CDL
Cool Designs Ltd

Pocket Quick Reference Guide On the TOSHIBA

R410A – Mini VRF Heat Pump VRF System

Air Conditioning Design & Distribution

TOSHIBA's 2 Pipe "Mini VRF" Heat Pump Vertical Fan VRF system.

4hp & 5hp (6 Series) units are singular vertical fan, single phase 230-240VAC 50HZ
6hp (4 Series) units are twin vertical fan, single phase 230 – 240VAC 50HZ
8hp & 10hp (6 Series) units are twin vertical fan, three phase and neutral 380-415VAC 50HZ

MCY-MHP0406HT-E	– 4hp (12.1kW Cool and 14kW Heat)
MCY-MHP0506HT-E1	– 5hp (12.5kW Cool and 16kW Heat)
MCY-MHP0604HS-E	– 6HP (15.5Kw Cool and 18kW Heat)
MCY-MHP0806HS8-E	– 8hp (22.4kW Cool and 22.4kW Heat)
MCY-MHP1006HS8-E	- 10hp (28kW Cool and 28kW Heat)

4hp & 5hp Units

6hp, 8hp & 10hp Units

The new 6 series units allow for a greater number of connected indoor units.
8 on the 4hp,
10 on the 5hp,
12 on the 8hp,
16 on the 10hp,

0.6hp indoor units are also available on the 6 series units.

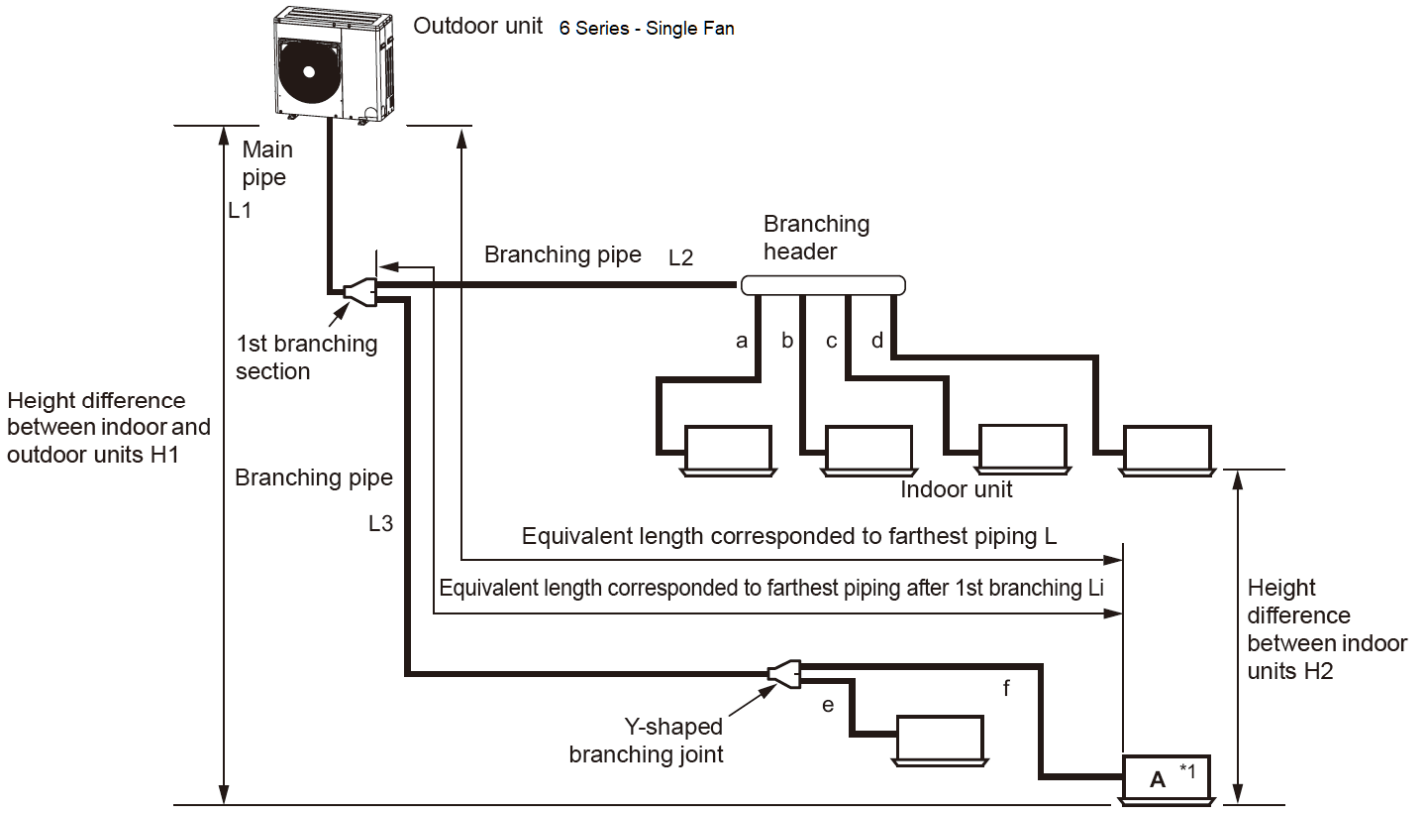
The 4 & 5hp units are singular vertical fan units and are smaller and lighter than previous versions, with a reduction in refrigerant charge, thus reducing the impact on global warming.

