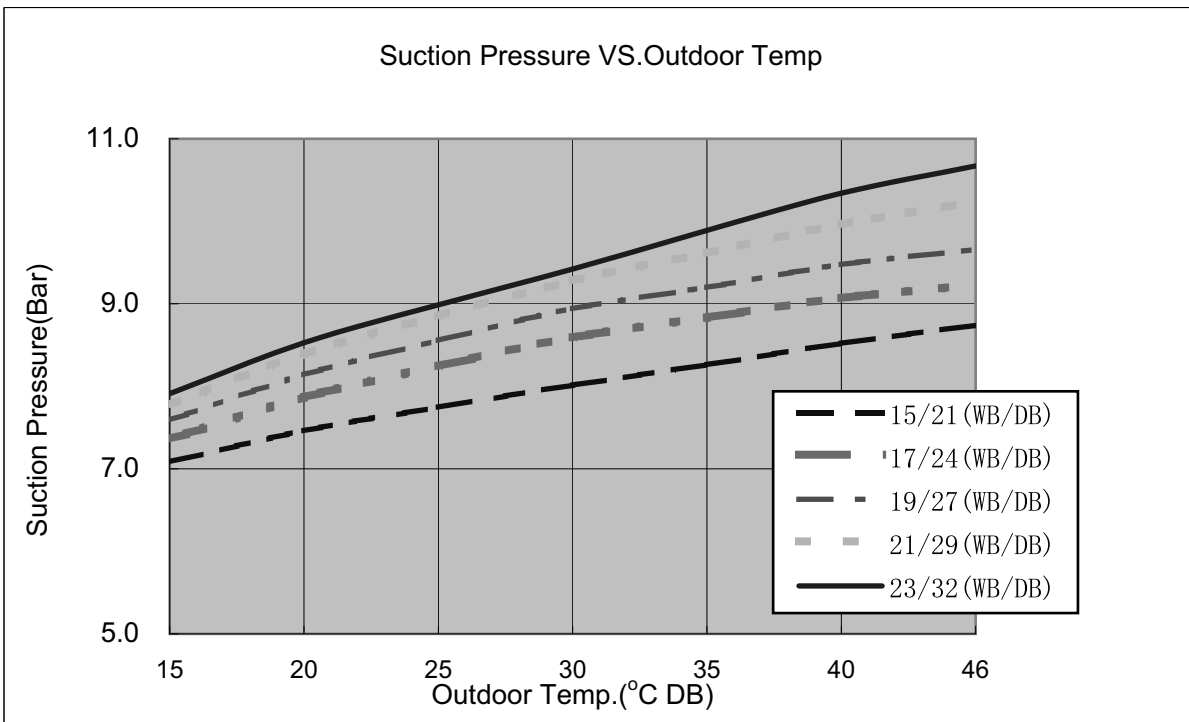
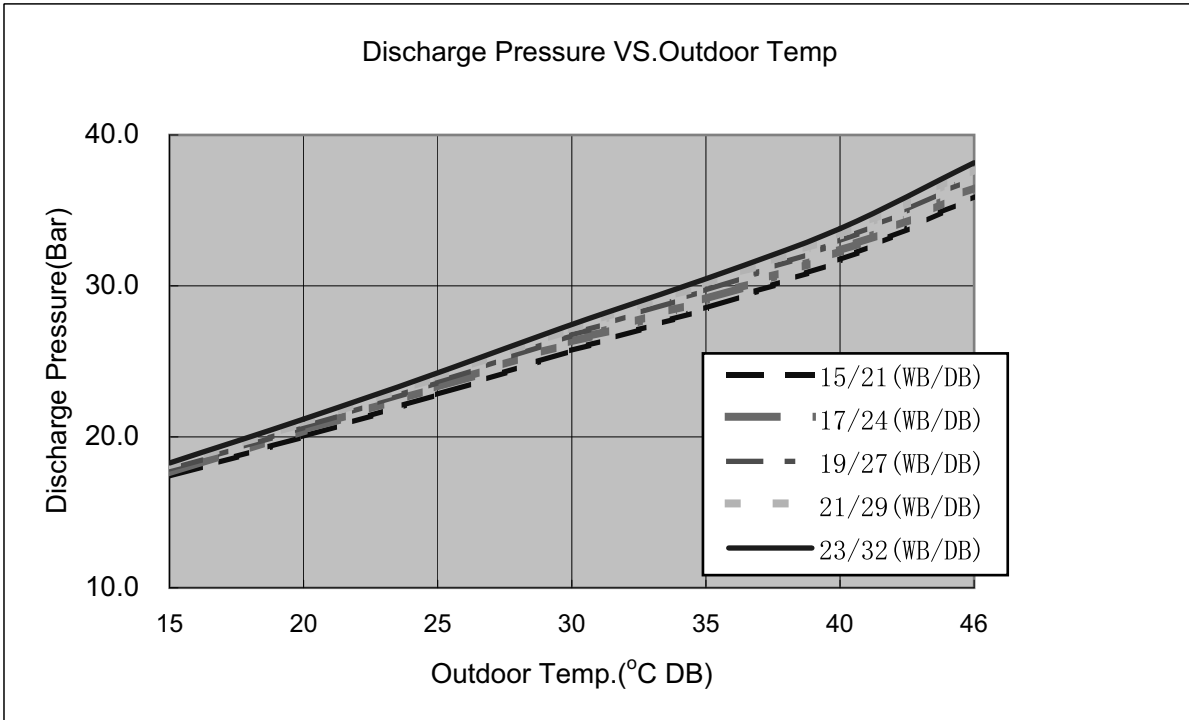


5.2.2 Heating

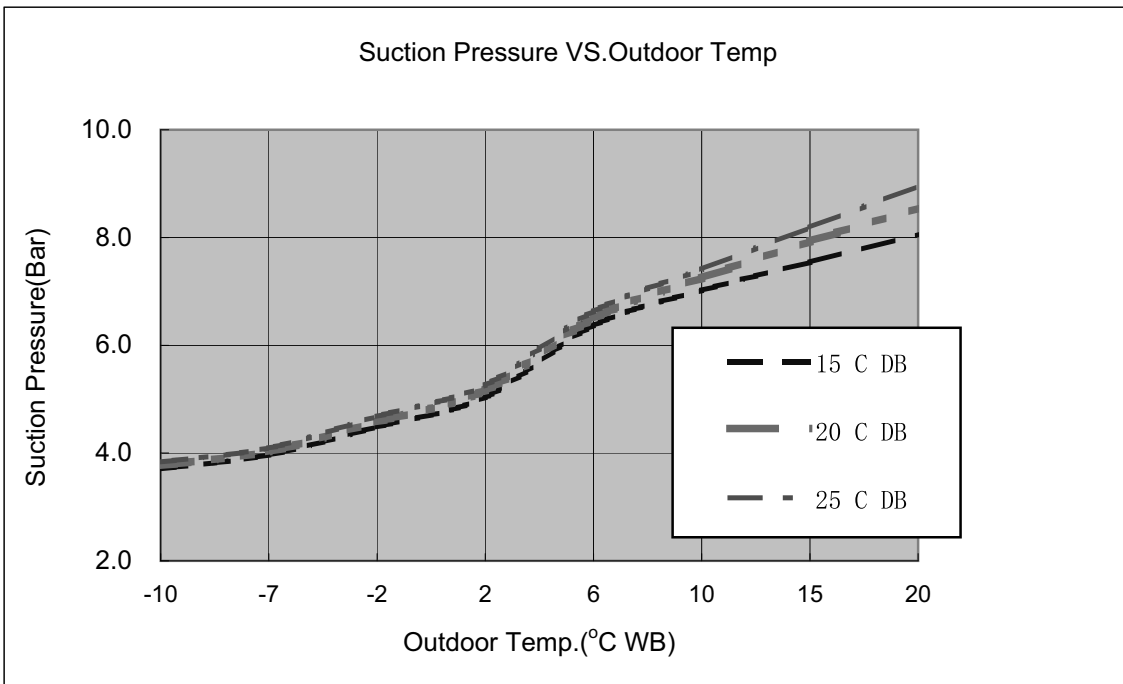
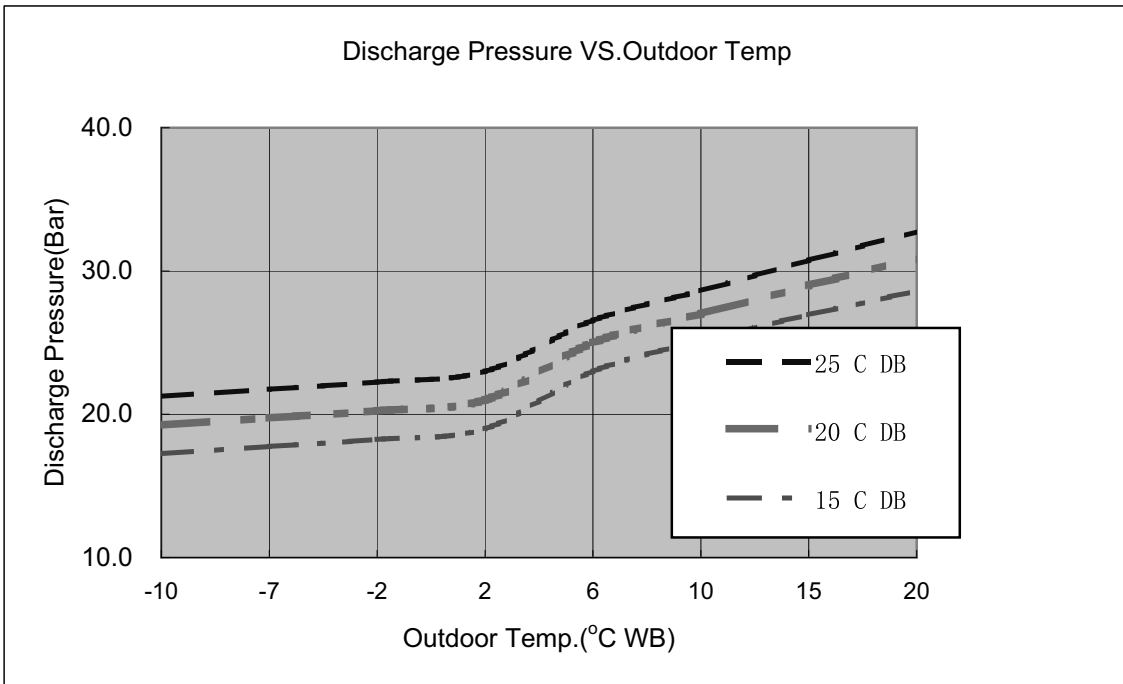


**5.3 PRESSURE CURVES**

**5.3.1 Model: HAF 18 / YAF018 =>Cooling**



**5.3.2 Model: HAF 18 / YAF018 =>Heating**





## 5.4 HAF 24 / GCN 24

### 5.4.1 Cooling Mode at 7.5m Tubing Connection.

230V : Indoor Fan at High Speed.

ENTERING AIR DB OD Coil(°C)	Data	ENTERING AIR WB/DB ID Coil(°C)				
		15/21	17/24	19/27	21/29	23/32
15 <sup>(1)</sup>	TC	7.14	7.39	7.57	7.74	7.86
	SC	4.72	4.92	5.11	5.24	5.34
	PI	1.50	1.51	1.51	1.51	1.52
20 <sup>(1)</sup>	TC	6.90	7.28	7.51	7.68	7.85
	SC	4.63	4.88	5.08	5.23	5.32
	PI	1.63	1.64	1.64	1.65	1.65
25	TC	6.53	7.05	7.42	7.64	7.83
	SC	4.51	4.78	5.04	5.19	5.29
	PI	1.76	1.78	1.79	1.80	1.81
30	TC	6.11	6.65	7.19	7.44	7.66
	SC	4.37	4.64	4.93	5.08	5.17
	PI	1.90	1.93	1.95	1.96	1.98
35	TC	5.66	6.14	<b>6.77</b>	7.11	7.45
	SC	4.15	4.45	<b>4.82</b>	4.96	5.06
	PI	2.05	2.09	<b>2.12</b>	2.14	2.15
40	TC	5.14	5.60	6.11	6.68	7.02
	SC	3.91	4.21	4.56	4.70	4.80
	PI	2.21	2.25	2.29	2.31	2.34
46	TC	4.46	4.88	5.37	5.93	6.39
	SC	3.60	3.86	4.16	4.30	4.40
	PI	2.42	2.45	2.51	2.55	2.57

### 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

(1) Marked area is below standard operating limits. For operating in low ambient conditions, an A.S.K Kit is required.

**5.4.2 Heating**

ENTERING WB OD COIL(°C)	ENTERING AIR DB ID COIL(°C)					
	15		20		25	
	TH	PI	TH	PI	TH	PI
-10	3.52	1.67	3.38	1.78	3.25	1.87
-7	3.79	1.71	3.65	1.81	3.52	1.91
-2	4.02	1.73	3.89	1.84	3.75	1.94
2	4.89	1.82	4.69	1.93	4.49	2.05
6	6.90	1.95	<b>6.70</b>	<b>2.09</b>	6.47	2.22
10	7.50	2.06	7.30	2.20	7.10	2.36
15	8.11	2.15	7.91	2.32	7.71	2.47
20	8.54	2.22	8.34	2.40	8.11	2.59

**LEGEND**

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

**5.4.3 Capacity Correction Factor Due to Tubing Length**

**Cooling**

TOTAL TUBING LENGTH								
3m	7.5m	10m	15m	20m	25m	30m	40m	50m
1.02	1	0.98	0.95	---	---	---	---	---

\* Minimum recommended tubing length between indoor and outdoor units is 3m.

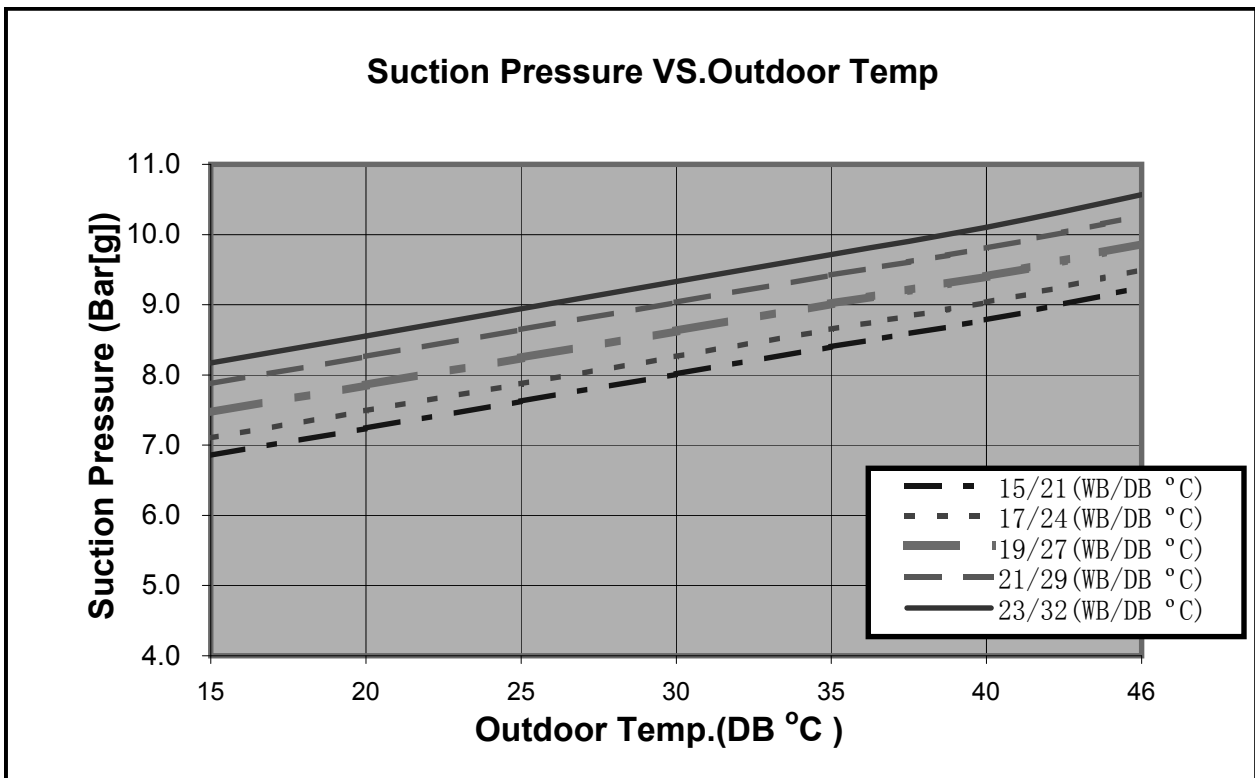
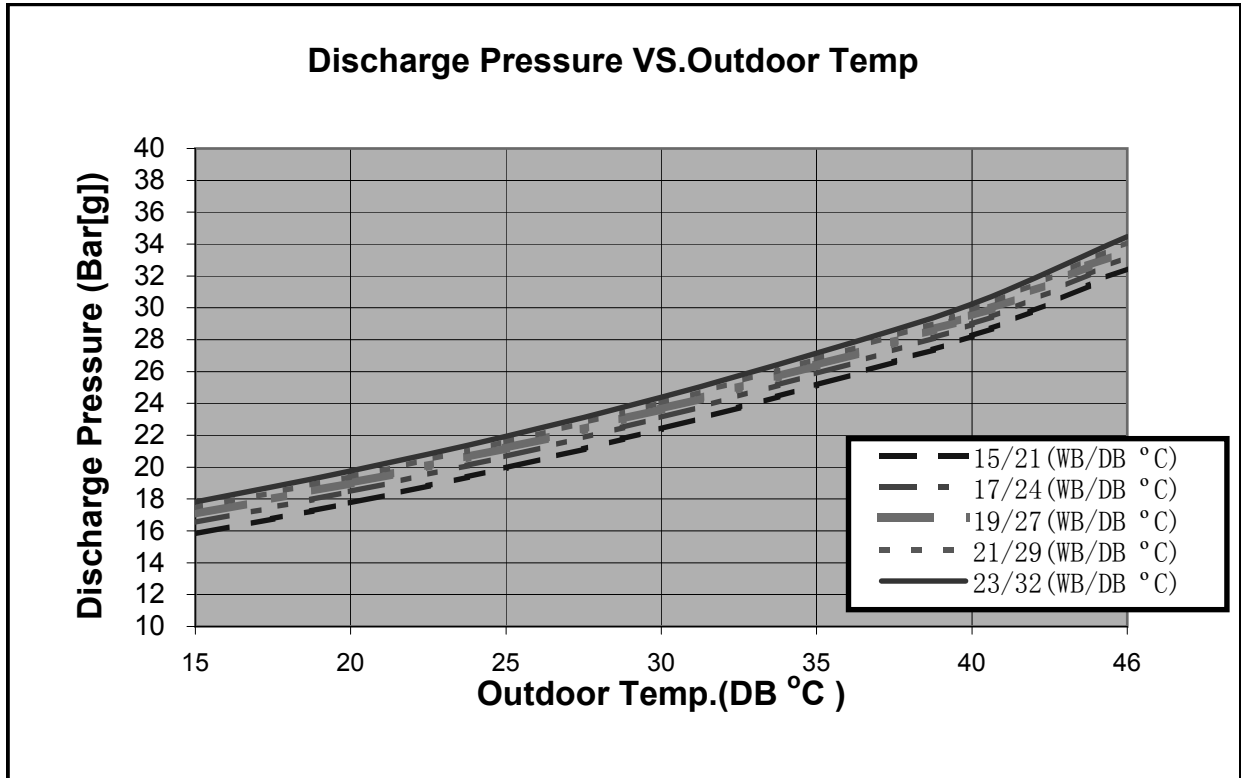
**Heating**

TOTAL TUBING LENGTH								
3m	7.5m	10m	15m	20m	25m	30m	40m	50m
1.02	1	0.99	0.96	---	---	---	---	---

