

# Engineering Data

## Ceiling & floor VRF IDU



MI2-36DL DHN1

MI2-90DL DHN1

MI2-45DL DHN1

MI2-112DL DHN1

MI2-56DL DHN1

MI2-140DL DHN1

MI2-71DL DHN1

MI2-160DL DHN1

MI2-80DL DHN1

# Ceiling & floor

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## 1 Specifications

### MI2-36DL DHN1 / MI2-45DL DHN1 / MI2-56DL DHN1 / MI2-71DL DHN1

Table 1.1: MI2-36(45,56,71)DL DHN1 specifications

Model			MI2-36DL DHN1	MI2-45DL DHN1	MI2-56DL DHN1	MI2-71DL DHN1
Power supply			1 phase, 220-240V, 50/60Hz			
Cooling <sup>1</sup>	Capacity	kW	3.6	4.5	5.6	7.1
		kBtu/h	12.3	15.4	19.1	24.2
	Power input	W	49	115	115	115
Heating <sup>2</sup>	Capacity	kW	4.0	5.0	6.3	8.0
		kBtu/h	13.6	17.1	21.5	27.3
	Power input	W	49	115	115	115
Fan motor	Model		WZDK100-38GS-2			
	Type		DC			
	Brand		Panasonic/Match-Well			
	Speed <sup>3</sup>	r/min	770/740/700/680 /650/630/610	1380/1330/1300/1260/ 1210/1140/1070		1380/1340/1300/126 0/1190/1140/1120
Indoor coil	Number of rows		2	3		
	Tube pitch × row pitch	mm	25.4×22			
	Fin spacing	mm	1.8			
	Fin type		Hydrophilic aluminum			
	Tube OD and type	mm	Φ9.53 Inner-groove			
	Dimensions (L×H×W)	mm	804×254×44	804×254×66		
	Number of circuits		3			
Air flow rate <sup>3</sup>		m <sup>3</sup> /h	550/525/500/48 0/460/440/420	800/750/700/650/600/550/500		
Sound pressure level <sup>4</sup>		dB(A)	40/39/38/38/37/ 36/36	43/42/41/41/39/38/38		
Unit	Net dimensions <sup>5</sup> (W×H×D)		mm 990×660×203			
	Packed dimensions (W×H×D)		mm 1089×744×296			
	Net/Gross weight		kg	27/33	28/34	
Refrigerant type			R410A			
Throttle	Type		Electronic expansion valve			
	Model		D20MISZ-1R(L)			
Design pressure (H/L)		MPa	4.4/2.6			
Pipe connections	Liquid/Gas pipe		mm Φ6.35/Φ12.7		Φ9.53/Φ15.9	
	Drain pipe		mm OD Φ16			

Notes:

1. Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
2. Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
3. Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured in a semi-anechoic chamber.
5. Unit body dimensions given are the largest external dimensions of the unit, including hanger attachments.

Table 1.2: MI2-80(90,112,140)DL DHN1 specifications

Model			MI2-80DL DHN1	MI2-90DL DHN1	MI2-112DL DHN1	MI2-140DL DHN1
Power supply			1 phase, 220-240V, 50/60Hz			
Cooling <sup>1</sup>	Capacity	kW	8.0	9.0	11.2	14.0
		kBtu/h	27.2	30.7	38.2	47.8
	Power input	W	130	130	180	180
Heating <sup>2</sup>	Capacity	kW	9.0	10.0	12.5	15.0
		kBtu/h	30.7	34.1	42.7	51.2
	Power input	W	130	130	180	180
Fan motor	Model		WZDK100-38GS-1		WZDK100-38GS-2	
	Type		DC		DC	
	Brand		Panasonic/Match-Well			
	Speed <sup>3</sup>	r/min	1300/1270/1230/1200/1160/1120/1090		1140/1090/1060/1040/1010/990/970	
Indoor coil	Number of rows		3			
	Tube pitch × row pitch	mm	25.4×22			
	Fin spacing	mm	1.8			
	Fin type		Hydrophilic aluminum			
	Tube OD and type	mm	Φ9.52 Inner-groove			
	Dimensions (L×H×W)	mm	1094×254×66		1360×254×66	
	Number of circuits		5			
Air flow rate <sup>3</sup>		m <sup>3</sup> /h	1280/1245/1210/1170/1130/1085/1050		1890/1830/1765/1700/1660/1620/1580	
Sound pressure level <sup>4</sup>		dB(A)	45/44/43/43/42/41/40		47/46/45/45/44/43/42	
Unit	Net dimensions <sup>5</sup> (W×H×D)	mm	1280×660×203		1670×680×244	
	Packed dimensions (W×H×D)	mm	1379×744×296		1915×760×330	
	Net/Gross weight	kg	35/41		48/58	
Refrigerant type			R410A			
Throttle	Type	Electronic expansion valve				
	Model	BD24FKS(L)				
Design pressure (H/L)		MPa	4.4/2.6			
Pipe connections	Liquid/Gas pipe	mm	Φ9.53/Φ15.9			
	Drain pipe	mm	OD Φ16			

Notes:

- Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
- Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured in a semi-anechoic chamber.
- Unit body dimensions given are the largest external dimensions of the unit, including hanger attachments.

# The 2<sup>nd</sup> Generation DC Series VRF Indoor Units



Table 1.2: MI2-160DLHNN1 specifications

Model			MI2-160DLHNN1
Power supply			1 phase, 220-240V, 50/60Hz
Cooling <sup>1</sup>	Capacity	kW	16.0
		kBtu/h	54.6
	Power input	W	288
Heating <sup>2</sup>	Capacity	kW	18.0
		kBtu/h	61.4
	Power input	W	288
Fan motor	Model		WZDK100-38GS-2
	Type		DC
	Brand		Panasonic/Match-Well
	Speed <sup>3</sup>	r/min	1360/1330/1300/1260/1210/1160/1100
Indoor coil	Number of rows		3
	Tube pitch × row pitch	mm	25.4×22
	Fin spacing	mm	1.8
	Fin type		Hydrophilic aluminum
	Tube OD and type	mm	Φ9.52 Inner-groove
	Dimensions (L×H×W)	mm	1360×254×66
	Number of circuits		5
Air flow rate <sup>3</sup>		m <sup>3</sup> /h	2300/2240/2180/2100/2005/1950/1800
Sound pressure level <sup>4</sup>		dB(A)	50/49/48/47/46/45/44
Unit	Net dimensions <sup>5</sup> (W×H×D)	mm	1670×680×244
	Packed dimensions (W×H×D)	mm	1915×760×330
	Net/Gross weight	kg	48/58
Refrigerant type			R410A
Throttle	Type	Electronic expansion valve	
	Model	BD24FKS(L)	
Design pressure (H/L)		MPa	4.4/2.6
Pipe connections	Liquid/Gas pipe	mm	Φ9.53/Φ15.9
	Drain pipe	mm	OD Φ16

Notes:

1. Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
2. Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
3. Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured in a semi-anechoic chamber.
5. Unit body dimensions given are the largest external dimensions of the unit, including hanger attachments.