The 6hp unit (4 series), 8hp & 10hp (6 series) are twin vertical fan units.

Flexible Installation

The new units allow for greater flexibility in installation, with longer pipe runs and greater height separations between outdoor and indoor units and between indoor units.

6 Series, MCY-MHP0406HT-E and MCY-MHP0506HT-E1

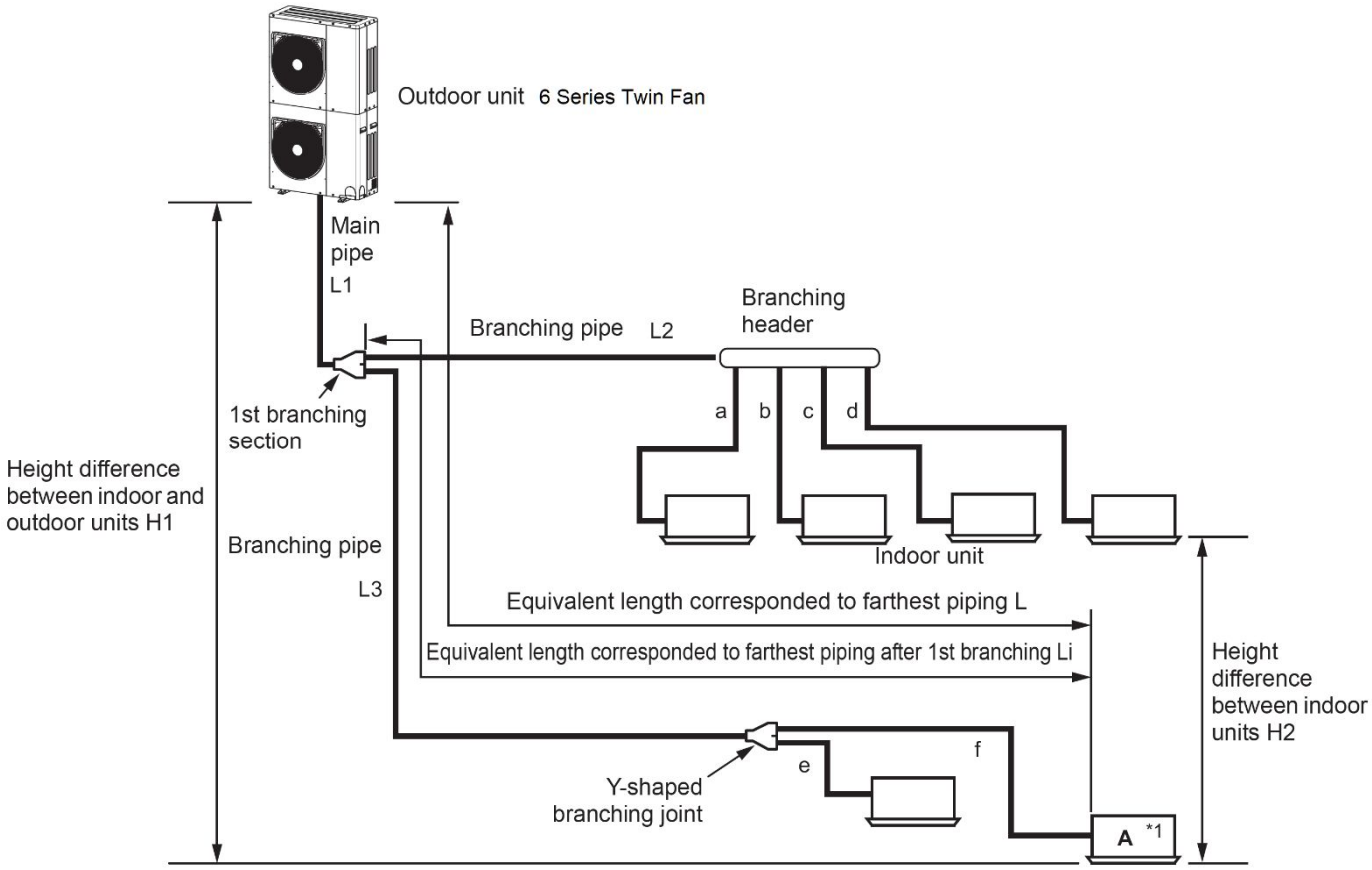


			Allowable value	Pipes
Piping Length	Total extension of pipe (liquid pipe, real length)		90 m	L1 + L2 + L3 + a + b + c + d + e + f
	Furthest piping length L (*1)	Real length	50 m	L1 + L3 + f
		Equivalent length	60 m	
	Max. equivalent length of main pipe		30 m	L1
	Max. real length of furthest piping from 1st branching Li (*1)		20 m	L3 + f
	Max. real length of indoor unit connecting pipe		10 m	a, b, c, d, e, f
Height Difference	Height between indoor and outdoor units H1	Upper outdoor unit	15 m	
		Lower outdoor unit	15 m	
	Height between indoor units H2		10 m	

*1 Furthest indoor unit from 1st branch to be named “A”.

Main pipe sizes (L1), Liquid 3/8”, Vapour 5/8”, branch pipes are dependent on the specific configuration.

