

# **TOSHIBA**

**SERVICE MANUAL**

## **AIR CONDITIONER**

HEAT PUMP MULTI SPLIT (2-PIPE)

Outdoor Units

**MAR - M81HTM8 - E**

**MAR - M101HTM8 - E**

Multi Controllers

**RBM - Y1032E - E**

**RBM - Y1042E - E**

# TOSHIBA

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**Note :** The two pipe Super Multi systems are heat pump units and can provide heating or cooling, where both modes are required simultaneously heating mode takes priority.

# TOSHIBA

## 1. Specifications

### OUTDOOR UNITS

Model		MAR-M81HTM8-E	MAR-M101HTM8-E
Cooling Capacity	kW	20.0 (22.4)	25.0 (28.0)
Heating Capacity	kW	20.0 (25.0)	25.0 (31.5)
Power Supply		3ph,380/415v,50Hz	
Power Consumption	(C/H) kW	8.0 / 7.7	10.1 / 10.1
Running Current	(C/H) Amps	12.3 / 11.7	15.7 / 15.0
Start Current	Amps	60	
Dimensions	Height (mm)	1,490	
	Width (mm)	1,290	
	Depth (mm)	824	
Weight	kg	308	315
Noise Level SPL	dB(A)	66	
Min Temp. (ambient)	Cooling / Heating °C	-5 / -10	
Gas Pipe (main)	Inch	1 1/8	
	(sub)	3/4	
Liquid Pipe (main)	Inch	5/8	
	(sub)	1/2	
Max.. Length Actual	m	100	
Max.. Length Equiv.	m	120	
Height Difference	Outdoor Above (m)	50	
	Outdoor Below (m)	20	
Refrigerant Type		R 22	
Std Refrigerant Weight	Kg	15.6	18.6
Compressor Type		Hermetically Sealed Twin Scroll	
Compressor Output	kW	5.6	7.5
Fan Type		2 x Propeller Fan (two speed)	
Fan Motor Consumption	W	2 x 150	
Air Flow Rate	m <sup>3</sup> /hr	10,000	
Colour		Silky Grey (Munsell 6Y7.0/0.3)	
Multi Controllers	3 - Way	RBM-Y1032E-E	
	4 - Way	RBM-Y1042E-E	

Note: The capacity value in brackets is the maximum operating capacity

Cooling and Heating capacities are based on JIS B8615

Cooling capacity:	Room Temperature	27°C DB
	Ambient Temperature	19.5°C WB
Heating capacity:	Room Temperature	35°C DB
	Ambient Temperature	21°C DB
	Ambient Temperature	7°C DB
		6°C WB

Usable outdoor temperature ranges

Cooling mode -5°C to +43°C DB

Heating mode -10°C to +21°C DB

Specifications are subject to change without prior notice.

# TOSHIBA

## 1. Specifications

### MULTI CONTROLLERS

Model		RBM-Y1032E-E	RBM-Y1042E-E
Number of Branches		3	4
Gas Pipe (Inlet)	Inch	1 1/8	1 1/8
Liquid Pipe (Inlet)	Inch	5/8	5/8
Branch Pipes (Gas)	Inch	3/4 x 3	3/4 x 4
Branch Pipes (Liquid)	Inch	3/8 x 3	3/8 x 4
Dimensions	Height (mm)	260	260
	Width (mm)	590	590
	Depth (mm)	450	520
Weight	kg	20	23
Max.. Branch Length	m	30	30
Max.. Difference between Branches	m	10	10
Max.. Vertical Separation	m	15	15
<b>Where two M/C are used</b>			
Max.. Sub Pipe Length (each)	m	15	15
Max.. Difference between Sub Pipes	m	10	10

Specifications are subject to change without prior notice.

### Pipe Size Conversion Chart

mm	6.4	9.5	12.7	15.9	19	22.4	25.4	28.6
inch	1/4	3/8	1/2	5/8	3/4	7/8	1	1.1/8

## 2. Basic Permutations of Indoor to Outdoor Units

The indoor units are given a code number according to their capacity rank - see below

Model Number	Code Number
RAV103	2
RAV132/133	3
RAV453/160/1/2/3	4
RAV202/3	5
RAV713/260/1/2/3	6
RAV1003/360/1/2/3	8
RAV1253/460/1/2/3	10

Multiple indoor units may be connected to one outdoor unit, providing the total indoor code does not exceed the outdoor unit code number. The outdoor unit codes are listed below

Model	Max.. No. Indoor Units	Min Code	Max. Code
MAR-M81HTM8-E	8	3	21
MAR-M101HTM8-E	8	3	27

When connecting up to four single indoor units only one multi controller is required, if more single indoor units are needed then two multi controllers must be used. When connecting a twin indoor arrangement to one multi controller branch the capacity code will be the sum of both indoor unit codes.

Example :

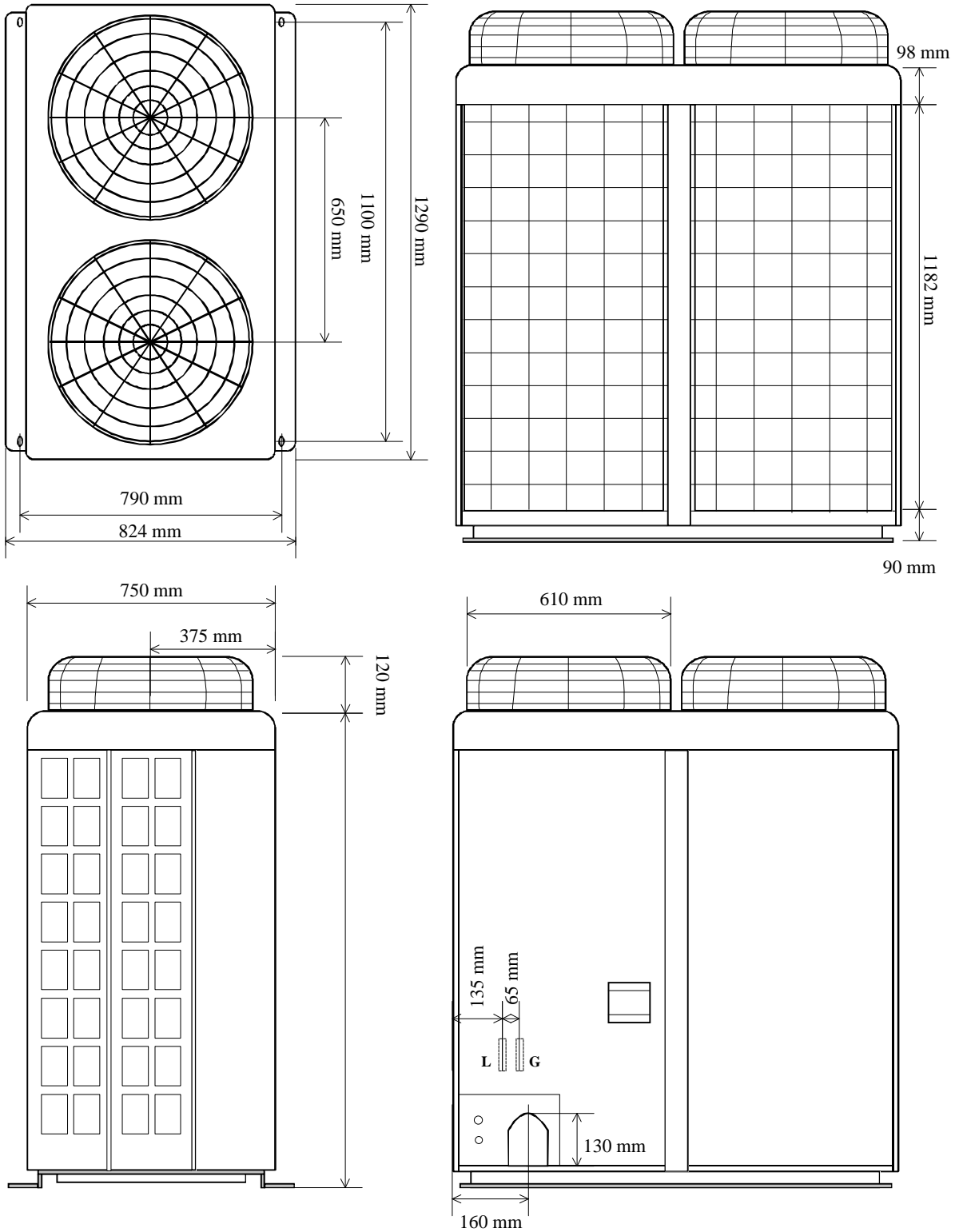
Model No.	Arrangement	Indoor Capacity Code	Total Capacity Code
RAV133TUH	Single	3	3
RAV133TUH	Twin	3	6
RAV202KH(W)	Single	5	5
RAV202KH(W)	Twin	5	10
		Total	24

The total capacity codes for the example above are within the maximum permitted for a 10hp (MAR-F101HTM8-E) outdoor unit therefore the use of a twin arrangement is acceptable.

**NOTE :** The maximum duty from the system cannot exceed the maximum capacity of the outdoor unit, it is possible to use indoor units with a total capacity of 135% of the outdoor unit capacity.

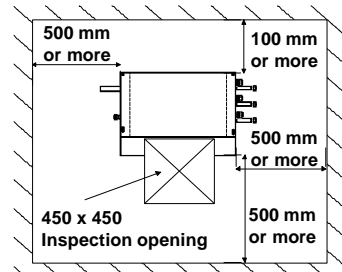
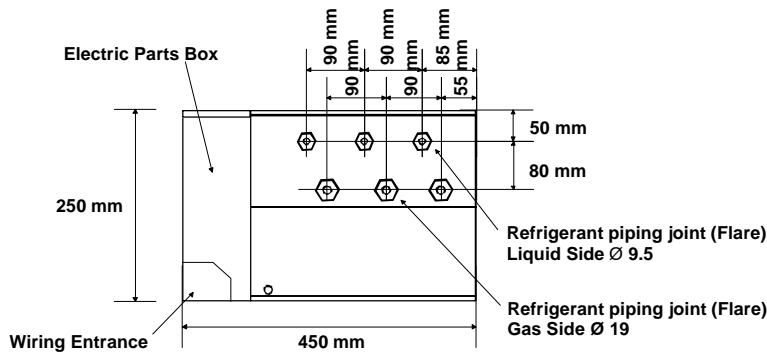
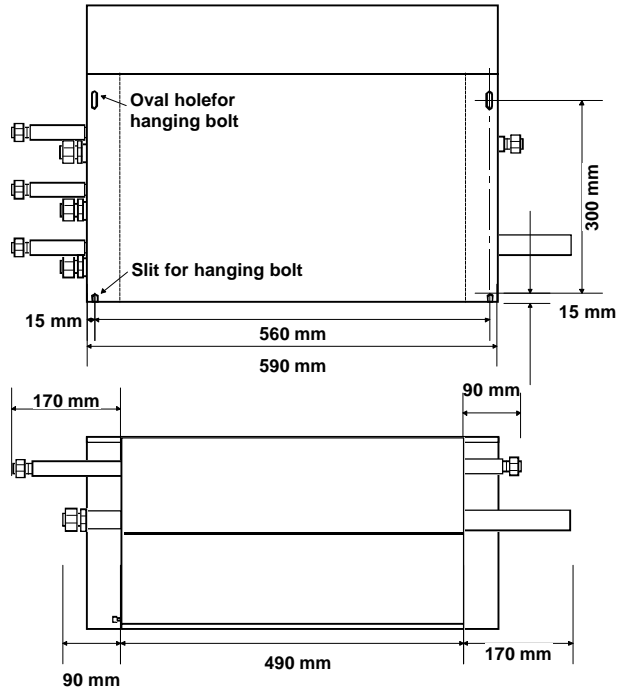
## CONSTRUCTION VIEWS

MAR-M81HTM8E-E  
MAR-M101FHTM8E-E

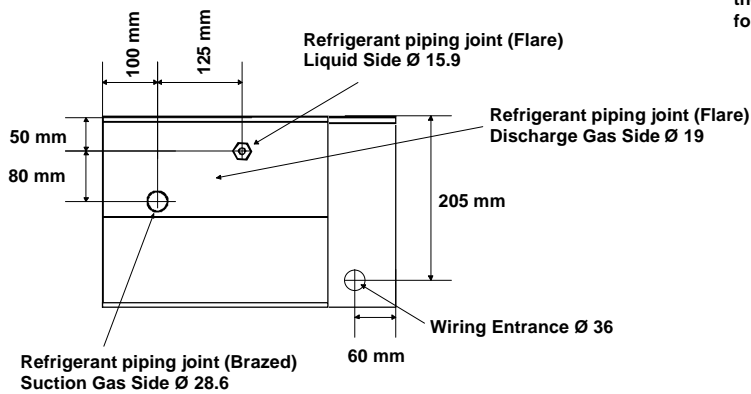


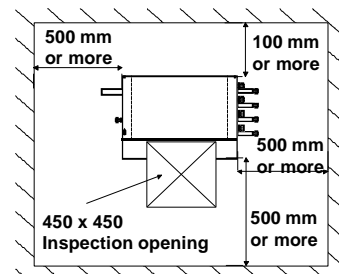
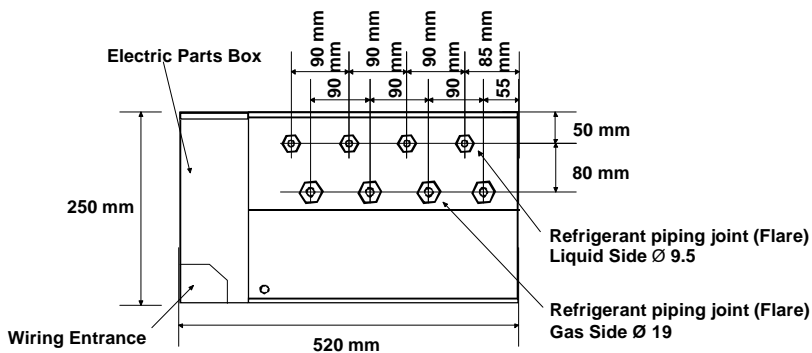
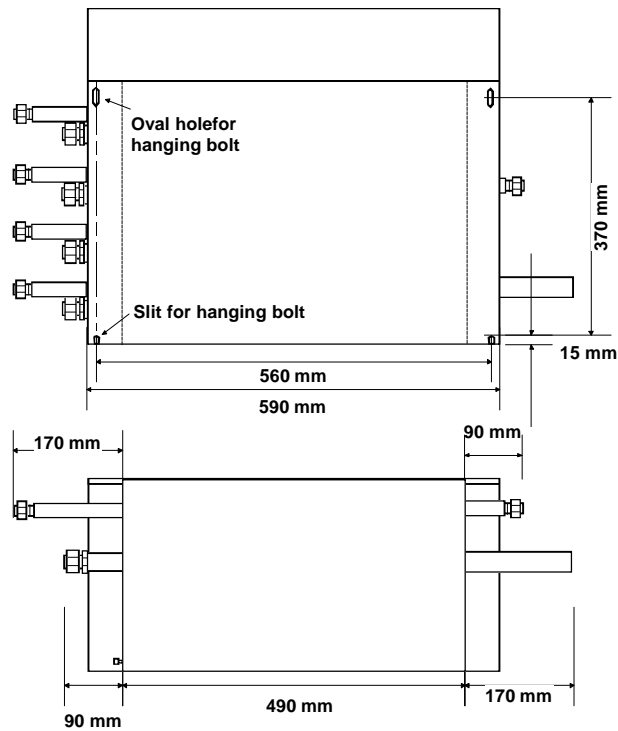
## DIMENSIONAL DRAWINGS

RBM-Y1032E-E

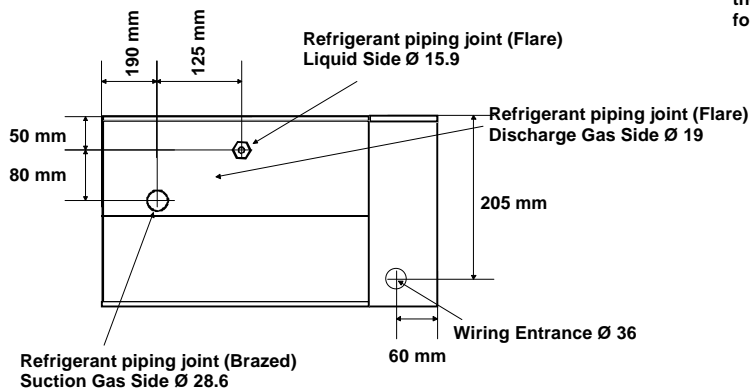


Note. Make an inspection opening at the specified place. It is indispensable for servicing.





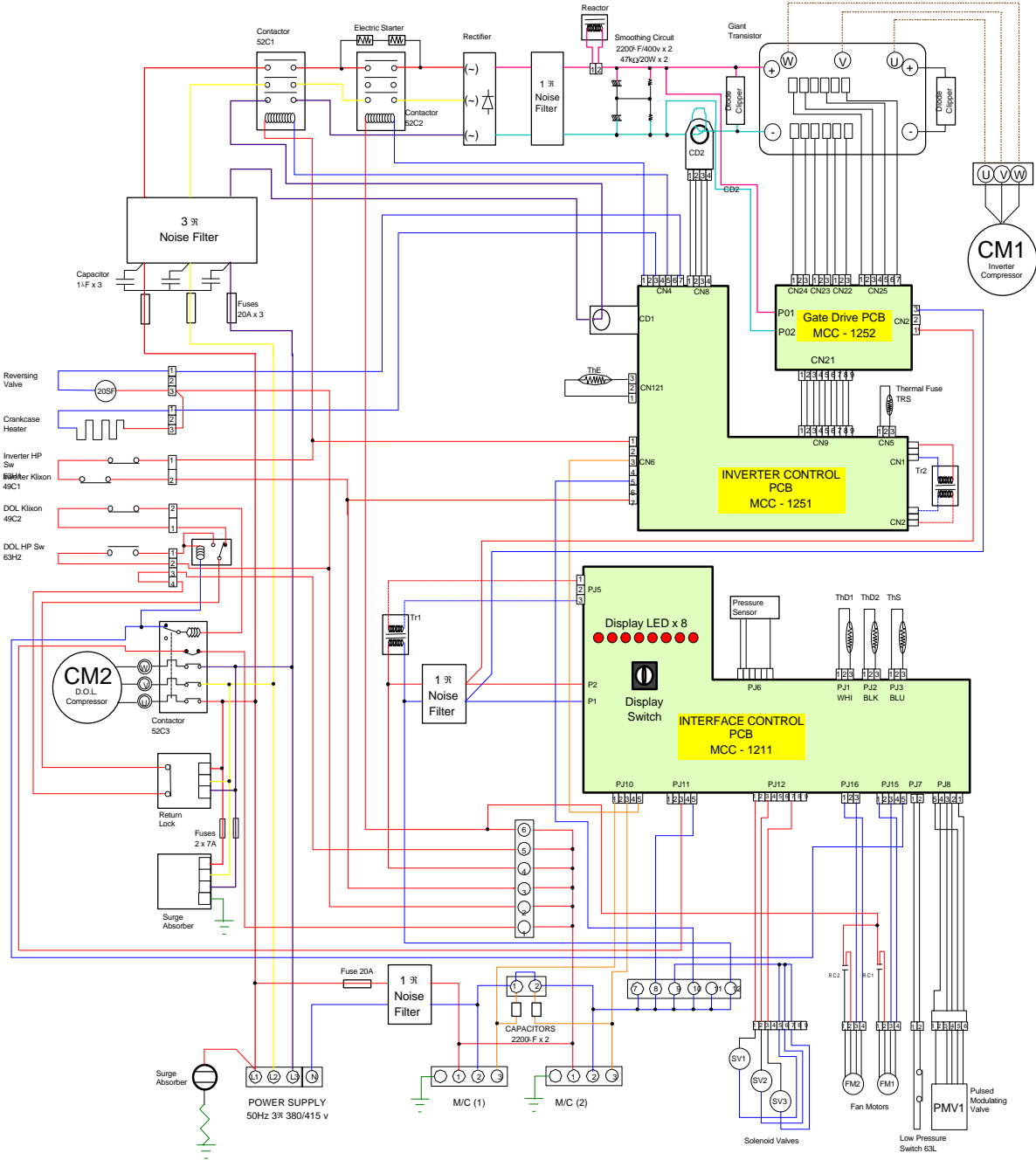
Note. Make an inspection opening at the specified place. It is indispensable for servicing.





## 4. Schematic Wiring Diagrams

### Outdoor Unit

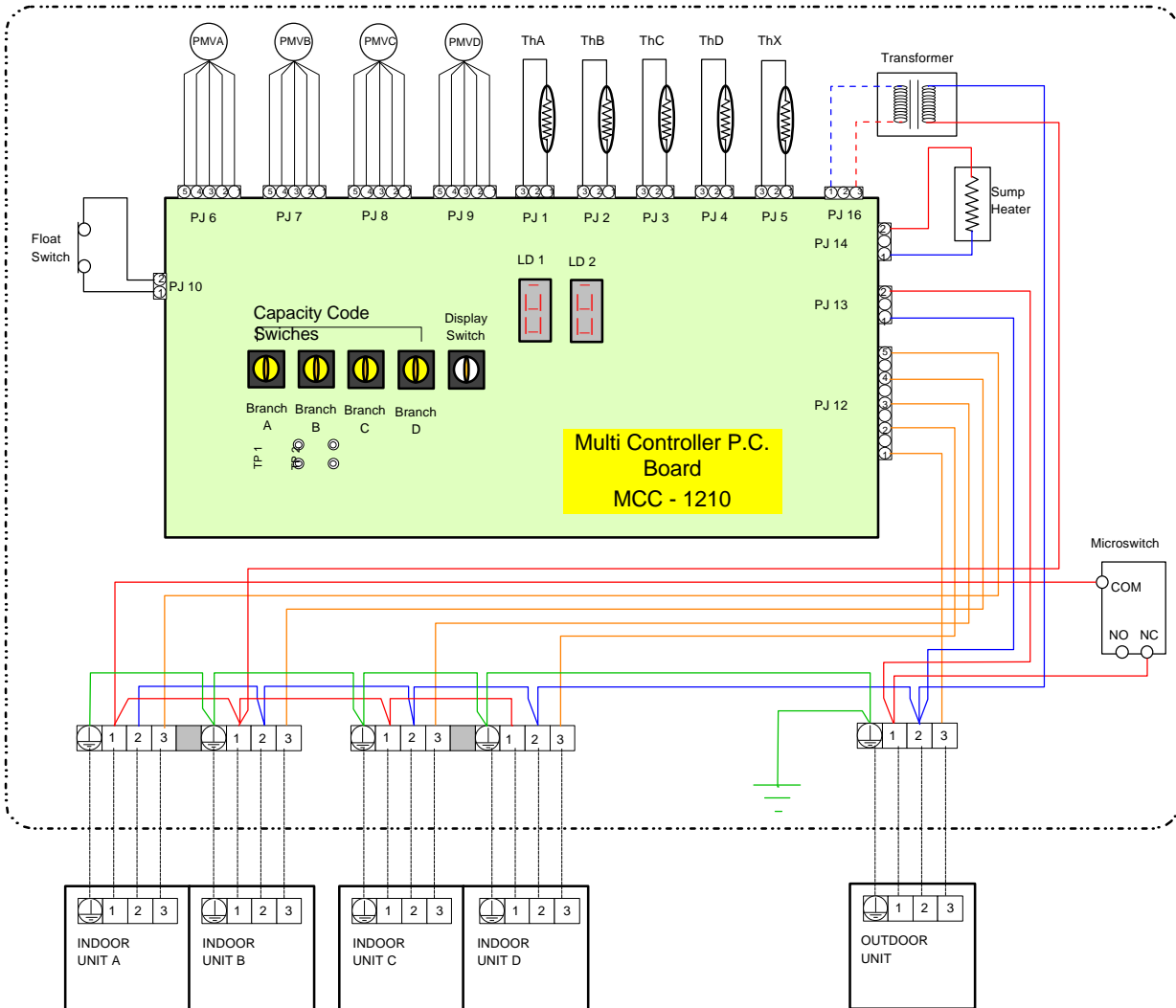


- = 240 v ac Live (not permanent)
- = Neutral (not permanent)
- = Communication Signal
- = Earth
- = L1 phase 415ac
- = L2 phase 415ac
- = L3 phase 415ac
- = dc high voltage live
- = dc high voltage neutral
- = 3Ø for Inv Compressor
- = dc low voltage
- = ac low voltage
- = ac low voltage

Note :The colours used in this diagram are not representative of those on the actual product, they are intended to indicate the status of each wire.

