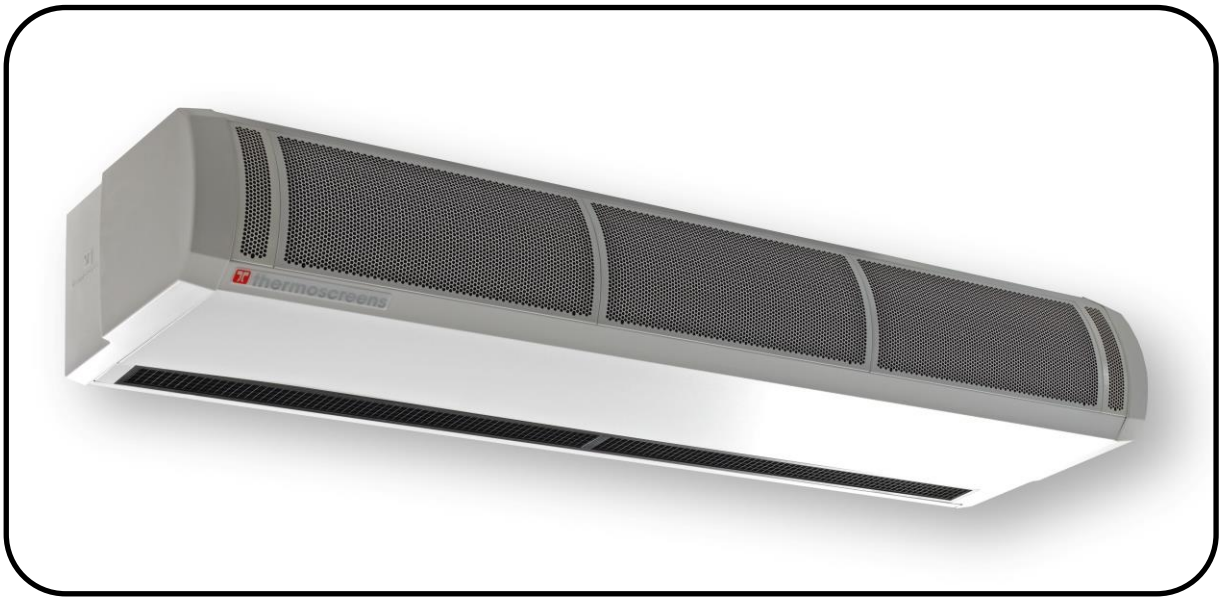
HP DX 2.0 Heat Pump Range Air Curtains

Installation, operation & maintenance instructions



For use with Mr Slim R32 and R410A Outdoor Units

PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING INSTALLATION

Thermoscreens Ltd
St. Mary's Road Nuneaton
Warwickshire England
CV11 5AU

Email: sales@thermoscreens.com
Tel: +44 (0) 24 7638 4646
Fax: +44 (0) 24 7638 8578
www.thermoscreens.com

English

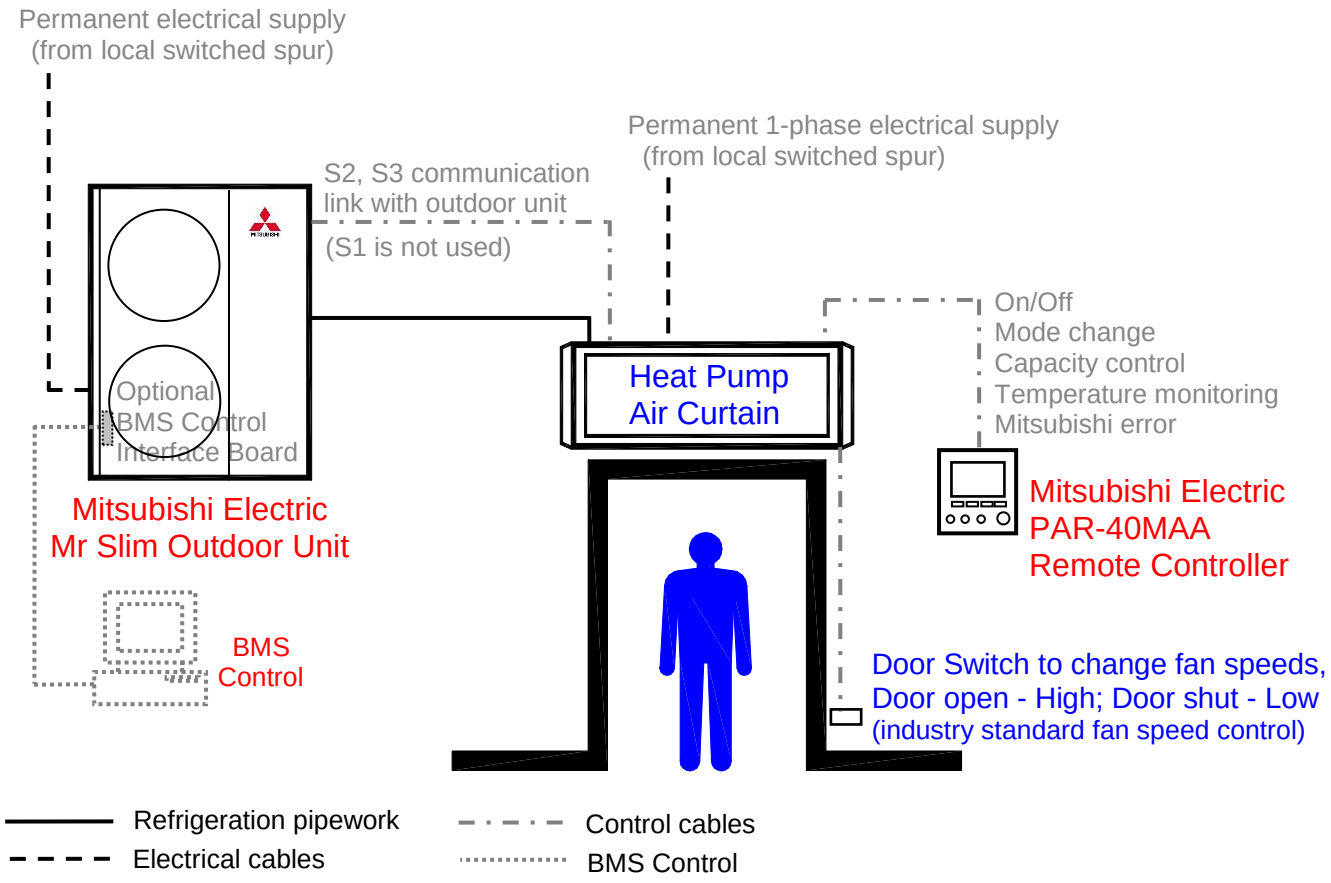
Thermoscreens / Mitsubishi Electric

Mr Slim HP DX 2.0 Heat Pump Air Curtain System

CONTENTS

Thermoscreens / Mitsubishi Electric

Mr Slim HP DX 2.0 Heat Pump Air Curtain System (for providing an air curtain effect at a doorway) with Inlet Air Temperature Control or Room Air Temperature Control



The Mr Slim HP DX 2.0 Heat Pump Air Curtain System consists of :-

- a Thermoscreens 'HP DX 2.0 Air Curtain' fitted with a Mitsubishi Electric PAC-IF011B-E Interface PCB *
- a Mitsubishi Electric R32 or R410A 'Mr Slim Outdoor Unit/Air Conditioner' +
- a Mitsubishi Electric 'PAR-40MAA Remote Controller' for manual control by the occupant of inlet air temperature control or room air temperature control +
- a door switch to change fan speeds; higher speed when the door is open, lower speed when the door is shut (Option - if end user wants it) ^

* - *supplied by Thermoscreens Ltd.*
\+ - *Mitsubishi Electric items supplied by the installer*
^ - *supplied by the installer*

DESIGN INFORMATION

The HP DX 2.0 Heat Pump Air Curtain is a partial unit air conditioner as described in IEC 60335-2-40:2018 and must only be connected to Mitsubishi Electric Mr Slim R32 outdoor units or R410A outdoor units (whilst still available from Mitsubishi Electric).

The air curtain operates on a 1 phase electrical supply (1L+N+E) from a local switched spur which provides power for fans and controls, see also R32 notes on Page 6 and Section 'Installation - Electrical Supply and Wiring to the Air Curtain', Page 15. There is also a communications link with the Mr Slim outdoor unit via connections S2 and S3 (S1 is not used).

The air curtain can be set up on site during commissioning to operate under **Inlet Air Temperature Control** or **Room Air Temperature Control**. The following functions are available:-

- On/Off control of the Mitsubishi Electric heat pump system
- Mode change between Heating mode and Fan only mode, with Cooling mode also available if enabled during commissioning and with a condensate disposal system
- Capacity control of the Mitsubishi Electric heat pump system
- Temperature monitoring of the inlet air entering the heat pump air curtain, or the room air temperature at the remote controller
- Error signal for if the Mitsubishi Electric heat pump system has a problem

Refer to a Mitsubishi Electric agent if the air curtain is to be controlled via a Building Management System (BMS) or Centralised Controller.