6 Series, MCY-MHP0806HS8-E and MCY-MHP1006HS8-E

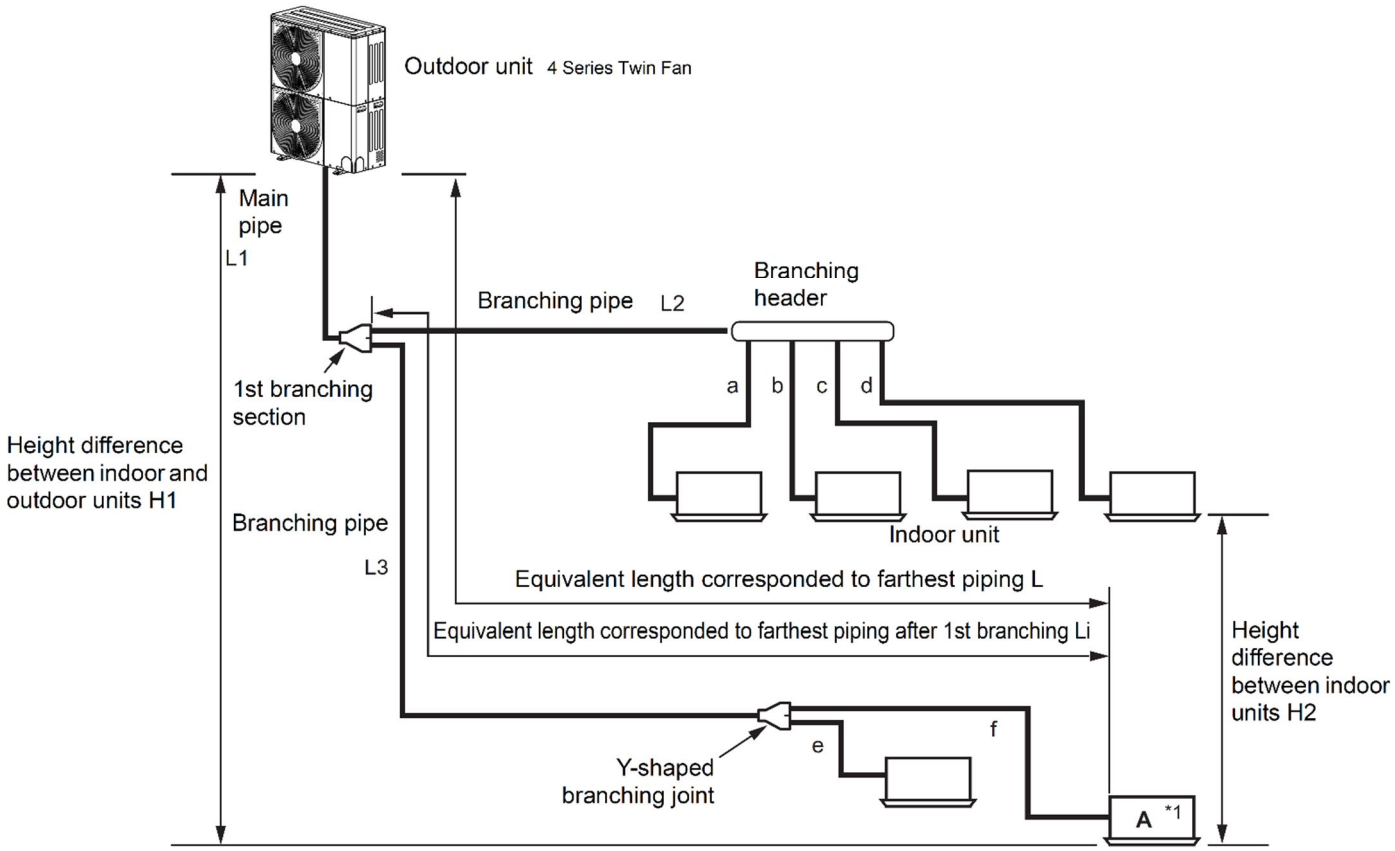


			Allowable value	Pipes
Piping Length	Total extension of pipe (liquid pipe, real length)		300 m	L1 + L2 + L3 + a + b + c + d + e + f
	Furthest piping length L (*1)	Real length	120 m	L1 + L3 + f
		Equivalent length	150 m	
	Max. equivalent length of main pipe		80 m *2	L1
	Max. real length of furthest piping from 1st branching Li (*1)		40 m	L3 + f
	Max. real length of indoor unit connecting pipe		15 m	a, b, c, d, e, f
Height Difference	Height between indoor and outdoor units H1	Upper outdoor unit	30 m *2	
		Lower outdoor unit	30 m *2	
	Height between indoor units H2		15 m	

*1 Furthest indoor unit from 1st branch to be named "A".
*2 The main liquid pipe size varies depending on L1 and H1. See the page of "Selection of refrigerant piping" for details.

Main pipe sizes (L1), Liquid 3/8", Vapour 3/4", branch pipes are dependent on the specific configuration.

4 Series, MCY-MHP0604HS-E



			Allowable value	Pipes
Piping Length	Total extension of pipe (liquid pipe, real length)		180 m	L1 + L2 + L3 + a + b + c + d + e + f
	Furthest piping length L (*1)	Real length	100 m	L1 + L3 + f
		Equivalent length	125 m	
	Max. equivalent length of main pipe		65 m	L1
	Max. equivalent length of furthest piping from 1st branching Li (*1)		35 m	L3 + f
	Max. real length of indoor unit connecting pipe		15 m	a, b, c, d, e, f
Height Difference	Height between indoor and outdoor units H1	Upper outdoor unit	30 m	
		Lower outdoor unit	20 m	
	Height between indoor units H2		15 m	

*1 Furthest indoor unit from 1st branch to be named “A”.

Main pipe sizes (L1), Liquid 3/8”, Vapour 3/4”, branch pipes are dependent on the specific configuration.

Refrigerant Charge

For the 4 series, MCY-MHP0604HS-E

Additional refrigerant charge amount at local site	=	Real length of liquid pipe	×	Additional refrigerant charge amount per 1 m liquid pipe (Table 1)	+	Compensation by outdoor HP (Table 2)

