Mitsubishi Electric – Unico AHU Interface (re-circulating AHU)

PROCON ACH2, ACH2.1

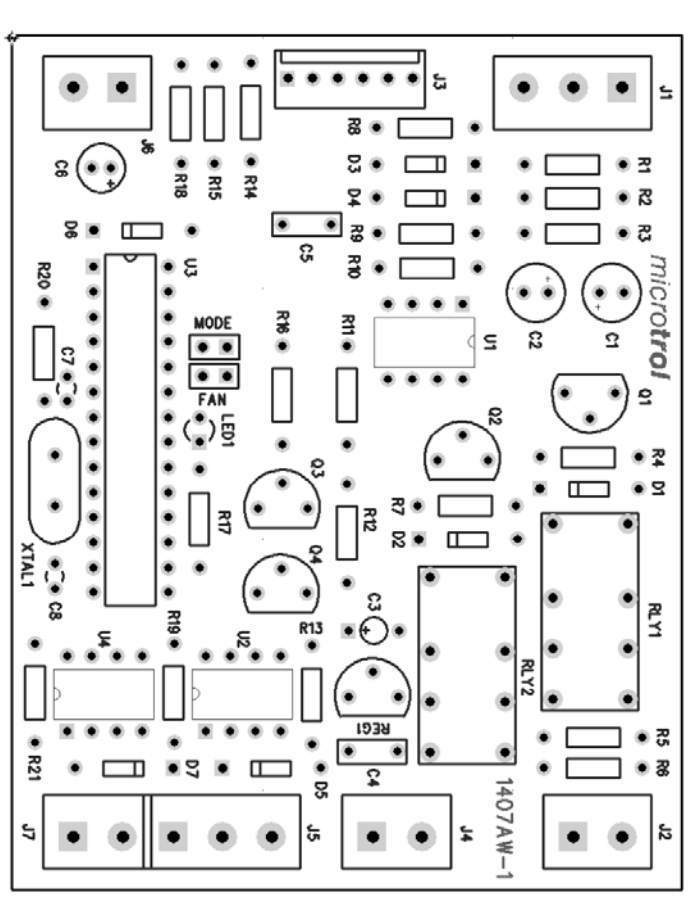
FOR Installer and Operator

INSTALLATION / OPERATION MANUAL

For safe and correct use, please read this manual thoroughly before installing and using the Interface.

MITSUBISHI ELECTRIC

FIGURE 5.1.1.1


microtrol
MODE
FAN
LED1
XTAL1
REG1
RLY1
RLY2
1407AW-1
J1
J2
J3
J4
J5
J6
J7
U1
U2
U3
U4
Q1
Q2
Q3
Q4
C1
C2
C3
C4
C5
C6
C7
C8
D1
D2
D3
D4
D5
D6
D7
D8
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21

Terminals as follows: (square is pin 1 - designations shown in pin number order)

J1 Cool, Common, Heat (24v a.c)
J2 12k or 3k3 thermistor feed (TH1)
J4 Fan relay contacts
J5 CN52-3, CN52-4, CN52-5
J7 CN52-1, CN52-2
J6 Thermistor Input (Defrost Sensor)