It should be noted that during heating mode, if the outdoor unit goes into its defrost cycle during cold weather, the air curtain fans will continue to operate to maintain the all-important air stream across the doorway. It is this air stream, particularly towards the top of the doorway, which is so effective at stopping buoyant warm air from inside the building escaping to outside and wasting energy and also in reducing airborne contamination.

The temperature of the discharge air will be lower during the 3 to 4 minute defrost cycle period that may occur every few hours under particular outdoor weather conditions but this has rarely become an issue with the end user and is really only a perceived problem.

Cooling is possible if the air curtain is modified during commissioning. The air curtain is supplied with its cooling mode disabled, although an integral condensate drain tray is fitted inside the air curtain so it could be used in cooling mode during warm weather, if so desired. This should be decided at the design stage as a condensate drain system will need to be installed if cooling is required and extended to a suitable drain by the installer. The condensate can be drained by gravity by connecting suitable condensate hose onto the 15mm drain pipe on the condensate drain tray inside the air curtain. If a gravity condensate drain is not visually suitable it will be necessary to remove condensate using a condensate pump, supplied and fitted by the installer. The condensate pump can be located inside the right hand end of the air curtain or in a remote location outside of the unit if required. It must be of sufficient capacity, see Page 21, self priming and capable of providing the appropriate suction head so the pump will lift condensate out of the air curtain, particularly if it is in a remote location. There are two hole penetrations at the right hand end of the air curtain for condensate pipework to pass through, see Figure 1, Page 11. Suitable condensate pumps are Peristaltic or Rotary Diaphragm type. We recommend

the Blue Diamond rotary diaphragm type with cooling signal sensor (drainStik) manufactured by Charles Austen Pumps Ltd. (www.bluediamondpump.co.uk).

If using a condensate pump it is recommended that it has the facility so it only operates when the air curtain is in cooling mode by detection of water in the drain tray or by detecting a cooling differential in the airflow. It should also have a pump overrun feature to empty the drain tray as much as possible when the air curtain is switched off. It should have an alarm system with appropriate sensor fitted in the drain tray that will give a volt-free signal (closed circuit = alarm) and stop the air curtain cooling if the condensate drain tray is in danger of flooding (air curtain fans will continue to operate). There is a fixing bracket with 8mm diameter hole attached to the drain tray inside the air curtain so a condensate sensor can be fixed in the tray by the installer. The hole can be enlarged, if necessary, to suit the type of sensor used so it is located in the tray at the appropriate position, see the manufacturer's instructions that come with the condensate pump for further information. A 230V AC, single phase electrical supply is provided inside the air curtain to power a condensate pump and a condensate alarm connection is provided for the condensate pump alarm circuit.

Warning: The air curtain condensate collection system is designed to remove condensate with the air curtain operating in cooling mode during normal summer weather conditions in countries with a temperate climate. In case of extreme weather conditions, drain tray blockage or condensate pump failure, which can occur, it is vital that the design of the floor beneath the air curtain and its surface is such that it will not become slippery or damaged if it became wet. This is similar to the conditions that might be experienced with heavy rainfall in at an open doorway or wet pedestrian foot traffic, so careful consideration must be paid to the design of the floor and its surface finish.

If it is intended that the air curtain should not operate in cooling mode (which is how the air curtain is supplied) and a condensate drain system is not fitted, it is still recommended that the floor design and surface be as described above, in case cooling mode is used in the future and also to cope with heavy rainfall or wet pedestrian foot traffic.

The air curtain is designed for use with a Mitsubishi Electric Mr Slim Outdoor Unit for use on R32 and R410A. The complete Thermoscreens air curtain / Mitsubishi Electric heat pump system, including refrigerant pipework, wiring, controls, etc. must be installed only by an approved Mitsubishi Electric refrigeration contractor.

Persons using the air curtain must be given adequate instruction and supervision concerning the use of the appliance by a person responsible for their safety. The air curtain is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities.

These instructions must be read in conjunction with the separate Mitsubishi Electric instructions that come with the Mr Slim Outdoor Unit. All instructions should be kept by the building facilities manager for future reference.

Personnel working on the air curtain should wear appropriate personal protection equipment (PPE), i.e. gloves and eye protection.

Notes when using R32 refrigerant

R32 (Difluoromethane, CH2F2) is used as the refrigerant for this heat pump air curtain. It should be noted that R32 is an A2L refrigerant with low flammability and may not contain an odour. Personnel carrying out installation, maintenance, service and repair operations affecting safety need to be competent and qualified to work with R32 and hold an appropriate F-Gas handling certificate. Do not vent R32 into the atmosphere.

R32 is a flammable refrigerant, and the fire safety warranty for the whole system (including outdoor unit) must be done by the customer. Conformity of regulations and laws must be confirmed on the system by the installer. For safety, make sure to read the Mitsubishi Electric installation manual for the outdoor unit/air conditioner.

Reference must be made to EN378:2016/ISO5149 and IEC60335-2-40:2018 in the design of the heat pump air curtain installation, particularly relating to charge limits, room sizes and ventilation requirements of the space that the air curtain is located in. Table 1 gives the R32 charge for each size of air curtain used with its corresponding Mitsubishi Electric Outdoor Unit. See also Mitsubishi Electric Outdoor Unit Installation Manual.

Air Curtain	**Basic R32 charge for up to 30m pipework**	Additional R32 charge if using max. length of pipework	**Maximum R32 charge for the max. length pipework**
HP1000 DX 2.0 with PUZ-ZM71	2.8kg	0.8kg for 55m max.	3.6kg for 55m max.
HP1500 DX 2.0 with PUZ-ZM100	4.0kg	2.8kg for 100m max.	6.8kg for 100m max.
HP2000 DX 2.0 with PUZ-ZM140	4.0kg	2.8kg for 100m max.	6.8kg for 100m max.

Table 1

After charging the system with additional R32 refrigerant note the additional refrigerant amount on the service label on the Mitsubishi Electric outdoor unit/air conditioner.

The minimum room volumes to satisfy EN378:2016/ISO5149, for the basic and maximum R32 charge, as given in Table 1, are shown in Table 2 for spaces with Minimum ventilation and for spaces with Additional ventilation, as defined in EN378:2016/ISO5149:

EN378:2016 / ISO5149 minimum Room Volume requirements:

Air Curtain	**Minimum Room Volume (m^3)**			
	for Basic R32 charge (up to 30m pipework)		for Maximum R32 charge (with max. pipework length)	
	with Minimum ventilation	**with Additional ventilation**	**with Minimum ventilation**	**with Additional ventilation**
HP1000 DX 2.0 with PUZ-ZM71	44.4	18.7	57.1	24.0
HP1500 DX 2.0 with PUZ-ZM100	63.5	26.7	108.0	45.3
HP2000 DX 2.0 with PUZ-ZM140	63.5	26.7	108.0	45.3

Table 2

Refer to EN378:2016/ISO5149 for definitions and details of Minimum ventilation and Additional ventilation.

The minimum room floor areas to satisfy IEC60335-2-40:2018, for the basic and maximum R32 charge, as given in Table 1, are shown in Table 3 for an Unventilated space and for a space with Incorporated Circulation Airflow, as defined in IEC60335-2-40:2018:

IEC60335-2-40:2018 minimum Room Floor Area requirements:

Air Curtain	Minimum Room Floor Area (m^2)			
	for Basic R32 charge (up to 30m pipework)		for Maximum R32 charge (for max. pipework length)	
	In an Unventilated space	**with Incorporated Circulation Airflow**	**In an Unventilated space**	**with Incorporated Circulation Airflow**
HP1000 DX 2.0 with PUZ-ZM71	23.7	5.5	30.5	7.1
HP1500 DX 2.0 with PUZ-ZM100	33.9	7.9	57.6	13.4
HP2000 DX 2.0 with PUZ-ZM140	33.9	7.9	57.6	13.4

Table 3

Minimum Installed Height = 2.2m floor to grille.
Refer to IEC60335-2-40:2018 for definitions and details of an Unventilated Space and a space with Incorporated Circulation Airflow.
NB. Even at the lowest fan speed all air curtains exceed the minimum rated airflow/minimum air velocity at grille required by IEC60335-2-40:2018 for with Incorporated Circulation Airflow.

All air curtains in the range contain more than m_1 refrigerant charge as defined in IEC60335-2-40:2018. This being so, if the air curtain is installed in an Unventilated space the installation must be constructed so that any refrigerant leak will not stagnate so as to create a fire or explosion hazard.

If the air curtain is installed in a space with Incorporated Circulation Airflow the Designer/Installer must refer to IEC60335-2-40:2018, Annex GG for specific design details of mechanical or natural ventilation systems and any refrigerant sensors.

Lobby type applications (Vestibules) where the air curtain is located in a small lobby space with inner and outer doors will not have the minimum room volume or minimum floor area required by EN378:2016/ISO5149 or IEC60335-2-40:2018 respectively and would need additional safety measures such as refrigerant leak detection systems, ventilation systems, compressor interlocks, controls, etc. These additional safety measures are the responsibility of the Designer/Installer who must refer to EN378:2016/ISO5149 or IEC60335-2-40:2018 for specific design details.