## 2 Dimensions

### 2.1 Unit Dimensions

Figure 2.1: Ceiling & floor dimensions (unit: mm)

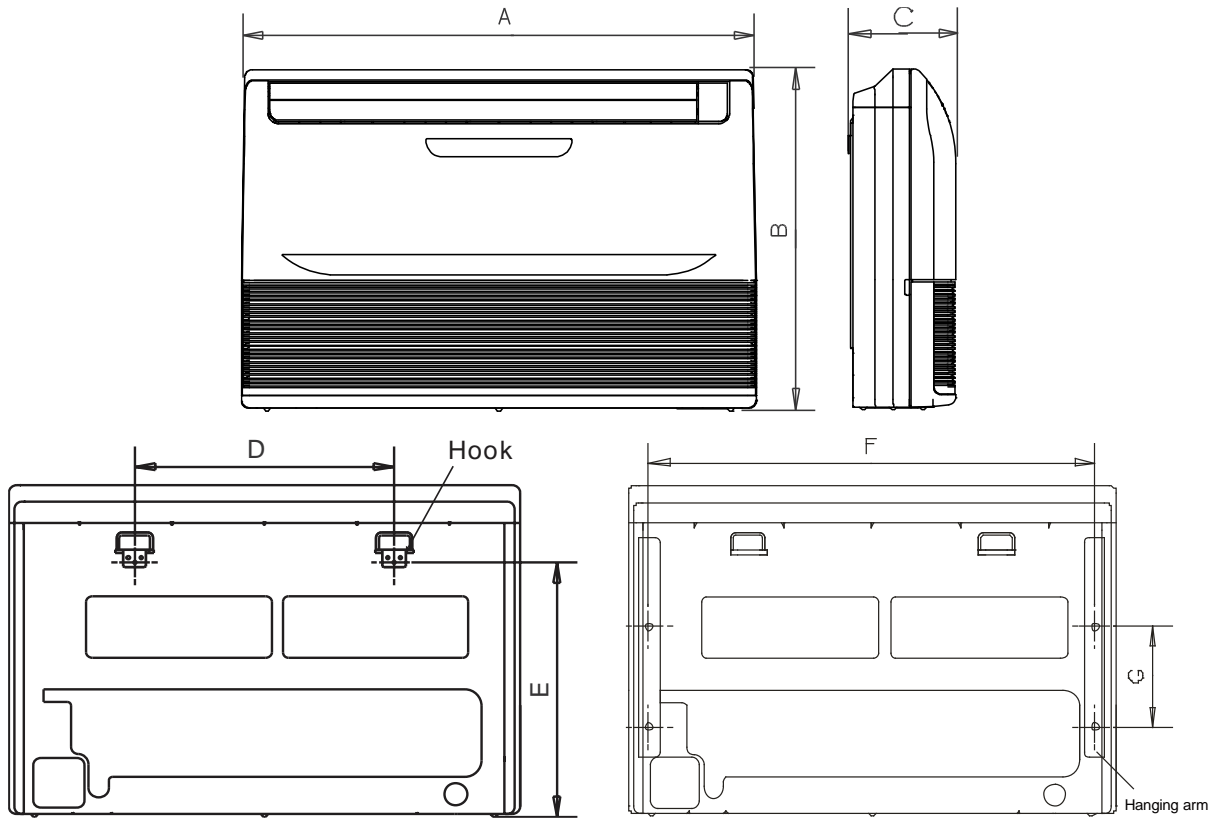


Table 2.1: Ceiling & floor dimensions

Model	Dimensions (mm)						
	A	B	C	D	E	F	G
MI2-36DL DHN1 MI2-45DL DHN1 MI2-56DL DHN1 MI2-71DL DHN1	990	660	203	505	506	907	200
MI2-80DL DHN1 MI2-90DL DHN1	1280	660	203	795	506	1195	200
MI2-112DL DHN1 MI2-140DL DHN1 MI2-160DL DHN1	1670	680	244	1070	450	1542	200

Table 2.2: Ceiling & floor piping connections

Model	Gas pipe (mm)	Liquid pipe (mm)
MI2-36DL DHN1 MI2-45DL DHN1	Φ12.7	Φ6.35
MI2-56DL DHN1 MI2-71DL DHN1 MI2-80DL DHN1 MI2-90DL DHN1 MI2-112DL DHN1 MI2-140DL DHN1 MI2-160DL DHN1	Φ15.9	Φ9.53

## 3 Unit Placement

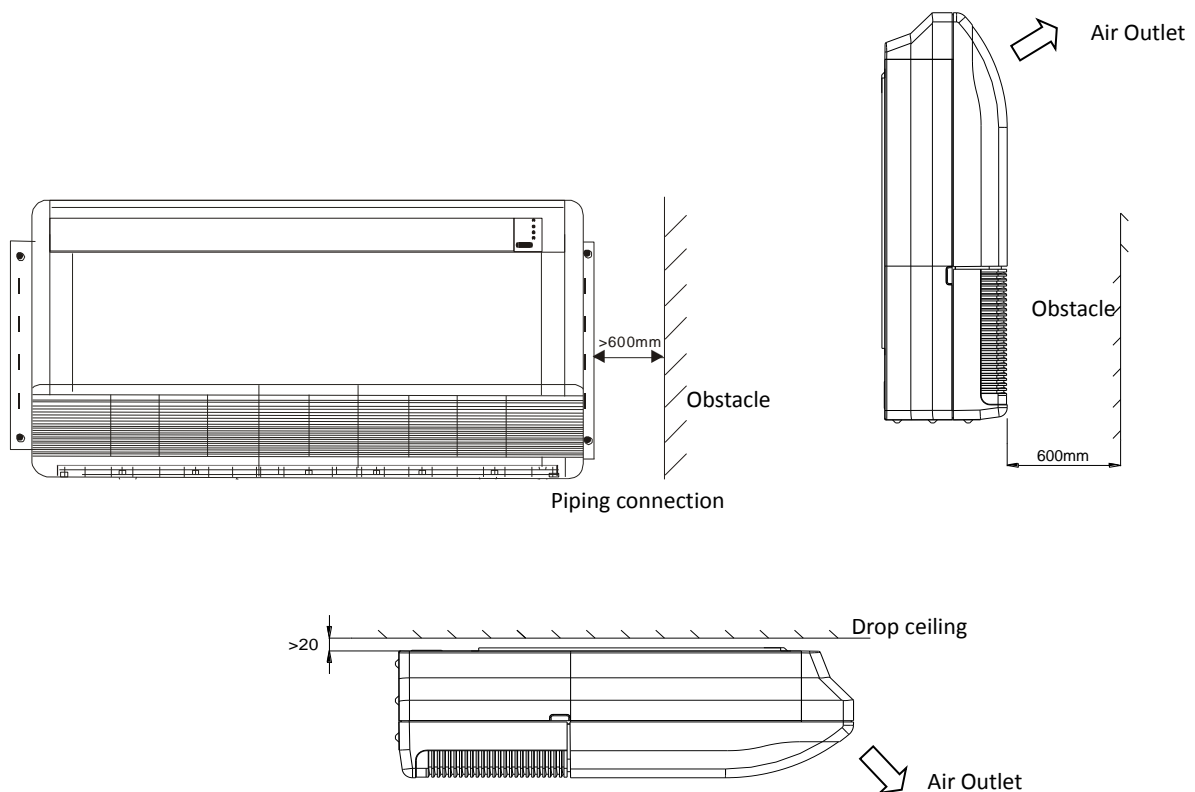
### 3.1 Placement Considerations

Unit placement should take account of the following considerations:

- Units should not be installed in the following locations:
  - Where exposure to direct radiation from a high-temperature heat source or to interference from a source of electromagnetic radiation may occur.
  - Where dust or dirt may affect heat exchangers.
  - Where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
  - Where exposure to salinity may occur, such as seaside locations.
  - Where highly flammable materials are present.
  - Where exposure to oily air may occur, such as a kitchen.
  - Where exposure to very high humidity may occur, such as a laundry.
- Units should be installed in positions where:
  - The ceiling is horizontal and is able to bear the unit's weight.
  - There are no obstructions that could impede the airflow into and out of the unit.
  - The airflow out of the unit can reach throughout the room.
  - There is sufficient space for access during installation, servicing and maintenance.
  - The refrigerant piping and drain piping can be easily connected to the refrigerant piping and drain piping systems.
  - Short-circuit ventilation (where outlet air returns quickly to a unit's air inlet) will not occur.