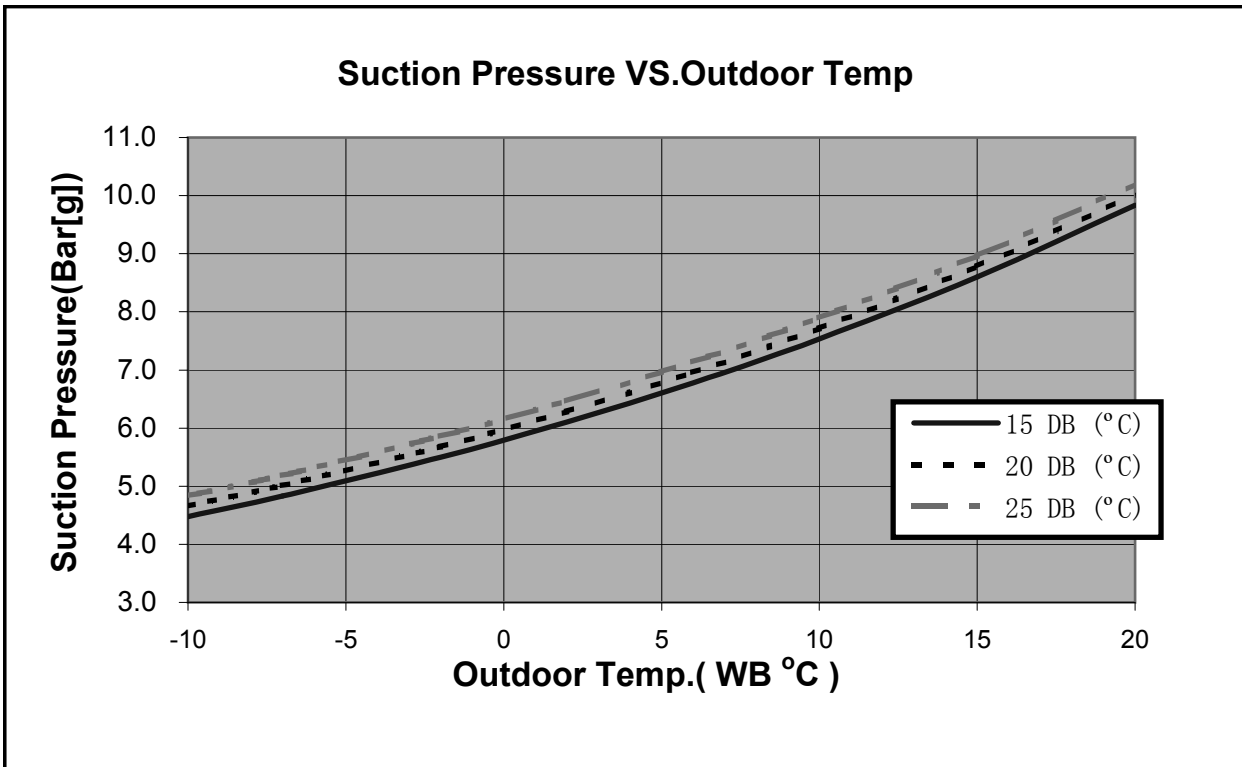
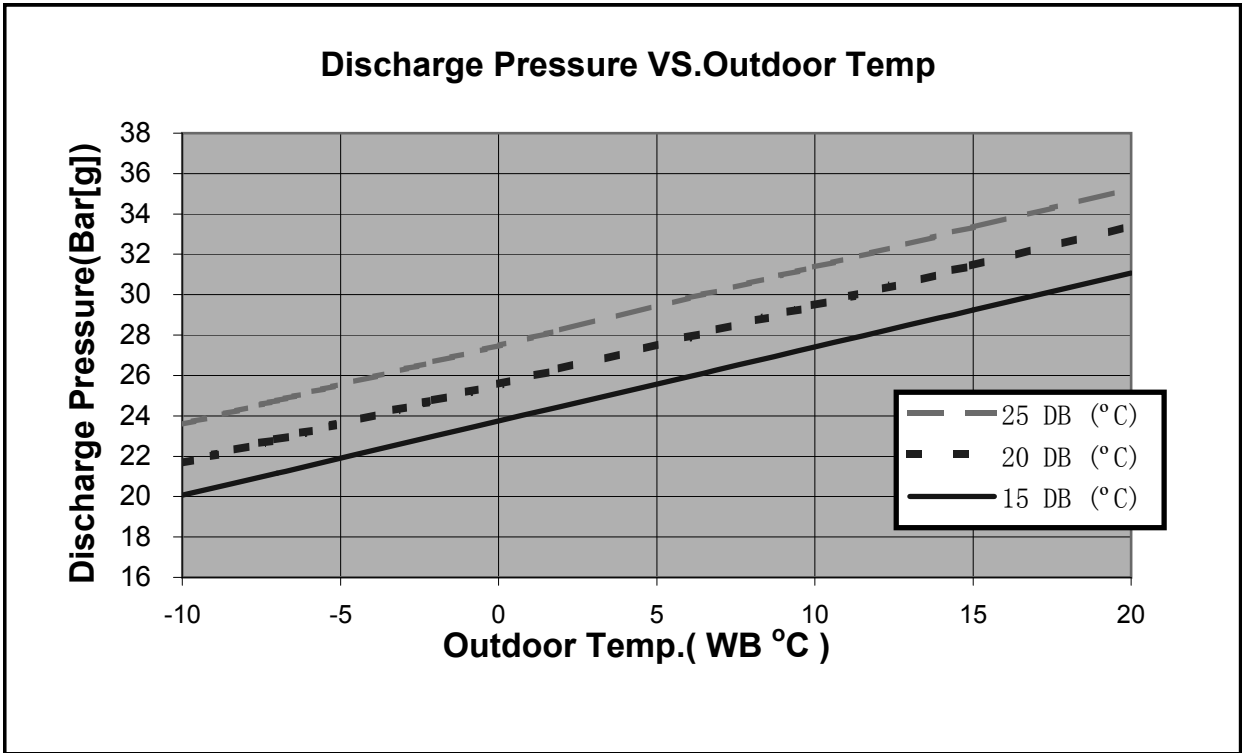
\* Minimum recommended tubing length between indoor and outdoor units is 3m.

5.5 Model: HAF 24 / GCN 24

5.5.1 Cooling

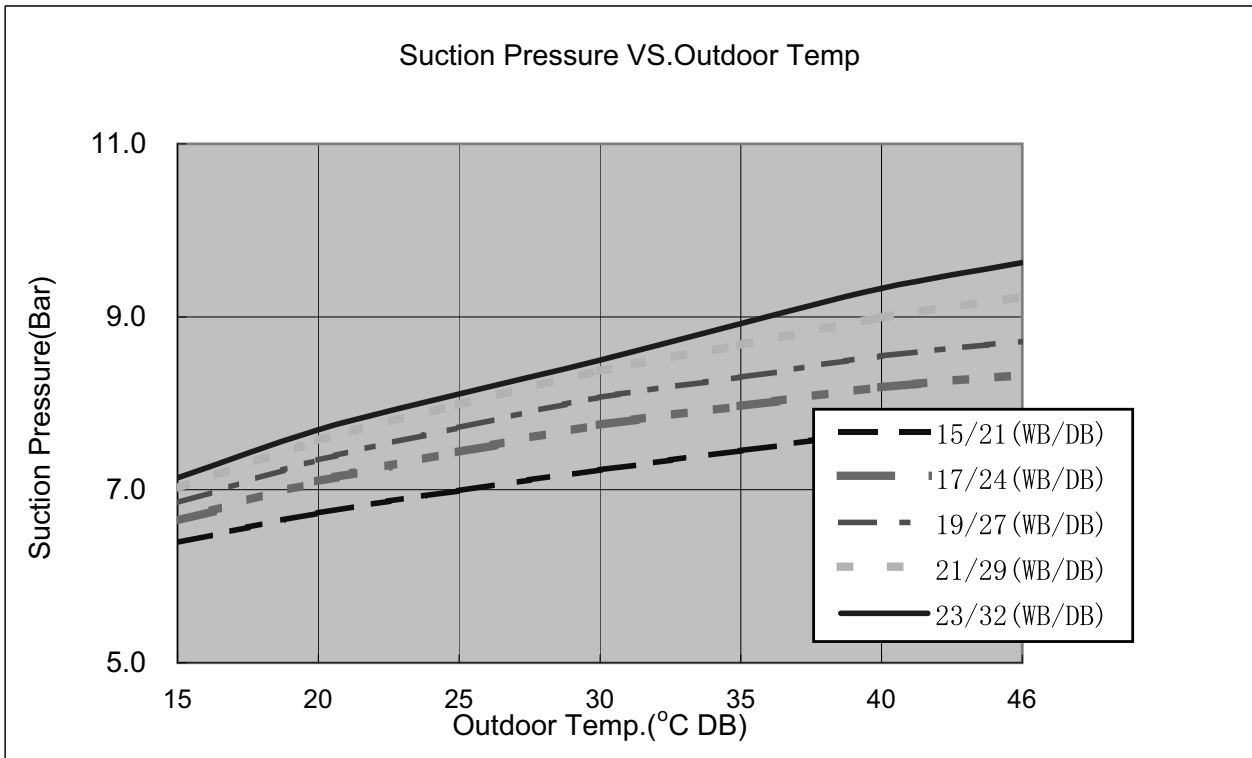
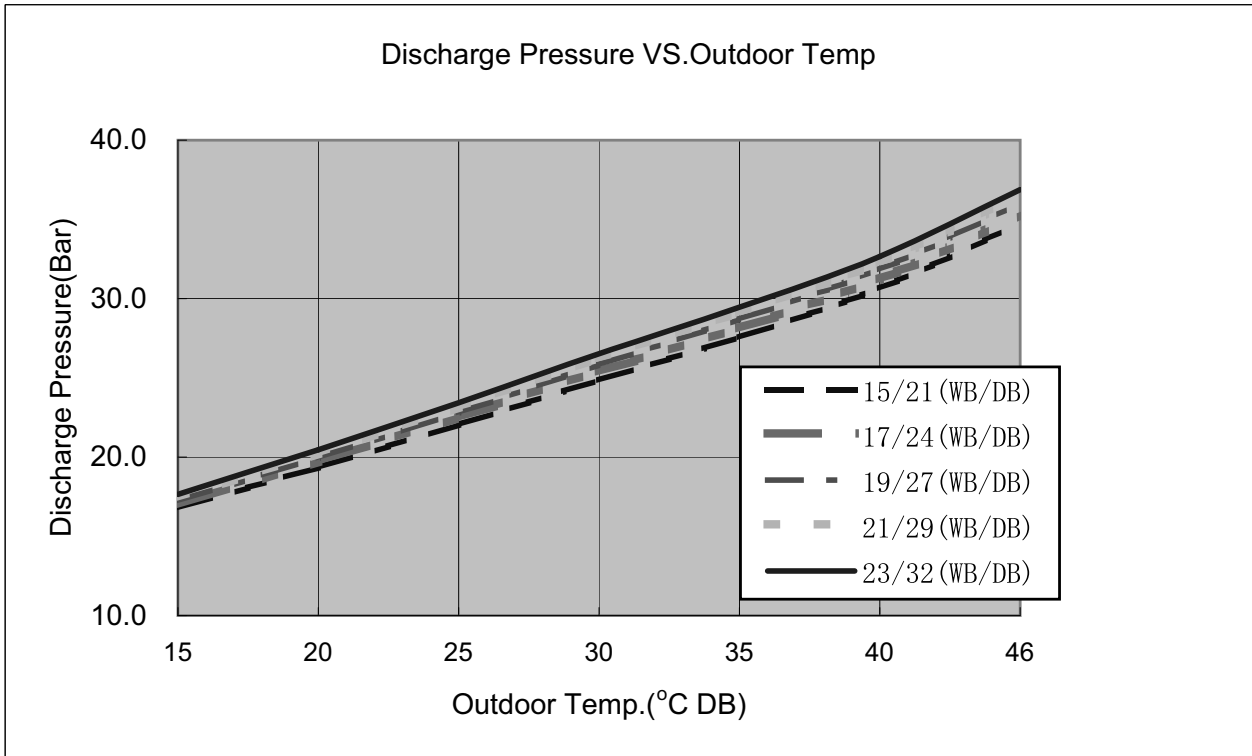


5.5.2 Heating

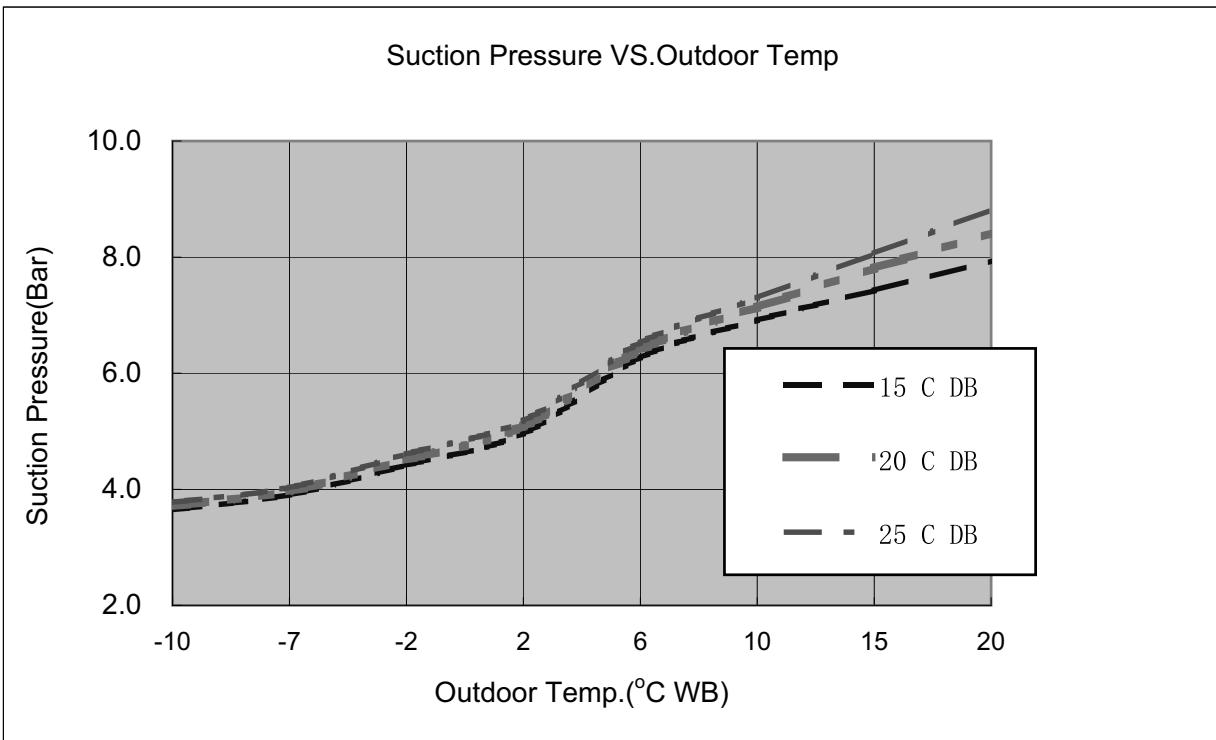
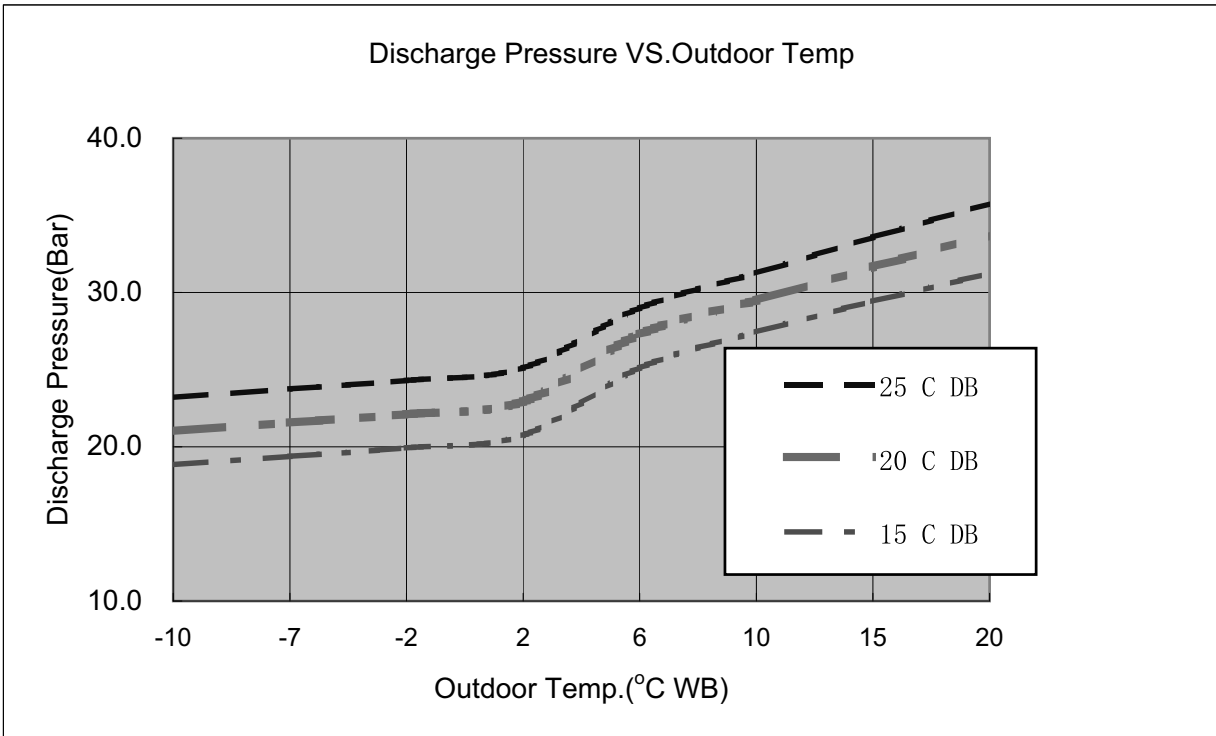


**5.6 PRESSURE CURVES**

**5.6.1 Model: HAF 24 / GCN 24 =>Cooling**



5.6.2 Model: HAF 24 / GCN 24 =>Heating



## 6. SOUND LEVEL CHARACTERISTICS

### 6.1 Sound Pressure Level

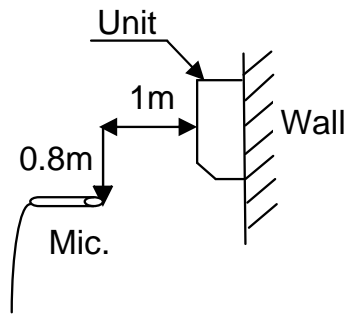
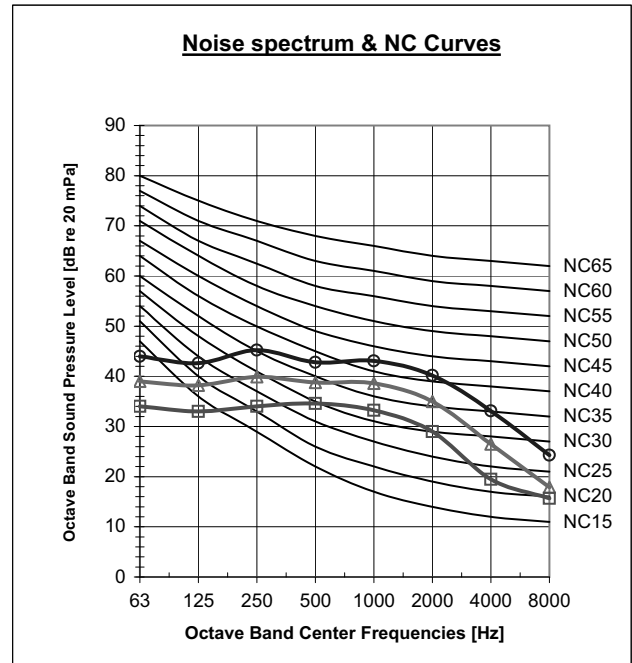
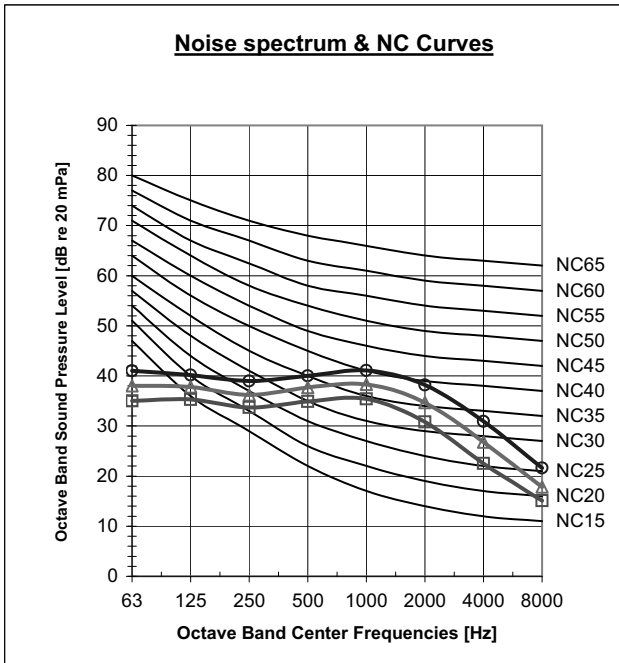


Figure 1

### 6.2 Sound Pressure Level Spectrum (Measured as Figure 1)

HAF 18

HAF 24



### 6.3 Outdoor units

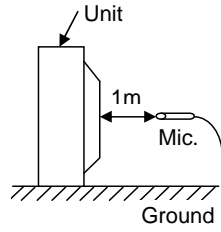
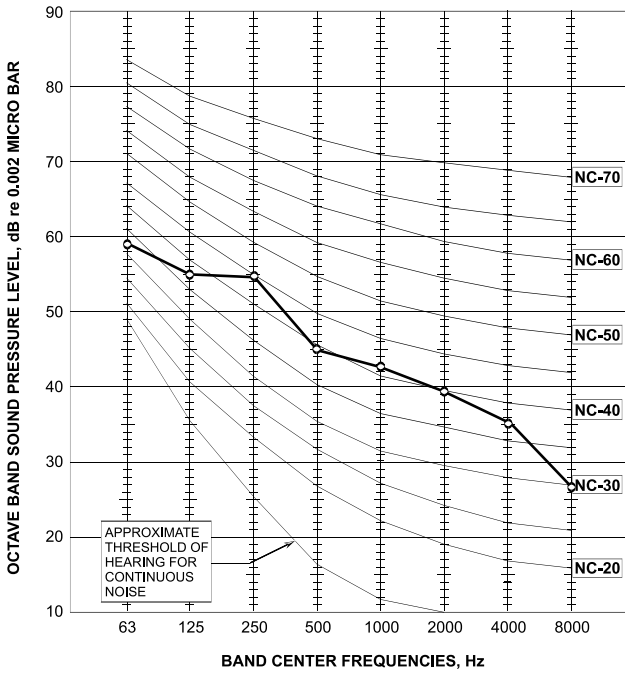


