Features

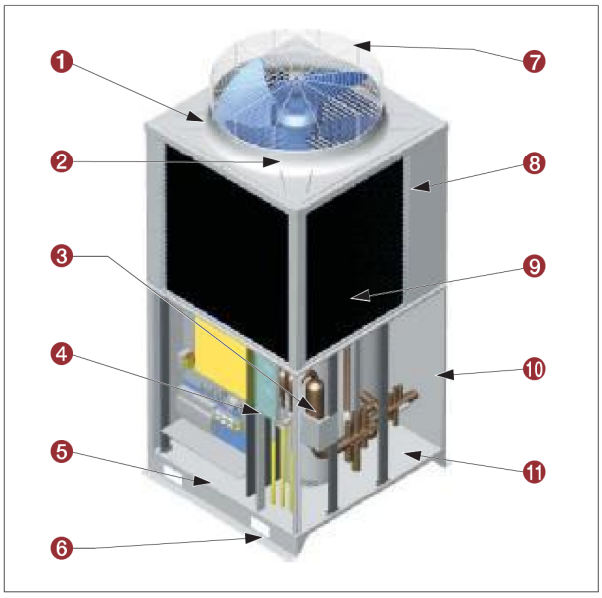
R-410A

Flow Logic

2 Way Outdoor Unit

Features
- DCI inverter technology
- R410 refrigerant
- Market leader in low sound levels
- 22.4-135 kW (* By combination of outdoor units)
- Reverse Cycle
- Power supply 415/3/50Hz
- Cooling EER 3.74 (in 22 kW model)
- Heating COP 4.05 (in 22 kW model)
- Flexibility to connect 40 indoor units (>68 kW)
- Minimum outdoor unit operating temperature (cooling) -10°C
- Maximum total piping length to 300m

Internals



1 Large-diameter plastic fan

A large resin type fan is used. This design is to offer low operation noise.

2 DC fan motor

By utilising conventional single-phase motor to a DC inverter control, the power consumption has been reduced by approx. 50%. By varying the rotation speed in 16 steps (conventionally 4 steps), stable refrigerant pressure control is performed according to the ambient air temperature and load variations.

3 DC inverter compressor

New development of twin rotary compressors for multi use. Great operation efficiency especially in the low-frequency range.

4 Constant-speed compressor

New development of high pressure scroll compressors for multi use. Also benefits in oil stability with overall improved COP (from MFL)

5 Oil sensor

Oil level control is performed for the first time in the world with proven oil sensors .

6 Fork Lift lifting points

This unit is designed with easy handling in mind. slots are fitted to the base to improve ease of handling by forklift.

7 Grille with little pressure loss

A grille with little pressure loss is used to ensure low sound output from the fan. The air flow and the strength are maintained. Combined with a DC fan motor to keep noise levels to a minimum.

8 Hot-gas defrosting valve

Hot-gas defrosting is utilised and the heat exchanger has been split into two for installation at each valve. This aims for reduced defrosting time.

9 Pressure sensor

The operation status is monitored at all times and control for optimum operation is performed. Power savings at the time of trial operation also have been considered.

10 Heat exchanger

Cross-arranged heat exchangers are used for the first time in this class, aiming for load reduction at the time of cooling operation.

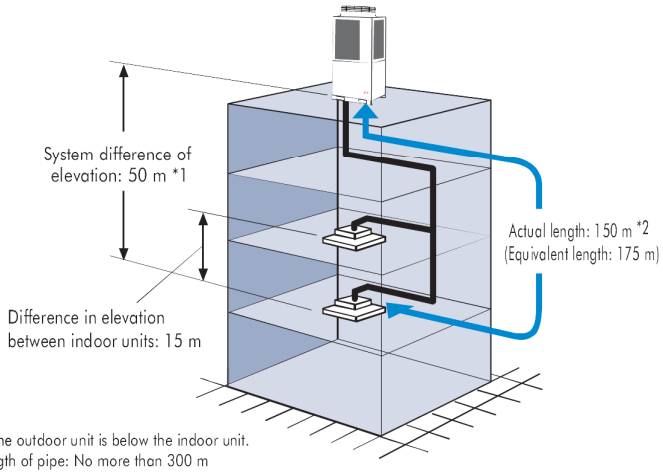
11 Compressor cabinet.

With the MFL design the use of a compressor box was utilised. This design is to reduce noise output from the compressor(s) when operating. It also allows for servicing while unit is operational.

Long Piping

The reduction in the refrigerant volume by a reduction is pipe diameter has extended the piping length to an actual length of 150 m and a total length of 300 m, the top of the class in the industry. The possible installation area for indoor and outdoor units has been widened and system deployment with a high degree of freedom has become possible.

Maximum Actual Piping Length ← 150 m
Maximum Equivalent Piping Length ← 175 m
Maximum Total Piping Length ← 300 m



*1: 40 m if the outdoor unit is below the indoor unit.
*2: Total length of pipe: No more than 300 m

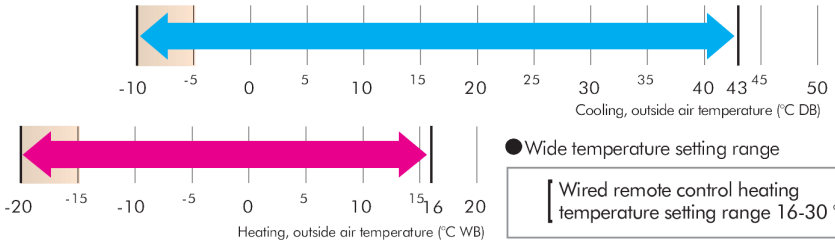
Operating Range

Cooling operation range:

- The cooling operation range is -10°C by use of inverter outdoor fan.