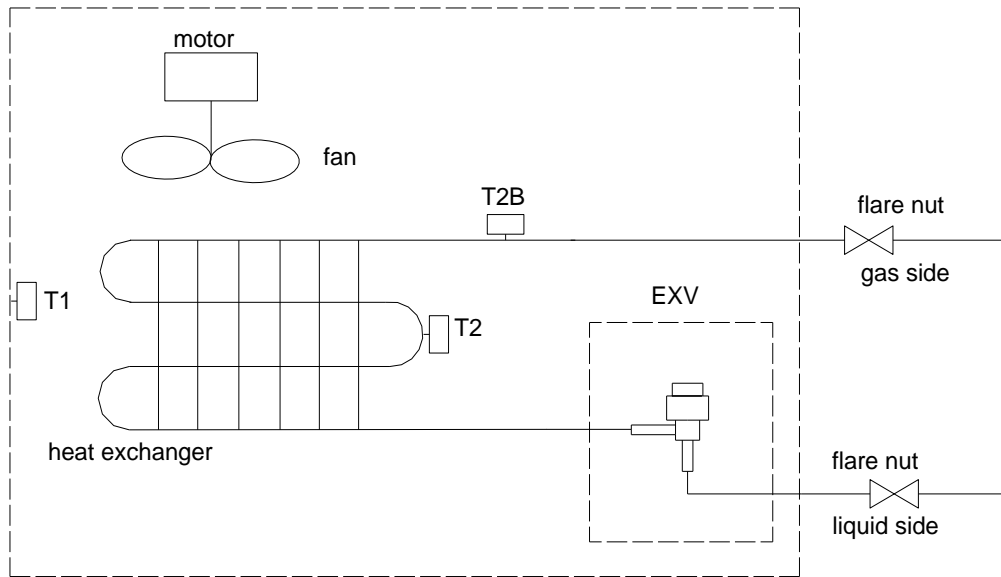
### 3.2 Space Requirements

Figure 3.1: Ceiling & floor space requirements (unit: mm)



## 4 Piping Diagram

Figure 4.1: Ceiling & floor piping diagram



Legend	
T1	Indoor ambient temperature sensor
T2	Indoor heat exchanger mid-point temperature sensor
T2B	Indoor heat exchanger outlet temperature sensor



# The 2<sup>nd</sup> Generation DC Series VRF Indoor Units



## 5 Wiring Diagram

Figure 5.1: Ceiling & floor MI2-36(45,56,71,80,90,112,140)DLH1 wiring diagram

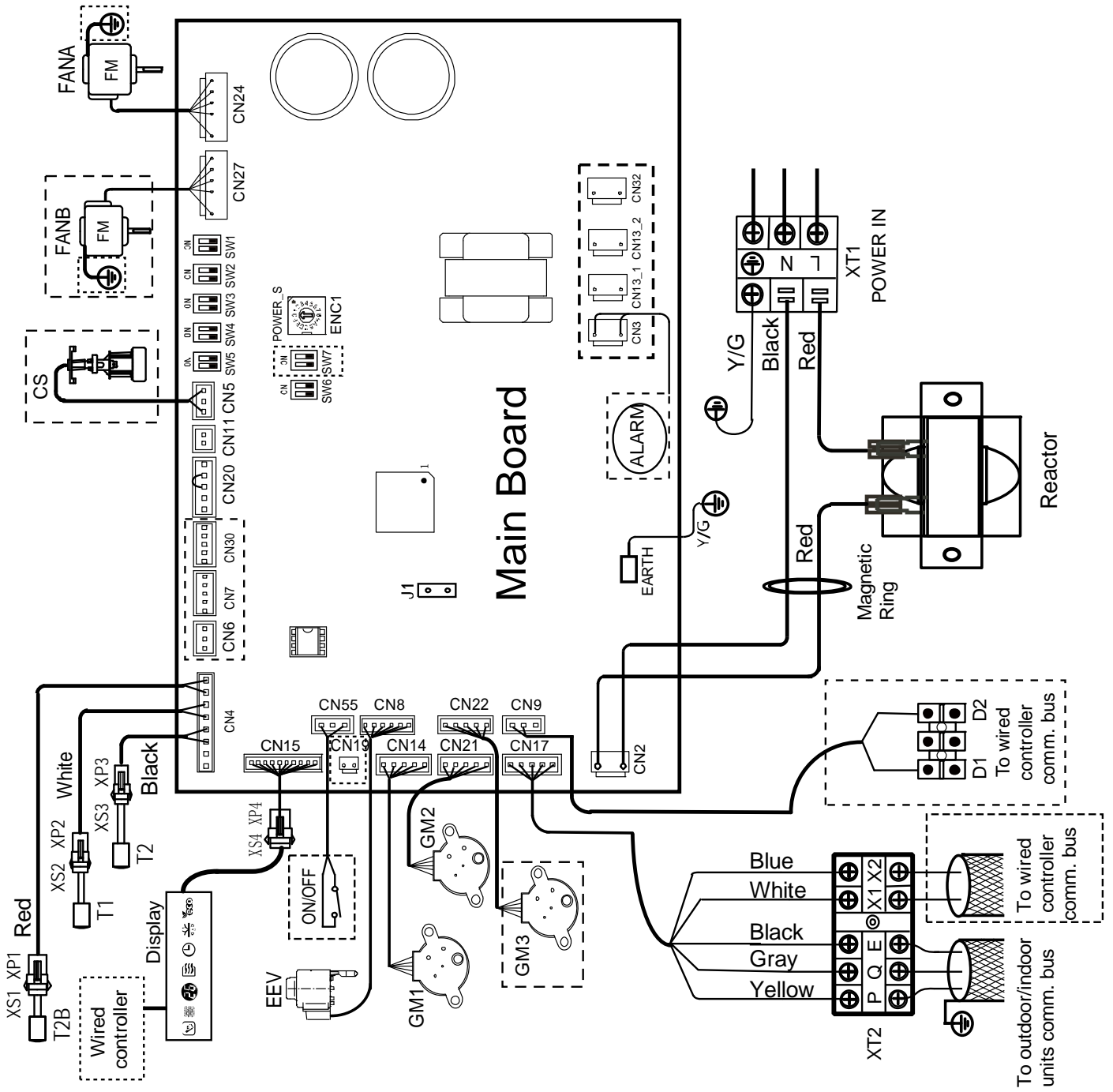
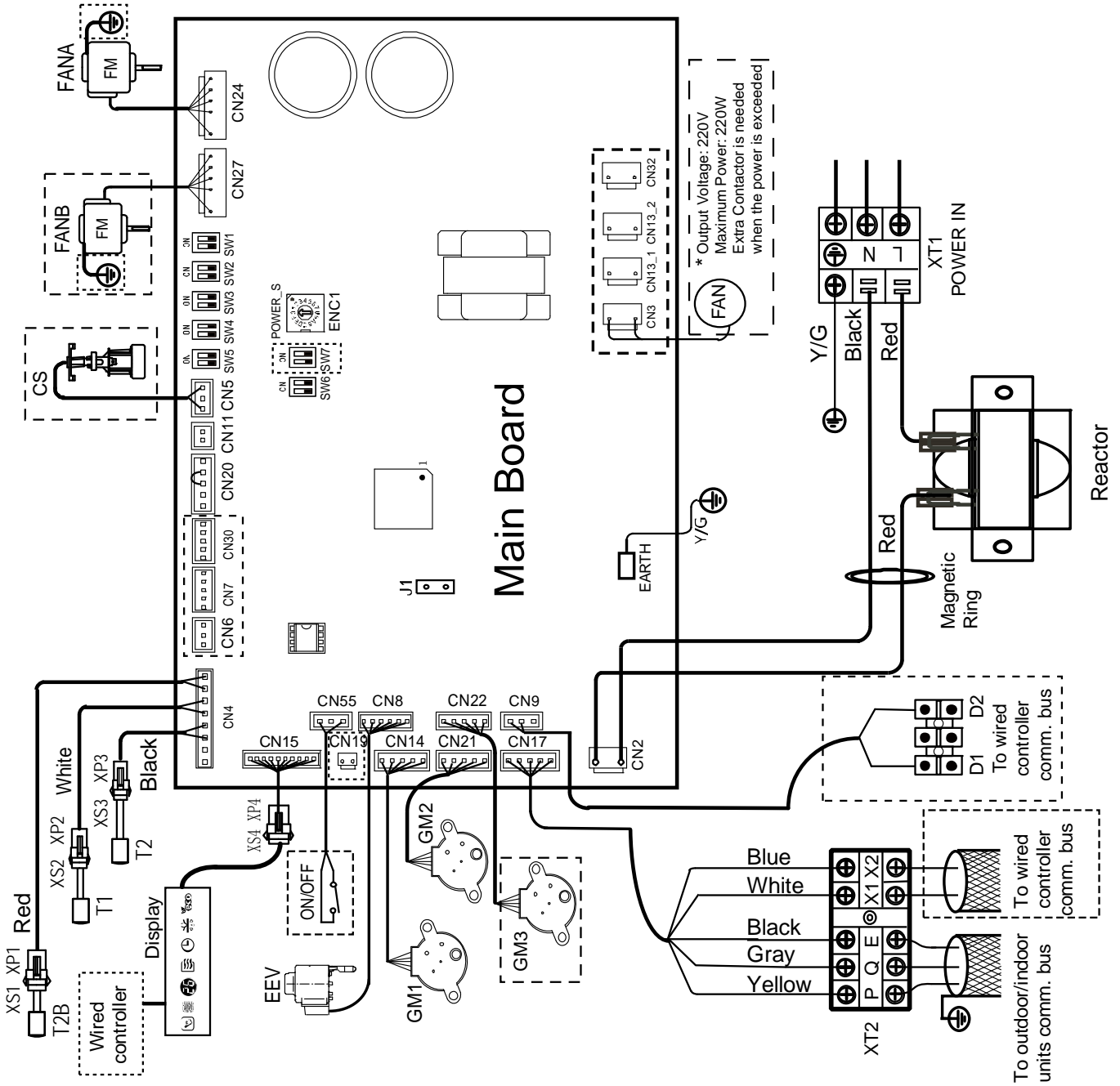