Liquid pipe dia. (inch)	1/4 ”	3/8”
Additional refrigerant amount / 1m liquid pipe (kg/m)	0.025	0.055

Table 1

Outdoor Unit	MCY-MHP0604HS-E
Compensation by Outdoor HP (kg)	0.8

Table 2

Example:
1 x MCY-MHP0604HS-E (6hp), with 35 metres of 3/8” liquid line and 15 metres of 1/4 ” liquid line and 4 assorted indoor units.

(35 x 0.055) = 1.925kg + (15 x 0.025) = 0.375kg + (1 x 0.8) = 0.8 = 3.1kg

Factory refrigerant charge is 6.4kg.

For the 6 series, MCY-MHP0406HT-E & MCY-MHP0506HT-E1

Additional refrigerant charge amount at local site	=	Real length of liquid pipe	×	Additional refrigerant charge amount per 1 m liquid pipe (Table 3)	+	Corrective amount of refrigerant depending on the indoor units (Table 4)	+	Compensation by outdoor HP (Table 5)

Liquid pipe dia. (inch)	1/4 ”	3/8”
Additional refrigerant amount / 1m liquid pipe (kg/m)	0.025	0.055

Table 3

	Capacity Rank		005*1	007	009	012	015	018	024	027	030	036	048
	Capacity Code (Equivalent to HP)		0.8	0.8	1.0	1.3	1.7	2.0	2.5	3.0	3.2	4.0	5.0
Indoor Units Model Name	4-Way Cassette	MMU-AP***HP*	-	-	0.4	0.4	0.8	0.8	0.8	0.8	0.8	1.2	1.2
		MMU-AP***MH*	0.4	0.4	0.4	0.4	0.6	0.6	-	-	-	-	-
	2-Way Cassette	MMU-AP***WH*	-	0.4	0.4	0.4	0.5	0.57	0.7	0.7	0.7	1.1	1.1
	1-Way Cassette	MMU-AP***YH/SH*	-	0.4	0.4	0.4	0.5	0.5	0.6	-	-	-	-
	Duct	MMD-AP***BHP*	-	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	1.1	1.1
		MMD-AP***SPH*	0.3	0.3	0.3	0.3	0.5	0.5	0.8	0.8	-	-	-
		MMD-AP***HP*	-	-	-	-	-	0.7	0.7	0.7	-	1.1	1.1
	Under-Ceiling	MMC-AP***HP*	-	-	-	-	0.6	0.6	0.8	0.8	-	1.2	1.2
	High Wall	MMK-AP***H*	-	0.5	0.5	0.5	0.7	0.7	0.7	-	-	-	-
		MMK-AP***HP*	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-
	Floor Standing	MMF-AP***H*	-	-	-	-	0.7	0.7	1.0	1.0	-	1.3	1.3
		MML-AP***H*	-	0.5	0.5	0.5	0.5	0.8	0.8	-	-	-	-
		MML-AP***BH*	-	0.3	0.3	0.3	0.5	0.5	0.7	-	-	-	-
		MML-AP***NH*	-	0.5	0.5	0.5	0.5	0.5	-	-	-	-	-