FIGURE 5.1.1.2

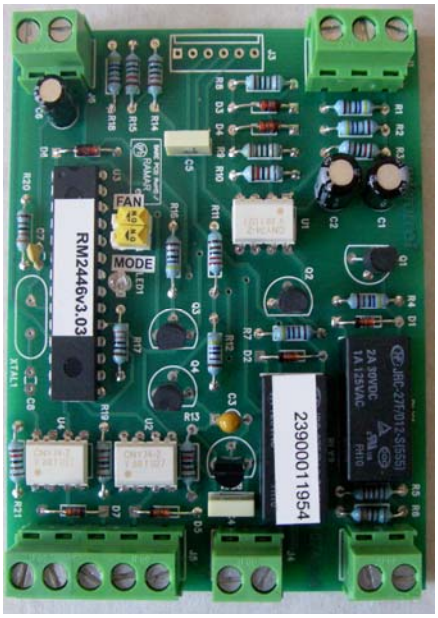


FIGURE 5.1.1.3

FIGURE 5.1.1.4

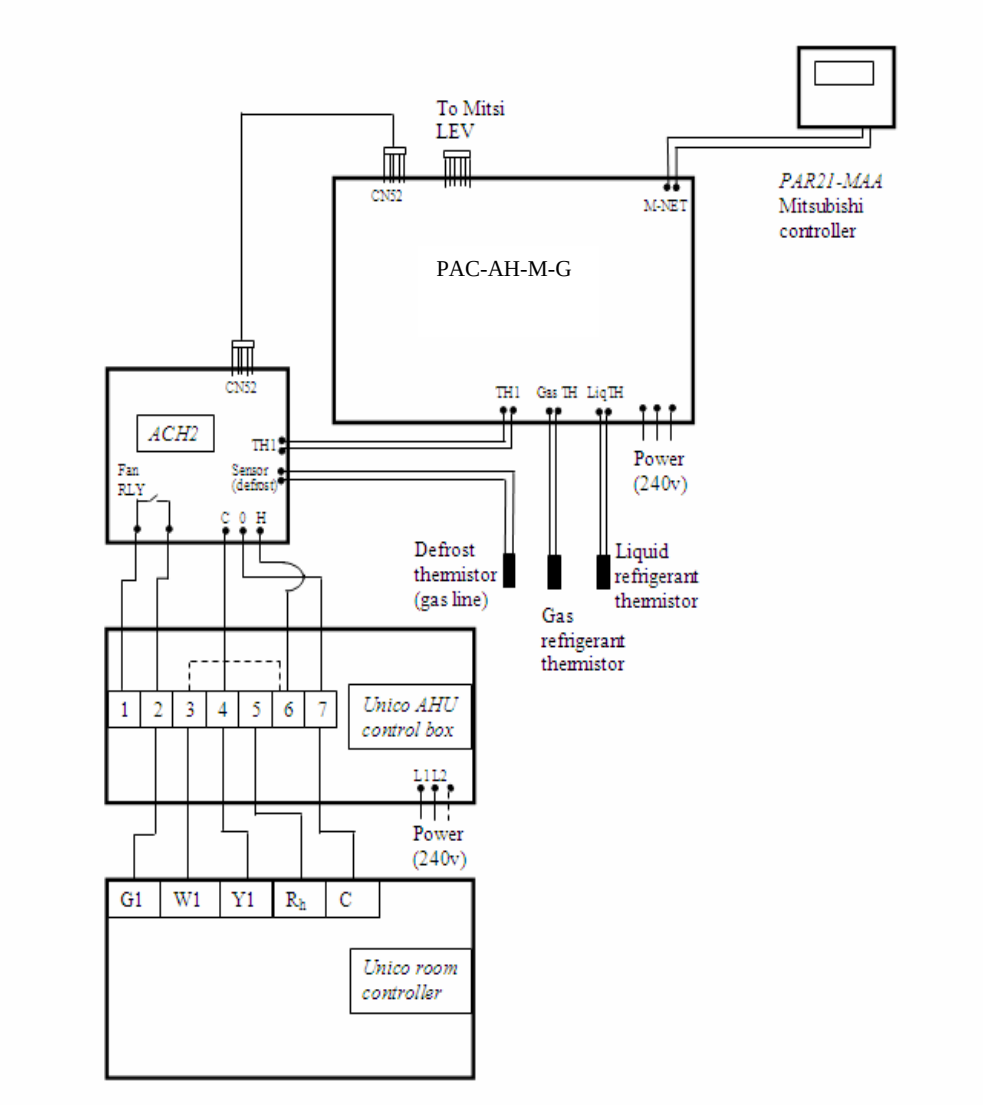

To Mitsi
LEV
CN52
M-NET
PAR21-MAA
Mitsubishi
controller
PAC-AH-M-G
CN52
TH1
Gas TH
LiqTH
Power
(240v)
ACH2
TH1
Fan
RLY
Sensor
(defrost)
C 0 H
Defrost
thermistor
(gas line)
Liquid
refrigerant
thermistor
Gas
refrigerant
thermistor
1 2 3 4 5 6 7
Unico AHU
control box
L1 L2
Power
(240v)
G1 W1 Y1 Rh C
Unico room
controller