## 4. Schematic Wiring Diagrams

### Multi Controllers



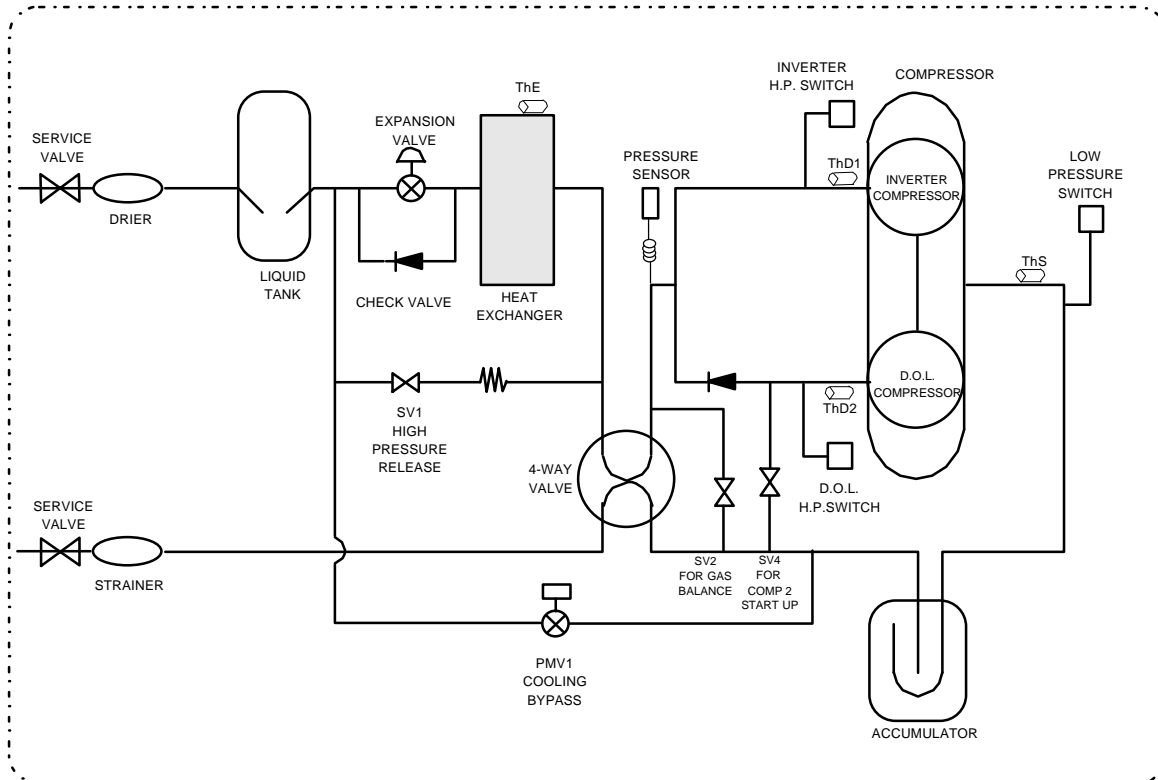
The colours used in this diagram are not representative of those on the product, they are intended to indicate the status of each wire.

- = 240v ac Live Wiring
- = Neutral Wiring
- = Serial Wiring
- = Earth Wiring
- - - = ac low voltage
- - - = ac low voltage

RBM - Y1032E - E does not have PMVD, ThD, indoor unit D connections or the capacity code switch for branch D.

## 5. Schematic Refrigeration Diagram

### Outdoor Unit

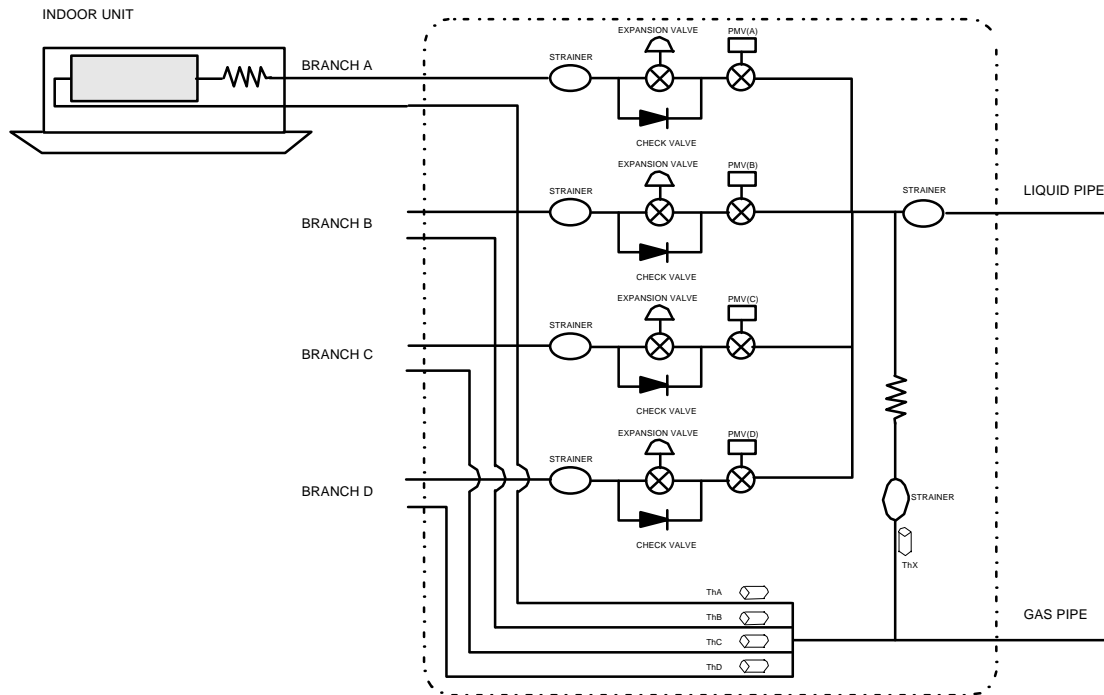


### Specification of Outdoor Unit Components

Model Number		MAR-M81HTM8-E	MAR-M101HTM8-E
Compressor	Type Number	HV991CW-Y12	HV1201CW-Y12
	Motor Type	Three Phase Induction	
	Power Supply	415/380 , 3-phase , 50Hz + Neutral	
	Output (kW)	5.6	7.5
	Coil Resistance (Ω)	Inv.1.49 / DOL 2.51	
Fan Motor	Type Number	STF-200-150C	
	Motor Type	Single Phase Induction	
	Power Supply	220 / 240 , single phase , 50Hz + Neutral	
	Consumption (W)	150	
	Current (A)	1.12 - 1.44	
	No. Poles	6	
	Thermal Cut-out	Trip 115°C ± 5°C	
H.P. Switch Inv.	P.S.I.G.	Break on Rise : Trip 425 , Reset 340	
H.P. Switch DOL	P.S.I.G.	Make on Rise : Trip 425 , Reset 340	
L.P. Switch	P.S.I.G.	Break on Drop : Trip 3.5 , Reset 20	
ThD1 & ThD2 Sensor	(kΩ)	50 @ 25°C , 17.9 @ 50°C , 3.35 @ 100°C	
ThS & ThE	(kΩ)	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Four Way Valve		Energised for Heating	
Crankcase Heater (240vac)	(W)	74	

## 5. Schematic Refrigeration Diagram

### Multi Controller



The schematic shows the layout for a four way multi controller (RBM-Y1042E-E), the three way multi controller (RBM-Y1302E-E) is very similar however all components relating to branch D have been removed.

### Specification of Multi Controller Components

Model Number		RBM-Y1032E-E	RBM-Y1042E-E
ThA,B,C,D,X Sensor	(k $\Omega$ )	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Float Switch		Break on Rise	
Sump Heater (240vac)	(W)	50	65
Thermal Fuse	(°C)	Trips at 119	
Heater Fuse	(Amps)	1	
Transformer	Primary / Secondary (v ac)	240 / 12	

## 6. Fault Code and Display Information

### Fault Codes

Before reading the fault codes **do not** turn the power off as doing so will wipe the diagnostic memory. Caution must be taken when removing the access covers as high voltages are present.

Fault diagnosis is available at three locations within the air conditioning system :-

1. Remote Controller - press the check button
2. Multi Controller - rotate the display switch to position 1
3. Outdoor Unit - see following text

Remote Controller Press Check			Multi Controller Switch Position 1			Outdoor Unit	
O4	No Communication Inverter to Interface	→	O4	No Communication Inverter to Interface	→	see Table 1	No Communication Inverter to Interface
O4	No Communication Multi Con to Outdoor	→	O4	No Communication Multi Con to Outdoor			
O4	No Communication Indoor to Multi Con						
Ob	I.D. Water Level						
OC	TA Sensor		88	No Communication Initially M/C to OD		Display Switch set to "8" (if lit....)	
Od	TC Sensor		80	Th(A) Sensor Fault	←	LED1	Th(A) Sensor Fault
O8	Reverse Change Temp		81	Th(B) Sensor Fault	←	LED2	Th(B) Sensor Fault
O9	Frost or no Change °C		82	Th(C) Sensor Fault	←	LED3	Th(C) Sensor Fault
99	No Communication Indoor to Rem Con.		83	Th(D) Sensor Fault	←	LED4	Th(D) Sensor Fault
			84	Th(X) Sensor Fault	←	LED5	Th(X) Sensor Fault
15	Refer to Multi Con	↗	Ob	M/C Water Level	←		M/C Water Level
	Preheat/Defrost Flash	→	89	ID Codes too High	←	LED6	M/C Settings too High
				ID Codes set to Zero		LED7	M/C1 Sensor Fault
						LED8	M/C2 Sensor Fault
						Display Switch set to "3" (if lit....)	
1C	Refer to O/D	→	1C	Refer to O/D	→	LED1	ThD1 Sensor Fault
						LED2	ThD2 Sensor Fault
						LED3	ThS Sensor Fault
						LED4	High Pressure - detected by pressure sensor
						LED5	Pressure Sensor Fault
						LED6	Discharge Pipe >130°C
						LED7	Suction Pipe >40°C
						LED8	Low Pressure <3.5psig
						SW01 Set to Off/Off	
14	Refer to O/D	→	14	Refer to O/D	→	* ○ ○ ○ ○	Low Inverter Voltage
1d	Refer to O/D	→	1d	Refer to O/D	→	○ * ○ ○ ○	High Inverter Current dc
1F	Refer to O/D	→	1F	Refer to O/D	→	○ ○ * ○ ○	High Inverter Current ac
18	Refer to O/D	→	18	Refer to O/D	→		ThE Sensor Fault
21	Refer to O/D	→	21	Refer To O/D	→	○ ○ ○ * ○	Inv HP Trip, Comp Klixon
					↘		Phase Rotation, DOL HP Trip, O/Load, Comp Klixon

\* = LED Flashing

○ = LED On

## 6. Fault Code and Display Information

### Display switch information

#### **Multicontroller**

Switch position	Information
0	System Communication
1	Fault Codes
2	Level of Demand
3	Oil Retrieval, Superheat, Defrost
4	Operating Mode
5	Restart Timer
6	Circuit Test (commissioning only)
7	PMV(A) Position
8	PMV(B) Position
9	PMV(C) Position
10	PMV(D) Position
11	ThA Sensor Data (Hex Code)
12	ThB Sensor Data (Hex Code)
13	ThC Sensor Data (Hex Code)
14	ThD Sensor Data (Hex Code)
15	ThX Sensor Data (Hex Code)

#### **Outdoor Unit**

Switch position	Information
0	System Communication
1	Status of Compressors
2	System Status (Mode, Defrost, PMV)
3	Fault Diagnostics (Outdoor Unit)
4	M/C1 Branches A & B Indoor Capacity Codes
5	M/C1 Branches C & D Indoor Capacity Codes
6	M/C2 Branches A & B Indoor Capacity Codes
7	M/C2 Branches C & D Indoor Capacity Codes
8	Fault Diagnostics (Multi Controller)
9	Circuit Test (commissioning only)
10	Not Used
11	Not Used
12	Not Used
13	Not Used
14	Not Used
15	Not Used

## 6. Fault Code and Display Information

### Multi Controller Display Switch Information

Switch Pos.	Indicates	LD 1							LD 2						
0	Serial		From B Branch	To B Branch		To A Branch	From A Branch	From Outdoor		From D Branch	To D Branch		To C Branch	From C Branch	To Outdoor
1	Fault Codes	For Details of Fault Codes see Page 13													
2	Demand	Level of Cooling/Heating Demand (00-1F)													
3			Oil Ret brch B	Superheat brchB		Superheat brchA	Oil Ret brchA			Oil Ret brch D	Superheat brchD		Superheat brchC	Oil Ret brchC	
	Defrost	Displays "dF" during defrost operation													
4		Operating Mode :Heating (H-), Cooling (-C), Stop (-), Defrost (J-)													
5	Timer	Normal Display (OO), Restart Timer Displays (-1) During Count Down													
6	cct test	Displays Branch Being Tested (A b C d)							Indicates Faulty Branch Connection After Circuit Test						
7	PMVA	Displays Degree Of PMV Opening As A Hexadecimal Code : (OO) = Closed , (FO) = Fully Open													
8	PMVB														
9	PMVC														
10	PMVD														
11	ThA	Displays Sensor Readings As A Hexadecimal Code : 40=0°C ; 68=10°C ; 90=20°C ; b8=30°C													
12	ThB														
13	ThC														
14	ThD														
15	ThX														

The Hexadecimal codes can be interpreted using the following chart

Display	PMV- Angle	Th-AbCdX °C	Level Of Demand			
			Display	Hz	Display	Hz
OO	Closed		OO	0	10	44.1
10	16		O1	0	11	47.2
20	32	-8	O2	0	12	50.3
30	48	-4	O3	3.9	13	53.4
40	64	0	O4	6.9	14	56.5
50	80	4	O5	10	15	59.6
60	96	8	O6	13	16	62.7
70	112	12	O7	16.2	17	65.8
80	128	16	O8	19.3	18	68.9
90	144	20	O9	22.4	19	72
AO	160	24	OA	25.5	1A	75.1
bO	176	28	Ob	28.6	1B	78.2
CO	192	32	OC	31.7	1C	81.3
dO	208		Od	34.8	1D	84.4
EO	224		OE	37.9	1	87.5
FO	240		OF	41	1F	90

The above chart shows a sample of readings, other intermediate readings may be registered.

## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information

The operating status of the outdoor unit and fault diagnosis can be made using both the display selector switch (on the interface pcb) and the eight red light emitting diodes on the interface printed circuit board.

a. Display switch set to position “0” shows communication around the system

LED 1	Lit = Receiving serial signal from multi controller 1
LED 2	Lit = Sending serial signal to multi controller 1
LED 3	Lit = Receiving serial signal from multi controller 2
LED 4	Lit = Sending serial signal to multi controller 2
LED 5	Lit = Receiving serial signal from inverter printed circuit board
LED 6	Lit = Sending serial signal to inverter printed circuit board
LED 7	n/a
LED 8	n/a

b. Display switch set to position “1” shows status of both compressors

Inverter Speed		LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
S0	0 Hz	X	X	X	X	DOL compressor On On = Run Off Off = Stop		Speed Limiting Due To Protection Circuits i.e. High TD or Low TS	
S3	30 Hz	X	X	O	O				
S4	36 Hz	X	O	X	X				
S5	42 Hz	X	O	X	O				
S6	46 Hz	X	O	O	X				
S7	53 Hz	X	O	O	O				
S8	61 Hz	O	X	X	X				
S9	69 Hz	O	X	X	O				
SA	76 Hz	O	X	O	X				
SB	84 Hz	O	X	O	O				
SC	92 Hz	O	O	X	X				
SD	103 Hz	O	O	X	O				
SE	111 Hz	O	O	O	X				
SF	122 Hz	O	O	O	O				

O = Lit      X = Off

c. Display switch set to position “2” shows the status of the system



## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information cont.

d. Display switch set to position “3” identifies a fault condition in the outdoor unit.

Details are in the fault code chart on page 13

e. Display switch set to positions “4, 5, 6 & 7” identifies the indoor unit capacity code for each branch.

	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
Pos. 4	Capacity code of unit on M/C 1 branch A				Capacity code of unit on M/C 1 branch B			
Pos. 5	Capacity code of unit on M/C 1 branch C				Capacity code of unit on M/C 1 branch D			
Pos. 6	Capacity code of unit on M/C 2 branch A				Capacity code of unit on M/C 2 branch B			
Pos. 7	Capacity code of unit on M/C 2 branch C				Capacity code of unit on M/C 2 branch D			
	O = Lit      X = Off				Indoor Model Number			Code No
	X	X	O	X	103			2
	X	X	O	O	132/133			3
	X	O	X	X	453/160/161/162/163			4
	X	O	X	O	200/202/203			5
	X	O	O	X	713/260/261/262/263			6
	X	O	O	O				
	O	X	X	X	1,003/360/361/362/363			8
	O	X	O	X	1,253/460/461/462/463			10

f. Display switch set to position “8” identifies a fault condition in the multi controller.

Details are in the fault code chart on page 13

g. Display switch set to position “9” shows the status of the commissioning circuit test.

LED 1	M/C 1	Branch A	When an LED is lit it indicates that there is a wiring or piping fault between the multi controller and the relevant indoor unit.
LED 2		Branch B	
LED 3		Branch C	
LED 4		Branch D	
LED 5	M/C 2	Branch A	
LED 6		Branch B	
LED 7		Branch C	
LED 8		Branch D	

## 7. Circuit Test Procedure

These systems have a feature which enables them to check that the wiring and piping connections are aligned with each other. This is carried out by allowing refrigerant flow to one indoor unit at a time and monitoring that indoor unit's coil sensor for a corresponding drop in temperature. Each indoor unit is tested in turn and where two multi controllers are installed each multi controller is tested in turn.

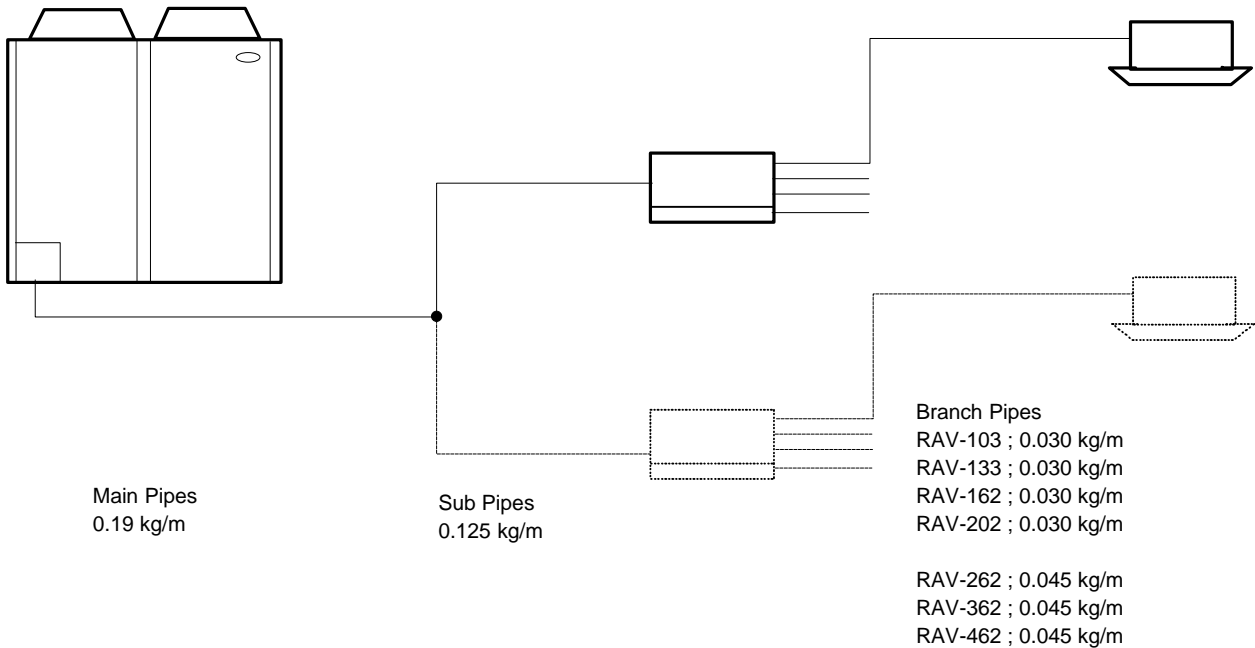
This test would normally be used at the commissioning stage.

Procedure for initialising the circuit test.

1. Turn the power off, and disconnect any T2s (optional) fitted.
2. Put the outdoor display switch to 9 and multi controller(s) display switch to 6.
3. Turn the power back on.
4. Set all the remote controllers to cool mode and 29°C.
5. Press the on/off button to start the indoor units (fans will run).
6. Go to outdoor unit press switch J2 (above 8 x LEDs) for 3 sec .
7. The system is now self-testing (all 8 LEDs will be flashing rapidly).
8. The system will stop at the end of the test, indicated by the on/off lights flashing.

In the event of cross wiring/piping the system will indicate which units are faulty, see pages 15 & 17

## 8. Calculating The Additional Gas Charge



### Single Multi Controller

Main pipe run (minus 3m.)	x	0.190 kg/m	=
Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge			= _____ kg

### Two Multi Controllers

Main pipe run (minus 2m.)	x	0.190 kg/m	=
Total sub pipe (minus 2m.)	x	0.125 kg/m	=
M/C1 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
M/C2 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge			= _____ kg

# **TOSHIBA**

**SERVICE MANUAL**

## **AIR CONDITIONER**

HEAT PUMP MULTI SPLIT (2-PIPE)

Outdoor Units

**MAR - M81HTM8 - E**

**MAR - M101HTM8 - E**

Multi Controllers

**RBM - Y1032E - E**

**RBM - Y1042E - E**

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| 4. Wiring Diagrams                       | Outdoor Unit<br>Multi Controller |
| 5. Refrigeration Circuit                 | Outdoor Unit<br>Multi Controller |
| 6. Display Information and Fault Codes   |                                  |
| 7. Circuit Test Procedure                |                                  |
| 8. Calculation for Additional Gas Charge |                                  |

**Note :** The two pipe Super Multi systems are heat pump units and can provide heating or cooling, where both modes are required simultaneously heating mode takes priority.