Figure 5.2: Ceiling & floor MI2-160DLHN1 wiring diagram



## Notes for installers and service engineers

### Caution

- All installation, servicing and maintenance must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Units should be grounded in accordance with all applicable legislation. Metal and other conductive components should be insulated in accordance with all applicable legislation.
- Power supply wiring should be securely fastened at the power supply terminals – loose power supply wiring would represent a fire risk.
- After installation, servicing or maintenance, the electric control box cover should be closed. Failing to close the electric control box cover risks fire or electric shock.
- Switch ENC1 (indoor unit capacity setting) is factory-set and its setting should normally not be changed. The only circumstances in which a switch ENC1 might need to be set in the field is when replacing a main PCB. When replacing a main PCB, ensure that the capacity setting on switch ENC1 on the new PCB is consistent with the unit capacity given on the unit's nameplate.

## 6 Capacity Tables

### 6.1 Cooling Capacity Table

Table 6.1: Ceiling & floor cooling capacity

Model	Indoor air temperature (°C WB/DB)													
	14/20		16/23		18/26		19/27		20/28		22/30		24/32	
	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC
MI2-36DL DHN1	3.2	3.1	3.4	3.1	3.6	3.1	3.6	3.0	3.7	2.9	3.8	2.8	3.9	2.7
MI2-45DL DHN1	4.0	3.8	4.3	3.9	4.5	3.8	4.5	3.7	4.6	3.6	4.7	3.4	4.8	3.3
MI2-56DL DHN1	5.0	4.8	5.3	4.8	5.6	4.8	5.6	4.6	5.7	4.5	5.8	4.2	6.0	4.1
MI2-71DL DHN1	6.3	6.0	6.7	6.0	7.0	5.9	7.1	5.8	7.2	5.6	7.4	5.4	7.6	5.2
MI2-80DL DHN1	7.1	6.8	7.6	6.8	7.9	6.7	8.0	6.5	8.1	6.3	8.3	6.0	8.5	5.8
MI2-90DL DHN1	8.0	7.6	8.5	7.6	8.9	7.6	9.0	7.3	9.1	7.1	9.4	6.8	9.6	6.5
MI2-112DL DHN1	9.9	9.5	10.6	9.6	11.1	9.5	11.2	9.1	11.3	8.9	11.6	8.4	11.9	8.1
MI2-140DL DHN1	12.4	11.9	13.2	11.9	13.8	11.8	14.0	11.4	14.2	11.1	14.5	10.5	14.9	10.1
MI2-160DL DHN1	14.2	13.8	15.1	13.7	15.8	13.6	16.0	13.1	16.2	12.7	16.6	12.1	17.0	11.6

Abbreviations:

TC: Total capacity (kW)

SC: Sensible capacity (kW)

Notes:

1. Shaded cells indicate rating condition

### 6.2 Heating Capacity Table

Table 6.2: Ceiling & floor heating capacity

Model	Indoor air temperature (°C DB)					
	16	18	20	21	22	24
	TC	TC	TC	TC	TC	TC
MI2-36DL DHN1	4.2	4.2	4.0	3.8	3.8	3.5
MI2-45DL DHN1	5.3	5.3	5.0	4.8	4.7	4.4
MI2-56DL DHN1	6.7	6.6	6.3	6.1	5.9	5.5
MI2-71DL DHN1	8.5	8.4	8.0	7.8	7.5	7.0
MI2-80DL DHN1	9.5	9.5	9.0	8.7	8.5	7.8
MI2-90DL DHN1	10.6	10.5	10.0	9.7	9.4	8.8
MI2-112DL DHN1	13.3	13.1	12.5	12.1	11.8	10.9
MI2-140DL DHN1	17.0	16.8	16.0	15.5	15.0	13.9
MI2-160DL DHN1	18.0	17.9	17.0	16.5	16.0	14.8

Abbreviations:

TC: Total capacity (kW)

Notes:

