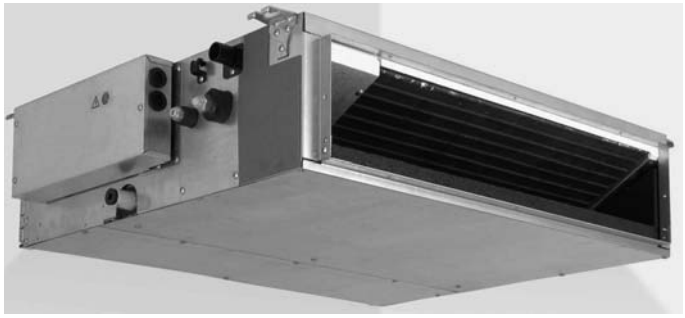
Airwell

Technical Manual

ECO DESIGN 2014

DLF DC Inverter Series

Indoor Units	Outdoor Units
DLF 18 DCI	YBDE018-H11
DLF 24 DCI	YBDE024-H11



REFRIGERANT

R410A

HEAT PUMP

SM DLF 1-A.1 GB

AUG – 2015

LIST OF EFFECTIVE PAGES

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

Dates of issue for original and changed pages are:

Original ..... 0 ..... June 2013

Total number of pages in this publication is 102 consisting of the following:

Page No.	Revision No. #		Page No.	Revision No. #		Page No.	Revision No. #

- Zero in this column indicates an original page.

* Due to constant improvements please note that the data on this service manual can be modified with out notice.

** Photos are not contractual.

Table of Contents

1. INTRODUCTION

1.1 General

The new **DLF DC INVERTER** split unit range comprises the following RC (heat pump) models:

- **DLF 18**
- **DLF 24**

Remote control compatibility

The units are compatible with remote controls RC3, RC4, RC7, RC8

Inverter description

Unlike standard units (fix RPM) that are selected according to their nominal capacity to overcome the maximum required load, DC Inverter units can be selected to a smaller nominal capacity range unit.
It made possible due to the ability of inverters to reach a much higher capacity level (indicated as Maximum Capacity) which is around 115-130% of the nominal capacity.

1.2 Main Features

High Technology

- Sine wave DC Compressor drive.
- DC-BL-SL (DC Brush-Less Sensor less) Inverter Compressor and fan motors.
- DC-BL Inverter Outdoor and Indoor Fan.
- Fuzzy Logic Adaptive Control.

System Features

- **ECO Design 2014 ready**
- Variable cooling and heating capacity from 30% to 115% (of rated capacity).
- High COP “A+ / A” class energy rating (Most units).
- Low noise levels.
- Pre-charged system up to 15m.
- Tubing up to 30m length / 15m height difference (most units).
- Networking connectivity.
- Dry contact inputs:
  - ♦ Forced Standby.
  - ♦ Night mode (for silent operation).
  - ♦ Power Shedding (to control maximum power consumption).
- Dry contact output:
  - ♦ Alarm
  - ♦ Base Heater
  - ♦ Crank Case Heater
- HMI Display consists of 7-segments shows system diagnostics and setup.
- Monitoring software (PC port for high level service).
- Cooling operation at outdoor temperature down to -10°C.
- Heating operation at outdoor temperature down to -15°C. •

1.3 Indoor Unit

DLF

The **DLF DCI** indoor unit is a low silhouette ducted unit and low noise level (up to 29 DBA), can be easily fitted to many type of residential and commercials applications.

- Low silhouette units 200mm height.
- High technology plastic fan and fan housing.
- Drain pool at bottom of unit with internal downward slope.
- Over-low switch, stops compressor operation in case of a blocked drainage.
- Integrated water pump
- Hydrophilic coated aluminum fins coil.
- **DC fan motor** with maximum fan speed flexibility.
- Easy installation and service access.
  (1) Horizontal/Vertical installation build in.
  (2) 2 options of return air location, on back of the unit or bellow the unit.
- Infrared remote control with liquid display unit (LCD).
- Advanced electronic control box assembly with 1 meter cable to allow installation at a more accessible area.

1.4 Filtration

- The unit is equipped with pre filters.
- The air filter can be located in the back side or in the bottom of the unit for easy access.

1.5 Control

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

1.6 Outdoor Unit

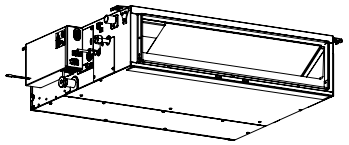
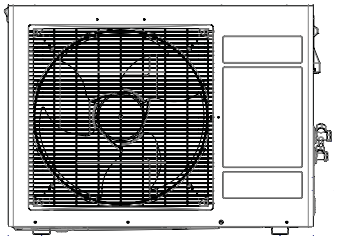
The **DCI** outdoor units can be installed as floor or wall mounted units by using a wall-supporting bracket. The metal sheets are protected by anti- corrosion paint work allowing long life resistance. All outdoor units are pre-charged. For further information, please refer to the Product Data Sheet,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

- Compressor mounted in a soundproofed compartment.
- Improved 3-blades axial fans for noise reduction.
- Outdoor coil with hydrophilic fins optimized for operation with R410A refrigerant.
- Fan grill air outlet.
- Service valves “flare” type connection.
- Service ports for high/low pressure measurement.
- Interconnecting wiring terminal blocks.

1.7 Inbox Documentation

Each unit includes its own installation and operation manuals.

1.8 Matching Table

OUTDOOR UNITS		 INDOOR UNITS	
OUTDOOR	MODEL	DLF18	DLF24
	YBDE018-H11	√	
	YBDE024-H11		√

2. PRODUCT DATA SHEET

2.1 DLF 18 DCI

Model Indoor Unit				AWSI-DLF018 –N11		
Model Outdoor Unit				AWAU-YBDE018-H11		
Installation Method				DUCTED		
Characteristics			**Units**	**Cooling**	**Heating**	
					Average	**Warmer**
Pdesign			kW	5.0	4.8	4.8
SEER / SCOP (1)			W/W	5.4	3.9	4.3
Energy efficiency class				A	A	A+
Annual energy consumption			kWh	808	2549	1488
Tbiv			°C	N/A	-3	6
Tol			°C	N/A	-15	-15
Capacity Range (1) (min÷max)			kW	1.5÷5.8	1.3÷6.8	
Power supply			V/Ph/Hz	220-240V/Single/50Hz		
Circuit breaker rating			A	20		
INDOOR	Fan type & quantity			Centrifugal x 2		
	Fan speeds	H/M/L	RPM	1110/980/860		
	Air flow (2)	H/M/L	m^3/hr	710/600/540		
	External static pressure	Min-Max	Pa	0-40		
	Sound power level (3)	H/M/L	dB(A)	54/51/48		
	Sound pressure level (4)	H/M/L	dB(A)	35/32/29		
	Moisture removal		l/hr	1.8		
	Condensate drain tube I.D		mm	19		
	Dimensions	WxHxD	mm	750x630x200		
	Weight		kg	21		
	Package dimensions	WxHxD	mm	890x710x243		
	Packaged weight		kg	23		
	Units per pallet		units	14		
	Stacking height		units	7		
OUTDOOR	Refrigerant control			EEV		
	Compressor type, model			Twin Rotary DC Inverter		
	Fan type & quantity			Axial x 1		
	Fan speeds		RPM	200 – 750 (continuous)		
	Air flow	Max.	m^3/hr	2500		
	Sound power level	Nom.	dB(A)	65		
	Sound pressure level	Nom.	dB(A)	53		
	Dimensions	WxHxD	mm	900x700x340		
	Weight		kg	56		
	Package dimensions	WxHxD	mm	985x730x435		
	Packaged weight		kg	58.5		
	Units per pallet		Units	6 units per pallet		
	Stacking height		units	2 levels		
	Refrigerant type			R410A		
	Refrigerant charge (standard connecting tubing length)		kg(7.5m)	1.55		
	Additional charge per 1 meter		gr / 1m	7.5m < 0gr < 15m < 35gr per 1m < 30m		
	Connections between units	Liquid line	In.(mm)	1/4"(6.35)		
		Suction line	In.(mm)	1/2"(12.7)		
		Max. tubing length	m.	30		
		Max. height difference	m.	15		
Operation control type				Remote control		
Heating elements			kW			
Others						

(1) Rating conditions in accordance with EN14825 and EN14511 (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 1.4 meter distance from unit.

2.2 DLF 24 DCI

Model Indoor Unit				AWSI-DLF024 –N11		
Model Outdoor Unit				AWAU-YBDE024-H11		
Installation Method				DUCTED		
Characteristics			**Units**	**Cooling**	**Heating**	
					Average	**Warmer**
Pdesign			kW	7.0	7.5	7.5
SEER / SCOP			W/W	5.6	3.8	4.7
Energy efficiency class				A+	A	A++
Annual energy consumption			kWh	1099	4019	1920
Tbiv			°C	N/A	-3	6
Tol			°C	N/A	-15	-15
Capacity Range (1) (min÷max)			kW	1.5÷7.5	1.5÷8.8	
Power supply			V/Ph/Hz	220-240V/Single/50Hz		
Circuit breaker rating			A	20		
INDOOR	Fan type & quantity			Centrifugal x 3		
	Fan speeds	H/M/L	RPM	1200/1050/980		
	Air flow (2)	H/M/L	m3/hr	1150/950/900		
	External static pressure	Min-Max	Pa	0-40		
	Sound power level (3)	H/M/L	dB(A)	63/59/56		
	Sound pressure level (4)	H/M/L	dB(A)	39/35/32		
	Moisture removal		l/hr	2.7		
	Condensate drain tube I.D		mm	19		
	Dimensions	WxHxD	mm	1050x630x200		
	Weight		kg	25		
	Package dimensions	WxHxD	mm	1190x710x243		
	Packaged weight		kg	28		
	Units per pallet		units	14		
	Stacking height		units	7		
OUTDOOR	Refrigerant control			EEV		
	Compressor type, model			Twin Rotary DC Inverter		
	Fan type & quantity			Axial x 1		
	Fan speeds		RPM	300 – 820 (continuous)		
	Air flow	Max.	m3/hr	2750		
	Sound power level	Nom.	dB(A)	67		
	Sound pressure level	Nom.	dB(A)	55		
	Dimensions	WxHxD	mm	900x700x340		
	Weight		kg	61.0		
	Package dimensions	WxHxD	mm	985x730x435		
	Packaged weight		kg	63.5		
	Units per pallet		Units	6		
	Stacking height		units	2 levels		
	Refrigerant type			R410A		
	Refrigerant charge (standard connecting tubing length)		kg(7.5m)	2.3		
	Additional charge per 1 meter		gr / 1m	7.5m < 0gr < 15m < 35gr per 1m < 30m		
	Connections between units	Liquid line	In.(mm)	3/8"(9.53)		
		Suction line	In.(mm)	5/8"(15.88)		
		Max.tubing length	m.	30		
		Max.height difference	m.	15		
Operation control type				Remote control		
Heating elements			kW			
Others						

(1) Rating conditions in accordance with EN14825 and EN14511 (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 1.4 meter distance from unit.

3. RATING CONDITIONS

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

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

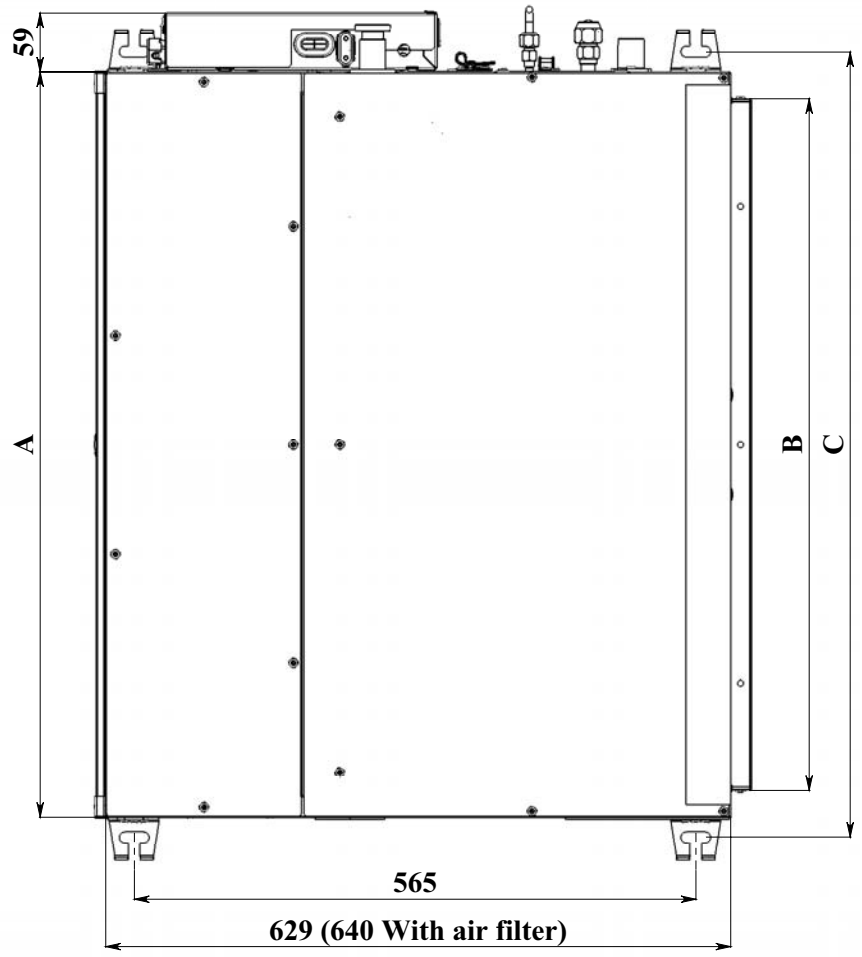
Heating:
Indoor: 20°C DB
Outdoor: 7°C DB 6°C WB

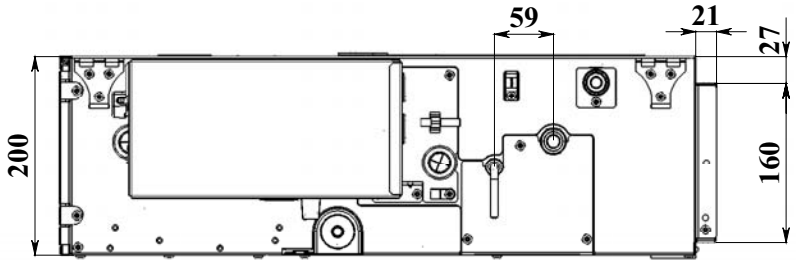
3.1 Operating Limits

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

4. OUTLINE DIMENSIONS

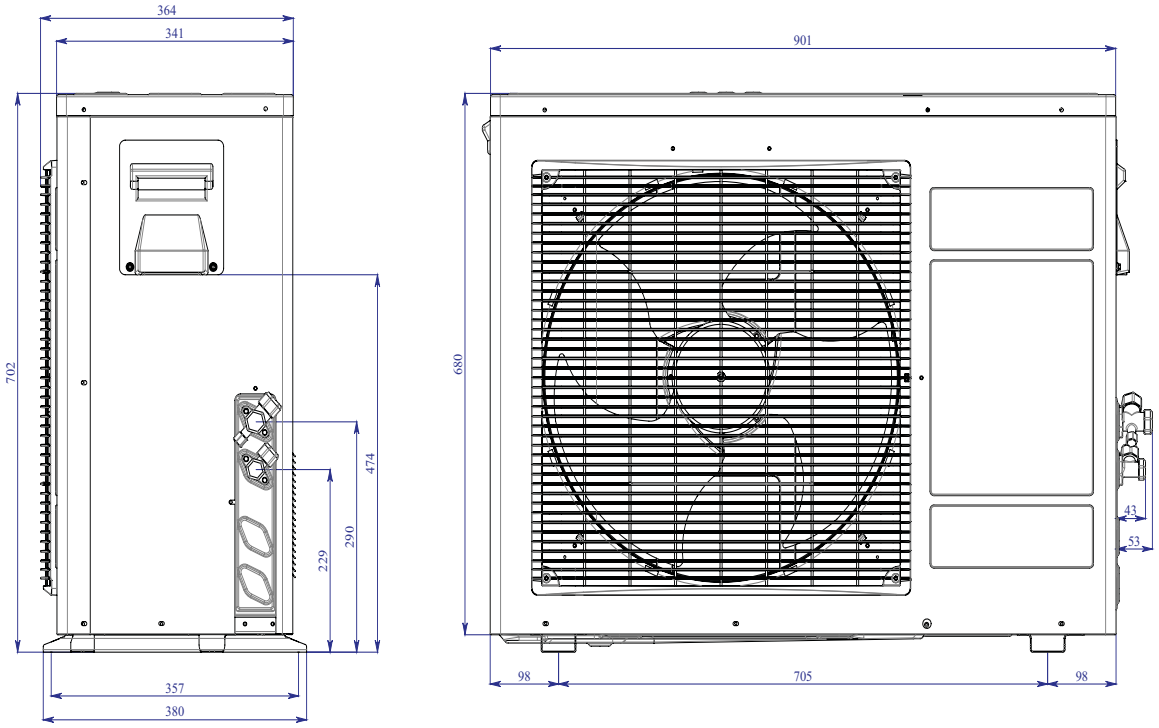
4.1 Indoor Unit: DLF 18, 24





Nominal Capacity	A	B	C
5.0 kW	750	696	790
7.0 kW	1050	996	1090

4.2 Outdoor Unit: YBDE 018/024



5. PERFORMANCE DATA & PRESSURE CURVES

5.1 DLF 18 DCI - H11

5.1.1 Cooling Capacity (kW)

		ID COIL ENTERING AIR DB/WB TEMPERATURE [°C]				
OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	4.83	5.15	5.47	5.78	6.10
	SC	3.94	4.02	4.10	4.18	4.26
	PI	0.97	0.99	1.01	1.03	1.05
30	TC	4.60	4.92	5.23	5.55	5.86
	SC	3.84	3.92	4.00	4.08	4.16
	PI	1.09	1.11	1.13	1.14	1.16
35	TC	4.37	4.68	**5.00**	5.32	5.63
	SC	3.74	3.82	**3.90**	3.98	4.06
	PI	1.20	1.22	**1.24**	1.26	1.28
40	TC	4.14	4.45	4.77	5.08	5.40
	SC	3.64	3.72	3.80	3.88	3.96
	PI	1.32	1.34	1.35	1.37	1.39
46	TC	3.86	4.17	4.49	4.80	5.12
	SC	3.52	3.60	3.68	3.76	3.84
	PI	1.45	1.47	1.49	1.51	1.53

LEGEND

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

5.1.2 Heating

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB		
		15	20	25
-15/-16	TC	3.06	2.84	2.63
	PI	0.79	0.87	0.95
-10/-12	TC	3.40	3.19	2.97
	PI	0.95	1.04	1.12
-7/-8	TC	3.66	3.45	3.23
	PI	1.08	1.16	1.24
-1/-2	TC	3.79	3.58	3.36
	PI	1.14	1.22	1.30
2/1	TC	3.88	3.66	3.45
	PI	1.18	1.26	1.34
7/6	TC	5.01	**4.80**	4.59
	PI	1.24	**1.32**	1.40
10/9	TC	5.29	5.08	4.86
	PI	1.31	1.39	1.47
15/12	TC	5.57	5.35	5.14
	PI	1.39	1.47	1.55
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
OD – Outdoor

5.2 DLF 24 DCI - H11

5.2.1 Cooling Capacity (kW)

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C] 22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	6.77	7.21	7.65	8.09	8.54
	SC	5.71	5.82	5.94	6.05	6.17
	PI	1.34	1.36	1.39	1.41	1.44
30	TC	6.44	6.88	7.33	7.77	8.21
	SC	5.56	5.68	5.79	5.91	6.03
	PI	1.49	1.52	1.54	1.57	1.59
35	TC	6.12	6.56	**7.00**	7.44	7.88
	SC	5.42	5.53	**5.65**	5.77	5.88
	PI	1.65	1.67	**1.70**	1.73	1.75
40	TC	5.79	6.23	6.67	7.12	7.56
	SC	5.27	5.39	5.51	5.62	5.74
	PI	1.81	1.83	1.86	1.88	1.91
46	TC	5.40	5.84	6.28	6.73	7.17
	SC	5.10	5.22	5.33	5.45	5.57
	PI	1.99	2.02	2.04	2.07	2.10

LEGEND

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

5.2.2 Heating

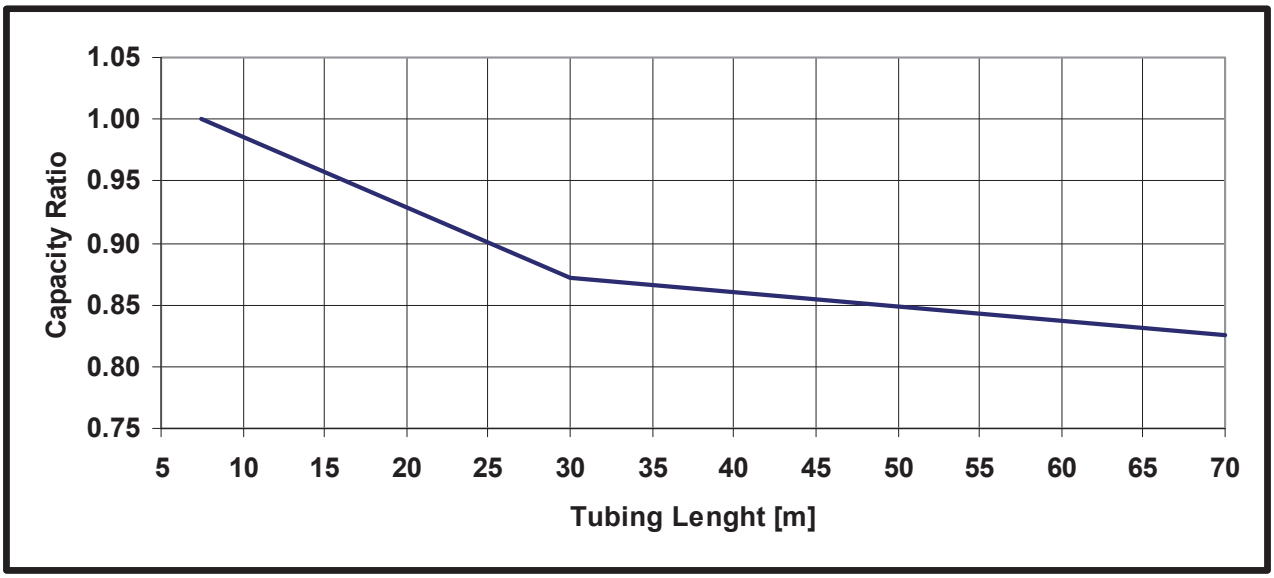
		ID COIL ENTERING AIR DB TEMPERATURE [°C]		
OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	15	20	25
-15/-16	TC	4.77	4.44	4.11
	PI	1.06	1.16	1.27
-10/-12	TC	5.31	4.98	4.65
	PI	1.27	1.38	1.49
-7/-8	TC	5.72	5.39	5.05
	PI	1.44	1.54	1.65
-1/-2	TC	5.92	5.59	5.25
	PI	1.52	1.62	1.73
2/1	TC	6.06	5.72	5.39
	PI	1.57	1.68	1.79
7/6	TC	7.83	**7.50**	7.17
	PI	1.65	**1.76**	1.87
10/9	TC	8.27	7.93	7.60
	PI	1.75	1.86	1.97
15/12	TC	8.70	8.36	8.03
	PI	1.85	1.96	2.06
15-24 (Protection Range)	TC	85 - 105 % of nominal		
	PI	80 - 120 % of nominal		

LEGEND

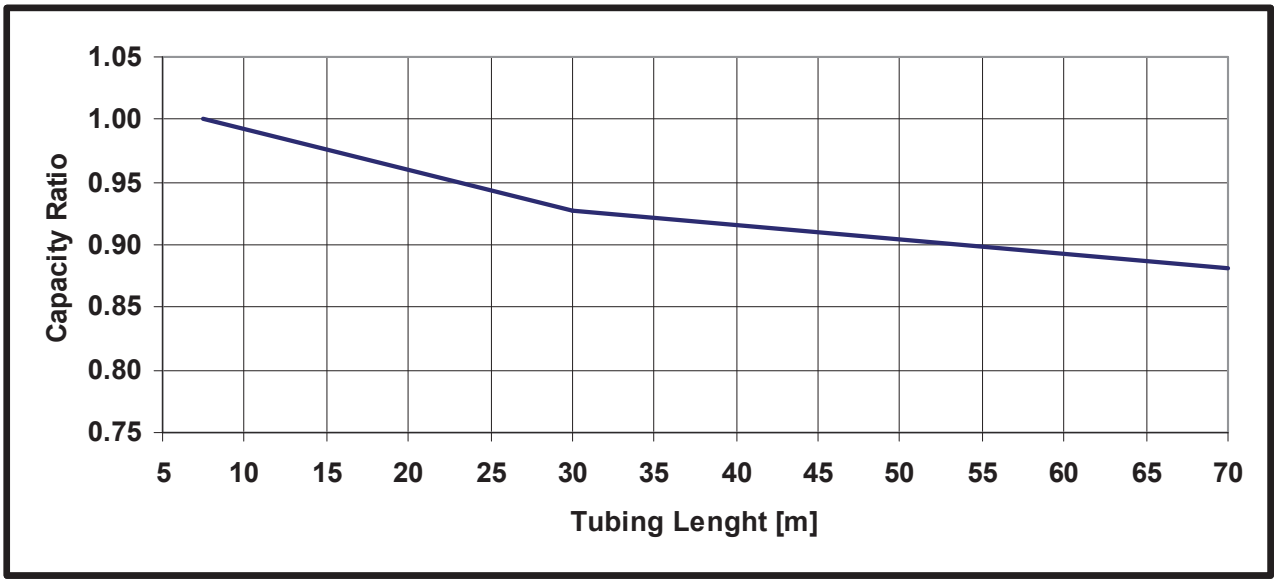
TH – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.3 Capacity Correction Factor for Tubing Length