If the Designer/Installer incorporates a leak detector into the air curtain for safety that requires the air curtain to be operational a permanent notice must be placed on the air curtain, and any supplemental leak detector unit, and contain the substance of the following:
“This unit is equipped with a refrigerant leak detector for safety. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.”
This information must also be included in the on-site information/log book left with the end user.

If the Designer/Installer incorporates a ventilation system for safety that requires the air curtain to be operational a permanent notice must be placed on the air curtain, and any supplemental ventilation unit, and contain the substance of the following:
“This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.”
This information must also be included in the on-site information/log book left with the end user.

For installation and relocation work, follow the instructions in the Installation Manual and use tools and pipe components specifically made for use with R32 refrigerant. If pipe components not designed for R32 refrigerant are used and the unit is not installed correctly, the pipes may burst and cause damage or injuries. In addition, water leakage, electric shock, or fire may result.

When installing or relocating, or servicing the air curtain, use only the specified refrigerant (R32) to charge the refrigerant lines. Do not mix it with any other refrigerant and do not allow air to remain in the lines. Do not use means to accelerate the defrosting process or to clean, other than those recommended by Mitsubishi Electric. Do not pierce or burn the unit.

The installer must refer to Mitsubishi Electric and to the Mitsubishi Electric Installation Manual that comes with the outdoor unit/air conditioner taking particular attention to any references concerning the use of refrigerant R32 and for the following information:

- Handling, charging and disposal of refrigerant/operating-fluid/equipment and the hazards associated with it;
- Pipework sizes, pipework lengths, numbers of fittings, etc.;
- concerning function and maintenance of safety, protective and first aid equipment;
- guidance for the drafting of the logbook;
- reference to protective measures, first aid provisions and procedures to be followed in the event of emergencies, e.g. leakage, fire, explosion; refer to EN378-3:2016;

Any ventilation openings must be kept clear of obstruction. Do not connect ducts to the unit. Any ducting into the space that the unit is located in must not contain a potential ignition source and false ceilings shall not be used as ducting.

The refrigeration system of air curtain and outdoor unit/air conditioner does not fall into the category of enhanced tightness refrigerating system as defined in IEC60335-2-40:2018.

There shall be no ignition sources, permanent or temporary, that could ignite R32 refrigerant.

Charging of the refrigerating system during installation, or removal and recovery of refrigerant during decommissioning must be carried out in accordance with IEC60335-2-40:2018, Annex DD. After decommissioning, the air curtain must be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Disposal of refrigerant must be done in accordance with F-gas regulations by a competent maintenance technician with F-gas qualifications. At the end of its operational life the air curtain must be disposed of in accordance with local recycling regulations.

An independent explosion risk assessment, as required by DSEAR, has been conducted on the air curtain and resulted in an overall risk ranking of 8, or Broadly Acceptable.

UNPACKING THE AIR CURTAIN

The following items are supplied and packaged within the air curtain box :-

HP DX 2.0 Heat Pump Air Curtain

Please note, plastic end caps are supplied loose to be fitted during installation

Wall Brackets and Fixing Bolts

for if air curtain is to be wall mounted

If anything is missing or damaged please contact your place of purchase immediately.

Take care when lifting and handling the air curtain, do not lift by the refrigerant connection pipes.

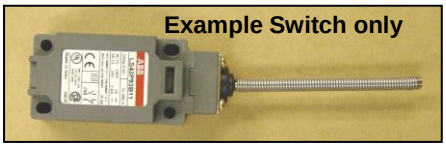
There will also be a Mitsubishi Electric 'R32 or R410A Mr Slim Outdoor Unit/Air Conditioner' supplied by the Installer.

The Installer may also need to supply and install the following:-

PAR-40 MAA Remote Controller

If Air Curtain is to be manually controlled, also needed for commissioning

Door Switch – for energy efficient, noise friendly, fan speed control,
Door open – Higher fan speed
Door shut – Lower fan speed



Gives industry standard fan speed control – see wiring diagrams and text on Pages 19, 23 & 24 for more information

Condensate Pump – self priming with cooling mode detection, alarm system and pump overrun

If Air Curtain is to be operated in COOL mode and gravity drain cannot be used – see text on Pages 4 & 5 for more information

Side-Guard Airstream Vanes from Thermoscreens Ltd.

The complete Thermoscreens air curtain / Mitsubishi Electric heat pump system, to provide a heat pump air curtain over a doorway, including wiring, fridge pipework, etc. is to be installed only by an approved Mitsubishi Electric refrigeration contractor.

IMPORTANT

This Heat Pump Air Curtain is intended only for use with a Mitsubishi Electric Mr Slim Outdoor Unit, for use on R32 or R410A.

These instructions must be read in conjunction with the Mitsubishi Electric Mr Slim Outdoor Unit instructions.

(All documentation supplied with each unit should be stored and kept for future reference.)

If the air curtain is not to be installed immediately it must be stored so as to prevent mechanical damage from occurring.

For your records:

Date of Purchase……..

Place of Purchase…….

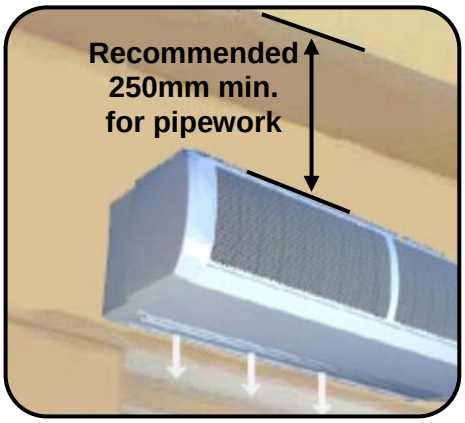
Serial Number……

For warranty purposes proof of purchase is necessary so please keep a copy of your invoice.

INSTALLATION OF THE AIR CURTAIN

The air curtain is designed to be surface mounted inside a building and located horizontally over a doorway. It must not be installed on the outside of the building, or built into a cabinet or recessed in any way.

Location



The air curtain must be mounted so the discharge grille is between 2.2m minimum and 3.2m maximum (AC Fans) 3.6m maximum (EC Fans) above floor level and as close to the doorway as possible. It must be installed level or condensate may leak out if used for cooling. It is recommended to leave a gap of 250mm minimum above the air curtain to allow for pipework brazing operations. Beware of doorway top edges, structural beams, door opening/closure devices, etc. which may interfere with the air stream and affect the location of the unit.

Wall Fixing

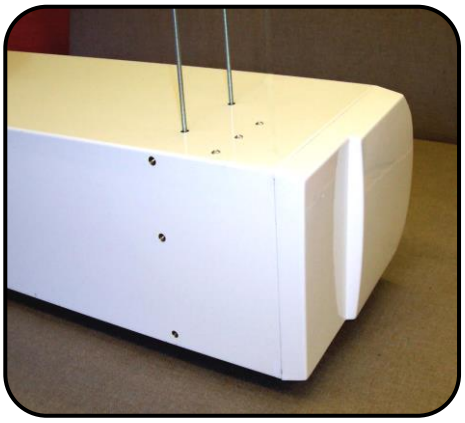
Bolt all of the wall brackets supplied to the rear face of the unit as shown in the adjacent picture using the M10 bolts supplied. Suitable wall fixing bolts (not supplied) need to be used to fix the brackets to the wall, taking into account the type of wall and the weight of the unit*, see Table 4:

Air Curtain	Weight (kg)
HP1000 DX 2.0	46
HP1500 DX 2.0	67
HP2000 DX 2.0	84

Table 4

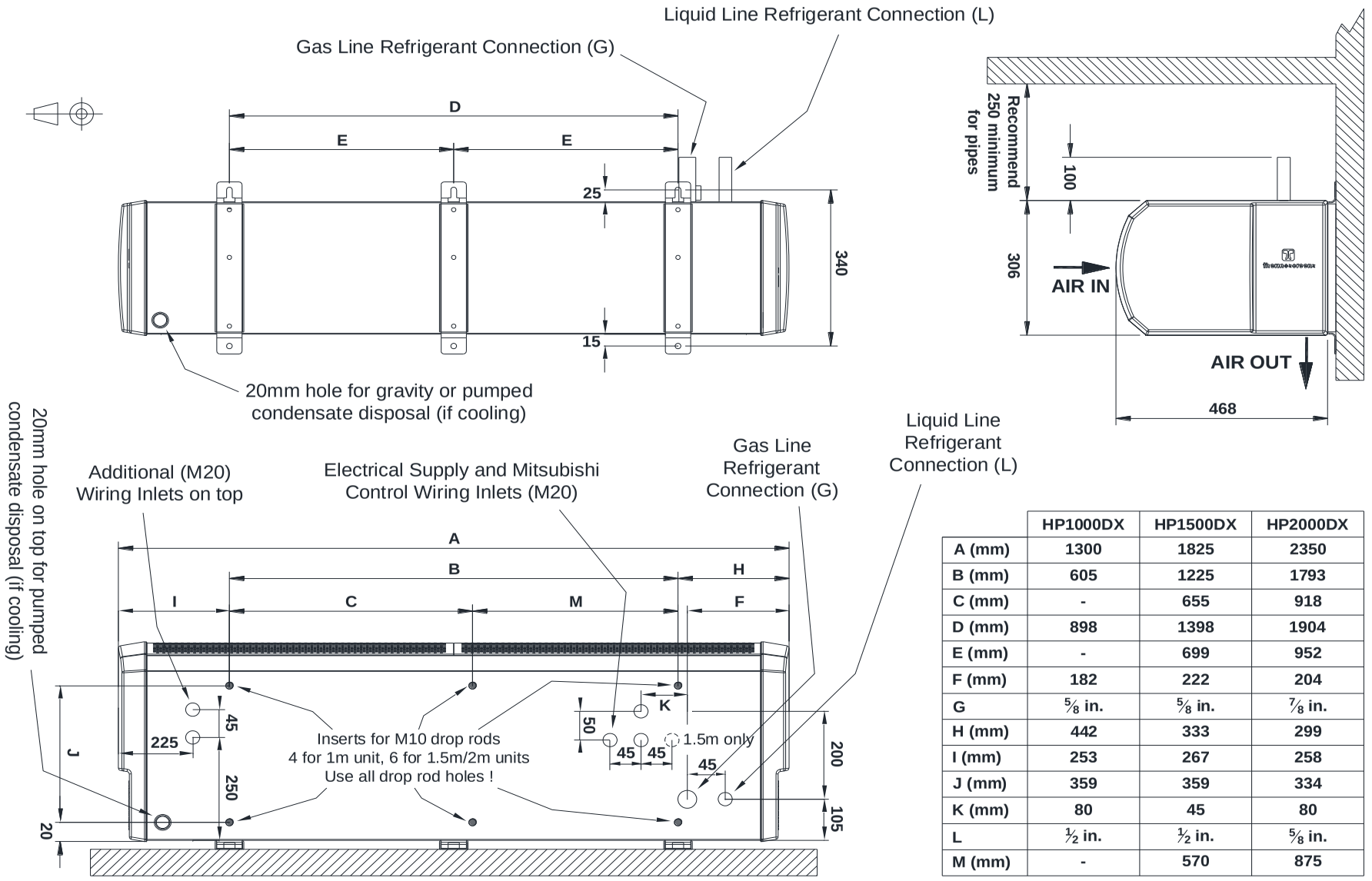
Step 1. Refer to Figure 1, Page 12 for mounting details and drill the fixing points in the wall.
Step 2. Screw in the top wall bolts leaving a small gap between the head and the wall. Lower the unit onto the bolts via the key-hole slots in the top of the wall brackets and then screw in the bottom wall bolts. Take care not to damage the refrigerant connection pipes.
Step 3. Ensure all fixing bolts are tightened and the air curtain is safely secured to the wall.

Ceiling Suspension



M10 threaded inserts are provided in the top face of the unit (see Figure 1, Page 12 for positions) so it can be suspended on M10 threaded hanging rods (not provided). All suspension points must be used. Ensure each of the hanging rods is secured onto a suitable structure that can support the weight of the unit (see table above)*. Screw the hanging rods into the inserts by a minimum or 20mm and fit locking nuts (not provided) to prevent the rod rotating and coming away from the casing. Do not screw the hanging rod too far in or it could interfere with internal components.

* It is the sole responsibility of the installer to ensure that the building fixing locations and suspension system used are suitable for the air curtain being installed.



	HP1000DX	HP1500DX	HP2000DX
A (mm)	1300	1825	2350
B (mm)	605	1225	1793
C (mm)	-	655	918
D (mm)	898	1398	1904
E (mm)	-	699	952
F (mm)	182	222	204
G	⅝ in.	⅝ in.	⅞ in.
H (mm)	442	333	299
I (mm)	253	267	258
J (mm)	359	359	334
K (mm)	80	45	80
L	½ in.	½ in.	⅝ in.
M (mm)	-	570	875

FIGURE 1 – DIMENSIONS OF HP DX 2.0 HEAT PUMP AIR CURTAIN

Mitsubishi Electric Outdoor Unit/Air Conditioner

Only a Mitsubishi Electric Mr Slim R32 or R410A Outdoor Unit/Air Conditioner must be used. The size of the Outdoor Unit is selected to match its refrigerant heat output to the size of the Air Curtain. See table below for size of outdoor unit to be used together with performance data for the air curtain.

Air Curtain	Mr Slim Outdoor Unit Index Size	Air Curtain Parameters								
		Maximum Heating Output (kW)		Maximum Cooling Output (kW)		Max. Air Volume Flow Rate (m^3/h)		Maximum Noise Level dB(A) @3m		Effective Width of Airstream (m)
		AC	EC	AC	EC	AC	EC	AC	EC	
HP1000 DX 2.0	71	8.3	8.9	7.4	7.8	1310	1590	56	57	1.10
HP1500 DX 2.0	125	13.2	14.3	11.8	12.1	2070	2500	56	57	1.63
HP2000 DX 2.0	140	15.7	15.8	14.0	14.1	2590	3200	57	58	2.15

R32 Outdoor Units are designated PUZ-ZM… R410A Outdoor Units are designated ZRP…
Outputs based on:- Indoor air temperature = 20ºC. Outdoor condition = 7/6 db/wb ºC for heating output, 35/27 db/wb ºC for cooling output. AC = with AC Fans, EC = with EC Fans
Performance figures derived from independent testing by UK test houses BRE and BSRIA in accordance with test standard EN14511. Noise testing carried out at Sound Research Laboratories to ISO3741, ISO27327-2 and BS4856-4. See Table 4-5 on Page 23-24 for more details of air volume flow rates and noise levels.

Refrigerant Pipework – see Notes when using R32; Section: Design Information

This must be carried out <u>before</u> connection of any electrical and controls cables and in accordance with the Instructions that come with the Mitsubishi Electric Outdoor Unit. This work must only be undertaken by a Mitsubishi Electric approved Contractor and in compliance with national gas regulations.

Keep the pipework installation to a minimum and protect from physical damage. The installation **<u>must</u>** be carried out in accordance with EN378:2016/ISO5149, IEC60335-2-40:2018 and the Mitsubishi Electric Installation Manual that comes with the outdoor unit/air conditioner taking particular attention to any references concerning the use of refrigerant R32. This gives information for handling, installation, cleaning, servicing, disposal of refrigerant, pipework sizes, pipework lengths, numbers of fittings, etc.

It is intended that refrigerant pipe connections to the air curtain are made using brazed joints and these must be carried out in a professional and safe manner. If installation pipe sizes for the discharge (gas) line and liquid line are different from the pipe connection sizes on the air curtain (see Figure 1, Page 12) suitable pipe reducers must be used for the connection. R32 and R410A refrigerant systems can operate at pressures up to 42 bar. These brazed joints may well be located in a public area and a weakness leading to an explosion could be extremely dangerous.

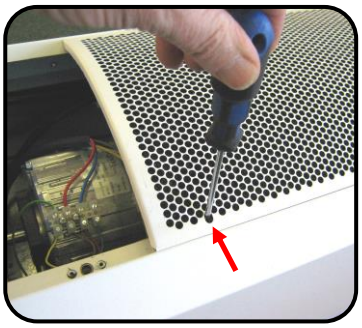
The air curtain with its coil is manufactured in accordance with the Pressure Equipment Directive (PED) and the installation must be carried out to a good standard of workmanship. Remove the protective plastic film on top of the air curtain before starting work and protect the top surface of the air curtain. Use a heat sink on the copper pipes during brazing to reduce the transfer of heat to the inside of the air curtain where sensitive components are located.

To gain access inside the Air Curtain

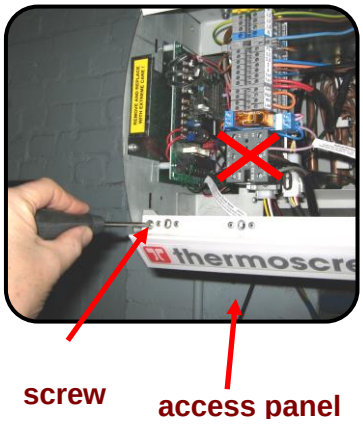
To gain access for connection of the electrical supply, controls wiring and to work on the unit during commissioning, remove the air inlet grilles and the bottom access panel.

First remove the plastic end caps at each end of the unit, if already fitted, by pulling off to the side (see picture).

Then remove each inlet grille in turn with its filter by unfastening the quarter-turn Philips Head fastener at the bottom corner of the grille. Use a Philips No.1 screwdriver to access the screw via the elongated hole at the bottom corner of each grille and turn anti-clockwise to remove (see picture).



To remove the bottom access panel unfasten the access panel securing screws, one at each end, plus two in the centre (HP1500 DX 2.0 and HP2000 DX 2.0 units) and slide the panel out forwards (see picture).