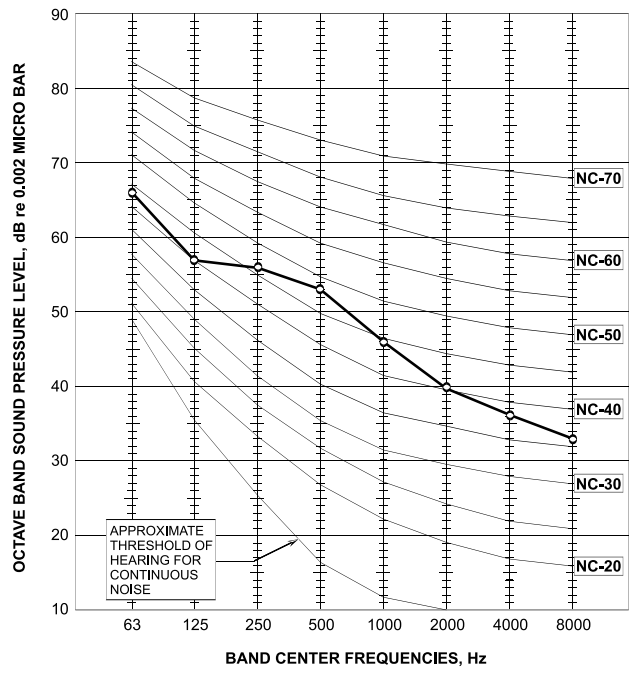
Figure 2

### 6.4 Sound Pressure Level Spectrum (Measured as Figure 2)

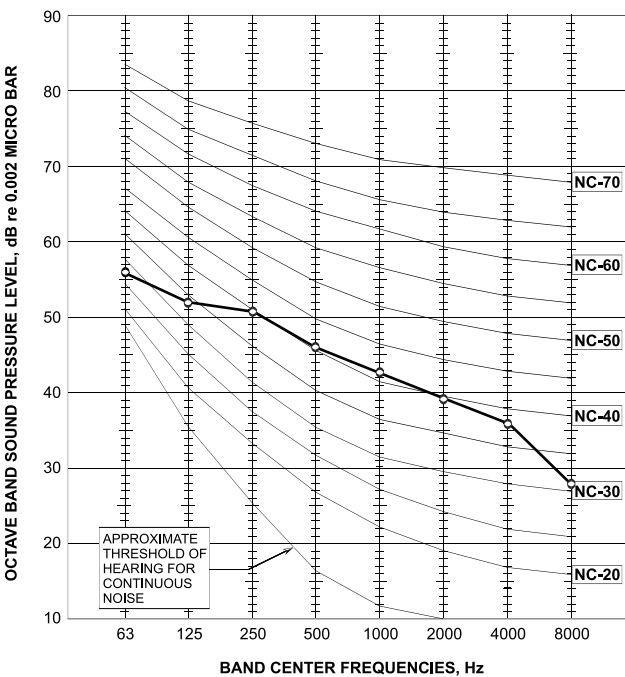
**YAF 018 Cooling**



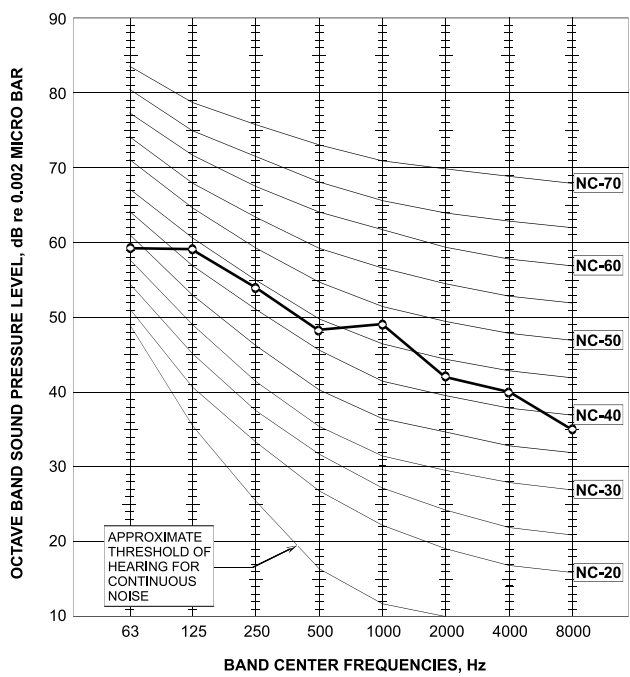
**YAF 018 Heating**



**GCN 24 Cooling**



**GCN 24 Heating**





## 7. ELECTRICAL DATA

### 7.1 Single Phase Units

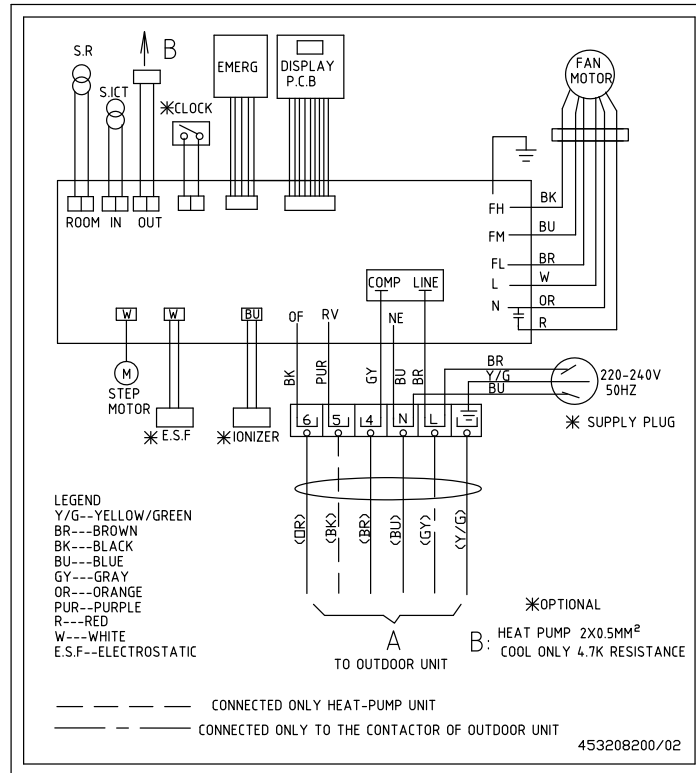
MODEL	HAF 18		HAF 24	
	from indoor	from outdoor	from indoor	from outdoor
Power Supply	1PH-230V-50Hz		1PH-230V-50Hz	
Max Current, A	11		15	
Circuit Breaker,A	15		20	
Power Supply Wiring No. X Cross Section mm <sup>2</sup>	3x1.5 mm <sup>2</sup>		3x2.5 mm <sup>2</sup>	
Interconnecting Cable RC Model No. X Cross Section mm <sup>2</sup>	5x1.5 mm <sup>2</sup> +2x0.5 mm <sup>2</sup> (OCT sensor)	6x1.5 mm <sup>2</sup> +2x0.5 mm <sup>2</sup> (OCT sensor)	5x2.5 mm <sup>2</sup> +2x0.5 mm <sup>2</sup> (OCT sensor)	6x2.5 mm <sup>2</sup> +2x0.5 mm <sup>2</sup> (OCT sensor)
Interconnecting Cable ST Model No. X Cross Section mm <sup>2</sup>	4x1.5 mm <sup>2</sup>	5x1.5 mm <sup>2</sup>	4x2.5 mm <sup>2</sup>	5x2.5 mm <sup>2</sup>

#### NOTE

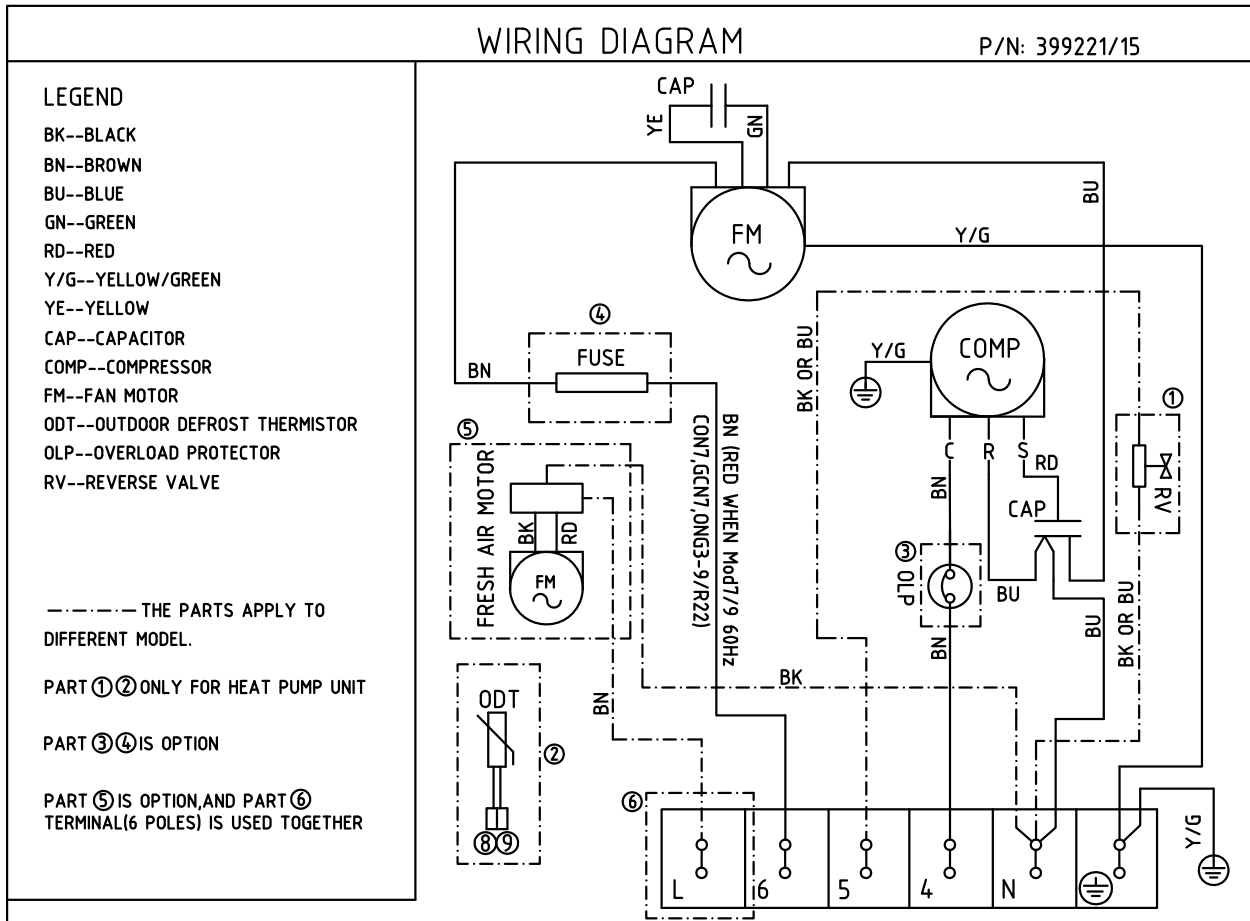
***Power wiring cord should comply with local laws and electrical regulations requirements.***