5.3.1 Cooling

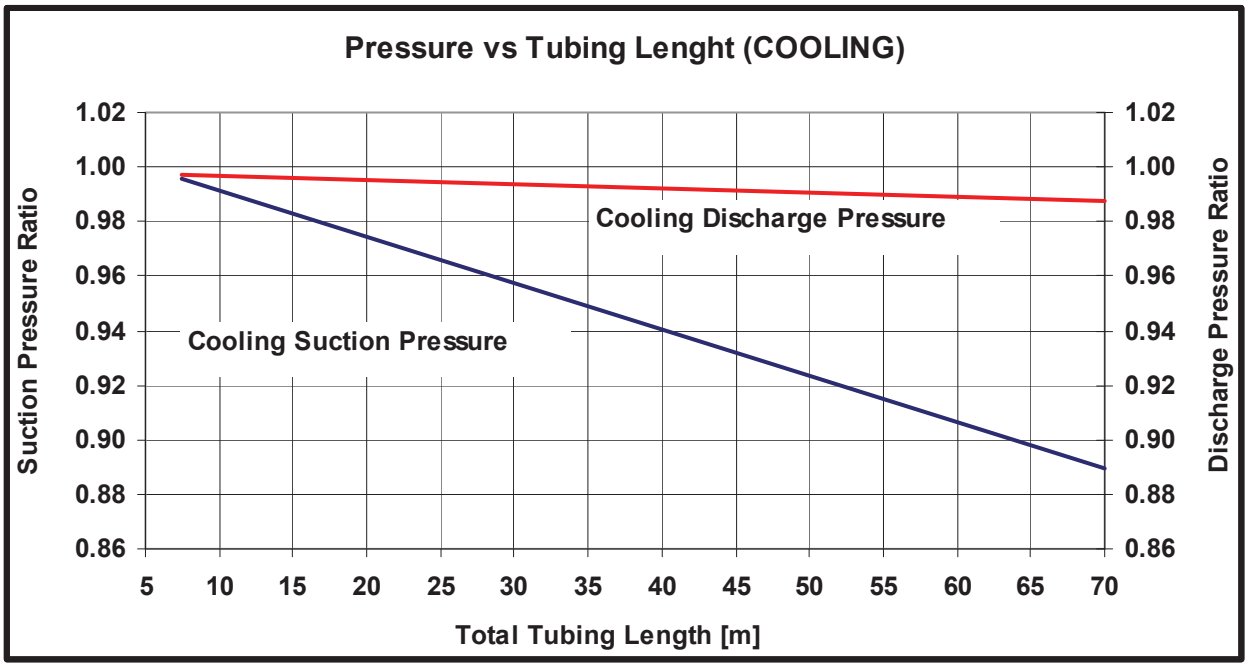


5.3.2 Heating

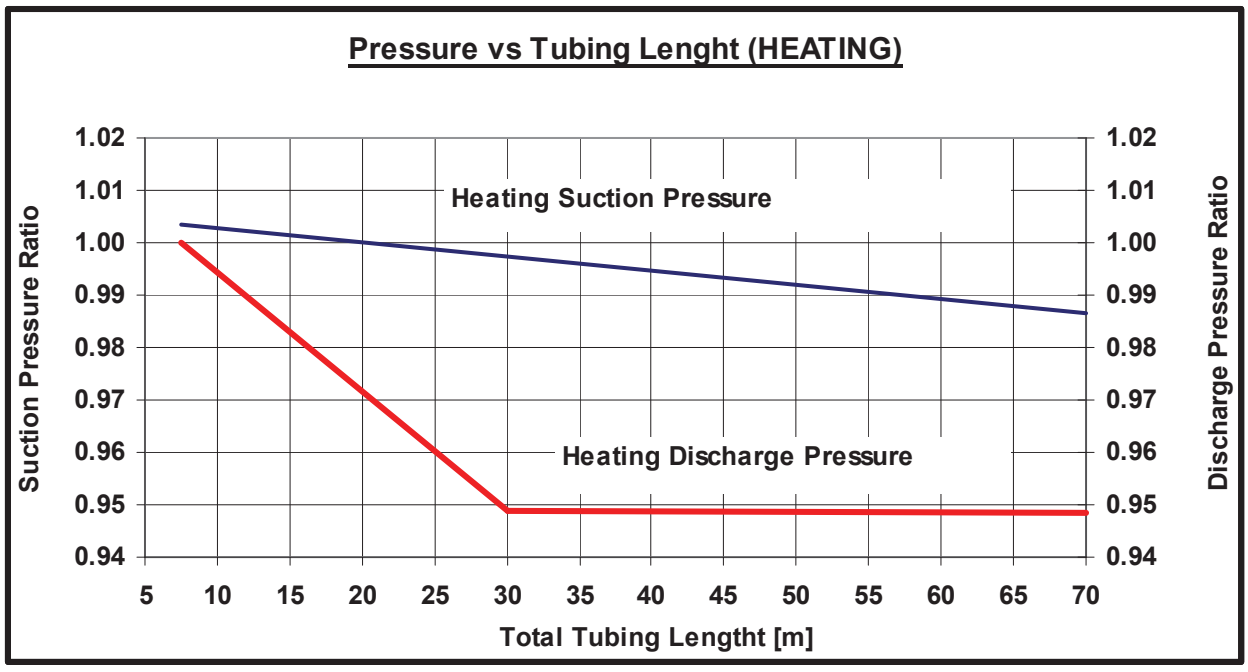


5.4 Pressure Correction Factor for Tubing Length

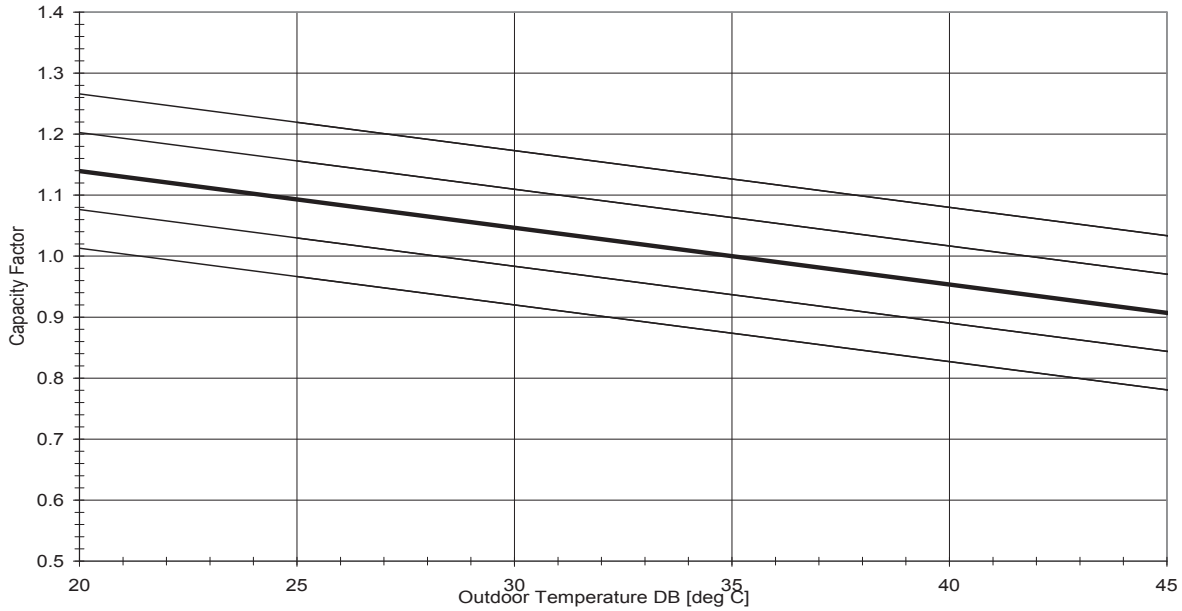
5.4.1 Cooling



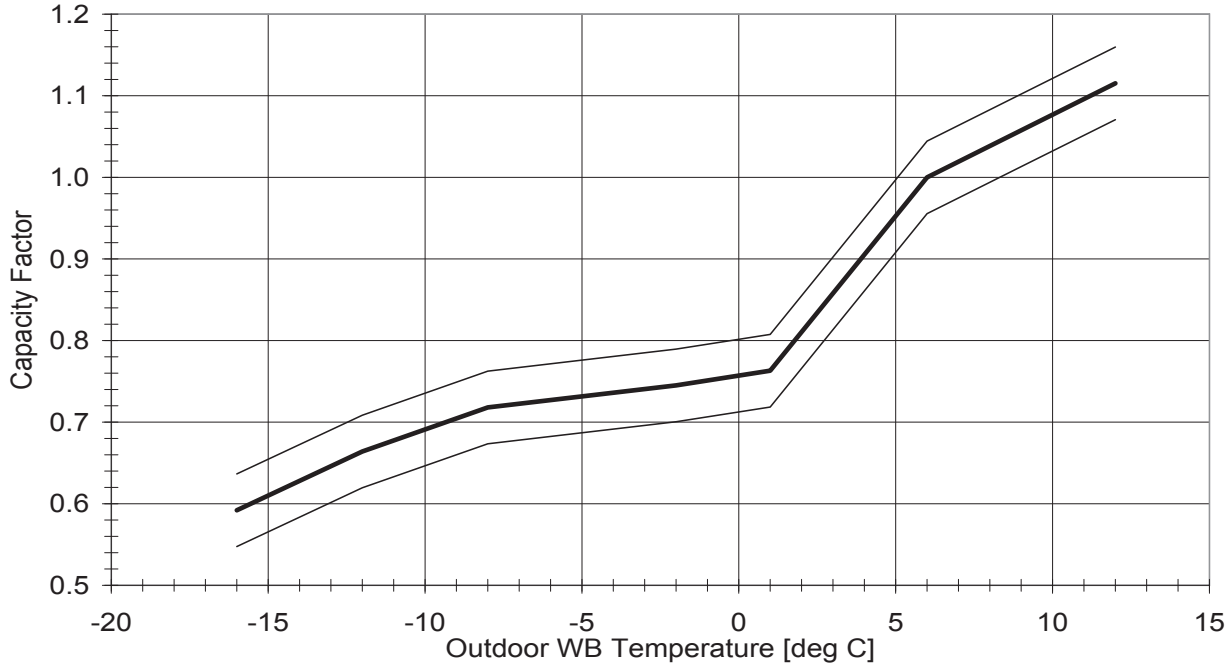
5.4.2 Heating



5.5 Capacity Correction Factors (Cooling)

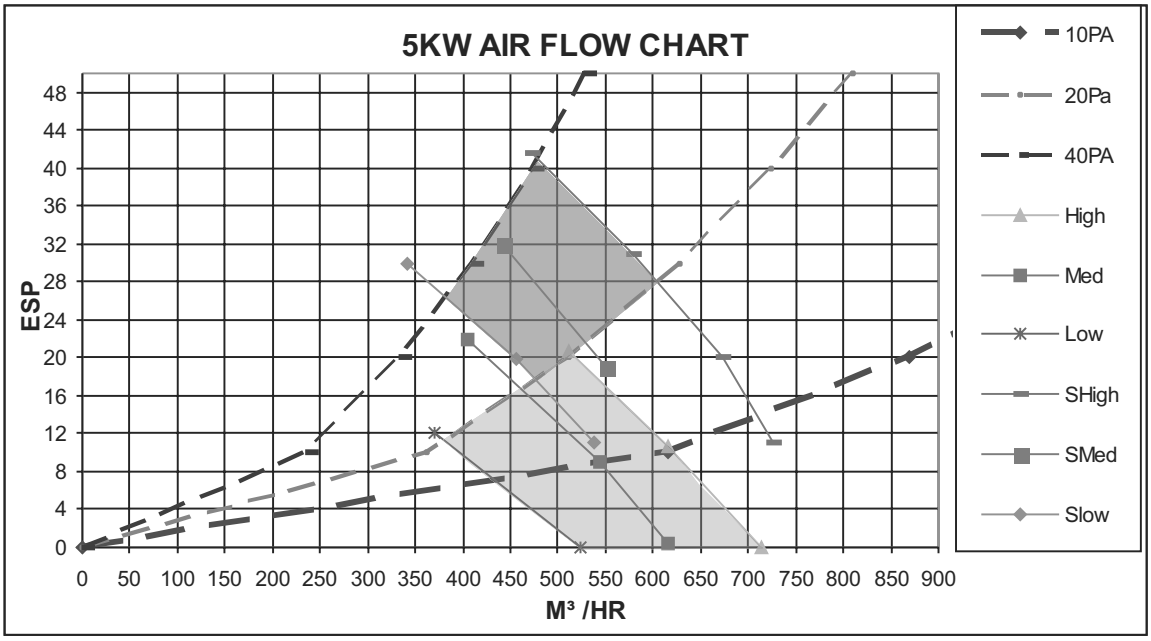


5.6 Capacity Correction Factors (Heating)

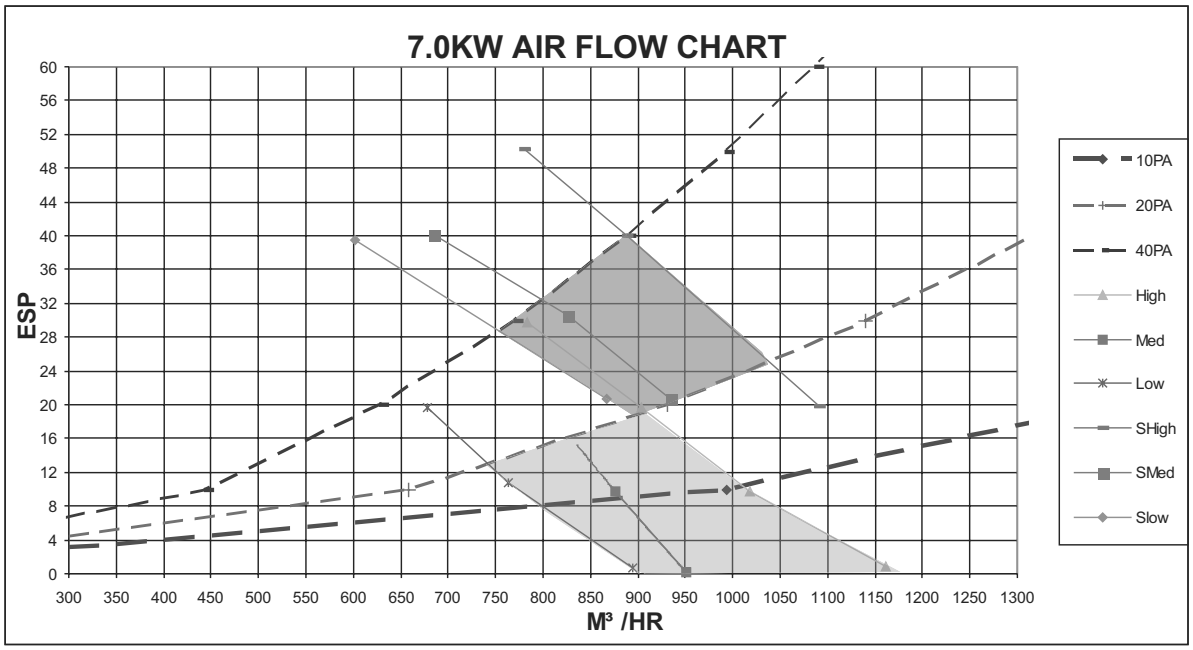


6. AIRFLOW CURVES

6.1 Model: DLF 18 DCI



6.2 Model: DLF 24 DCI



6.3 DLF UNITS RANGE AIR FLOW CORRECTION FACTORS

(at nominal rating conditions — Test mode).

		Air Flow Rate [% of nominal]				
		60%	70%	80%	90%	100%
Cooling	TC	0.88	0.91	0.94	0.97	1
	SC	0.78	0.84	0.89	0.95	1
	PI	0.95	0.97	0.98	0.99	1
Heating	PI	1.07	1.05	1.03	1.02	1
	TC	0.90	0.92	0.95	0.97	1

* Permissible Air flow Rate - according to model Air Flow Curves

7. SOUND LEVEL CHARACTERISTICS

7.1 Sound Pressure Level

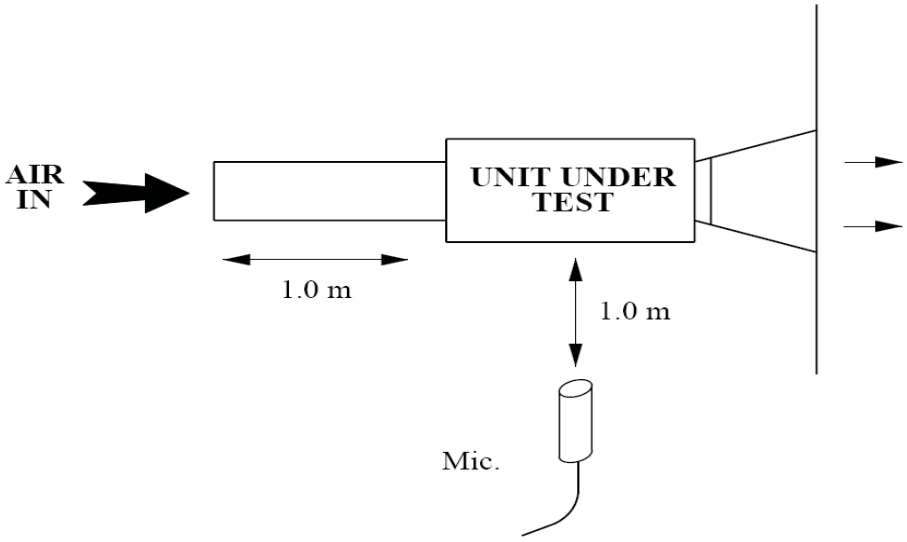
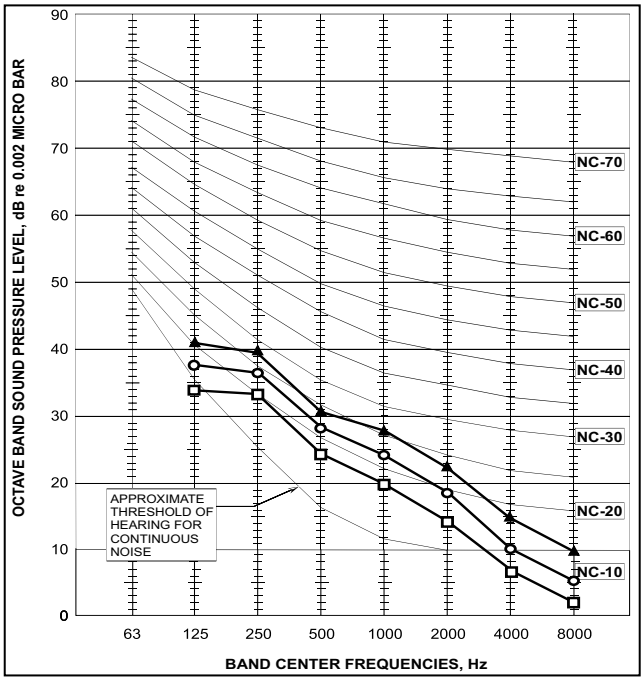


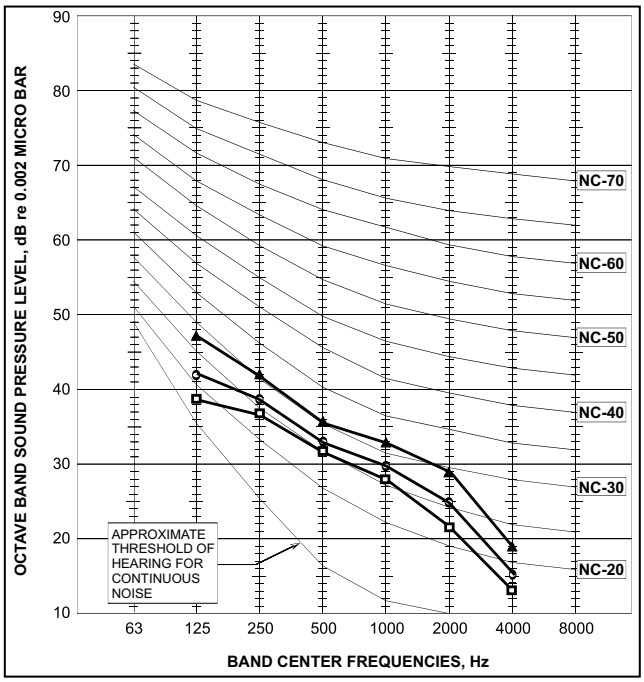
Figure 1

7.2 Soud Pressure Level Spectrum (Measured as Figure 1)

DLF 18



DLF 24



FAN SPEED	LINE
HI	▲
ME	○
LO	□

7.3 Outdoor Units

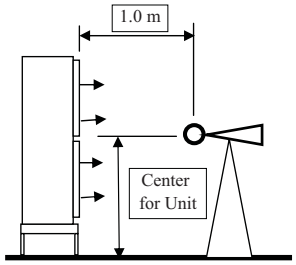
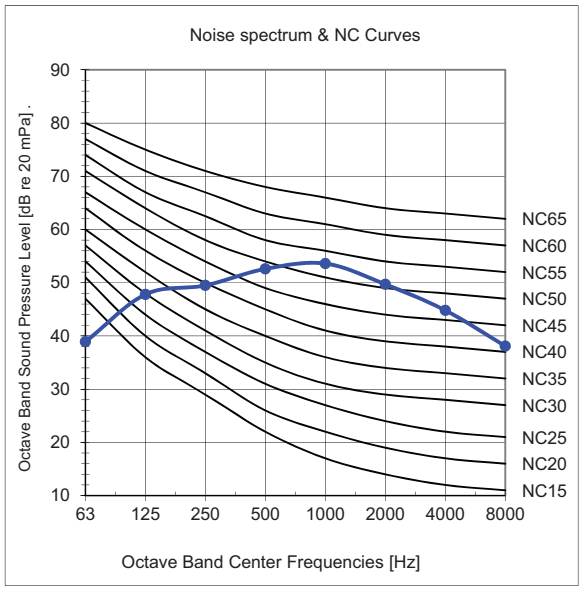


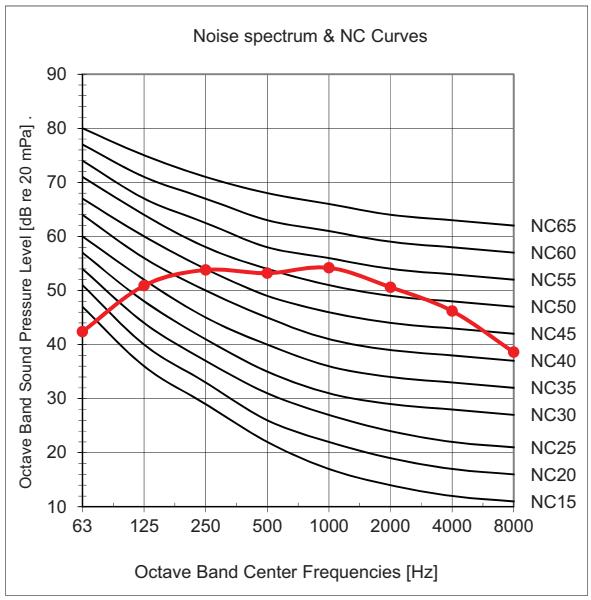
Figure 2

7.4 Sound Pressure Level Spectrum (Measured as Figure 2)

YBDE 018/024 - H11 Cooling



YBDE 018/024 - H11 Heating



8. ELECTRICAL DATA

8.1 Single Phase Units

MODEL	DLF 18	DLF 24
Power Supply	1 PH ,220-240VAC ,50HZ	
Connected to	Indoor or Outdoor	Outdoor
Maximum Current	15A	15A
Inrush Current (c)	45 A	
Starting Current (d)	15 A	15A
Circuit Breaker	20 A	
Power Supply Wiring No x Cross Section	3 X 2.5 mm²	
Interconnecting cable No x Cross Section	4X 2.5 mm²	

(a) Power supply can be connected in both ways:

- ❖ To outdoor unit to supply both outdoor and indoor unit.
- ❖ To outdoor unit and to Indoor unit separately.

(b) Communication wires must be separated from the power wires and should be shielded type, earth connected at both ends.

(c) Inrush current is the current when power is up (charging the DC capacitors at outdoor unit controller).

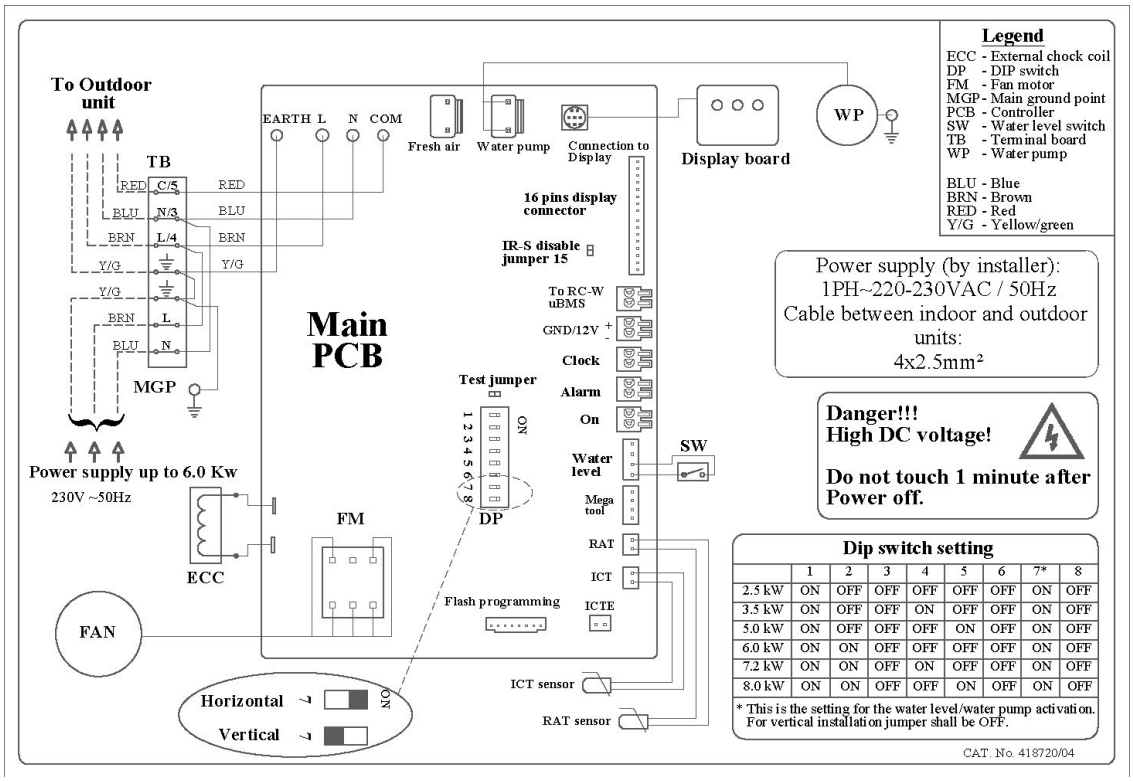
(d) Starting current is the current peak when starting the compressor.

***NOTE*:**

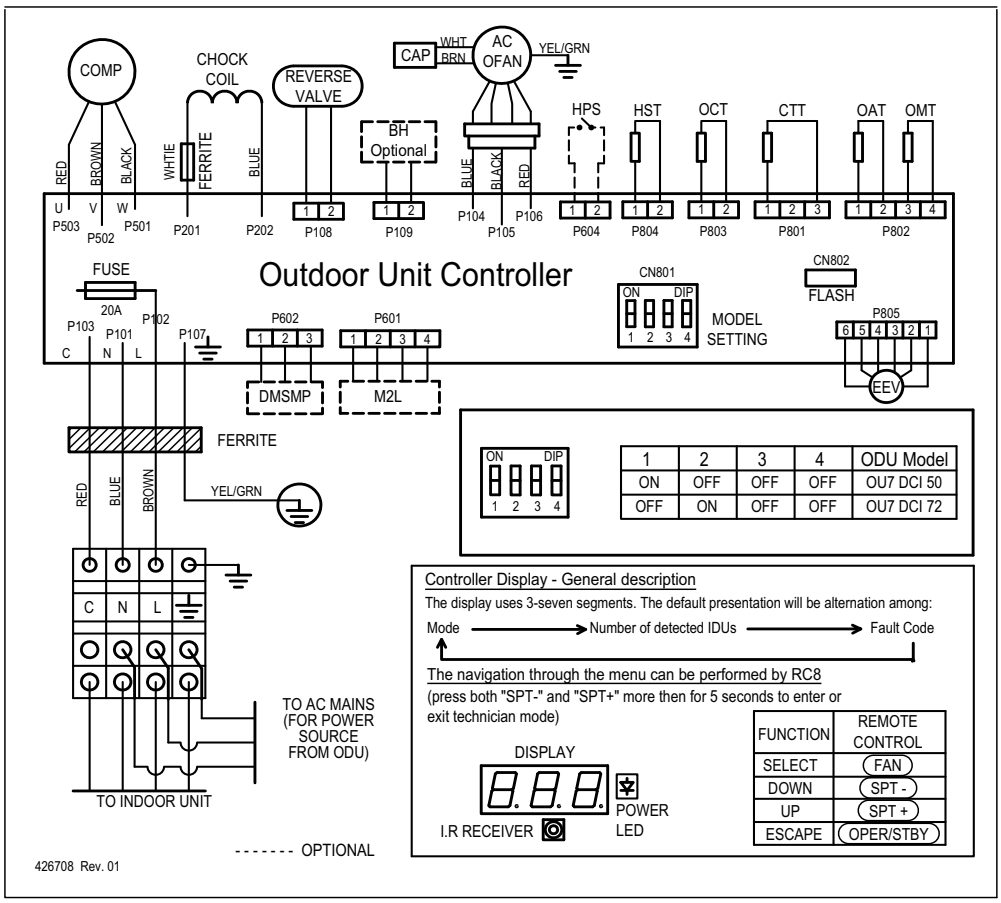
Power wiring cord should comply with local lows and electrical regulations requirements.

9. WIRING DIAGRAMS

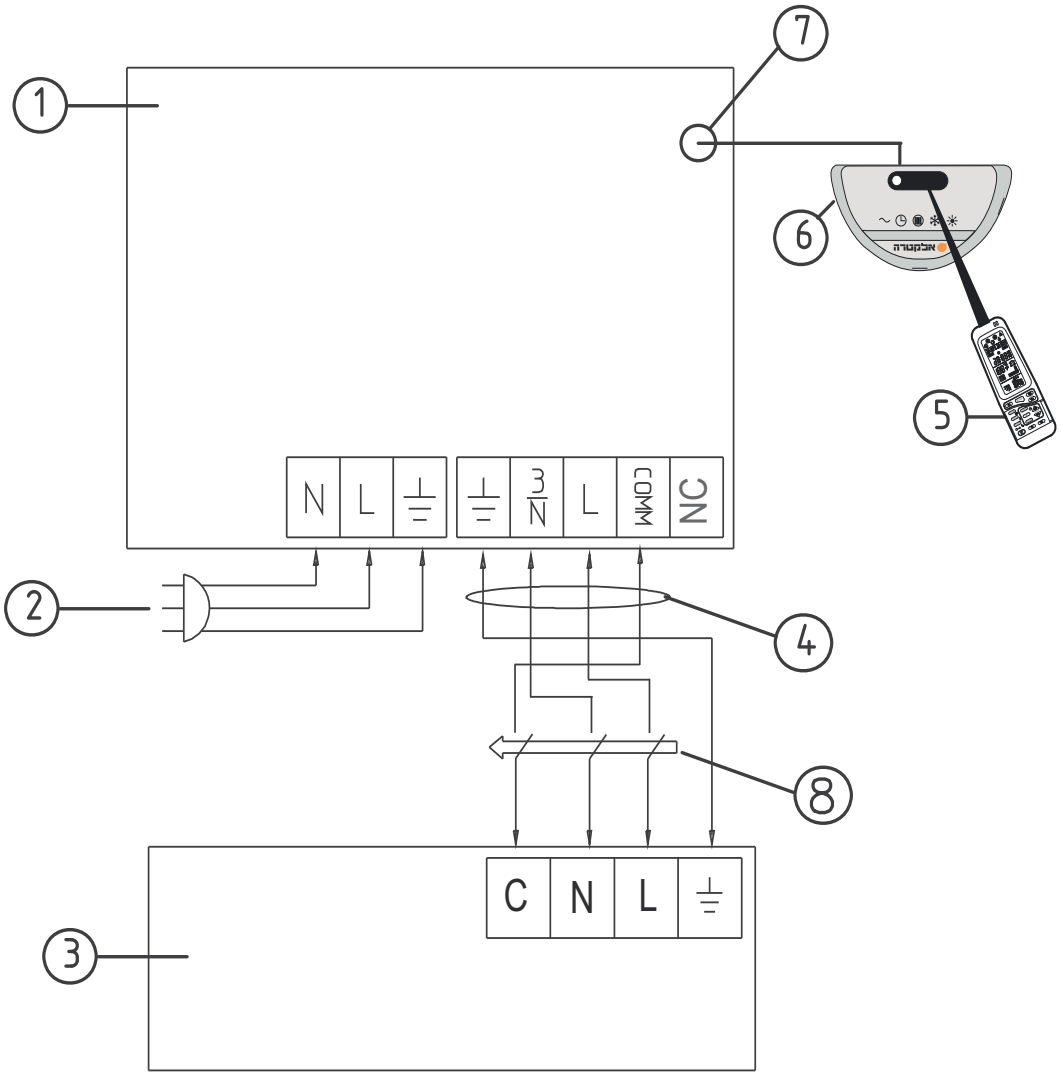
9.1 Indoor Unit: DLF 18/24 DCI



9.2 Outdoor Unit: YBDE 18/24 - H11



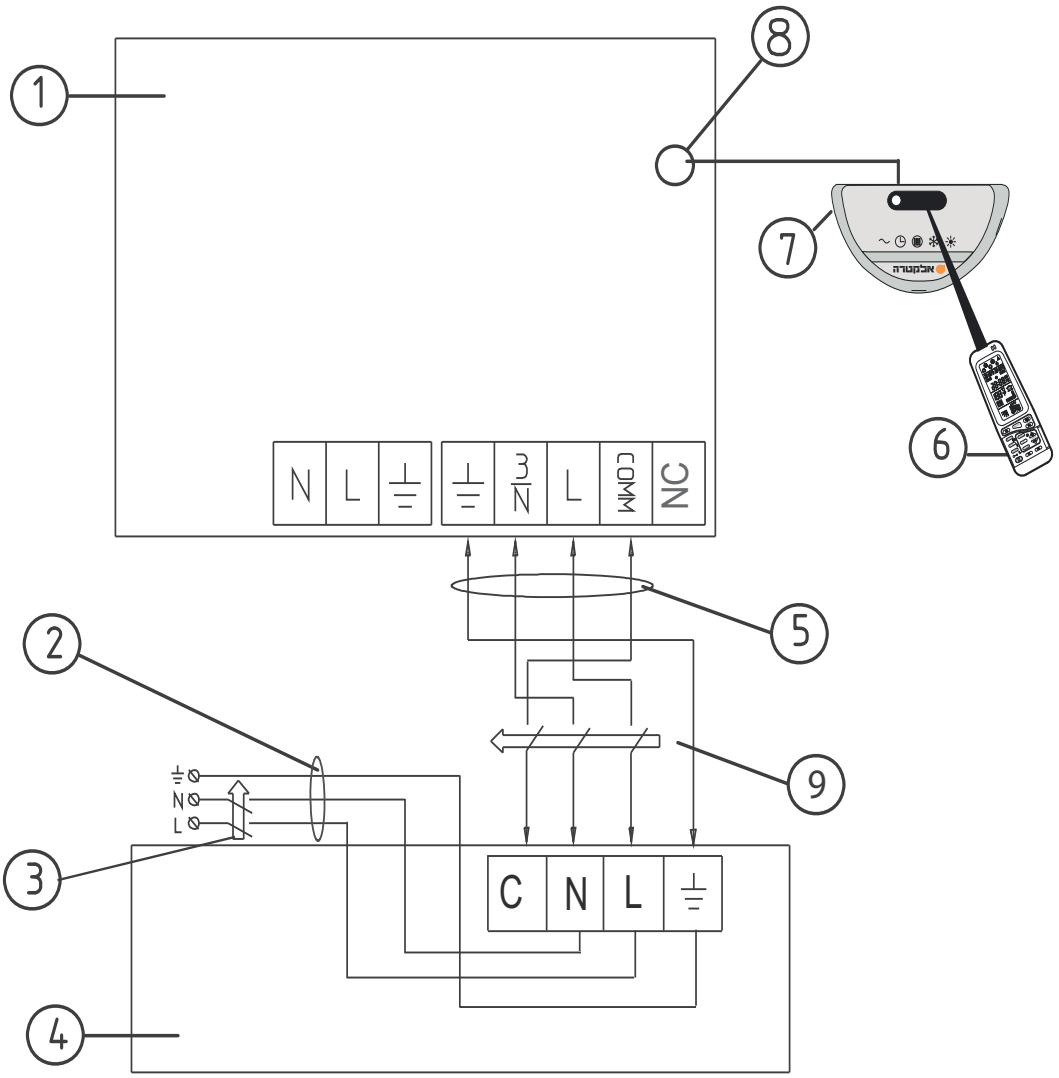
9.3 1PH UNITS POWER SUPPLY TO INDOOR (DLF 18)