Heating operation range:

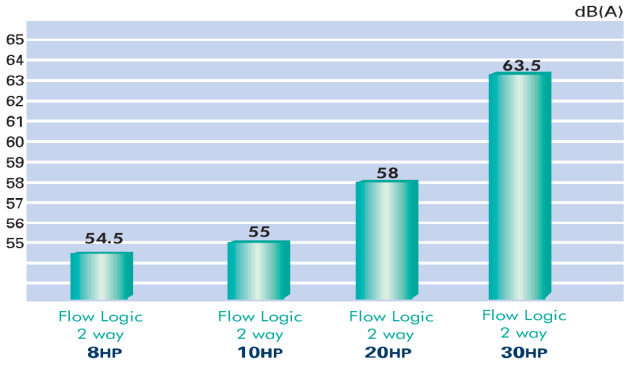
- Stable heating operation even with an outside air temperature of -20°C



- Wide temperature setting range

[Wired remote control heating temperature setting range 16-30 °C]

Low Sound Levels



First criteria was to design the quietest outdoor unit on the market.

Airwell presents - Flow Logic. Unashamedly a market leader

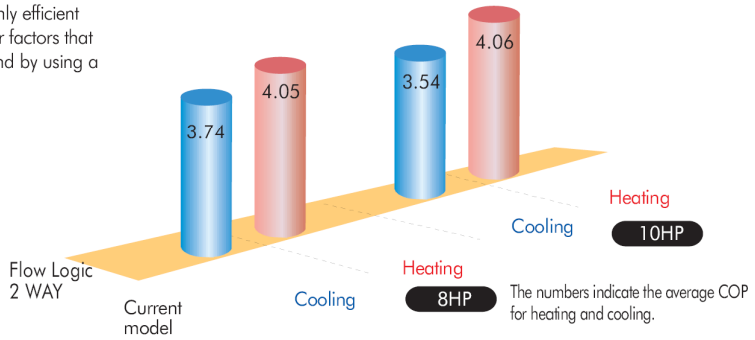
A silent function has been provided, making a further reduction by 5 dB (A) possible.

The outdoor fan speed can be saved and switching to silent mode can be done from the outdoor remote control unit.

* The rated capacity cannot be performed in silent mode.

Efficiency

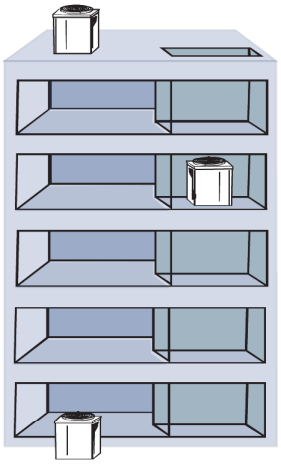
The operation efficiency has been obtained by using the highly efficient new refrigerant R410A and a DC inverter compressor. Other factors that increase the efficiency was the adoption of DC fan motor, and by using a low-loss wire guard for the fan guard.



Benefits

R-410A

Size



All units can be loaded in an elevator for installation in a multi level building. Especially convenient for replacement or upgrading of an existing building.

Installation

Wind Direction Guard (Field Supply)

Discharge duct deflector (Field Supply)

Vertical Discharge Duct (Field Supply)

The standard models are designed for free discharge to outside, but in instances where the oudoor unit needs to be mounted indoors the standard model can be field configured to accomodate minimal external resistance.

Here are some examples of field manufactured fan discharge ducts.

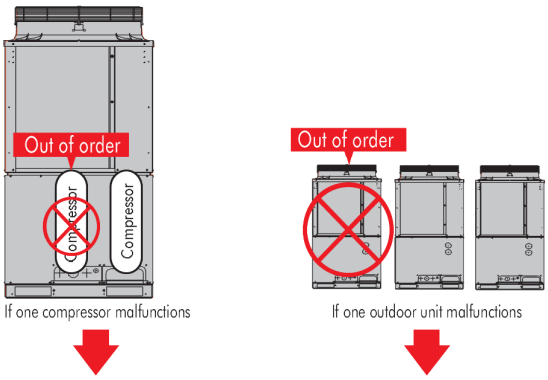
Commissioning

Commissioning time kept to a minimum !

Airwell superior electronics has an advantage over the competition, as there is no need to individually address every indoor unit. Normally before operation each indoor unit has to be configured to identify each indoor unit with an address. Normally each indoor unit is dissassembled and each adress is field configures by means of dip switches. Airwell Flow Logic system has an auto addressing feature that is automatically performed from the outdoor unit in one easy step. This equates to less time commissioning / installing time.

Fault diagnosis is easy to perform by indicating lights or connectig a standard wired wall controller (NRCT-FLR).

Backup Function

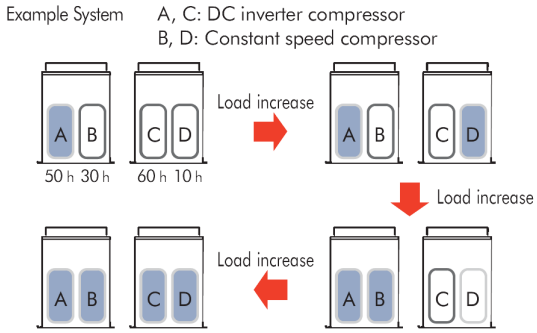


If one of the two compressors in a system P malfunctions, another compressor provides emergency backup operation. Also if one outdoor unit malfunctions in a system, other outdoor units provide emergency backup operation.

Backup function maintains customer comfort in event of failure

Lead lag operation to maintain equal compressor operting time.