FIGURE 5.2.1.1

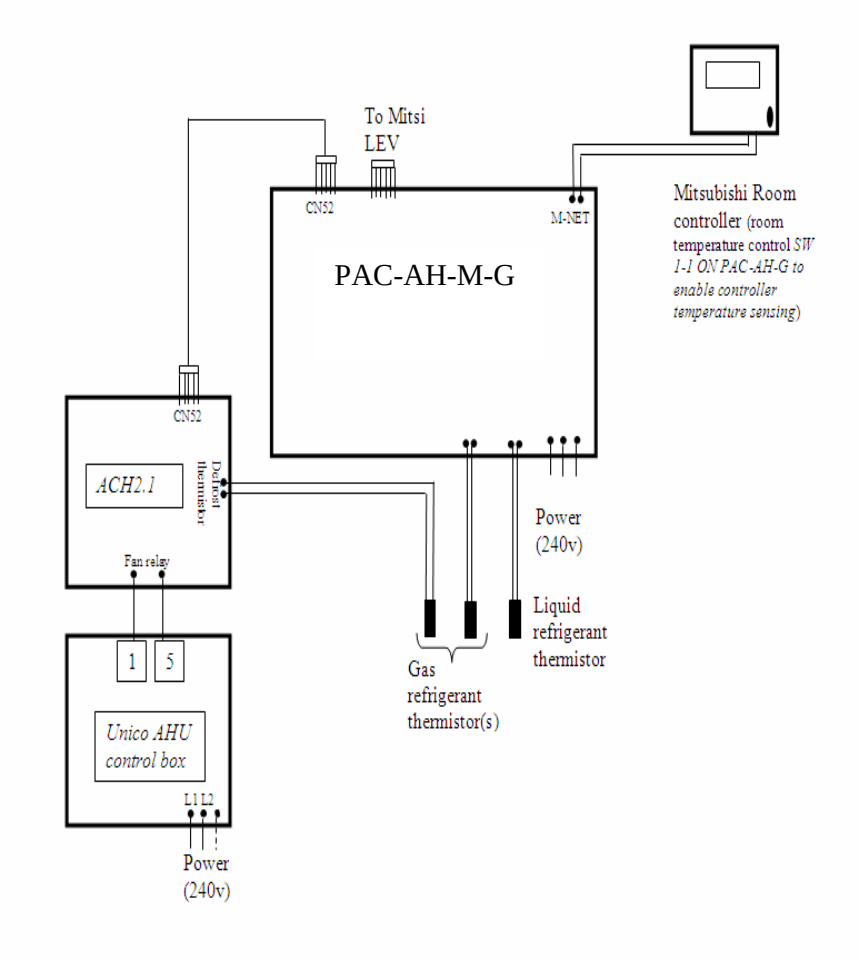

To Mitsi
LEV
CN52
M-NET
PAC-AH-M-G
Mitsubishi Room
controller (room
temperature control SW
1-1 ON PAC-AH-G to
enable controller
temperature sensing)
CN52
ACH2.1
Defrost thermistor
Fan relay
Power
(240v)
Liquid
refrigerant
thermistor
Gas
refrigerant
thermistor(s)
1
5
Unico AHU
control box
L1 L2
Power
(240v)

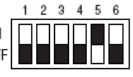
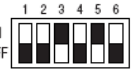
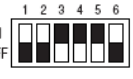
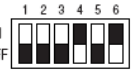
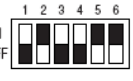
FIG 7.0

Compatibility Table

UNICO	*Model No*	**1218**	**2430**	**3642**	**4860**
	kW rating	3.5-5	7-10	10-14	12-17.5
	AHU controller[*1]	**PAC-AH63M-G**	**PAC-AH125M-G**	**PAC-AH125M-G**	**PAC-AH140M-G**
Mitsubishi Electric	Reference air flow rate (m^3/h)	1250	1750	2500	3000
	Unit size	**40**[*2]	**80**	**125**	**140**

*1 - note the AHU box has to be changed to a -H box by changing dip SW3-1 OFF
*2 - Dip PAC-AH63M-G to a size 40

Set the unit size according to the evaporator type (field supply).
Set the dip switch (SW2) on the control board in accordance with the chart below.

Type	Unit size (Air handling unit)	Allowed evaporator capacity	Setting switches (SW2)*
PAC-AH63M-G	P63	4.6 ~ 7.1 kW	
PAC-AH125M-G	P71	6.7 ~ 8.0 kW	
	P80	7.3 ~ 9.0 kW	
	P100	8.6 ~ 11.2 kW	
	P125	10.1 ~ 14.0 kW	
PAC-AH140M-G	P140	11.2 ~ 16.0 kW	
PAC-AH250M-G	P200	15.9 ~ 22.4 kW	
	P250	18.7 ~ 28.0 kW	

* ■ indicates ON/OFF state.

Contents

1. Safety precautions

1.1. Before installation and electric work

- **Before installing the unit, make sure you read all the "Safety precautions".**
- **The "Safety precautions" provide very important points regarding safety. Make sure you follow them.**

Symbols used in the text

⚠**Warning:**
Describes precautions that should be observed to prevent danger of injury or death to the user.