## 8. WIRING DIAGRAMS

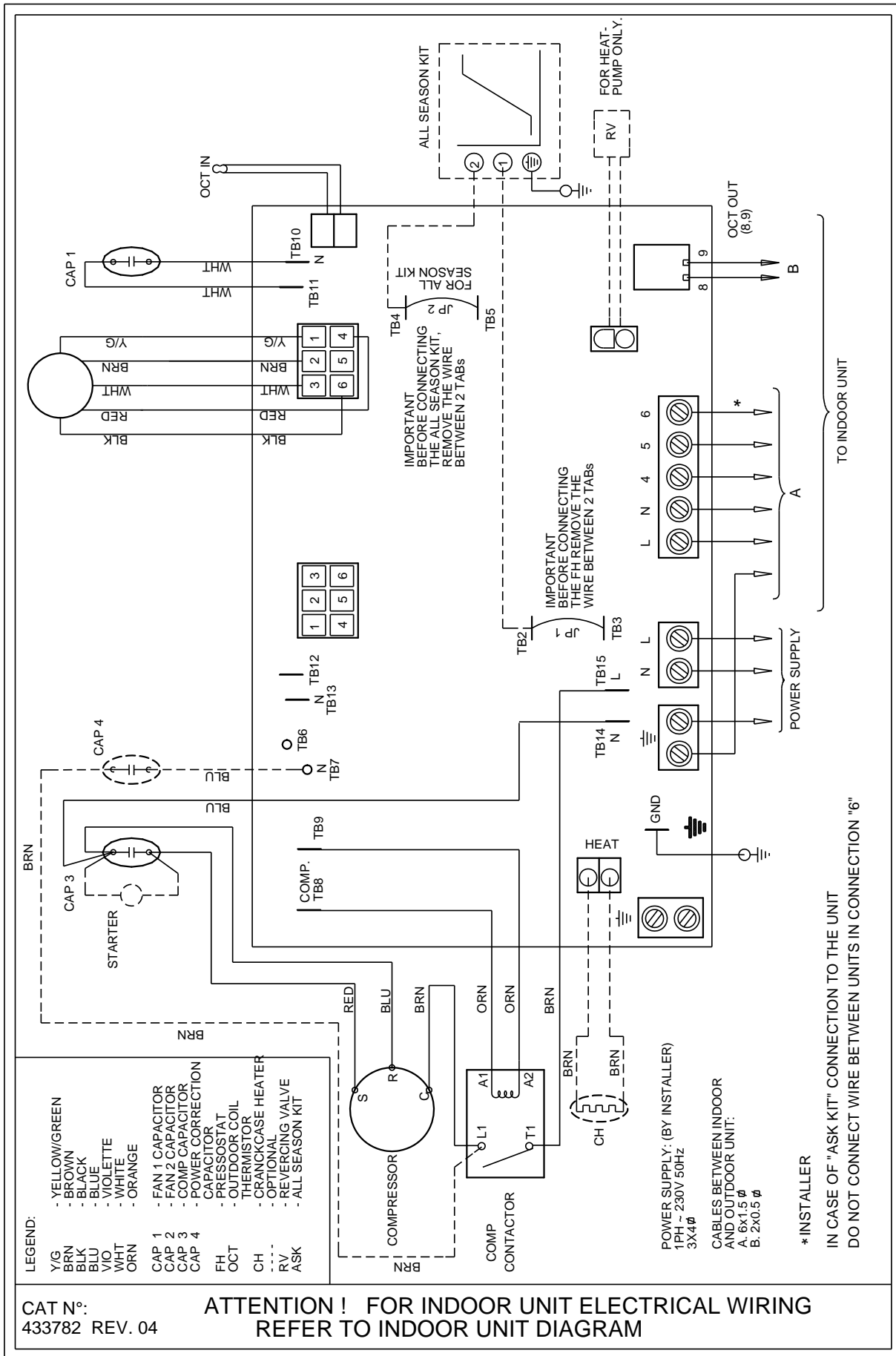
### 8.1 Indoor Unit: HAF 18, HAF 24



### 8.2 Outdoor Unit: YAF 018

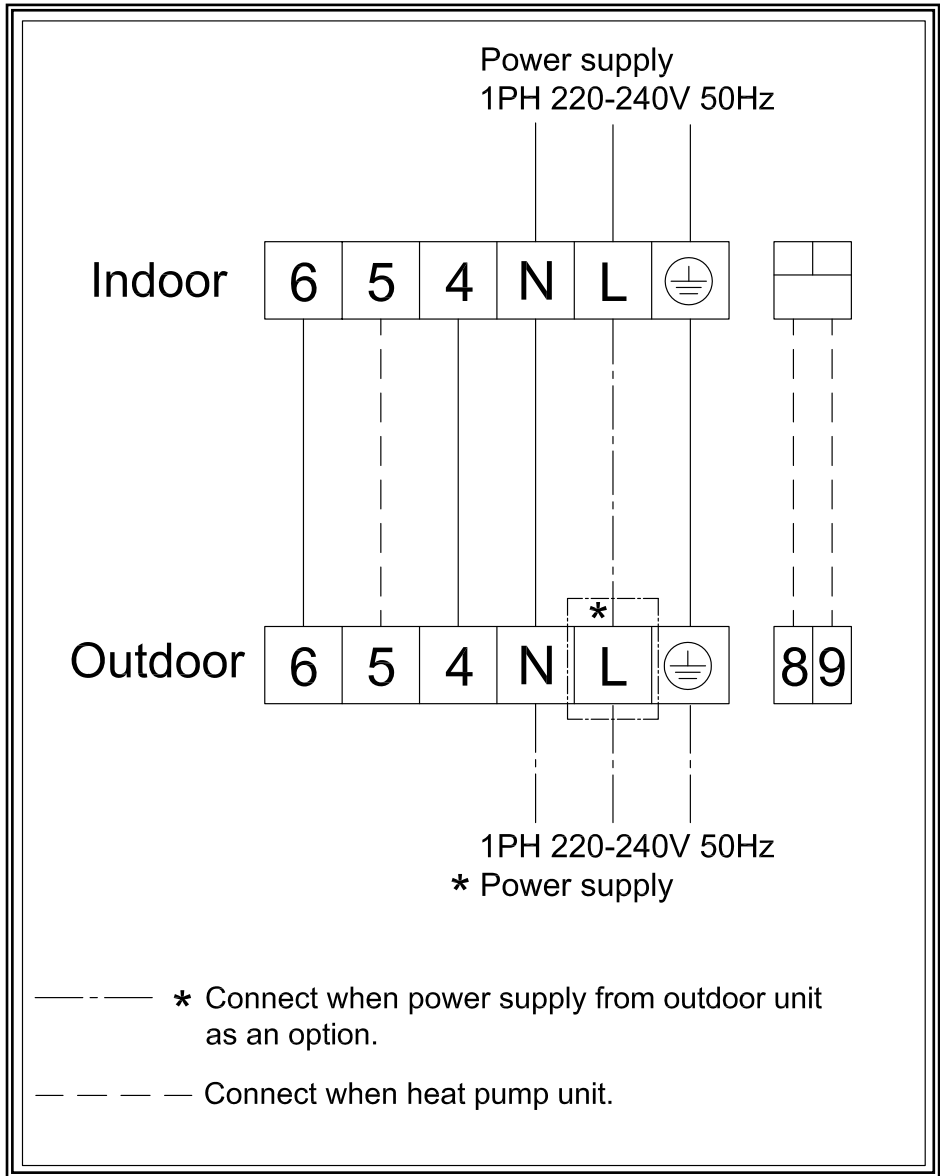


### 8.3 Outdoor Unit: GCN 24



9. ELECTRICAL CONNECTIONS

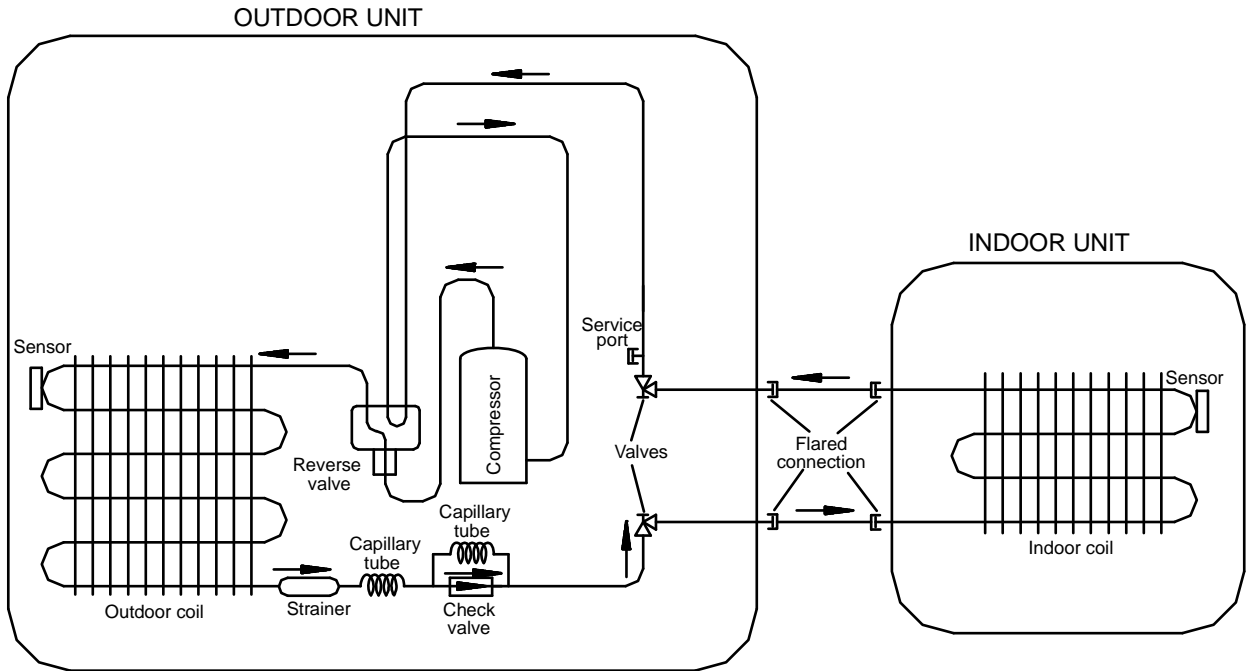
9.1 HAF 18, HAF 24



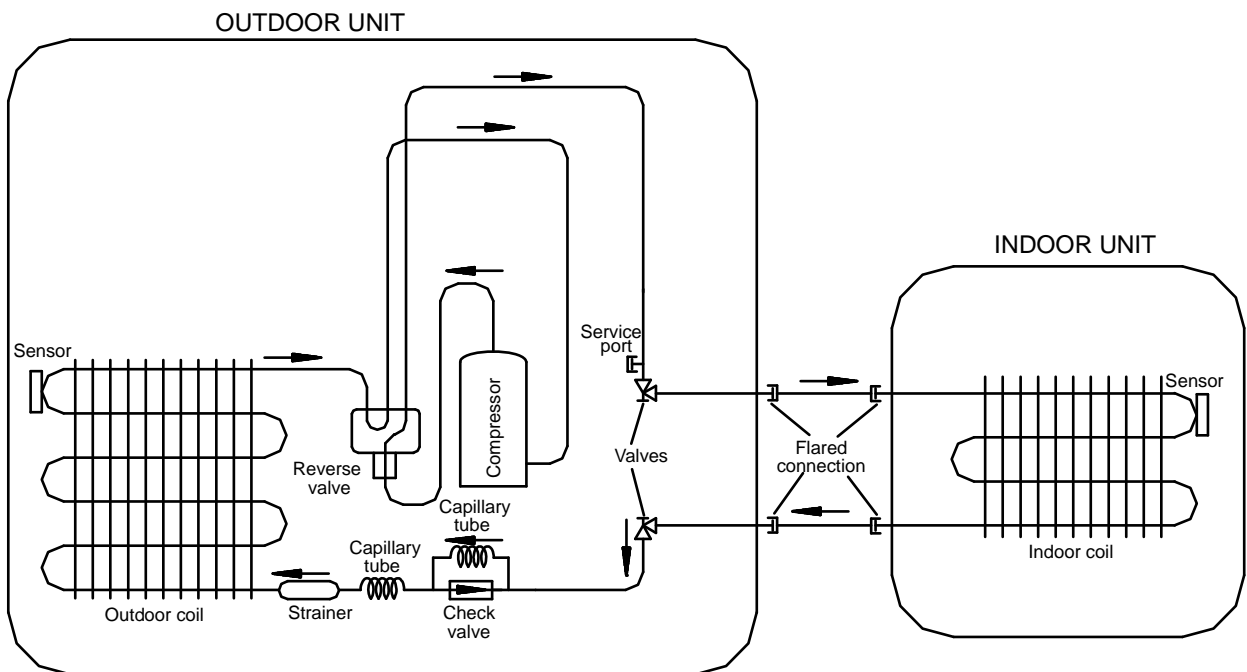
# 10. REFRIGERATION DIAGRAMS

## 10.1 Heat Pump Models

### 10.1.1 HAF 18, HAF 24



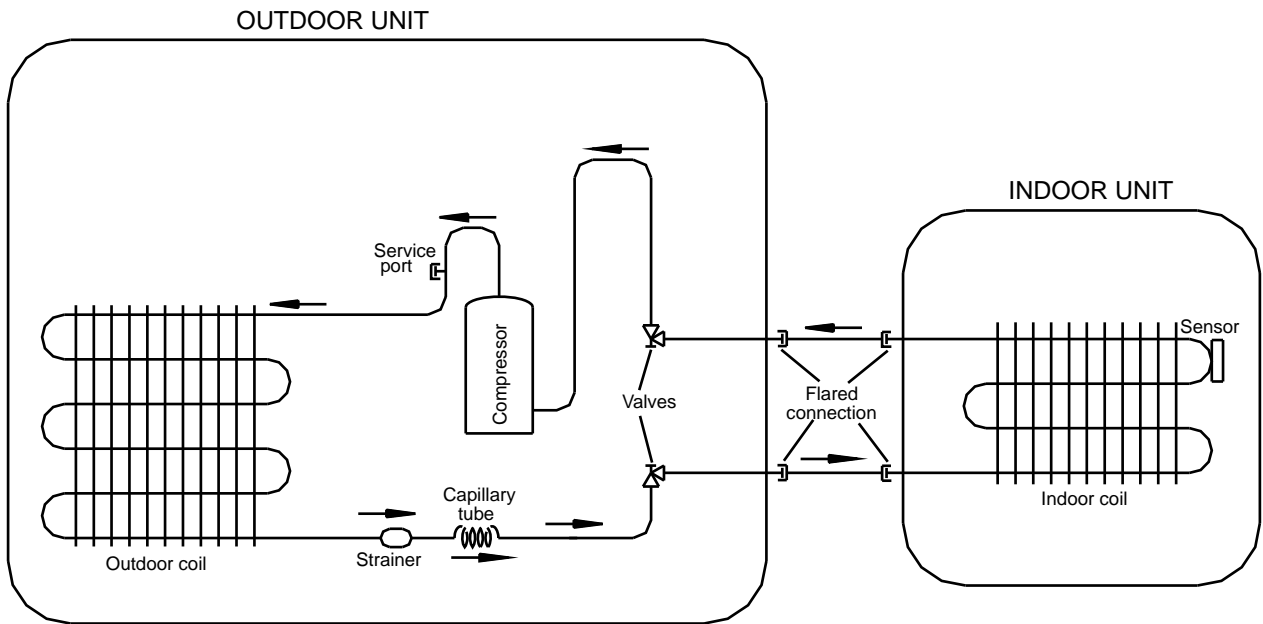
COOLING MODE



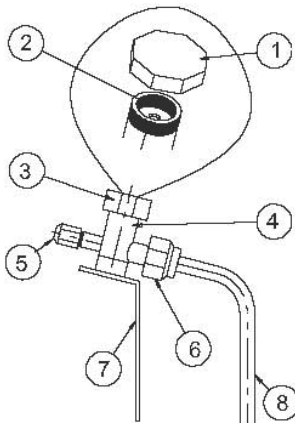
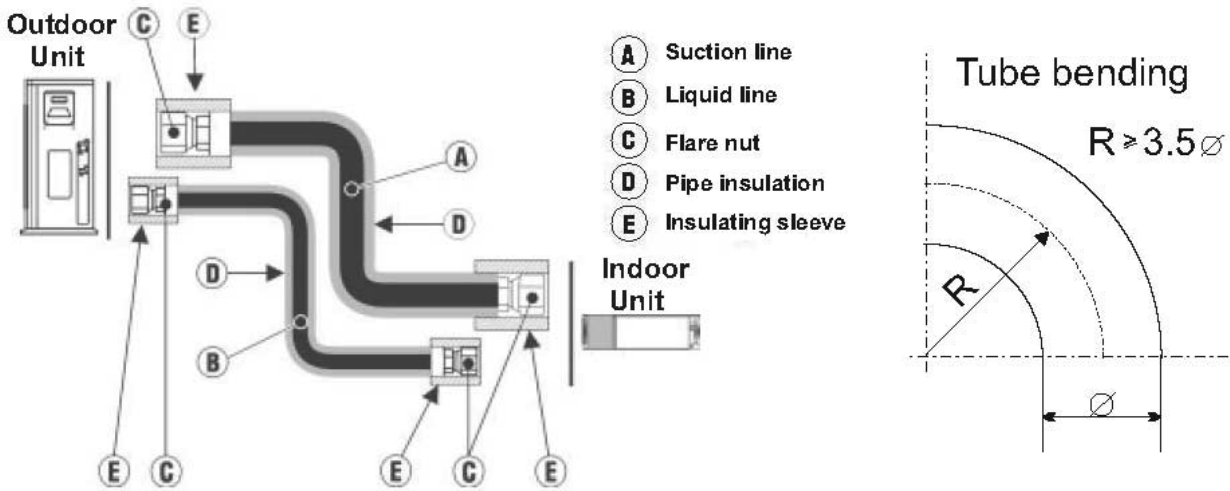
HEATING MODE

**10.2 Cooling Only Models**

**10.2.1 HAF 18, HAF 24**



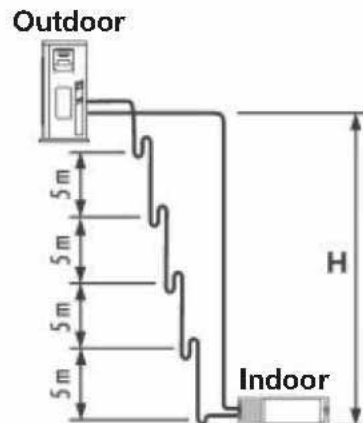
# 11. TUBING CONNECTIONS



TUBE (Inch)	1/4"	3/8"	1/2"	5/8"	3/4"
<b>TORQUE (Nm)</b>					
<b>Flare Nuts</b>	11-13	40-45	60-65	70-75	80-85
<b>Valve Cap</b>	13-20	13-20	18-25	18-25	40-50
<b>Service Port Cap</b>	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. In case the indoor unit is installed above the outdoor, no trap is required.



## 12. CONTROL SYSTEM

### 12.1 Electronic Control

#### 12.1.1 Introduction

The electronic control information is designed for service application, and is common to the following groups of air-conditioners:

ST/RC Group -Cooling only/ cooling and heating by heat pump

SH Group -Cooling and heating by heat pump and supplementary heater.

RH Group -Cooling, heating by heaters only.

#### 12.1.2 Jumpers Settings

0 = Open Jumper (disconnect jumper).

1 = Close Jumper (connect jumper).

Self test Jumper - J1

OPERATION	J1
SELF-TEST	1
NORMAL	0

Group Jumper - J2, J6

GROUP	J2	J6
ST	1	0
RC	0	0
SH	0	1
RH	1	1



## 12.2 LEGEND

### 12.2.1 Abbreviations

AC	-Alternate Current
A/C	- Air-Conditioner
ANY	- ON or OFF status
CLOCK	- ON/OFF Operation Input, (dry contact)
COMP	- Compressor
CPU	- Central Processing Unit
ELUM	- Extended Louver Upward Movement (Software Jumper)
E <sup>2</sup> PROM, EEPROM	- Erase Enable Programmable Read Only Memory
HE	- Heating Element
HPC	- High Pressure Control
H/W	- Hardware
ICP	- Indoor Condensation Pump
ICT	- Indoor Coil Temperature (RT2) sensor
IF, IFAN	- Indoor Fan
IR	- Infra Red
LEVEL1	- Normal Water Level
LEVEL2/3	- Medium/High Water Level
LEVEL4	- Overflow Level
Max	- Maximum
Min	- Minimum
min	- Minute (time)
NA	- Not Applicable
OCP	- Outdoor Condensation Pump
OCT	- Outdoor Coil Temperature (RT3) sensor
OF, OFAN	- Outdoor Fan
OPER	- Operate
Para.	- Paragraph
RAT	- Return Air Temperature (RT1) sensor
RC	- Reverse Cycle (Heat Pump)
R/C	- Remote Control
RCT	- Remote Control Temperature
RH	- Resistance Heater
RT	- Room Temperature (i.e. RCT in IFEEL mode, RAT otherwise)
RV	- Reversing Valve
SB, STBY	- Stand-By
sec	- Second (time)
Sect	- Section
SH	- Supplementary Heater
SPT	- Set Point Temperature
ST	- Standard (a Model with Cooling Only)

S/W	- Software
TEMP	- Temperature
W/O	- Without
T	-The difference between SPT and RT. In Heat Mode: $T=SPT-RT$ In Cool/Dry/Fan Mode: $T=RT-SPT$

### 12.2.2 List of A/C Groups

The following table defines the different A/C groups, and the applicable operation modes for each group.

Operating Mode	ST	RH	RC	SH
Fan	Yes	Yes	Yes	Yes
Cool <sup>(3)</sup>	Yes	Yes	Yes	Yes
Heat <sup>(3)</sup>	No	Yes <sup>(1)</sup>	Yes	Yes <sup>(2)</sup>
Dry <sup>(3)</sup>	Yes	Yes	Yes	Yes
Auto Cool/Heat <sup>(3)</sup>	No	Yes <sup>(1)</sup>	Yes	Yes <sup>(2)</sup>

Notes:

1. Heating is done by electric heaters.
2. Heating is done by Compressor (Heat Pump), and by electric heaters.

## 12.3 GENERAL FUNCTIONS FOR ALL MODELS

### 12.3.1 COMP operation

For each Mode including POWER OFF & SB, a Min time delay of 3 min before COMP restarting, excluding DEICING Mode

The Min operation time of COMP under different operating conditions is

Operation Mode	Min operation time of COMP
Heat, Cool or Auto Modes	3 min.
Fan, Dry, Overflow, Protection modes, or mode change	ignored

### 12.3.2 IFAN operation

Min time interval between IFAN speed change in AUTOFAN Mode, is 30 sec.

Min time interval between IFAN speed change in H/M/L Mode is 1 sec.

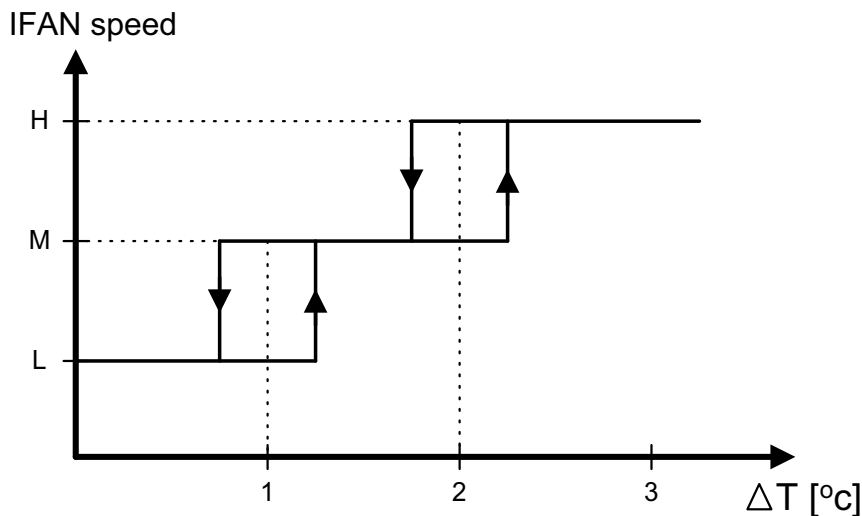
IFAN speed in Heat/Cool Autofan Mode is determined according to the following table:

$\Delta T$	IFAN Speed
$\Delta T \geq 2$	HIGH
$2 \geq \Delta T \geq 1$	MED
$1 \geq \Delta T$	LOW

Where In Heat Mode:  $T = SPT - RT$   
 In Cool Mode:  $T = RT - SPT$

Note:

1. In Heat Mode, the rules in section 4.0.3 have the higher priority.
2. The table above can be represent by a hysteresis curve which will minimize the switching of the IFAN relay and will minimize the change in IFAN speed:



### 12.3.3 OFAN operation

Min time interval between OFAN ON/OFF state change is 30 sec.

In general, OFAN starts together with COMP.

### 12.3.4 HE operation

Minimum Heaters ON or OFF time is 30 sec.

Heaters can be activated only if IFAN is on.

In RH group, HE-1 and HE-2 will be activated only when COMP is operating, except in Dry Mode.

### 12.3.5 Protections

High pressure protection is applicable to all operating modes.

Defrosting control is valid in Heat and Auto Heat Mode only.

Defrosting control is valid in Dry, Cool, Heat and Auto Modes.

No reset after protection modes.

### 12.3.6 Thermistors operation

Return air Temp. is detected by RAT (RT1) in normal Mode, or by RCT (R/C) in I-FEEL Mode.

Indoor Coil Temp. is detected by ICT (RT2).

Outdoor Coil Temp. is detected by OCT (RT3).

Similarly, in the Indoor Units of a WMQ/T system, 4.7k Ohm (5%) resistors must be connected to the OCT ports to disable the "Thermistor Temp reading doesn't change" error checking.

Definition of thermistor faults:

- a. Thermistor is disconnected -  
The thermistor reading is below  $-30^{\circ}\text{C}$ .
- b. Thermistor is shorted -  
The thermistor reading is over  $75^{\circ}\text{C}$ .
- c. Thermistor Temp reading doesn't change (irrelevant for RT1) -
  - (i) This test is performed only once after a unit is switched from OFF/SLEEP to ON operation. At the first occurrence of 10 min continuous COMP operation, current ICT & OCT are compared with those when the COMP was switched from OFF to ON 10 min before. If the  $\Delta T$  is less than  $3^{\circ}\text{C}$ , the thermistor is regarded as defective.

- (ii) The ICT and OCT no-change error can be disabled together by connecting a 4.7 k or 3.9 k ohm resistor (5%) to the OCT connector. These resistors are equivalent to a thermistor at 43+/-1°C and 48+/-1°C respectively.
- (iii) Connecting a 4.7k resistor to the ICT connector will disable the ICT no-change error only.

#### Cases for disabling thermistor short/disconnected detection

1. The detection of thermistor faults (a) and (b) above, are disabled when Deicer Protection is started. The detection will be enabled again only after (1) the deicing is completed, and (2) COMP has been restarted and operated for 30 sec.
2. When all the following conditions are fulfilled:
  - a. 4.7K Ohm resistor is connected on the OCT
  - b. IFAN is OFF
  - c. Compressor is ON
  - d. ICT < -30 (disconnected)

This condition come to detect and prevent IFAN operation in Deicer in multi spilt units.

#### Handling the thermistor faults in a COMP unit

- i. ICT/OCT thermistor is disconnected or shorted -

The invalid thermistor temperature is replaced by 43°C, so that the unit can continue the normal operation. All protections related to that faulty thermistor will be disabled. For example, in case of any ICT fault, the ICT high pressure protection in Heat Mode and ICT defrost protection in Cool Mode will not operate anymore. The same is also applied to the OCT fault.

There is an EEPROM option that, when the OCT thermistor is not connected, the buzzer will be ON continuously until the user turn off the alarm by

- (i) switching the unit to STBY using a R/C, or
- (ii) pressing the mode switch once.

Once the alarm is turned OFF, it will not be active again unless the unit is reset.

- ii. RAT thermistor is disconnected or shorted –

The RAT will be derived from the ICT by using the equations :

$$\text{Heat Mode: RAT=ICT/2.3}$$

$$\text{Cool Mode: RAT=ICT*4}$$

#### Notes:

1. In case of Shorted/Disconnected thermistor failure, the STBY LED will be blinking until the fault condition is corrected. In case of “Temp No change” fault the STBY LED will never blink.
2. User can use the system diagnostics function to find out the nature of the thermistor faults.

#### Notes:

1. As in the COMP unit, the STBY LED will be blinking to indicate a thermistor fault. And, the user can use the system diagnostics function to find out the nature of the fault.

Recover from the thermistor faults

1. ICT/OCT/RAT is disconnected or shorted –  
The fault status will be cleared automatically when the connection is back to normal.
2. ICT/OCT reading doesn't change -  
The ICT no-change error is cleared automatically if a 3°C change in ICT is detected afterward. Similarly, the OCT no-change error is cleared by a change in OCT.  
This faults can also be cleared by switching the unit from STBY mode to operate mode, or when the unit is reset (e.g. reset by power interrupt).

## 12.4 COOLING MODE

### 12.4.1 Cooling Mode – General

- a. Room Temperature, RT, is detected by
  - RAT in normal operation, or
  - RCT (R/C sensor) in I-FEEL mode.
- b. The resolution of RT is 1°C.
  - RT is activating COMP if (RT > SPT), and
  - RT is stopping COMP if (RT ≤ SPT).
- c. Indoor Coil Temp is detected by ICT (RT2).
- d. Outdoor Coil Temp is detected by OCT (RT3).
- e. OFAN OPERATIONS
  - OFAN starts together with COMP in general.

### 12.4.2 Cooling

Mode: Cool, Auto (at Cooling)

Temp: Selected desired temperature.

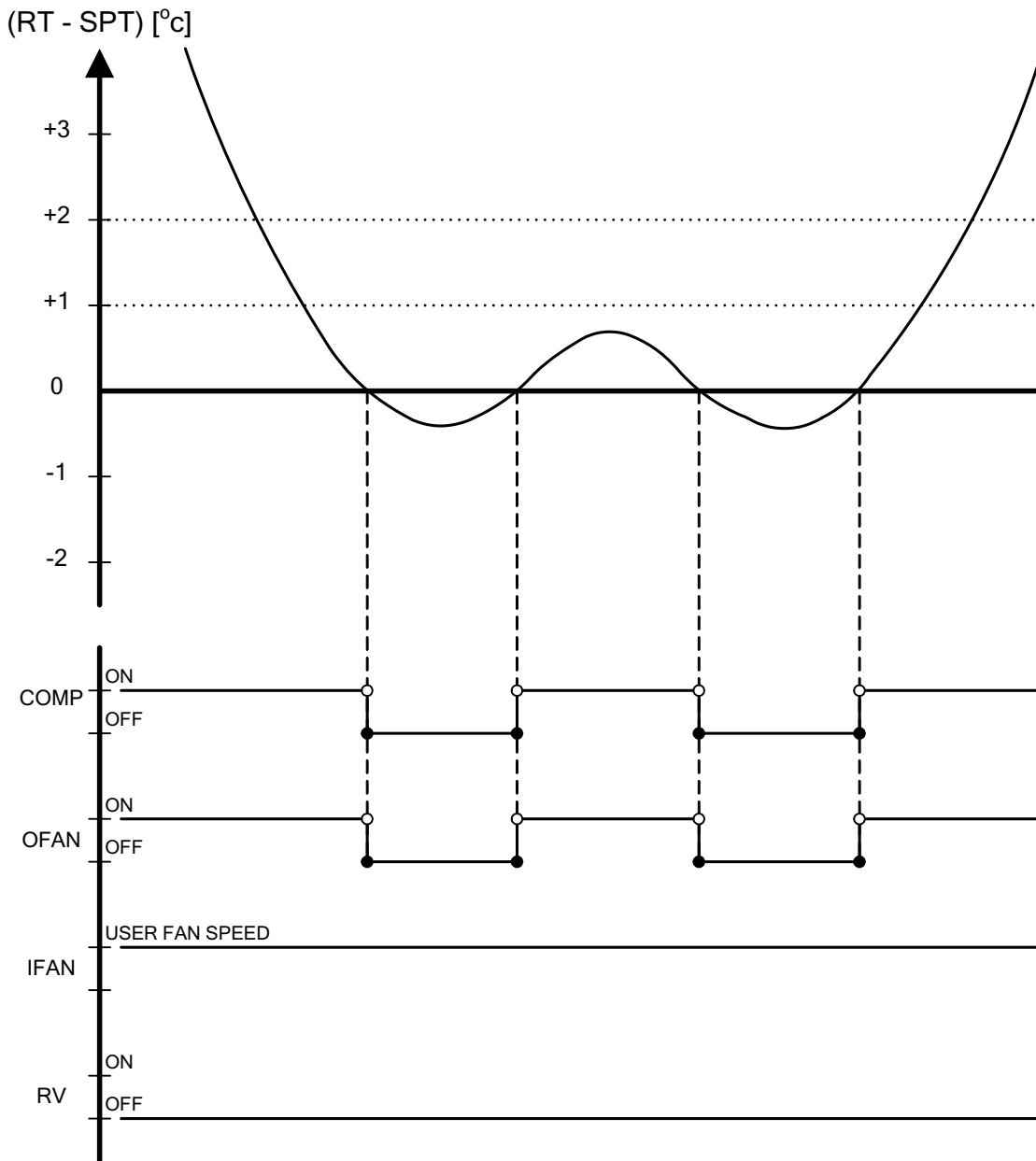
Fan: HIGH, MED, LOW

Timer: Any

I Feel: On or Off

Control function

Maintains room temp at desired level by comparing RT and SPT.