1. Indoor Unit
2. Power Supply Cable
3. Outdoor Unit
4. Interconnecting Cable (4x2.5mm^2)**
5. Wireless Remote Control
6. Display Unit
7. Display Connector
8. Power Breaker (*by installer)

* The power breaker must be of type that disconnects all poles with 3 mm contact opening.
** Use shielded cable and connect the shield to earth point

9.4 1PH UNITS POWER SUPPLY TO OUTDOOR (DLF 18,24)

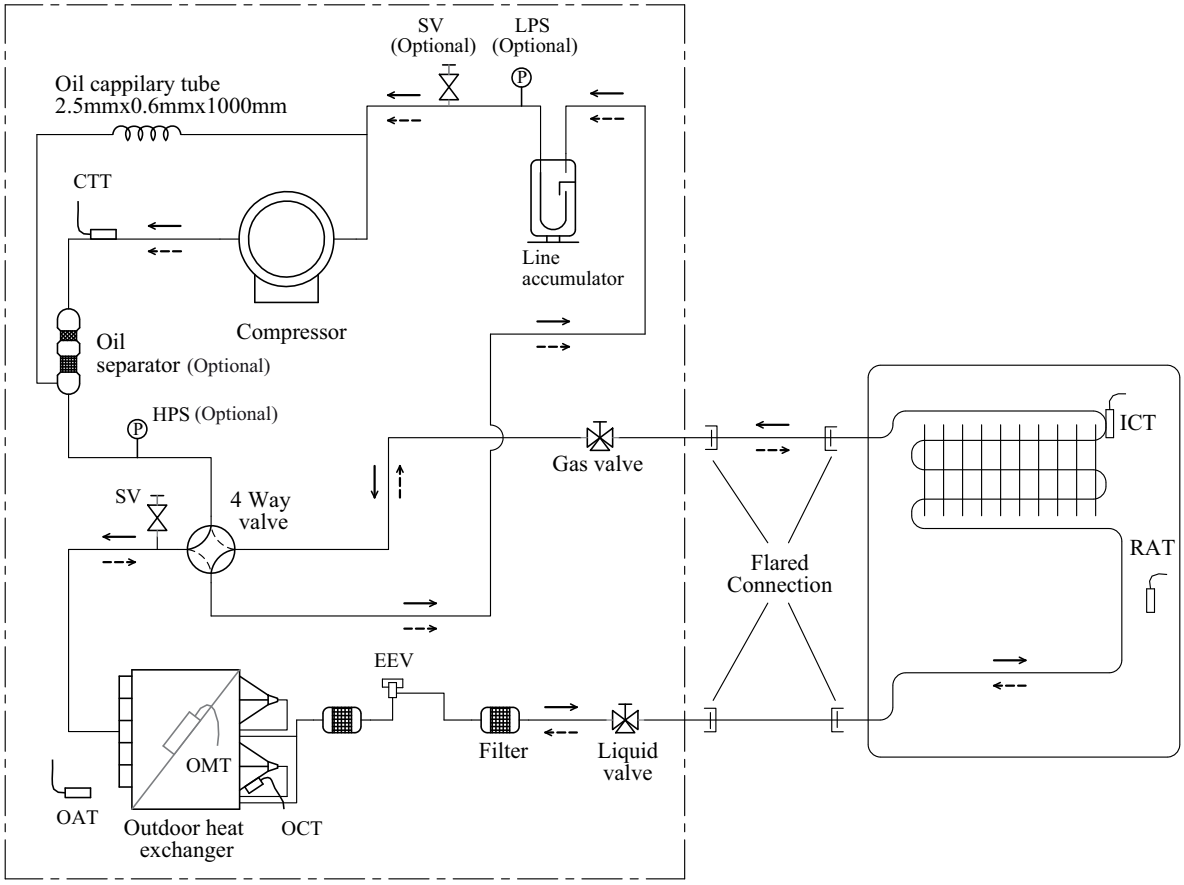


1. Indoor Unit
2. Power Supply Cable
3. Main Power Breaker
4. Outdoor Unit
5. Interconnecting Cable (4x2.5mm²)**
6. Wireless Remote Control
7. Display Unit
8. Display Connector
9. Power Breaker (*by installer)

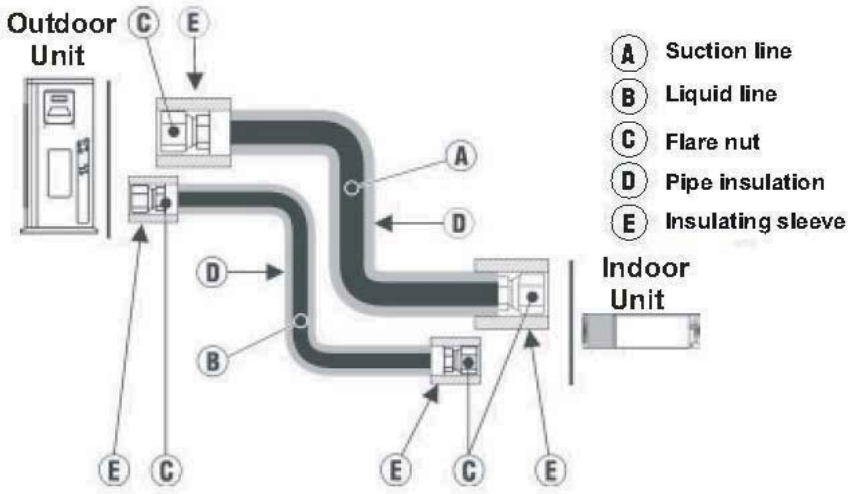
* The power breaker must be of type that disconnects all poles with 3 mm contact opening.
** Use shielded cable and connect the shield to earth point

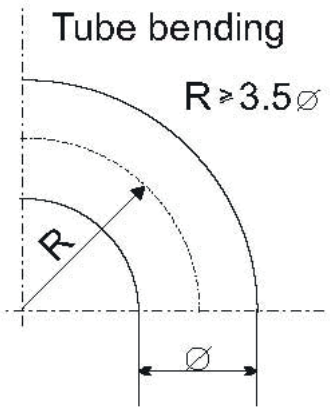
10. REFRIGERATION DIAGRAMS

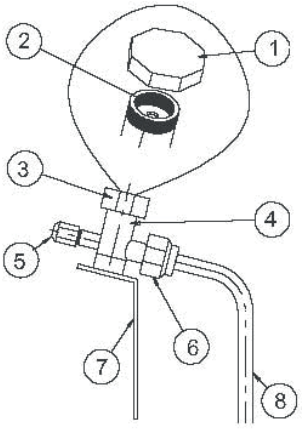
10.1 Heat Pump Models



11. TUBING CONNECTIONS







TUBE (Inch) / TORQUE (Nm)	1/4"	3/8"	1/2"	5/8"	3/4"
Flare Nuts	15-18	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

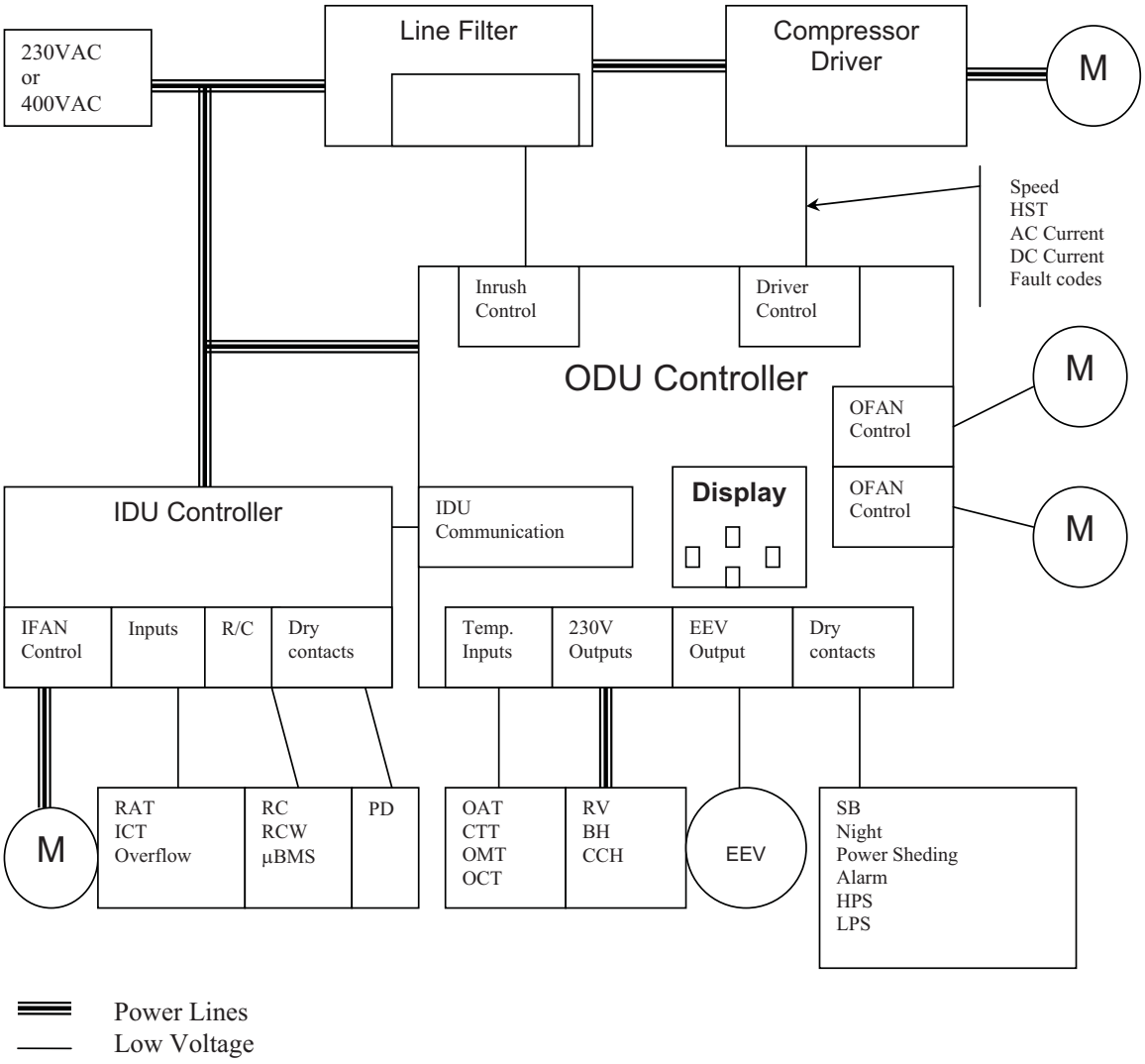
12. CONTROL SYSTEM

12.1 Abbreviations

Abbreviation	Definition
A/C	Air Conditioner
BMS	Building Management System
CCR	Compressor Current
CCH	Crankcase Heater
COMP	Compressor
CTT	Compressor Top Temperature sensor
DCI	DC Inverter
DMSMP	Dummy Multi Split multi Pipe – Control board
E²PROM, EEP	Erase Enable Programmable Read Only Memory
EEV	Electronic Expansion Valve
HE	Heating Element
HMI	Human Machine Interface
HPS	High Pressure Switch
HST	Heat Sink Temperature sensor
Hz	Hertz (1/sec) – electrical frequency
ICT	Indoor Coil Temperature (RT2) sensor
IDU	Indoor Unit
IFAN	Indoor Fan
LPS	Low Pressure Switch
M2L	Mega Tool (Monitoring SW)
MCU	Micro Controller Unit
NA	Not Applicable
OAT	Outdoor Air Temperature sensor
OCT	ODU Coil Temperature sensor
OMT	Outdoor middle coil temperature sensor
ODU	Outdoor Unit
ODUC	Outdoor Unit Control board
OFAN	Outdoor Fan
PD	Presence Detector
PFC	Power Factor Corrector
RAC	Residential A/C
RAT	Return (Room) Air Temperature sensor
R/C	Remote Control
RC	Reverse Cycle (Heat Pump)
RGT	Return Gas Temperature sensor
RLT	Return Liquid Temperature sensor
RPS	Rounds per second (mechanical speed)
RV	Reverse Valve
SB,STBY	Stand By
SH	Super-Heat
SPT	Set Point Temperature (In R/C)
S/W	Software
TBD	To Be Defined
TEMP	Temperature
TMR	Timer
TPT	Technician peripherial Test

12.2 Product Overview

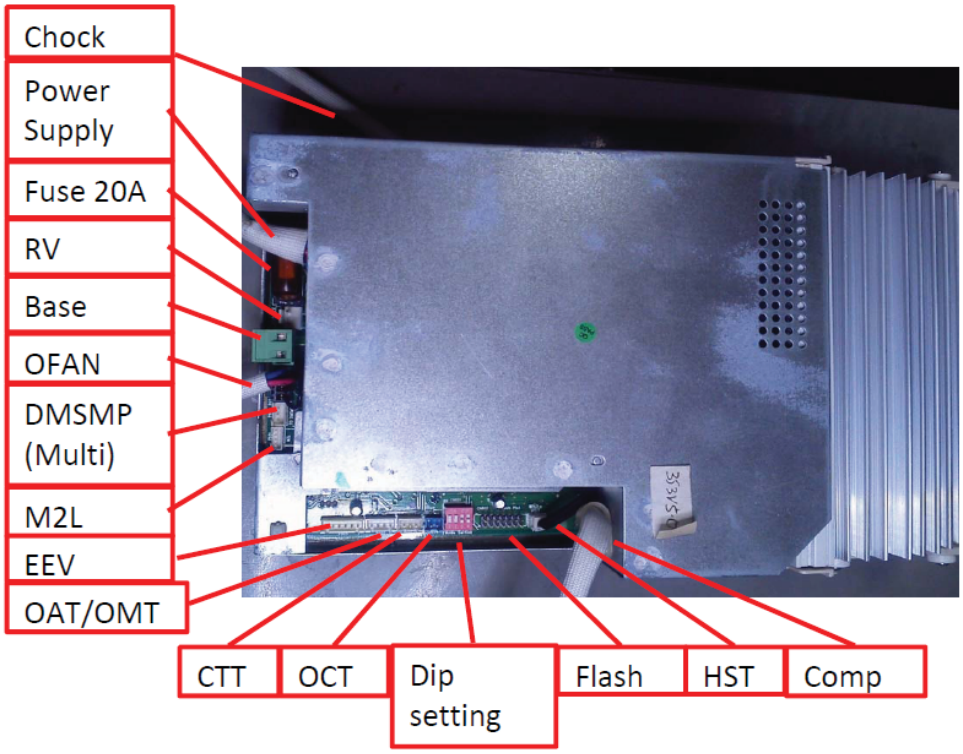
12.2.1 Block Diagram



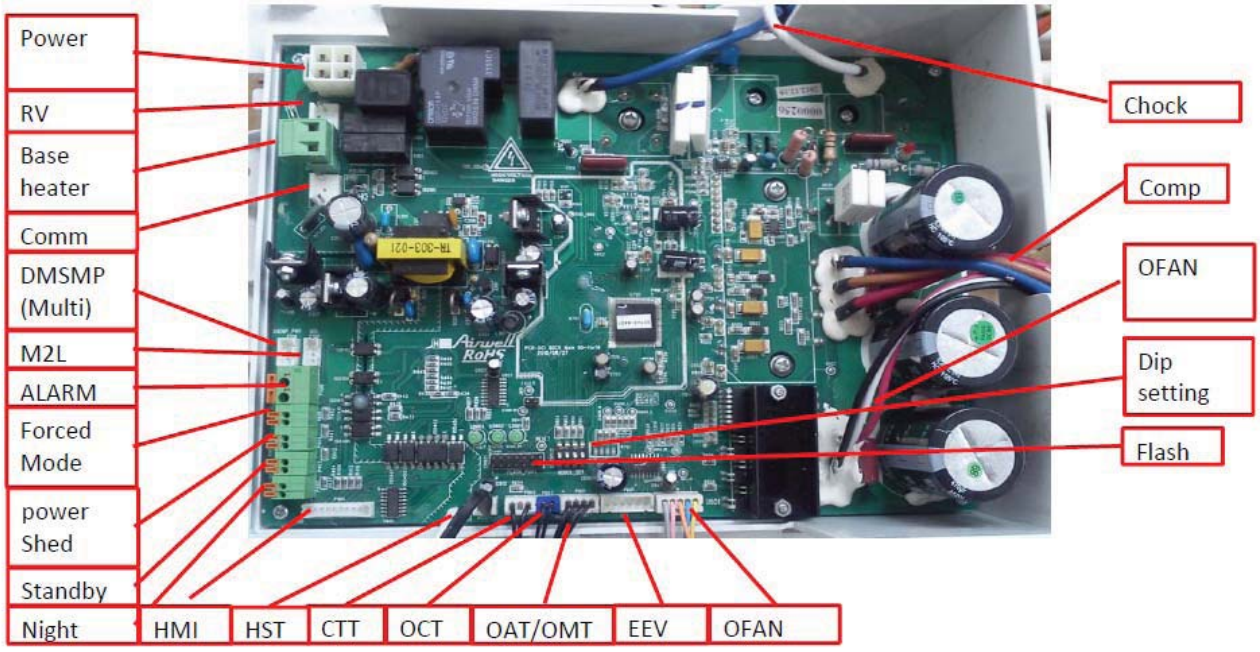
12.2.2 Controller overview

12.2.2.1 Main Controller Indoor Unit DLF 18,24

12.2.2.3 Main Controller Outdoor Unit YBDE018/024

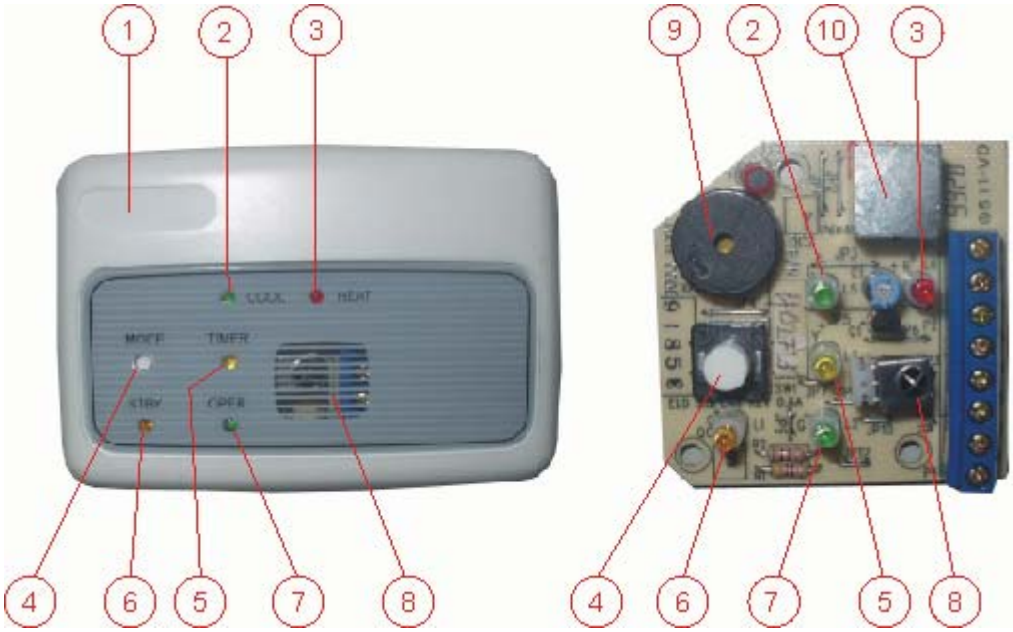


12.2.2.4 Main Controller Outdoor Unit YBDE030



12.2.2.5 Display Board

Display **Display Board PCB**



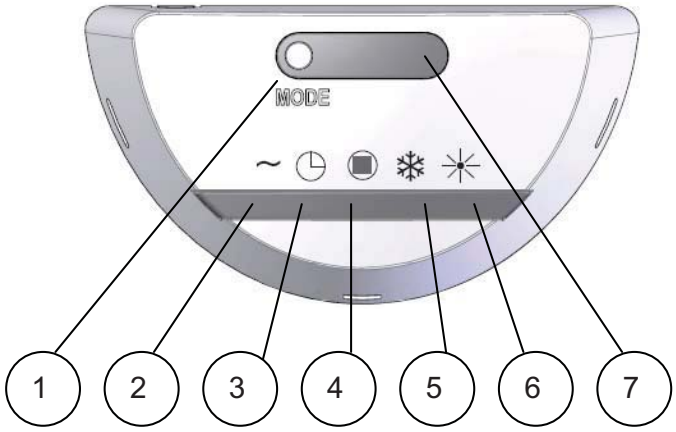
Legend

1. Name Plate
2. Cooling LED
3. Heating LED
4. Push Button (Mode)
5. Timer LED
6. STBY LED
7. Operation LED
8. IR Receiver
9. Buzzer
10. Display Port Connection

12.2.2.6 New Display Board

Legend

1. Mode Button
2. Stand-By Led
3. Timer led
4. Filter Led
5. Cool Mode Led
6. Heat mode Led
7. IR Reciever



12.2.3 Control Features

12.2.3.1 Compressor

DC brush less and sensor less motor inverter driven compressor.

12.2.3.2 Compressor Drive

DC inverter module to drive compressor.

12.2.3.3 Outdoor Fan

DC brush less motor(s) drive the outdoor unit fan(s).

12.2.3.4 RV

Reverse Valve set the direction of refrigerant flow in the system, thus setting the operation mode for cooling or heating.
When the solenoid is powered, system will work in heat mode.

12.2.3.5 EEV

Expansion valve operated by step motor which controls the size of the orifice.

12.2.3.6 HMI

Consists of Four “7-Segments” + four push buttons for display, monitoring and setup features.

12.2.3.7 Dry Contacts

Dry contacts are used to interface the system with an external building management system (BMS).

12.2.3.7.1 ODU Dry Contacts

- **Night** input. Switches the system to night mode when closed. During night mode, the outdoor unit fan motor(s) and compressor speed will be reduced in order to reduce the system noise level.
- **SB** input. System will be turned to Stand-by when the contact is closed.
- **Power Shedding** input. Limits the maximum power consumption when closed.
- **Alarm** output indicates a failure in the system.
  Alarm output will be activated when an ODU Faults/Protections occure. Alarm output will be **OFF** when the Fault/Protection is cleared.

12.2.3.7.2 IDU Dry Contacts

- Presence detector input / clock.

12.2.3.8 Temperature Sensors

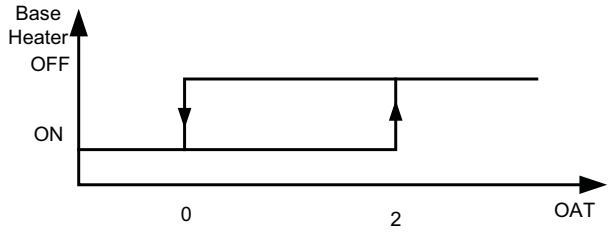
Action	CTT	OAT	OCT	OMT	HST	RGT	RLT	ICT	RAT
Compressor Speed Cool/Dry	P		P	P	P			P	+
Compressor Speed Heat	P	+(Multi)		P	P			P	+
OFAN Speed Cool	P		+	+	P				
OFAN Speed Heat			+	+	P				
EEV Cool	+	+		+		+(Multi)		+	+
EEV Heat	+	+	+				+(Multi)	+	+
Deicing		+	+						
Base Heater		+							
Cranck case Heater	+	+							
Indoor load (NLOAD)									+
IFAN Speed (Cool)									+
IFAN Speed (Heat)								+	+
Heating Element (Indoor)								+	

P – Sensor is acting only for protection
+ - Sensor is active part of the control.

12.2.3.9 Base Heater

Heating element designed to melt any ice that is accumulated on the outdoor unit base during low heating operation.

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

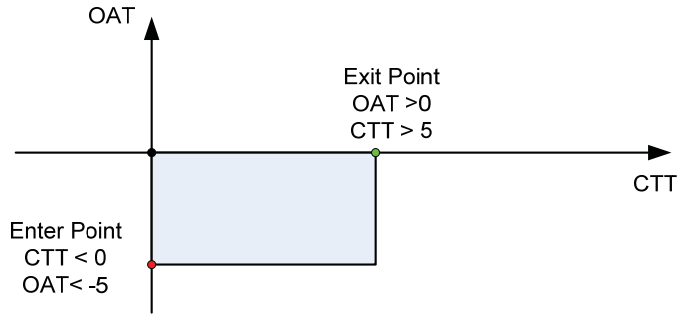


When OAT is faulty the base heater will be “ON” continuously in HEAT mode.

12.2.3.10 Cranckcase Heater

Heating element designed to heatup the compressor oil cranck case during low outdoor ambient temeratures.

The crank case heater operates only when compressor is off and according to OAT and CTT as following:



- In case of OAT failure - CTT is used for the operation, OAT ignored.
- In case of CTT failure - Coil heating is disabled.

12.3 General Operating Rules

12.3.1 Power up Sequence

After Power up A/C must perform some initialization procedures.

- Thermistors short/disconnect.
- Compressor Driver communication connected and error codes if any.
- Fans connected – check feedback.
- EEPROM power up parameters uploads.
- EEV initialization – zero process.
- ODU-IDU-DMSMP communication check.

12.3.2 Communication with Indoor Unit

12.3.2.1 Communication Failures Definition

12.3.2.1.1 'Bad Communication' fault

The system keeps a balance of a good/bad communication packet ratio. When the ratio becomes high the system enters 'Bad Communication' fault. The system recovers from that fault when the ratio becomes small again.
When in 'Bad Communication' fault, system continues its normal operation and fault code is shown in diagnostics.

12.3.2.1.2 'No Communication' fault

If no legal transmission or no message received for 30 seconds, system enters 'No Communication' fault.
When in 'No Communication' fault, the fault code will be shown in diagnostics. In this case, the system will force the compressor to off.
The system will recover from 'No Communication' fault when counter is below 10 and legal massage is received.

1. For the single split communication channel, whenever there is loose in the communication channel, the ODU unit will be forced to Idle mode.
2. For Multi split communication channel,

IDUs messages	Does DMSMP Message exist?	ODU report 'no-communication	ODU force to Idle
All IDUs Loose comm.	No	Yes	Yes
All IDUs Loose comm.	Yes	No	Yes
Some IDUs loose comm.	Yes	No	No The IDU channel Lost communication will be defined as inactive channel.

12.3.3 System Configuration Test

This test is continuously performed while the system is on:

12.3.3.1 Communication Channel Auto Detection (Single or Multi)

System is continuoesly checking wether it is a single or multi system according its 2 seperate communication lines.