Table 4

- Capacity code of 005 type is the same as the 007 type

(Unit kg)

Outdoor Unit	MCY-MHP0406HT-E	MCY-MHP0506HT-E1
Compensation by Outdoor HP (kg)	-1.6	-1.6

Table 5

Example:
1 x MCY-MHP04046HT-E (4hp), with 35 metres of 3/8" liquid line and 15 metres of 1/4 " liquid line with 4 x MMK-AP0243H1 indoor units.

(35 x 0.055) = 1.925kg + (15 x 0.025) = 0.375kg **+ (4 x 0.7) = 2.8kg** - (1 x -1.6) 1.6 = 3.5kg

Both the 4HP and the 5HP units have a factory refrigerant charge of 3.3kg.

For the 6 series, MCY-MHP0806HS-E & MCY-MHP1006HS8-E

Additional refrigerant charge amount at local site	=	Real length of liquid pipe	×	Additional refrigerant charge amount per 1 m liquid pipe (Table 6)	+	Corrective amount of refrigerant depending on the indoor units (Table 7)	+	Compensation by outdoor HP (Table 8)

Liquid pipe dia. (inch)	1/4 "	3/8"	1/2 "
Additional refrigerant amount / 1m liquid pipe (kg/m)	0.025	0.055	0.105

Table 6

	Capacity Rank		005*1	007	009	012	015	018	024	027	030	036	048	056
	Capacity Code (Equivalent to HP)		0.8	0.8	1.0	1.3	1.7	2.0	2.5	3.0	3.2	4.0	5.0	6.0
Indoor Units Model Name	4-Way Cassette	MMU-AP***HP*	-	-	0.4	0.4	0.8	0.8	0.8	0.8	0.8	1.2	1.2	1.2
		MMU-AP***MH*	0.4	0.4	0.4	0.4	0.6	0.6	-	-	-	-	-	-
	2-Way Cassette	MMU-AP***WH*	-	0.4	0.4	0.4	0.5	0.57	0.7	0.7	0.7	1.1	1.1	1.1
	1-Way Cassette	MMU-AP***YH/SH*	-	0.4	0.4	0.4	0.5	0.5	0.6	-	-	-	-	-
	Duct	MMD-AP***BHP*	-	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	1.1	1.1	1.1
		MMD-AP***SPH*	0.3	0.3	0.3	0.3	0.5	0.5	0.8	0.8	-	-	-	-
		MMD-AP***HP*	-	-	-	-	-	0.7	0.7	0.7	-	1.1	1.1	1.1
	Under-Ceiling	MMC-AP***HP*	-	-	-	-	0.6	0.6	0.8	0.8	-	1.2	1.2	1.2
	High Wall	MMK-AP***H*	-	0.5	0.5	0.5	0.7	0.7	0.7	-	-	-	-	-
		MMK-AP***HP*	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-	-
	Floor Standing	MMF-AP***H*	-	-	-	-	0.7	0.7	1.0	1.0	-	1.3	1.3	1.3
		MML-AP***H*	-	0.5	0.5	0.5	0.5	0.8	0.8	-	-	-	-	-
		MML-AP***BH*	-	0.3	0.3	0.3	0.5	0.5	0.7	-	-	-	-	-
		MML-AP***NH*	-	0.5	0.5	0.5	0.5	0.5	-	-	-	-	-	-

Table 7

- Capacity code of 005 type is the same as the 007 type

(Unit kg)

Outdoor Unit	MCY-MHP0806HS8-E	MCY-MHP1006HS8-E
Compensation by Outdoor HP (kg)	-1.0	-1.0

Table 8

Example:
1 x MCY-MHP08046HTS8-E (8hp), with 15 metres of 1/2" liquid line, 35 metres of 3/8" liquid line and 15 metres of 1/4 " liquid line with 3 x MMK-AP0243H1 and 1 x MMU-AP056HP* indoor units.