Note:

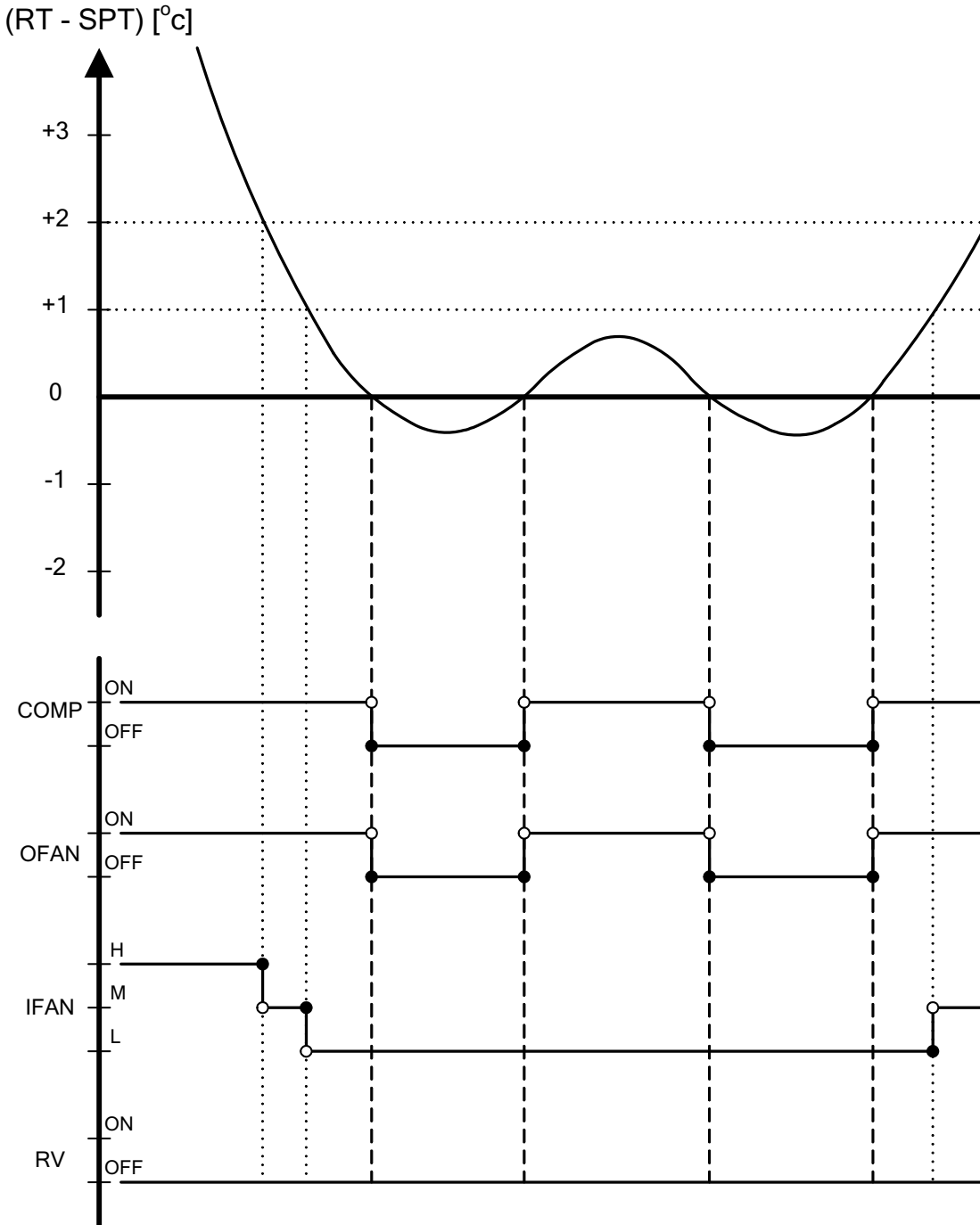
- 1) IFAN is always running at High, Medium or Low speed selected by user.
- 2) In IFEEL mode, the Room Temperature (RT) is the RCT from a R/C. Otherwise, the RT is the RAT from the Room Thermistor.

### 12.4.3 Cooling with Autofan

Mode: Cool, Auto (at cooling)  
 Temp: Selected desired temperature  
 Fan: Auto  
 Timer: Any  
 I Feel: On or Off

Control function

Maintains room temp at desired level and controls the IFAN speed for opt comfort.





## 12.5 HEATING MODE

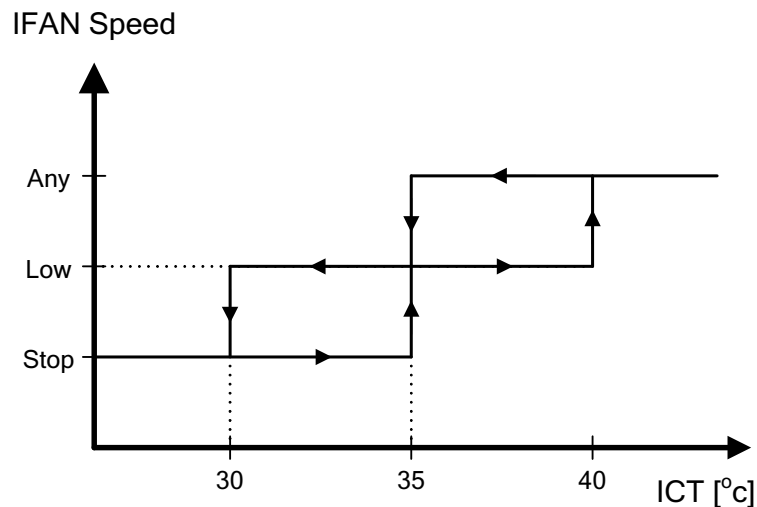
### 12.5.1 Heating Mode – General

1. In heating Mode, temp. compensation schedule will be activated for wall mounted, ducted models, and ceiling mounted (i.e. NKN, CN, and NFC) according to the following table:

SPT [°c]	Add to SPT	
	I-FEEL ON	I-FEEL OFF
$18 \leq SPT \leq 27$	0 °c	+2 °c
$27 < SPT \leq 30$	0 °c	+3 °c

Notes :

- 1) compensation will be activated in Forced operation modes
2. RV is OFF in RH group.
3. IF operating rules
  - (a) As a general rule for **RC and SH groups**, when **COMP is ON**, excluding protection modes, IFAN will be switched ON if
    - ICT > 35°c or
    - at the 30 second <sup>(4)</sup> after the COMP is switched ON. In this case, the IFAN will be started at low speed <sup>(5)</sup>.

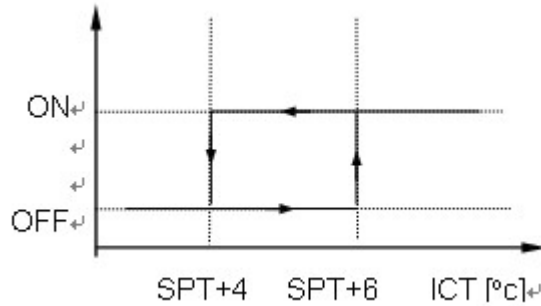


Notes :

- 1) In **SH or RC group**, if HE is set to OFF due to low ICT, IFAN will be switched to LOW and will be turned OFF after 30 sec.
- 2) An exception to this rule is the Back-up mode for SH group.
- 3) If the IFAN is turned ON by the 30 seconds operation, its minimum operation time before stopping due to low ICT temperature is 60 sec.
- (b) In **RC and SH groups**, whenever **COMP & HE are both OFF**, excluding protection modes, IFAN operation will be according to the following:

In **other models** IFAN will operate in low speed for 30 sec and then stop. If COMP is OFF for more than 3 minutes and IFEEL Mode is inactive, IFAN will operate in low speed according to the following graph:

IFAN (Low Speed)



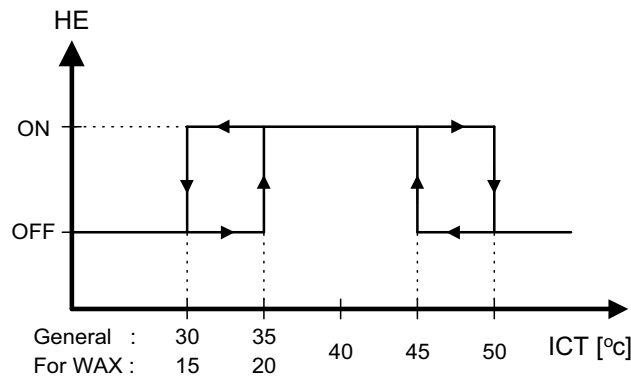
(c) In **RH group**, IFAN starts when HE starts. When HE switches to OFF, IFAN switches to LOW for 30 sec and then stops.

4. HE operation

(a) For **all Groups**, HE can be ON only when IFAN is ON.

(b) For **all Groups**, HE switches to OFF when  $ICT > 50\text{ }^{\circ}\text{C}$ , and is activated again when  $ICT \leq 45\text{ }^{\circ}\text{C}$ .

(c) In **SH or RC group**, HE operation is limited by the following graph:



(d) Back-up mode for **SH group**

After COMP has been working for 5 minutes, HE & IFAN are activated even if the ICT is still below 35°C. This situation is called Back-up Mode. Both HE & IFAN will work in Back-up Mode until the ICT reaches 35°C. Then, the operation goes on in the usual mode

### 12.5.2 Heating, RC or SH Group

Mode: Heat, Auto (at heating)

Temp: Selected desired temperature

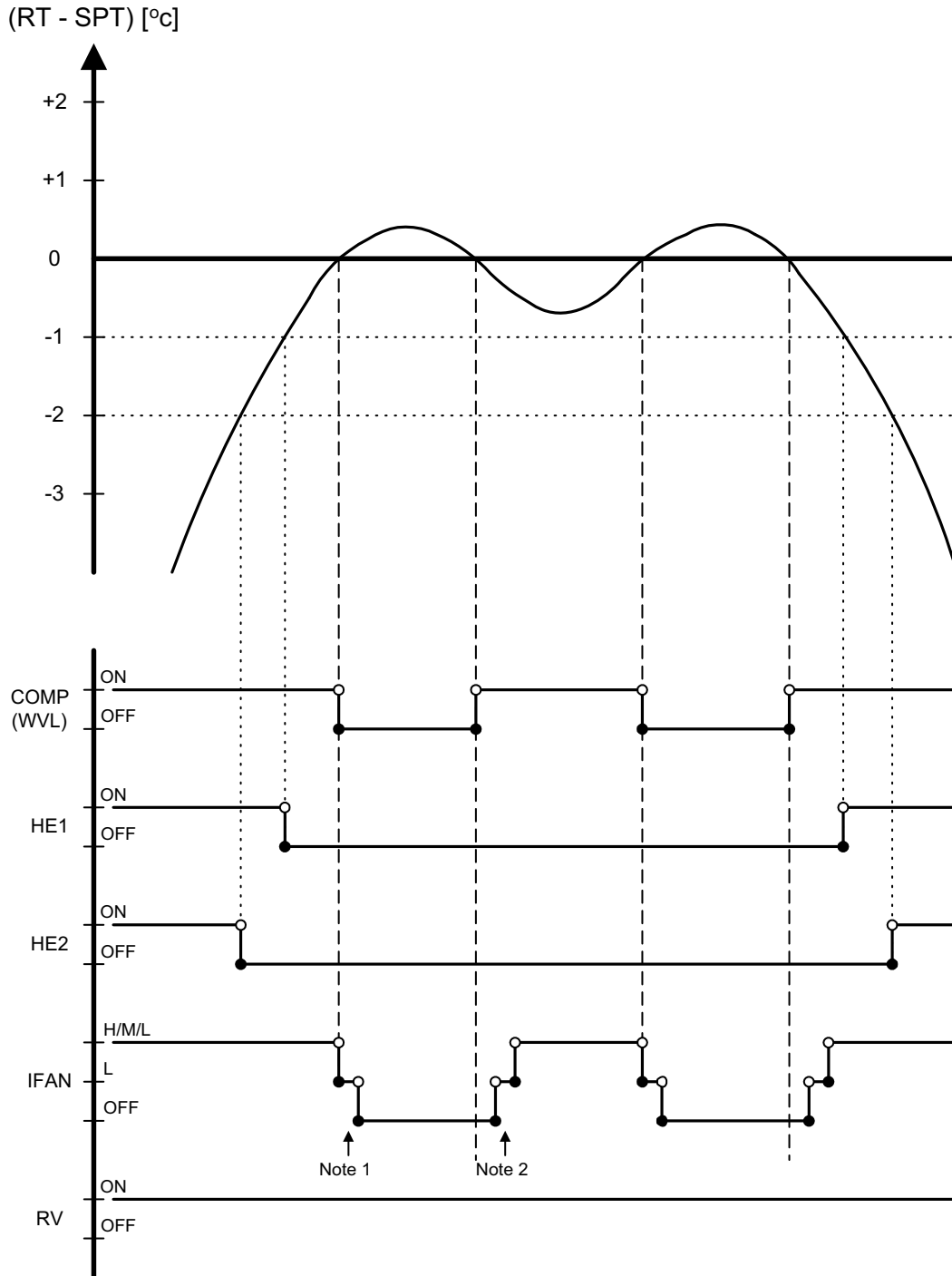
Fan: HIGH, MED, LOW

Timer: Any

I Feel: On or Off

Control function

Maintains room temp. at desired level by comparing RAT or RCT to SPT.



### 12.5.3 Heating, RC or SH Group with Autofan

Mode: Heat, Auto (at heating)

Temp: Selected desired temperature

Fan: Auto

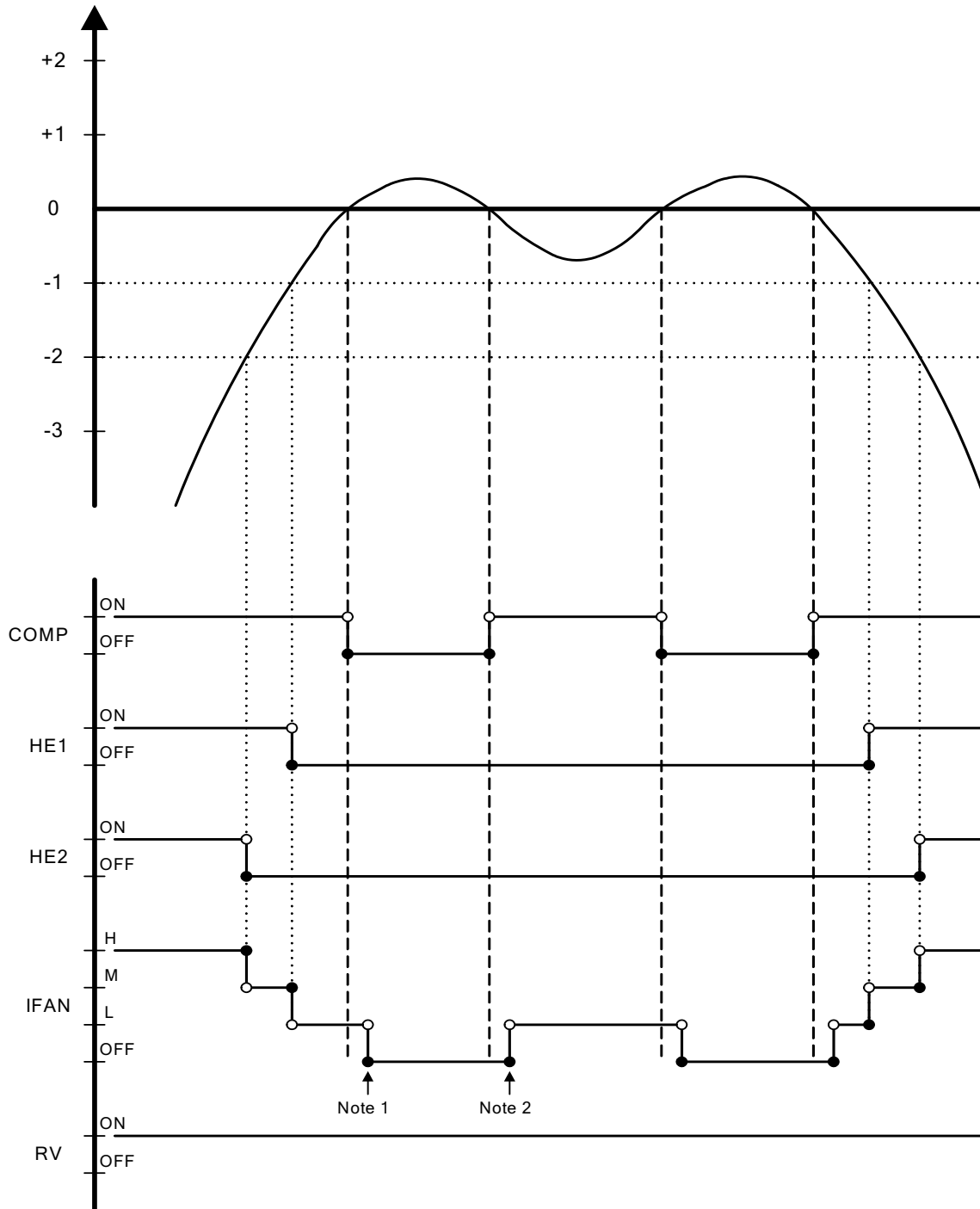
Timer: Any

I Feel: On or Off

Control function

Maintains room temp at desired level by controlling COMP, IFAN and OFAN.

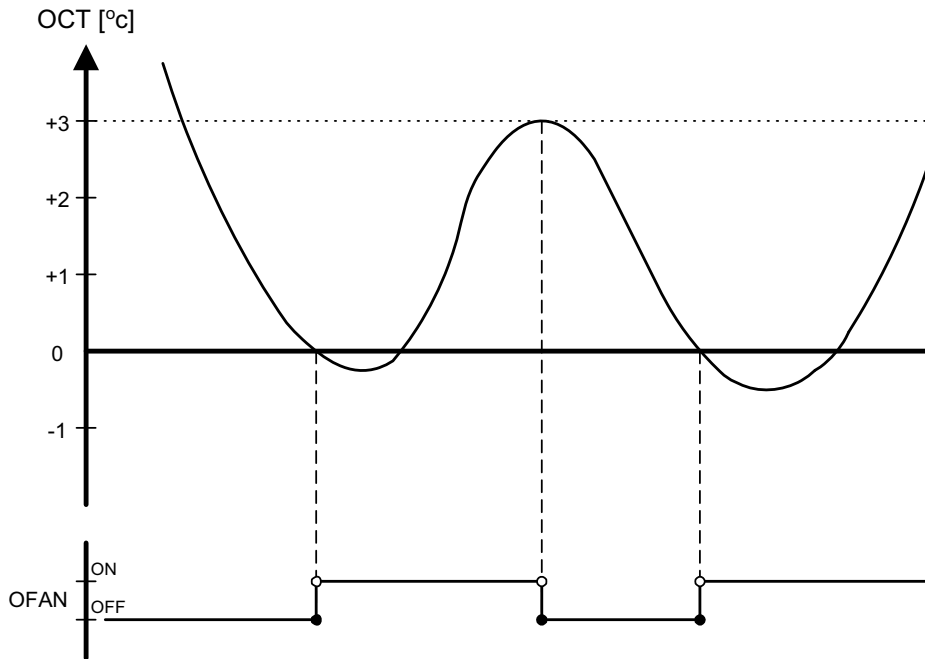
(RT - SPT) [°c]



Note: OFAN operation is controlled by the graph below when

- 1. (RAT  $\geq$  SPT - 2°C), AND
- 2. (ICT  $\geq$  45°C), AND
- 3. (COMP is ON)

Otherwise, OFAN runs together with COMP.



## 12.6 AUTOMATIC COOLING OR HEATING

### 12.6.1 Automatic Cooling or Heating - General

1. Switching-temperature between Cooling and Heating is  $SPT \pm 3^{\circ}C$ .
2. Autofan in Automatic Cooling and Heating Mode will activate "Cooling with Autofan Mode" and "Heating with Autofan Mode" respectively.
3. When the Auto Mode is started with  $SPT \pm 0^{\circ}C$ , the unit will not select Auto Heat or Auto Cool mode immediately. Instead, the unit will be in a temporary Fan Mode with IFAN operating at low speed. The proper Auto Heat mode or Auto Cool will be started whenever the RT reaches  $SPT-1^{\circ}C$  or  $SPT+1^{\circ}C$  respectively.
4. For RC & SH units, Mode change between Auto Heat & Auto Cool Modes are possible only after the COMP has been OFF during the last T minutes.

Mode Change	time, T
Auto Cool to Auto Heat	3 min
Auto Heat to Auto Cool	4 min

5. When unit is changed form Cool/Dry mode to Auto Mode, the unit will continue to operate at (Auto) Cool Mode until the conditions for switching from Auto Cool to Auto Heat are satisfied.