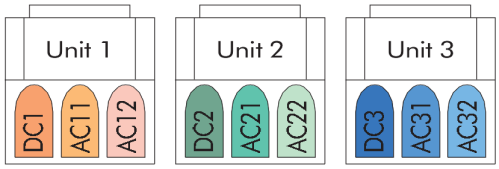
The total operation time of the compressors is monitored by a microcomputer, so that there is no imbalance for the operation times of all compressors in the same refrigerant system, and compressors with a shorter operation time are operated with preference. When several sub units are installed, the operation of the outdoor units is rotated automatically in order to make balanced operating time of compressors.

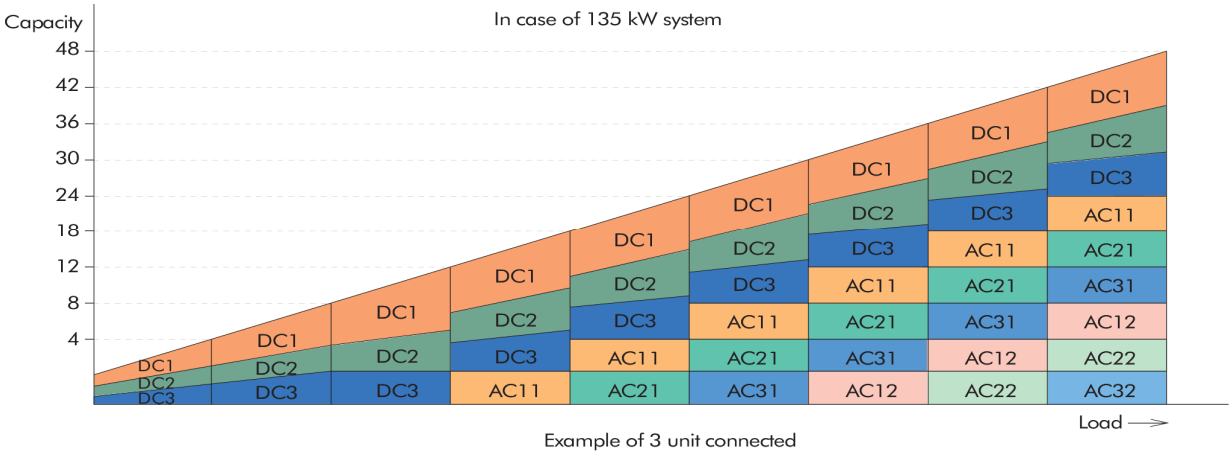


Capacity Control

Capacity control is possible smoothly with a DC inverter compressor. The lower graph shows the image of the operating combination of compressors in case of 135kW system. In actual operation, the combination will be changed by operating condition, operating time amount, priority of compressor and so on.

Comp. kW	Unit 1	Unit 2	Unit 3
DC comp.	11.2	11.2	11.2
AC1 comp.	16.9	16.9	16.9
AC2 comp.	16.9	16.9	16.9





Example of 3 unit connected

Specifications

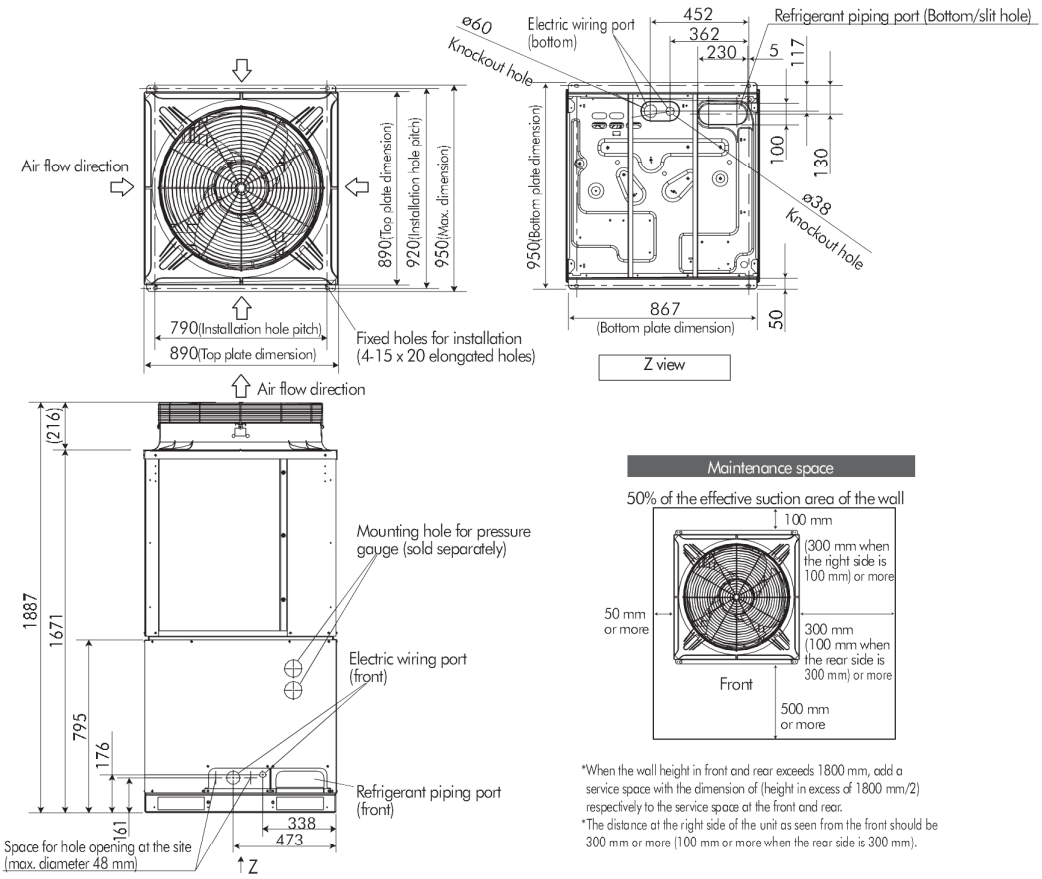
HP				8	10	12	14	16
Model name				MFL80R-3	MFL100R-3	MFL120R-3	MFL140R-3	MFL160R-3
Power supply				380/400/415V-3 phase/50Hz				
Capacity	Cooling		(kW)	22.4	28.0	33.5	40.0	45.0
			(BTU/h)	76,400	95,500	114,300	136,500	153,600
	Heating		(kW)	25.0	31.5	37.5	45.0	50.0
			(BTU/h)	85,300	107,500	128,000	153,600	170,600
COP	Cooling		(W/W)	3.74	3.54	3.50	3.45	3.38
	Heating		(W/W)	4.05	4.06	3.91	3.91	3.79
Dimensions(HxWxD)			(mm)	1,887 x 890 x 890 (+60)				
Net weight			(kg)	245	295	295	345	345
Electrical rating	Cooling	Running amperes	(A)	10.1/9.6/9.3	13.3/12.7/12.2	16.2/15.4/14.8	20.0/19.0/18.3	23.0/21.8/21.0
		Power input	(kW)	5.99	7.90	9.58	11.6	13.3
	Heating	Running amperes	(A)	10.4/9.9/9.5	13.1/12.4/12.0	16.2/15.4/14.8	19.9/18.9/18.2	22.8/21.6/20.9
		Power input	(kW)	6.17	7.75	9.60	11.5	13.2
	Starting amperes		(A)	1/1/1	59/62/64	66/69/72	68/71/73	78/80/82
Air circulation			(m^3/min)	150	160	180	200	220
Refrigerant amount at shipment			(kg)	12.0	12.0	12.0	14.0	14.0
Piping connection	Gas pipe		(mm)	ø19.05	ø22.22	ø25.4	ø25.4	ø28.58
	Liquid pipe		(mm)	ø9.52	ø9.52	ø12.7	ø12.7	ø12.7
	Balance pipe		(mm)	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35
Ambient temperature operating range				Cooling/dry: -10°C ~+ 43°C (DB), Heating: -20°C~ +15°C (WB)				
Operating sound	Normal mode		dB (A)	54.5	55.0	56.0	60.0	61.0
	Silent mode		dB (A)	51.5	52.0	53.0	57.0	58.0