# TOSHIBA

## 1. Specifications

### OUTDOOR UNITS

Model		MAR-M81HTM8-E	MAR-M101HTM8-E
Cooling Capacity	kW	20.0 (22.4)	25.0 (28.0)
Heating Capacity	kW	20.0 (25.0)	25.0 (31.5)
Power Supply		3ph,380/415v,50Hz	
Power Consumption	(C/H) kW	8.0 / 7.7	10.1 / 10.1
Running Current	(C/H) Amps	12.3 / 11.7	15.7 / 15.0
Start Current	Amps	60	
Dimensions	Height (mm)	1,490	
	Width (mm)	1,290	
	Depth (mm)	824	
Weight	kg	308	315
Noise Level SPL	dB(A)	66	
Min Temp. (ambient)	Cooling / Heating °C	-5 / -10	
Gas Pipe (main)	Inch	1 1/8	
	(sub)	3/4	
Liquid Pipe (main)	Inch	5/8	
	(sub)	1/2	
Max.. Length Actual	m	100	
Max.. Length Equiv.	m	120	
Height Difference	Outdoor Above (m)	50	
	Outdoor Below (m)	20	
Refrigerant Type		R 22	
Std Refrigerant Weight	Kg	15.6	18.6
Compressor Type		Hermetically Sealed Twin Scroll	
Compressor Output	kW	5.6	7.5
Fan Type		2 x Propeller Fan (two speed)	
Fan Motor Consumption	W	2 x 150	
Air Flow Rate	m <sup>3</sup> /hr	10,000	
Colour		Silky Grey (Munsell 6Y7.0/0.3)	
Multi Controllers	3 - Way	RBM-Y1032E-E	
	4 - Way	RBM-Y1042E-E	

Note: The capacity value in brackets is the maximum operating capacity

Cooling and Heating capacities are based on JIS B8615

Cooling capacity:	Room Temperature	27°C DB
	Ambient Temperature	19.5°C WB
Heating capacity:	Room Temperature	35°C DB
	Ambient Temperature	21°C DB
	Ambient Temperature	7°C DB
		6°C WB

Usable outdoor temperature ranges

Cooling mode -5°C to +43°C DB

Heating mode -10°C to +21°C DB

Specifications are subject to change without prior notice.

# TOSHIBA

## 1. Specifications

### MULTI CONTROLLERS

Model		RBM-Y1032E-E	RBM-Y1042E-E
Number of Branches		3	4
Gas Pipe (Inlet)	Inch	1 1/8	1 1/8
Liquid Pipe (Inlet)	Inch	5/8	5/8
Branch Pipes (Gas)	Inch	3/4 x 3	3/4 x 4
Branch Pipes (Liquid)	Inch	3/8 x 3	3/8 x 4
Dimensions	Height (mm)	260	260
	Width (mm)	590	590
	Depth (mm)	450	520
Weight	kg	20	23
Max.. Branch Length	m	30	30
Max.. Difference between Branches	m	10	10
Max.. Vertical Separation	m	15	15
<b>Where two M/C are used</b>			
Max.. Sub Pipe Length (each)	m	15	15
Max.. Difference between Sub Pipes	m	10	10

Specifications are subject to change without prior notice.

### Pipe Size Conversion Chart

mm	6.4	9.5	12.7	15.9	19	22.4	25.4	28.6
inch	1/4	3/8	1/2	5/8	3/4	7/8	1	1.1/8

## 2. Basic Permutations of Indoor to Outdoor Units

The indoor units are given a code number according to their capacity rank - see below

Model Number	Code Number
RAV103	2
RAV132/133	3
RAV453/160/1/2/3	4
RAV202/3	5
RAV713/260/1/2/3	6
RAV1003/360/1/2/3	8
RAV1253/460/1/2/3	10

Multiple indoor units may be connected to one outdoor unit, providing the total indoor code does not exceed the outdoor unit code number. The outdoor unit codes are listed below

Model	Max.. No. Indoor Units	Min Code	Max. Code
MAR-M81HTM8-E	8	3	21
MAR-M101HTM8-E	8	3	27

When connecting up to four single indoor units only one multi controller is required, if more single indoor units are needed then two multi controllers must be used. When connecting a twin indoor arrangement to one multi controller branch the capacity code will be the sum of both indoor unit codes.

Example :

Model No.	Arrangement	Indoor Capacity Code	Total Capacity Code
RAV133TUH	Single	3	3
RAV133TUH	Twin	3	6
RAV202KH(W)	Single	5	5
RAV202KH(W)	Twin	5	10
		Total	24

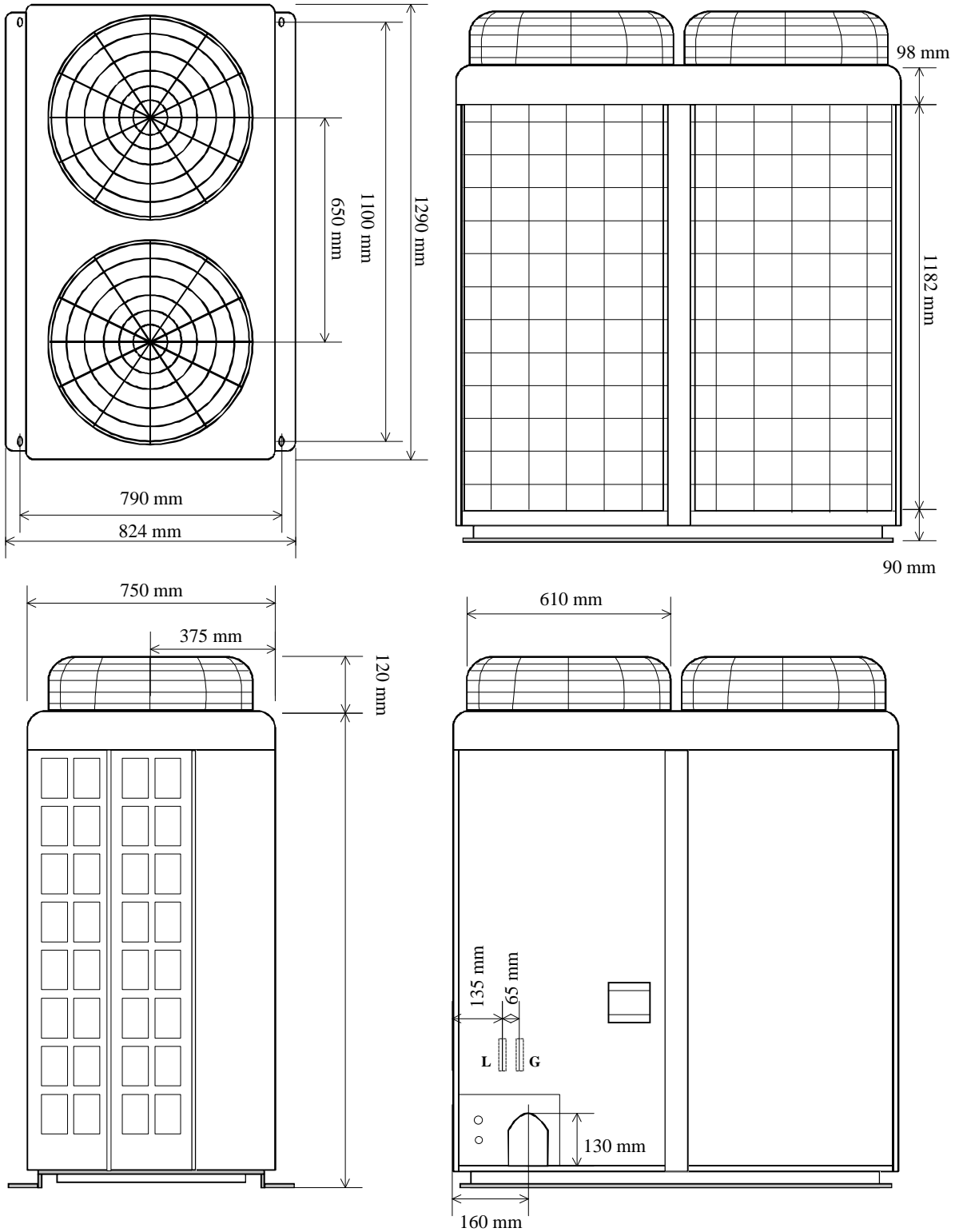
The total capacity codes for the example above are within the maximum permitted for a 10hp (MAR-F101HTM8-E) outdoor unit therefore the use of a twin arrangement is acceptable.

**NOTE :** The maximum duty from the system cannot exceed the maximum capacity of the outdoor unit, it is possible to use indoor units with a total capacity of 135% of the outdoor unit capacity.



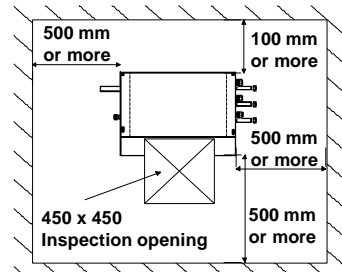
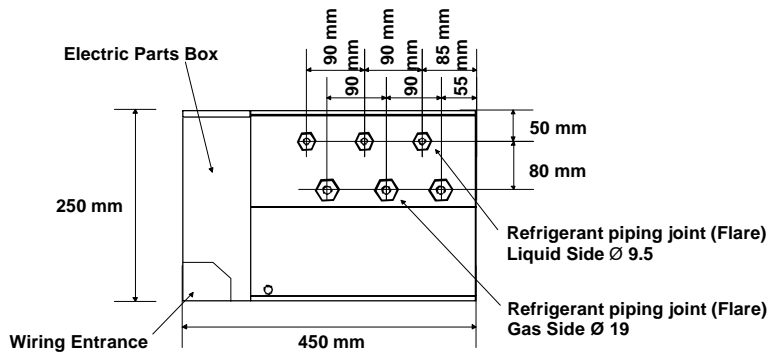
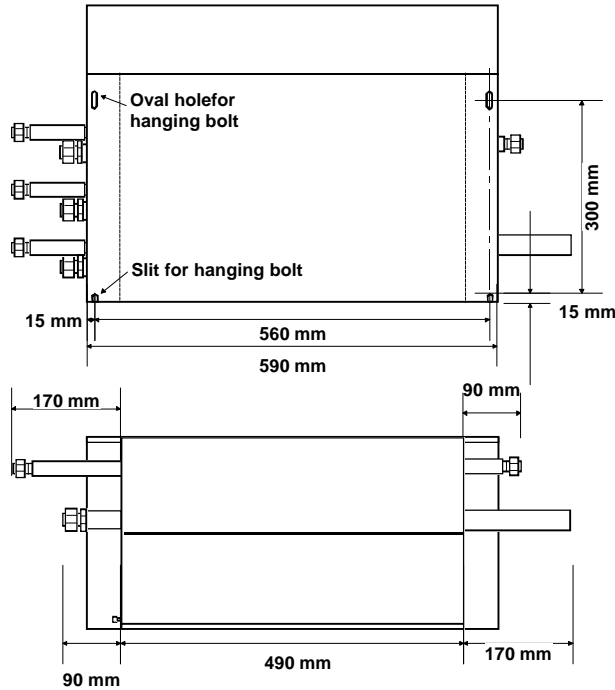
## CONSTRUCTION VIEWS

MAR-M81HTM8E-E  
MAR-M101FHTM8E-E

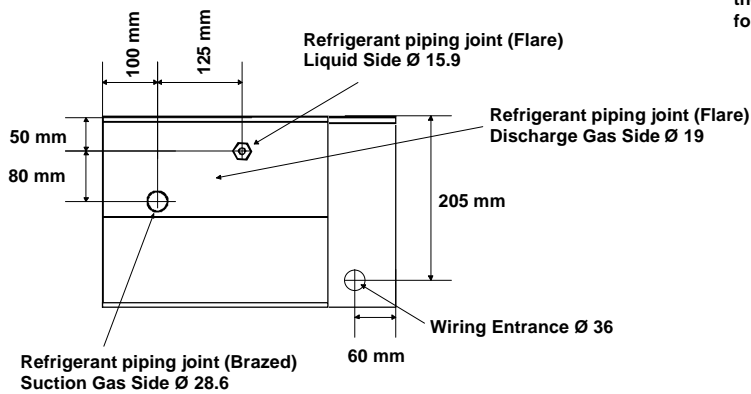


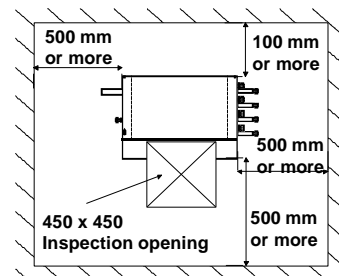
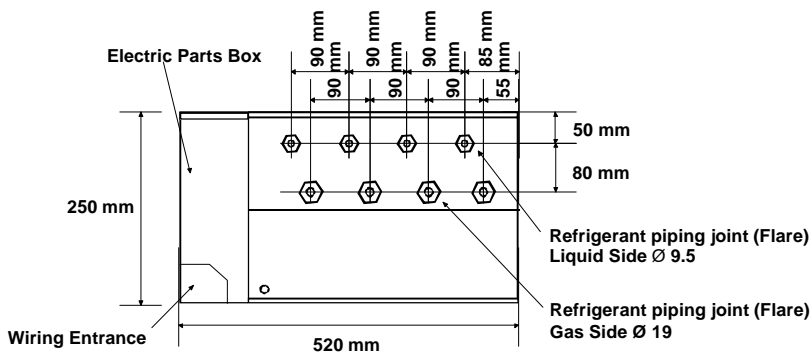
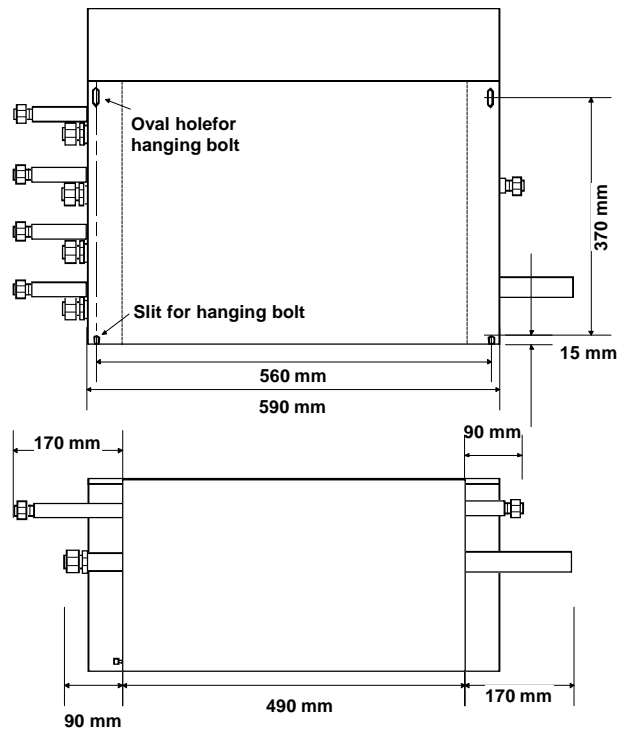
## DIMENSIONAL DRAWINGS

RBM-Y1032E-E

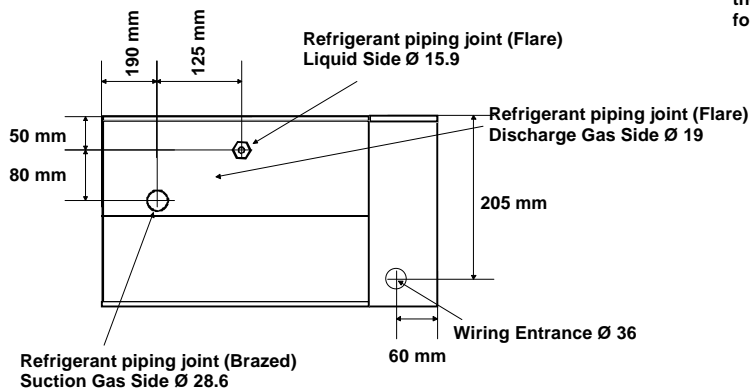


Note. Make an inspection opening at the specified place. It is indispensable for servicing.



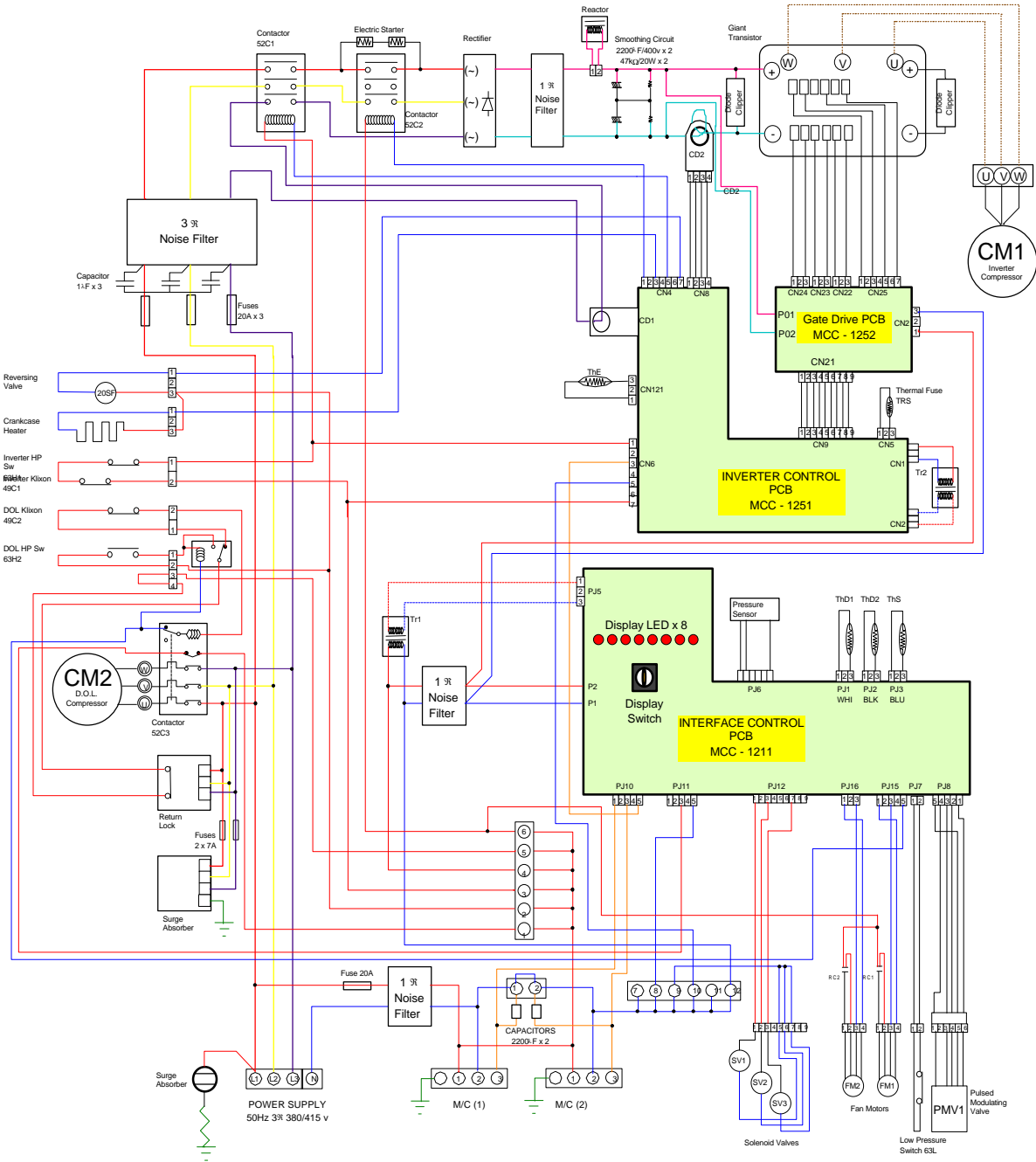


Note. Make an inspection opening at the specified place. It is indispensable for servicing.



## 4. Schematic Wiring Diagrams

### Outdoor Unit

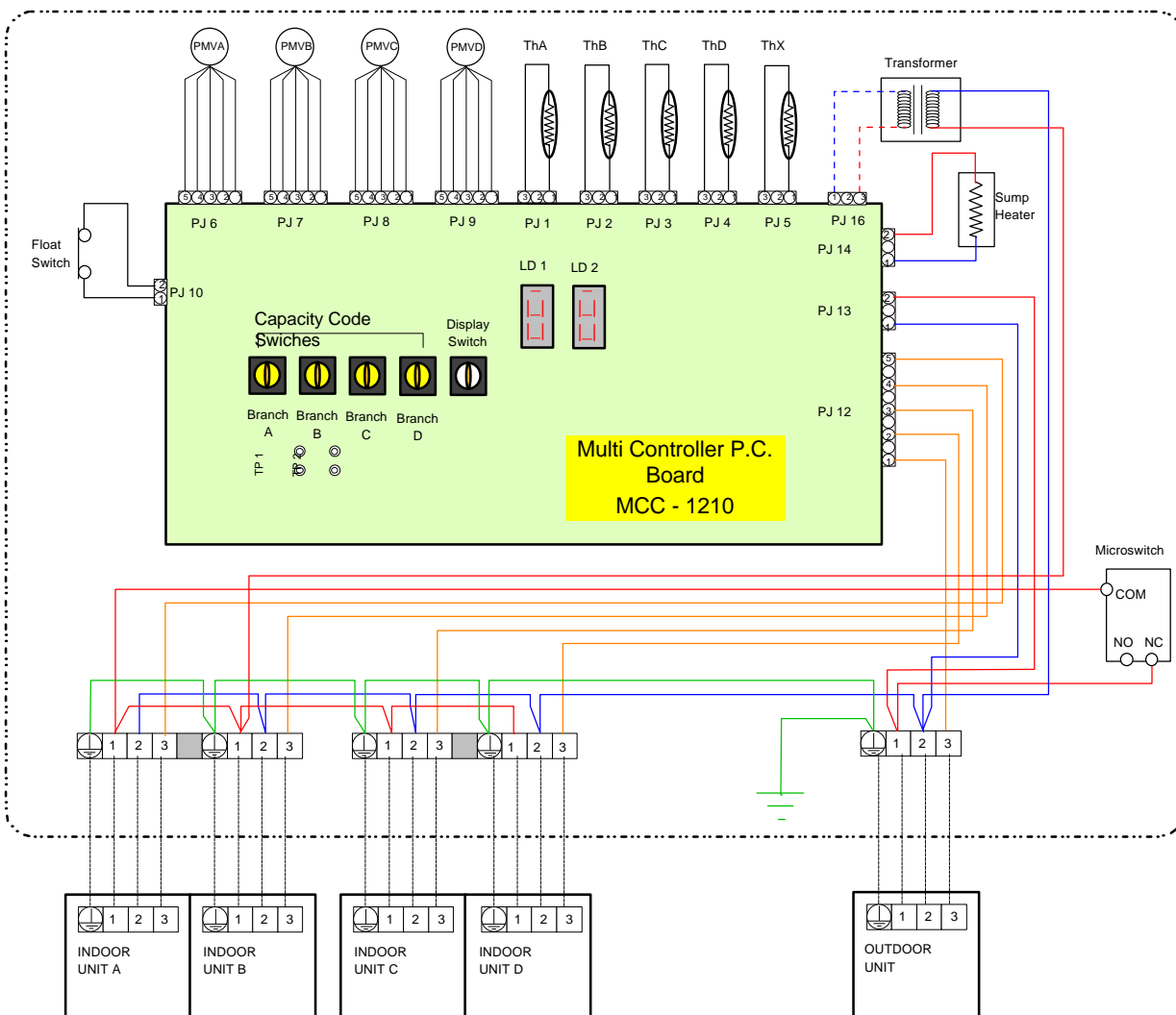


- = 240 v ac Live (not permanent)
- = Neutral (not permanent)
- = Communication Signal
- = Earth
- = L1 phase 415ac
- = L2 phase 415ac
- = L3 phase 415ac
- = dc high voltage live
- = dc high voltage neutral
- = 3Ø for Inv Compressor
- = dc low voltage
- = ac low voltage
- = ac low voltage

Note :The colours used in this diagram are not representative of those on the actual product, they are intended to indicate the status of each wire.