1. Shaded cells indicate rating condition

## 7 Electrical Characteristics

Table 7.1: Ceiling & floor electrical characteristics

Model	Power supply						Indoor fan motors	
	Hz	Volts	Min. volts	Max. volts	MCA	MFA	Rated motor output (kW)	FLA
MI2-36DL DHN1	50/60	220-240	198	264	0.45	15	0.10	0.35
MI2-45DL DHN1	50/60	220-240	198	264	1.20	15	0.10	0.93
MI2-56DL DHN1	50/60	220-240	198	264	1.20	15	0.10	0.95
MI2-71DL DHN1	50/60	220-240	198	264	1.20	15	0.10	0.95
MI2-80DL DHN1	50/60	220-240	198	264	1.30	15	0.10	1.10
MI2-90DL DHN1	50/60	220-240	198	264	1.30	15	0.10	1.10
MI2-112DL DHN1	50/60	220-240	198	264	1.70	15	0.10+0.10	0.65+0.65
MI2-140DL DHN1	50/60	220-240	198	264	1.70	15	0.10+0.10	0.65+0.65
MI2-160DL DHN1	50/60	220-240	198	264	1.80	15	0.10+0.10	0.65+0.65

Abbreviations:

MCA: Minimum Circuit Amps

MFA: Maximum Fuse Amps

FLA: Full Load Amps

## 8 Sound Levels

### 8.1 Overall

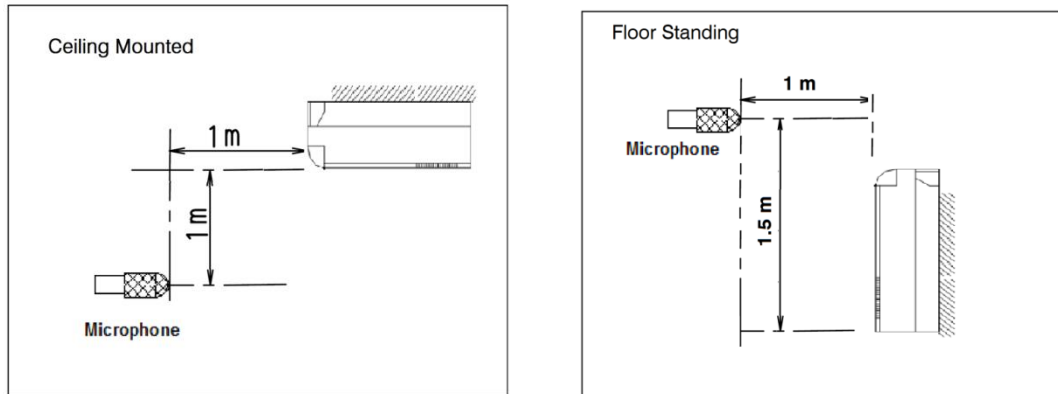
Table 8.1: Ceiling & floor sound pressure levels<sup>1</sup>

Model name	Sound pressure levels dB(A)						
	SSH	SH	H	M	L	SL	SSL
MI2-36DLH1	40	39	38	38	37	36	36
MI2-45DLH1	43	42	41	41	39	38	38
MI2-56DLH1	43	42	41	41	39	38	38
MI2-71DLH1	43	42	41	41	39	38	38
MI2-80DLH1	45	44	43	43	42	41	40
MI2-90DLH1	45	44	43	43	42	41	40
MI2-112DLH1	47	46	45	45	44	43	42
MI2-140DLH1	47	46	45	45	44	43	42
MI2-160DLH1	50	49	48	47	46	45	44

Notes:

1. Sound pressure levels are measured in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

Figure 8.1: Ceiling & floor sound pressure level measurement



### 8.2 Octave Band Levels

Figure 8.2: MI2-36DLH1 octave band levels

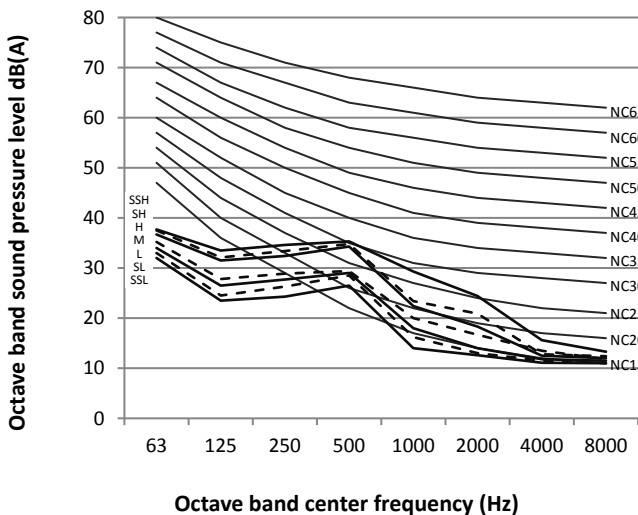
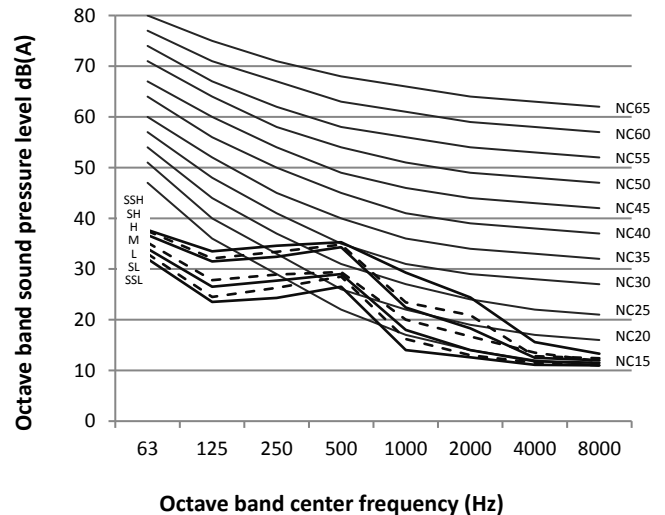