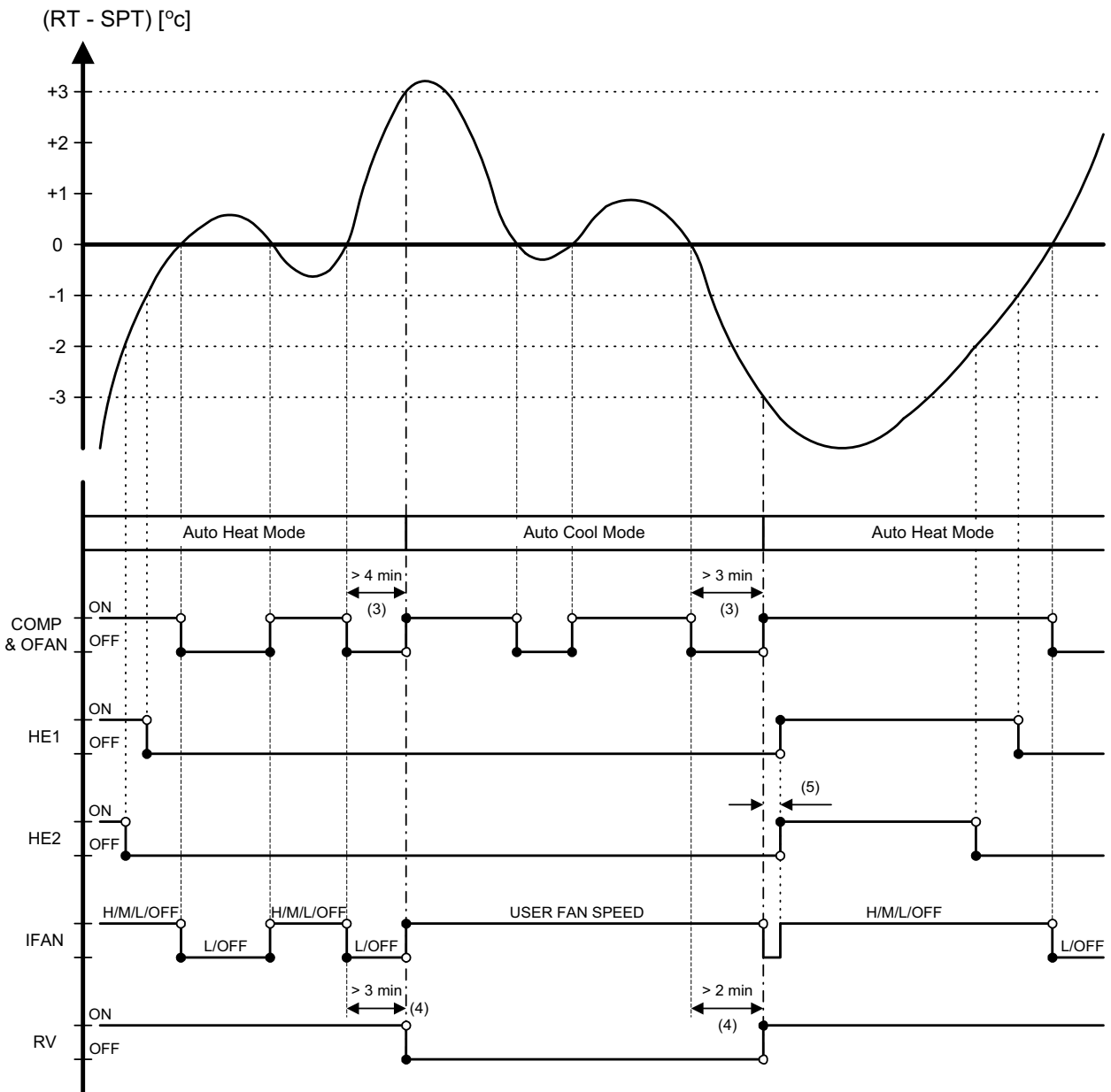
Similarly, when unit is changed from Heat Mode to Auto Mode, the unit will continue to operate at (Auto) Heat Mode until the conditions for switching from Auto Heat to Auto Cool are satisfied.

### 12.6.2 Auto Cooling or Heating, RC or SH Groups

- Mode: Auto
- Temp: Selected desired temperature
- Fan: Any
- Timer: Any
- I Feel: On or Off

Control function

Maintains room temp at desired level by selecting between cooling and heating modes.



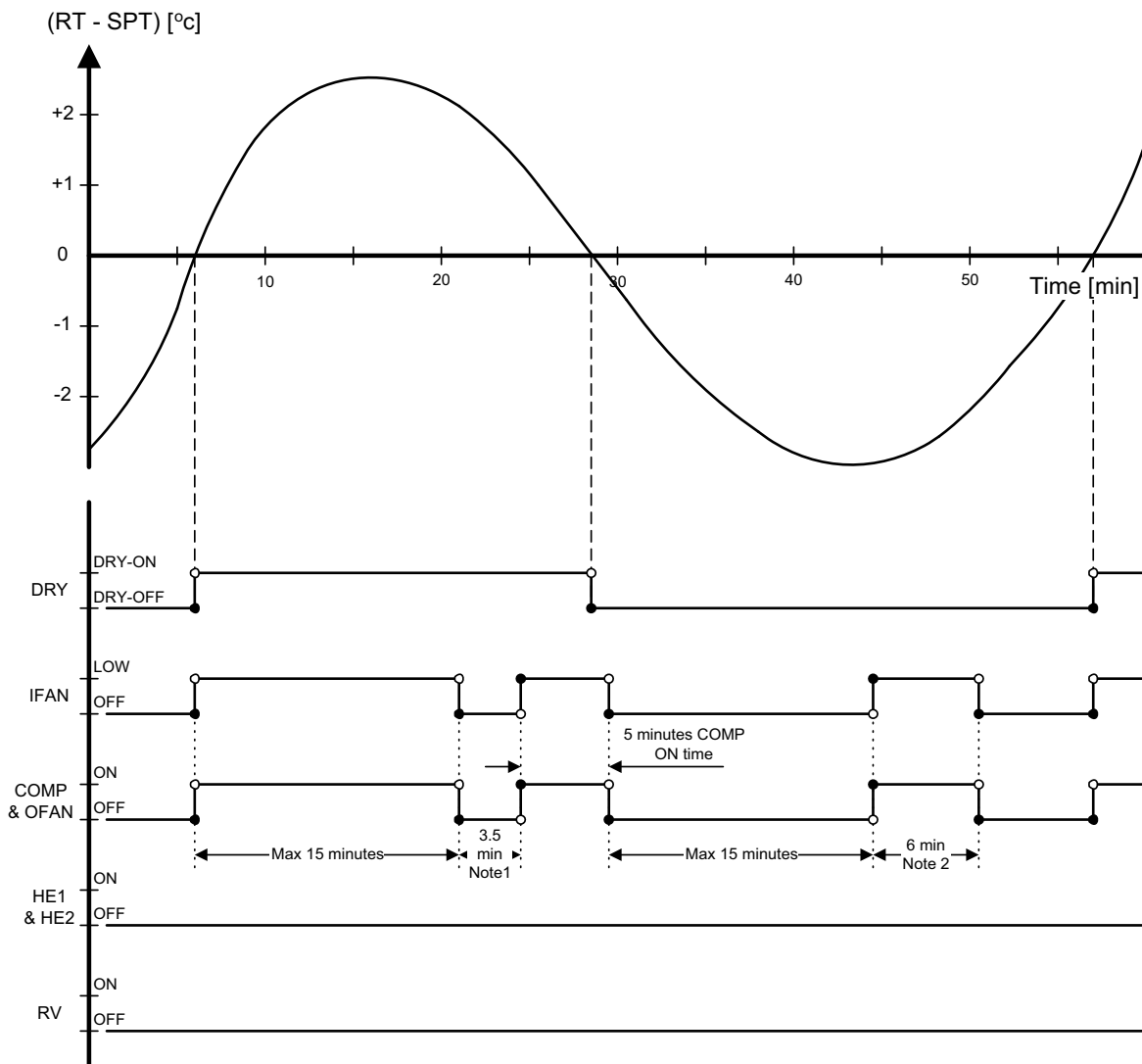
## 12.7 Dry Mode

### 12.7.1 Dry, ST or RC group

Mode: Dry  
 Temp: Selected desired temp  
 Fan: Low (automatically selected by software)  
 Timer: Any  
 I FEEL: Any

Control function

Reduce room humidity with minimum temp. fluctuations by operating in Cool Mode with low speed IFAN.



Notes :

1. When Dry is ON, the COMP is forced OFF for 3.5 min (longer than the 3 min Min COMP-Off time) after every 15 min of continuous COMP operation.
2. When Dry is OFF, the COMP is forced ON for 6 min (longer than the 3 min Min COMP-On time) after every 15 min of continuous COMP OFF time.



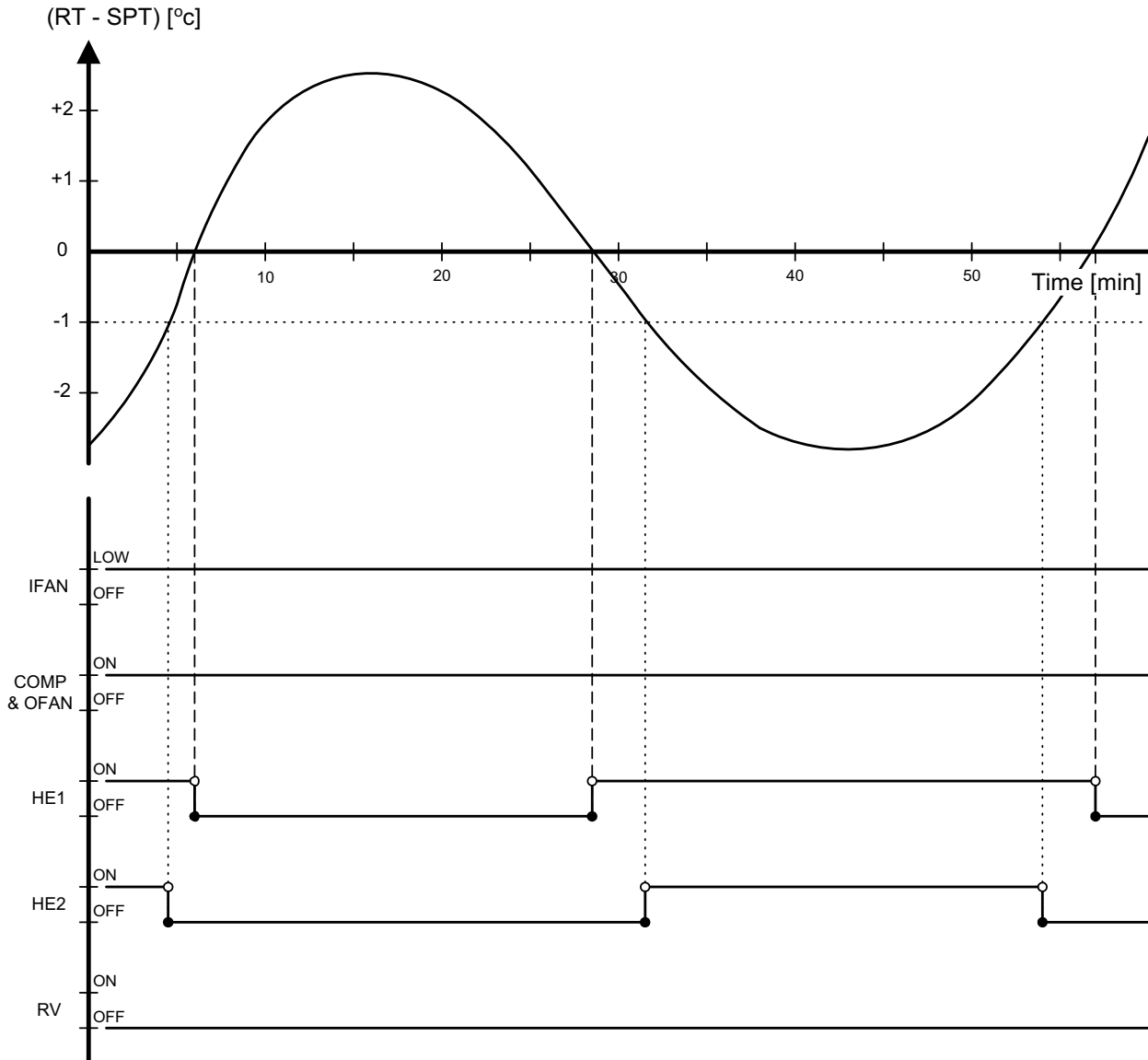
3. When Dry is changed from ON to OFF or vice versa, the limits mentioned in (1) & (2) are ignored. The COMP operation is only controlled by the 3 min Min OFF time and 1 min Min ON time.
4. In Dry Mode, IFAN is LOW when COMP is ON, and is OFF when COMP is OFF.
5. HEs are always OFF in Dry Mode.

### 12.7.2 Dry, SH

Mode: Dry  
 Temp: Selected desired temp.  
 Fan: Low (automatically selected by software)  
 Timer: Any  
 I FEEL: Any

Control function

Reduce room humidity with minimum Temp. fluctuations by operating in Cool Mode with low speed IFAN and HE.



Notes :

- 1) HP and Defrost protections are the same as in Cool Mode.
- 2) IFAN is operating continuously at low speed.
- 3) For MBX model, HE1 and HE2 will be activated simultaneously as the HE1 above.

## 12.8 Protection

### 12.8.1 Cooling Mode Protections

#### 1. Indoor Coil Defrost

Mode: Cooling, Dry, Auto

Temp: Selected desired temp.

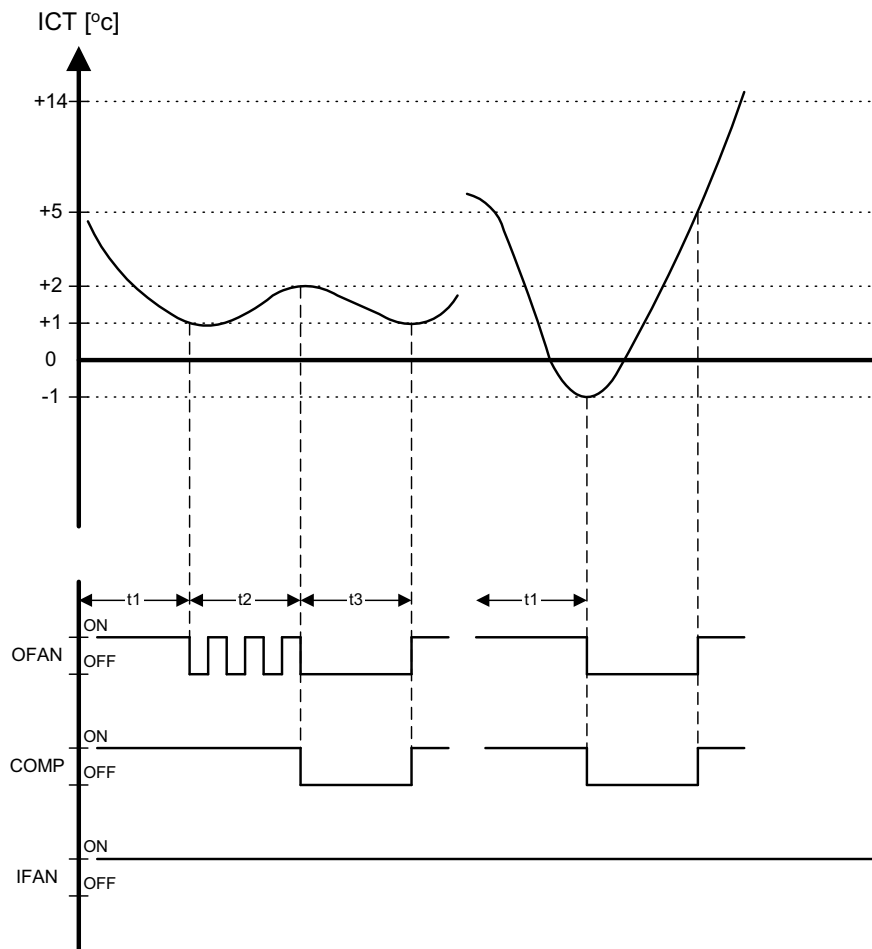
Fan: Any

Timer: Any

I Feel: On or Off

#### Control Function

Protect the indoor coil from ice formation at low ambient temperature.



t1 = 5 min minimum for each COMP starting

t2 = OFAN cycling (alternate between ON and OFF every 30 sec) for 20 min maximum

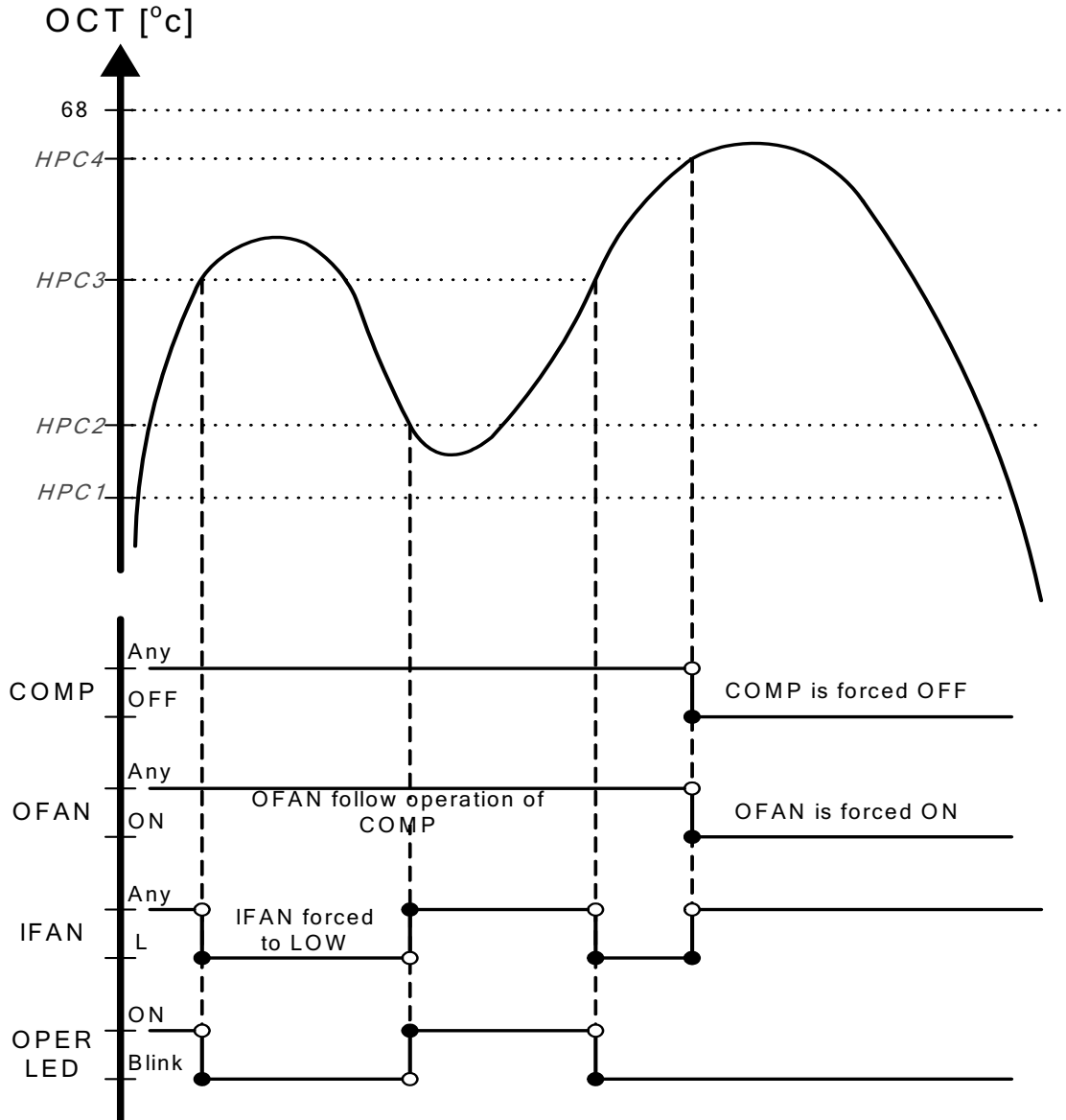
t3 = COMP and OFAN stop for 10 min minimum

**2. High Pressure Protection**

Mode: (Auto) Cooling or Dry  
 Temp: Selected desired temp.  
 Fan: Any  
 Timer: Any  
 I Feel: On or Off

Control Function

To protect the COMP from the high pressure built-up in the outdoor coil during normal cooling operation, by switching OFF the IFAN and COMP.



**Note:**

1. The ICT is also monitored during Cool and Dry mode, in case the RV control circuit is faulty. Whenever ICT reaches 70°C, which indicates a high pressure in the indoor coil, the COMP will be forced off automatically. The COMP can be turned on again only after the ICT is under 70°C again and after the 3 min COMP ON delay time. The OPER LED will not blink in this case.

## 12.8.2 Heating Mode Protections

### 1. Outdoor coil Deicing (excluding RH Group)

Mode: Heating, Auto (at heating)

Temp: Selected desired Temp

Fan: Any

Timer: Any

I FEEL: Any

#### Control function

Protects the Outdoor coil from ice formation by controlling COMP & RV operation.