⚠**Caution:**
Describes precautions that should be observed to prevent damage to the unit.

⚠**Warning:**
Carefully read the labels affixed to the main unit.

⚠ **Warning:**

- **Ask the dealer or an authorised technician to install the controller.**
  - Improper installation by the user may result in water leakage, electric shock, or fire.
- **Use the specified cables for wiring. Make the connections securely so that the outside force of the cable is not applied to the terminals.**
  - Inadequate connection and fastening may generate heat and cause a fire.
- **Never repair the unit. If the controller must be repaired, consult the dealer.**
  - If the unit is repaired improperly, electric shock, or fire may result.
- **Install the controller according to this Installation Manual.**
  - If the unit is installed improperly, electric shock, or fire may result.
- **Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations" and the instructions given in this manual and always use a special circuit.**
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock or fire may result.
- **Keep the electric parts away from water (washing water etc.).**
  - It might result in electric shock, fire or smoke.
- **When moving and reinstalling the ACH2 unit, consult the dealer or an authorised technician.**
  - If the controller is installed improperly, electric shock, or fire may result.
- **To dispose of this product, consult your dealer.**

1.3. Before installation

⚠ **Caution:**

- **Do not install the unit where combustible gas may leak.**
  - If the gas leaks and accumulates around the unit, an explosion may result.
- **Do not use the control box where food, pets, plants, precision instruments, or artwork are kept.**
- **Do not use the control box in special environments.**
  - Oil, steam, sulphuric smoke, etc. can significantly reduce the performance of the air conditioner or damage its parts.

1.3.1. Before installation - electrical work

⚠ **Caution:**

- **Do not wash the control box.**
  - Washing them may cause an electric shock.
- **Be very careful about product transportation.**
- **Safely dispose of the packing materials.**
  - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
  - Tear apart and throw away plastic packaging bags so that children will not play with them - If children play with a plastic bag which has not been torn apart, they face the risk of suffocation.

1.3.2. Before starting the test run

⚠ **Caution:**

- **Do not touch the switches with wet fingers.**
  - Touching a switch with wet fingers can cause electric shock.
- **Do not operate the control box with the panels and guards removed.**
- **Do not turn off the power immediately after stopping operation.**
  - Always wait at least five minutes before turning off the power. Otherwise problems may occur.

.

2. Accessories

The unit is provided with the following accessories:
[Fig. 2.1]

No	Accessories	No supplied
1	Thermistor (1m)	1
2	5 wire adapter	1
3	ACH2/2.1 Interface	1

3. System components

ACH2

- ACH2 Control box
- Unico AHU
- Unico controller
- City Multi Outdoor unit (any type)
- Thermistor
- BC box for R2 application
- PAR-21MAA controller
- 5 wire adapter
- PAC-AH-M-G
- LEV kit

ACH2.1

- ACH2 Control box
- Unico AHU
- City Multi Outdoor Unit (any type)
- Thermistor
- BC box for R2 application
- PAR-21MAA controller
- 5 wire adapter
- PAC-AH-M-G
- LEV kit

4. Selecting an installation site

- Avoid locations in direct sunlight.
- Avoid locations exposed to stream or oil vapour.
- Avoid locations where combustible gas may leak, settle or be generated.
- Avoid installation near machines emitting high-frequency waves.
- Avoid places where acidic solutions are frequently handled.
- Avoid places where sulphur-based or other sprays are frequently used.

5. Electrical wiring

Precautions on electrical wiring

⚠ **Warning:**
Electrical work should be done by qualified electrical engineers in accordance with "Engineering Standards for Electrical Installation" and supplied installation manuals. Special circuits should also be used. If the power circuit lacks capacity or has an installation failure, it may cause a risk of electric shock or fire.

- Install the unit to prevent any of the control circuit cables (remote controller, transmission cables) from direct contact with the power cable outside the unit.
- Ensure that there is no slack on all wire connections.
- Some cables (power, remote controller, transmission cables) above the ceiling may be prone to be bitten by mice. Insert the cables into metal pipes for protection.
- Never connect the power cable to leads for the transmission cables. Otherwise the cables could be broken.

5.1.Connecting the ACH2

5.1.1

The ACH2 is connected to the AHU via fan relay, H/com/C select, and PAC-AH-M-G to (TH1) and CN52 – see figure 5.1.1.3. The defrost sensor input (J6) is connected to the refrigerant gas line to the AHU to monitor the temperature for defrost activation via the fan relay (J4). See also figures 5.1.1.1 and 5.1.1.4.