Figure 8.3: MI2-45(56,71)DLH1 octave band levels



# The 2<sup>nd</sup> Generation DC Series VRF Indoor Units



Figure 8.4: MI2-80(90)DL DHN1 octave band levels

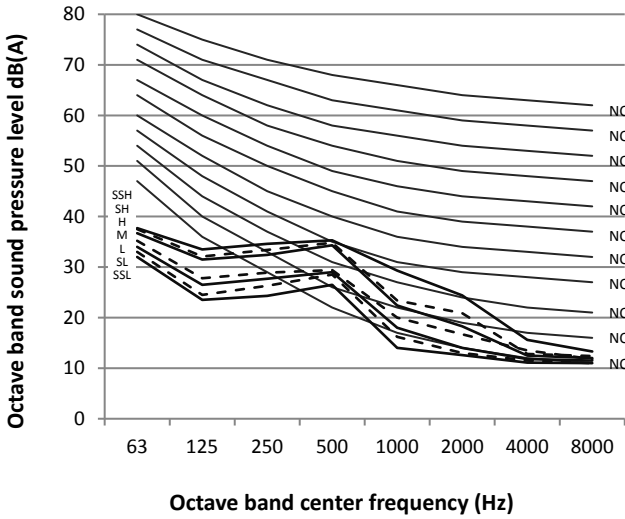


Figure 8.5: MI2-112(140)DL DHN1 octave band levels

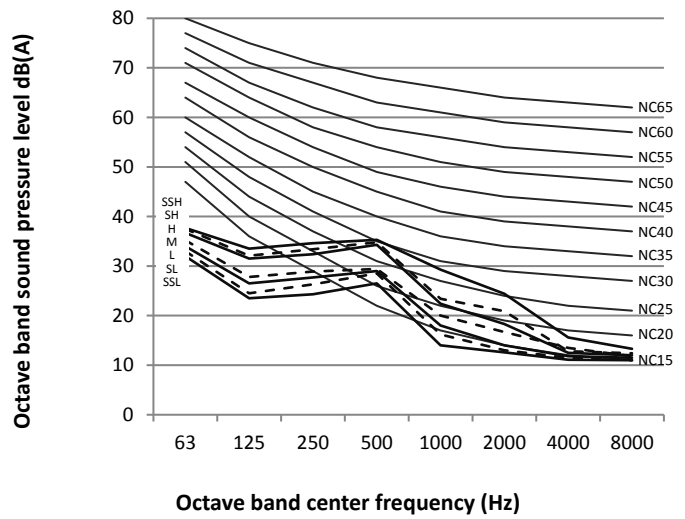
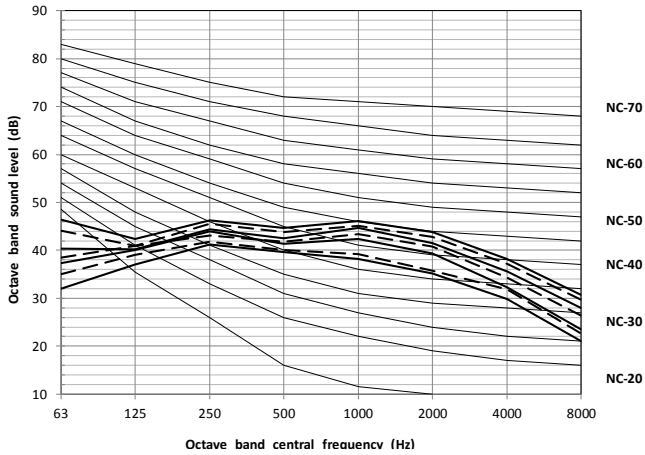


Figure 8.5: MI2-160DL DHN1 octave band levels



## 9 Temperature and Airflow Distributions

### 9.1 Simulate condition

Table 9.1: Ceiling and floor simulate condition

Table 9.1: Ceiling and floor simulate condition

Model name	Room size (m)	Ceiling height (m)	Flow angle (Cooling/Heating)	Placing
MI2-36DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-45DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-56DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-71DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-80DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-90DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-112DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-140DL DHN1	8*8	2.7	50° /85°	Ceiling
MI2-160DL DHN1	8*8	2.7	50° /85°	Ceiling

Note:

- These figures are based on software simulation. They show typical temperature and airflow distributions in the conditions above. In the actual installation, they may differ from these figures under the influence of air temperature conditions, ceiling height, cooling/heating load, obstacles, etc.

## 9.2 Airflow distributions (unit: m/s)

Figure 9.1: MI2-36DLH1 cooling at 300S

Time : 00:05:00.000

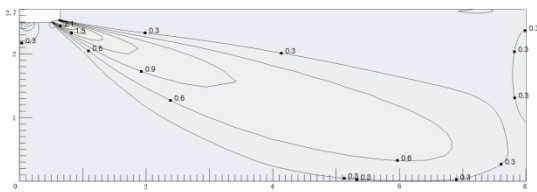


Figure 9.3: MI2-45DLH1 cooling at 300S

Time : 00:05:00.000

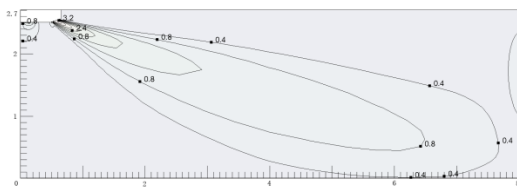


Figure 9.5: MI2-56DLH1 cooling at 300S

Time : 00:05:00.000

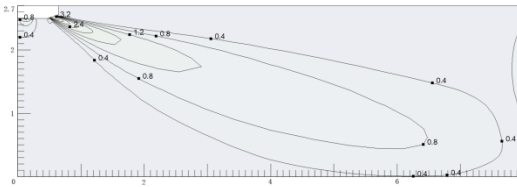


Figure 9.7: MI2-71DLH1 cooling at 300S

Time : 00:05:00.000

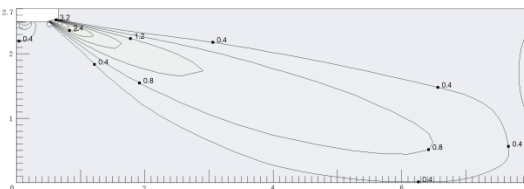


Figure 9.2: MI2-36DLH1 heating at 300S

Time : 00:05:00.000

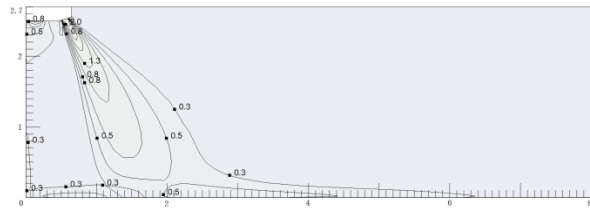


Figure 9.4: MI2-45DLH1 heating at 300S

Time : 00:05:00.000

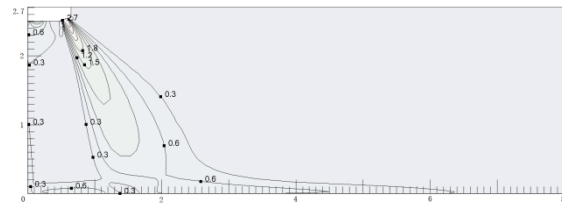


Figure 9.6: MI2-56DLH1 heating at 300S

Time : 00:05:00.000

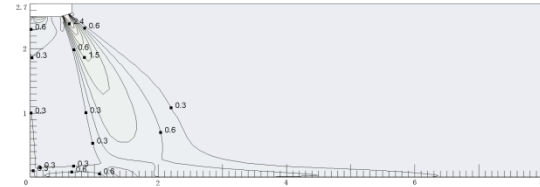
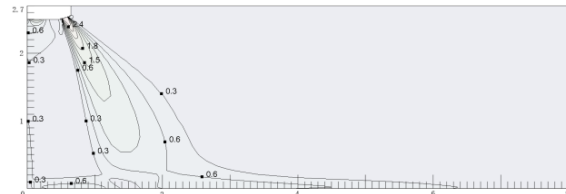


Figure 9.8: MI2-71DLH1 heating at 300S

Time : 00:05:00.000





# The 2<sup>nd</sup> Generation DC Series VRF Indoor Units



Figure 9.9: MI2-80DLHDN1 cooling at 300S

Figure 9.10: MI2-80DLHDN1 heating at 300S

Time : 00:05:00.000

Time : 00:05:00.000

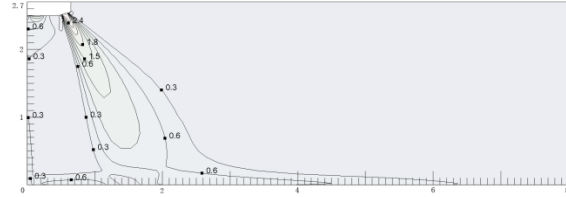
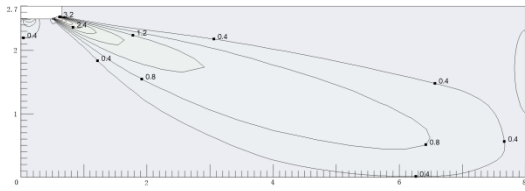