## 4. Schematic Wiring Diagrams

### Multi Controllers



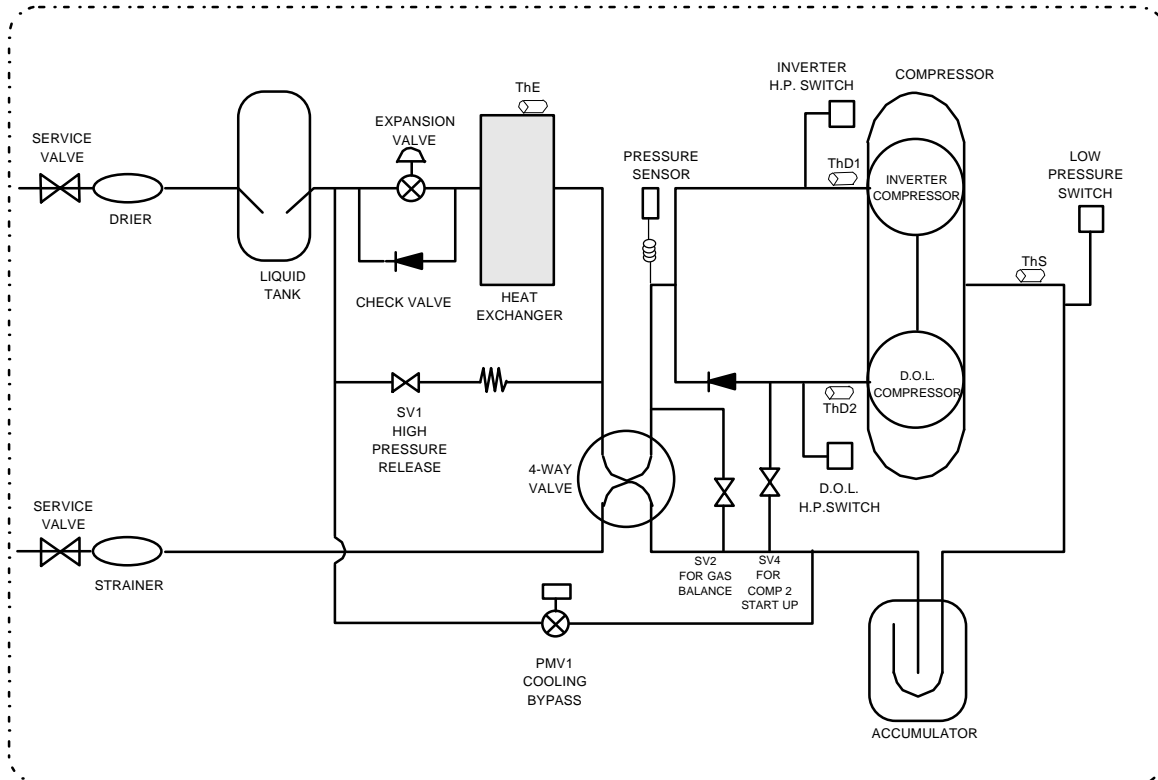
The colours used in this diagram are not representative of those on the product, they are intended to indicate the status of each wire.

- = 240v ac Live Wiring
- = Neutral Wiring
- = Serial Wiring
- = Earth Wiring
- = ac low voltage
- = ac low voltage

RBM - Y1032E - E does not have PMVD, ThD, indoor unit D connections or the capacity code switch for branch D.

## 5. Schematic Refrigeration Diagram

### Outdoor Unit

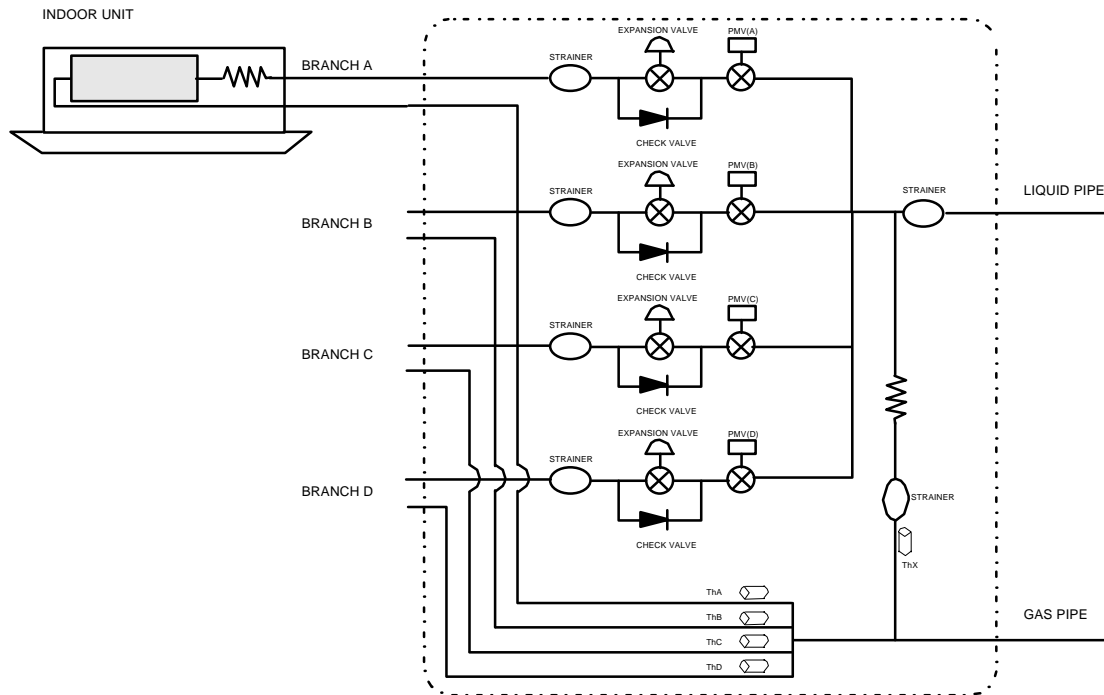


### Specification of Outdoor Unit Components

Model Number		MAR-M81HTM8-E	MAR-M101HTM8-E
Compressor	Type Number	HV991CW-Y12	HV1201CW-Y12
	Motor Type	Three Phase Induction	
	Power Supply	415/380 , 3-phase , 50Hz + Neutral	
	Output (kW)	5.6	7.5
	Coil Resistance (Ω)	Inv.1.49 / DOL 2.51	
Fan Motor	Type Number	STF-200-150C	
	Motor Type	Single Phase Induction	
	Power Supply	220 / 240 , single phase , 50Hz + Neutral	
	Consumption (W)	150	
	Current (A)	1.12 - 1.44	
	No. Poles	6	
	Thermal Cut-out	Trip 115°C ± 5°C	
H.P. Switch Inv.	P.S.I.G.	Break on Rise : Trip 425 , Reset 340	
H.P. Switch DOL	P.S.I.G.	Make on Rise : Trip 425 , Reset 340	
L.P. Switch	P.S.I.G.	Break on Drop : Trip 3.5 , Reset 20	
ThD1 & ThD2 Sensor	(kΩ)	50 @ 25°C , 17.9 @ 50°C , 3.35 @ 100°C	
ThS & ThE	(kΩ)	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Four Way Valve		Energised for Heating	
Crankcase Heater (240vac)	(W)	74	

## 5. Schematic Refrigeration Diagram

### Multi Controller



The schematic shows the layout for a four way multi controller (RBM-Y1042E-E), the three way multi controller (RBM-Y1302E-E) is very similar however all components relating to branch D have been removed.

### Specification of Multi Controller Components

Model Number		RBM-Y1032E-E	RBM-Y1042E-E
ThA,B,C,D,X Sensor	(k $\Omega$ )	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Float Switch		Break on Rise	
Sump Heater (240vac)	(W)	50	65
Thermal Fuse	(°C)	Trips at 119	
Heater Fuse	(Amps)	1	
Transformer	Primary / Secondary (v ac)	240 / 12	

## 6. Fault Code and Display Information

### Fault Codes

Before reading the fault codes **do not** turn the power off as doing so will wipe the diagnostic memory. Caution must be taken when removing the access covers as high voltages are present.

Fault diagnosis is available at three locations within the air conditioning system :-

1. Remote Controller - press the check button
2. Multi Controller - rotate the display switch to position 1
3. Outdoor Unit - see following text

Remote Controller Press Check			Multi Controller Switch Position 1			Outdoor Unit	
O4	No Communication Inverter to Interface	→	O4	No Communication Inverter to Interface	→	see Table 1	No Communication Inverter to Interface
O4	No Communication Multi Con to Outdoor	→	O4	No Communication Multi Con to Outdoor			
O4	No Communication Indoor to Multi Con						
Ob	I.D. Water Level						
OC	TA Sensor		88	No Communication Initially M/C to OD		Display Switch set to "8" (if lit....)	
Od	TC Sensor		80	Th(A) Sensor Fault	←	LED1	Th(A) Sensor Fault
O8	Reverse Change Temp		81	Th(B) Sensor Fault	←	LED2	Th(B) Sensor Fault
O9	Frost or no Change °C		82	Th(C) Sensor Fault	←	LED3	Th(C) Sensor Fault
99	No Communication Indoor to Rem Con.		83	Th(D) Sensor Fault	←	LED4	Th(D) Sensor Fault
			84	Th(X) Sensor Fault	←	LED5	Th(X) Sensor Fault
15	Refer to Multi Con	↗	Ob	M/C Water Level	←		M/C Water Level
	Preheat/Defrost Flash	→	89	ID Codes too High	←	LED6	M/C Settings too High
				ID Codes set to Zero		LED7	M/C1 Sensor Fault
						LED8	M/C2 Sensor Fault
						Display Switch set to "3" (if lit....)	
1C	Refer to O/D	→	1C	Refer to O/D	→	LED1	ThD1 Sensor Fault
						LED2	ThD2 Sensor Fault
						LED3	ThS Sensor Fault
						LED4	High Pressure - detected by pressure sensor
						LED5	Pressure Sensor Fault
						LED6	Discharge Pipe >130°C
						LED7	Suction Pipe >40°C
						LED8	Low Pressure <3.5psig
						SW01 Set to Off/Off	
14	Refer to O/D	→	14	Refer to O/D	→	*○○○	Low Inverter Voltage
1d	Refer to O/D	→	1d	Refer to O/D	→	○*○○	High Inverter Current dc
1F	Refer to O/D	→	1F	Refer to O/D	→	○○*○	High Inverter Current ac
18	Refer to O/D	→	18	Refer to O/D	→		ThE Sensor Fault
21	Refer to O/D	→	21	Refer To O/D	→	○○○*	Inv HP Trip, Comp Klixon
					↘		Phase Rotation, DOL HP Trip, O/Load, Comp Klixon

\* = LED Flashing

○ = LED On



## 6. Fault Code and Display Information

### Display switch information

#### **Multicontroller**

Switch position	Information
0	System Communication
1	Fault Codes
2	Level of Demand
3	Oil Retrieval, Superheat, Defrost
4	Operating Mode
5	Restart Timer
6	Circuit Test (commissioning only)
7	PMV(A) Position
8	PMV(B) Position
9	PMV(C) Position
10	PMV(D) Position
11	ThA Sensor Data (Hex Code)
12	ThB Sensor Data (Hex Code)
13	ThC Sensor Data (Hex Code)
14	ThD Sensor Data (Hex Code)
15	ThX Sensor Data (Hex Code)

#### **Outdoor Unit**

Switch position	Information
0	System Communication
1	Status of Compressors
2	System Status (Mode, Defrost, PMV)
3	Fault Diagnostics (Outdoor Unit)
4	M/C1 Branches A & B Indoor Capacity Codes
5	M/C1 Branches C & D Indoor Capacity Codes
6	M/C2 Branches A & B Indoor Capacity Codes
7	M/C2 Branches C & D Indoor Capacity Codes
8	Fault Diagnostics (Multi Controller)
9	Circuit Test (commissioning only)
10	Not Used
11	Not Used
12	Not Used
13	Not Used
14	Not Used
15	Not Used

## 6. Fault Code and Display Information

### Multi Controller Display Switch Information

Switch Pos.	Indicates	LD 1							LD 2						
0	Serial		From B Branch	To B Branch		To A Branch	From A Branch	From Outdoor		From D Branch	To D Branch		To C Branch	From C Branch	To Outdoor
1	Fault Codes	For Details of Fault Codes see Page 13													
2	Demand	Level of Cooling/Heating Demand (00-1F)													
3			Oil Ret brch B	Superheat brchB		Superheat brchA	Oil Ret brchA			Oil Ret brch D	Superheat brchD		Superheat brchC	Oil Ret brchC	
	Defrost	Displays "dF" during defrost operation													
4		Operating Mode :Heating (H-), Cooling (-C), Stop (-), Defrost (J-)													
5	Timer	Normal Display (OO), Restart Timer Displays (-1) During Count Down													
6	cct test	Displays Branch Being Tested (A b C d)							Indicates Faulty Branch Connection After Circuit Test						
7	PMVA	Displays Degree Of PMV Opening As A Hexadecimal Code : (OO) = Closed , (FO) = Fully Open													
8	PMVB														
9	PMVC														
10	PMVD														
11	ThA	Displays Sensor Readings As A Hexadecimal Code : 40=0°C ; 68=10°C ; 90=20°C ; b8=30°C													
12	ThB														
13	ThC														
14	ThD														
15	ThX														

The Hexadecimal codes can be interpreted using the following chart

Display	PMV- Angle	Th-AbCdX °C	Level Of Demand			
			Display	Hz	Display	Hz
OO	Closed		OO	0	10	44.1
10	16		O1	0	11	47.2
20	32	-8	O2	0	12	50.3
30	48	-4	O3	3.9	13	53.4
40	64	0	O4	6.9	14	56.5
50	80	4	O5	10	15	59.6
60	96	8	O6	13	16	62.7
70	112	12	O7	16.2	17	65.8
80	128	16	O8	19.3	18	68.9
90	144	20	O9	22.4	19	72
AO	160	24	OA	25.5	1A	75.1
bO	176	28	Ob	28.6	1B	78.2
CO	192	32	OC	31.7	1C	81.3
dO	208		Od	34.8	1D	84.4
EO	224		OE	37.9	1	87.5
FO	240		OF	41	1F	90

The above chart shows a sample of readings, other intermediate readings may be registered.

## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information

The operating status of the outdoor unit and fault diagnosis can be made using both the display selector switch (on the interface pcb) and the eight red light emitting diodes on the interface printed circuit board.

a. Display switch set to position “0” shows communication around the system

LED 1	Lit = Receiving serial signal from multi controller 1
LED 2	Lit = Sending serial signal to multi controller 1
LED 3	Lit = Receiving serial signal from multi controller 2
LED 4	Lit = Sending serial signal to multi controller 2
LED 5	Lit = Receiving serial signal from inverter printed circuit board
LED 6	Lit = Sending serial signal to inverter printed circuit board
LED 7	n/a
LED 8	n/a

b. Display switch set to position “1” shows status of both compressors

Inverter Speed		LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
S0	0 Hz	X	X	X	X	DOL compressor On On = Run Off Off = Stop		Speed Limiting Due To Protection Circuits i.e. High TD or Low TS	
S3	30 Hz	X	X	O	O				
S4	36 Hz	X	O	X	X				
S5	42 Hz	X	O	X	O				
S6	46 Hz	X	O	O	X				
S7	53 Hz	X	O	O	O				
S8	61 Hz	O	X	X	X				
S9	69 Hz	O	X	X	O				
SA	76 Hz	O	X	O	X				
SB	84 Hz	O	X	O	O				
SC	92 Hz	O	O	X	X				
SD	103 Hz	O	O	X	O				
SE	111 Hz	O	O	O	X				
SF	122 Hz	O	O	O	O				

O = Lit      X = Off

c. Display switch set to position “2” shows the status of the system

## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information cont.

d. Display switch set to position “3” identifies a fault condition in the outdoor unit.

Details are in the fault code chart on page 13

e. Display switch set to positions “4, 5, 6 & 7” identifies the indoor unit capacity code for each branch.

	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
Pos. 4	Capacity code of unit on M/C 1 branch A				Capacity code of unit on M/C 1 branch B			
Pos. 5	Capacity code of unit on M/C 1 branch C				Capacity code of unit on M/C 1 branch D			
Pos. 6	Capacity code of unit on M/C 2 branch A				Capacity code of unit on M/C 2 branch B			
Pos. 7	Capacity code of unit on M/C 2 branch C				Capacity code of unit on M/C 2 branch D			
	O = Lit      X = Off				Indoor Model Number			Code No
	X	X	O	X	103			2
	X	X	O	O	132/133			3
	X	O	X	X	453/160/161/162/163			4
	X	O	X	O	200/202/203			5
	X	O	O	X	713/260/261/262/263			6
	X	O	O	O				
	O	X	X	X	1,003/360/361/362/363			8
	O	X	O	X	1,253/460/461/462/463			10

f. Display switch set to position “8” identifies a fault condition in the multi controller.

Details are in the fault code chart on page 13

g. Display switch set to position “9” shows the status of the commissioning circuit test.

LED 1	M/C 1	Branch A	When an LED is lit it indicates that there is a wiring or piping fault between the multi controller and the relevant indoor unit.
LED 2		Branch B	
LED 3		Branch C	
LED 4		Branch D	
LED 5	M/C 2	Branch A	
LED 6		Branch B	
LED 7		Branch C	
LED 8		Branch D	

## 7. Circuit Test Procedure

These systems have a feature which enables them to check that the wiring and piping connections are aligned with each other. This is carried out by allowing refrigerant flow to one indoor unit at a time and monitoring that indoor unit's coil sensor for a corresponding drop in temperature. Each indoor unit is tested in turn and where two multi controllers are installed each multi controller is tested in turn.

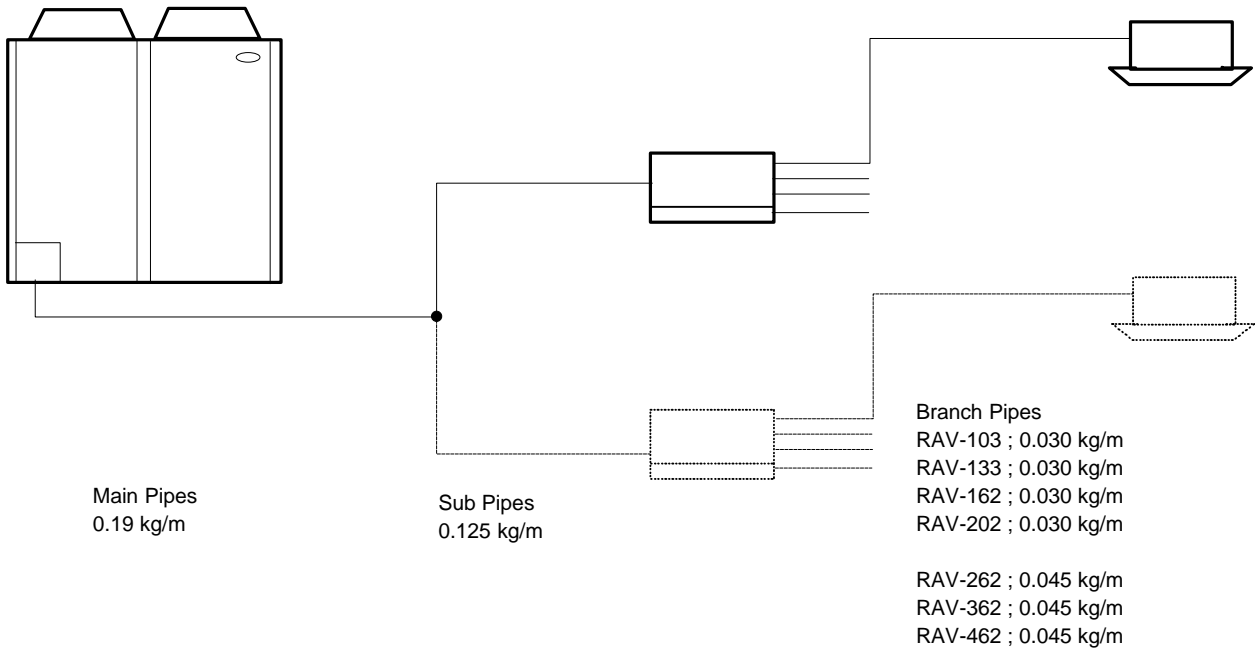
This test would normally be used at the commissioning stage.

Procedure for initialising the circuit test.

1. Turn the power off, and disconnect any T2s (optional) fitted.
2. Put the outdoor display switch to 9 and multi controller(s) display switch to 6.
3. Turn the power back on.
4. Set all the remote controllers to cool mode and 29°C.
5. Press the on/off button to start the indoor units (fans will run).
6. Go to outdoor unit press switch J2 (above 8 x LEDs) for 3 sec .
7. The system is now self-testing (all 8 LEDs will be flashing rapidly).
8. The system will stop at the end of the test, indicated by the on/off lights flashing.

In the event of cross wiring/piping the system will indicate which units are faulty, see pages 15 & 17

## 8. Calculating The Additional Gas Charge



### Single Multi Controller

Main pipe run (minus 3m.)	x	0.190 kg/m	=
Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge =			_____ kg

### Two Multi Controllers

Main pipe run (minus 2m.)	x	0.190 kg/m	=
Total sub pipe (minus 2m.)	x	0.125 kg/m	=
M/C1 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
M/C2 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge =			_____ kg

# **TOSHIBA**

**SERVICE MANUAL**

## **AIR CONDITIONER**

HEAT PUMP MULTI SPLIT (2-PIPE)

Outdoor Units

**MAR - M81HTM8 - E**

**MAR - M101HTM8 - E**

Multi Controllers

**RBM - Y1032E - E**

**RBM - Y1042E - E**

# TOSHIBA

## Contents

- |  |                                  |
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| 1. Specifications                        | Outdoor Unit<br>Multi Controller |
| 2. Basic Permutations / Capabilities     |                                  |
| 3. Dimensional Views                     | Outdoor Unit<br>Multi Controller |
| 4. Wiring Diagrams                       | Outdoor Unit<br>Multi Controller |
| 5. Refrigeration Circuit                 | Outdoor Unit<br>Multi Controller |
| 6. Display Information and Fault Codes   |                                  |
| 7. Circuit Test Procedure                |                                  |
| 8. Calculation for Additional Gas Charge |                                  |

**Note :** The two pipe Super Multi systems are heat pump units and can provide heating or cooling, where both modes are required simultaneously heating mode takes priority.