Case	Single split Channel	Multi Split Channel	Fault	Action
1 (Normal)	Detected	Not detected	No Fault	Continue to the next step
2 (Normal)	Not Detected	Detected	No Fault	Continue to the next step
3 (Abnormal)	Not Detected	Not Detected	*'No Communication'*	Present Fault under the HMI. Unit is forced to Idle mode.
4 (Abnormal)	Detected	Detected	*'Mismatch between IDU and ODU models'*	

12.3.3.2 Model Plug & Indoor Capacity Test

Test	How to check?	Error to report?	System Action (ODU Mode)
Jumper is inserted/ DIP is configured	ODU model is 0 (zero).	*"Missing ODU configuration"*	Force to Idle mode.
Jumper/DIP is not defined in the software	ODU model is not defined	*"Undefined ODU model"*	Force to Idle mode
IDU-ODU capacity group mismatch	When ODU model is defined but the capacity group is not allowed.	*"Mismatch between IDU and ODU models "*	Force to Idle mode

The following combinations show the allowed and not allowed capacity group:

ODU Model	Is it allowed capacity group?				
	Indoor Capacity				
	0	1	2	3	4
AB (GCD36 DCI)	No	No	No	No	Yes
AV(YBD036-H13/4HP 3Phase)	No	No	No	No	Yes
AE (4HP DCI 3-Phase)	No	No	No	No	Yes
AF (YBD042-H13/5HP DCI 3-Phase)	No	No	No	No	Yes
AG (YBD060-H13/6HP DCI 3-Phase)	No	No	No	No	Yes
AO (YBD042/5HP DCI)	No	No	No	No	Yes
AP (YBD060/6HP DCI)	No	No	No	No	Yes
AS (YBDE018 DCI)	No	No	No	Yes	No
AT (YBDE024 DCI)	No	No	No	No	Yes
AU (YBDE030 DCI)	No	No	No	No	Yes

Capacity group	Capacity Code
Non Connected unit	0
0	1.0
1	1.5
2	1.7
3	2
4	3

12.3.4 Temperature Measurements

12.3.4.1 Thermistors default value.

Thermistor	Default value		System Reaction
	COOL	HEAT	
OCT	1°C	1°C	(1)
OAT	43°C	6°C	
CTT	43°C	43°C	
HST	75°C	75°C	
OMT	43°C	43°C	Replaced by OCT(1)
RGT	43°C	43°C	
RLT	43°C	43°C	
ICT	43°C	43°C	
RAT	SPT+4°C	SPT-4°C	

Notes:

(1) Whenever both OCT and OMT are faulty the compressor will be forced to OFF.

(2) Thermistor is defined as faulty (shorted/disconnected) if it's faulty for more than 10 seconds continuously. During this time, the system uses the last valid temperature

12.3.4.2 The following thermistor faults are detected by the system:

Thermistor	Thermistor is Disconnected	Thermistor is Shorted
OCT	Temp < -35 °C	Temp > 75 °C
OAT	Temp < -30 °C	Temp > 75 °C
CTT	Temp < -30 °C	Temp > 130 °C
HST	Temp < -30 °C	Temp > 125 °C
OMT	Temp < -30 °C	Temp > 75 °C
RGT	Temp < -30 °C	Temp > 75 °C
RLT	Temp < -30 °C	Temp > 75 °C
ICT	Temp < -30 °C	Temp > 75 °C
RAT	Temp < -30 °C	Temp > 75 °C

12.3.4.3 System operation whenever a thermistor fault occurs

#	Sensor	Single/Multi	Hydro/ Non Hydro	IDU Status	ODU Mode							Fault indication	System Operation
					Cool	Heat	Deicer	Idle	Technician/ Installation	ITU	TPT		
1	OAT	Any	H/NH	Any	√	√	√	√		√	√	Yes	Normal
2	OAT	Any	H/NH	Any					√			Yes	Stop Comp
3	OCT	Any	H/NH	Any	√	√	√	√		√	√	Yes	Normal
4	OCT	Any	H/NH	Any					√			Yes	Stop Comp
5	CTT	Any	H/NH	Any	√	√	√	√		√	√	Yes	Stop Comp
6	CTT	Any	H/NH	Any					√			Yes	Normal
7	HST	Any	H/NH	Any	√	√	√	√	√	√	√	Yes	Stop Comp
8	OMT	Any	H/NH	Any	√			√	√			Yes	Stop Comp
9	OMT	Any	H/NH	Any		√	√			√	√	Yes	Normal
10	RGT_i/RLT_i	Multi	NH	Inactive (Available)	√	√		√	√	√	√	Yes	Normal
11	RGT_i/RLT_i	Multi	NH	Inactive (Unavailable)	√	√		√	√	√	√	No	Normal
12	RGT_i	Multi	NH	Active		√			√	√	√	Yes	Normal
13	RLT_i	Multi	NH	Active	√				√	√	√	Yes	Normal
14	RGT_i/ RLT_i/ ICT_i	Multi	NH	Any			√		√	√	√	Yes	Normal
15	ICT	single	H/NH	NA	√	√		√	√			Yes	Stop Comp
16	ICT	single	H/NH	NA			√			√	√	No	Normal
17	LWT	single	H	NA	√	√	√	√	√			Yes	Stop Comp
18	LWT	single	H	NA						√	√	Yes	Normal
19	EWT	single	H	NA	√	√	√	√	√			Yes	Stop Comp
20	EWT	single	H	NA						√	√	Yes	Normal
21	IRT	single	H	NA	√	√		√	√			Yes	Stop Comp
22	IRT	single	H	NA			√			√	√	No	Normal

12.4 Indoor Unit Control

12.4.1 Load calculation

LOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.

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

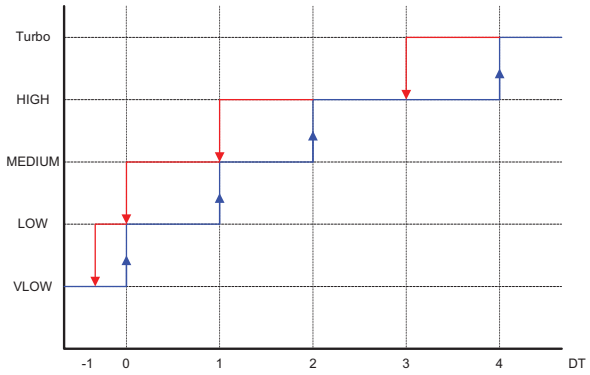
NLOAD limits as a function of power shedding:

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

12.4.2 Indoor Fan Control

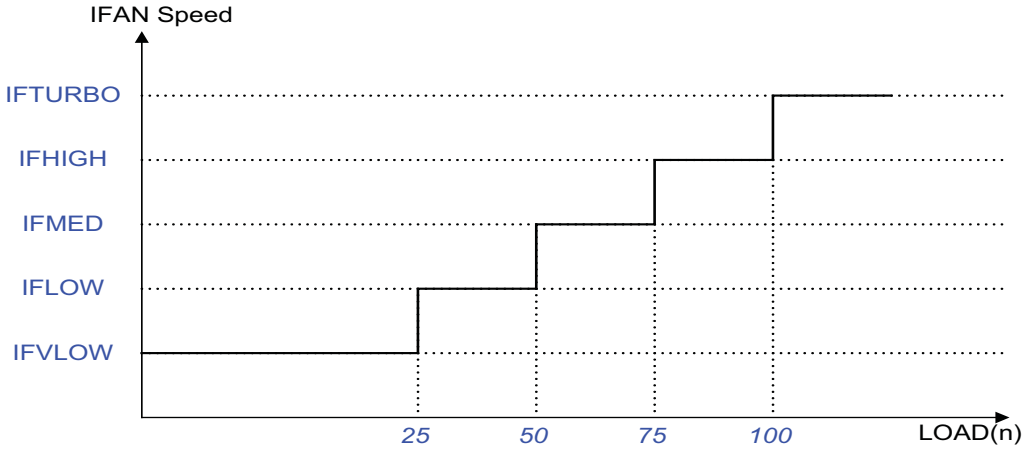
12.4.2.1 Indoor fan control - FAN Mode

- When T/H/M/L speed is set by user, IFAN will work in constant requested speed.
- When Auto-Fan is set by user, IFAN speed will be set according to the following graph:



12.4.2.2 Indoor fan control - Cool Mode

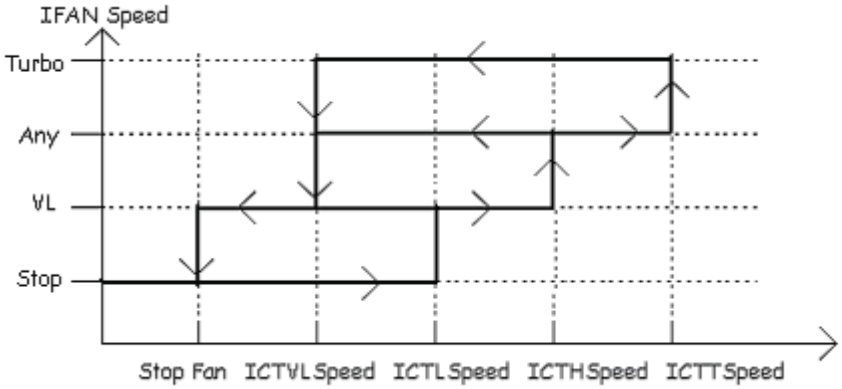
- When T/H/M/L speed is set by user, IFAN will work in constant requested speed.
- When Auto-Fan speed is set by user, IFAN speed will be set according to LOAD(n) as in the following graph:



12.4.2.3 Indoor fan control – Heat Mode

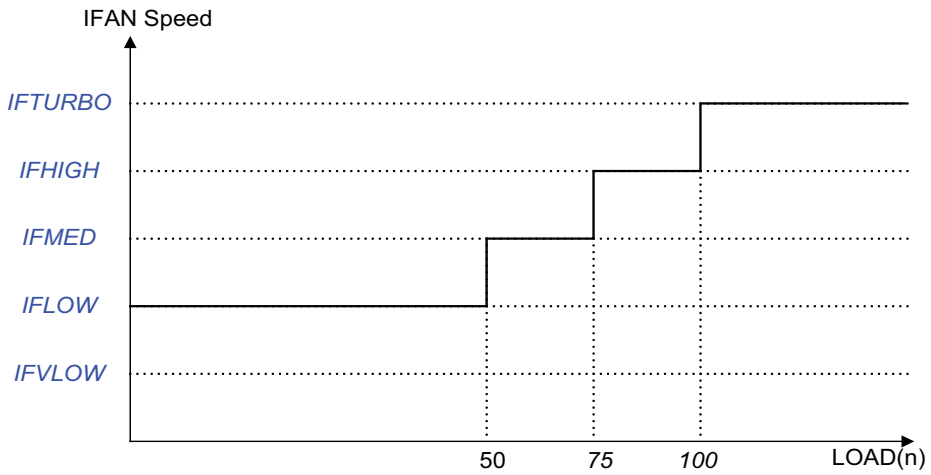
12.4.2.3.1 IFAN Operation in set speed

When in heat mode, including protections and except Deicing, IFAN will be working according to the graph below.



12.4.2.3.2 IFAN Operation in Auto Fan Mode

IFAN speed will be set automatically according to $Load_{(n)}$ by the following graph:



12.4.3 Cooling Mode

12.4.3.1 Cooling Mode – General

a. Mode Definition
   Mode: COOL, AUTO (at Cooling)
   Temp: Selected desired temperature.
   Fan: LOW, MED, HIGH, TURBO, AUTO.
   Timer: Any
   I-FEEL: ON or OFF

b. Room Temperature, RT, is detected by:
   RAT in normal operation, or
   RCT (R/C sensor) in I-FEEL mode.

c. Indoor Coil Temp is detected by ICT.

12.4.3.2 Control Functions

a. **COMP** Operation

In general – the operation is set by the NLOAD calculation in indoor unit side.
Other rules are according to section 12.5.1.

b. **OFAN** Operation

In normal operation OFAN operates together with the COMP.
Other rules are according to section12.5.3.

c. **IFAN Operation**

IFAN will operate in ANY speed regardless the ICT or COMP state.
IFAN speed will be determined according to user selection or AUTO-FAN logic (see para. 12.4.2.2)

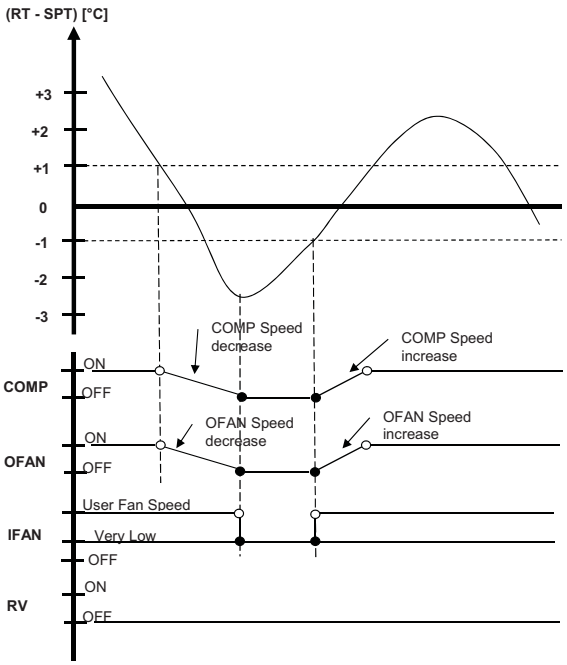
d. **RV** is OFF during COOL mode.

e. **HEATERS** are OFF during COOL mode.

f. **PUMP** operates in cool/dry mode (see protection section 12.6.1.1).

12.4.3.3 Sequence Diagrams

Maintaining room temp at desired level by comparing RT and SPT with user defined IFAN speed.



12.4.4 Heating Mode

12.4.4.1 Heating - General

a. Mode Definition
   Mode: HEAT, AUTO (at heating)
   Temp: Selected desired temperature
   Fan: LOW, MED, HIGH, TURBO, AUTO.
   Timer: Any
   I-FEEL: ON or OFF

b. Room Temperature, RT, is detected by:
   RAT in normal operation, or
   RCT (R/C sensor) in I-FEEL mode.

c. Indoor Coil Temp is detected by ICT.

12.4.4.2 Control Functions

a. **COMP** Operation

In general – the operation is set by the NLOAD calculation in indoor unit side.
Other rules are according to section 12.5.1.

b. **OFAN** Operation

In normal operation OFAN operates together with the COMP.
Other rules are according to section 12.5.3.

c. **IFAN** operation:-

IFAN will operates according heat mode rules. See section 12.4.2.3.

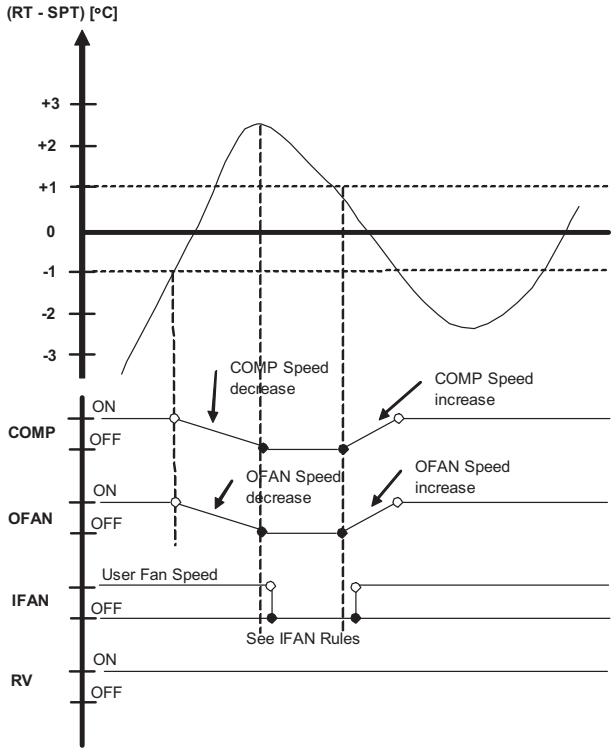
d. **RV** is ON during HEAT mode.

e. **HEATERS** – See section 12.4.9.

f. **PUMP** is OFF during heat mode.

12.4.4.3 Sequence Diagram

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

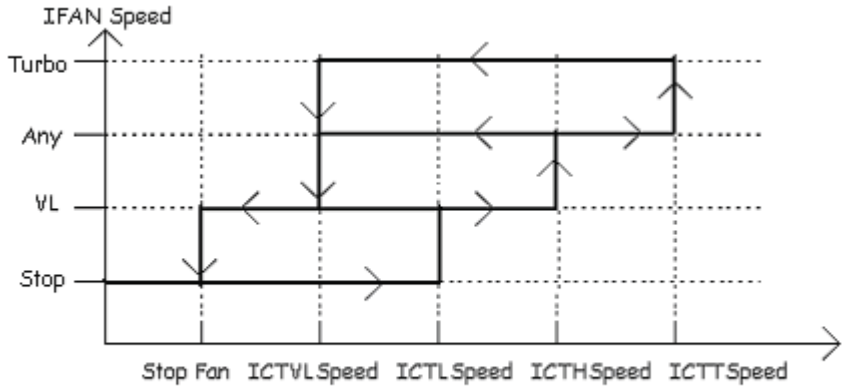


12.4.4.4 Temperature Compensation

A compensation value of 2-4 degrees is 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 closing/opening J2 on the indoor unit controller.
No compensation will be activated in Forced operation modes.

12.4.4.5 Indoor Fan Control in Heat Mode

When in heat mode, including protections and except Deicing, and when the conditions in the table below are fulfilled, IFAN will be working according to the graph below.



12.4.5 Automatic Cooling or Heating

12.4.5.1 Automatic Cooling or Heating - General

a. Mode Definition
   Mode: AUTO
   Temp: Selected desired temperature
   Fan: Any
   Timer: Any
   I-FEEL: ON or OFF

12.4.5.2 Control Functions

a. Switching-temperature between Cooling and Heating is SPT ± 3°C.
b. When the AUTO Mode is started with SPT +/-0 °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°C or SPT+1°C respectively.
c. Mode change between Auto Heat & Auto Cool Modes is 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

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

12.4.6 Dry Mode

12.4.6.1 DRY - General

a. Mode Definition
Mode: DRY
Temp: Selected desired temperature
Fan: LOW (automatically selected by software)
Timer: Any
I-FEEL: ON or OFF

12.4.6.2 Control function

a. COMP Operation
In general – the operation is set by the NLOAD calculation in indoor unit side.
Other rules are according to section 12.5.1.

b. OFAN Operation
In normal operation OFAN operates together with the COMP.
Other rules are according to section 12.5.3.

c. IFAN Operation
LOW only.

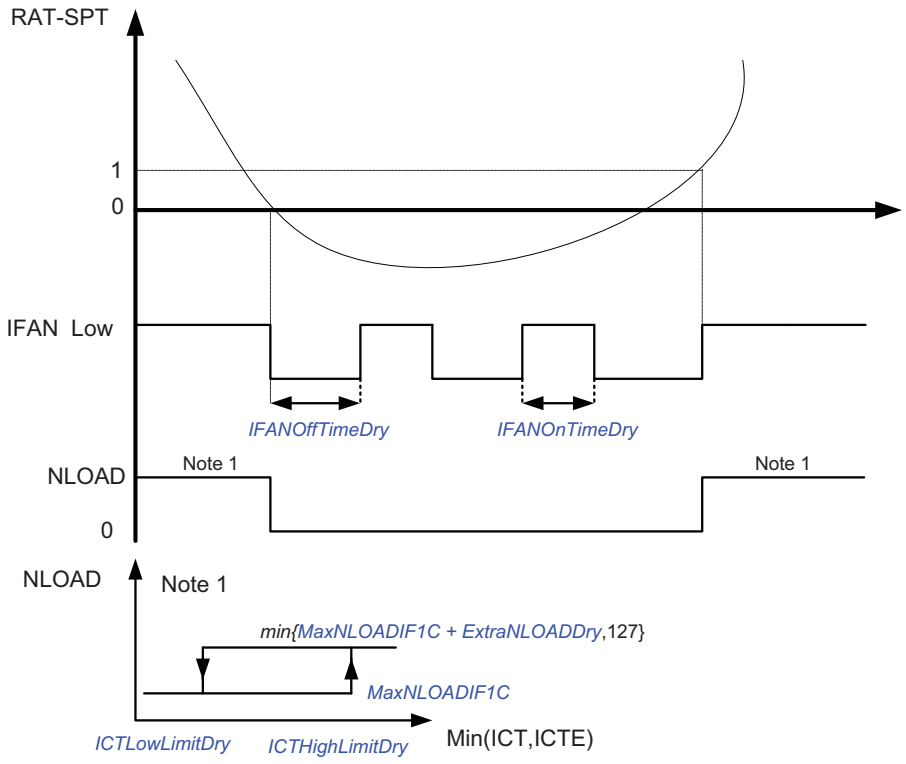
d. RV
RV is in OFF state during DRY mode.

e. HEATERS
HEATERS are in OFF state during DRY mode.

f. Pump
Pump operates in cool/dry mode.

12.4.6.3 Sequence Diagrams

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



12.4.7 Sleep Mode

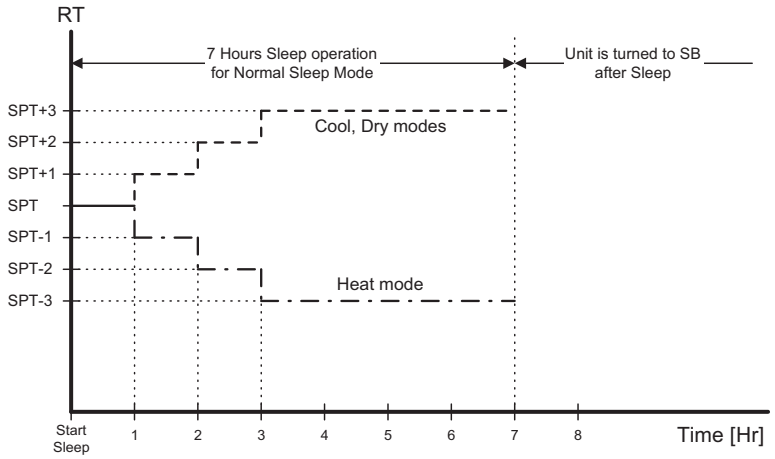
12.4.7.1 Sleep Mode - General

a. Mode Definition
Mode: Any
Temp: Selected desired temperature
IFan: Any
Timer: See below
I-FEEL: ON or OFF

12.4.7.2 Control function

- 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 for the sleeping user.
- Sleep is treated as TIMER function. Therefore, the TIMER LED is activated similar to TIMER function.
- In COOL, AUTO COOL or DRY modes, the SPT adjustment is positive (from 0 to +3oC).
- In HEAT or AUTO HEAT modes, the SPT adjustment is negative (from 0 to -3oC).
- In other modes, there is no SPT adjustment.
- The SPT adjustment is cancelled when the Sleep mode is cancelled.
- If OFF-timer is active, the unit may go to SB before or after 7 hours of sleep operation.

12.4.7.3 Sequence Diagrams



12.4.8 Forced Operation

Forced operation is set by the mode button on the Display Board and 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^{0}C
Heating	28^{0}C

NOTES

- While under the forced operation, the temperature compensation is disabled.
- The IFAN is always set to Autofan Speed in forced operation.

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

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

12.4.10 Indoor Unit Dry Contact

Status	Function	Contact = Open	Contact = Short
J9 = Open	Clock	See below	See below
J9 = Short	Presence Detector Connection	No action - normal operation	Forced to STBY

The Clock is activated according to the following table:

A/C STATE (before clock is changed)	CLOCK STATE (before clock is changed)	CLOCK ACTION (clock is changed)	A/C NEW STATE (after clock is changed)
ON	1	0	OFF
ON	0	1	ON
OFF	0	1	ON
OFF	1	0	OFF

12.4.11 On Unit Controls and Indicators

STAND BY INDICATOR	Lights up when the Air Conditioner is connected to power and ready to receive the R/C commands
OPERATION INDICATOR	Lights up during operation. Blinks for 300 mSec to announce that R/C infrared signal has been received and stored. Blinks continuously during protections (according to the relevant spec section).
TIMER INDICATOR	Lights up during Timer and Sleep operation.
FILTER INDICATOR	Lights up after fix period of operation to indicate that 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.

12.5 Run Mode

Run mode is the default operation mode of the system. This is the standard operation mode that is active in field application (at customer site).
System can go from run mode to other operation modes through keyboard or serial ports.

12.5.1 Mode Setting

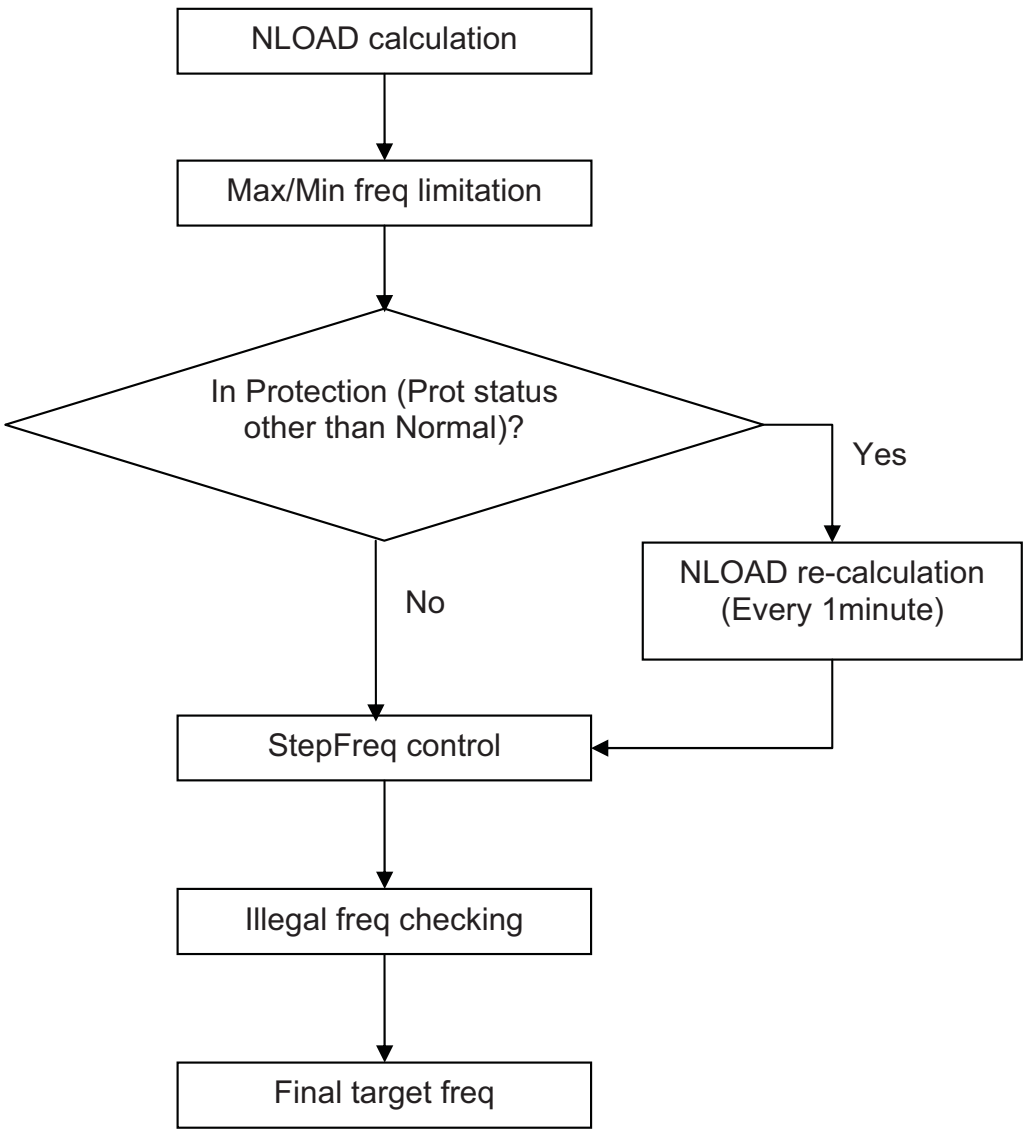
Thermal mode defines the ODU operation mode. There are three possible operation modes:

1. **STBY** – Standby mode
2. **COOL** - the unit operate at cooling cycle
3. **HEAT** - the unit operates at heat pump cycle (deicer will be treated as sub-mode of heat mode in the thermal Mode setting).

The last mode will be stored in the EEPROM, and it will be restored on system power up, where the default value is STBY.

12.5.2 Compressor Speed Control

The following diagram describes the sequence of the Target Frequency calculations:



12.5.2.1 Compressor Min On/Off time

Compressor minimum ON and OFF time is 3 minutes except during protections.

12.5.2.2 Compressor Startup

When started, compressor speed reaches certain level (usually 30÷40 RPS) and will not go below that during the first 5 minutes except when compressor is forced OFF.

12.5.2.3 Compressor start up fail

If the compressor does not succeed to complete the startup procedure, it retries the startup procedure every 10 second and up to 3 minutes it will report a compressor lock or unusal behavior.

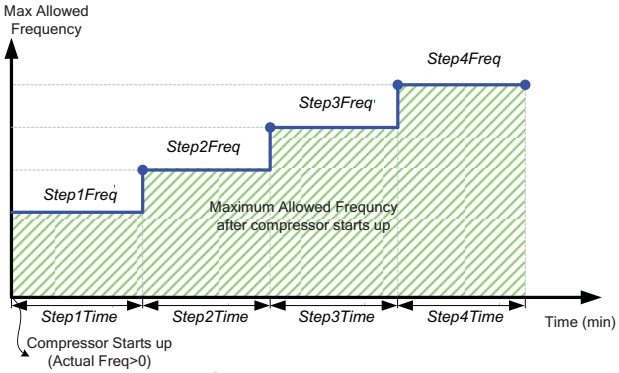
12.5.2.4 Compressor operation while OFAN Error

In case an OFAN error occured for 10 continues seconds and the compressor is on, the compressor will be set to OFF until OFAN error will recover.

12.5.2.5 Speed Change Limitations

Acceleration and deceleration will be 1 RPS/sec.

12.5.2.6 Speed Step Limitations



12.5.2.7 Illegal frequencies

Illegal Frequencies are values that the unit is not allowed to be working at. The frequencies and values within tolerance of ±2 Hz are not allowed.

12.5.2.8 Compressor shutdown Cases

#	Shutdown Reason
1	Single: ODU NLOAD=0 (or IDU protections)
2	Single: IDU change to STBY.
3	Multi: All IDU`s become inactive.
4	Deicing (both when going from heat to cool and from cool to heat)
5	ODU Protections
6	Sensor fault: according sensor fault list
7	HPS protection
8	LPS protection
9	OFAN-ERR (Up and Down)
10	PFC TRIP
11	Water Overflow

12.5.2.9 Compressor taget frequency

During normal operation (excluding protections) the compressor target frequency is set according to the ODU NLOAD number received from the indoor unit.

ODU NLOAD	Target Frequency [Hz]
0	0
0 < ODU NLOAD ≤ MinFreq	MinFreq
>MinFreq	Linear relation between Min and Max freq.

12.5.3 EEV Control

12.5.3.1 EEV General Rules

The EEV is controlled to keep the optimal system performance at all times. It is done by means of discharge superheat temperature and optimum compressor temperature control.
The target EEV value is the sum of open loop value (OL) and a result of the accumulative correction values (CV).

$$EEV_i = EEVOL_i + \sum EEVCV_i$$

12.5.3.2 EEV initialization procedure

After power up, the EEVs perform initialization procedure while it closed completely and reopened to predefined position.