Figure 9.11: MI2-90DLHDN1 cooling at 300S

Figure 9.12: MI2-90DLHDN1 heating at 300S

Time : 00:05:00.000

Time : 00:05:00.000

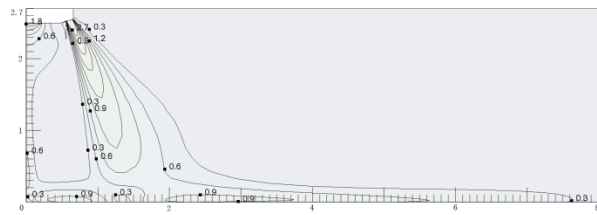
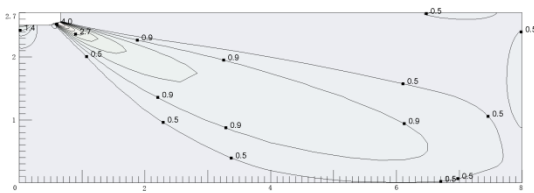


Figure 9.13: MI2-112DLHDN1 cooling at 300S

Figure 9.14: MI2-112DLHDN1 heating at 300S

Time : 00:05:00.000

Time : 00:05:00.000

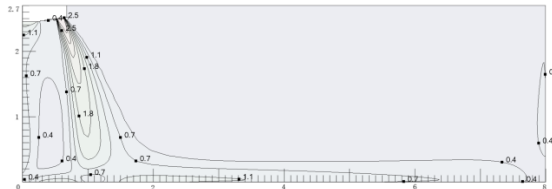
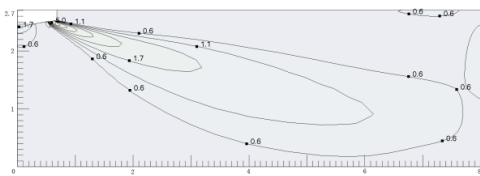


Figure 9.15: MI2-140DLHDN1 cooling at 300S

Figure 9.16: MI2-140DLHDN1 heating at 300S

Time : 00:05:00.000

Time : 00:05:00.000

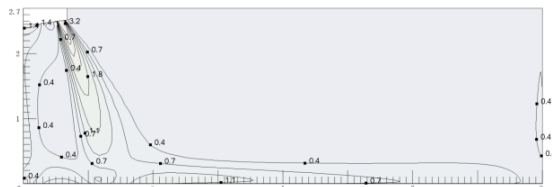
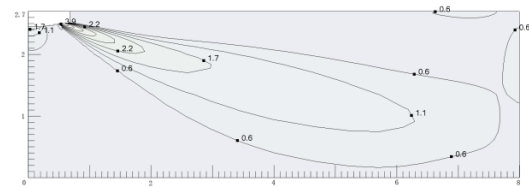
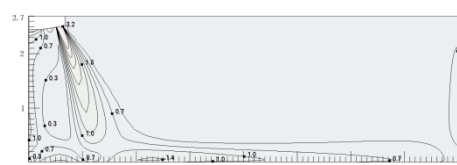
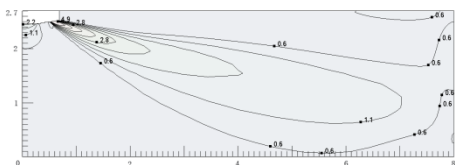