It will be necessary to connect the appropriate size PAC-AH-M-G to its relative Unico AHU and set the dip switches on the unit, for compatibility see fig.7.0.

PAR-21MAA controller is connected to the PAC-AH-M-G on to TB15 and set to auto 28ºC and hidden out of site. This is set up to enable auto changeover. To set up auto changeover please refer to the PAR-21MAA manual. For Y series (YGM/YHM) outdoor unit auto function must be enabled. Please set the following dip switches:

PUMY Dip switch SW2 – 5
PUHY -YGM Dip switch SW4 – 8
PUHY – YHM Dip switch SW4 – 5

On the PAC-AH-M-G set the auto re start dip switch SW1 – 9 to 'ON'.

Attach the 5 wires on the adapter to ACH2 (CN52) – see figure 5.1.1.1. starting with black to terminal (1), followed by red (2), white (3), yellow (4) and green (5). Insert plug end to CN52 on the PAC-AH-M-G control board. Please note power to the ACH2 box is provided through the 5 wire adapter.

Note:
Ensure that the wiring is not pinched when fitting the terminal box cover. Pinching the wiring may cut it.

***For terminal connections see fig 5.1.1.1**

⚠ **Caution:**
Do not route the thermistor cables together with power cables.

⚠ **Caution:**
When the lead wire is too long, cut it to the appropriate length. Do not bind it in the box.

⚠ **Caution:**
Take proper measures not to miswire.

5.2. Connecting the ACH2.1

5.2.1.

The ACH2.1 is connected to the AHU via fan relay (J4). The defrost sensor input is connected to the refrigerant gas line to the AHU (J6) to monitor the temperature for defrost activation. See figures 5.1.1.1 and 5.2.1.1.

It will be necessary to connect the appropriate size PAC-AH-M-G to its relative Unico AHU and set the dip switches on the unit, for compatibility see fig.7.0.

PAR-21MAA controller is connected to PAC-AH-M-G on to TB15 and the controller is installed in the room space.

The thermistor provided with the PAC-AH-M-G must remain connected to TH1 terminal, even when the PAR-21MAA is used for remote sensing. To enable this function, switch SW1-1 to the 'ON' position. If return air temperature sensing is required, place the thermistor provided with the PAC-AH-M-G in the return air stream and connect to TH1 on the PAC-AH-M-G. Switch SW1-1 to 'OFF'.

For terminal connections see figure 5.1.1.1

Attach the 5 wires on the adapter to ACH2 (CN52) – see figure 5.1.1.1. starting with black to terminal 1, followed by red (2), white (3), yellow (4) and green (5). Insert plug end to CN52 on the PAC-AH-M-G control board. Please note power to the ACH2 box is provided through the 5 wire adapter.

Note:
Ensure that the wiring is not pinched when fitting the terminal box cover. Pinching the wiring may cut it.

⚠ **Caution:**
Install wiring so that it is not tight and under tension. Wiring under tension may break, or overheat and burn.

- After wiring is complete, make sure again that there is no slack on the connections, and attach the cover onto the control box in the reverse order removal.

⚠ **Caution:**
Do not route the thermistor cables together with power cables.

⚠ **Caution:**
When the lead wire is too long, cut it to the appropriate length. Do not bind it in the box.

⚠ **Caution:** Take proper measures not to miswire

6. Refrigerant Installation

Installation of refrigerant piping on both options 2. and 2.1 is the same. Control wiring is different.

For installation of Unico AHU please see Unico install manual for 'M' series modular air handler units (Bulletin 30-20).

For connection installation of Mitsubishi Electric City Multi system to Unico AHU, please see this manual.

The Unico system is fully compatible with R410A and comes in 3 sizes, all of which are connectable to Mitsubishi Electric City Multi R410A systems.

- The connection pipe sizes will be the same as with R410A fan coil sizes, please see compatibility table for index sizes of unit.
- Connection of pipe into position of R407C pipe. The Unico unit comes as standard with a connection point for a valve on the inside of the unit. As in this installation case, the Mitsubishi Electric LEV valve is used externally; therefore the internal connection point needs to be connected. Please braze a straight piece of copper pipe between this section. Where there is a screw connection, this will need to be removed and pipe brazed to the copper pipe on the Unico unit. Please be careful not to damage the rest of the AHU when brazing.