12.5.3.3 Balance time

During the first 5 minutes after SB the correction is not calculated. After that the correction value is updated every EEVCVTConst seconds.

12.5.3.4 Operation Range

The EEV operation range is defined according to the operation mode as following:

Comp Status	ODU Mode	EEV
On	COOL	From *EEVMinOperOpenC* to *EEVMaxOperOpenC*
On	HEAT	From *EEVMinOperOpenC* to *EEVMaxOperOpenC*
On/Off	De-ice	*EEVDeiceOpenSingle*
OFF	Cool/Heat/Idle	400

12.5.3.5 EEV initial value determination ($EEVOL_i$)

The EEV initial value (open loop) is determined according to the operation mode, the actual compressor speed and indoor/outdoor conditions.

12.5.3.6 EEV correction definition(EEVCV$_i$)

The EEV correction value is determined according to the operation mode, the actual compressor speed and indoor/outdoor conditions. The correction value is targeting towrds optimal behavior of the system.

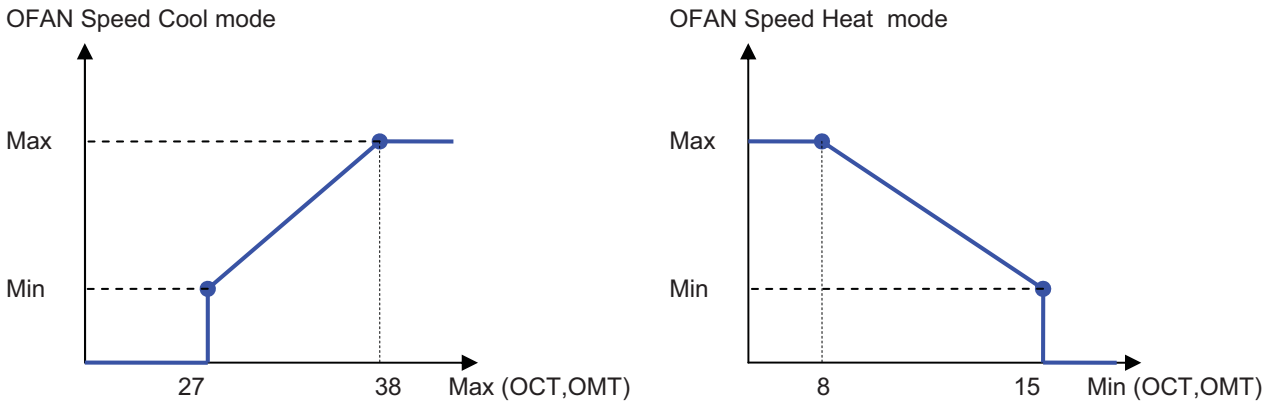
The following table describes the closed loop control type (EEV correction):

Mode	Main EEV
Cool	• Target CTT • Discharge super heat protection • CTT Protection
Heat	• Target CTT • Discharge super heat protection • CTT Protection • Sub-cooling (SC) protection

12.5.4 Outdoor Fan Speed Control

12.5.4.1 General Rules

The OFAN operation keeps the outdoor heat exchanger temperature within predefined values by increasing or reducing the OFAN speed.
Note - Whenever the OFAN speed is abnormal, the OMT and OCT sensors need to be checked.



12.5.4.2 Night mode

During night mode, the OFAN and the compressor will be limited to lower speeds.

12.5.4.3 Behavior when there is a failure in OFAN

Whenever OFAN fault occurs the compressor will be stopped immediately.

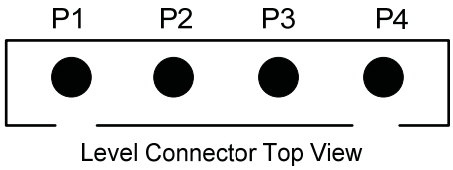
12.5.4.4 Protection Behavior

OFAN will enter protection speed according to CTT / HST / OMT protection level. Whenever one of these protections is entered, OFAN will also speed up/down (Cool/heat) accordingly.

12.6 Thermodynamic Protections

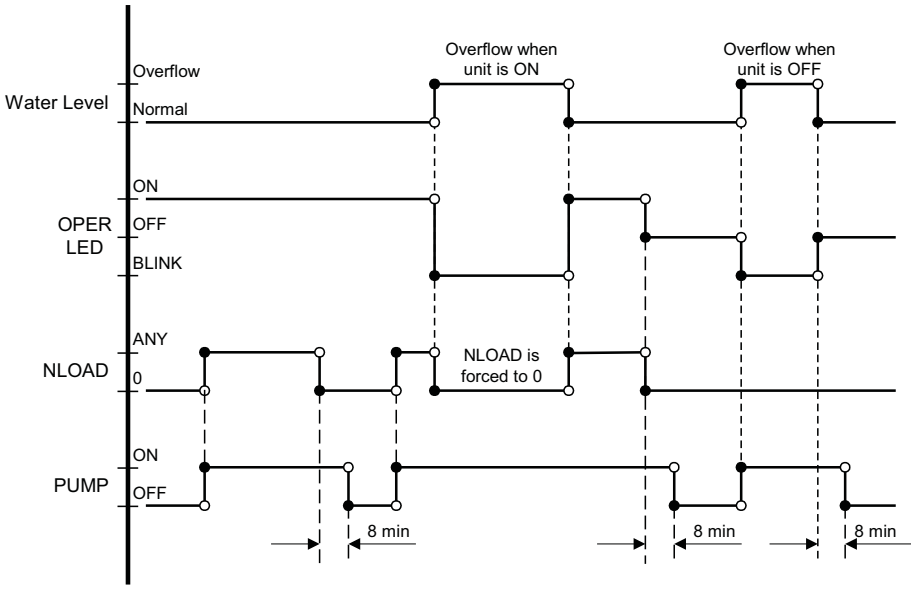
12.6.1 IDU Protections

12.6.1.1 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

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



12.6.2 ODU Protections

12.6.2.1 Protection types

There are 2 types of protection: Thermodynamic protections and Cut-Off protection

Thermodynamic	Cut-Off protection
Compressor AC Over Current	Low Pressure Switch
Compressor DC Over Current / Driver Overload	High Pressure Switch
Heat Sink Overheating	Water Overflow
Indoor Coil Overheating	Exceeding Operating Conditions
Outdoor Coil Overheating	
Compressor Overheat Protection	
Indoor Coil Defrost	

12.6.2.2 Protection status

Thermodynamic protections are based on reducing compressor frequency when needed. The following represent the possible protection status and their actions

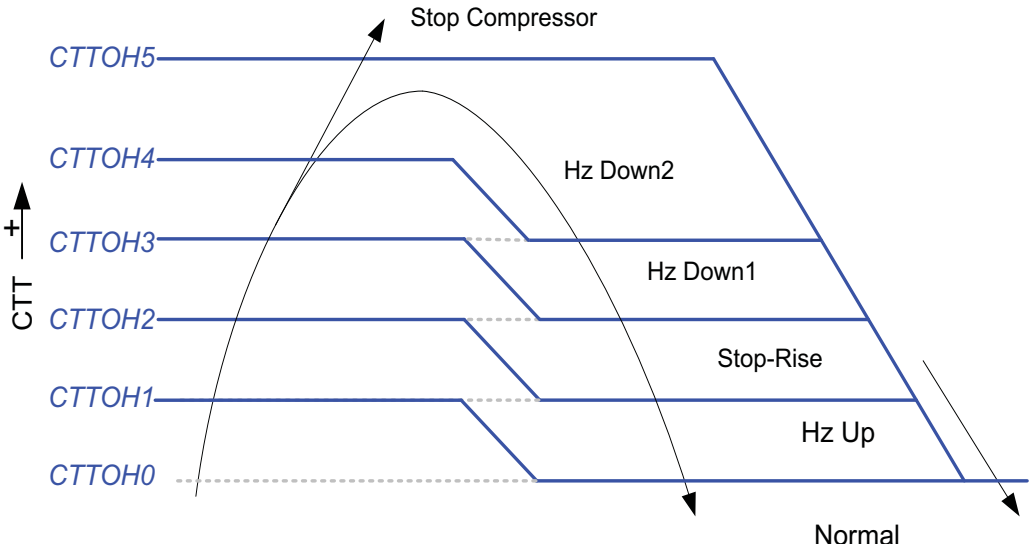
Protection Status	General Description
Normal	No protection
Hz Up	Compressor frequency is allowed to increase slowly
Stop Rise	Compressor frequency is not allowed to rise
Hz Down 1	Compressor frequency is reduce
Hz Down 2	Compressor frequency is reduce
Stop Compressor	Compressor is stopped

Each protection has protection status. The following are the possible protection status:

Protection Status	Active In?			
	Cool/Heat	Deicer	Technician/TPT/ Installation	ITU
Normal	√	√	√	√
Hz Up	√	**x**	**x**	**x**
Stop Rise	√	**x**	**x**	**x**
Hz Down 1	√	**x**	**x**	**x**
Hz Down 2	√	**x**	**x**	**x**
Stop compressor	√	√	√	√

Operation logic of all thermodynamic protections is the same. The controlled input (CTT, HST, ACC, DCC,OMT) is controlled by changing the protection level using the fuzzy logic algorithm according the input level and the change rate. The following table summarizes the basic levels of each protection:

Protection level	Compressor Overheat	Heat Sink Overheat	Compressor AC Overcurrent	Compressor DC Overcurrent	Outdoor Coil Overheat	Indoor Coil Overheat	Indoor Coil Freeze
SC	*CTTOH5*	*HSTOH5*	*CCROC3*	*DCROC3*	*OMTOH5*	*ICTOH5*	*ICTDEF5*
D2	*CTTOH4*	*HSTOH4*			*OMTOH4*	*ICTOH4*	*ICTDEF4*
D1	*CTTOH3*	*HSTOH3*	*CCROC2*	*DCROC2*	*OMTOH3*	*ICTOH3*	*ICTDEF3*
SR	*CTTOH2*	*HSTOH2*	*CCROC1*	*DCROC1*	*OMTOH2*	*ICTOH2*	*ICTDEF2*
Hz Up	*CTTOH1*	*HSTOH1*	*CCROC0*	*CCROC0*	*OMTOH1*	*ICTOH1*	*ICTDEF1*
Normal	*CTTOH0*	*HSTOH0*			*OMTOH0*	*ICTOH0*	*ICTDEF0*



12.6.2.3 Total Protection Level Definition

The total protection level is defined by the higher level of protection received.

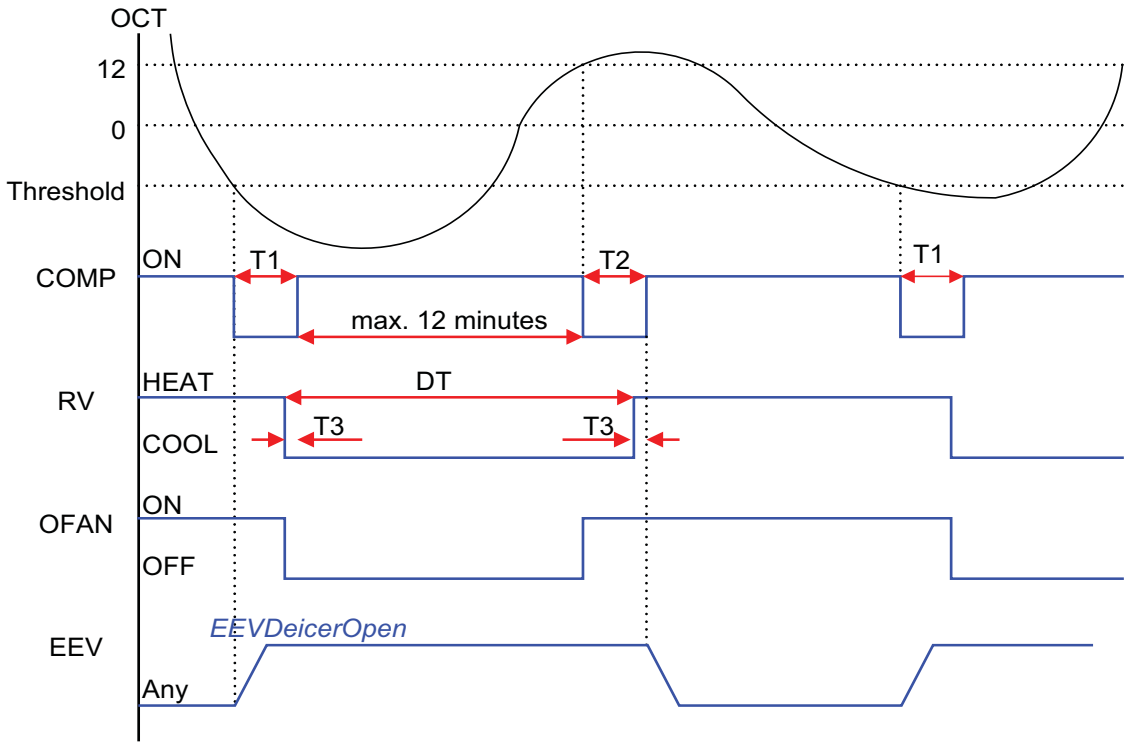
12.6.3 Deicing

12.6.3.1 Deicing Starting Conditions

12.6.4.1 Deicing Starting Conditions
Deicing operation will start when either one of the following conditions exist:
Case 1: OCT is 8 degree lower then the ambiant temp and the minimum time from the last deicer is passed.
Case 2: OCT is 12 degree lower then the ambiant temp and 30 minutes from the last deicer wa passed.

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.
In case one of the thermistors is bad the deicer will initiate in predefined intervals.
Deicer may accure also when the unit switch to stanby and the OCT is 8 degree lower then ambiant temperature

12.6.3.2 Deicing Protection Procedure



T1 = T2 = 36 seconds, T3 = 6 seconds

12.6.4 High/Low Pressure Protection

Whenever high or low pressure accures in the system which extend beind the system pre-defined limits, the high and low pressure switchs turns on (short) and stops the compressor until these limits are redrawn.
Fault code error 8 (HPS) or 9 (LPS) will be shown until compressor will resume operation.

12.7 Technician Test Mode

This test is aimed for the technicians to check the system under a preset compressor and outdoor fan values while the expansion valves will function according to the normal running mode.

12.7.1 Entering Technician Mode

- This mode is entered through the outdoor unit using the HMI (refer to user interface section).
- It can be selected either for cool or heat.
- Technician test is not possible to enter during deicer.

12.7.2 Technician Mode Procedure

- All the connected Indoor units will enter technician test at high indoor fan speed.
- The outdoor unit will be working normally (according to the run mode control logic) except the following changes:
  - The dry contacts inputs will be ignored.
  - Protections will be operative for stop compressor only.
  - The compressor and the outdoor fan will be working in target preset values according to the number and size of IDUs.

12.7.3 Exiting Technician Mode

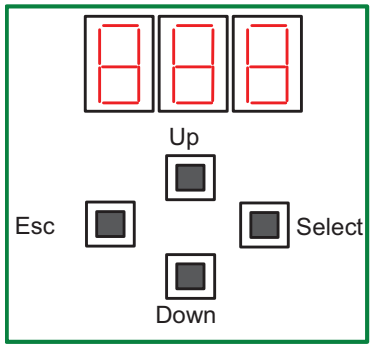
Technician mode will be exited either when:

- Escaping by the HMI (exiting the ttC or ttH menus)
- 60 minutes are passed from entering

12.8 User Interface

12.8.1 User interface description

- The user interface uses three 7 segments, and 4 keys.
- Keys, The 4 keys are:
  - Scroll - used to scroll between options (up and down)
  - Select - use to select an option
  - Escape - Will go up one level in the menu
- The user interface concept is Tree menus.
- Active selection or status will be indicated by a dot at the right side of the third digit.



12.8.2 Keys functionality

- Scrolling will be done whenever the button is pressed.
- When scrolling alpha values, if the scroll button is held in, the selection will change at the rate of one step per second.
- When changing/scrolling numeric value, if the scroll button is held in, the selection will change at the rate of one step per second. After 2 seconds, if the button continues to be held in, the rate of change will increase to 10 steps per second.

The display will not roll over during selection (for example stop/Ode/Dia/Stp/Par/stop)

12.8.3 Menus

12.8.3.1 Main Menu

Mode (Cl/Ht/Sb)

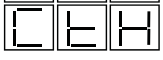
Technician Test (tt)

- Technician Test Cool (PtC)

- Technician Test Heat (PtH)

- Charge Test Cool (CtC)

- Charge Test Heat (CtH)



Installation Test (it)

 **(Multi Only)**

- Number of IDU`s

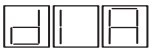
- Begin test

- Test Result

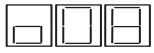
- Matrix Table Test Result

- Problem Correction

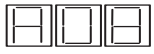
Diagnostics (dia)



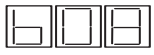
- Outdoor Unit (oxx)



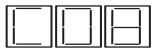
- Indoor Unit A (axx)



- Indoor Unit B (bxx) **(Multi Only)**



- Indoor Unit C (Cxx) **(Multi Only)**



- Indoor Unit D (dxx) **(Multi Only)**

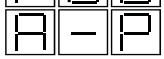
- Indoor Unit E (Exx) **(Multi Only)**

Set Up (Stp)

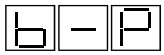
 **(Multi Only)**

- First IDU Wins (Idu)

- IDU A is master (A-P)

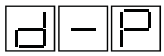


- IDU B is master (b-P)



- IDU C is master (C-P)

- IDU D is master (d-P)



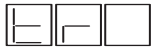
- IDU E is master (E-P)

Status (Stt)

- IDU (Idu)

- ODU (odu)

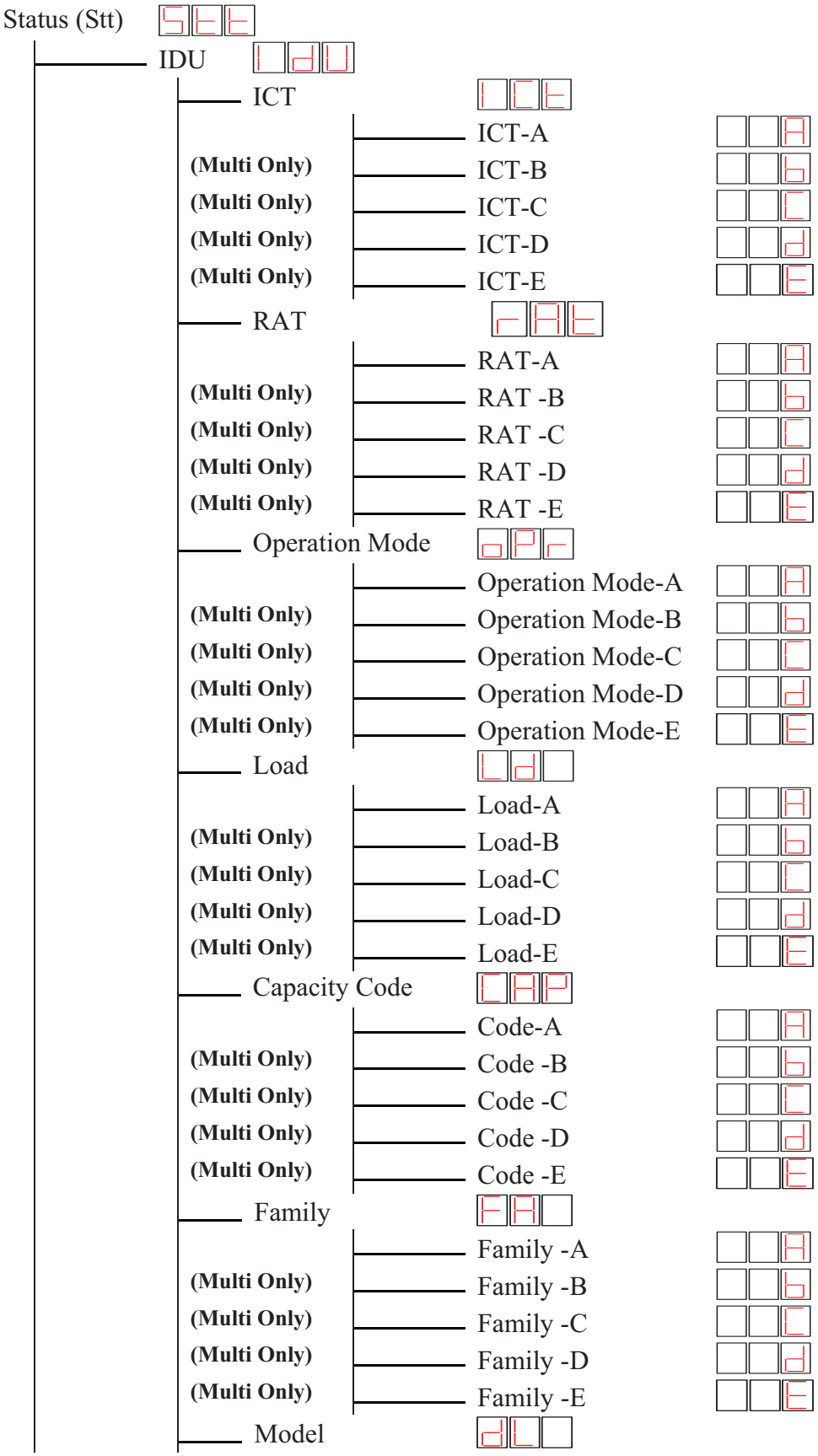
- Timer (tr)

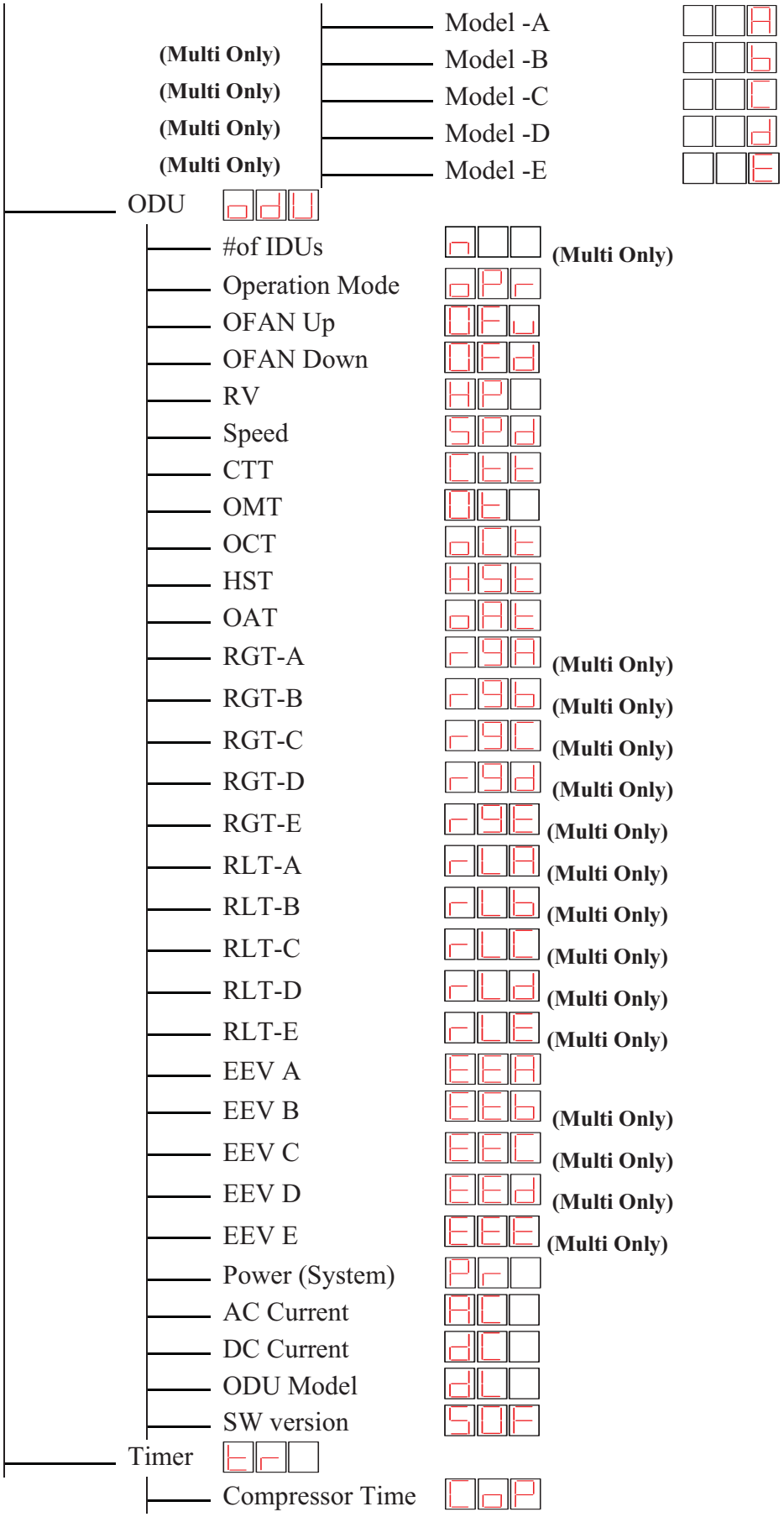


Notes:

- The default presentation will be the mode of the unit (Cl/Ht/Sb).
- In diagnostics menu, xx means failure code. Only the last active (operative) failure code will be shown, if there is no active failure a “-“sign will be shown (the faults Numbers are the one shown in the single split table).
- Technician Test mode is exited after 60 minutes from entry.
- All the menus, except technician menus- Status, Technician Test and their sub menus, are automatically exited to the main menu after 1 continuous minute out of any press.
- When Technician test cool or heat menu is selected, it will blink constantly until this menu is escaped.
- Pressing select and escape buttons together when in RST for more than 5 seconds will restore only the parameters of the factory settings. Acknowledge for restored parameters will be indicated by blinking RST for 3 seconds.
- When a thermistor is shorted or disconnected it shows FLT (FLt), when it is disabled it shows DIS (dis).
- It’s possible to present a number between 999 and 99,999 by alternating between two numbers (each number is presented for 1 second). The two numbers format is "xx, yyy".
- Pressing select + escape together for 5 seconds will reset the counter to 0.
- The compressor time is measured in hours.

12.8.3.2 Status (Sub Menu)




(Multi Only)
(Multi Only)
(Multi Only)
(Multi Only)
Model -A
Model -B
Model -C
Model -D
Model -E
ODU
#of IDUs
(Multi Only)
Operation Mode
OFAN Up
OFAN Down
RV
Speed
CTT
OMT
OCT
HST
OAT
RGT-A
(Multi Only)
RGT-B
(Multi Only)
RGT-C
(Multi Only)
RGT-D
(Multi Only)
RGT-E
(Multi Only)
RLT-A
(Multi Only)
RLT-B
(Multi Only)
RLT-C
(Multi Only)
RLT-D
(Multi Only)
RLT-E
(Multi Only)
EEV A
EEV B
(Multi Only)
EEV C
(Multi Only)
EEV D
(Multi Only)
EEV E
(Multi Only)
Power (System)
AC Current
DC Current
ODU Model
SW version
Timer
Compressor Time

12.8.4 Technician Perpherial Test (TPT)

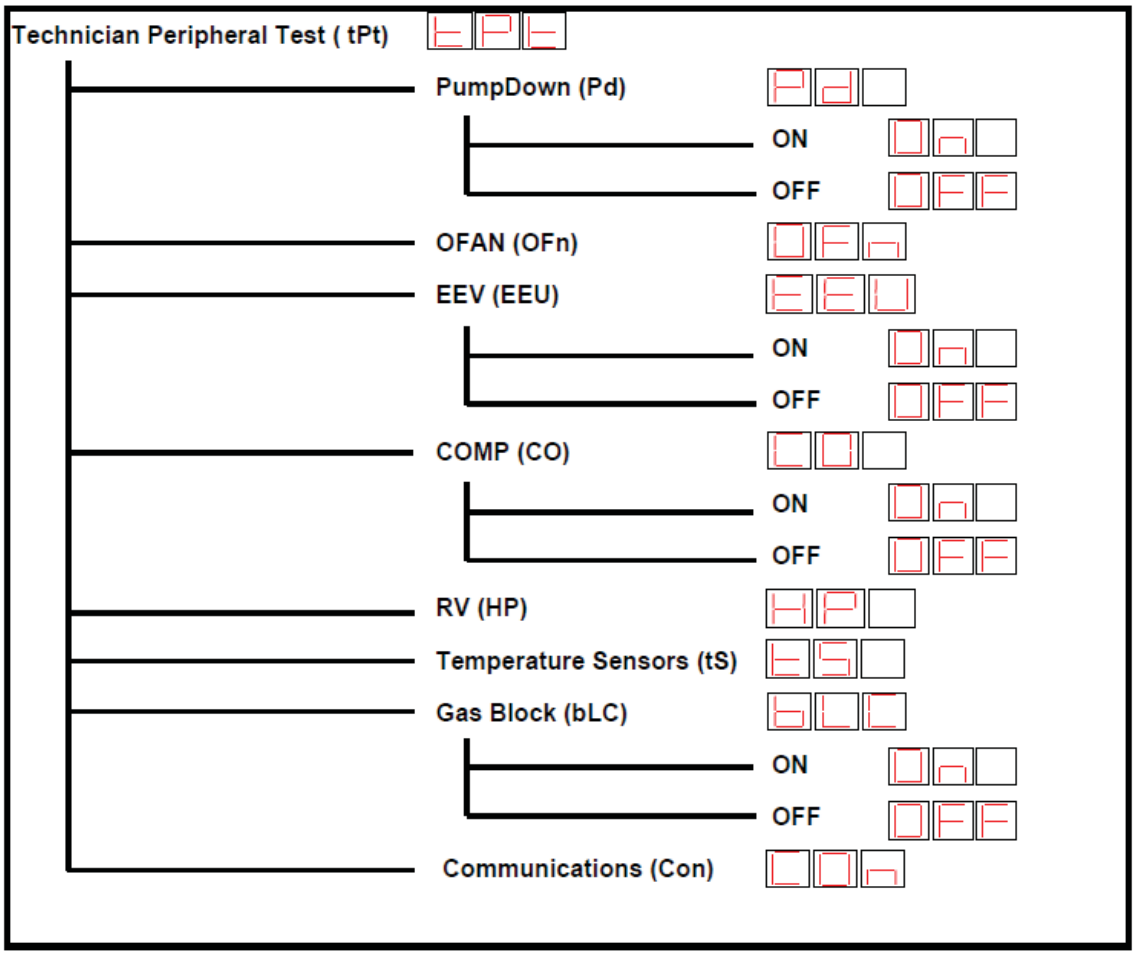
Technician Peripheral test mode designed especially for Technician personal to provide ability to test peripherals such as OFAN, EEV, RV, COMP, etc.