Please note: *All the panels of the air curtain are covered in a protective plastic film which should now be removed.*

Electrical Supply and Wiring to the Air Curtain

This must be carried out AFTER the connection of the refrigerant pipework. All electrical wiring and connections MUST be carried out by a competent qualified electrician in accordance with the latest edition of the National wiring/IEE wiring regulations and/or local statutory regulations. (see also Wiring Diagrams 1 & 2)

- A local isolator having a contact separation of at least 3mm on all poles must be fitted in the 1 phase electrical supply (1L + N + E) to the air curtain and located in an accessible position adjacent to the unit.

  Do not have a switch or isolator in the S2, S3 (Comms Link), use continuous wire.
- The appliance must be connected using cables having an appropriate temperature rating (heat resistant).
- Ensure that the supply cables, circuit breakers and other electrical installation equipment are correctly sized for the air curtain being installed. See Table below.
- A 25mm size cable gland or conduit connector should be used for the Electrical Supply into the air curtain. See Figure 1, Page 12 showing where the electrical supply enters the unit.
- This is a Class 1 appliance and must be Earthed.

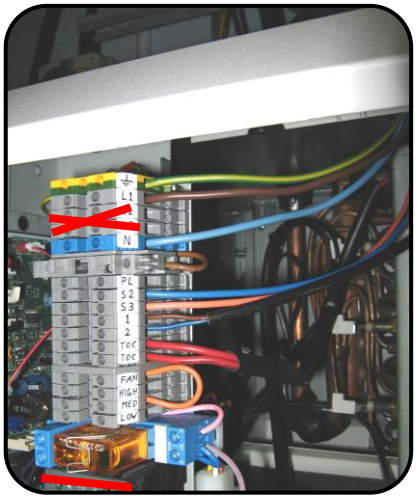
Air Curtain	Rated Electrical Power Input (kW)		Rated Current (A)	
	AC Fans	EC Fans	AC Fans	EC Fans
HP1000 DX 2.0	0.2	0.3	0.8	1.2
HP1500 DX 2.0	0.3	0.4	1.2	1.6
HP2000 DX 2.0	0.35	0.45	1.4	1.9

Wiring the unit - see Wiring Diagram 1 or 2 (230V/1ph/50Hz electrical supply from separate local isolator)

Connect to terminals Earth, L1 and N with a 1-phase electrical supply.

Connect terminals S2 and S3 from the outdoor unit to terminals S2 and S3 on the air curtain – Communication link between outdoor unit and the air curtain.

Connect a Mitsubishi Electric PAR-40MAA Remote Controller to terminals 1 and 2 on the air curtain.



Recommended wire sizes for electrical connections are as follows:

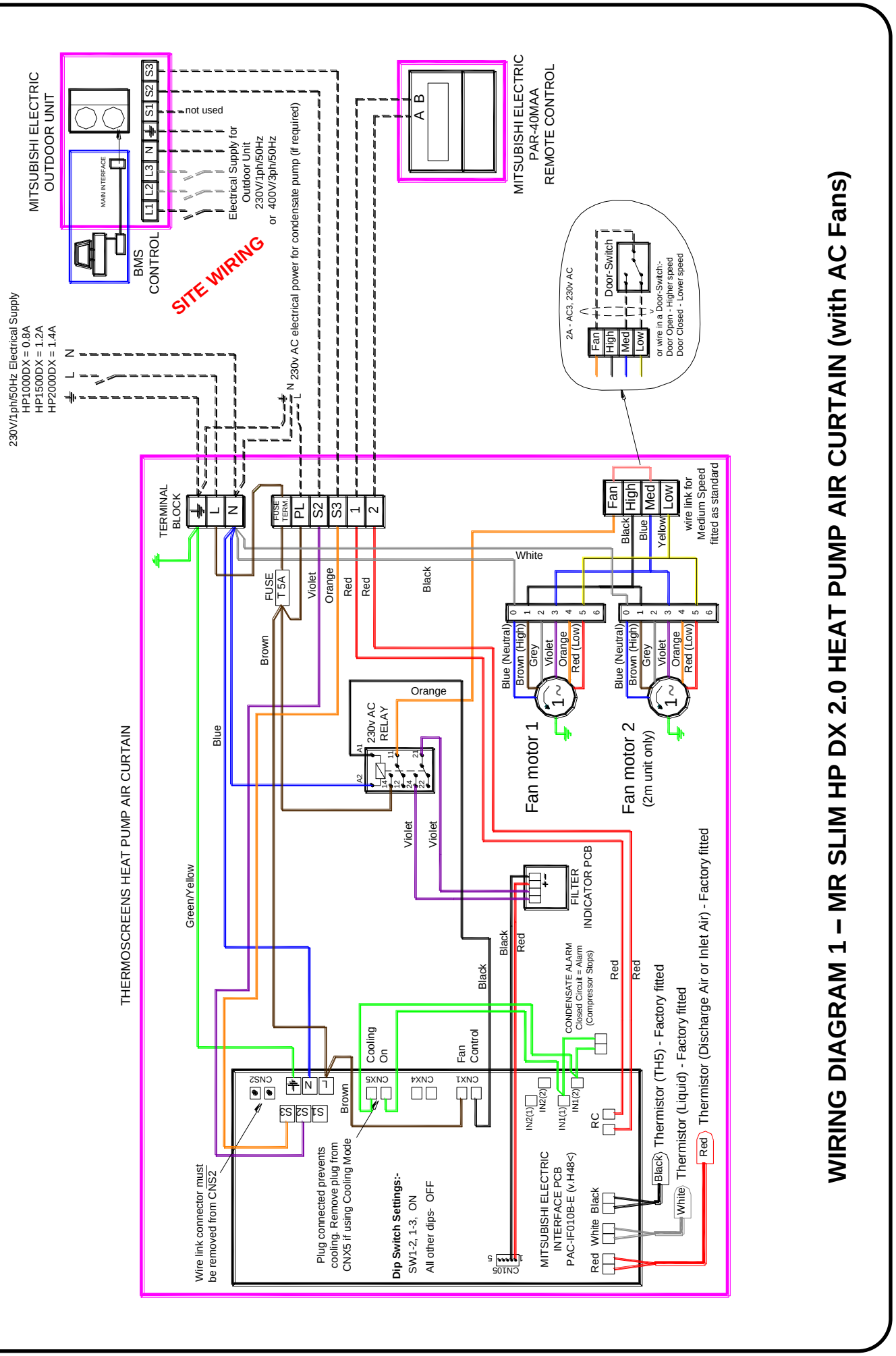
Electrical Connection	Wire Size
1-phase electrical supply from separate local isolator	2.5mm^2 max. for access
S2, S3 – communication link between outdoor unit and the air curtain	1.5mm^2
Mitsubishi Electric PAR-40MAA Remote Controller (2-core cable)	0.75mm^2
Door switch to change fan speeds as door opens and shuts or Remote 3-Speed fan switch	0.75mm^2
PL (**P**ump **L**ive electrical feed for condensate pump only) 230V ac, 1ph, 50Hz, 1A max.	0.75mm^2

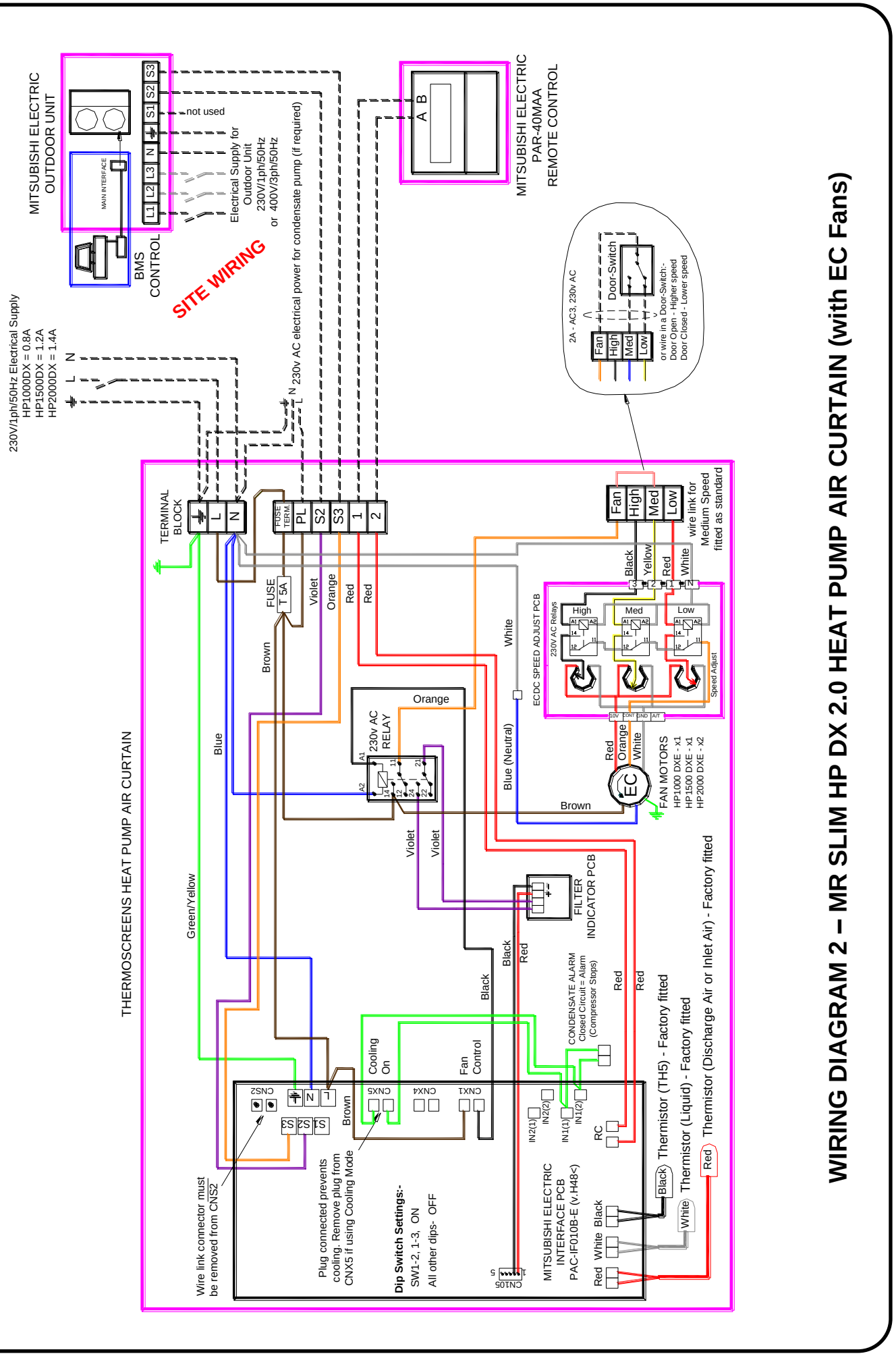
Refer to Mitsubishi Electric for electrical details of the Mr Slim Outdoor Unit.