Data subject to change without notice.

* The values for performance and electric characteristics apply under the following test conditions.
  At the time of cooling: Indoor suction air temperature 27°C DB, 19°C WB, outdoor suction air temperature 35°C DB
  At the time of heating: Indoor suction air temperature 20°C DB, outdoor suction air temperature 7°C DB, 6°C WB

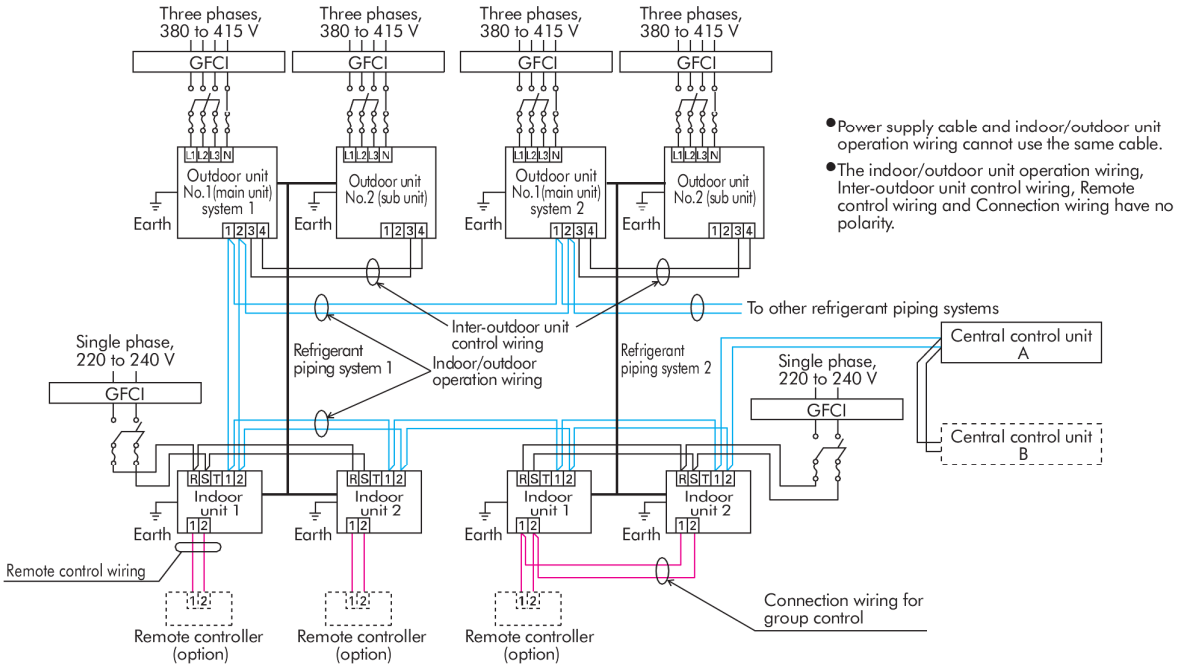
* The operating sound has been measured in an anechoic chamber, and it is the value one meter in front of the outdoor unit at a height of 1.5 m. With actual installation, the indication value normally differs widely according to the surrounding noise and reverberations.

General Arrangement MFL (all sizes)



*When the wall height in front and rear exceeds 1800 mm, add a service space with the dimension of (height in excess of 1800 mm/2) respectively to the service space at the front and rear.
*The distance at the right side of the unit as seen from the front should be 300 mm or more (100 mm or more when the rear side is 300 mm).