Each item is operated directly so no software logic can deny the operation.

12.8.4.1 General Rules

- ◊ **Entering TPT** – Set Jumper J8 to ON and Power Up. The main menu will be switched to the TPT menu.
  Navigate the HMI For the required test and press the “Select” for more than 5sec until the test name will blink.
- ◊ **Exiting TPT** - Power OFF, Set Jumper J8 to OFF and Power Up. The main menu will be switched back to normal menu.
- ◊ All the menus and their sub menus are automatically exited to the top of TPT menu after 1 continuous minute out of any press.
- ◊ Whenever one or more peripherals are not operating during the test, the corresponding fault code will be shown in diagnostics and the fault code will blink continuously for 30sec (or until “esc” has been pressed).
- ◊ For each of the tests, an “End” procedure is carried out after the “Test Time” is over or the “ESC” button was pushed or “OFF” was pushed. The display will show: “End” for 5 seconds and return to normal display according the menu.

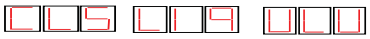
12.8.4.2 TPT Sub-Menu



12.8.4.3 Pump Down Test procedure

Pump Down is used to evacuate the refrigerant back to the ODU in case of need to dis-connect the indoor unit or the inter-connecting piping for repair.

1. Start the operation by navigating the HMI.
2. A/C will start operate.
3. After about 1 minute (finish of pre-test), the display will show:

   At this stage - close the Liquid valve.
4. After about 1 minutes, as soon as the low pressure will drop to below 1.5 bar(g), theLPS - Low pressure status will blink:

   
5. Close the suction valve
6. Shut the unit power OFF
7. The test will end after about 2 minutes. This is for percussion reasons in case the unit will not be shut OFF (or not closes the valves).

12.8.4.4 OFAN Test procedure

1. Start the operation by navigating the HMI.
2. Both OFANs will start operation.
3. After about 30 sec the fans will be shut off.
4. If any of the OFANs are not operating, check the OFANs and the Main board. Replace if faulty.

12.8.4.5 EEV Test procedure

1. Start the operation by navigating the HMI.
2. Press up or down to move the EEV by 10 steps each push.
3. Replace if faulty.

12.8.4.6 Compressor Test procedure

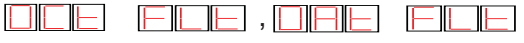
1. Start the operation by navigating the HMI.
2. A/C will start operate.
3. Listen to compressor motor to assure operation. Use Pressures, Temperatures and current measurements to assure the operation.
4. After about 30 sec the A/C will be shut off.
5. If compressor is not operating, check both Driver and compressor and replace if faulty.

12.8.4.7 RV Test procedure

1. Start the operation by navigating the HMI.
2. Listen to RV “clicks” (2 cycles) to assure operation.
3. Replace if faulty.

12.8.4.8 Temperature Sensor Test procedure

1. Start the operation by navigating the HMI.
2. A/C is not operating at this test, only thermistor measurements are taken.
3. If one the measurements is not as specified, it is declared as faulty.
4. The display will show the faulty thermistor name following by “FLT” display:

    , etc.

   This message should be displayed blinking for 30 sec.
5. Replace the faulty sensor.
6. **Note** – the fault is NOT send diagnostics as “Short” or “Disconnected”.

12.8.4.9 Gas Block Test procedure

This test is used for technician to check the blockage within the system. The test is operates in heat mode and the technician should close the liquid valve manually.

1. Start the operation by navigating the HMI.
2. **Note -** The test is not operable when OAT<5°C. If so, the display will show: “nA”.
3. A/C will start operate in Heat Mode.
4. After about 1 minute (finish of pre-test), the display will show:

   At this stage - close the Liquid valve.
5. After about 1 minutes, as soon as the low pressure will drop to below 1.5 bar(g), the LPS - Low pressure status will blink: 
6. At this stage the technician should observe if any ice accumulates on the coil or EEV section that may indicate on any gas block.
7. The test will end after about 15 minutes. This acts as percussion in case the unit will not be shut OFF (or not closes the valves).

12.8.4.10 Communication Test procedure

Check if communication fault occurs between the Indoor and outdoor units.

Note – Require test tool (560Ohm) P/N 416765.

Start the operation by navigating the HMI.

1. Disconnect the IDU-ODU communication connector from main board of ODU.
2. Connect test tool between the 2 pins.
3. After about 30sec, the display will show “PAS” or “FLt”:

4. If “FLT” Replace ODU main board. If “Pass” and still no communication, replace wires or indoor controller.

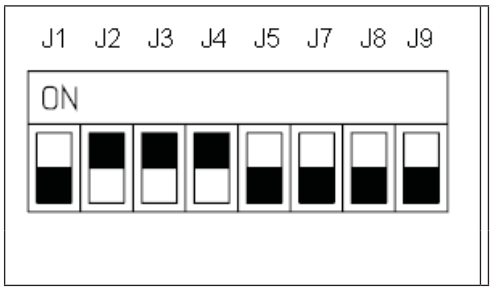
12.9 Jumper/DIP-Switch Setting

12.9.1 Jumper/DIP-Switch Definition

0 = Open (Disconnected)

1 = Close (Shorted)

12.9.2 IDU Jumpers/DIP-Switch



12.9.2.1 Self test Jumper/DIP – J1

Position	Status	Description
0	Open (Disconnected)	Normal Operation (Default)
1	Close (Shorted)	Self Test enabled

Used for internal production line testing. For normal use must be set to OFF (0).

12.9.2.2 *Compensation Jumper/DIP – J2*

Position	Status	Description
0	Open (Disconnected)	Compensation deactivated
1	Close (Shorted)	Compensation activated (Default)

Used for height compensation in heat mode

12.9.2.3 *Family selection Jumper/DIP – J3, J4, J5, J11*

# / Family Name	J3	J4	J5
DLSE 36	1	NA	1
DLS 43	1	1	0
DLSE 18-30	0	NA	1

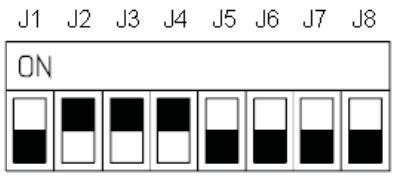
12.9.2.4 *Model selection Jumper/DIP – J7, J8*

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

12.9.2.5 *Clock/Presence Detector/DIP – J9*

Position	Status	Description
0	Open (Disconnected)	Clock enabled (Default)
1	Close (Shorted)	Presence detector enabled

12.9.3 ODU Jumpers



12.9.3.1 *Self test Jumper/DIP – J1*

Position	Status	Description
0	Open (Disconnected)	Normal Operation (Default)
1	Close (Shorted)	Self Test enabled

Used for internal production line testing. For normal use must be set to OFF (0).

12.9.3.2 *ODU Model Selection Jumper/DIP – J2, J3, J4, J5, J6, J7*

See below table

12.9.3.3 *TPT test Jumper /DIP – J8*

Position	Status	Description
0	Open (Disconnected)	Normal Operation (Default)
1	Close (Shorted)	Test enabled

Used for technician testing – TPT. For normal use must be set to OFF (0).

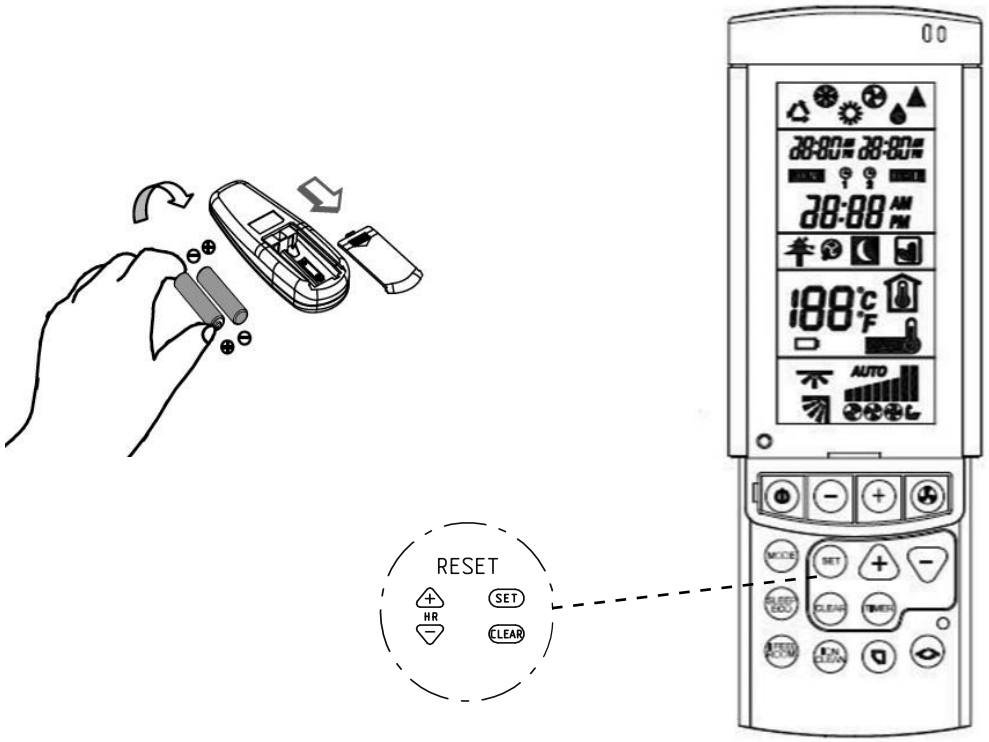
12.9.4 Dip-Switch Setting Table

DLF IDU	#	1	2	3	4	5	6	7	8
	J	J2	J3	J5	J7	J8	J9	J10	J12
DLF 18	ON	■				■		■	
	OFF		■	■	■		■		■
DLF 24	ON	■	■		■			■	
	OFF			■		■	■		■

ODU	ODU Model		J1	J2	J3	J4
YBDE 018-H11	AS	ON	■			
		OFF		■	■	■
YBDE 024-H11	AT	ON		■		
		OFF	■		■	■

12.9.5 Remote Control RC-8

Reset Operation – Press all 4 buttons simultaneously for 5 sec.: “CLEAR“ , “SET” , “+” , ”-” .



12.10 System Parameters

12.10.1 General Parameters for All Models

#	Name	Default Value	Units
1.	*MinOFFTime*	3	minute
2.	*MinONTime*	3	minute
3.	*DImin*	30	minute
4.	*DImax*	240	minute
5.	*TimeD*	1	minute
6.	*DTmin*	2	minute
7.	*DIT*	10	minute
8.	*CTMRUP*	10	minute
9.	*DIF*	30	minute
10.	*TCT*	240	second
11.	*DEICT1*	60	second
12.	*DEICT2*	36	second
13.	*DEICT3*	6	second
14.	*DSTF*	12	°C
15.	*OMTOH0*	50	°C
16.	*OMTOH1*	53	°C
17.	*OMTOH2*	56	°C
18.	*OMTOH3*	59	°C
19.	*OMTOH4*	61	°C
20.	*OMTOH5*	63	°C

12.10.2 ODU Model Dependent Parameters

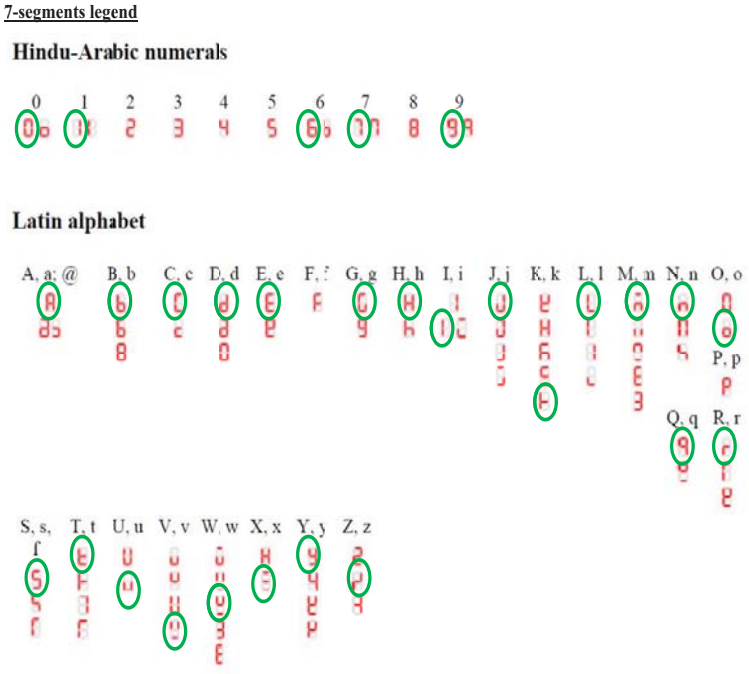
Parameter Name	AS YBDE018-H11	AT YBDE024-H11	AU YBDE030-H11	AB YBD036-H11	AV YAD036-H13	AF YAD042-H13	AG YAD060-H13	AO YBD042-H11	Range	Res.	Unit
MinFreqC	23	24	20	20	20	20	20	20	0-127	1	Hz
MaxFreqC	79	89	70	90	57	65	70	65	0-127	1	Hz
MinFreqH	23	24	20	20	20	20	20	20	0-127	1	Hz
MaxFreqH	80	89	75	95	61	70	75	65	0-127	1	Hz
DeicerFreq	65	80	80	90	65	70	75	65	0-127	1	Hz
Step1Freq	40	40	40	40	40	40	40	40	0-127	1	Hz
Step2Freq	65	65	55	60	50	55	55	60	0-127	1	Hz
Step3Freq	75	75	65	70	60	65	65	70	0-127	1	Hz
Step4Freq	95	95	85	80	80	80	80	80	0-127	1	Hz
Step1Time	3	3	3	3	3	3	3	3	0-7	1	Min
Step2Time	3	3	3	5	3	3	3	3	0-7	1	Min
Step3Time	1	1	1	1	1	1	1	1	0-7	1	Min
Step4Time	1	1	1	1	1	1	1	1	0-7	1	Min
NightRPS	NA	NA	NA	70	45	50	55	50	0-110	1	RPS
OFMinRPMC	27	27	20	20	15	15	15	15	0-130	1	*10RPM
OFMinRPMH	27	27	30	20	20	20	20	20	0-130	1	*10RPM
OFMaxRPMC	85	85	85	95	80	85	85	85	0-130	1	*10RPM
OFMaxRPMH	NA	NA	NA	95	80	85	85	85	0-130	1	*10RPM
NightRPM	85	75	60	80	50	60	60	60	0-130	1	*10RPM
OFNNoiseMaxRPMC	NA	NA	78	90	75	75	75	75	0-130	1	*10RPM
OFNNoiseMaxRPMH	NA	NA	NA	95	75	75	75	75	0-130	1	*10RPM
OCT_OFAN_Noise_Max	8	8	8	8	8	8	8	8	0-15	1	°C
OMT_OFAN_Noise_Max	38	38	35	38	35	35	35	35	27-42	1	°C
EEVMinOperOpenC	70	70	70	70	70	70	70	70	0 – 1023	1	step
EEVMaxOperOpenC	480	480	480	480	480	480	480	480	0 – 1023	1	step
EEVMinOperOpenH	70	70	80	80	70	70	70	80	0 – 1023	1	step
EEVMaxOperOpenH	480	480	480	480	480	480	480	480	0 – 1023	1	step
CTTOH0	78	78	78	80	80	80	80	80	0-120	1	°C
CTTOH1	85	85	85	87	87	87	87	87	0-120	1	°C
CTTOH2	90	90	90	90	90	90	90	90	0-120	1	°C
CTTOH3	95	95	95	92	92	92	92	92	0-120	1	°C
CTTOH4	100	100	100	95	95	95	95	95	0-120	1	°C
CTTOH5	105	105	105	96	96	96	96	96	0-120	1	°C
CCROC0	8.5	8.5	12	17.0	10.0	10.0	10.0	22.0	5-40	0.1	A
CCROC1	9.5	9.5	12.6	17.6	11.0	11.0	11.0	23.0	5-40	0.1	A
CCROC2	10.5	10.5	13.5	18.2	12.0	12.0	12.0	24.0	5-40	0.1	A
CCROC3	11.5	11.5	15.5	19.0	13.0	13.0	13.0	25.0	5-40	0.1	A
DCCOC0/ OVRPWR0	2350	2350	2950	12.0	12.0	12.0	12.0	22.0	5-40	0.1	A
DCCOC1/ OVRPWR1	2500	2500	3050	12.8	13.0	13.0	13.0	23.0	5-40	0.1	A
DCCOC2/ OVRPWR2	2650	2650	3200	13.2	14.0	14.0	14.0	24.0	5-40	0.1	A
DCCOC3/ OVRPWR3	2800	2800	3400	13.6	15.0	15.0	15.0	25.0	5-40	0.1	A
HSTOH0	65	65	59	64	62	62	62	62	0 –110	1	°C

Parameter Name	AS YBDE018-H11	AT YBDE024-H11	AU YBDE030-H11	AB YBD036-H11	AV YAD036-H13	AF YAD042-H13	AG YAD060-H13	AO YBD042-H11	Range	Res.	Unit
HSTOH1	*71*	*71*	*65*	*70*	*73*	*73*	*73*	*68*	0 –110	1	°C
HSTOH2	*74*	*74*	*67*	*73*	*75*	*75*	*75*	*73*	0 –110	1	°C
HSTOH3	*77*	*77*	*69*	*75*	*77*	*77*	*77*	*75*	0 –110	1	°C
HSTOH4	*78*	*78*	*78*	*78*	*78*	*78*	*78*	*77*	0 –110	1	°C
HSTOH5	*85*	*85*	*85*	*80*	*81*	*81*	*81*	*80*	0 –110	1	°C
ICTDef0	*13*	*13*	*13*	6	6	6	6	6	-23 – 8	1	°C
ICTDef1	*10*	*10*	*10*	4	4	4	4	4	-23 – 8	1	°C
ICTDef2	*8*	*8*	*8*	3	3	3	3	3	-23 – 8	1	°C
ICTDef3	*6*	*6*	*6*	2	2	2	2	2	-23 – 8	1	°C
ICTDef4	*3*	*3*	*3*	1	1	1	1	1	-23 – 8	1	°C
ICTDef5	*0*	*0*	*0*	0	0	0	0	0	-23 – 8	1	°C
ICTOH0	*44*	*44*	*44*	*45*	*50*	*50*	*50*	*45*	35– 66	1	°C
ICTOH1	*50*	*50*	*50*	*49*	*52*	*52*	*52*	*49*	35– 66	1	°C
ICTOH2	*54*	*54*	*54*	*51*	*54*	*54*	*54*	*51*	35– 66	1	°C
ICTOH3	*58*	*58*	*58*	*53*	*58*	*58*	*58*	*53*	35– 66	1	°C
ICTOH4	*60*	*60*	*60*	*55*	*61*	*61*	*61*	*55*	35– 66	1	°C
ICTOH5	*61*	*61*	*61*	*61*	*63*	*63*	*63*	*61*	35– 66	1	°C
OCTExitDeicer	*10*	*10*	*10*	*12*	*12*	*12*	*12*	*12*	12 - 28	1	°C
MaxDeicerTime	*12*	*12*	*12*	*12*	*12*	*12*	*12*	*12*	12 – 20	1	Min
EEVDecierOpenSingle	*350*	*150*	*500*	*480*	*480*	*480*	*480*	*480*	0 – 1023	1	Step
DeicerCoef	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	*0.9*	0.7 – 1	0.1	NA

12.10.3. IDU Model Dependent Parameters

Parameter Name	DLSE18	DLSE24	DLSE30	DLSE36	DLS43
Cap.Group	3	4	4	4	4
ICTSTSpeed	25	25	25	25	25
ICTVLSpeed	28	28	28	28	28
ICTLSpeed	30	30	30	30	30
ICTHSpeed	32	32	32	32	32
ICTTSpeed	40	40	40	40	40

12.11 7-Segment Legend



13. TROUBLESHOOTING

13.1 Precaution, Advise and Notice Items

13.1.1 High voltage in Indoor and Outdoor unit electrical assembly

- Open the Outdoor unit controller assembly only after one minute from power off.
- Whole controller assembly, including the wires, connected to the Outdoor unit may have the potential hazard voltage when power is on.
- Touching the Outdoor unit controller assembly may cause an electrical shock.
- Do not touch the naked lead wire and don't insert finger, conductor or anything else into the controller when power is on.

13.1.2 Charged Capacitors

- Large capacity electrolytic capacitors are used in the outdoor unit controller and driver.
- Charging voltage (380VDC) remains after power is down.
- Discharging takes about one minute after turned off.
- Touching the outdoor unit electrical assembly before discharging may cause an electrical shock.
- Measure the electrolytic capacitors voltage to be below 50VDC before further checking electrical assembly parts.

13.1.3 Advisory Notes

- When open the Outdoor unit electrical assembly, don't touch the soldering pin by hand or by any conductive material.
- When connecting or disconnecting the connectors on the PCB, hold the whole housing, don't pull the wire.

WARNING!!!

- When Power Up – the outdoor and indoor unit electrical assemblies, including the wiring, are under HIGH VOLTAGE!!!
- Never open the outdoor or indoor units before turning off **ALL** Power sources!!!
- When turned off, the outdoor unit electrical assembly is still charged (400V)!!!
- DC capacitors are discharging for about 3 Minute after power is OFF.
- Touching the electrical before discharging may cause an electrical shock!!!

- **For safe handling of the electrical assembly please refer to section *13.1* above.**

13.2 General System Failures and Corrective Actions

No.	SYMPTOM / PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Indoor unit			
1.	Indoor unit power supply indicator (Red LED) does not light up.	No Power supply	Check supply voltage to main terminals L and N with volt meter.
		Miss-wiring	Check all supply wiring to controller and terminals according to wiring diagram
		Loose connection	Check all power wiring connections
		Display and display cable	Check continuity of each wire of the display wires/ pins with Ohm meter
		If still not OK	Check if fuse burnt
2.	Fuse burned in indoor unit controller	Short Circuit between wires	Check for any cuts or exposed supply wires or miss-wiring
		Failure of Indoor Unit Fan Motor	Check the motor and capacitor ***(13.5.19)*** Check for any cuts or exposed wires
		If still not OK	Replace fuse
3.	Indoor unit does not respond to remote control message	Remote control message not reached the indoor unit	Check remote control batteries
			Check continuity of each wire of the display wires/ pins with Ohm meter
		If still not OK	Replace display box or indoor Electronic Assembly
4.	Indoor 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 indoor Electronic Assembly
5.	Indoor fan does not start (louvers are opened and Green LED is ON)	Unit in heat mode and coil is still not warm	Change to Cool or Fan mode
		Failure of Indoor Unit Fan Motor	Check the motor and capacitor ***(13.5.19***) Check for any cuts or exposed wires
		Problem with controller or motor capacitor	Change to high speed and Check power supply to motor is higher than 220VAC
		If still not OK	Replace indoor Electronic Assembly
6.	Indoor fan works when unit is OFF, and indoor fan speed is not changed by remote control command.	Controller problem	Replace indoor Electronic Assembly
7.	Water leakage from indoor unit	Indoor unit drainage tube is blocked	Check and open drainage tube

No.	SYMPTOM / PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
8.	One indoor unit or more are operating in cool mode with no capacity, and the other units have water leaks/freezing problems	The communication wires of the indoor units are switched	Check and correct the communication wires connection
9.	One indoor or more are operating in heat mode with a limited capacity, and the coil on the other units are very hot.		
Outdoor unit			
10.	Outdoor unit display board and LEDs are off	No power supply	Check supply voltage to main terminals L and N with volt meter.
		Miss-wiring	Check all supply wiring to controller and terminals according to wiring diagram
		Loose connection	Check all power wiring connections
		Burnt fuse	Check fuse on the main board ***(13.5.8)***
		If still not OK	Replace main board ***(14.1.13)***
11.	Compressor does not start operation	One or some components are not operating well	Check for any fault code shown on display board and act accordingly
		Electronics control problem or protection	
		PFC Chock coil	Check the PFC Chock coil ***(13.5.6)***
		Driver failure	Check if fault code # is shown on display board. If so, fix the problem according to ***(13.5.5)*** or replace driver
		If still not OK	Replace compressor

No.	SYMPTOM / PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
12.	Cooling capacity is not sufficient	Unit size not match the load	Check if the size chosen for the complete room(s) load is enough or need bigger units
		Piping size not matching system	Check if piping is installed correctly and proper diameter size and total length is according to unit specifications
		Refrigerant leakage	Check refrigeration system ***(13.3)***
		Refrigerant over-charge	
		Refrigerant clog	Check and repair clogging specially near the EEV
		Electronics control problem or protection	Check for any fault code shown on display board and act accordingly
		Compressor failure	Check if fault code # is shown on display board. If so, fix the problem according to ***(13.5.10)*** or replace driver
		Indoor coil block	Clean filters and/or remove block or air by-pass
		Indoor fan malfunction	Check the motor and capacitor ***(13.5.19)***
		Outdoor coil block	Remove block and/or avoid air by-pass
		Outdoor fan malfunction	Check outdoor fan motors ***(13.5.9)***
		EEV malfunction	Check EEV ***(13.5.12)***
		Thermistor(s) malfunction	Check if any of fault codes #1-7 is shown on display board. Replace faulty thermistors ***(13.5.13)***
13.	Heating capacity is not sufficient	Check all according to above cooling problem ***(12)***	
		Reverse valve	Check reversing valve operation ***(13.5.11)***
		Deicing not performed well (during low outdoors temperatures)	Check OCT and OAT thermistors fault codes (#1 and 4) Check OCT thermistor if connected well to pipe Check OAT thermistor if connected well Check the thermistors operation ***(13.5.13)***
14.	Compressor is over heated	Electronic control	Check for any fault code shown on display board and act accordingly.
		EEV problem	Check EEV ***(13.5.12)***
		Refrigerant leakage	Check refrigeration system ***(13.3)***
		Indoor coil block	Clean filters and/or remove block
		Indoor fan malfunction	Check indoor fan motor and capacitor ***(13.5.19)***
		Outdoor coil block	Remove block and/or avoid air by-pass
		Outdoor fan malfunction	Check outdoor fan motors ***(13.5.9)***
		Compressor malfunction	Check the compressor ***(13.5.10)***

No.	SYMPTOM / PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
15.	Compressor stops many times during operation	Check all according to above problem	
		HP Switch	Check if HPS fault code (#8) is accruing frequently. If so, check the switch operation ***(13.5.14)***
		LP Switch	Check if LPS fault code (#9) is accruing frequently. If so, check the switch operation ***(13.5.15)***
16.	Not all units are operating	Communication problems	Check the communication between outdoor and indoor units ***(13.5.17)***
17.	Unit is cooling while in heat mode	RV problem	Check RV operation ***(13.5.11)***
		IDU-ODU communication	Check the communication between outdoor and indoor units ***(13.5.17)***
18.	Compressor is generating abnormal noise	Phase order to compressor is wrong	Check compressor phase order
		Compressor internal parts wearing	Replace compressor
		Vibration	Check all piping connections Check compressor rubbers are fixed well Check all screws on unit metal chassis are tightened Check that no piping is in contact with each other or with other parts.
19.	Freezing of outdoor unit coil in heat mode and outdoor unit base is blocked with ice	Hard conditions of low temperatures and high humidity	Check that no obstructions to outdoor unit coil air inlet.
			Check that all holes in bottom of outdoor unit base are open and clean from dirt.
			Check OCT and OAT thermistors
			Connect base heater
20.	The unit stop suddenly during operation	EMC interference to the A/C unit	Check for EMC problems ***(13.5.20.1)***
21.	Indoor unit Indicator leds may flicker		
22.	Other home appliances operation is faulty such as noise appears in the television picture, or the picture is distorted or static occurs in the radio sound	EMC interference by the A/C unit	Check for EMC problems ***(13.5.20.1)***
23.	All others	Specific problems of indoor or outdoor units	Check for any fault code shown on display board and act accordingly

13.3 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in technician Mode where the system operates as in fixed settings. The performance curves given in this manual are given for unit performance in Technician mode when high indoor fan speed is selected.

For entering technician mode see ***12.7***.

13.4 Troubleshooting by Diagnostics Codes

13.4.1 Fault Code for Outdoor Unit

If any fault exists in the system, its fault will be shown according to the following coding method.

The 5 last fault occurred in the system will be stored in the EEPROM.

If no fault exist in the system, no fault code will be displayed during normal operation mode. STATUS LED is blinking 5 times in 5 seconds, and shut off for the next 5 seconds.

FAULT LED will blink during the same 5 seconds according to the following table

The LED coding method is as follow:

STATUS **FAULT**

No	Problem	AO	5	4	3	2	1
1	OCT is shorted/disconnected	Yes	0	0	0	0	1
2	CTT is shorted/disconnected	Yes	0	0	0	1	0
3	HST is shorted/disconnected	Yes	0	0	0	1	1
4	OAT is shorted/disconnected	Yes	0	0	1	0	0
5	OMT is shorted/disconnected	Yes	0	0	1	0	1
6	RGT is shorted/disconnected	Yes	0	0	1	1	0
7	RLT is shorted/disconnected	Yes	0	0	1	1	1
8	High pressure protection	Yes	0	1	0	0	0
9	Low pressure protection	Yes	0	1	0	0	1
10	No communication to Driver	Yes	0	1	0	1	0
11	• Compressor IPM Fault • IPM Driver Pin • Compressor Current Sensor Fault	Yes	0	1	0	1	1
12	No Water Flow (For Hydro Units only)	Yes	0	1	1	0	0
13	Refrigerant Leakage	No	0	1	1	0	1
14	• DC over voltage • DC under voltage	Yes	0	1	1	1	0
15	• AC under voltage • AC over Voltage • Zero Crossing detection	Yes	0	1	1	1	1
16	• Mismatch between IDU & ODU models • Missing ODU configuration • Undefined ODU Model	Yes	1	0	0	0	0
17	No Communication	Yes	1	0	0	0	1
18	System Over Power	Yes	1	0	0	1	0
19	• PFC Current sensor • Missing phase • Phase order mismatch • PFC Trip (Oveload)	Yes	1	0	0	1	1
20	Heat sink Over Heating	Yes	1	0	1	0	0
21	Deicing	No	1	0	1	0	1
22	Compressor Over Heating	Yes	1	0	1	1	0
23	Compressor Over Current	Yes	1	0	1	1	1
24	No OFAN Feedback (Both OFAN_UP or OFAN_DN)	Yes	1	1	0	0	0
25	• OFAN IPM fault • OFAN IPM Driver Pin	Yes	1	1	0	0	1
26	Compressor Lock	Yes	1	1	0	1	0
27	Indoor Coil defrost	Yes	1	1	0	1	1
28	Abnormal system behave	No	1	1	1	0	0
29	Indoor Sensor fault	Yes	1	1	1	0	1
30	• Outdoor Coil Overheating • Indoor Coil Overheating	Yes	1	1	1	1	0
31	Operation conditions are exceeded	Yes	1	1	1	1	1

1 - ON, 0 - OFF

Only one code is shown. Order of priority is lower to the higher number. Diagnostics is continuously ON as long power is on.