(15 x 0.105) = 1.575kg + (35 x 0.055) = 1.925kg + (15 x 0.025) = 0.375kg **+ (3 x 0.7) = 2.1kg + (1 x 1.2) = 1.2kg** - (1 x -1.0) 1.0 = 6.175kg

Both the 8HP and the 10HP units have a factory refrigerant charge of 4.4kg.

Electrical

Power and control are the same across the range, either single fan or twin fan versions.

Single phase and neutral power supply to the outdoor unit (HT-E/HS-E), with local isolation adjacent to each unit.
Three phase and neutral power supply to the outdoor unit (HS8-E), with local isolation adjacent to each unit.

Fuse sizes are calculated based on the following data, (table 9), and should be carried out in accordance with current 18th IET regulations.

Single phase and neutral power supply to each indoor unit, suggested fuse 6 amp, with local isolation adjacent to each unit, in accordance with 18th IET regulations.

Interconnecting communication cable between indoor and outdoor units (terminals U1 & U2), **1.5mm** two core screened cable, up to 1000m over 1001m to 2000m 2.5mm, forming a radial (daisy chain) circuit.

Screens to be joined together but **NOT** grounded at each indoor unit but grounded at one end **ONLY.**

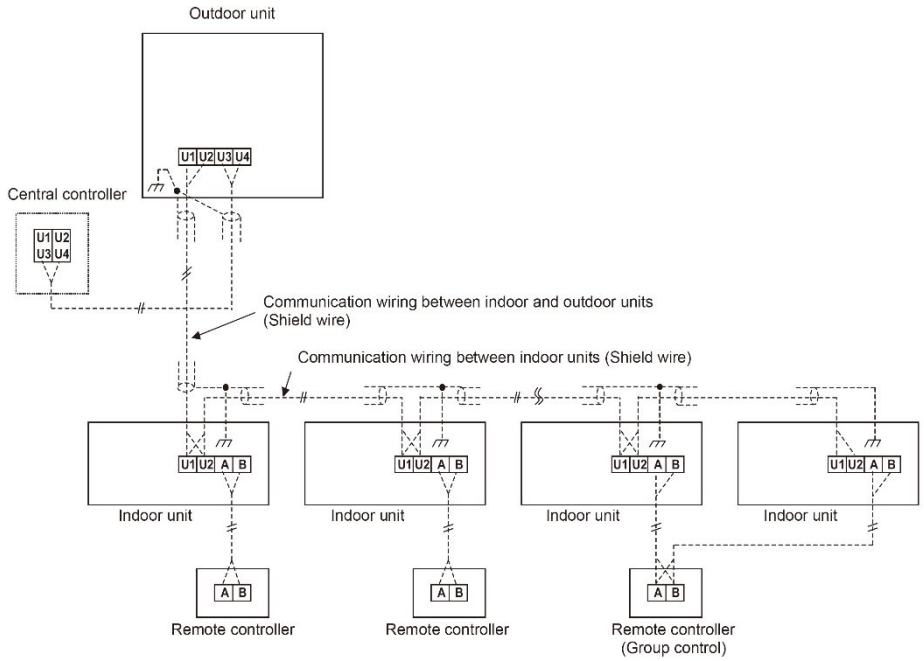
Indoor local remote controller wiring 0.5mm to 2.0mm two core cable connected to terminals A&B at each indoor unit, (maximum length 500m).

Model	Power supply, nominal voltage, phase, frequency	MCA (A)	MOCP (A)
MCY-MHP0406*	220-240VAC 1N 50Hz 220VAC 1N 60Hz	26.5	32
MCY-MHP0506*		28	32
MCY-MHP0604*	220-240VAC 1N 50Hz	28	32
MCY-MHP0806HS8-E	380-415VAC 3N 50Hz	17	20
MCY-MHP1006HS8-E		20	25

Table 9

MCA – Maximum Circuit Amp (A). MOCP – Maximum Overcurrent Protection (A)

Example.



Addressing

By default each system is factory configured as system reference number **1**, SW13 and SW14 (located in the outdoor unit) all "dip switches" are in the down (off) position, (fig 1), when more than one system is being controlled via a central controller or a BMS interface each system requires a unique system number.

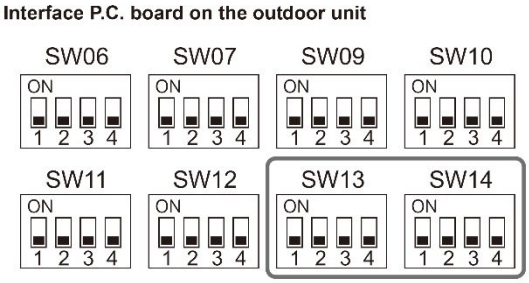


Fig 1

It is recommended that **BEFORE** the auto address sequence is instigated, each outdoor unit has a separate system number, between 1 to 28, (table 10), set via "dip switches" SW13 and SW14 (fig ?).