Wiring



- Power supply cable and indoor/outdoor unit operation wiring cannot use the same cable.
- The indoor/outdoor unit operation wiring, Inter-outdoor unit control wiring, Remote control wiring and Connection wiring have no polarity.

Combination of Outdoor Units

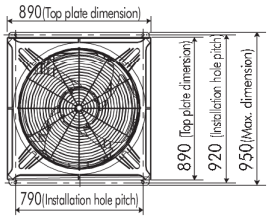
Combination Outdoor Unit Specifications


HP				8	10	12	14	16	18	20	22	24
Model name				MFL80R-3	MFL100R-3	MFL120R-3	MFL140R-3	MFL160R-3	MFL100R-3 MFL80R-3	MFL100R-3 MFL100R-3	MFL120R-3 MFL100R-3	MFL140R-3 MFL100R-3
Power supply				380/400/415V-3phase/50, 60Hz	380/400/415V-3phase/50Hz							
Capacity	Cooling		(kW)	22.4	28.0	33.5	40.0	45.0	50.4	56.0	61.5	68.0
			(BTU/h)	76,400	95,500	114,300	136,500	153,600	172,000	191,100	209,900	232,000
	Heating		(kW)	25.0	31.5	37.5	45.0	50.0	56.5	63.0	69.0	76.5
			(BTU/h)	85,300	107,500	128,000	153,600	170,600	192,800	215,000	235,500	261,000
COP	Cooling		(W/W)	3.74	3.54	3.50	3.45	3.38	3.63	3.54	3.51	3.49
	Heating		(W/W)	4.05	4.06	3.91	3.91	3.79	4.06	4.06	3.97	3.96
Dimensions (HxWxD)			(mm)	1,887 x 890 x 890 (+60)					1,887 x 1,880 x 890 (+60)			
Net weight			(kg)	245	295	295	345	345	540	590	590	640
Electrical ratings	Cooling	Running amperes	(A)	10.1/9.6/9.3	13.3/12.7/12.2	16.2/15.4/14.8	20.0/19.0/18.3	23.0/21.8/21.0	23.4/22.3/21.5	26.6/25.4/24.4	29.5/28.1/27.0	33.3/31.7/30.5
		Power input	(kW)	5.99	7.90	9.58	11.6	13.3	13.9	15.8	17.5	19.5
	Heating	Running amperes	(A)	10.4/9.9/9.5	13.1/12.4/12.0	16.2/15.4/14.8	19.9/18.9/18.2	22.8/21.6/20.9	23.5/22.3/21.5	26.2/24.8/24.0	29.3/27.8/26.8	33.0/31.3/30.2
		Power input	(kW)	6.17	7.75	9.60	11.5	13.2	13.9	15.5	17.4	19.3
Air circulation			(m^3/min)	150	160	180	200	220	150+160	160+160	160+180	160+200
Refrigerant amount at shipment			(kg)	12.0	12.0	12.0	13.0	13.0	24.0	24.0	24.0	25.0
Piping connections	Gas pipe		(mm)	ø19.05	ø22.22	ø25.4	ø25.4	ø28.58	ø28.58	ø28.58	ø28.58	ø28.58
	Liquid pipe		(mm)	ø9.52	ø9.52	ø12.7	ø12.7	ø12.7	ø15.88	ø15.88	ø15.88	ø15.88
	Balance pipe		(mm)	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35
Ambient temperature operating range				Cooling/Dry: -10°C~+43°C (DB), Heating: -20°C~+15°C (WB)								
Operating sound	Normal mode		dB (A)	54.5	55.0	56.0	60.0	61.0	58	58	58.5	61.5
	Silent mode		dB (A)	51.5	52.0	53.0	57.0	58.0	55	55	55.5	58.5

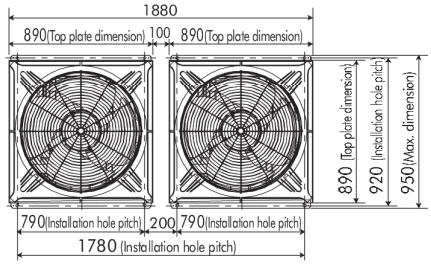
Note: Rated conditions Cooling: indoor air temperature 27°C CB/19°C WB, outdoor air temperature 35°C DB
Heating: indoor air temperature 20°C DB, outdoor air temperature 7°C DB/6°C WB