Connection of R410A LEV externally to unit on liquid line. Mount horizontally as near to heat exchanger as possible. See PAC-AH-M-G installation manual for more information.

7. Operating ACH2 , ACH2.1

Each Unico AHU needs the following Mitsubishi Electric kit:

1 x City Multi Outdoor (BC if R2)
1 x PAC-AH-M-G
1 x ACH2/2.1
1 x PAR21MAA

1) **ACH2** uses Unico controller in the room space to call for heating or cooling. Stored out of sight, the PAR-21MAA is used to enable auto changeover via the PAC-AH-M-G.
2) **ACH2.1** uses Mitsubishi Electric remote controller in the room space only to call for heating or cooling. This is also linked via the PAC-AH-M-G.

7.1. Operating the modes

The ACH2/2.1 interface comes as one box and is interchangeable on site. This is done via a mode switch 'MODE', figure 5.1.1.1

'OFF' position = ACH2
'ON' position = ACH2.1

Change this switch only when the power is off to the interface. In both modes, set dip switch SW1-5 to 'ON' on the PAC-AH-M-G to enable thermostat on.

Possible Fan operating conditions (see fig 5.1.1.1):

	Fan Switch	Heating	Cooling	Standby*	Defrost
OPTION 1	ON	✓	✓	×	×
OPTION 2	OFF	✓	✓	✓	×

*Standby is when unit has reached set point.

The fan switch is located next to the mode switch on the ACH2 control board – see figure 5.1.1.1. To change the option for the fan from either option 1 or 2 as seen in the table above, use the switch 'FAN'. For option 1, select ON and for option 2, select OFF.

For refrigerant gas/liquid thermistor position and LEV installation, see Installation Manual for PAC-AH83-250M-G, Air Handling Unit Controller.

To operate with heating and cooling signals, the PAC-AH-M-G needs to enable heating mode by setting dip switch SW3-1 to 'OFF' on AHU control box. This enables the system to both heat and cool and combined with ACH2/2.1 provides a solution for defrost.

7.2 ACH2 operation

Control using Unico room controller

Conditions

- When receiving a signal from Unico for cooling then contact pins 1 and 3 on CN52 show 12V dc signal.
- When receiving a signal from Unico controller for Heating then contact pins 1 and 4 on CN52 show 12V dc signal
- In heating mode, when the temperature on the defrost sensor (refrigerant gas line) ≤ 30 ºC then defrost is enabled and fan relay stops fan.
- In heating mode, when the temperature on defrost sensor >35ºC then defrost signal disabled and fan starts.

The Unico controller is the master controller to call for heating or cooling. The signal is sent via the Unico control on the AHU to the ACH2. In order for the PAR-21MAA to auto change from heating to cooling mode, a flip-flop resistor is used which will force the PAR-21MAA into heating or cooling mode.

- The PAR-21MAA controller can be hidden away with the PAC-AH-M-G and should be set to auto 28ºC.
- The PAR-21MAA controller will display 8ºC in heating and 37ºC in cooling as the return (inlet) air temperature.

7.3 ACH2.1 operation

Control using Mitsubishi Electric controller

Conditions

- When receiving a signal from PAR-21MAA for cooling then contact pins 1 and 3 on CN52 show 12V dc signal.
- When receiving a signal from PAR-21MAA for heating then contact pins 1 and 4 on CN52 show 12V dc signal.
- In heating mode, when the temperature on the defrost sensor (refrigerant gas line) ≤ 30 ºC then defrost is enabled fan relay stops the fan.
- In heating mode, when the temperature on defrost sensor >35ºC then defrost signal disabled and fan starts.

The Mitsubishi controller (PAR-21MAA) is the master controller to call for heating or cooling. The signal is sent to the PAC-AH-M-G which switches on the fan via the ACH2.1.

No Unico controller is used in this mode.

Room temperature is detected by the PAR-21MAA remote thermistor. The thermistor on TH1 on the PAC-AH-M-G must remain connected. To enable return air temperature control see section 5.2.1.

This product is designed and intended for use in the residential, commercial and light-industrial environment.

The product at hand is based on the following EU regulations:

• Low Voltage Directive 73/23/EEC

• Electromagnetic Compatibility Directive 89/336/

Please be sure to put the contact address/telephone number on this manual before handing it to the customer.

MITSUBISHI ELECTRIC UK

MITSUBISHI ELECTRIC UK, TRAVELLERS LANE, HATFIELD, HERTDFORSHIRE, AL10 8XB.