Example system set as system 2;

With mains power turned **OFF**, turn **ON** "Dip Switch" 1 on SW14,(fig 2), **BEFORE** Auto addressing is carried out.

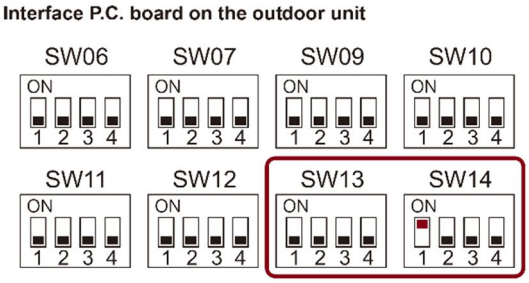


Fig 2

Switch settings for a line (system) address on the interface P.C. board on the outdoor unit
(○: switch ON, ×: switch OFF)

Line (system) address	SW13				SW14			
	1	2	3	4	1	2	3	4
1	–	–	–	×	×	×	×	×
2	–	–	–	×	○	×	×	×
3	–	–	–	×	×	○	×	×
4	–	–	–	×	○	○	×	×
5	–	–	–	×	×	×	○	×
6	–	–	–	×	○	×	○	×
7	–	–	–	×	×	○	○	×
8	–	–	–	×	○	○	○	×
9	–	–	–	×	×	×	×	○
10	–	–	–	×	○	×	×	○
11	–	–	–	×	×	○	×	○
12	–	–	–	×	○	○	×	○
13	–	–	–	×	×	×	○	○
14	–	–	–	×	○	×	○	○
15	–	–	–	×	×	○	○	○
16	–	–	–	×	○	○	○	○
17	–	–	–	○	×	×	×	×
18	–	–	–	○	○	×	×	×
19	–	–	–	○	×	○	×	×
20	–	–	–	○	○	○	×	×
21	–	–	–	○	×	×	○	×
22	–	–	–	○	○	×	○	×
23	–	–	–	○	×	○	○	×
24	–	–	–	○	○	○	○	×
25	–	–	–	○	×	×	×	○
26	–	–	–	○	○	×	×	○
27	–	–	–	○	×	○	×	○
28	–	–	–	○	○	○	×	○

"–": not used for system address setting (Do not change their positions.)

Auto Addressing

The system has an "Automatic" addressing system, which is "Instigated" by pressing and holding SW15 push button located on the main printed circuit board of the outdoor unit.

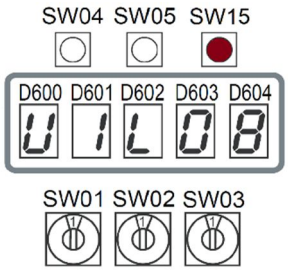


Fig 3

Sequence.

1) Apply power to the indoor units.
2) **Set the "System Number" at the outdoor unit.**
3) Set the rotary switches SW01,02 & 03 to "1 – 1 – 1" (fig 3).
4) Apply power to the outdoor unit.
5) Outdoor display D600,601,602,603 & 604 illuminates.
   When the outdoor display shows "U1 – L08".
   Press and hold SW05. (fig 3).
   The display will automatically scroll through "Auto 1, to Auto 9"

When the automatic addressing is complete, the display will show U1 - - -

Set rotary switches SW01 to 1, SW02 to 4 & SW03 to 3 this will display the quantity of indoor units recognised.

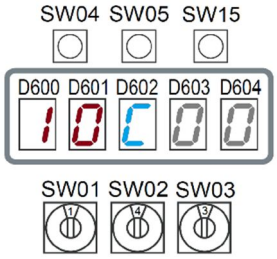


Fig 4

D600 & D601 Display the quantity of indoor units found
D602 "C" indicates Cooling
D603 & D604 Indicates quantity of units running.

If the quantity found does not match the quantity installed
Check the indoor units are powered up.

If an indoor unit was found to have no power, make sure power is available, check if hard wired remote controls are installed, if so, does the affected units remote display "Setting or an Egg Timer symbol".
No display then no power or incorrect wiring if the display shows "Setting or Egg Timer symbol" unit not registered to outdoor unit.