# TOSHIBA

## 1. Specifications

### OUTDOOR UNITS

Model		MAR-M81HTM8-E	MAR-M101HTM8-E
Cooling Capacity	kW	20.0 (22.4)	25.0 (28.0)
Heating Capacity	kW	20.0 (25.0)	25.0 (31.5)
Power Supply		3ph,380/415v,50Hz	
Power Consumption	(C/H) kW	8.0 / 7.7	10.1 / 10.1
Running Current	(C/H) Amps	12.3 / 11.7	15.7 / 15.0
Start Current	Amps	60	
Dimensions	Height (mm)	1,490	
	Width (mm)	1,290	
	Depth (mm)	824	
Weight	kg	308	315
Noise Level SPL	dB(A)	66	
Min Temp. (ambient)	Cooling / Heating °C	-5 / -10	
Gas Pipe (main)	Inch	1 1/8	
	(sub)	3/4	
Liquid Pipe (main)	Inch	5/8	
	(sub)	1/2	
Max.. Length Actual	m	100	
Max.. Length Equiv.	m	120	
Height Difference	Outdoor Above (m)	50	
	Outdoor Below (m)	20	
Refrigerant Type		R 22	
Std Refrigerant Weight	Kg	15.6	18.6
Compressor Type		Hermetically Sealed Twin Scroll	
Compressor Output	kW	5.6	7.5
Fan Type		2 x Propeller Fan (two speed)	
Fan Motor Consumption	W	2 x 150	
Air Flow Rate	m <sup>3</sup> /hr	10,000	
Colour		Silky Grey (Munsell 6Y7.0/0.3)	
Multi Controllers	3 - Way	RBM-Y1032E-E	
	4 - Way	RBM-Y1042E-E	

Note: The capacity value in brackets is the maximum operating capacity

Cooling and Heating capacities are based on JIS B8615

Cooling capacity:	Room Temperature	27°C DB
	Ambient Temperature	19.5°C WB
Heating capacity:	Room Temperature	35°C DB
	Ambient Temperature	21°C DB
	Ambient Temperature	7°C DB
		6°C WB

Usable outdoor temperature ranges

Cooling mode -5°C to +43°C DB

Heating mode -10°C to +21°C DB

Specifications are subject to change without prior notice.

# TOSHIBA

## 1. Specifications

### MULTI CONTROLLERS

Model		RBM-Y1032E-E	RBM-Y1042E-E
Number of Branches		3	4
Gas Pipe (Inlet)	Inch	1 1/8	1 1/8
Liquid Pipe (Inlet)	Inch	5/8	5/8
Branch Pipes (Gas)	Inch	3/4 x 3	3/4 x 4
Branch Pipes (Liquid)	Inch	3/8 x 3	3/8 x 4
Dimensions	Height (mm)	260	260
	Width (mm)	590	590
	Depth (mm)	450	520
Weight	kg	20	23
Max.. Branch Length	m	30	30
Max.. Difference between Branches	m	10	10
Max.. Vertical Separation	m	15	15
<b>Where two M/C are used</b>			
Max.. Sub Pipe Length (each)	m	15	15
Max.. Difference between Sub Pipes	m	10	10

Specifications are subject to change without prior notice.

### Pipe Size Conversion Chart

mm	6.4	9.5	12.7	15.9	19	22.4	25.4	28.6
inch	1/4	3/8	1/2	5/8	3/4	7/8	1	1.1/8

## 2. Basic Permutations of Indoor to Outdoor Units

The indoor units are given a code number according to their capacity rank - see below

Model Number	Code Number
RAV103	2
RAV132/133	3
RAV453/160/1/2/3	4
RAV202/3	5
RAV713/260/1/2/3	6
RAV1003/360/1/2/3	8
RAV1253/460/1/2/3	10

Multiple indoor units may be connected to one outdoor unit, providing the total indoor code does not exceed the outdoor unit code number. The outdoor unit codes are listed below

Model	Max.. No. Indoor Units	Min Code	Max. Code
MAR-M81HTM8-E	8	3	21
MAR-M101HTM8-E	8	3	27

When connecting up to four single indoor units only one multi controller is required, if more single indoor units are needed then two multi controllers must be used. When connecting a twin indoor arrangement to one multi controller branch the capacity code will be the sum of both indoor unit codes.

Example :

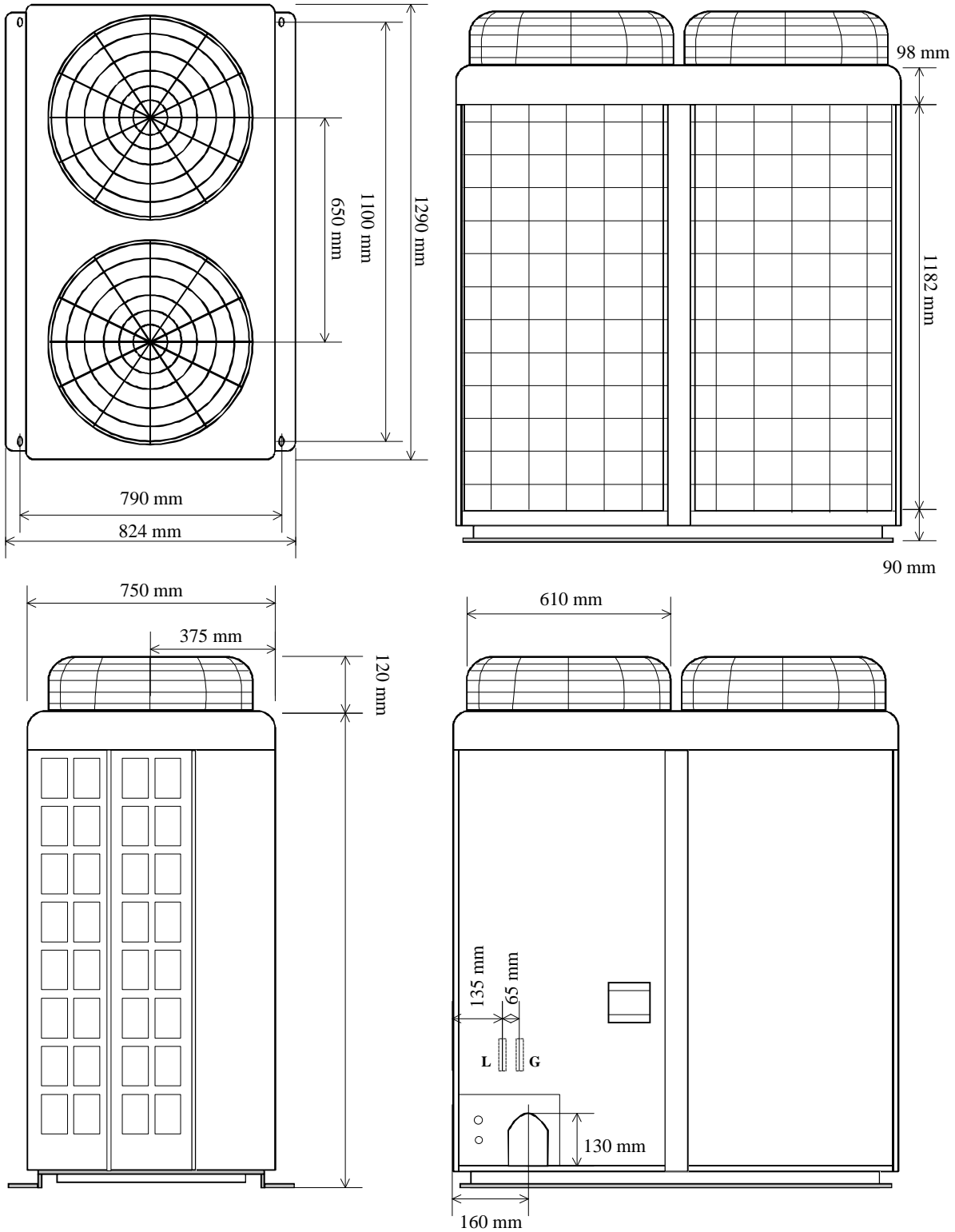
Model No.	Arrangement	Indoor Capacity Code	Total Capacity Code
RAV133TUH	Single	3	3
RAV133TUH	Twin	3	6
RAV202KH(W)	Single	5	5
RAV202KH(W)	Twin	5	10
		Total	24

The total capacity codes for the example above are within the maximum permitted for a 10hp (MAR-F101HTM8-E) outdoor unit therefore the use of a twin arrangement is acceptable.

**NOTE :** The maximum duty from the system cannot exceed the maximum capacity of the outdoor unit, it is possible to use indoor units with a total capacity of 135% of the outdoor unit capacity.

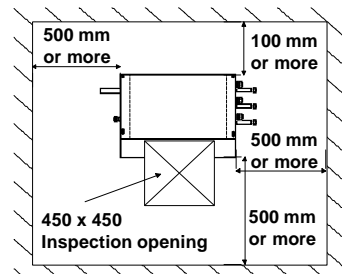
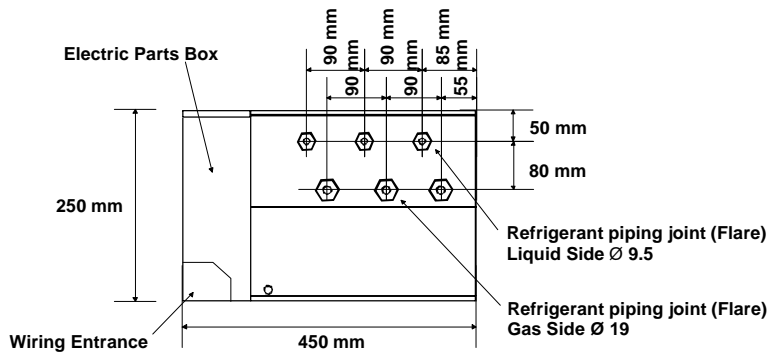
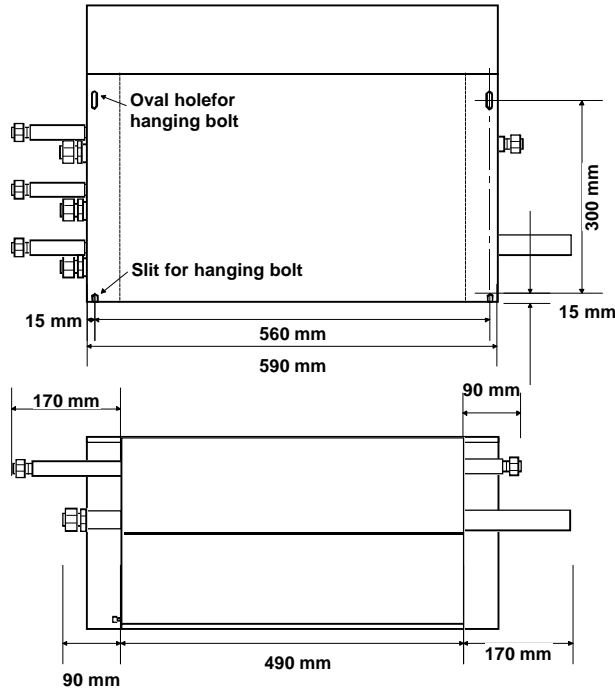
## CONSTRUCTION VIEWS

MAR-M81HTM8E-E  
MAR-M101FHTM8E-E

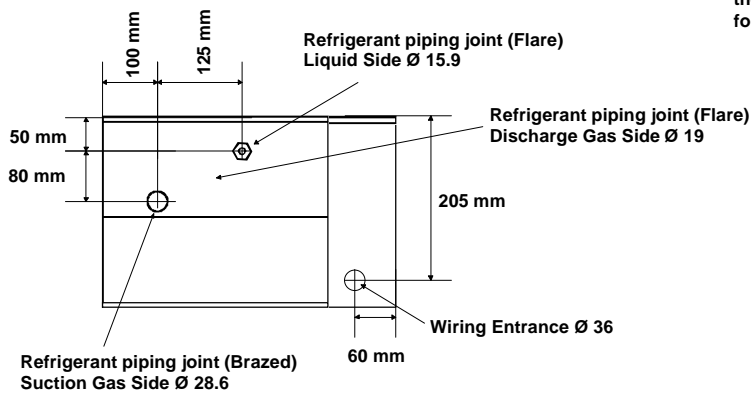


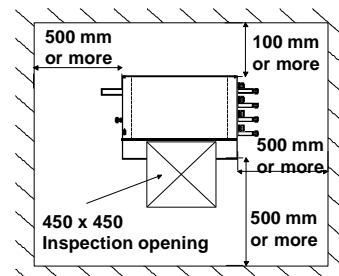
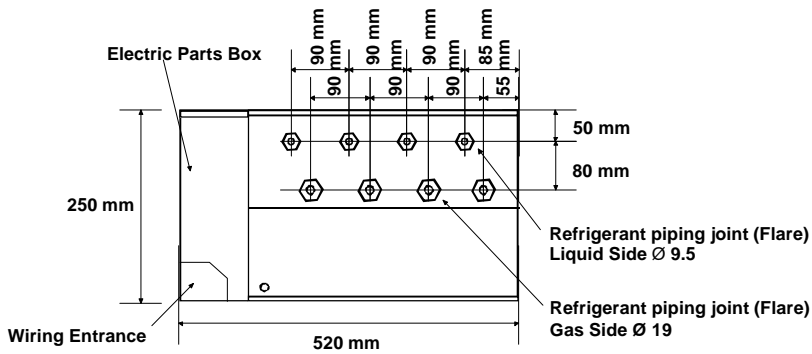
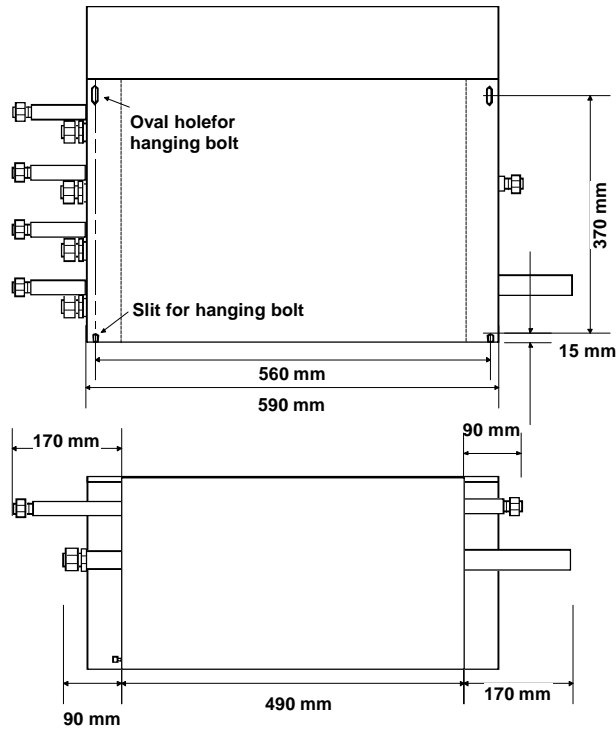
## DIMENSIONAL DRAWINGS

RBM-Y1032E-E

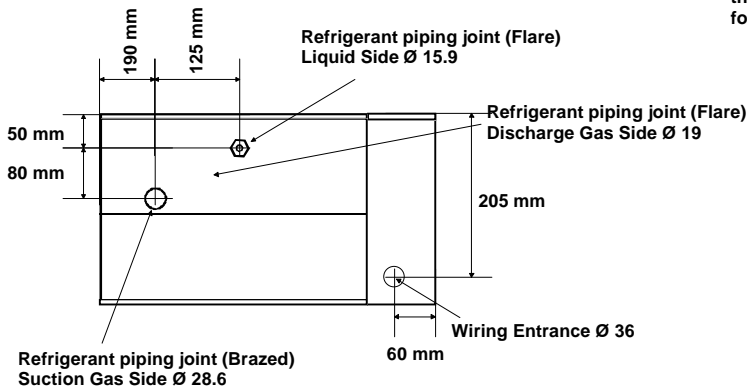


Note. Make an inspection opening at the specified place. It is indispensable for servicing.



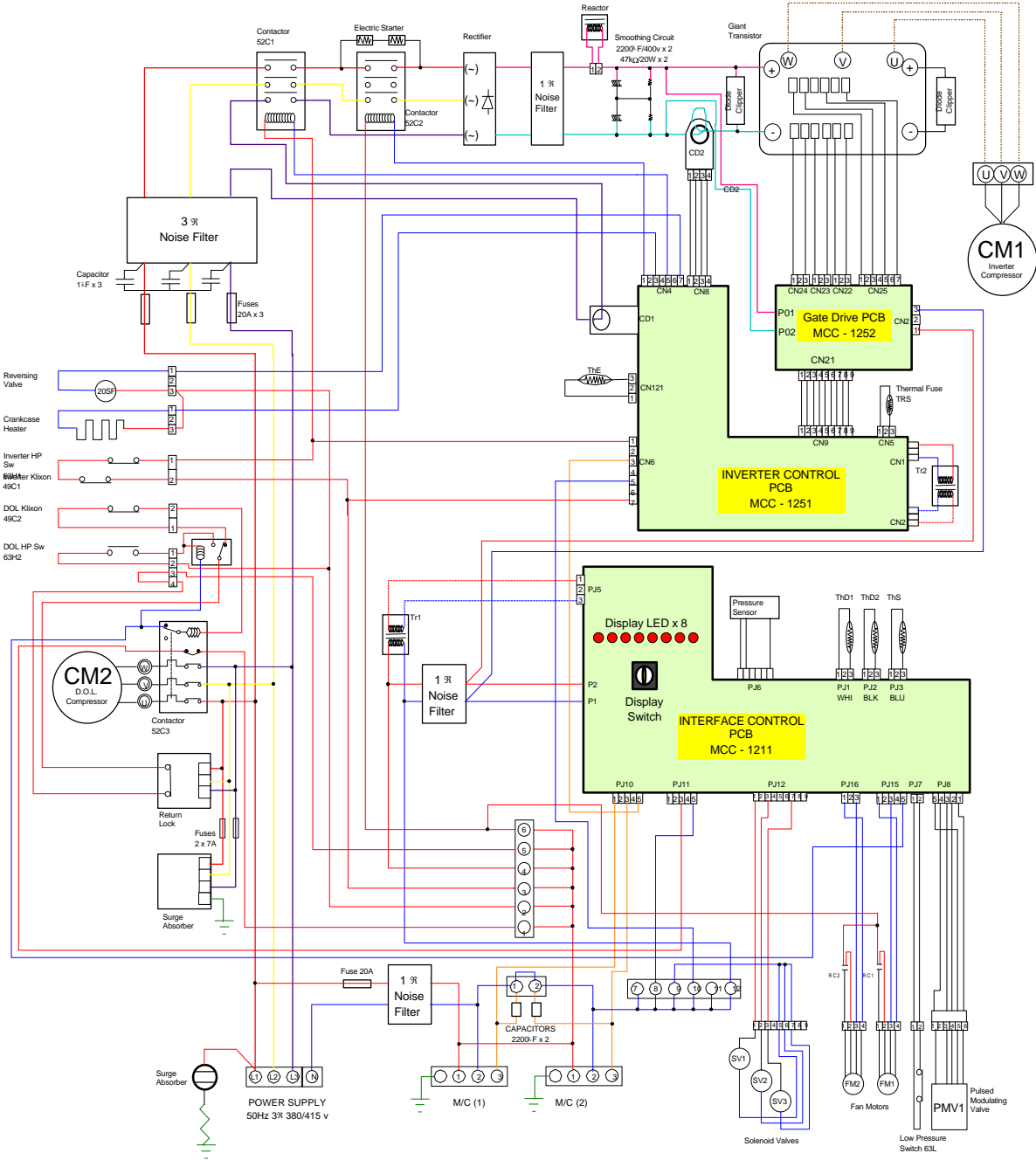


Note. Make an inspection opening at the specified place. It is indispensable for servicing.



## 4. Schematic Wiring Diagrams

### Outdoor Unit

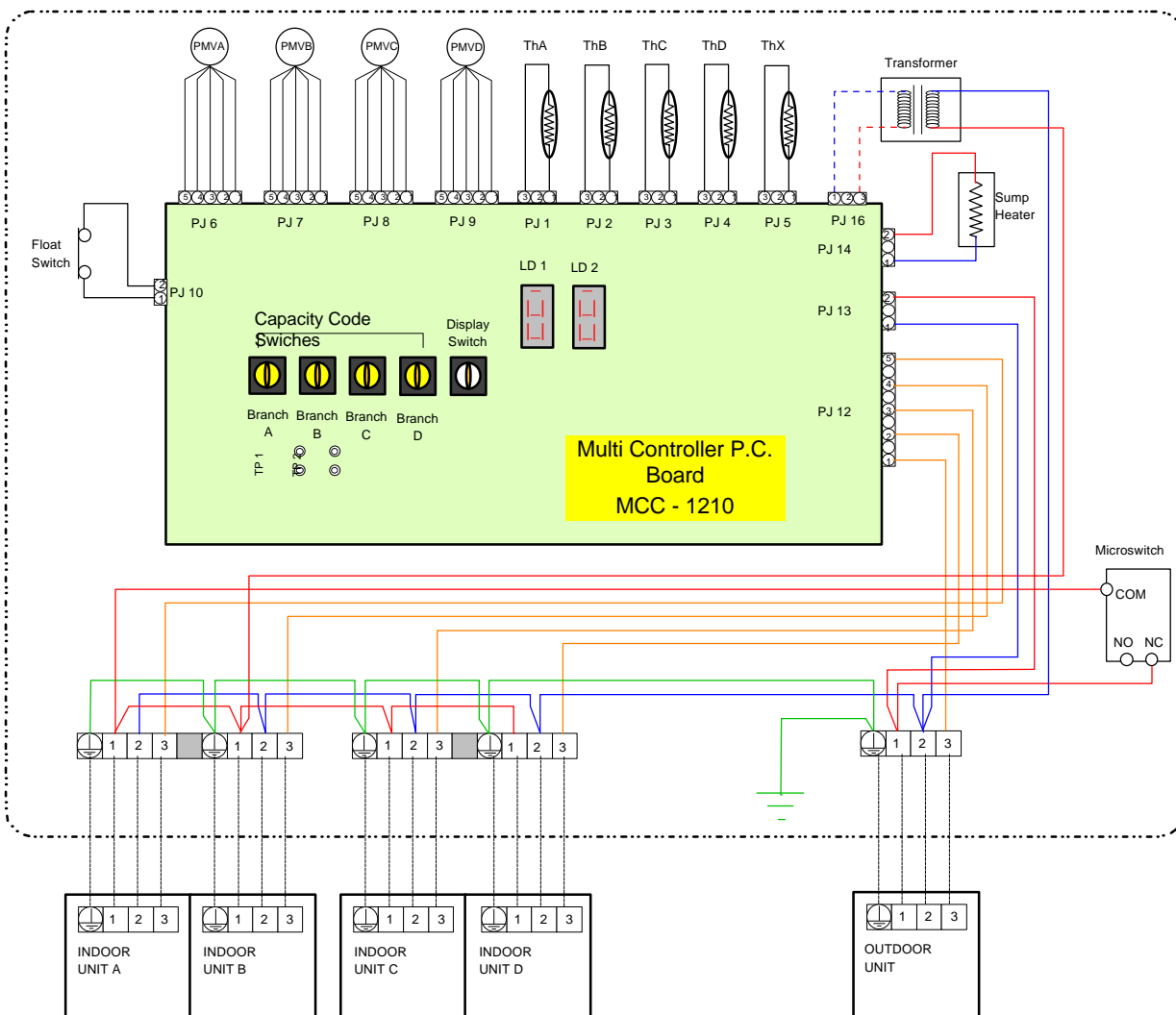


- = 240 v ac Live (not permanent)
- = Neutral (not permanent)
- = Communication Signal
- = Earth
- = L1 phase 415ac
- = L2 phase 415ac
- = L3 phase 415ac
- = dc high voltage live
- = dc high voltage neutral
- = 3Ø for Inv Compressor
- = dc low voltage
- = ac low voltage
- = ac low voltage

Note :The colours used in this diagram are not representative of those on the actual product, they are intended to indicate the status of each wire.