Fuses:
There are the following electrical fuses within the air curtain

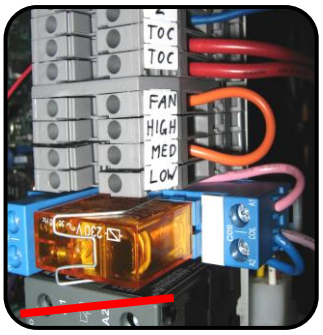
Fuse Location	Fuse Type	Fuse Rating
DIN Rail connector block	5x20mm, 250Vac	T5A
at rear of Mitsubishi Electric interface PCB	5x20mm, 250Vac	T3.15A

Units using R32 refrigerant:
Any refrigerant leak detection safety system or ventilation safety system must have its own separate electrical feed. Do not use terminal PL (condensate **P**ump **L**ive) feed from the air curtain.


WIRING DIAGRAM 1 – MR SLIM HP DX 2.0 HEAT PUMP AIR CURTAIN (with AC Fans)
MITSUBISHI ELECTRIC OUTDOOR UNIT
MAIN INTERFACE
L1 L2 L3 N S1 S2 S3
not used
Electrical Supply for Outdoor Unit 230V/1ph/50Hz or 400V/3ph/50Hz
BMS CONTROL
SITE WIRING
MITSUBISHI ELECTRIC PAR-40MAA REMOTE CONTROL
A B
230V/1ph/50Hz Electrical Supply
HP1000DX = 0.8A
HP1500DX = 1.2A
HP2000DX = 1.4A
L N
230v AC electrical power for condensate pump (if required)
2A - AC3, 230v AC
Door-Switch
Fan High Med Low
or wire in a Door-Switch:-
Door Open - Higher speed
Door Closed - Lower speed
THERMOSCREENS HEAT PUMP AIR CURTAIN
TERMINAL BLOCK
L N
FUSE TERM.
PL S2 S3 1 2
FUSE T 5A
Violet
Orange
Red
Red
Black
Brown
Blue
White
Fan High Med Low
Black Blue Yellow
wire link for Medium Speed fitted as standard
230v AC RELAY
A1 A2 11 12 14 21 22 24
Orange
Violet
Violet
Fan motor 1
Fan motor 2
(2m unit only)
Blue (Neutral)
Brown (High)
Grey
Violet
Orange
Red (Low)
FILTER INDICATOR PCB
Green/Yellow
Black
Red
Red
Red
CONDENSATE ALARM
Closed Circuit = Alarm
(Compressor Stops)
Cooling On
Fan Control
CNS2
CNX5
CNX4
CNX1
IN2(1) IN2(2)
IN1(1) IN1(2)
RC
Brown
Wire link connector must be removed from CNS2
Plug connected prevents cooling. Remove plug from CNX5 if using Cooling Mode
Dip Switch Settings:-
SW1-2, 1-3, ON
All other dips- OFF
CN105
MITSUBISHI ELECTRIC INTERFACE PCB PAC-IF010B-E (v.H48<)
Red White Black
Black Thermistor (TH5) - Factory fitted
White Thermistor (Liquid) - Factory fitted
Red Thermistor (Discharge Air or Inlet Air) - Factory fitted


WIRING DIAGRAM 2 – MR SLIM HP DX 2.0 HEAT PUMP AIR CURTAIN (with EC Fans)
MITSUBISHI ELECTRIC
OUTDOOR UNIT
MAIN INTERFACE
L1 L2 L3 N S1 S2 S3
not used
Electrical Supply for
Outdoor Unit
230V/1ph/50Hz
or 400V/3ph/50Hz
BMS
CONTROL
SITE WIRING
MITSUBISHI ELECTRIC
PAR-40MAA
REMOTE CONTROL
A B
230V/1ph/50Hz Electrical Supply
HP1000DX = 0.8A
HP1500DX = 1.2A
HP2000DX = 1.4A
L N
230v AC electrical power for condensate pump (if required)
2A - AC3, 230v AC
Door-Switch
Fan High Med Low
or wire in a Door-Switch:-
Door Open - Higher speed
Door Closed - Lower speed
THERMOSCREENS HEAT PUMP AIR CURTAIN
TERMINAL BLOCK
L N
FUSE TERM
PL S2 S3 1 2
FUSE T 5A
Fan High Med Low
wire link for Medium Speed fitted as standard
Black Yellow Red White
3 2 1 N
ECDC SPEED ADJUST PCB
230V AC Relays
High Med Low
Speed Adjust
0V CONT GND A/T
230v AC RELAY
A1 A2 11 12 14 21 22
Orange
Violet
Violet
Blue
Brown
Red
Red
Orange
White
Blue (Neutral)
Brown
Red Orange White
EC
FAN MOTORS
HP1000 DXE - x1
HP1500 DXE - x1
HP2000 DXE - x2
FILTER INDICATOR PCB
Green/Yellow
Black
Red
CONDENSATE ALARM
Closed Circuit = Alarm
(Compressor Stops)
Red
Red
Cooling On
Fan Control
CNX5 CNX4 CNX1
CNS2
L N
S1 S2 S3
Brown
IN2(1) IN2(2)
IN1(1) IN1(2)
RC
CN105
MITSUBISHI ELECTRIC
INTERFACE PCB
PAC-IF010B-E (v.H48<)
Red White Black
Black Thermistor (TH5) - Factory fitted
White Thermistor (Liquid) - Factory fitted
Red Thermistor (Discharge Air or Inlet Air) - Factory fitted
Wire link connector must be removed from CNS2
Plug connected prevents cooling. Remove plug from CNX5 if using Cooling Mode
Dip Switch Settings:-
SW1-2, 1-3, ON
All other dips- OFF

Wiring of Air Curtain Fan Speed

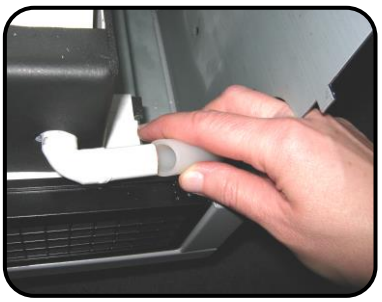


As delivered the air curtain is wire-linked to operate on a single fan speed at its medium speed, see picture opposite (orange wire). Current thinking for air curtain technology, however, is to have a Door-Switch wired to switch the unit between a Higher fan speed - Door Open and a Lower fan speed - Door Closed. This is both energy efficient and noise friendly. Alternatively a single fan speed, High, Medium or Low, can be set at commissioning to suit the general weather conditions of the site. Both methods prevent the end user switching fan speeds and maybe leaving the air curtain on an unsuitable setting.

A door switch or wire-link for single speed is wired to terminals FAN, HIGH, MED and LOW in the Air Curtain using 230V mains rated double insulated cable of size 0.75mm^2. See also Wiring Diagrams and Section, Commissioning; 'Selecting the fan speeds of the air curtain' on page 23-24 which gives details as to how the available speeds of the fan motor(s) can be set to suit outdoor environmental conditions and indoor noise levels.

Condensate Disposal System

If it is intended to use the air curtain in cooling mode the plug must be removed from CNX5 on the PAC-IF011 Interface PCB (see Wiring Diagrams) and a condensate disposal system must be installed.



The air curtain is fitted with a condensate drain tray with 15mm copper outlet pipe at the right hand side of the air curtain. Suitable condensate hose can be fitted to the pipe (see picture) and fed through a 20mm hole at the back of the unit, see Figure 1, Page 12, so condensate will gravity drain away. Means of condensate disposal must then be provided at the rear of the air curtain.