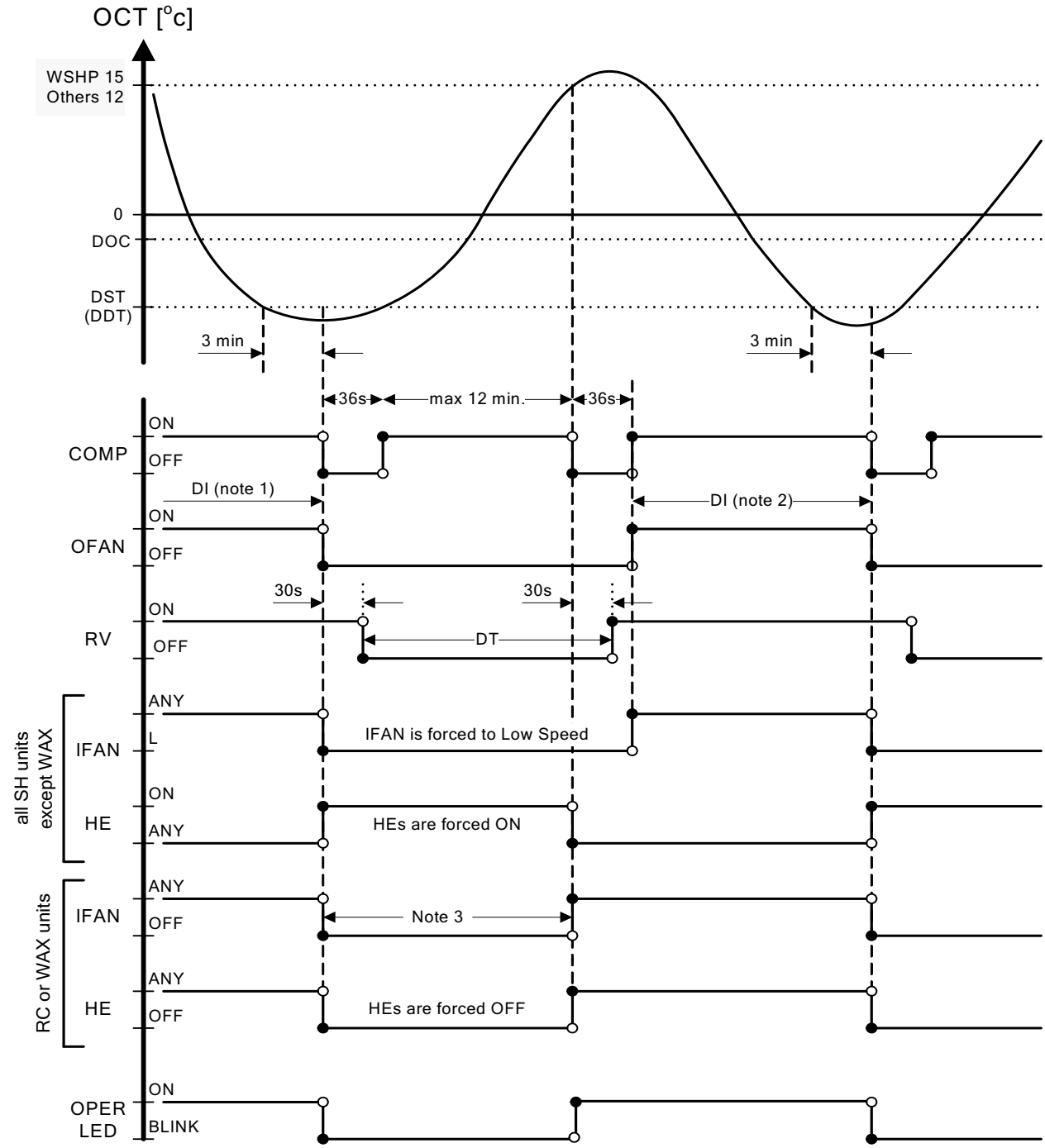
#### Scope

This new deicer is designed to operate at extreme temp conditions. The deicing cycle could be triggered from:

1. OCT temp and time between two consecutive deicing cycles.
2. Detection of ice forming by change of the OCT temp.

Both algorithms adjust the time between deicing cycles to optimize the A/C performance. The algorithm will automatically increase the time between deicing cycles and reduce the deicing cycle as needed.

2. Deicing procedure



Notes :

1. In the following Deicing cycles, the time interval between two Deicing cycles activation is between 30 to 80 min.
2. For RC group, HEs are forced OFF. IFAN operation is as in Heat Mode, Sect 4.0.3.a, i.e. IFAN will be set to OFF when  $ICT < 30^{\circ}C$ .  
For WAX, the IFAN is simply forced OFF.
3. For SH group, HEs are forced ON and IFAN is forced to operate in Low speed, regardless of the ICT and difference between RAT & SPT.

### 12.8.3 High pressure protection (excluding RH Group)

Mode: (Auto) Heating

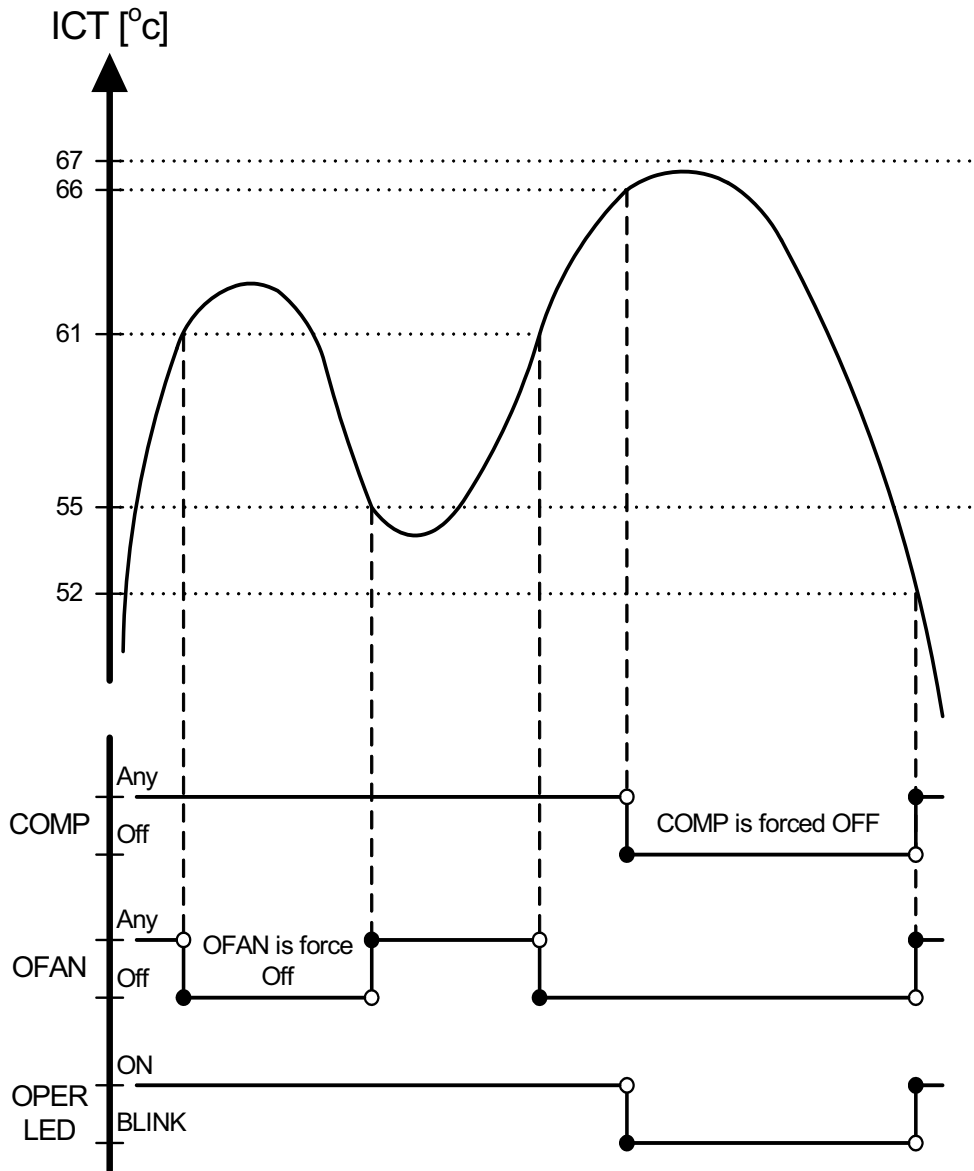
Fan: Any

Timer: Any

I Feel: On or Off

Control Function

Protect the Compressor from high pressure by switching OFF the OFAN and COMP.



Notes:

1. IFAN, HE1 and HE2 will be activated according to the relevant Heating Mode Sect.
2. In case of any malfunction in the relay control circuit, the OCT is also monitored during Heating mode. Whenever OCT reaches 70°C, which indicates a high pressure in the outdoor coil, the COMP will be forced off automatically. The COMP can be turned on again only after the 3 min COMP ON delay and the OCT is under 70°C. The OPER LED will not blink in this case.

## 12.9 Timer

Mode: Any  
Temp. Selected desired temp  
Fan: Any  
Timer: Timer On, Timer Off  
I Feel: On or Off

### Control function

1. Starts or stops the unit operation after pre-set time.  
If RC-1 is used, the timer setting will be (0.5 - 24 Hr) from the moment the timer is set. The minimum resolution is 30 minutes.  
If RC-2 or later version of remote controls is used, the timer setting will be (0:00 - 23:50) real time with 10 minutes resolution.
  2. After power failure, all pre-set timers are cleared. The system is forced to STBY mode and the Timer LED indicator is blinked to indicate the situation. The LED keeps blinking until the timer settings can be reloaded from a R/C message.  
Note: If all timers are inactive, the system will not be forced OFF after the power failure. The last OPER/STBY status will be loaded from the EEP instead.
  3. When the A/C receives any valid message from a R/C, the current ON/OFF timer settings will be replaced by the new timer settings in the R/C message.  
Note: The following timer related operations will not affect the A/C operating mode (Heat/Cool/Auto/Dry/Fan) setting.
    - Set ON/OFF timer
    - Clear ON/OFF timer
    - R/C ON Timer is time-up
    - R/C OFF Timer is time-up
- E.g. When a STBY A/C unit (with Cool Mode setting in its EEP) is turned on by the ON-TIMER of a R/C with heat mode setting, the A/C will start in Cool Mode.



## 12.10 I Feel Mode

Mode: Any  
Temp: Selected desired Temp.  
Fan: Any  
Timer: On or Off  
I Feel: On

### Control function:

Maintains room temp by comparing RAT to RCT sensor at the R/C.

Depending on the version of the R/C (RC1, 2, 3 or 4), a R/C in IFEEL mode will automatically send out its RCT (in I-FEEL data) with a time interval from 0 to 6 minutes continuously. The ELCON will blink the OPER LED to acknowledge the reception of this I-FEEL data but the buzzer is not activated.

### Notes:

1. The I-Feel function is cancelled when an ELCON unit is turned OFF OR after a power interrupt.
2. An ELCON will enter I-FEEL Mode automatically when it receives any I-FEEL data from any R/C.
3. If an ELCON is in I-FEEL Mode and no I-FEEL data has been received from the R/C for more than 4 min (6 min for RC4 short IFEEL messages), the I-FEEL mode would be suspended. And, the temp is replaced by the RAT from the local thermistor. As soon as a new I-FEEL data is received from the R/C, the I-FEEL mode will be resumed (same as the case described in Note 2).
4. There are 3 different format of I-FEEL data
  - the 32-bits data format of RC-1
  - the 34-bits data format of RC-2, RC-3 and RC-4 (in RC-2 compatible mode)
  - the 12-bits data format of stand-alone temperature sensor and RC-4 (in RC-4 mode)
5. The formats of the R/C data are provided in the Appendix section.

## 12.11 ORCED OPERATION

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

Forced operation mode	Pre-set Temp for : WMF,WMN,WNG models
Cooling	22°C
Heating	28°C

Note:

1. While under the forced operation, the temperature compensation schedule is disabled.
2. The forced operation is activated when the mode button on the Display Board is used to switch the unit to Cool or Heat mode.
3. The IFAN is always set to Autofan Speed in forced operation.

## 12.12 SLEEP

Mode: Any

Temp: Set – desired temperature selected

Fan: Any

Timer: Interact with Sleep Timer as described in sect 12.2

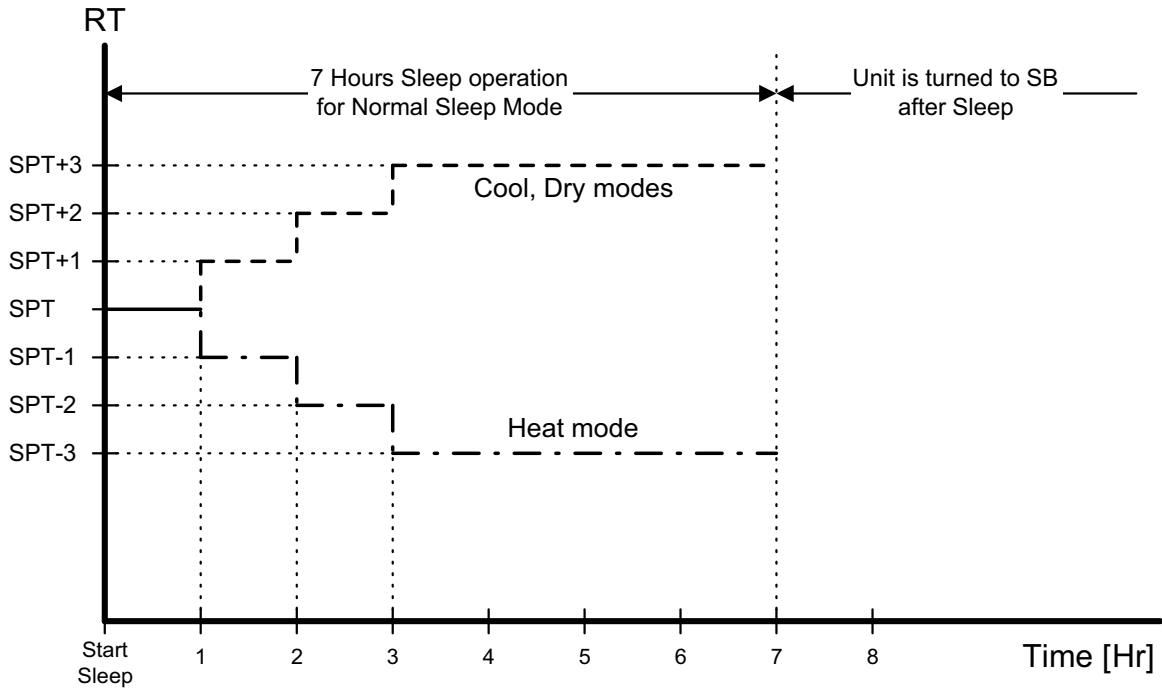
I Feel: On or Off

The Sleep mode is activated by using the sleep button on the R/C. In Sleep Mode, the unit will automatically adjust the SPT to turn up/down the room temperature (RT) gradually to provide maximum comfort to the user in sleep.

Sleep is treated as TIMER function. Therefore, the TIMER LED is activated similar to TIMER function.

### 12.13 SPT adjustment in Sleep Mode

1. In cool, auto cool or dry modes, the SPT adjustment is positive (from 0 to +3°C).
2. In heat or auto heat modes, the SPT adjustment is negative (from 0 to -3°C).
3. In other modes, there is no SPT adjustment.
4. The SPT adjustment is cancelled when the Sleep mode is cancelled.



Note: If Off-timer is active, the unit may go to SB before or after 7 hours of sleep operation.

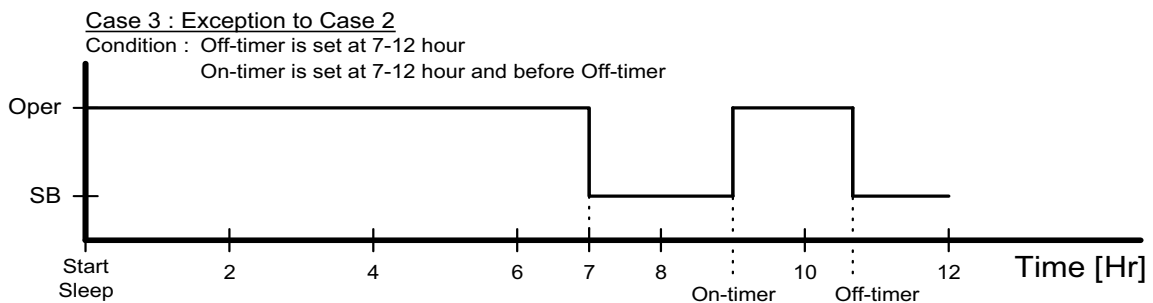
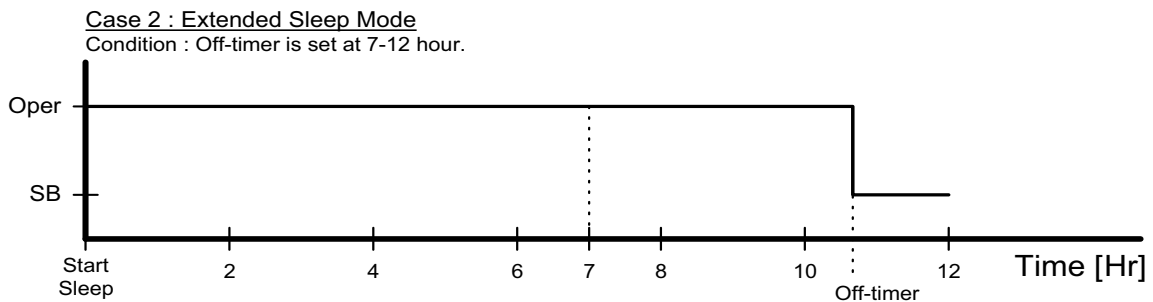
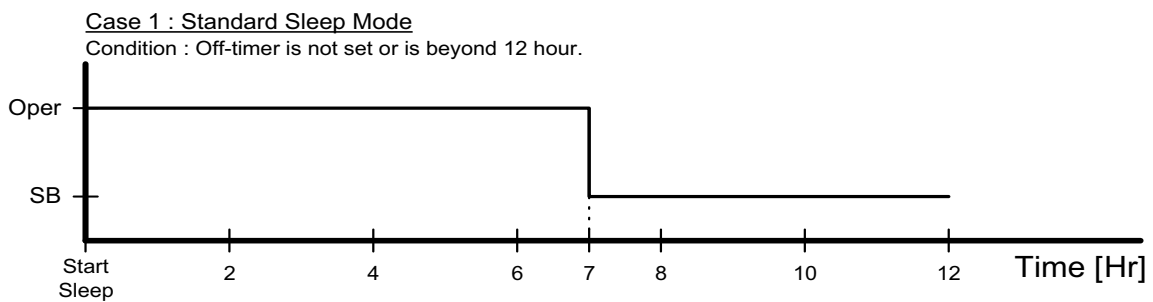
### 12.14 Time adjustment in Sleep Mode

In 10V6, the user can make use of the Off-Timer to extend the Sleep Time from 7 hours to 12 hour (max). The operation of the new “Extended Sleep Mode” is illustrated by the graphs below.

Case 1 is the Standard Sleep Mode, which is the only sleep mode in previous version of MCU. The A/C unit simply works for 7 hours, then goes to SB.

Case 2 is the new Extended Sleep Mode. If an active Off-Timer is set to turn off the A/C between 7-12 hour, relative to the starting of Sleep, the Sleep time is extended. And, instead of going to SB at the 7th hour, the A/C will work until reaching the Off-time.

Case 3 is an exception to case 2. The Sleep Mode will not be extended to the Off-Time when the Off-Timer is preceded by an On-Timer, which is also between 7-12 hour.



### 12.15 Clogged Air filter

Filter LED ON after 512 HR.

Filter LED is turned OFF, and the Filter Timer is restarted by pressing the reset button.