## 4. Schematic Wiring Diagrams

### Multi Controllers



The colours used in this diagram are not representative of those on the product, they are intended to indicate the status of each wire.

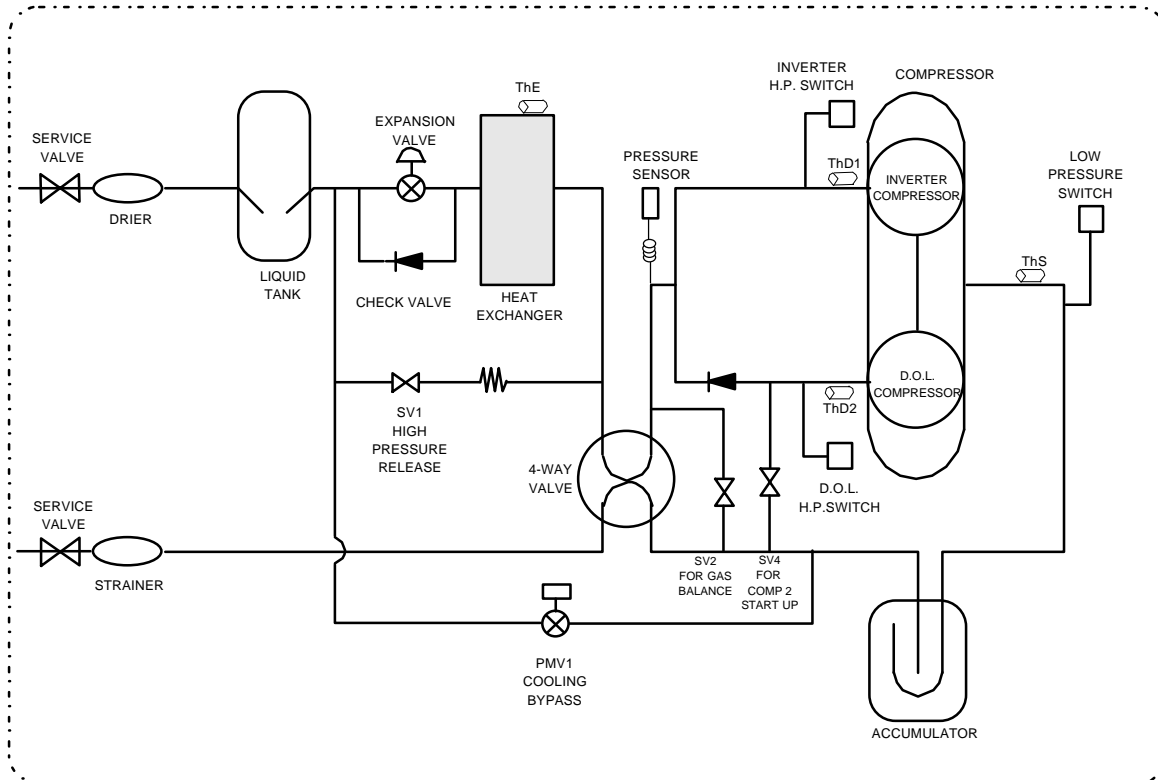
- = 240v ac Live Wiring
- = Neutral Wiring
- = Serial Wiring
- = Earth Wiring
- = ac low voltage
- = ac low voltage

RBM - Y1032E - E does not have PMVD, ThD, indoor unit D connections or the capacity code switch for branch D.



## 5. Schematic Refrigeration Diagram

### Outdoor Unit

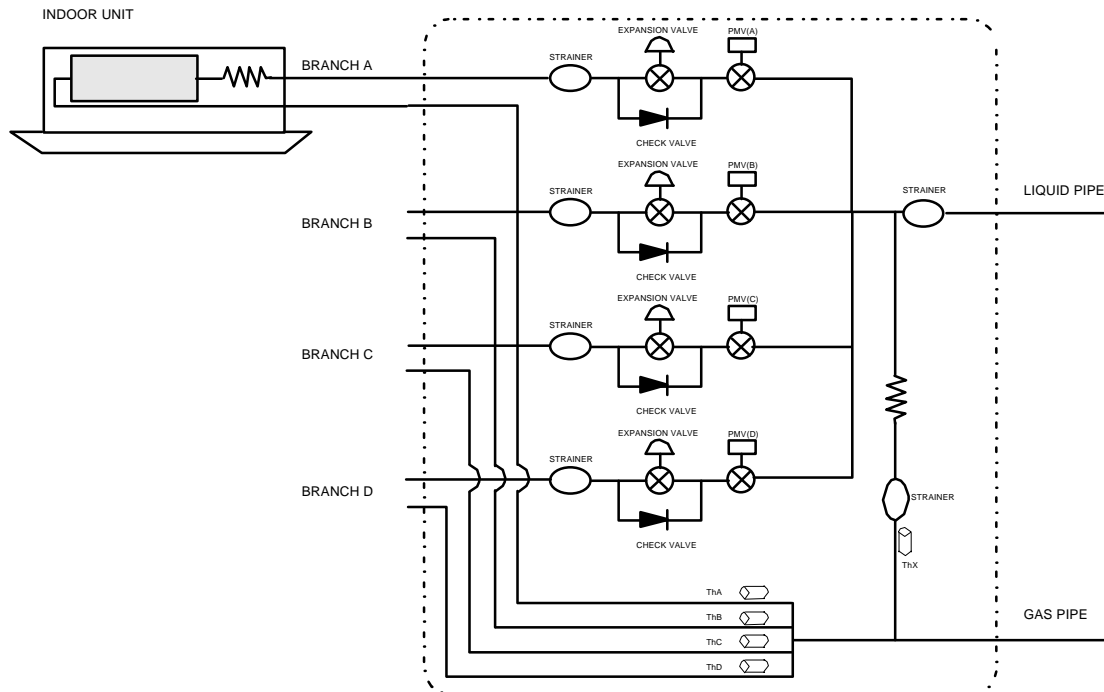


### Specification of Outdoor Unit Components

Model Number		MAR-M81HTM8-E	MAR-M101HTM8-E
Compressor	Type Number	HV991CW-Y12	HV1201CW-Y12
	Motor Type	Three Phase Induction	
	Power Supply	415/380 , 3-phase , 50Hz + Neutral	
	Output (kW)	5.6	7.5
	Coil Resistance (Ω)	Inv.1.49 / DOL 2.51	
Fan Motor	Type Number	STF-200-150C	
	Motor Type	Single Phase Induction	
	Power Supply	220 / 240 , single phase , 50Hz + Neutral	
	Consumption (W)	150	
	Current (A)	1.12 - 1.44	
	No. Poles	6	
	Thermal Cut-out	Trip 115°C ± 5°C	
H.P. Switch Inv.	P.S.I.G.	Break on Rise : Trip 425 , Reset 340	
H.P. Switch DOL	P.S.I.G.	Make on Rise : Trip 425 , Reset 340	
L.P. Switch	P.S.I.G.	Break on Drop : Trip 3.5 , Reset 20	
ThD1 & ThD2 Sensor	(kΩ)	50 @ 25°C , 17.9 @ 50°C , 3.35 @ 100°C	
ThS & ThE	(kΩ)	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Four Way Valve		Energised for Heating	
Crankcase Heater (240vac)	(W)	74	

## 5. Schematic Refrigeration Diagram

### Multi Controller



The schematic shows the layout for a four way multi controller (RBM-Y1042E-E), the three way multi controller (RBM-Y1302E-E) is very similar however all components relating to branch D have been removed.

### Specification of Multi Controller Components

Model Number		RBM-Y1032E-E	RBM-Y1042E-E
ThA,B,C,D,X Sensor	(k $\Omega$ )	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Float Switch		Break on Rise	
Sump Heater (240vac)	(W)	50	65
Thermal Fuse	(°C)	Trips at 119	
Heater Fuse	(Amps)	1	
Transformer	Primary / Secondary (v ac)	240 / 12	

## 6. Fault Code and Display Information

### Fault Codes

Before reading the fault codes **do not** turn the power off as doing so will wipe the diagnostic memory. Caution must be taken when removing the access covers as high voltages are present.

Fault diagnosis is available at three locations within the air conditioning system :-

1. Remote Controller - press the check button
2. Multi Controller - rotate the display switch to position 1
3. Outdoor Unit - see following text

Remote Controller Press Check			Multi Controller Switch Position 1			Outdoor Unit	
O4	No Communication Inverter to Interface	→	O4	No Communication Inverter to Interface	→	see Table 1	No Communication Inverter to Interface
O4	No Communication Multi Con to Outdoor	→	O4	No Communication Multi Con to Outdoor			
O4	No Communication Indoor to Multi Con						
Ob	I.D. Water Level						
OC	TA Sensor		88	No Communication Initially M/C to OD		Display Switch set to "8" (if lit....)	
Od	TC Sensor		80	Th(A) Sensor Fault	←	LED1	Th(A) Sensor Fault
O8	Reverse Change Temp		81	Th(B) Sensor Fault	←	LED2	Th(B) Sensor Fault
O9	Frost or no Change °C		82	Th(C) Sensor Fault	←	LED3	Th(C) Sensor Fault
99	No Communication Indoor to Rem Con.		83	Th(D) Sensor Fault	←	LED4	Th(D) Sensor Fault
			84	Th(X) Sensor Fault	←	LED5	Th(X) Sensor Fault
15	Refer to Multi Con	↗	Ob	M/C Water Level	←		M/C Water Level
	Preheat/Defrost Flash	→	89	ID Codes too High	←	LED6	M/C Settings too High
				ID Codes set to Zero		LED7	M/C1 Sensor Fault
						LED8	M/C2 Sensor Fault
						Display Switch set to "3" (if lit....)	
1C	Refer to O/D	→	1C	Refer to O/D	→	LED1	ThD1 Sensor Fault
						LED2	ThD2 Sensor Fault
						LED3	ThS Sensor Fault
						LED4	High Pressure - detected by pressure sensor
						LED5	Pressure Sensor Fault
						LED6	Discharge Pipe >130°C
						LED7	Suction Pipe >40°C
						LED8	Low Pressure <3.5psig
						SW01 Set to Off/Off	
14	Refer to O/D	→	14	Refer to O/D	→	* ○ ○ ○ ○	Low Inverter Voltage
1d	Refer to O/D	→	1d	Refer to O/D	→	○ * ○ ○ ○	High Inverter Current dc
1F	Refer to O/D	→	1F	Refer to O/D	→	○ ○ * ○ ○	High Inverter Current ac
18	Refer to O/D	→	18	Refer to O/D	→		ThE Sensor Fault
21	Refer to O/D	→	21	Refer To O/D	→	○ ○ ○ * ○	Inv HP Trip, Comp Klixon
					↘		Phase Rotation, DOL HP Trip, O/Load, Comp Klixon

\* = LED Flashing

○ = LED On

## 6. Fault Code and Display Information

### Display switch information

#### **Multicontroller**

Switch position	Information
0	System Communication
1	Fault Codes
2	Level of Demand
3	Oil Retrieval, Superheat, Defrost
4	Operating Mode
5	Restart Timer
6	Circuit Test (commissioning only)
7	PMV(A) Position
8	PMV(B) Position
9	PMV(C) Position
10	PMV(D) Position
11	ThA Sensor Data (Hex Code)
12	ThB Sensor Data (Hex Code)
13	ThC Sensor Data (Hex Code)
14	ThD Sensor Data (Hex Code)
15	ThX Sensor Data (Hex Code)

#### **Outdoor Unit**

Switch position	Information
0	System Communication
1	Status of Compressors
2	System Status (Mode, Defrost, PMV)
3	Fault Diagnostics (Outdoor Unit)
4	M/C1 Branches A & B Indoor Capacity Codes
5	M/C1 Branches C & D Indoor Capacity Codes
6	M/C2 Branches A & B Indoor Capacity Codes
7	M/C2 Branches C & D Indoor Capacity Codes
8	Fault Diagnostics (Multi Controller)
9	Circuit Test (commissioning only)
10	Not Used
11	Not Used
12	Not Used
13	Not Used
14	Not Used
15	Not Used

## 6. Fault Code and Display Information

### Multi Controller Display Switch Information

Switch Pos.	Indicates	LD 1							LD 2						
0	Serial		From B Branch	To B Branch		To A Branch	From A Branch	From Outdoor		From D Branch	To D Branch		To C Branch	From C Branch	To Outdoor
1	Fault Codes	For Details of Fault Codes see Page 13													
2	Demand	Level of Cooling/Heating Demand (00-1F)													
3			Oil Ret brch B	Superheat brchB		Superheat brchA	Oil Ret brchA			Oil Ret brch D	Superheat brchD		Superheat brchC	Oil Ret brchC	
	Defrost	Displays "dF" during defrost operation													
4		Operating Mode :Heating (H-), Cooling (-C), Stop (-), Defrost (J-)													
5	Timer	Normal Display (OO), Restart Timer Displays (-1) During Count Down													
6	cct test	Displays Branch Being Tested (A b C d)							Indicates Faulty Branch Connection After Circuit Test						
7	PMVA	Displays Degree Of PMV Opening As A Hexadecimal Code : (OO) = Closed , (FO) = Fully Open													
8	PMVB														
9	PMVC														
10	PMVD														
11	ThA	Displays Sensor Readings As A Hexadecimal Code : 40=0°C ; 68=10°C ; 90=20°C ; b8=30°C													
12	ThB														
13	ThC														
14	ThD														
15	ThX														

The Hexadecimal codes can be interpreted using the following chart

Display	PMV- Angle	Th-AbCdX °C	Level Of Demand			
			Display	Hz	Display	Hz
OO	Closed		OO	0	10	44.1
10	16		O1	0	11	47.2
20	32	-8	O2	0	12	50.3
30	48	-4	O3	3.9	13	53.4
40	64	0	O4	6.9	14	56.5
50	80	4	O5	10	15	59.6
60	96	8	O6	13	16	62.7
70	112	12	O7	16.2	17	65.8
80	128	16	O8	19.3	18	68.9
90	144	20	O9	22.4	19	72
AO	160	24	OA	25.5	1A	75.1
bO	176	28	Ob	28.6	1B	78.2
CO	192	32	OC	31.7	1C	81.3
dO	208		Od	34.8	1D	84.4
EO	224		OE	37.9	1	87.5
FO	240		OF	41	1F	90

The above chart shows a sample of readings, other intermediate readings may be registered.

## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information

The operating status of the outdoor unit and fault diagnosis can be made using both the display selector switch (on the interface pcb) and the eight red light emitting diodes on the interface printed circuit board.

a. Display switch set to position “0” shows communication around the system

LED 1	Lit = Receiving serial signal from multi controller 1
LED 2	Lit = Sending serial signal to multi controller 1
LED 3	Lit = Receiving serial signal from multi controller 2
LED 4	Lit = Sending serial signal to multi controller 2
LED 5	Lit = Receiving serial signal from inverter printed circuit board
LED 6	Lit = Sending serial signal to inverter printed circuit board
LED 7	n/a
LED 8	n/a

b. Display switch set to position “1” shows status of both compressors

Inverter Speed		LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
S0	0 Hz	X	X	X	X	DOL compressor On On = Run Off Off = Stop		Speed Limiting Due To Protection Circuits i.e. High TD or Low TS	
S3	30 Hz	X	X	O	O				
S4	36 Hz	X	O	X	X				
S5	42 Hz	X	O	X	O				
S6	46 Hz	X	O	O	X				
S7	53 Hz	X	O	O	O				
S8	61 Hz	O	X	X	X				
S9	69 Hz	O	X	X	O				
SA	76 Hz	O	X	O	X				
SB	84 Hz	O	X	O	O				
SC	92 Hz	O	O	X	X				
SD	103 Hz	O	O	X	O				
SE	111 Hz	O	O	O	X				
SF	122 Hz	O	O	O	O				

O = Lit      X = Off

c. Display switch set to position “2” shows the status of the system

## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information cont.

d. Display switch set to position “3” identifies a fault condition in the outdoor unit.

Details are in the fault code chart on page 13

e. Display switch set to positions “4, 5, 6 & 7” identifies the indoor unit capacity code for each branch.

	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
Pos. 4	Capacity code of unit on M/C 1 branch A				Capacity code of unit on M/C 1 branch B			
Pos. 5	Capacity code of unit on M/C 1 branch C				Capacity code of unit on M/C 1 branch D			
Pos. 6	Capacity code of unit on M/C 2 branch A				Capacity code of unit on M/C 2 branch B			
Pos. 7	Capacity code of unit on M/C 2 branch C				Capacity code of unit on M/C 2 branch D			
	O = Lit      X = Off				Indoor Model Number			Code No
	X	X	O	X	103			2
	X	X	O	O	132/133			3
	X	O	X	X	453/160/161/162/163			4
	X	O	X	O	200/202/203			5
	X	O	O	X	713/260/261/262/263			6
	X	O	O	O				
	O	X	X	X	1,003/360/361/362/363			8
	O	X	O	X	1,253/460/461/462/463			10

f. Display switch set to position “8” identifies a fault condition in the multi controller.

Details are in the fault code chart on page 13

g. Display switch set to position “9” shows the status of the commissioning circuit test.

LED 1	M/C 1	Branch A	When an LED is lit it indicates that there is a wiring or piping fault between the multi controller and the relevant indoor unit.
LED 2		Branch B	
LED 3		Branch C	
LED 4		Branch D	
LED 5	M/C 2	Branch A	
LED 6		Branch B	
LED 7		Branch C	
LED 8		Branch D	

## 7. Circuit Test Procedure

These systems have a feature which enables them to check that the wiring and piping connections are aligned with each other. This is carried out by allowing refrigerant flow to one indoor unit at a time and monitoring that indoor unit's coil sensor for a corresponding drop in temperature. Each indoor unit is tested in turn and where two multi controllers are installed each multi controller is tested in turn.

This test would normally be used at the commissioning stage.

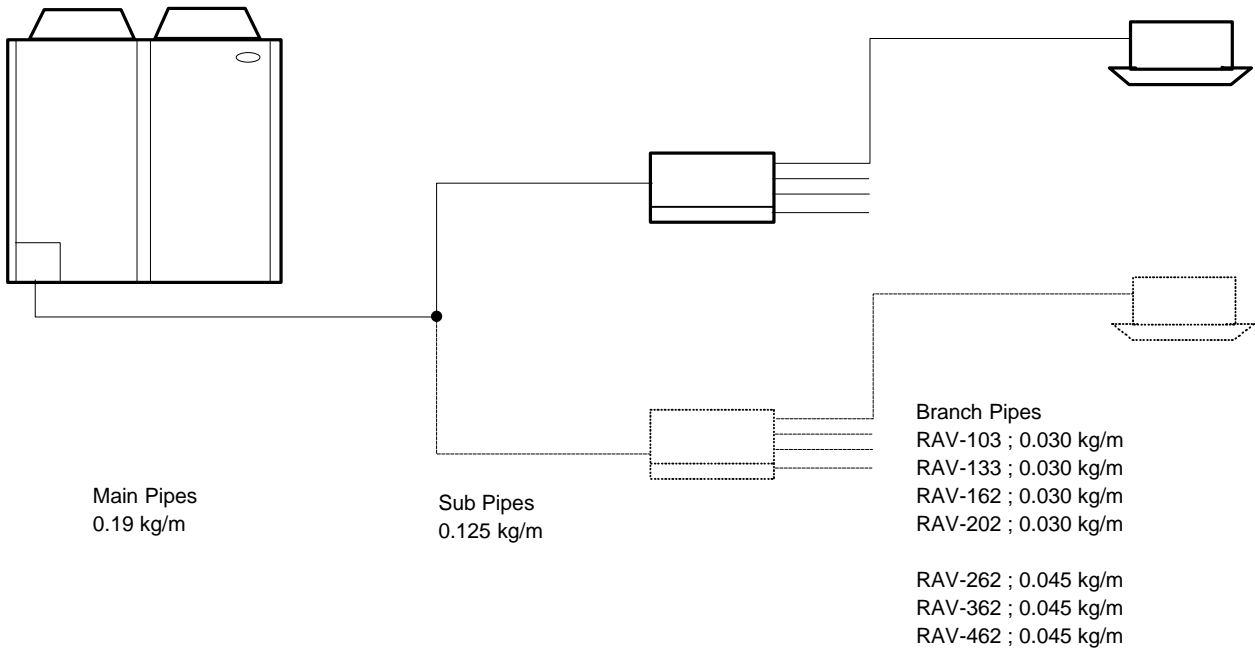
Procedure for initialising the circuit test.

1. Turn the power off, and disconnect any T2s (optional) fitted.
2. Put the outdoor display switch to 9 and multi controller(s) display switch to 6.
3. Turn the power back on.
4. Set all the remote controllers to cool mode and 29°C.
5. Press the on/off button to start the indoor units (fans will run).
6. Go to outdoor unit press switch J2 (above 8 x LEDs) for 3 sec .
7. The system is now self-testing (all 8 LEDs will be flashing rapidly).
8. The system will stop at the end of the test, indicated by the on/off lights flashing.

In the event of cross wiring/piping the system will indicate which units are faulty, see pages 15 & 17



## 8. Calculating The Additional Gas Charge



### Single Multi Controller

Main pipe run (minus 3m.)	x	0.190 kg/m	=
Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge			= _____ kg

### Two Multi Controllers

Main pipe run (minus 2m.)	x	0.190 kg/m	=
Total sub pipe (minus 2m.)	x	0.125 kg/m	=
M/C1 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
M/C2 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge			= _____ kg

# **TOSHIBA**

**SERVICE MANUAL**

## **AIR CONDITIONER**

HEAT PUMP MULTI SPLIT (2-PIPE)

Outdoor Units

**MAR - M81HTM8 - E**

**MAR - M101HTM8 - E**

Multi Controllers

**RBM - Y1032E - E**

**RBM - Y1042E - E**

# TOSHIBA

## Contents

- |  |                                  |
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| 1. Specifications                        | Outdoor Unit<br>Multi Controller |
| 2. Basic Permutations / Capabilities     |                                  |
| 3. Dimensional Views                     | Outdoor Unit<br>Multi Controller |
| 4. Wiring Diagrams                       | Outdoor Unit<br>Multi Controller |
| 5. Refrigeration Circuit                 | Outdoor Unit<br>Multi Controller |
| 6. Display Information and Fault Codes   |                                  |
| 7. Circuit Test Procedure                |                                  |
| 8. Calculation for Additional Gas Charge |                                  |

**Note :** The two pipe Super Multi systems are heat pump units and can provide heating or cooling, where both modes are required simultaneously heating mode takes priority.