If it is not practical to gravity drain from the air curtain a suitable condensate pump (not supplied with the unit) can be supplied and fitted by the installer to remove condensate directly from the unit. The condensate pump must be of sufficient capacity (see Table 5 below) and if located higher than the drain tray; self priming and capable of providing the appropriate suction head so the pump will lift condensate out from the top of the air curtain. Suitable condensate pumps with a suction head are Peristaltic or Rotary Diaphragm type. It is recommended that the condensate pump has the facility so it only operates when the air curtain is in cooling mode by detection of water in the drain tray or by detecting a cooling differential in the airflow. It should also have a pump overrun to empty the drain tray as much as possible when the air curtain is switched off. We recommend the Blue Diamond rotary diaphragm type with cooling signal sensor (drainStik) manufactured by Charles Austen Pumps Ltd. (www.bluediamondpump.co.uk).

Table 5

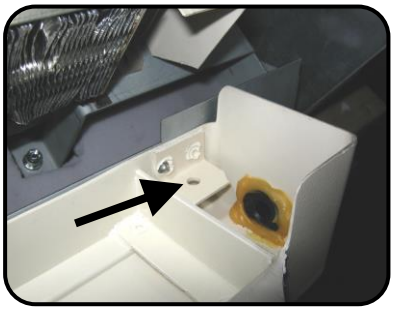
Air Curtain	Maximum likely condensate flow rate (litres/hour)
HP1000 DX 2.0	8.0
HP1500 DX 2.0	12.0
HP2000 DX 2.0	14.0

There is space inside the air curtain at the right hand end of the unit to mount a condensate pump. A permanent 230V AC, single phase electrical supply is provided inside the air curtain at the DIN-Rail terminals to power the pump, see Wiring Diagrams. There are two 20mm condensate outlet holes in the casing, one at the top of the unit and a lower one at the rear, both fitted with rubber plugs (see Figure 1, Page 12). These can be used to feed a hose from the condensate pump to a remote condensate drain.

Condensate drain hose should be pushed through either of the two condensate outlet holes after removing the plug and connected to the condensate pump using the adapter supplied with the pump. It may be necessary to extend the hose if the pump is remotely located.

Whether a gravity drain system or a condensate pump is used to remove the condensate there should be an alarm system with appropriate sensor fitted in the drain tray that will give a volt-free signal (closed circuit = alarm). A 2-wire condensate alarm signal should be wired back to the condensate alarm connection provided at the Interface PCB inside the air curtain. This will stop the air curtain cooling if the condensate drain tray is in danger of flooding, bringing up an error code on the Mitsubishi Electric system (air curtain fans will continue to operate).

There is a fixing bracket with 8mm diameter hole attached to the drain tray inside the air curtain so a condensate alarm sensor can be fixed in the tray by the installer. Hinge the drain tray down to gain better access to the fixing bracket (see picture and Section, Servicing – Page 32). Enlarge the hole if necessary to suit the type of sensor being used so it is located in the tray at the appropriate position. If a condensate pump is being used see the manufacturers instructions that come with the pump for further information.

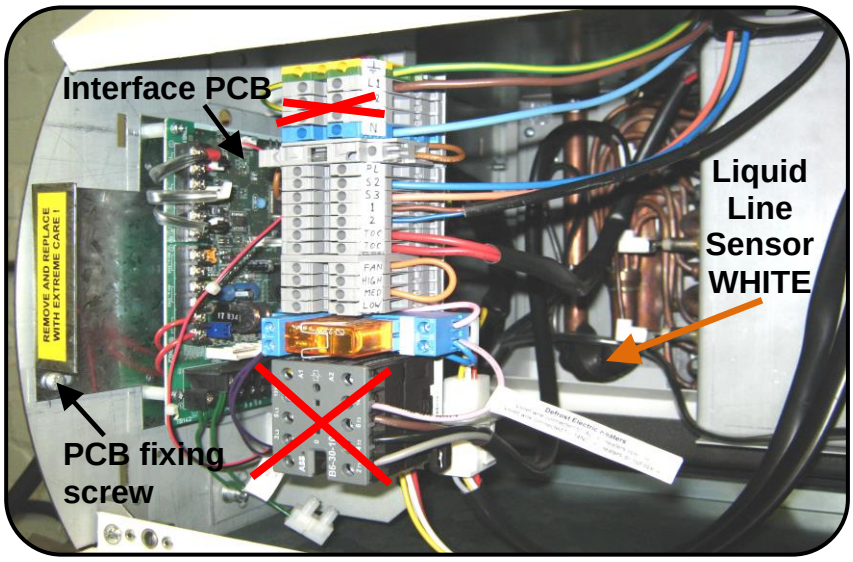


COMMISSIONING THE AIR CURTAIN

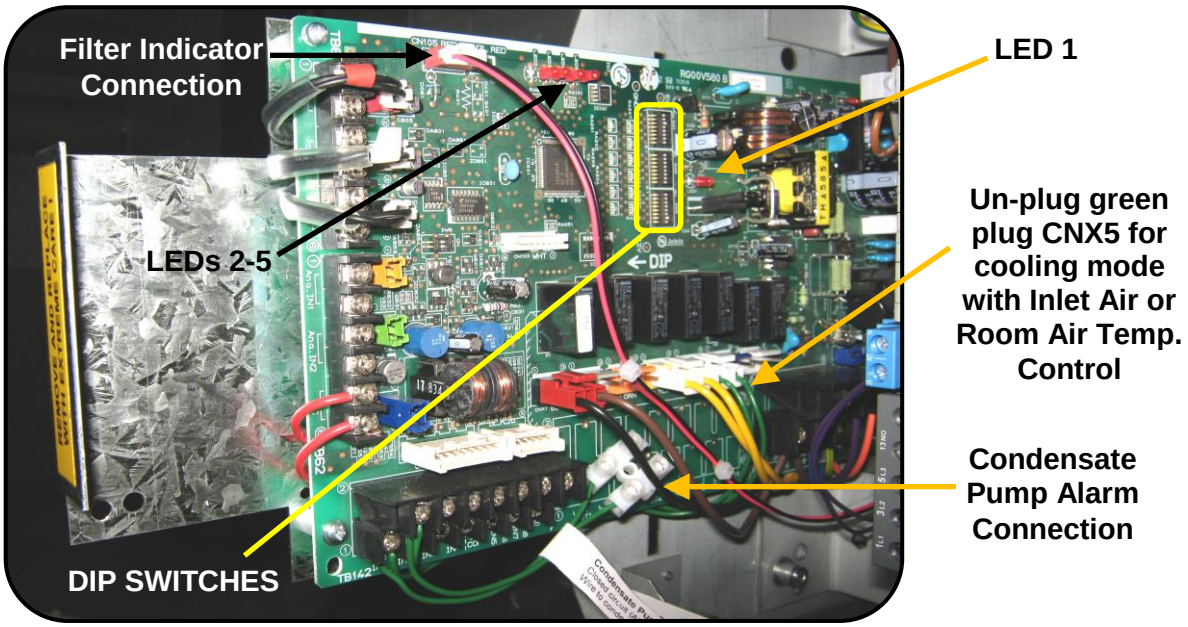
Ensure that the electrical supply to the Mitsubishi Electric Outdoor Unit/Air Conditioner and the local electrical supply to the Air Curtain, are switched off.

Air Curtain Checks

Check that the components inside the air curtain are as shown in the picture below.



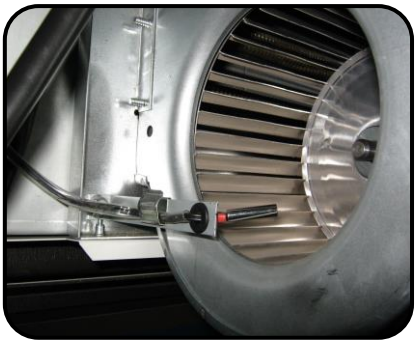
There is a Mitsubishi Electric Interface PCB located within the left hand end of the Thermoscreens Air Curtain. This provides control and communication between the Mitsubishi Electric Outdoor Unit and the Air Curtain Indoor Unit. It is held in place by a fixing screw located in the left-hand end panel of the air curtain under the left-hand plastic end cap. Remove the screw and carefully slide the PCB partially out. For easier withdrawal of the PCB the filter indicator connection may be temporarily removed.



Dip Switch Settings and Air Temperature Sensor Location

Check that the dip switches on the Interface PCB are set as follows:

The air temperature sensor for Inlet Air Temperature Control (marked red) is located in the air inlet of the fan on a bracket, see picture.



If the air curtain is going to be operated under Room Air Temperature Control the PAR-40MAA Remote Controller will need to be set up via its Installer Menu so that temperature sensing is done at the controller. See instructions that come with the controller. It does not matter where the air temperature sensor (marked red) is located as air temperature sensing is now done at the PAR-40MAA Remote Controller

Check that the wiring between the air curtain and the Mr Slim outdoor unit is in accordance with the Wiring Diagram. If the Interface PCB is still withdrawn, carefully slide it back into place and re-plug the Filter Indication connection into CN105 if removed earlier. Ensure cables are not trapped inside and refit the retaining screw.