Layout Example

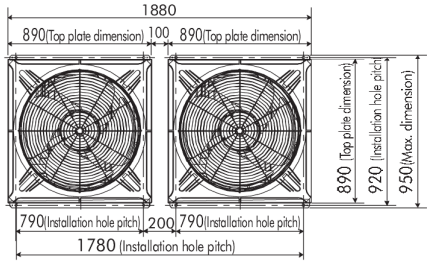
8 to 16 HP



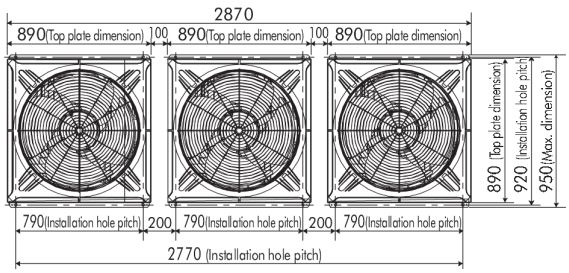
18 to 26HP



26 to 32 HP



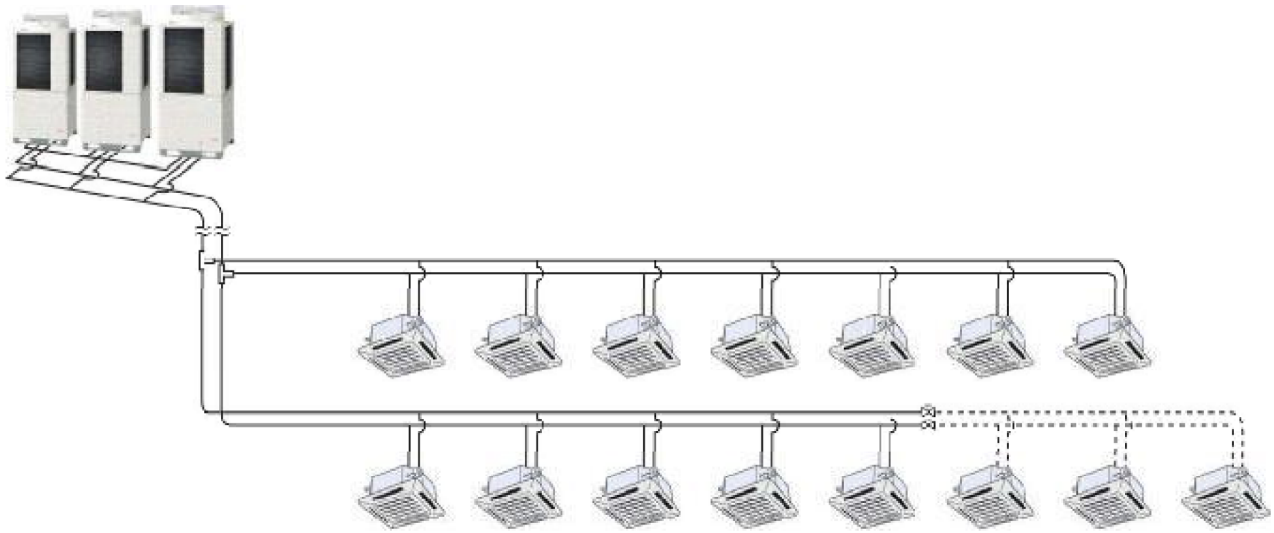
34 to 48 HP



											
26	28	30	32	34	36	38	40	42	44	46	48
MFL160R-3 MFL100R-3	MFL160R-3 MFL120R-3	MFL160R-3 MFL140R-3	MFL160R-3 MFL160R-3	MFL140R-3 MFL100R-3 MFL100R-3	MFL160R-3 MFL100R-3 MFL100R-3	MFL160R-3 MFL120R-3 MFL100R-3	MFL160R-3 MFL140R-3 MFL100R-3	MFL160R-3 MFL160R-3 MFL100R-3	MFL160R-3 MFL160R-3 MFL120R-3	MFL160R-3 MFL160R-3 MFL140R-3	MFL160R-3 MFL160R-3 MFL160R-3
380/400/415V-3phase/50Hz											
73.0	78.5	85.0	90.0	96.0	101.0	107.0	113.0	118.0	124.0	130.0	135.0
249,100	267,900	290,000	307,100	327,600	344,600	365,100	385,600	402,700	423,100	443,600	460,700
81.5	87.5	95.0	100.0	108.0	113.0	119.0	127.0	132.0	138.0	145.0	150.0
278,100	298,600	324,200	341,200	368,500	385,600	406,100	433,400	450,400	470,900	494,800	511,800
3.44	3.43	3.41	3.38	3.50	3.47	3.47	3.45	3.42	3.43	3.40	3.38
3.88	3.84	3.85	3.79	4.00	3.94	3.89	3.91	3.86	3.83	3.83	3.79
1,887 x 1,880 x 890 (+60)				1,887 x 2,870 x 890 (+60)							
640	640	690	690	935	935	935	985	985	985	1,035	1,035
36.3/34.5/33.2	39.2/37.2/35.8	43.0/40.8/39.3	46.0/43.6/42.0	46.6/44.4/42.7	49.6/47.2/45.4	52.5/49.9/48.0	56.3/53.5/51.5	59.3/56.3/54.2	62.2/59.0/56.8	66.0/62.6/60.3	69.0/65.4/63.0
21.2	22.9	24.9	26.6	27.4	29.1	30.8	32.8	34.5	36.2	38.2	39.9
35.9/34.0/32.9	39.0/37.0/35.7	42.7/40.5/39.1	45.6/43.2/41.8	46.1/43.7/42.2	49.0/46.4/44.9	52.1/49.4/47.7	55.8/52.9/51.1	58.7/55.6/53.8	61.8/58.6/56.6	65.5/62.1/60.0	68.4/64.8/62.7
21.0	22.8	24.7	26.4	27.0	28.7	30.6	32.5	34.2	36.0	37.9	39.6
160+220	180+220	200+220	220+220	160+160+200	160+160+220	160+180+220	160+200+220	160+220+220	180+220+220	200+220+220	220+220+220
25.0	25.0	26.0	26.0	37.0	37.0	37.0	38.0	38.0	38.0	39.0	39.0
ø31.75	ø31.75	ø31.75	ø31.75	ø31.75	ø38.1	ø38.1	ø38.1	ø38.1	ø38.1	ø38.1	ø38.1
ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05	ø19.05
ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35
Cooling/Dry: -10°C~+43°C (DB), Heating: -20°C~+15°C (WB)											
62	62.5	63.5	64	62.5	63	63	64.5	64.5	65	65.5	66
59	59.5	60.5	61	59.5	60	60	61.5	61.5	62	62.5	63

Data subject to change without notice.