To add the missing unit/s to the system.
Using the three rotary switches SW01, 02 & 03, set them to SW01 – 2, SW02 14, SW03 2, (fig5)

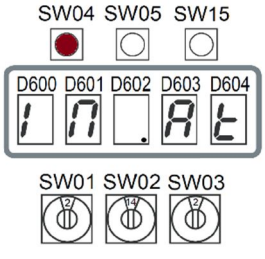
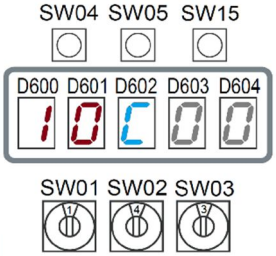


Fig 5

The display shows "In.At
Press and hold SW04 for 4 seconds.(fig 5)
Display scrolls through "Auto 1 to Auto9"
When display shows "Auto 9"
Return SW01,02 & 03 to 1 – 1 – 1
Display shows "U1 - - -"

Repeat the steps above for checking the quantity of indoor units registered via rotary switches
SW01 to 1, SW02 to 4 & SW03 to 3.
Quantity of indoor units registered should have increased.



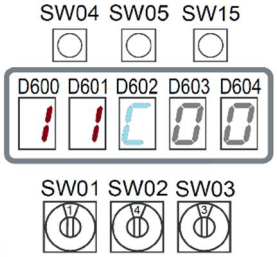


fig 6 fig 7

Setting the Priority Mode of Operation

Two pipe heat pump Mini VRF systems allow for either heating or cooling mode, simultaneous operation heat and cool modes together, is **not available**.

The "Auto" mode function is removed from the local remote controllers' functions, the local remote will allow for Heat mode, Cool mode, Fan only mode.

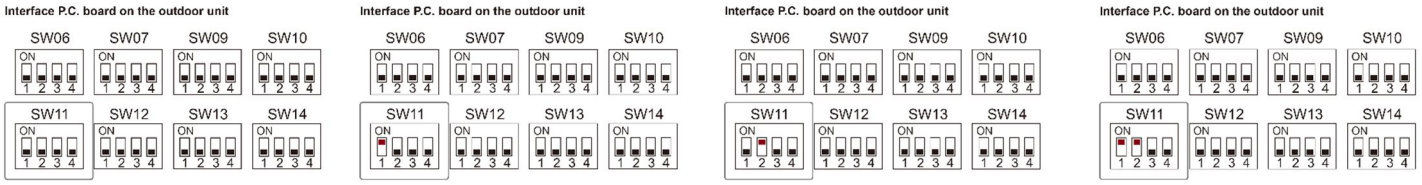
The equipment is set to priority heat mode, any one indoor unit requesting heating will place the outdoor unit into heating mode, any indoor units operating but not requiring heating are automatically placed into the fan only mode, until the indoor unit requiring heating is satisfied, at this time the outdoor unit will automatically change mode to meet the demand of the indoor unit requiring cooling, the indoor unit which had required heating mode but was satisfied, will now automatically be placed into fan only mode.

The priority operation can be changed from priority heating to priority cooling, priority majority mode (60% of the installed indoors require the same mode of operation either heating or cooling.), or by a specific indoor unit setting the required mode, (Heat or Cool) (table 11).

SW11		Operation
Bit 1	Bit 2	
OFF	OFF	Priority Heating (Factory Default)
ON	OFF	Priority Cooling
OFF	ON	Priority majority (60%)
ON	ON	Priority Specific Indoor Unit

table 11

Changes are made via SW11, (located on the main printed circuit board of the outdoor unit), "dip switches" 1 & 2.

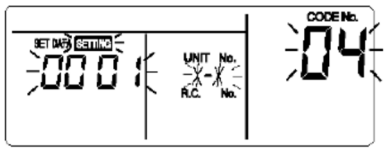


Default (Heating Priority) | Cooling Priority SW11 dip switch one ON | Majority Operation Specific dip switch two ON (60%) | Indoor unit selects Mode dip swich one & two ON

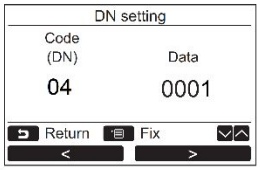
To configure a specific indoor unit to be the unit to select the mode of operation (heat or cool), change SW11 (Outdoor unit) "dip switch" one and two both ON.

Via the local remote controller wired to the indoor unit required to be the unit to set the mode, enter the "DN" code menu, access is dependant on the model of local remote installed.

In the "DN Code" settings select "DN Code" 04, change the "Set Data" from default "0000" to "0001"



Example; RBC-AMS32/41 display



RBC-AMS51/54/55 display

Full details are available in the "Installation Manual" supplied with the equipment.

Contact details:

Cool Designs Ltd Technical Support

07590 775510 / 07706 293028

Monday – Friday 07.30 to 19.30

Email: support@cooldesignsltd.co.uk

Web site: www.cdlweb.info

Toshiba Air Conditioning

24/7 technical support

0870 843 0333 (Option 7)

Text back service

07624 803 017

(Type fault code in lower case no spaces)

Try our on-line training videos on YouTube.