13.4.2 Outdoor unit diagnostics and corrective actions

No	Fault Name	Fault Description	Corrective Action
1	OCT short/disconnect	Thermistor not connected or damaged	Check Thermistor ***(13.5.13)***
2	CTT short/disconnect		
3	HST short/disconnect		
4	OAT short/disconnect		
5	OMT short/disconnect		
6	RGT short/disconnect		
7	RLT short/disconnect		
8	High pressure protection	Compressor stopped due to high pressure protection	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant clog. Check the switch operation ***(13.5.14)***
9	Low pressure protection	Compressor stopped due to low pressure protection	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant leak. Check the switch operation ***(13.5.15)***
10	No communication to Driver	Driver fault	Check power supply to driver Check driver communication ***(13.5.16)***
11	• Compressor IPM Fault • IPM Driver Pin • Compressor Current Sensor Fault	Over current / IPM malfunction	Check no obstruction to electrical box and outdoor coil air inlet. Check Compressor ***(13.5.10)***
12	No Water Flow (For Hydro Units only)	NA	NA
13	Refrigerant Leakage	NA	NA
14	DC Under/over voltage	DC voltage exceeds its limit	Check if input voltage out of limit, if not and the problem persists, replace driver. If voltage is high/Low, shut off the power and recommend the customer to fix the power supply
15	AC under voltage/AC over Voltage/Zero Crossing	AC input voltage is lower/ higher than limit	Check if input voltage is out of limit, if not and the problem persists, replace driver. If voltage is High/low, recommend the customer to fix the power supply
16	Mismatch between IDU & ODU models	Mismatch between IDU and ODU models	Indoor unit sizes are exceeding outdoor unit capacity, check indoor units model plugs. Either too high or too low capacity indoor units
	Missing ODU Configuration	ODU dip switches are not configured correctly	Check ODU dip switch setting if correct
	Undefined ODU Model		
17	No Communication to IDU	IDU-ODU communication	Check communication between indoor and outdoor units ***(13.5.17)***
18	System Over Power	Protection – not available	-

No	Fault Name	Fault Description	Corrective Action
19	PFC Current sensor	Driver fault	Replace Compressor Driver
	Missing phase	Installation incorrect	Check power supply lines
	Phase order mismatch		Switch between 2 supply lines
	PFC Trip (Overload)	Protection of driver	Can occur during high current conditions. If problem persists, Check power supply to driver. Check driver communication (13.5.16). Check no obstruction to electrical box and outdoor coil air inlet.
20	Heat sink Over Heating	Compressor stopped due to heat sink protection	Check that the airflow around the ODU is free and the fan is running free Check the screws connecting the driver to heat sink are tighten Check outdoor fan motors. ***(13.5.9)***
21	Deicing	During deicing procedure	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant leak and thermodynamic operation ***(13.3)***
22	Compressor Over Heating	Compressor stopped due to over heat protection	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant leak and thermodynamic operation ***(13.3)***
23	Compressor Over Current	Compressor stopped due to over current protection	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant leak or clog and thermodynamic operation ***(13.3)***
24	No OFAN Feedback (Both OFAN_UP or OFAN_DN)	Outdoor fan(s) does not rotate	Check no obstruction to outdoor unit coil air path Check OFAN motor ***(13.5.9)***
25	OFAN IPM fault / OFAN IPM Driver Pin	Not available	-
26	Compressor Lock	Compressor does not rotate	Check Compressor ***(13.5.10)*** Check driver ***(13.5.5)***
27	Indoor Coil defrost	Indoor coil is freezing - protection	Normally no action is required If the problem persists for more than twice on each hour.
			Check refrigerant leakage – add refrigerant if required according pressure charts on section ***5***.
			Check ICT sensor – replace if required
			Check IFAN motor and capacitor ***(13.5.19)***
28	Abnormal	Compressor cannot start properly.	Reset power and check again after 5 min. If happens again, replace driver.
29	Indoor Sensor fault	Thermistor not connected or damaged	Check Thermistor (13.5.13)
30	Outdoor/Indoor Coil Overheating	Compressor stopped due to over pressure protection	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant clog and thermodynamic operation ***(13.3)***

No	Fault Name	Fault Description	Corrective Action
31	Operation conditions are exceeded	System is performing out of its outdoor condition limitations: Cooling: >46°C , <-11°C. Heating: >30°C , <-18°C. Indication only, no action.	Check if indeed the conditions are exceeded. If not, check OAT thermistor, if OK, check no obstructions to outdoor air path.

13.4.3 Fault Code for Indoor unit

Note: Indoor unit diagnostics can be viewed by the outdoor unit display board *(13.4)*.
The below procedure is for viewing the indoor unit codes via the indoor unit led display.

Pressing Mode button for more than 5 seconds will activate diagnostic mode by the acknowledgment of 3 short beeps and lighting of COOL and HEAT LED's.
When Indoor diagnostics is displayed, all four LED's (STBY, Operate, Filter, TMR) are on.
Entering diagnostics in STBY mode allows only viewing of status (fault-display).
In diagnostic mode, system problems / information will be indicated by blinking of Heat & Cool LED's.

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 table:

No	Fault Name	5	4	3	2	1
1	ICT is disconnected	0	0	0	0	1
2	ICT is shorted	0	0	0	1	0
3	RAT is disconnected	0	0	0	1	1
4	is shorted	0	0	1	0	0
5	Reserved	0	0	1	0	1
6	ICTE Shorted/Disconnected	0	0	1	1	0
7	Undefined IDU Family/Model	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	0
…	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
…	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

1 - ON,0 - OFF
Only one code is shown. Order of priority is lower to the higher number. Diagnostics is continuously ON as long power is on.

13.4.4 Indoor unit diagnostics and corrective actions

No.	Fault	Probable Cause	Corrective Action
1-4, 6	Sensor failures	Sensors not connected or damaged	Check Thermistor (***13.5.13***)
7	Undefined IDU Family/Model	IDU is not a valid model or family	IDU jumper configuration is not correct
8	No Communication	IDU-ODU communication	Check communication between indoor and outdoor units (***13.5.17***)
9	No Encoder	Indoor electronics or motor	Check motor wiring, if OK, replace motor
		If still not ok	Replace Indoor electronic assembly (***14.2.2***)
11	Outdoor Unit Fault	Outdoor controller problem	Check for any fault code shown on outdoor unit display board and act accordingly (***13.4***)
17-18	Protections	Indication	No action
19	Outdoor Unit Protection	Compressor stopped due to outdoor unit protection	Normally no action is required If the problem persists for more than twice on each hour, Check for any fault code shown on outdoor unit display board and act accordingly (***13.4***) Check the EEV (***13.5.12***) Check the Outdoor fans (***13.5.9***) Check the Indoor fans (***13.5.19***) Check the Compressor (***13.5.10***) Check the CTT Thermistor (***13.5.13***)
20	Indoor Coil HP Protection	Compressor stopped due to high pressure (heating) protection	Normally no action is required If the problem persists for more than twice on each hour, check for refrigerant leak and thermodynamic operation (***13.3***) Check the EEV (***13.5.12***) Check the Outdoor fans (***13.5.9***) Check the Indoor fans (***13.5.19***) Check the Compressor (***13.5.10***) Check the CTT Thermistor (***13.5.13***)
21	Overflow Protection	Compressor stopped due to water level overflow protection	Check the drainage tube for any clog. Correct drain piping or float switch if needed. It is highly recommended to install a siphon into the unit drainage point.

No.	Fault	Probable Cause	Corrective Action
24	EEPROM Not Updated	System is using ROM parameters and not EEPROM parameters	No action, unless special parameters are required for unit operation.
25	Bad EEPROM		No action, unless special parameters are required for unit operation.
26	Bad Communication	IDU-ODU communication	Check communication between indoor and outdoor units (*13.5.17*)
27	Using EEPROM data	No problem	
28	IDU model	Indoor unit model connected is shown: Model A - 4HP unit	No problem
29		Indoor unit model connected is shown: Model B - 5HP unit	
30		Indoor unit model connected is shown: Model C - 6HP unit	
31		Not applicable	

13.5 Procedures for checking Main Parts

13.5.1 Discharge DC Voltage

WARNING

High voltage!!!

Wait for DC voltage to be discharged before touching any part of the driver to avoid electric shock.
Check to ensure that DC voltage has reduced to below 50VDC, if not, keep waiting until it does.

13.5.2 Checking Mains Voltage

Confirm that the Mains voltage is in range. 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 mistakes.

13.5.3 Checking Line Filter Board

1) Check for any burn signs on the filter board and its coils and relays, replace if any.
2) Check voltage at the inlet and outlet of the line filter. If no output voltage, replace line filter.
3) In case of burnt main fuse in line filter – replace **both Line filter** and **driver**.

Replacing line filter - (***14.1.16***)

13.5.4 Checking Compressor Driver

13.5.4.1 YBD 018-024

In normal operation the 7-segments display is ON continuously. Even is that case, there can still be a Hardware problem that prevents the system to perform well or at all. If no other problem is found, replace the driver.

- Check power supply to driver connected well and no burn marks on wiring.
- PFC chock is connected well. Correct if needed.
- Check PFC Chock (13.5.4.3). Replace chock if needed.
- Check main fuse (20A). In case fuse is burnt, replace driver.

If all is well but still leds are OFF, Replace driver.

13.5.5 Checking PFC Chock coil

1) Check PFC chock connections – repair if needed.
2) Visually check to see any burn marks on the wires – replace the chock(s) if needed.
3) Disconnect the chock from the driver and check if the 2 ending wires of each chock are shorted (continuity check) – if they are NOT shorted replace the chock(s), if they are shorted – check the driver (***13.5.4***).

Replacing PFC chock - (***14.1.17***)

13.5.6 Checking DC Capacitors

1) Check visually for burn marks on the capacitor PCB and the capacitors for swelling casing – replace if needed.
2) When power is ON - Check that red led is ON, if not check voltage between + and - poles to be according table:

Unit	Voltage
GC036-43 / INV40-50	380±50VDC
YAD036-42-60-H13 / INV40T/50T/60T	560±50VDC
YBD042-60-H11	310±50VDC

3) When power is OFF - Check capacitance between + and – poles, should be according table :

Unit	Capacitance
GC036-43 / INV40-50	2820±560µF
YAD036-42-60-H13 / INV40T/50T/60T	1360±270µF
YBD042-60-H11	3360±670µF

Replacing driver - ***(14.1.18)***

13.5.7 Checking fuse on Main Board

If the 3.15A fuse on the main Board is burnt check the outdoor fans or any other peripheral that can cause a short:

1) In case of a problematic peripheral - replace it.
2) In case no problematic peripheral replace the burnt fuse.
3) In case of frequent burning fuse, replace the controller.

Replacing main board - (***14.1.13***)

13.5.8 Checking Outdoor Fan Motor

13.5.8.1. YBD018-027

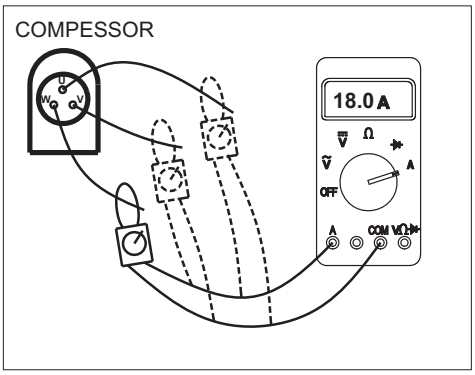
Check motor capacitor.
Check voltage to motor, should be 230-130VAC. If voltage is not in range, replace the motor.
Check that OMT sensor reading is OK.
If motor is Ok, replace the controller.

13.5.9 Checking Compressor

1) Check Compressor connections - Repair if needed.
2) Check the resistance between the three phases – all three coil resistances should be the same:

UNIT	RESISTANCE
YBD036 - H11 / INV38	0.788 Ω
INV40-50 / YBD042-060 - H11	0.188 Ω
YAD036-042-060 - H13	0.44 Ω
YBD030	0.8 Ω
YBD018-024	0.9 Ω

3) Check the compressor current while operating to be the same on each wire - In case of abnormal current (no current or excessive current), the problem could be of driver or compressor – if driver is checked to be operating well (***13.5.5***), replace the compressor.



3) Check Compressor motor current

Replacing compressor- (***14.1.11***)

13.5.10 Checking Reverse Valve (RV)

The RV has two parts, Solenoid and valve.

1) Disconnect the RV connector from the main board and operate the unit in heating mode, check the voltage between two pins of reverse valve connector on the controller, normal voltage is 230VAC - if no power supply to RV, replace outdoor main board.
2) Check RV operation with direct 230VAC power supply. If RV solenoid is OK (but still no heating operation while compressor is ON), replace the RV valve from the refrigeration system.if not, replace the RV coil.

Replacing RV Coil (***14.1.7***)

Replacing RV Valve - (***14.1.10***)

Replacing main board - (***14.1.13***)

13.5.11 Checking Electrical Expansion Valve (EEV)

The EEV has two parts, step motor and valve. Use additional set of valve and coil to check the system.

1) Check the impedance in the coil wires to be as following:
   Grey wire to each of the other wires – about 100Ω
   Other wires – each one to the others (except grey) – about 50Ω
2) When Outdoor unit is powered on, EEV shall have vibration and click sound. If not, replace the coil with the additional one and check again – turn OFF the unit and than turn it ON, vibration and click sound should be performed. If OK, the coil was damaged and require to be replaced.
3) Turn OFF the unit, insert a good coil onto an additional operating valve and turn the unit ON, vibration and click sound should be performed. If OK, replace EEV valve from the unit.
4) If both EEV coil and valve are still not operating, replace the ODU main board.

Replacing EEV Valve Coil - (***14.1.9***)

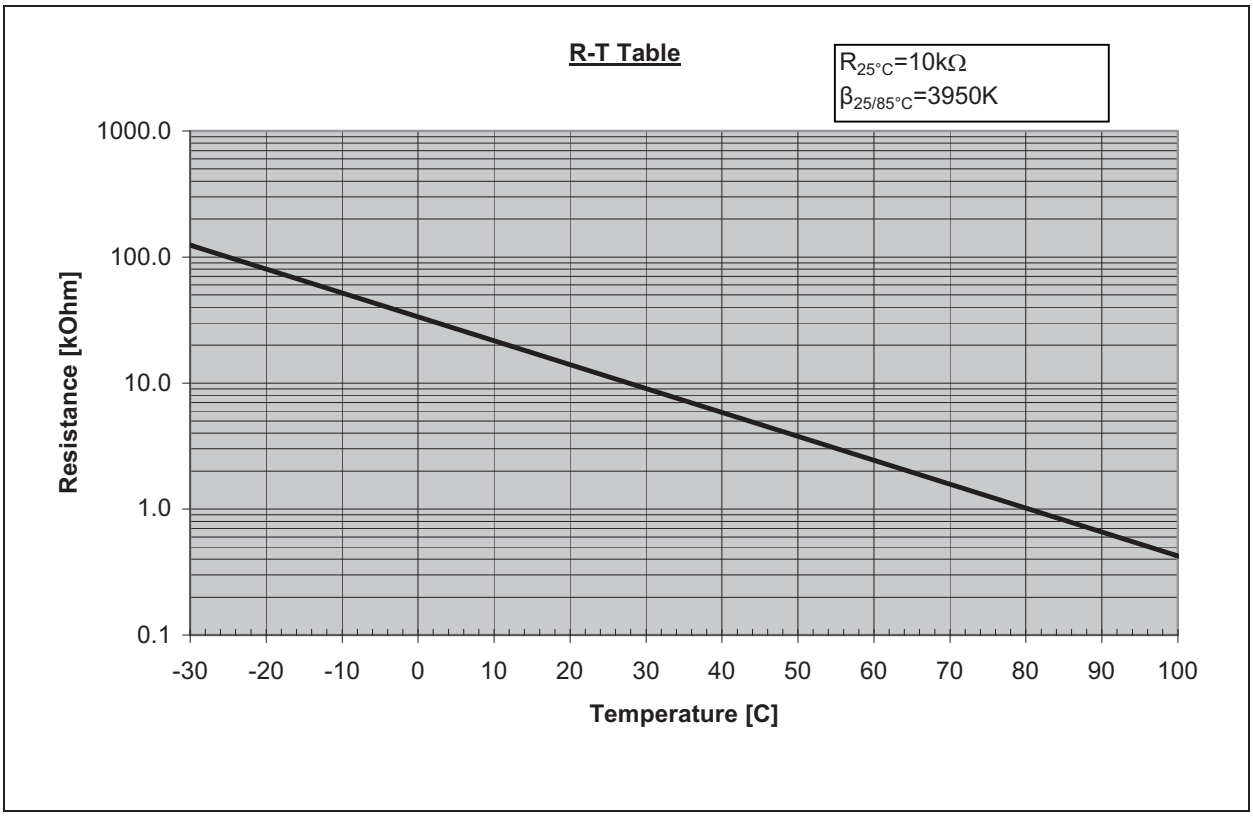
Replacing EEV Valve - ***(14.1.9***)

Replacing main board - ***(14.1.13***)

13.5.12 Checking Thermistors

1) Check Thermistor connections and wiring - Replace if needed.
2) Check sensor visually - Replace if needed.
3) Check thermistor sensor attachment to pipe (or other parts), specially pay attention to the spring holding the sensor towards its sensing part – repair if needed.
4) Disconnect the connector from the main board and check Thermistor resistance – should be according the charts below for each sensor. If not in range of 10%, replace thermistor.
5) If thermistor resistance check is OK but reading is still wrong, replace main board.

CTT (YBDE018-024), OAT, OCT, OMT, ICT, RAT, HST Chart



13.5.13 Checking High Pressure Switch (HPS)

1) Disconnect HPS connector from the main board and check resistance between the 2 pins of the HPS connector – if shorted the HPS is OK, otherwise replace HPS.

Replacing HPS - (***14.1.10***)

13.5.14 Checking Low Pressure Switch (LPS)

1) Disconnect LPS connector from the main board and check resistance between the 2 pins of the HPS connector – if shorted the LPS is OK otherwise replace LPS.

Replacing LPS - (***14.1.9***)

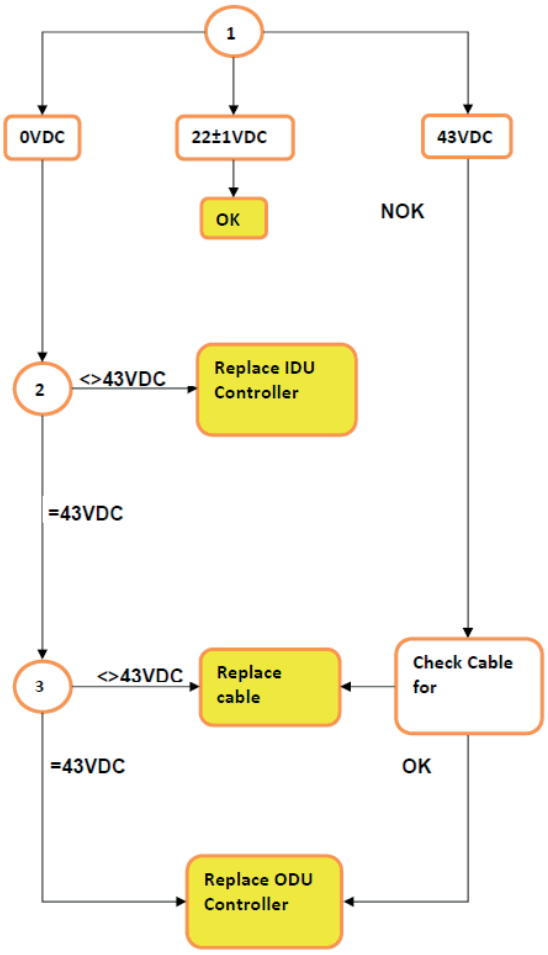
13.5.15 Checking Compressor Driver Communications

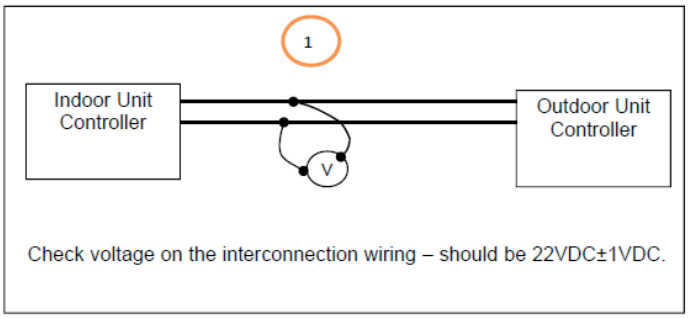
1) Disconnect the wire cable from the connectors on both sides (driver and main board), check the wiring continuity – Repair or replace wiring if needed.
2) Turn power ON and check if the red led in the driver is lighted. If OK and still no communications, replace main board. If the led is OFF, replace driver.

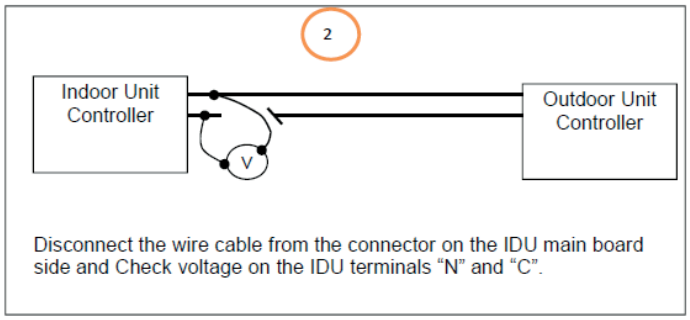
Replacing Outdoor Unit main board - (***14.1.13***)
Replacing driver - ***(14.1.15***)

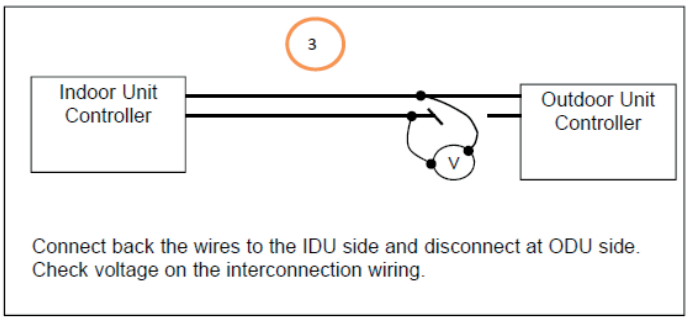
13.5.16.2 YBD 018-030

1) Check voltage on the interconnection wiring – should be 22VDC±1VDC. If not:
2) Disconnect the wire cable from the connector on the IDU main board side and Check voltage on the IDU terminals “N” and “C” – should be 43VDC±1VDC. If not, replace IDU controller. If it is 43VDC:
3) Connect back the wires to the IDU side and disconnect at ODU side. Check voltage on the interconnection wiring – should be 43VDC±1VDC. If not, replace wiring. If it is 43VDC replace Outdoor unit controller.









13.5.17 Checking Indoor Unit Fuse on Controller

If the 3.15A fuse on the main Board is burnt check the fan or any other peripheral that can cause a short:

1) In case of a problematic peripheral - replace it.
2) In case no problematic peripheral replace the burnt fuse.
3) In case of frequent burning fuse, replace the controller.

13.5.18 Checking Indoor Unit Fan Motor

1) Check the motor wiring from the controller.
2) Check the motor capacitor for capacitance according to the capacitor name plate.
3) Check the resistance between each coil of the motor to be within normal range (30-300Ω).
4) Check resistance between each wire to ground to be above 5Ω.

13.5.19 Checking for electromagnetic interference (EMC problems)

13.5.19.1 *EMC interference to the A/C unit*

Locations most susceptible to interference

1) Locations near broadcast stations where there are strong electromagnetic waves.
2) Locations near amateur radio (short wave) stations.
3) Locations near electronic sewing machines and arc-welding machines.

Problem:

1) The unit may stop suddenly during operation.
2) Indicator lamps may flicker

Correction Actions:

The fundamental concept is to make the system less susceptible to noise by Insulation for noise or distance from the noise source.

1) Use shielded wires.
2) Move unit away from the noise source.

13.5.19.2 *EMC interference to near by home appliances*

Locations most susceptible to interference:

1) A television or radio is located near the A/C and A/C wiring.
2) The antenna cable for a television or radio is located close to the A/C and A/C wiring.
3) Locations where television and radio signals are weak.

Problem:

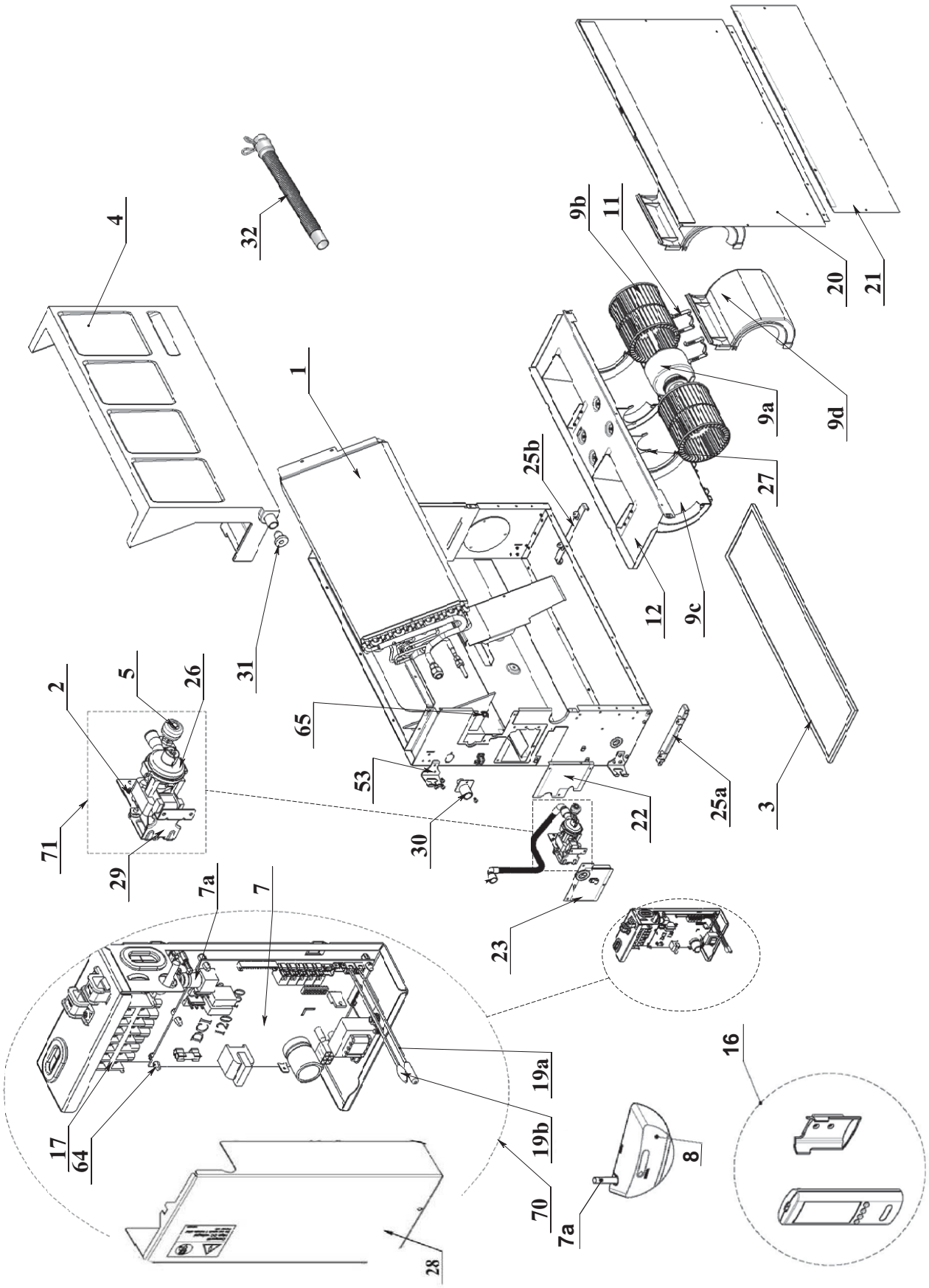
1) Noise appears in the television picture, or the picture is distorted.
2) Static occurs in the radio sound.

Correction Actions:

1) Select a separate power source.
2) Keep the A/C and A/C wiring at least 1 meter away from wireless devices and antenna cables.
3) Change the wireless device's antenna to a high sensitivity antenna.
4) Change the antenna cable to a BS coaxial cable.
5) Use a noise filter (for the wireless device).
6) Use a signal booster.