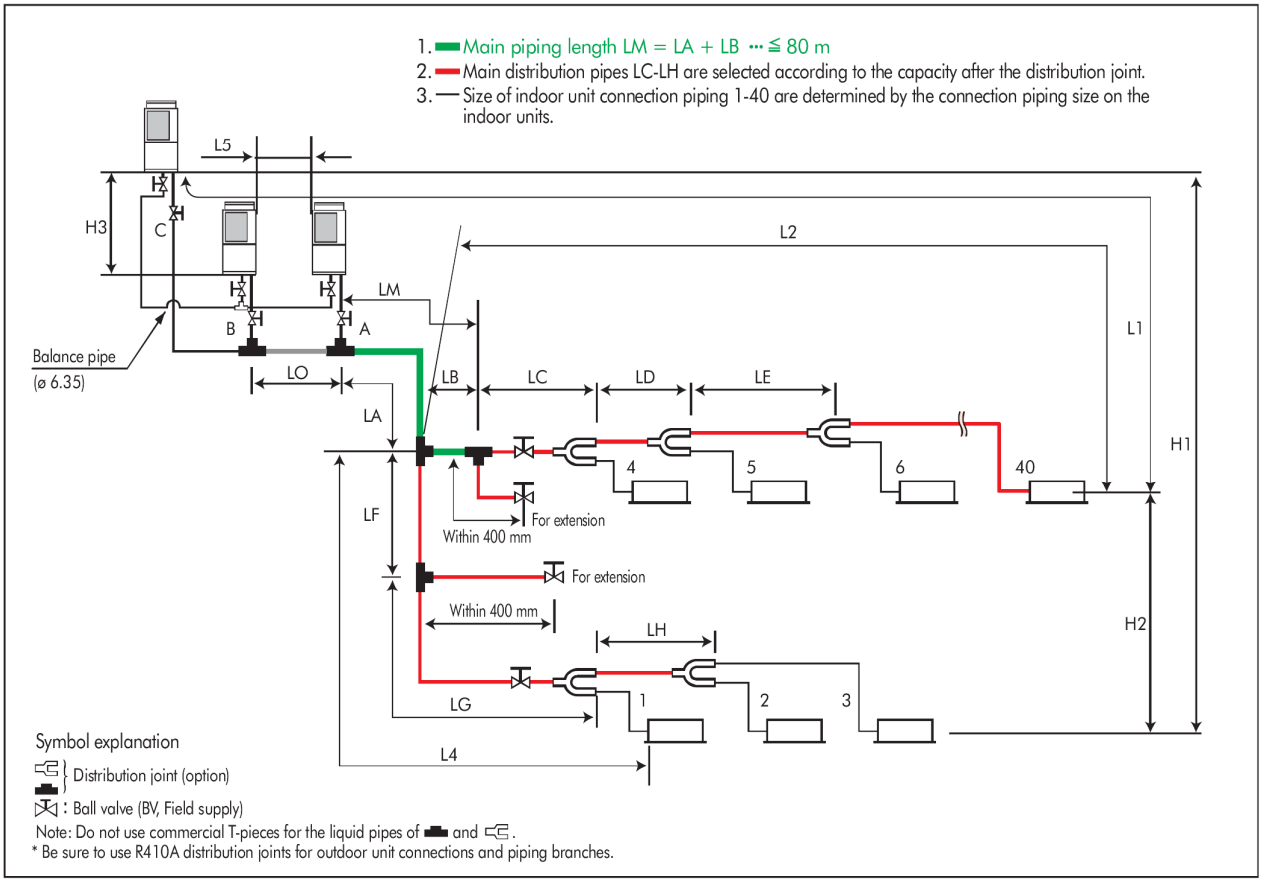
Layout Example



System HP	8	10	12	14	16	18	20	22	24-48
Connectable Indoor Units	13	16	19	23	26	29	33	36	40

Piping

Refrigerant Piping



Note: Do not use commercial T-pieces for the liquid pipes of and .
* Be sure to use R410A distribution joints for outdoor unit connections and piping branches.

Ranges that apply to refrigerant piping lengths and to differences in installation heights

Items	Marks	Contents		Length (m)
Allowable piping length	L1	Max. piping length	Actual piping length	≦150
			Equivalent piping length	≦175
	△L (L2 –L4)	Difference between the max. length and the min. length from the No.1 distribution joint		≦40
	LM	Max. length of main piping (at max. diameter)		≦80
	1, 2~40	Max. length of each distribution		≦30
	L1+1+2+~ 40 +A+B+LF+LG+LH	Total max. piping length including length of each distribution (only narrow tubing)		≦300
	L5	Distance between PC and AD unit		≦10
Allowable elevation difference	H1	When outdoor unit is installed higher than indoor unit		≦50
		When outdoor unit is installed lower than indoor unit		≦40
	H2	Max. difference between indoor units		≦15
	H3	Max. difference between outdoor units		≦4

Note 1: The outdoor connection main piping (LO part) depends on the total capacity of the outdoor units connected to the end.

Note 2: When the main piping length (L1) (equivalent length) exceeds 90 m, increase the size of both the gas and liquid main piping (LM) by 1 step.

System limitations

Max. number of combined outdoor units	3
Max. HP of combined outdoor units	135 kW (48 hp)
Max. number of connectable indoor units	40
Indoor/outdoor unit capacity ratio	50-130%

Additional refrigerant charge

Liquid piping size	Amount of refrigerant charge/m (g/m)
ø6.35	26
ø9.52	56
ø12.7	128
ø15.88	185
ø19.05	259
ø22.22	366

Distribution joint kits

Remarks	Model name	Cooling capacity after distribution
For outdoor unit	1. NRFO-DL68R	68.0 kW or less
	2. NRFO-D68135R	135.0 kW or less
For indoor unit	3. NRF-DL16R	22.4 kW or less
	4. NRF-DL1668R	68.0 kW or less
	5. NRF-T68135	135.0 kW or less

Refrigerant piping

Piping size (mm)			
O material		1/2 H, H material	
Outer diameter	Wall thickness	Outer diameter	Wall thickness
ø 6.35	t 0.8	ø 25.4	t 1.0
ø 9.52	t 0.8	ø 28.58	t 1.0
ø 12.7	t 0.8	ø 31.75	t 1.1
ø 15.88	t 1.0	ø 38.1	t 1.15
ø 19.05	t 1.0	ø 41.28	t 1.20
ø 22.22	t 1.15		

Note: When pipe bending is to be performed, the bending radius shall be at least 4 times the outer diameter. Also, take sufficient care to prevent pipe collapse and damage at the time of bending.