# TOSHIBA

## 1. Specifications

### OUTDOOR UNITS

Model		MAR-M81HTM8-E	MAR-M101HTM8-E
Cooling Capacity	kW	20.0 (22.4)	25.0 (28.0)
Heating Capacity	kW	20.0 (25.0)	25.0 (31.5)
Power Supply		3ph,380/415v,50Hz	
Power Consumption	(C/H) kW	8.0 / 7.7	10.1 / 10.1
Running Current	(C/H) Amps	12.3 / 11.7	15.7 / 15.0
Start Current	Amps	60	
Dimensions	Height (mm)	1,490	
	Width (mm)	1,290	
	Depth (mm)	824	
Weight	kg	308	315
Noise Level SPL	dB(A)	66	
Min Temp. (ambient)	Cooling / Heating °C	-5 / -10	
Gas Pipe (main)	Inch	1 1/8	
	(sub)	3/4	
Liquid Pipe (main)	Inch	5/8	
	(sub)	1/2	
Max.. Length Actual	m	100	
Max.. Length Equiv.	m	120	
Height Difference	Outdoor Above (m)	50	
	Outdoor Below (m)	20	
Refrigerant Type		R 22	
Std Refrigerant Weight	Kg	15.6	18.6
Compressor Type		Hermetically Sealed Twin Scroll	
Compressor Output	kW	5.6	7.5
Fan Type		2 x Propeller Fan (two speed)	
Fan Motor Consumption	W	2 x 150	
Air Flow Rate	m <sup>3</sup> /hr	10,000	
Colour		Silky Grey (Munsell 6Y7.0/0.3)	
Multi Controllers	3 - Way	RBM-Y1032E-E	
	4 - Way	RBM-Y1042E-E	

Note: The capacity value in brackets is the maximum operating capacity

Cooling and Heating capacities are based on JIS B8615

Cooling capacity:	Room Temperature	27°C DB
	Ambient Temperature	19.5°C WB
Heating capacity:	Room Temperature	35°C DB
	Ambient Temperature	21°C DB
	Ambient Temperature	7°C DB
		6°C WB

Usable outdoor temperature ranges

Cooling mode -5°C to +43°C DB

Heating mode -10°C to +21°C DB

Specifications are subject to change without prior notice.

# TOSHIBA

## 1. Specifications

### MULTI CONTROLLERS

Model		RBM-Y1032E-E	RBM-Y1042E-E
Number of Branches		3	4
Gas Pipe (Inlet)	Inch	1 1/8	1 1/8
Liquid Pipe (Inlet)	Inch	5/8	5/8
Branch Pipes (Gas)	Inch	3/4 x 3	3/4 x 4
Branch Pipes (Liquid)	Inch	3/8 x 3	3/8 x 4
Dimensions	Height (mm)	260	260
	Width (mm)	590	590
	Depth (mm)	450	520
Weight	kg	20	23
Max.. Branch Length	m	30	30
Max.. Difference between Branches	m	10	10
Max.. Vertical Separation	m	15	15
<b>Where two M/C are used</b>			
Max.. Sub Pipe Length (each)	m	15	15
Max.. Difference between Sub Pipes	m	10	10

Specifications are subject to change without prior notice.

### Pipe Size Conversion Chart

mm	6.4	9.5	12.7	15.9	19	22.4	25.4	28.6
inch	1/4	3/8	1/2	5/8	3/4	7/8	1	1.1/8

## 2. Basic Permutations of Indoor to Outdoor Units

The indoor units are given a code number according to their capacity rank - see below

Model Number	Code Number
RAV103	2
RAV132/133	3
RAV453/160/1/2/3	4
RAV202/3	5
RAV713/260/1/2/3	6
RAV1003/360/1/2/3	8
RAV1253/460/1/2/3	10

Multiple indoor units may be connected to one outdoor unit, providing the total indoor code does not exceed the outdoor unit code number. The outdoor unit codes are listed below

Model	Max.. No. Indoor Units	Min Code	Max. Code
MAR-M81HTM8-E	8	3	21
MAR-M101HTM8-E	8	3	27

When connecting up to four single indoor units only one multi controller is required, if more single indoor units are needed then two multi controllers must be used. When connecting a twin indoor arrangement to one multi controller branch the capacity code will be the sum of both indoor unit codes.

Example :

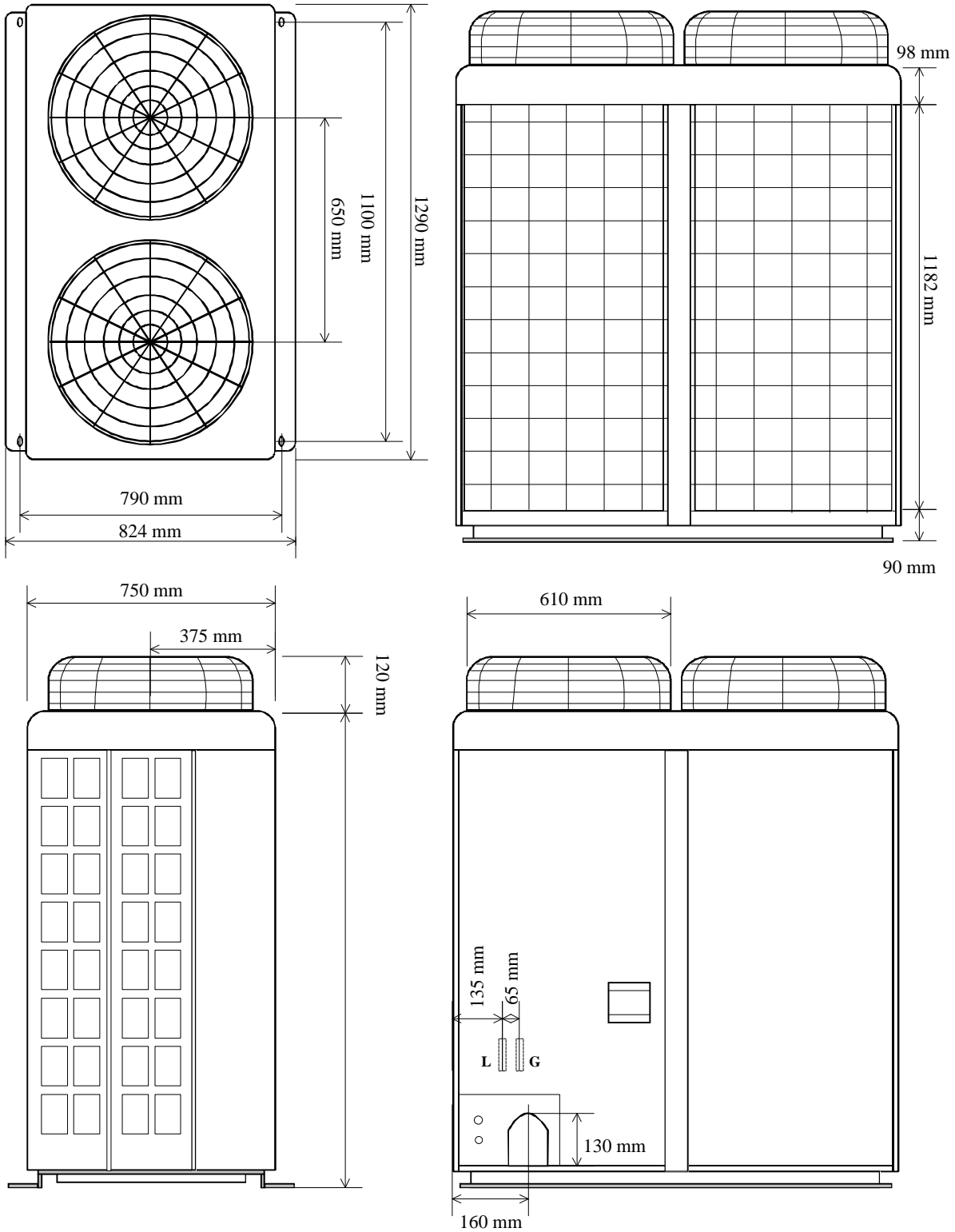
Model No.	Arrangement	Indoor Capacity Code	Total Capacity Code
RAV133TUH	Single	3	3
RAV133TUH	Twin	3	6
RAV202KH(W)	Single	5	5
RAV202KH(W)	Twin	5	10
		Total	24

The total capacity codes for the example above are within the maximum permitted for a 10hp (MAR-F101HTM8-E) outdoor unit therefore the use of a twin arrangement is acceptable.

**NOTE :** The maximum duty from the system cannot exceed the maximum capacity of the outdoor unit, it is possible to use indoor units with a total capacity of 135% of the outdoor unit capacity.

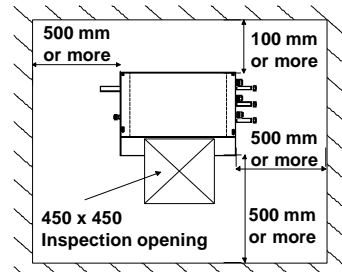
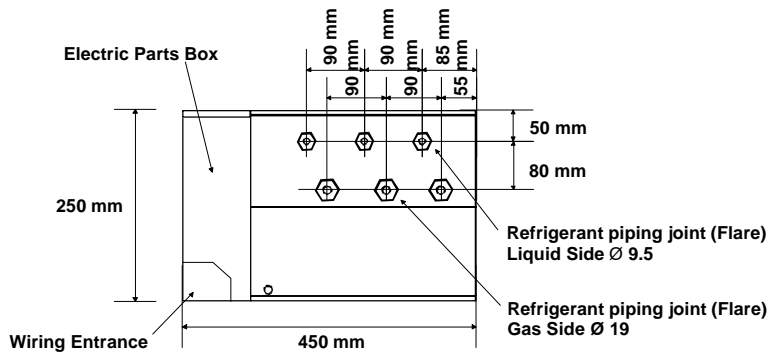
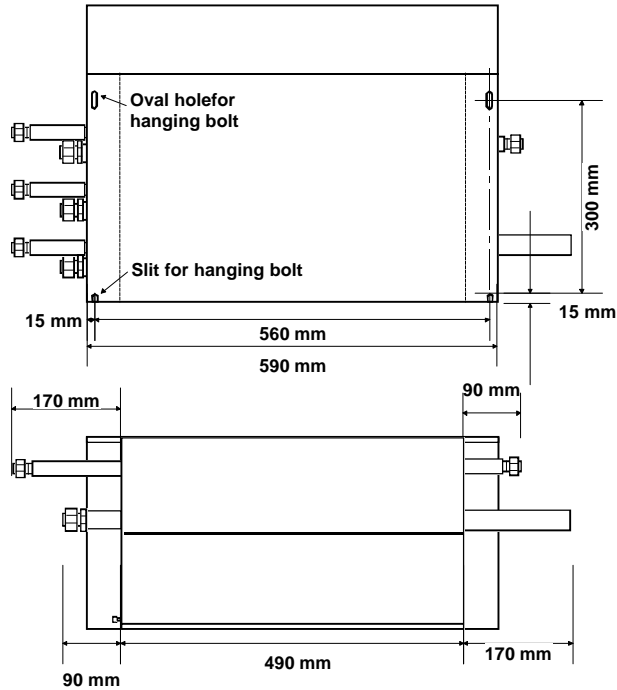
## CONSTRUCTION VIEWS

MAR-M81HTM8E-E  
MAR-M101FHTM8E-E

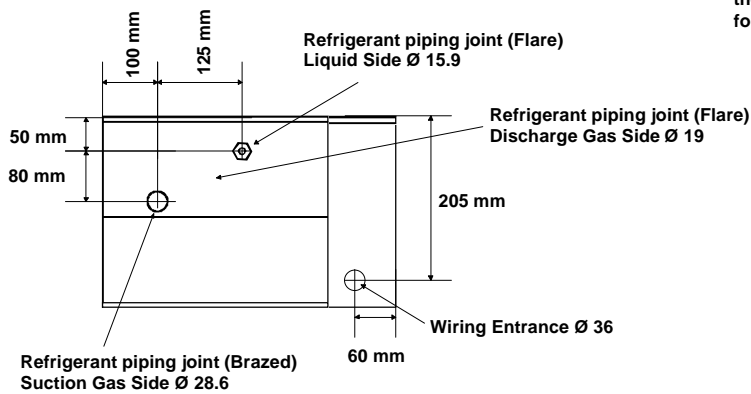


## DIMENSIONAL DRAWINGS

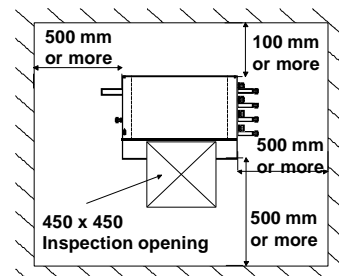
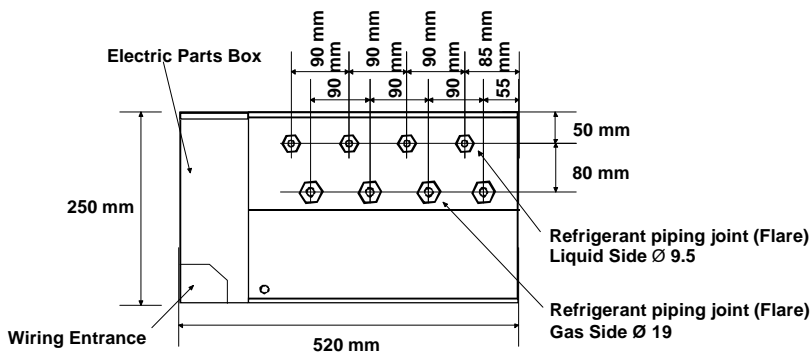
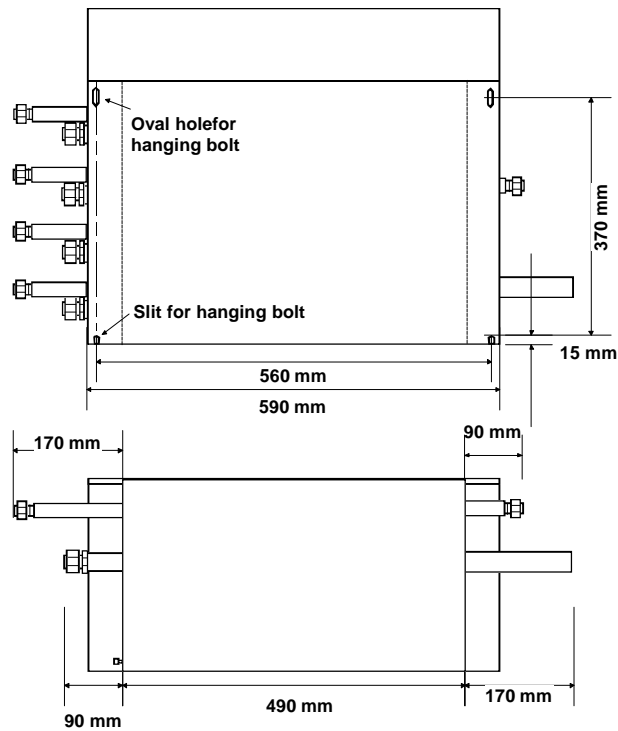
RBM-Y1032E-E



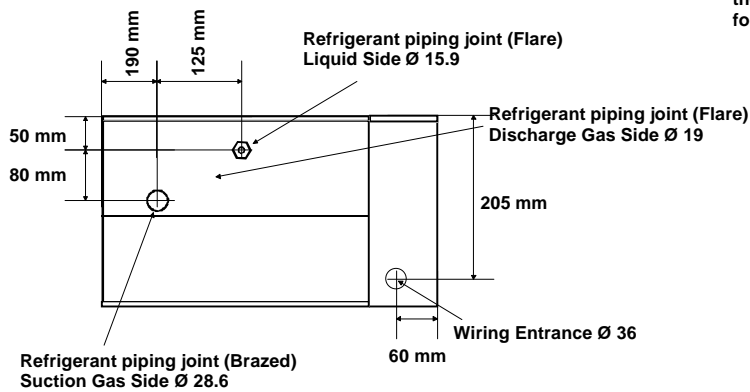
Note. Make an inspection opening at the specified place. It is indispensable for servicing.





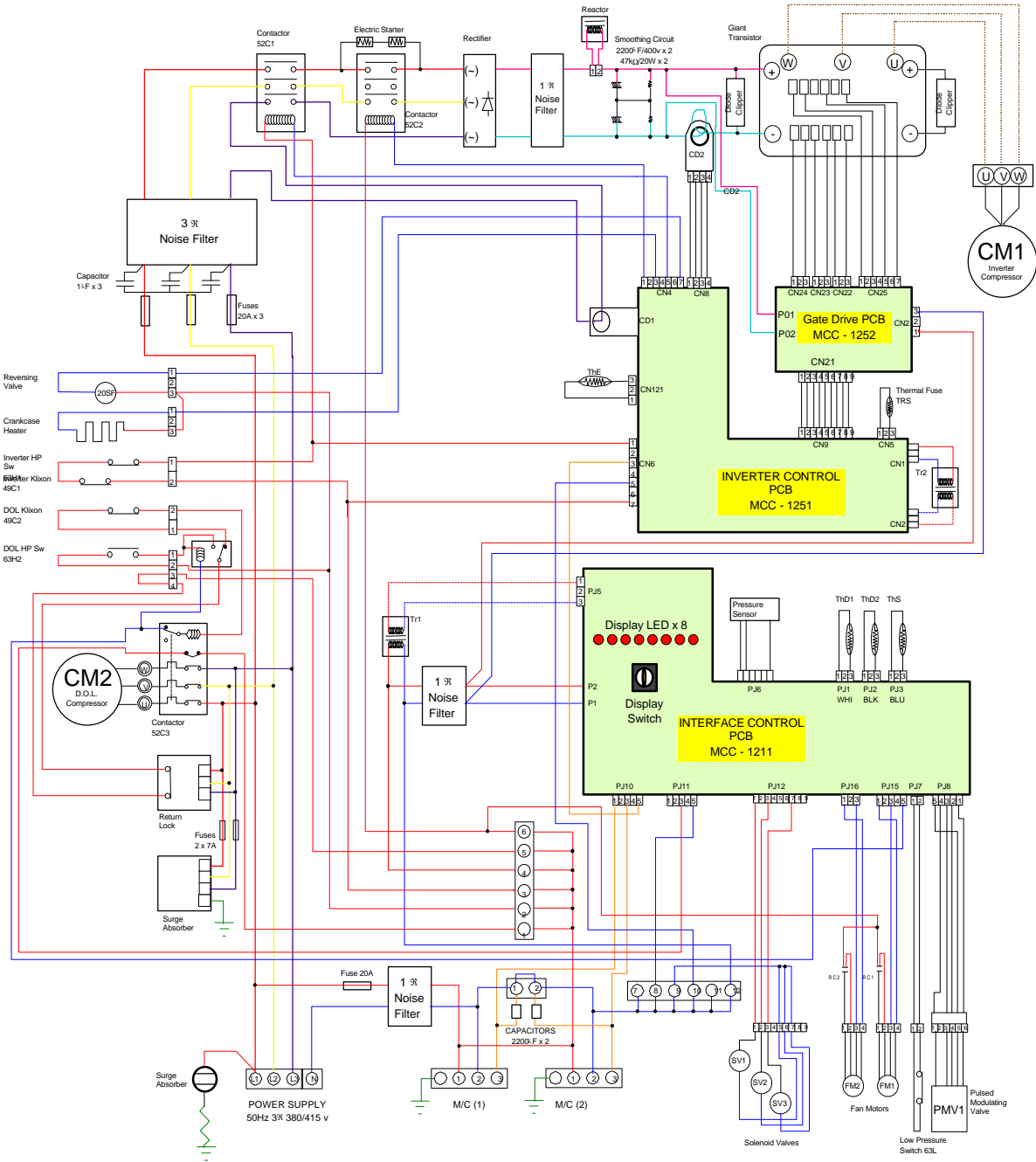


Note. Make an inspection opening at the specified place. It is indispensable for servicing.



## 4. Schematic Wiring Diagrams

### Outdoor Unit

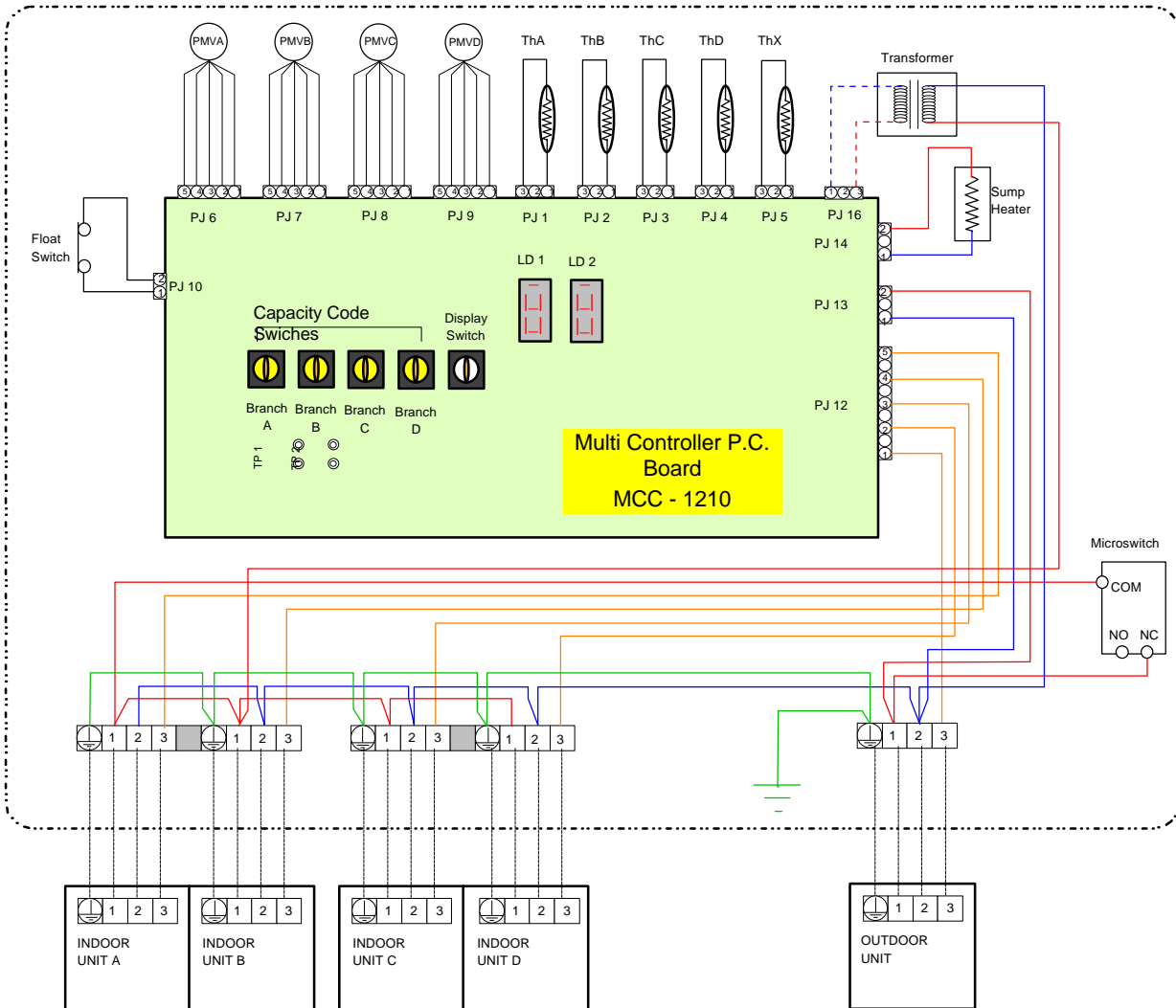


- = 240 v ac Live (not permanent)
- = Neutral (not permanent)
- = Communication Signal
- = Earth
- = L1 phase 415ac
- = L2 phase 415ac
- = L3 phase 415ac
- = dc high voltage live
- = dc high voltage neutral
- = 3Ø for Inv Compressor
- = dc low voltage
- = ac low voltage
- = ac low voltage

Note :The colours used in this diagram are not representative of those on the actual product, they are intended to indicate the status of each wire.