Figure 9.15: MI2-160DLHDN1 cooling at 300S

Figure 9.16: MI2-160DLHDN1 heating at 300S

Time : 300.000000

Time : 300.000000



## 9.3 Temperature distributions

Figure 9.17: MI2-36DL DHN1 cooling at 300S

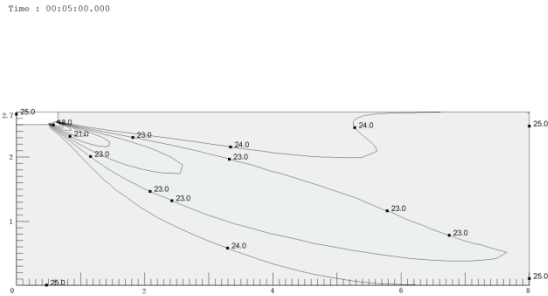


Figure 9.19: MI2-45DL DHN1 cooling at 300S

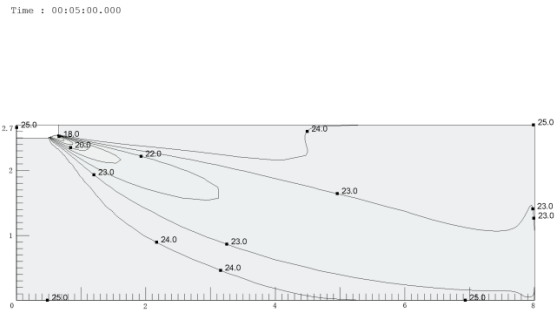


Figure 9.21: MI2-56DL DHN1 cooling at 300S

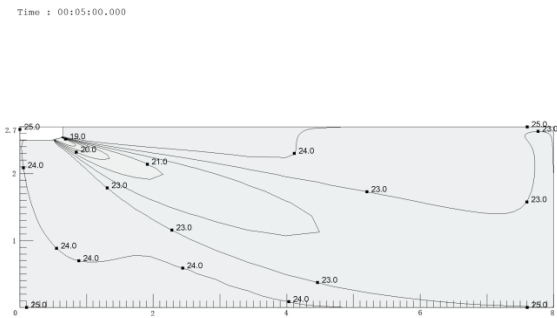


Figure 9.23: MI2-71DL DHN1 cooling at 300S

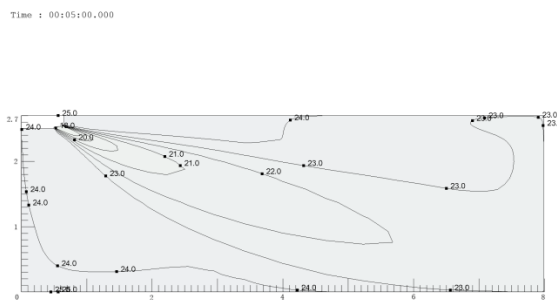


Figure 9.18: MI2-36DL DHN1 heating at 300S

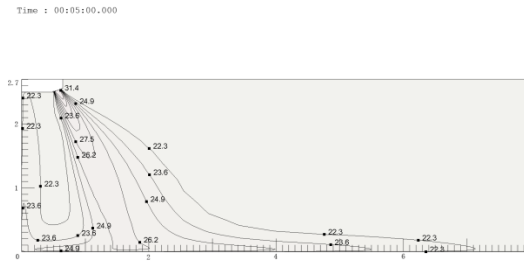


Figure 9.20: MI2-45DL DHN1 heating at 300S

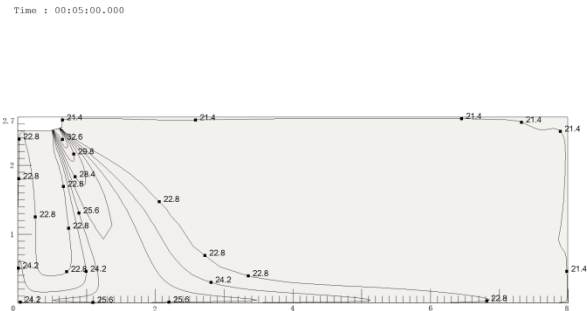


Figure 9.22: MI2-56DL DHN1 heating at 300S

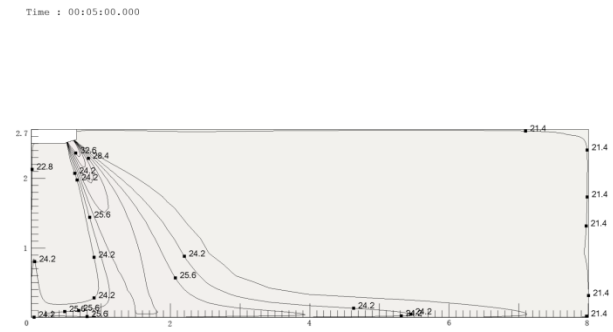
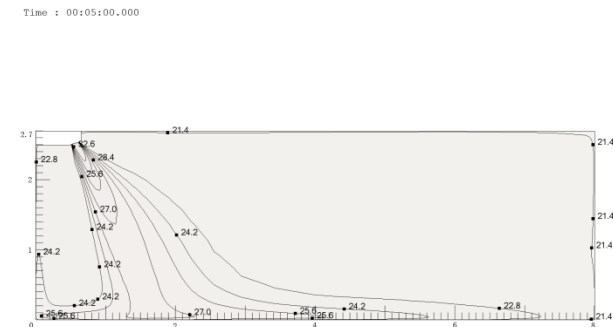


Figure 9.24: MI2-71DL DHN1 heating at 300S



# The 2<sup>nd</sup> Generation DC Series VRF Indoor Units



Figure 9.25: MI2-80LDHN1 cooling at 300S

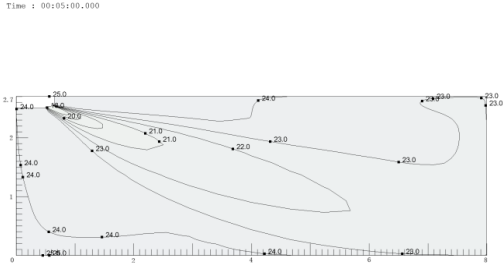


Figure 9.26: MI2-80LDHN1 heating at 300S

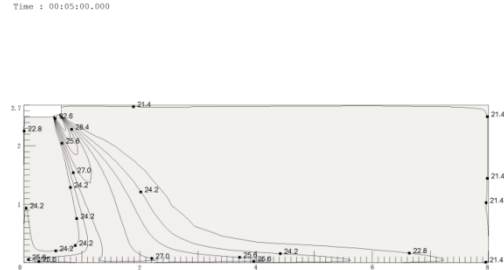


Figure 9.27: MI2-90LDHN1 cooling at 300S

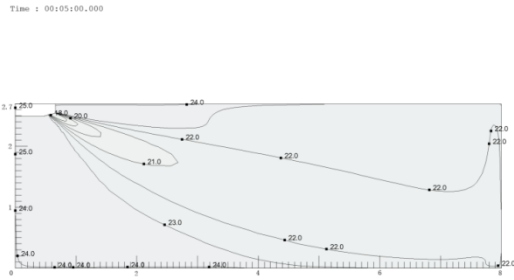


Figure 9.28: MI2-90LDHN1 heating at 300S

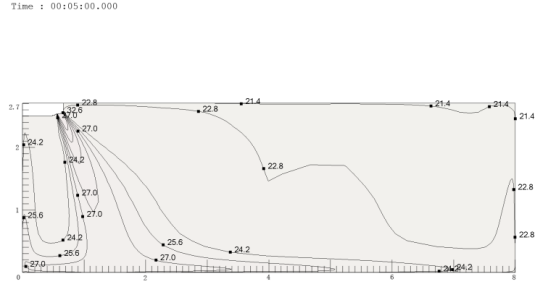


Figure 9.29: MI2-112LDHN1 cooling at 300S

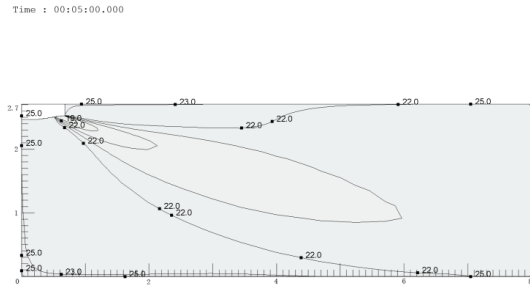


Figure 9.30: MI2-112LDHN1 heating at 300S

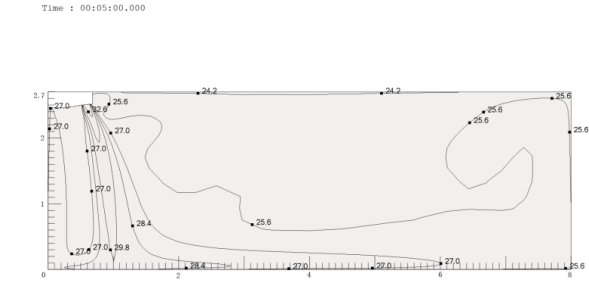


Figure 9.31: MI2-140LDHN1 cooling at 300S

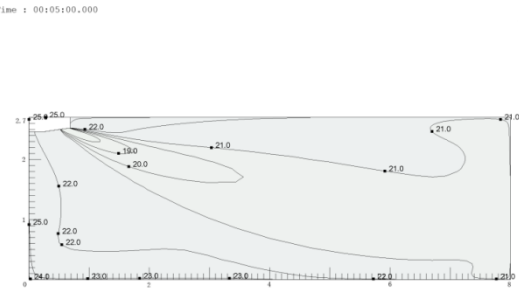


Figure 9.32: MI2-140LDHN1 heating at 300S

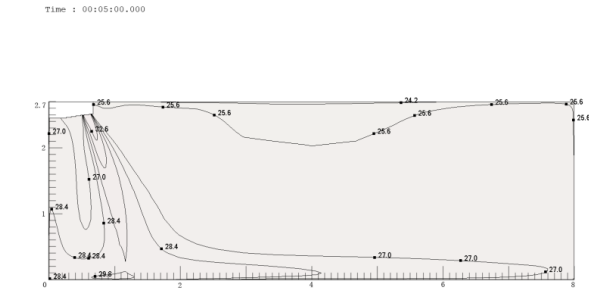


Figure 9.31: MI2-160LDHN1 cooling at 300S

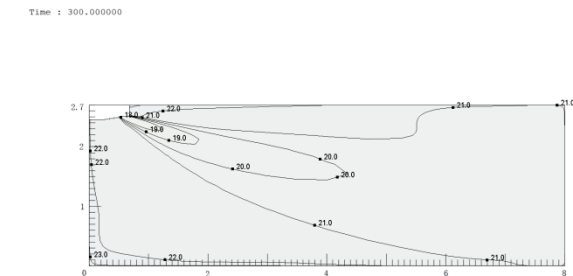
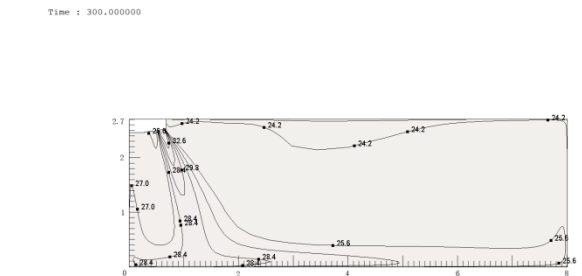


Figure 9.32: MI2-160LDHN1 heating at 300S





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Note: Product specifications change from time to time as product improvements and developments are released and may vary from those in this document.