Pipe Sizing

●Main pipe sizes (LA)

HP	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
Combined outdoor units	8	10	12	14	16	10 8	12 8	14 8	16 8	14 12	16 12	16 14	16 16	16 10 8	16 12 8	16 14 8	16 16 8	16 14 12	16 16 12	16 16 14	16 16 16
Gas pipe (mm)	ø19.05	ø22.22	ø25.4		ø28.58					ø31.75					ø38.1						
Liquid pipe (mm)	ø9.52		ø12.7			ø15.88				ø19.05											

Note 1: When future expansion is planned, select the piping diameter according to the total HP after expansion.
Note 2: The balance piping size is ø6.35.
Note 3: Max. length for the main pipe (LM); when the length exceeds 50 m, the size of the Gas pipe shall be increased by one size from the main pipe size up to 50 m. (For lengths in excess of 50 m, select from the above main pipes size table.)

●Main piping size between outdoor units (LO)

Select the piping size between outdoor units according to the main pipe size (LA) of the above table.

●Main piping size after distribution (LB, LC, ...)

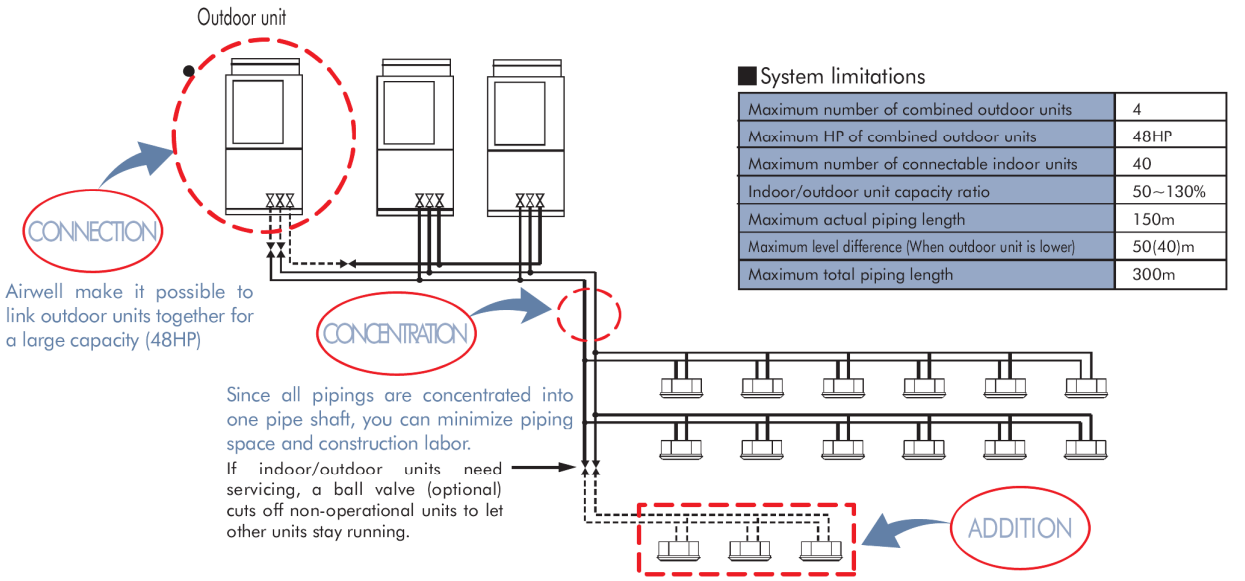
Total capacity after distribution	Below kW	7.1	16.0	22.5	30.0	42.0	52.4	70.0	98.0	—
	Over kW	—	7.1	16.0	22.5	30.0	42.0	52.4	70.0	98.0
Piping size	Gas pipe (mm)	ø 12.7	ø 15.88	ø 19.05	ø 22.22	ø 25.4	ø 28.58		ø 31.75	ø 38.1
	Liquid pipe (mm)	ø 9.52				ø 12.7		ø 15.88	ø 19.05	

Note 1: The outdoor unit connection main pipe (LO part) depends on the total capacity of the outdoor units connected to the end. Select the piping size from the table for the main pipe size after distribution.
Note 2: When the total capacity of the indoor units connected to the end differs from the total capacity of the outdoor units, select the main pipe size according to the total capacity of the outdoor units. (Especially the main pipe part of LA, LB, LF, etc.)

●Indoor unit connection piping (1 to 40)

Indoor unit type		7 type	9 type	12 type	16 type	18 type	25 type	36 type	48 type	60 type	76 type	96 type
Equivalent HP		0.8	1	1.3	1.6	2	2.5	4	5	6	8	10
Piping between distribution joint and indoor connection piping	Gas pipe (mm)	ø 12.7					ø 15.88				ø 19.05	ø 22.22
	Liquid pipe (mm)	ø 6.35					ø 9.52					

Example System



■System limitations

Maximum number of combined outdoor units	4
Maximum HP of combined outdoor units	48HP
Maximum number of connectable indoor units	40
Indoor/outdoor unit capacity ratio	50~130%
Maximum actual piping length	150m
Maximum level difference (When outdoor unit is lower)	50(40)m
Maximum total piping length	300m

* If the additional installment of outdoor and indoor units are expected, the size of refrigerant piping should be decided according to the total capacity after the addition.

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