## 12.16 ON UNIT INDICATORS AND CONTROLS

STAND BY INDICATOR	<p>Lights up during STBY mode.</p> <p>Turns off during operaiton mode.</p> <p>In case of Shorted/Disconnected thermistor failure, the STBY LED will be blinking until the fault condition is corrected. In case of "Temp No change" fault the STBY LED will never blink.</p>
OPERATION INDICATOR	<ol style="list-style-type: none"> <li>Lights up during operation (turns off during STBY mode)</li> <li>Blinks for 300 ms, to announce that a R/C infrared signal has been received and stored.</li> <li>Blinks continuously during <ul style="list-style-type: none"> <li>OCT High Pressure Protection Mode</li> <li>ICT High Pressure Protection Mode</li> <li>Deicing in Heating Mode</li> <li>Water Over Flow in ECC Model</li> </ul> </li> </ol>
TIMER INDICATOR	Lights up during Timer and Sleep operation.
FILTER INDICATOR	<ol style="list-style-type: none"> <li>Lights up when Air Filter needs to be cleaned.</li> <li>Blinks during Water Over Flow in MBX/P2000 models.</li> </ol>
COOLING INDICATOR	<ol style="list-style-type: none"> <li>Lights up when system is switched to Cool Mode by using the Mode Switch <u>on the unit</u>.</li> <li>Show the thermistor status in Diagnostic Mode</li> </ol>
HEATING INDICATOR	<ol style="list-style-type: none"> <li>Lights up when system is switched Heat Mode by using the Mode Switch <u>on the unit</u>.</li> <li>Show the thermistor status in Diagnostic Mode</li> </ol>
MODE BUTTON (Cool, Heat, SB)	<ol style="list-style-type: none"> <li>Use to cycle the operation mode of the A/C unit among COOL, HEAT and SB modes, without using the R/C. Every time this switch is pressed, the next operation mode is selected, in this order : SB → Cool Mode → Heat Mode → SB → ...</li> <li>Press this button continuously for 5 sec or more to start the Diagnostic Mode</li> <li>Whenever the filter LED is on, short pressing on the Mode will reset the filter timer and turns off the Filter LED</li> </ol>
RESET / FILTER BUTTON	<ol style="list-style-type: none"> <li>When the Filter LED is ON, press to turn off the Filter LED after a clean filter has been reinstalled.</li> <li>When the Filter LED is OFF, use this button to enable/disable the buzzer announcer.</li> </ol>

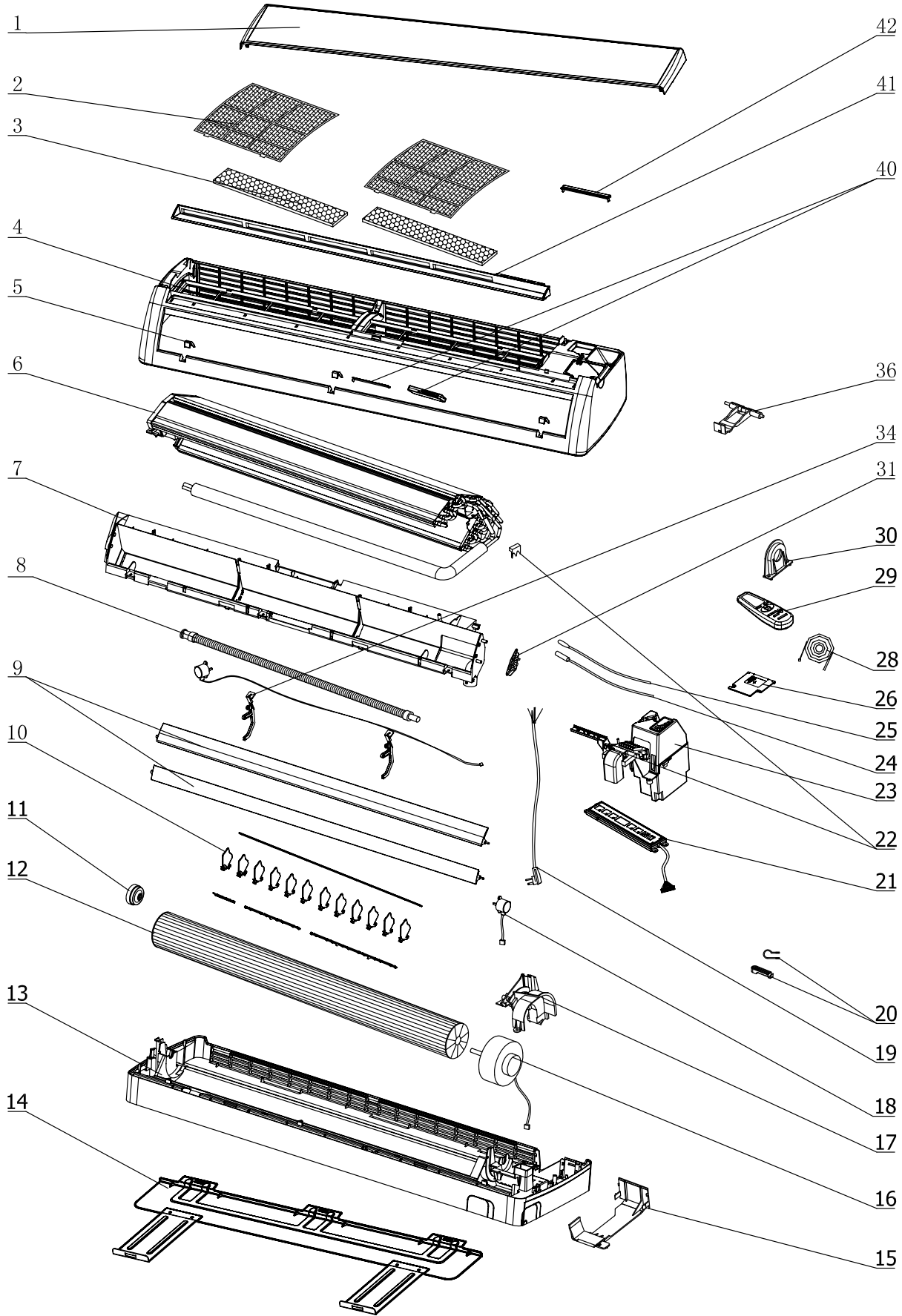
## 13. TROUBLESHOOTING

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 PCB.
2	Unit does not respond to remote control command.	Remote control command did not reach the indoor unit.	Check remote control batteries. If batteries are OK, check display and display wiring, if OK, replace PCB.
3	Unit responds to remote control command but operate indicator (Green LED) does not light up.	Problem with display PCB.	Replace display PCB.
4	Indoor fan does not start (louvers are opened and Green LED lights 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 130 VAC. If OK replace capacitor, if not OK replace controller.
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, and follow the actions described below.
7	Compressor stops during operation and Green LED remains on.	Electronic control or power supply problem.	Perform diagnostics, and follow the actions described below.
8	Compressor is ON but outdoor fan does not work.	Problem with outdoor electronics or outdoor fan capacitor.	Switch unit to COOL mode, HIGH speed with 16 degrees set point (summer) or HEAT mode high speed with 30 degrees set point (winter). Check power supply to motor is higher than 130 VAC. If OK replace capacitor, 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 230 VAC power supply, if OK, replace outdoor controller.
10	All components are operating properly but no cooling or heating.	Refrigerant leak.	Check refrigeration system.

No.	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
11	One of the protections is activated and compressor is stopped with no apparent reason.	Control problem or refrigeration system problem.	Perform diagnostics to detect active protection, and take action accordingly.
12	Compressor motor is noisy and no suction is present.	Wrong phase order to compressor.	Check compressor phase order.
13	Water leakage from indoor unit.	Indoor unit drainage tube is blocked.	Check and open drainage tube.
14	Freezing of outdoor unit in HEAT Mode and outdoor unit base is blocked with ice.		Connect base heater.
15	Unit operates with wrong fan speeds or wrong frequency.	Wrong jumper settings.	Perform diagnostics to obtain unit model or if operating by EEPROM parameters.
16	Filter LED comes ON after 512 hours of operation	Clogged air-filter	Replace air-filter. Press the RESET button.

**14. EXPLODED VIEWS AND SPARE PARTS LISTS**

**14.1 Indoor Unit: HAF 18, HAF 24**





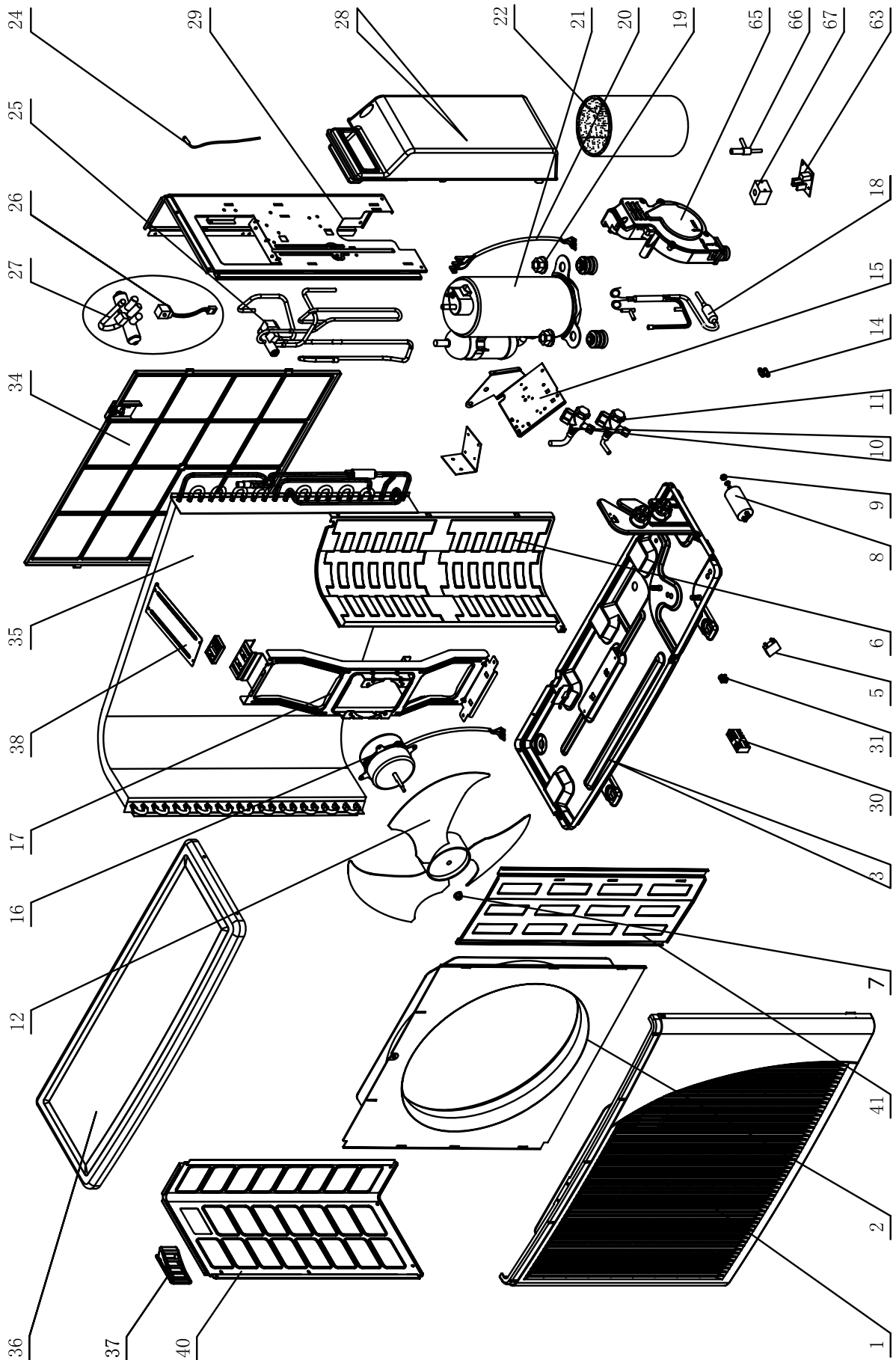
**14.2 Indoor Unit: HAF 18**

NO.	Part NO.	Description	Quantity
1	465720378	Front panel Assy./Black flat panel ,Airwell	1
1	465720379	Front panel Assy./Black flat panel,electra	1
1	465720380	Front panel Assy./Black flat panel,electra Inverter	1
1	465720381	Front panel Assy./Black flat panel,Johnson	1
1	465720382	Front panel Assy./Silver-white flat panel,Airwell	1
1	465720383	Front panel Assy./Silver-white flat panel,electra	1
1	465720384	Front panel Assy./Silver-white flat panel,electra Inverter	1
1	465720385	Front panel Assy./Silver-white flat panel,Johnson	1
2	452919800	Filter	2
3	470500012	Nanometer Photocatalysis Deodorant Filter	1
3	470500015	Biological Sterilization Filter	1
4	465720388	Front Frame Assy.	1
5	465340085	Screw Cover	3
6	453046600	Evaporator	1
7	465800111	Air Outlet Frame Assy.	1
8	465210009	Drain Pipe	1
9	465160023	Horizontal flap A	1
9	465160024	Horizontal flap B	1
10	465160016	Vertical Flap A	12
10	465160017	Vertical Flap B	2
11	4518662	Bearing assy fan	1
12	453024900	Impeller fan	1
13	465700011	Unit Housing Assy.	1
14	452920100	Mount bracket	1
15	465320017	Connect Plate/Unit housing	1
16	453116500R	Resin Motor	1
17	452918800	Cover/motor	1
18	453050300	STEP MOTOR B	1
19	455013404R	Power Cord/3G/2.5/2100(Israel Market)	1
19	455013707R	Power Cord Without Plug/3G/2.5/2100(Europe Market)	1
20	453232000	Clip /Power cord	1
21	467300270R	Display Board	1
22	452919100	Support/sensor	1
22	4516263	SENSOR BASE	1
23	467300201R	Controller/Delta F 18 S/W:10V15	1
24	438082	Thermistor Indoor coil BLACK	1
25	467400025	Indoor Air Inlet Temperature Sensor	1
26	465340051	Terminal Cover	1
28	4520416	Defrost cable EXPORT UNITS	1
29	438600R	Remote controller RC3-RC 973-600-00(optional)	1
29	467240007	Remote controller Assy.with batteries. RC5(optional)	1
29	467240018	Remote controller Assy with batteries. RC7(optional)	1
30	4518651	Cover Side Motor	1
31	453057900	Gear BOX ASSY	1
34	464250070	Support/Horizontal Flap	2
36	4518657	TUBE LOCK	1
40	465340049	Cover/Bi Polar Ionizer	1
41	465160008	Air Inlet Frame A Assy	1
42	465340045	Cover/Front Frame	2

**14.3 Indoor Unit: HAF 24**

NO.	Part NO.	Description	Quantity
1	465720378	Front panel Assy./Black flat panel ,Airwell	1
1	465720379	Front panel Assy./Black flat panel,electra	1
1	465720380	Front panel Assy./Black flat panel,electra Inverter	1
1	465720381	Front panel Assy./Black flat panel,Johnson	1
1	465720382	Front panel Assy./Silver-white flat panel,Airwell	1
1	465720383	Front panel Assy./Silver-white flat panel,electra	1
1	465720384	Front panel Assy./Silver-white flat panel,electra Inverter	1
1	465720385	Front panel Assy./Silver-white flat panel,Johnson	1
2	452919800	Filter	2
3	470500012	Nanometer Photocatalysis Deodorant Filter	1
3	470500015	Biological Sterilization Filter	1
4	465720388	Front Frame Assy.	1
5	465340085	Screw Cover	3
6	453260400	Evaporator Assy	1
7	465800111	Air Outlet Frame Assy.	1
8	465210009	Drain Pipe	1
9	465160023	Horizontal flap A	1
9	465160024	Horizontal flap B	1
10	465160016	Vertical Flap A	12
10	465160017	Vertical Flap B	2
11	4518662	Bearing assy fan	1
12	453024900	Impeller fan	1
13	465700011	Unit Housing Assy.	1
14	452920100	Mount bracket	1
15	465320017	Connect Plate/Unit housing	1
16	453134300R	Resin Motor	1
17	452918800	Cover/motor	1
18	453050300	STEP MOTOR B	1
19	455013404R	Power Cord/3G/2.5/2100(Israel Market)	1
19	455013707R	Power Cord Without Plug/3G/2.5/2100(Europe Market)	1
20	453232000	Clip /Power cord	1
21	467300270R	Display Board	1
22	452919100	Support/sensor	1
22	4516263	SENSOR BASE	1
23	467300201R	Controller/Delta F 18 S/W:10V15	1
24	438082	Thermistor Indoor coil BLACK	1
25	467400025	Indoor Air Inlet Temperature Sensor	1
26	465340051	Terminal Cover	1
28	4520416	Defrost cable EXPORT UNITS	1
29	438600R	Remote controller RC3-RC 973-600-00(Optional)	1
29	467240007	Remote controller Assy.with batteries. RC5(Optional)	1
29	467240018	Remote controller Assy with batteries. RC7(Optional)	1
30	4518651	Cover Side Motor	1
31	453057900	Gear BOX ASSY	1
34	464250070	Support/Horizontal Flap	2
36	4518657	TUBE LOCK	1
40	465340049	Cover/Bi Polar Ionizer	1
41	465160008	Air Inlet Frame A Assy	1
42	465340045	Cover/Front Frame	2

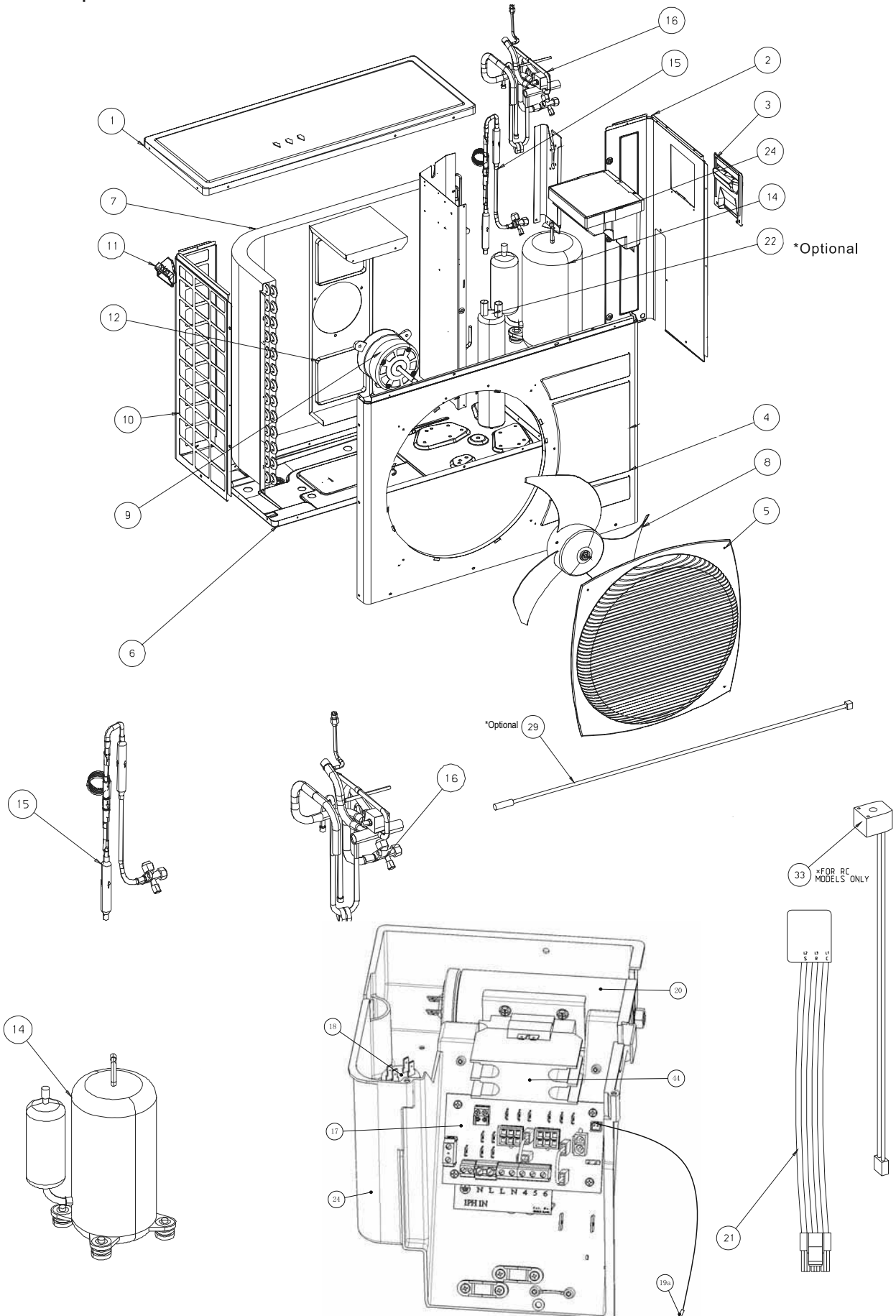
**14.4 Outdoor Unit: YAF 018**



## 14.5 Outdoor Unit YAF 018

NO.	Part NO.	Description	Quantity
1	433218	Front Panel A	1
2	433221	Air Inlet Ring	1
3	464600001	Base Plate Painting Assy.	1
5	455000108	Double patch Capacitor for fan motor 2uF	1
6	433217	Partition Plate	1
7	4519300	Nut M5 L	1
8	455000506	Compressor Capacitor With Screw 45uF	1
9	201019	Nut M8	1
10	463300506	Standard Valve Connect Pipe/Gas Valve	1
10	461010005	Gas Valve 1/2 R410A "	1
11	463300560	Connect Pipe/Standard Valve to Liquid Valve	1
11	461000004	Liquid Valve 1/4 R410A "	1
12	4519251	Axial Fan	1
14	204107	Cable clip Nylon	1
15	453012700	Electric Panel	1
16	4520171R	Fan Motor	1
17	4527203	Motor Support	1
18	463600000	Capillary Assy	1
19	4510677	Nut With Flange M8	3
20	391498	Wire assy	1
21	460000000	Compressor Assy./ GMCC PA200X2CS-4KT1	1
22	469270002	Insulation Rub+Felt/Compressor	1
24	467400054	OCT Outdoor Coil Temperature Sensor	1
25	461600001	4-Way Valve Assy.	1
26	4520071	4-W valve coil for R410A	1
27	4518952	4-W valve SHF-7H for R410A	1
28	465340080	Valve Cover//ONG3	1
29	4519606	Right side panel	1
31	236179	2 Poles terminal block	1
33	4514588	5 Poles terminal block	1
34	433228	Back Side Net	1
35	462300003	Condenser Assy.	1
36	4519614	Painting Top Cover	1
37	433225	Handle	1
38	4526298	Bridge	1
40	4519607	Left Side Panel Painting Plate	1
41	464860054	Painting Insulation Plate Assy/ONG	1

**14.6 Outdoor Unit: GCN 24**



**14.7 Outdoor Unit: GCN 24**

NO.	Part NO.	Description	Quantity
1	437045	LARGE UPPER COVER CUE	1
2	433280	SIDE PANEL OU7-24 R410A	1
3	436357	SMALL ELECTRICAL COVER CUE	1
4	439329	COVERAIR COLLECTOR	1
5	437091	OU SQUARE FAN GUARD	1
6	433722	BASE ASSY. OU7-24C EXPORT R410A	1
7	433285	COIL OU7-24 HDR	1
8	4529604	AXIAL FAN D493x143	1
9	434211	Replace by SP000000266 MOTOR+BRACKET	1
10	433281	SIDE GUARD OU7-24 R410A	1
11	436358	TRANSPORT HANDLE CUE	1
12	439342	MOTOR BASE OU7	1
14	438795	COMPRESSOR GP270PAA	1
15	433934	CAPILLARY HEATING ASSY OU7-24 R410A	1
16	433660	TUBING ASSY OU7-24C R410A	1
17	413496	BOARD TPHN 5F (RoHS)	1
18	442007	CAPACITOR 6uF 400V	1
19a	434716	THERMISTOR L1050(for coil)	1
20	442038	CAPACITOR 50mF 400V P1/P2	1
21	438627	COMPRESSOR WIRING TPHN-5F	1
24	437229	ELECTRICAL BOX TPHN	1
33	442520	VALVE COIL L700 MOLEX-DUNAN	1
44	192207	CONTACTOR 230V 40A	1

# APPENDIX A

## INSTALLATION AND OPERATION MANUAL

- ▶ **INSTALLATION AND OPERATION MANUAL HAF 18, HAF 24**