## 4. Schematic Wiring Diagrams

### Multi Controllers



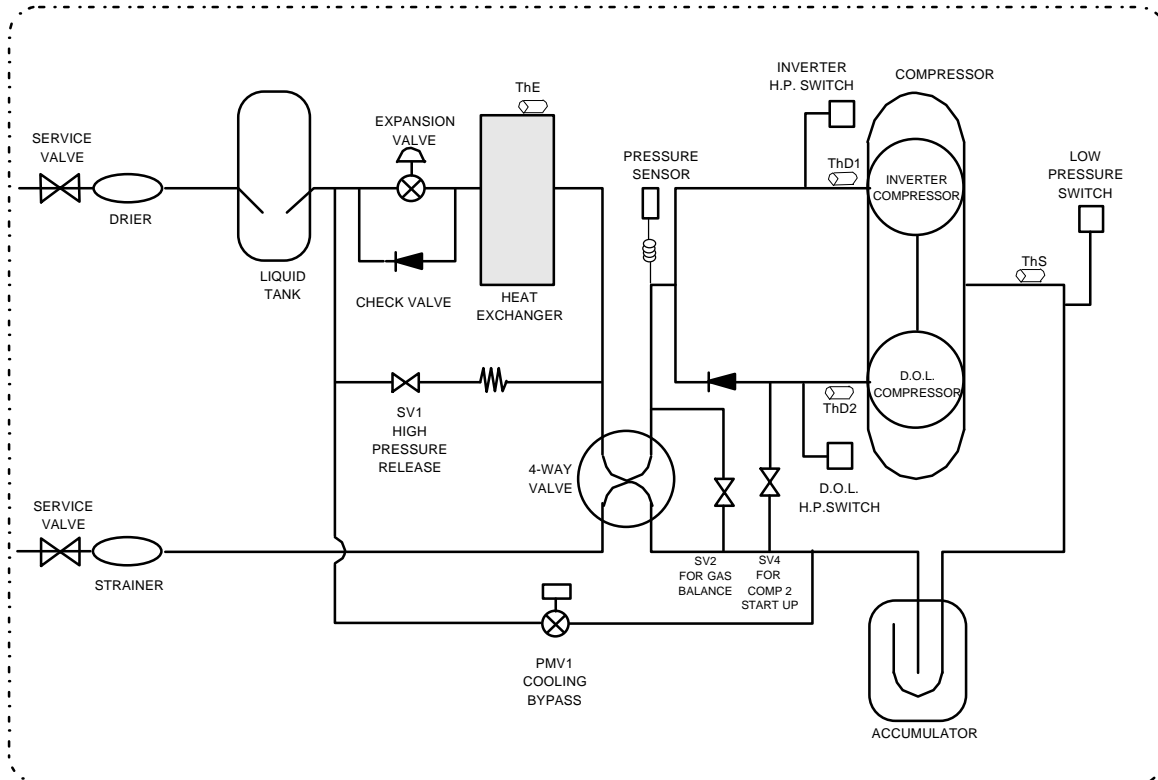
The colours used in this diagram are not representative of those on the product, they are intended to indicate the status of each wire.

- = 240v ac Live Wiring
- = Neutral Wiring
- = Serial Wiring
- = Earth Wiring
- - - = ac low voltage
- - - = ac low voltage

RBM - Y1032E - E does not have PMVD, ThD, indoor unit D connections or the capacity code switch for branch D.

## 5. Schematic Refrigeration Diagram

### Outdoor Unit

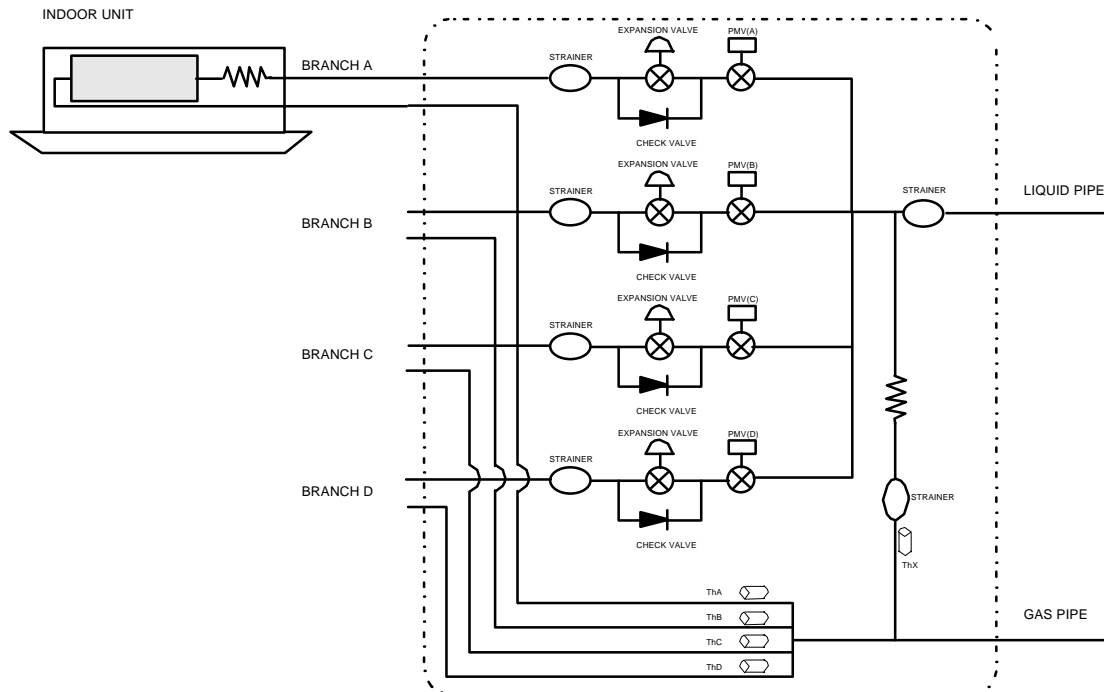


### Specification of Outdoor Unit Components

Model Number		MAR-M81HTM8-E	MAR-M101HTM8-E
Compressor	Type Number	HV991CW-Y12	HV1201CW-Y12
	Motor Type	Three Phase Induction	
	Power Supply	415/380 , 3-phase , 50Hz + Neutral	
	Output (kW)	5.6	7.5
	Coil Resistance (Ω)	Inv.1.49 / DOL 2.51	
Fan Motor	Type Number	STF-200-150C	
	Motor Type	Single Phase Induction	
	Power Supply	220 / 240 , single phase , 50Hz + Neutral	
	Consumption (W)	150	
	Current (A)	1.12 - 1.44	
	No. Poles	6	
	Thermal Cut-out	Trip 115°C ± 5°C	
H.P. Switch Inv.	P.S.I.G.	Break on Rise : Trip 425 , Reset 340	
H.P. Switch DOL	P.S.I.G.	Make on Rise : Trip 425 , Reset 340	
L.P. Switch	P.S.I.G.	Break on Drop : Trip 3.5 , Reset 20	
ThD1 & ThD2 Sensor	(kΩ)	50 @ 25°C , 17.9 @ 50°C , 3.35 @ 100°C	
ThS & ThE	(kΩ)	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Four Way Valve		Energised for Heating	
Crankcase Heater (240vac)	(W)	74	

## 5. Schematic Refrigeration Diagram

### Multi Controller



The schematic shows the layout for a four way multi controller (RBM-Y1042E-E), the three way multi controller (RBM-Y1302E-E) is very similar however all components relating to branch D have been removed.

### Specification of Multi Controller Components

Model Number		RBM-Y1032E-E	RBM-Y1042E-E
ThA,B,C,D,X Sensor	(k $\Omega$ )	32.8 @ 0°C , 10 @ 25°C , 3.6 @ 50°C	
Float Switch		Break on Rise	
Sump Heater (240vac)	(W)	50	65
Thermal Fuse	(°C)	Trips at 119	
Heater Fuse	(Amps)	1	
Transformer	Primary / Secondary (v ac)	240 / 12	

## 6. Fault Code and Display Information

### Fault Codes

Before reading the fault codes **do not** turn the power off as doing so will wipe the diagnostic memory. Caution must be taken when removing the access covers as high voltages are present.

Fault diagnosis is available at three locations within the air conditioning system :-

1. Remote Controller - press the check button
2. Multi Controller - rotate the display switch to position 1
3. Outdoor Unit - see following text

Remote Controller Press Check			Multi Controller Switch Position 1			Outdoor Unit	
O4	No Communication Inverter to Interface	→	O4	No Communication Inverter to Interface	→	see Table 1	No Communication Inverter to Interface
O4	No Communication Multi Con to Outdoor	→	O4	No Communication Multi Con to Outdoor			
O4	No Communication Indoor to Multi Con						
Ob	I.D. Water Level						
OC	TA Sensor		88	No Communication Initially M/C to OD		Display Switch set to "8" (if lit....)	
Od	TC Sensor		80	Th(A) Sensor Fault	←	LED1	Th(A) Sensor Fault
O8	Reverse Change Temp		81	Th(B) Sensor Fault	←	LED2	Th(B) Sensor Fault
O9	Frost or no Change °C		82	Th(C) Sensor Fault	←	LED3	Th(C) Sensor Fault
99	No Communication Indoor to Rem Con.		83	Th(D) Sensor Fault	←	LED4	Th(D) Sensor Fault
			84	Th(X) Sensor Fault	←	LED5	Th(X) Sensor Fault
15	Refer to Multi Con	↗	Ob	M/C Water Level	←		M/C Water Level
	Preheat/Defrost Flash	→	89	ID Codes too High	←	LED6	M/C Settings too High
				ID Codes set to Zero		LED7	M/C1 Sensor Fault
						LED8	M/C2 Sensor Fault
						Display Switch set to "3" (if lit....)	
1C	Refer to O/D	→	1C	Refer to O/D	→	LED1	ThD1 Sensor Fault
						LED2	ThD2 Sensor Fault
						LED3	ThS Sensor Fault
						LED4	High Pressure - detected by pressure sensor
						LED5	Pressure Sensor Fault
						LED6	Discharge Pipe >130°C
						LED7	Suction Pipe >40°C
						LED8	Low Pressure <3.5psig
						SW01 Set to Off/Off	
14	Refer to O/D	→	14	Refer to O/D	→	*○○○	Low Inverter Voltage
1d	Refer to O/D	→	1d	Refer to O/D	→	○*○○	High Inverter Current dc
1F	Refer to O/D	→	1F	Refer to O/D	→	○○*○	High Inverter Current ac
18	Refer to O/D	→	18	Refer to O/D	→		ThE Sensor Fault
21	Refer to O/D	→	21	Refer To O/D	→	○○○*	Inv HP Trip, Comp Klixon
					↘		Phase Rotation, DOL HP Trip, O/Load, Comp Klixon

\* = LED Flashing

○ = LED On

## 6. Fault Code and Display Information

### Display switch information

#### **Multicontroller**

Switch position	Information
0	System Communication
1	Fault Codes
2	Level of Demand
3	Oil Retrieval, Superheat, Defrost
4	Operating Mode
5	Restart Timer
6	Circuit Test (commissioning only)
7	PMV(A) Position
8	PMV(B) Position
9	PMV(C) Position
10	PMV(D) Position
11	ThA Sensor Data (Hex Code)
12	ThB Sensor Data (Hex Code)
13	ThC Sensor Data (Hex Code)
14	ThD Sensor Data (Hex Code)
15	ThX Sensor Data (Hex Code)

#### **Outdoor Unit**

Switch position	Information
0	System Communication
1	Status of Compressors
2	System Status (Mode, Defrost, PMV)
3	Fault Diagnostics (Outdoor Unit)
4	M/C1 Branches A & B Indoor Capacity Codes
5	M/C1 Branches C & D Indoor Capacity Codes
6	M/C2 Branches A & B Indoor Capacity Codes
7	M/C2 Branches C & D Indoor Capacity Codes
8	Fault Diagnostics (Multi Controller)
9	Circuit Test (commissioning only)
10	Not Used
11	Not Used
12	Not Used
13	Not Used
14	Not Used
15	Not Used

## 6. Fault Code and Display Information

### Multi Controller Display Switch Information

Switch Pos.	Indicates	LD 1							LD 2						
0	Serial		From B Branch	To B Branch		To A Branch	From A Branch	From Outdoor		From D Branch	To D Branch		To C Branch	From C Branch	To Outdoor
1	Fault Codes	For Details of Fault Codes see Page 13													
2	Demand	Level of Cooling/Heating Demand (00-1F)													
3			Oil Ret brch B	Superheat brchB		Superheat brchA	Oil Ret brchA			Oil Ret brch D	Superheat brchD		Superheat brchC	Oil Ret brchC	
	Defrost	Displays "dF" during defrost operation													
4		Operating Mode :Heating (H-), Cooling (-C), Stop (-), Defrost (J-)													
5	Timer	Normal Display (OO), Restart Timer Displays (-1) During Count Down													
6	cct test	Displays Branch Being Tested (A b C d)							Indicates Faulty Branch Connection After Circuit Test						
7	PMVA	Displays Degree Of PMV Opening As A Hexadecimal Code : (OO) = Closed , (FO) = Fully Open													
8	PMVB														
9	PMVC														
10	PMVD														
11	ThA	Displays Sensor Readings As A Hexadecimal Code : 40=0°C ; 68=10°C ; 90=20°C ; b8=30°C													
12	ThB														
13	ThC														
14	ThD														
15	ThX														

The Hexadecimal codes can be interpreted using the following chart

Display	PMV- Angle	Th-AbCdX °C	Level Of Demand			
			Display	Hz	Display	Hz
OO	Closed		OO	0	10	44.1
10	16		O1	0	11	47.2
20	32	-8	O2	0	12	50.3
30	48	-4	O3	3.9	13	53.4
40	64	0	O4	6.9	14	56.5
50	80	4	O5	10	15	59.6
60	96	8	O6	13	16	62.7
70	112	12	O7	16.2	17	65.8
80	128	16	O8	19.3	18	68.9
90	144	20	O9	22.4	19	72
AO	160	24	OA	25.5	1A	75.1
bO	176	28	Ob	28.6	1B	78.2
CO	192	32	OC	31.7	1C	81.3
dO	208		Od	34.8	1D	84.4
EO	224		OE	37.9	1	87.5
FO	240		OF	41	1F	90

The above chart shows a sample of readings, other intermediate readings may be registered.



## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information

The operating status of the outdoor unit and fault diagnosis can be made using both the display selector switch (on the interface pcb) and the eight red light emitting diodes on the interface printed circuit board.

a. Display switch set to position “0” shows communication around the system

LED 1	Lit = Receiving serial signal from multi controller 1
LED 2	Lit = Sending serial signal to multi controller 1
LED 3	Lit = Receiving serial signal from multi controller 2
LED 4	Lit = Sending serial signal to multi controller 2
LED 5	Lit = Receiving serial signal from inverter printed circuit board
LED 6	Lit = Sending serial signal to inverter printed circuit board
LED 7	n/a
LED 8	n/a

b. Display switch set to position “1” shows status of both compressors

Inverter Speed		LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
S0	0 Hz	X	X	X	X	DOL compressor On On = Run Off Off = Stop		Speed Limiting Due To Protection Circuits i.e. High TD or Low TS	
S3	30 Hz	X	X	O	O				
S4	36 Hz	X	O	X	X				
S5	42 Hz	X	O	X	O				
S6	46 Hz	X	O	O	X				
S7	53 Hz	X	O	O	O				
S8	61 Hz	O	X	X	X				
S9	69 Hz	O	X	X	O				
SA	76 Hz	O	X	O	X				
SB	84 Hz	O	X	O	O				
SC	92 Hz	O	O	X	X				
SD	103 Hz	O	O	X	O				
SE	111 Hz	O	O	O	X				
SF	122 Hz	O	O	O	O				

O = Lit      X = Off

c. Display switch set to position “2” shows the status of the system

## 6. Fault Code and Display Information

### Outdoor Unit Display Switch Information cont.

d. Display switch set to position “3” identifies a fault condition in the outdoor unit.

Details are in the fault code chart on page 13

e. Display switch set to positions “4, 5, 6 & 7” identifies the indoor unit capacity code for each branch.

	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	LED 7	LED 8
Pos. 4	Capacity code of unit on M/C 1 branch A				Capacity code of unit on M/C 1 branch B			
Pos. 5	Capacity code of unit on M/C 1 branch C				Capacity code of unit on M/C 1 branch D			
Pos. 6	Capacity code of unit on M/C 2 branch A				Capacity code of unit on M/C 2 branch B			
Pos. 7	Capacity code of unit on M/C 2 branch C				Capacity code of unit on M/C 2 branch D			
	O = Lit      X = Off				Indoor Model Number			Code No
	X	X	O	X	103			2
	X	X	O	O	132/133			3
	X	O	X	X	453/160/161/162/163			4
	X	O	X	O	200/202/203			5
	X	O	O	X	713/260/261/262/263			6
	X	O	O	O				
	O	X	X	X	1,003/360/361/362/363			8
	O	X	O	X	1,253/460/461/462/463			10

f. Display switch set to position “8” identifies a fault condition in the multi controller.

Details are in the fault code chart on page 13

g. Display switch set to position “9” shows the status of the commissioning circuit test.

LED 1	M/C 1	Branch A	When an LED is lit it indicates that there is a wiring or piping fault between the multi controller and the relevant indoor unit.
LED 2		Branch B	
LED 3		Branch C	
LED 4		Branch D	
LED 5	M/C 2	Branch A	
LED 6		Branch B	
LED 7		Branch C	
LED 8		Branch D	

## 7. Circuit Test Procedure

These systems have a feature which enables them to check that the wiring and piping connections are aligned with each other. This is carried out by allowing refrigerant flow to one indoor unit at a time and monitoring that indoor unit's coil sensor for a corresponding drop in temperature. Each indoor unit is tested in turn and where two multi controllers are installed each multi controller is tested in turn.

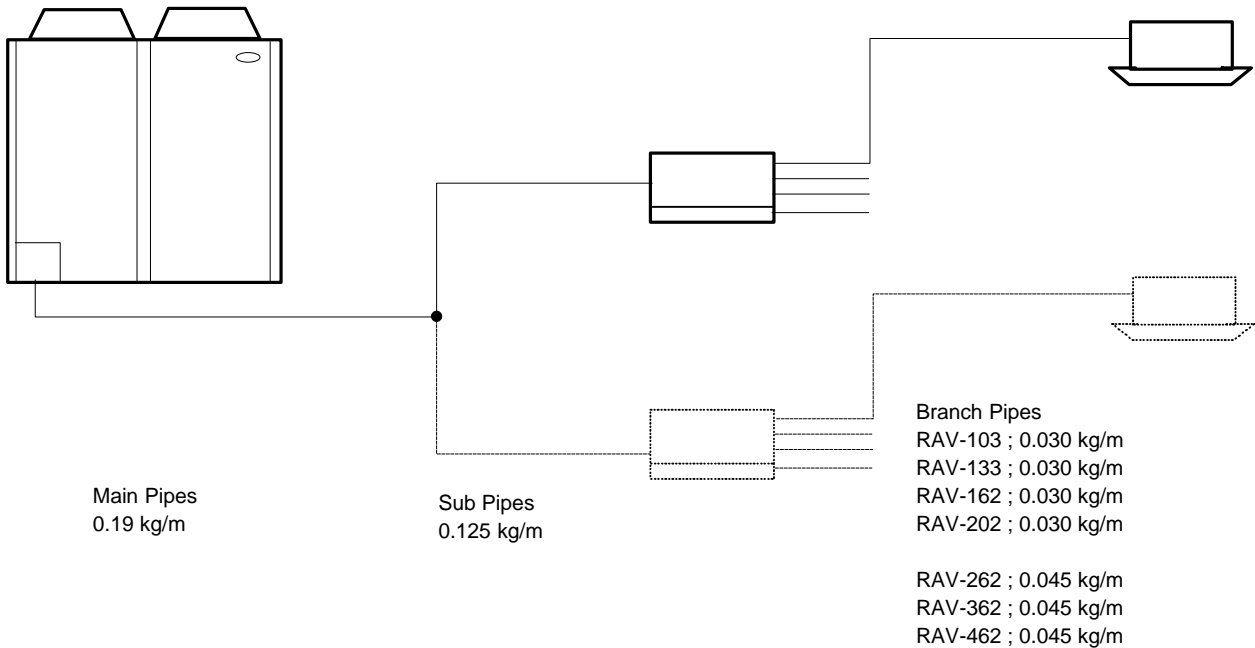
This test would normally be used at the commissioning stage.

Procedure for initialising the circuit test.

1. Turn the power off, and disconnect any T2s (optional) fitted.
2. Put the outdoor display switch to 9 and multi controller(s) display switch to 6.
3. Turn the power back on.
4. Set all the remote controllers to cool mode and 29°C.
5. Press the on/off button to start the indoor units (fans will run).
6. Go to outdoor unit press switch J2 (above 8 x LEDs) for 3 sec .
7. The system is now self-testing (all 8 LEDs will be flashing rapidly).
8. The system will stop at the end of the test, indicated by the on/off lights flashing.

In the event of cross wiring/piping the system will indicate which units are faulty, see pages 15 & 17

## 8. Calculating The Additional Gas Charge



### Single Multi Controller

Main pipe run (minus 3m.)	x	0.190 kg/m	=
Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge =			_____ kg

### Two Multi Controllers

Main pipe run (minus 2m.)	x	0.190 kg/m	=
Total sub pipe (minus 2m.)	x	0.125 kg/m	=
M/C1 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
M/C2 Branch pipe A (minus 2m.)	x	see above kg/m	=
Branch pipe B (minus 2m.)	x	see above kg/m	=
Branch pipe C (minus 2m.)	x	see above kg/m	=
Branch pipe D (minus 2m.)	x	see above kg/m	=
Total Additional Gas Charge =			_____ kg