14. EXPLODED VIEWS AND SPARE PARTS LISTS

14.1 Indoor Unit: DLF 18

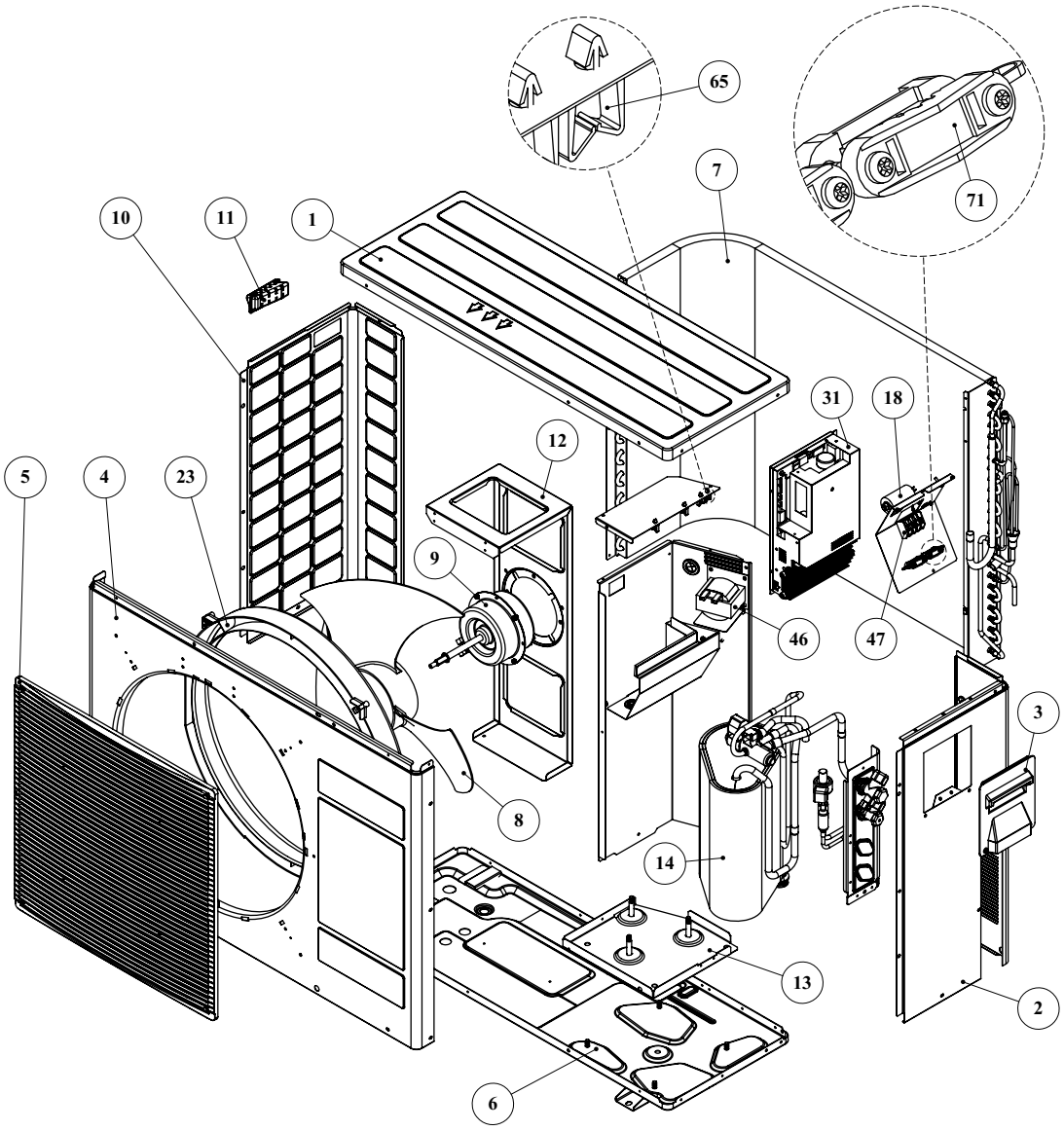


14.2 Indoor Unit: DLF 18 DCI

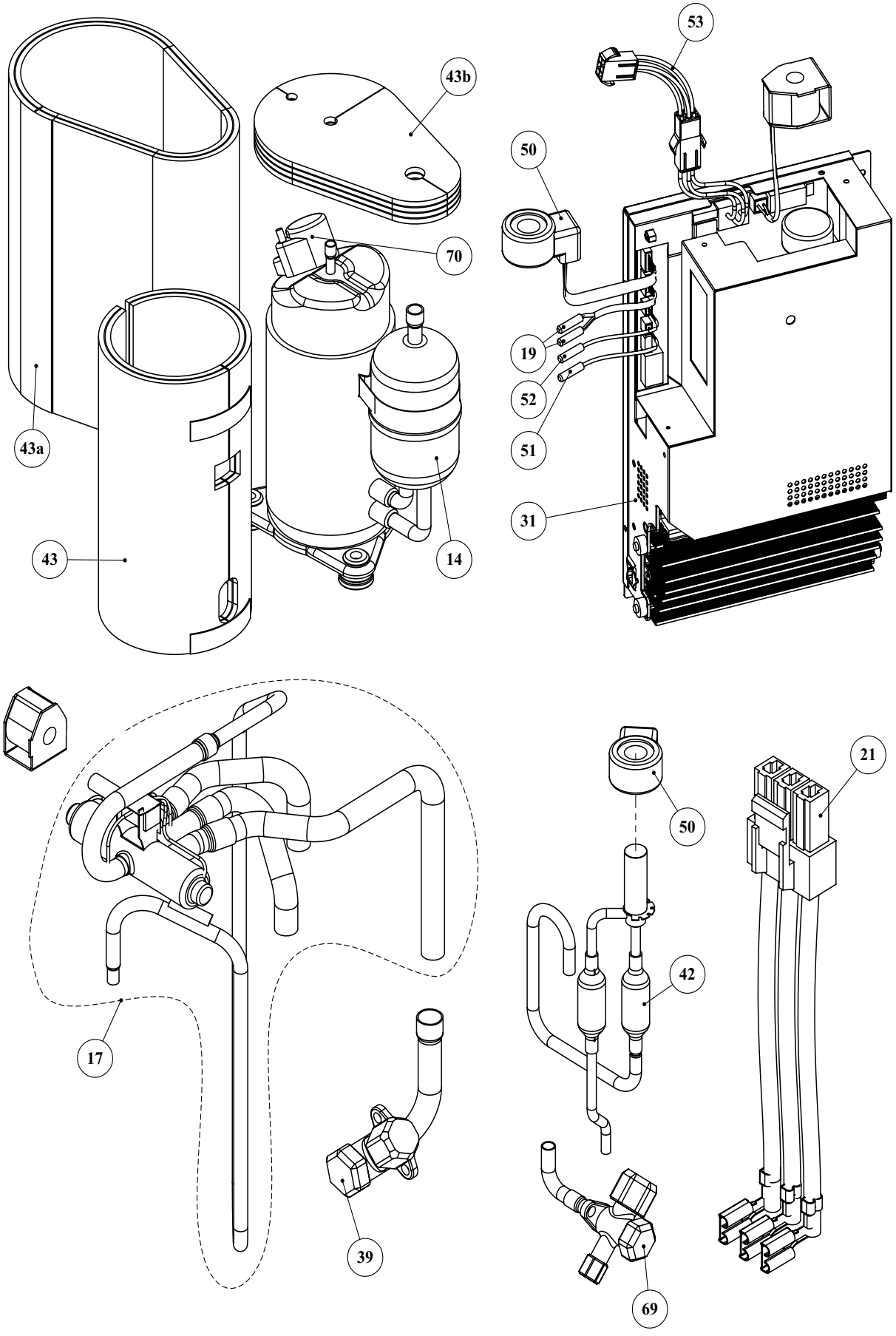
No.	Item	Description	Quantity
1	418401	Coil 7mm 3r 4c R410 LSN50	1
2	418214	Float support LSN	1
3	418951	Air filter AL 750	1
4	418910	Condensat drainag basin small	1
5	418716	Over flow float sensor	1
7	467300419R	CONTROLLER/ Ducted DC MOTOR	1
8	467300314R	DUCTED DISPLAY - AIRWELL	1
11	407038	MOTOR BRACKET FCR/FCX/EBS	2
12	418202	Fan deck small LSN	1
16	467200033R	REMOTE CONTROL RC08W WHITE	1
17	418717	Terminal Block 7P Hoppy	1
20	418223	Front panel small LSN	1
21	418227	Bottom panel small	1
22	418216	Nippels cover	1
23	418215	Water pump service cover	1
26	418302	WATER PUMP LSN	1
27	418206	Motor support LSN	1
28	4732102	Controller Cover (DCI controll	1
29	418213	Water pump support LSN	1
30	418916	External water pump nozzle	1
31	418908	Drain tube plug D20	1
32	418953	Drain flexible tub ID26	1
53	433316	Hanging BRACKET	4
64	416907	P.C SPACER - 10	5
65	416910	CABLE HOLDER	1
70	418714	CONTROLLER DC MOTOR&Cable Disp	1
71	418935	Water pump assy LSN	1
19a	473797	THERMISTOR+CAP WITH CONNECTOR	1
19b	473795	THERMISTOR WITH CONNECTOR L235	1
25a	418219	Air filter trail L	1
25b	418220	Air filter trail R	1
7a	404026	Cable 8 Wires 7M With JST MD a	1
9a	418300	Motor 16w LSN	1
9b	418902	Fan D140x150 LSN	2
9c	418901	Fan housing 150 lower LSN	2
9d	418900	Fan housing 150 upper LSN	2

14.3 Outdoor Units: YBDE 018-H11 - Exploded View

14.3.1 Outdoor Unit General Assembly



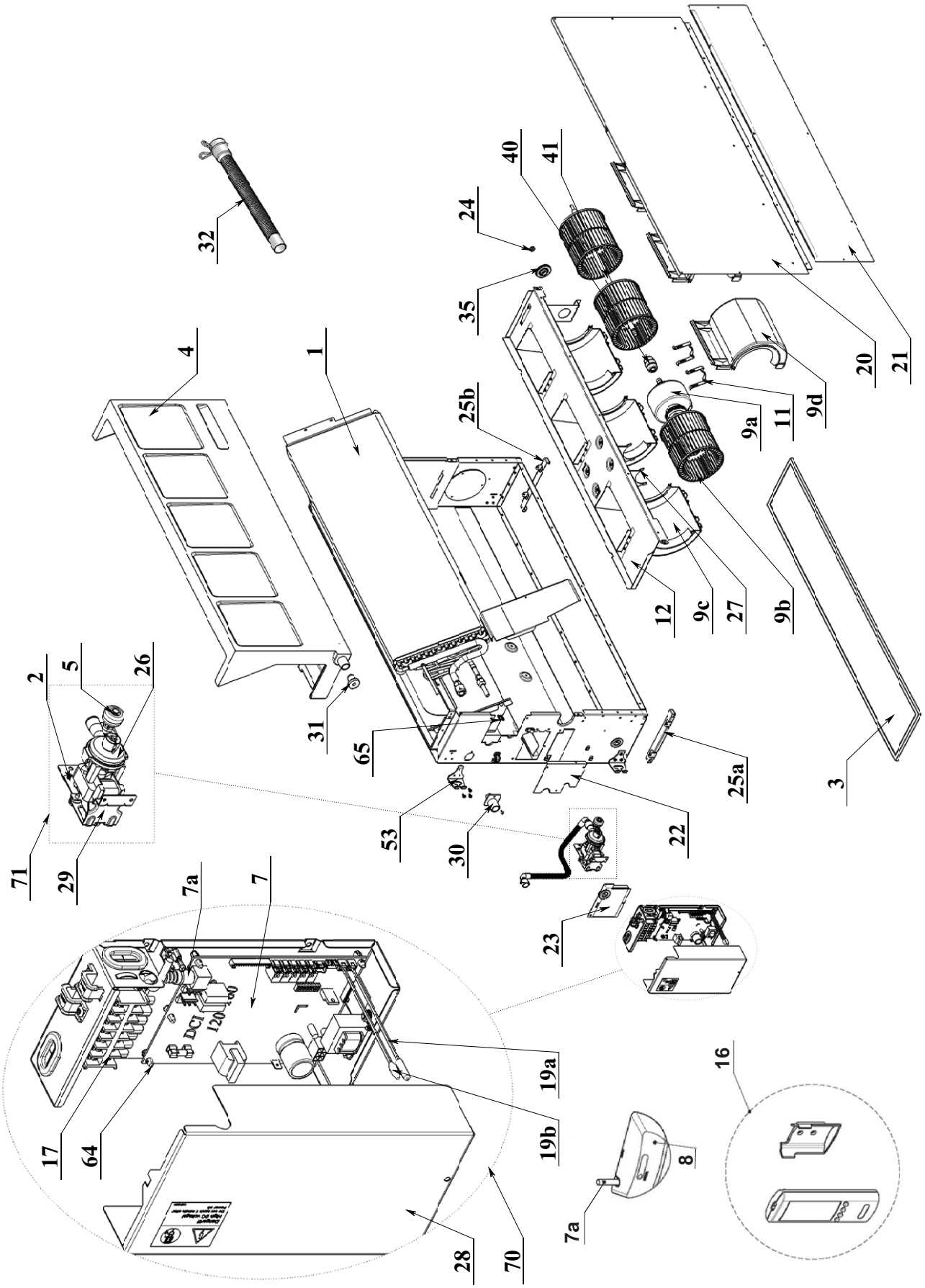
14.3.2 Outdoor Unit Parts Assembly



14.3.3 Outdoor Unit: YBDE 018-H11 Spare Part List

No.	PN	Description	Qty
71	253054	Supply Cord Clamp	2
9	416320	Motor 70W,2S,OU7 DCI	1
65	416910	Cable Holder	3
65	416910	Cable Holder	1
5	417000	OU Square Fan Guard	1
50	425713	EEV Coil (C) QA (Q) 12-YLT-07-RK	1
43	426630	Compressor Internal Insulation	1
43a	426631	Compressor External Insulation	1
43b	426632	Compressor Top Insulation OU7	1
13	426634	Compressor Base Plate OU7-22-30 DCI	1
2	426641	Side Panel OU7 DCI	1
7	426678	Coil OU7-22 DCI Eco Export As	1
17	426690	Tubing Assembly OU7-22 DCI	1
31	426705	Controller Assy OU7 DCI	1
21	426793	Compressor Wiring	1
46	426798	PFC Chock (1PH/DCI50)	1
70	426903	Terminal Cover Compressor GMCC	1
10	433281	Side Guard OU7-24	1
3	436357	Small Electrical Cover OU	1
11	436358	OU Leading Handle	1
1	437045	Upper Cover EL13 OU Large	1
12	439342	Motor Support OU7	1
4	439357	Front Cover OU7	1
23	4399281	Outlet Plastic Ring OU7/8/12	1
18	442007	Capacitor 6mF 450V/P2	1
8	4529604	Axial Fan D493*143	1
14	460170013R	Compressor DA150S1C-20FZ	1
19	467400040	OMT/OAT Thermistor with connector	1
51	467400078	OCT-Thermistor+CAP With Connector	1
52	467400200	CTT-Thermistor With Connector	1
47	467420025	Terminal Block 4P	1
69	474239	Liquid Valve Assemby OU12-50	1
39	455879	Service Valve 1/4"F	1
42	426662	EEV Assy OUI7-22 DCI	1
6	417200	Base Assembly	1

14.4 Indoor Unit: DLF 24 DCI

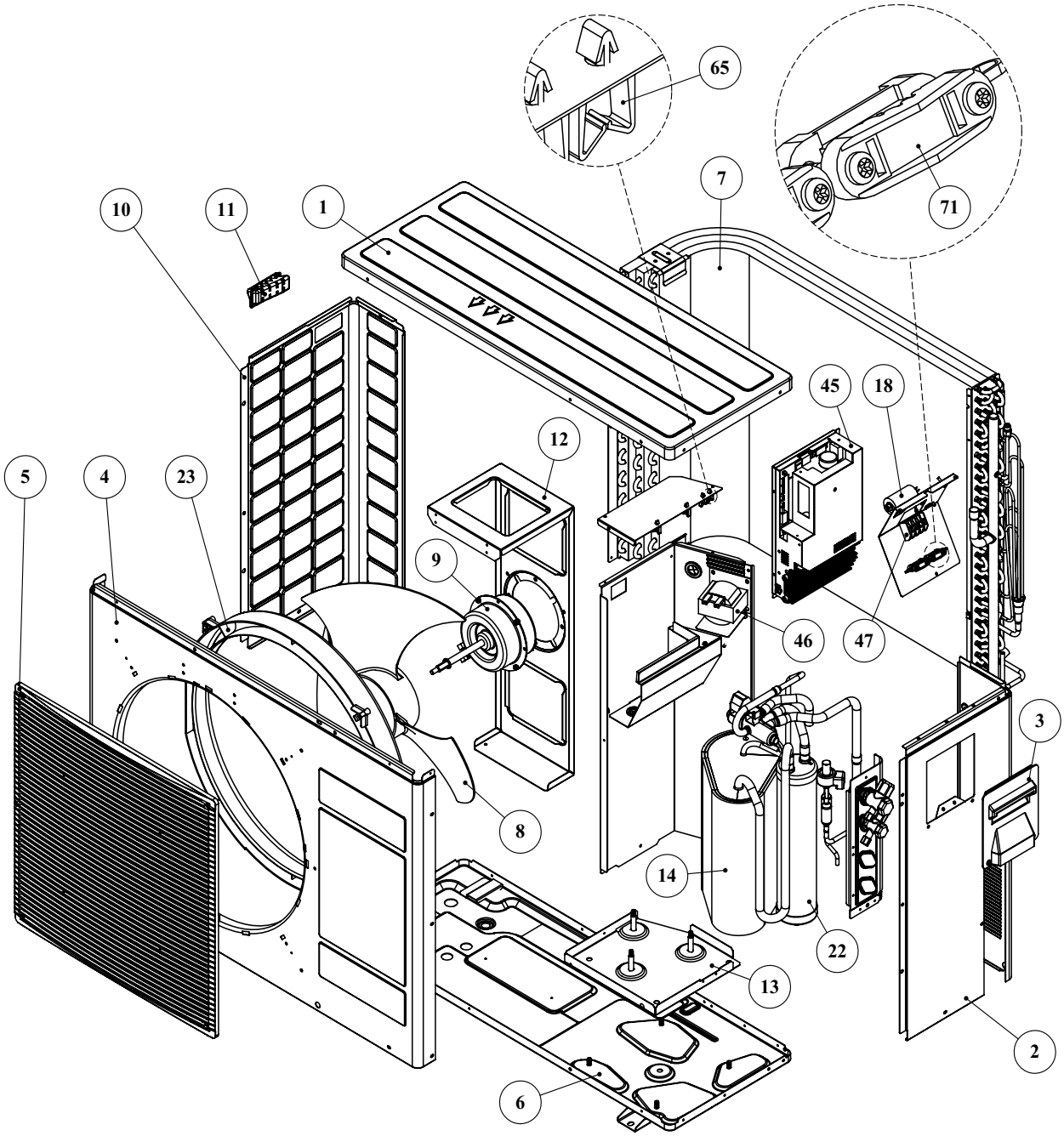


14.5 Indoor Unit: DLF 24 DCI

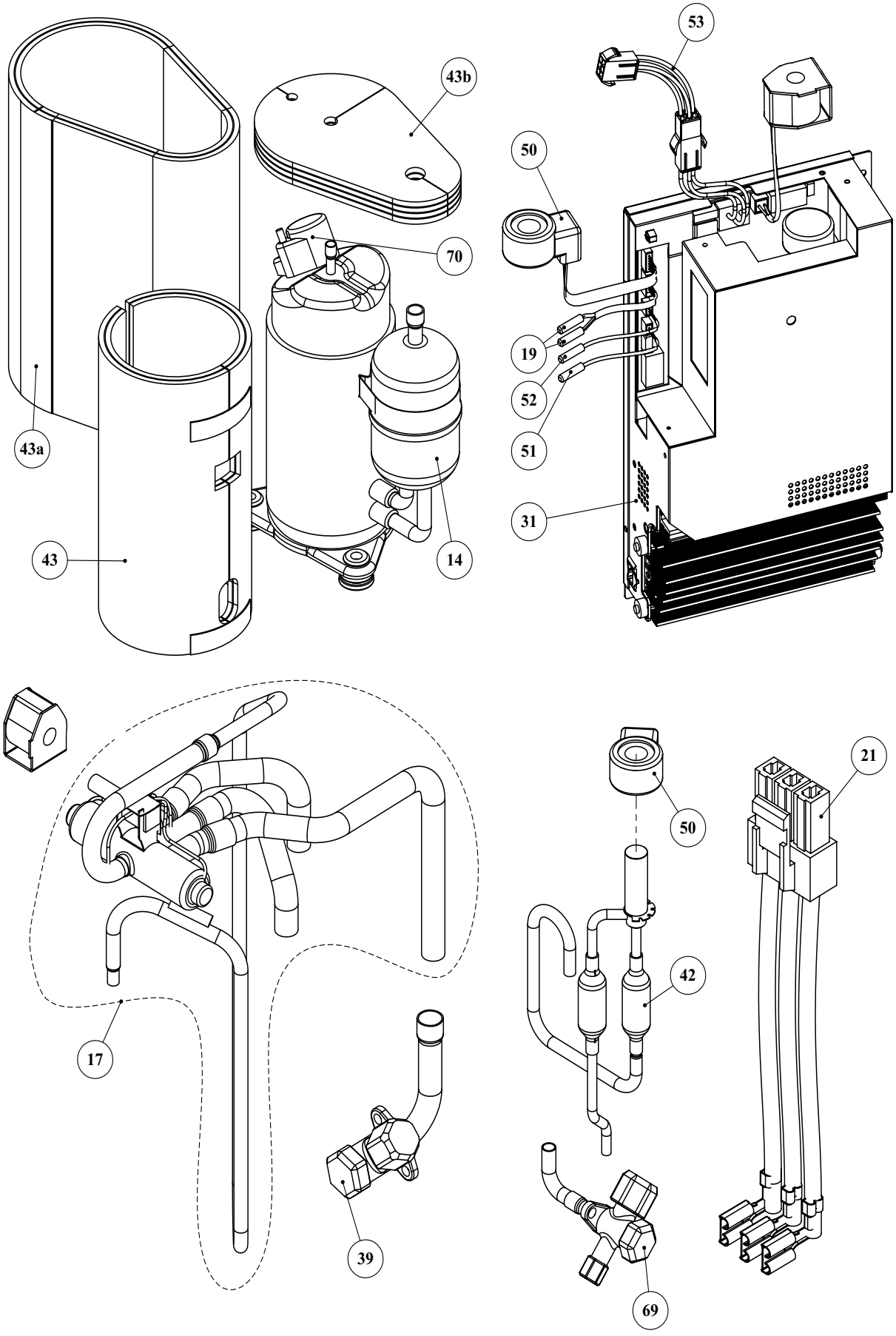
No.	Item	Description
1	418403	Coil 7mm 3r 5c R410 LSN72
2	418214	Float support LSN
3	418952	Air filter AL 1050
4	418912	Condensat drainag basin large
5	418716	Over flow float sensor
7	467300419R	CONTROLLER/ Ducted DC MOTOR
8	467300314R	DUCTED DISPLAY - AIRWELL
11	407038	MOTOR BRACKET FCR/FCX/EBS
12	418203	Fan deck large LSN
16	467200033R	REMOTE CONTROL RC08W WHITE
17	418717	Terminal Block 7P Hoppy
20	418224	Front panel large
21	418228	Bottom panel large
22	418216	Nippels cover
23	418215	Water pump service cover
24	442650	FAN BEARING I.D6-O.D14
26	418302	WATER PUMP LSN
27	418206	Motor support LSN
28	4732102	Controller Cover
29	418213	Water pump support LSN
30	418916	External water pump nozzle
31	418908	Drain tube plug D20
32	418953	Drain flexible tub ID26
35	430253	MIDDLE FAN BEARING RUBBER SUPP
40	418907	Motor axis adaptor LSN
41	418906	Motor axis extantion LSN
53	433316	Hanging BRACKET
64	416907	P.C SPACER - 10
65	416910	CABLE HOLDER
70	418714	CONTROLLER DC MOTOR&Cable Disp
71	418935	Water pump assy LSN
19a	473797	THERMISTOR+CAP WITH CONNECTOR
19b	473795	THERMISTOR WITH CONNECTOR L235
25a	418219	Air filter trail L
25b	418220	Air filter trail R
7a	404026	Cable 8 Wires 7M With JST MD
9a	418301	Motor AC 76w LSN
9b	418902	Fan D140x150 LSN
9c	418901	Fan housing 150 lower LSN
9d	418900	Fan housing 150 upper LSN

14.6 Outdoor Unit: YBDE 024-H11 - Exploded View

14.6.1 Outdoor Unit General Assembly



14.6.2 Outdoor Unit Parts Assembly



14.6.3 Outdoor Unit: YBDE 024-H11 - Spare Part List

No.	PN	Description	Qty
71	253054	Supply Cord Clamp	2
22	402283	Suction Accumulator 3"x5/8"	1
9	416320	Motor 70W,2S,OU7 DCI	1
65	416910	Cable Holder	3
65	416910	Cable Holder	1
5	417000	OU Square Fan Guard	1
50	425713	EEV Coil (C) QA (Q) 12-YLT-07-RK	1
43	426630	Compressor Internal Insulation	1
43a	426631	Compressor External Insulation	1
43b	426632	Compressor Top Insulation OU7	1
13	426634	Compressor Base Plate OU7-22-30 DCI	1
2	426641	Side Panel OU7 DCI	1
7	426686	Coil OU7-30 DCI Eco	1
17	426680	Tubing Assembly OU7-30 DCI	1
31	426705	Controller Assy OU7 DCI	1
21	426793	Compressor Wiring	1
53	426794	OU7 DCI Motor Wiring	1
46	426798	PFC Chock (1PH/DCI50)	1
70	426903	Terminal Cover Compressor GMCC	1
10	433281	Side Guard OU7-24	1
3	436357	Small Electrical Cover OU	1
11	436358	OU Leading Handle	1
1	437045	Upper Cover EL13 OU Large	1
12	439342	Motor Support OU7	1
4	439357	Front Cover OU7	1
23	4399281	Outlet Plastic Ring OU7/8/12	1
18	442007	Capacitor 6mF 450V/P2	1
8	4529604	Axial Fan D493*143	1
14	460170013R	Compressor DA150S1C-20FZ	1
19	467400040	OMT/OAT Thermistor with connector	1
51	467400078	OCT-Thermistor+CAP With Connector	1
52	467400200	CTT-Thermistor With Connector	1
47	467420025	Terminal Block 4P	1
69	426589	Nipple 3/8" Assy OU8 DCI	1
39	455877	Service Valve 5/8"F 3 Way	1
42	426665	EEV Assy OU7-30 DCI	1
6	417200	Base Assembly	1

15. OPTIONAL ACCESSORIES

15.1 Base Heater

Before starting the heaters connection verify that the unit is disconnected from main power supply!!

BASE HEATERT INSTALLATION INSTRUCTIONS

Instructions:

1. Open the outdoor unit electrical cover and service panel.
2. Connect the base heater wires to connections marked as “BH” on the main controller (refer to Figure 1).
3. Route the wires into the cable holders and through the grommet and attach the wires with strips to other wires as per Figure 1 & 2.
4. Locate the heater under the outdoor base.
5. Close the outdoor electrical cover and service panel.

Install off-shelf heater up to 70Watts

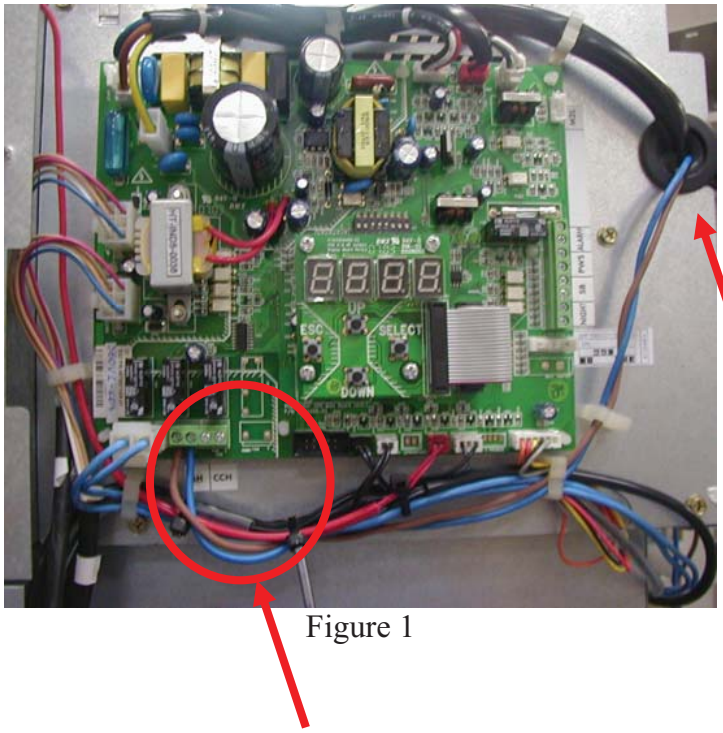


Figure 1

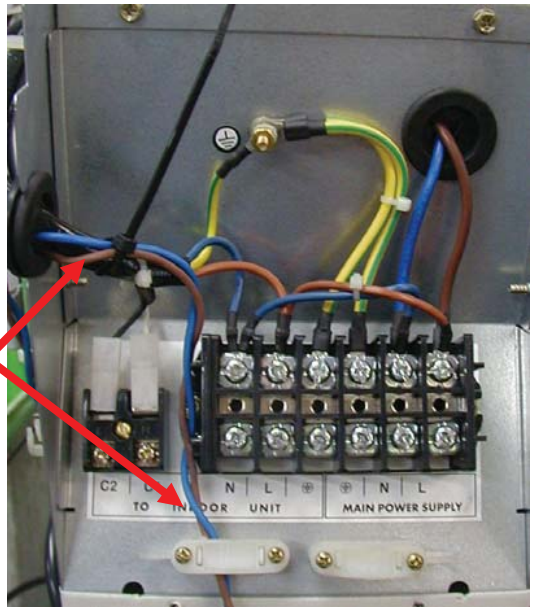


Figure 2

15.2 Crank Case Heater

Before starting the heaters connection verify that the unit is disconnected from main power supply!!

CRANK CASE HEATERS INSTALLATION INSTRUCTIONS

Instructions:

1. Open the outdoor unit electrical cover and service panel.
2. Remove the compressor insulation layers.
3. Locate the heater around the compressor and close with the spring according to Figure 1.
4. Route the wires into the cable holders as per Figure 2.
5. Connect the heater wires to connections marked as “CCH” on the main controller (refer to Figure 3).
6. Attach the wires with strips to other wires as per Figure 3.
7. Put back the compressor insulation layers.
8. Close the outdoor electrical cover and service panel.

Figure 1

Figure 3

Figure 2

APPENDIX A

INSTALLATION AND OPERATION MANUALS

- **INFRARED REMOTE CONTROL RECEIVER**
- **OPERATION MANUAL RC-8**