As the Mr Slim outdoor unit and the air curtain indoor unit are on separate electrical supplies the PCB in the outdoor unit must have dip SW8-3 ON.

Selecting the Fan Speeds of the Air Curtain – AC Fans

The fan motor(s) in the air curtain is a 5-speed motor and fan speeds can be re-selected at commissioning to suit the installation, both to suit the outdoor environmental conditions and for indoor noise levels.

As delivered, for the 3 fan speeds available at the fan speed DIN rail terminals:-

the HIGH fan speed (black wire) is wired into motor tapping 1 (highest motor speed tapping),

the MEDIUM fan speed (blue wire) is wired into motor tapping 3,

the LOW fan speed (yellow wire) is wired into motor tapping 5 (lowest motor speed),

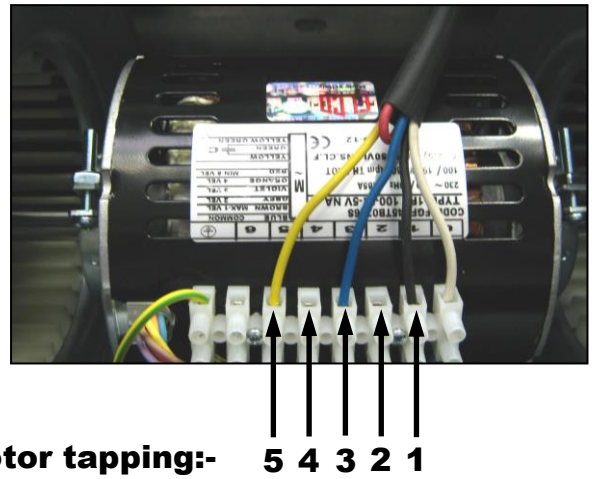


Table 6 provides guidance as to how the fan speeds can be set.

Table 6

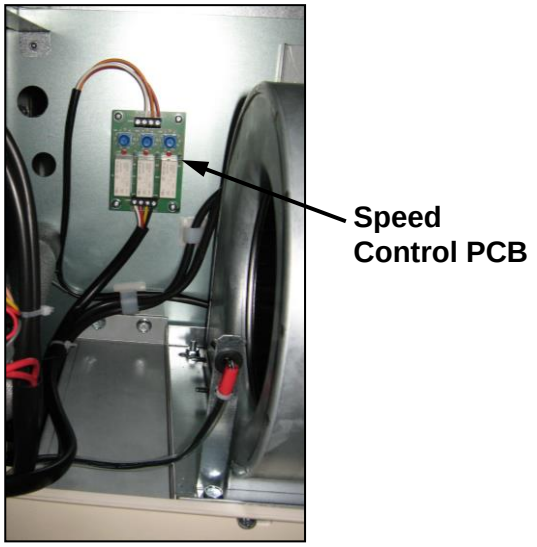
Fan Speed (air curtain as delivered)	**Motor Speed Tapping** (see Wiring Diagram)	**Maximum air curtain mounting height** (m)	**Sound Pressure Level of air curtain** [dB(A) at 3m, +/-2dB]	**Air Volume Flow Rate** (m^3/h)
HIGH (black wire)	1 – (Highest speed)	3.2	HP1000 DX 2.0 = 57 HP1500 DX 2.0 = 56 HP2000 DX 2.0 = 57	1310 2070 2590
	2	2.8	HP1000 DX 2.0 = 56 HP1500 DX 2.0 = 54 HP2000 DX 2.0 = 56	1250 1860 2480
MEDIUM (blue wire)	3	2.4	HP1000 DX 2.0 = 54 HP1500 DX 2.0 = 52 HP2000 DX 2.0 = 54	1170 1750 2340
	4	2.0	HP1000 DX 2.0 = 51 HP1500 DX 2.0 = 49 HP2000 DX 2.0 = 51	1030 1460 2070
LOW (yellow wire)	5 – (Lowest speed)	1.8	HP1000 DX 2.0 = 47 HP1500 DX 2.0 = 45 HP2000 DX 2.0 = 47	900 1240 1810

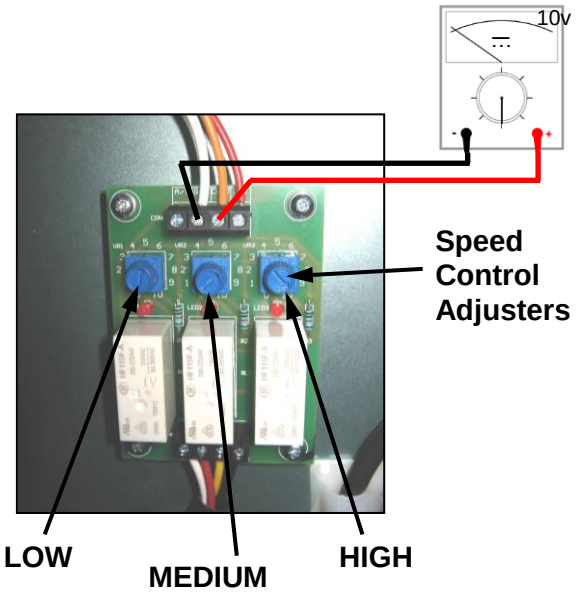
See also Section, Installation; 'Wiring of Air Curtain Fan Speed' giving details of how to wire in fan speeds.

Sound pressure levels dB(A) at 3m distance are for a single air curtain mounted at its maximum mounting height, operating in a room with average acoustic characteristics as defined in CIBSE Guide B5 (reverberation time 0.7s at 1kHz) and a room size equivalent to 8 air changes per hour (ac/h). Care needs to be taken when selecting air curtains for an installation as noise levels can be several dB higher if the mounting height is reduced, if the room is more 'live' (i.e. hard surfaces, no furnishings or absorbent materials), if the room is smaller than 8 ac/h equivalent or a combination of these factors. Noise levels will also increase if more than one air curtain is installed at the same doorway (e.g. +3dB(A) for 2 equal point sources: direct field).

Setting the Fan Speeds of the Air Curtain – EC Fans

If EC fans are fitted in the air curtain there is a speed control PCB fitted inside the unit with adjuster knobs to set the High, Medium and Low fan speeds available at the fan speed DIN rail terminals:-





The speed control adjusters can be set between 0 and 10(High), check with a voltmeter to set speed accurately. The 3 fan speeds are factory set but can be re-adjusted at commissioning to suit the installation, both to suit the outdoor environmental conditions and for indoor noise levels.
Factory settings are 9.5v – HIGH; 7.5v – MEDIUM; 5.5v – LOW.
Table 7 below provides guidance for setting the fan speeds.

Table 7

Fan Speed Voltage	**Maximum air curtain mounting height** (m)	**Sound Pressure Level of air curtain** [dB(A) at 3m, +/-2dB]			**Air Volume Flow Rate** (m^3/h)		
		HP…..DX 2.0			HP…..DX 2.0		
		1000	1500	2000	1000	1500	2000
10v	-	-	-	-	-	-	-
9.5v (High)	3.6	58	58	59	1510	2560	3025
9v	3.4	58	58	59	1500	2535	2990
8.5v	3.2	57	56	58	1425	2400	2820
8v	3.0	56	55	57	1320	2250	2665
7.5v (Medium)	2.8	54	53	55	1240	2120	2500
7v	2.6	53	52	54	1165	1975	2325
6.5v	2.4	51	50	52	1080	1835	2160
6v	2.2	50	49	51	990	1690	1990
5.5v (Low)	2.0	47	46	47	920	1550	1825
5v	1.9	45	44	45	835	1425	1680
4.5v	-	-	-	-	-	-	-

See also Section, Installation; 'Wiring of Air Curtain Fan Speed' giving details of how to wire in fan speeds.

Sound pressure levels dB(A) at 3m distance are for a single air curtain mounted at its maximum mounting height, operating in a room with average acoustic characteristics as defined in CIBSE Guide B5 (reverberation time 0.7s at 1kHz) and a room size equivalent to 8 air changes per hour (ac/h). Care needs to be taken when selecting air curtains for an installation as noise levels can be several dB higher if the mounting height is reduced, if the room is more 'live' (i.e. hard surfaces, no furnishings or absorbent materials), if the room is smaller than 8 ac/h equivalent or a combination of these factors. Noise levels will also increase if more than one air curtain is installed at the same doorway (e.g. +3dB(A) for 2 equal point sources: direct field).

Starting the Heat Pump System

Carry out a final inspection to ensure that all wiring is in accordance with the Wiring Diagram and that all connections have been properly made. Ensure that the refrigerant system is complete, there are no leaks and there is sufficient charge of refrigerant R32 or R410a. Switch on electrical power to the Mitsubishi Electric outdoor unit and the local electrical supply to the air curtain.

WARNING! The Interface PCB inside the air curtain will have 230 volts on it.

The system will 'boot-up' and when the screen on the PAR-40MAA Remote Controller becomes active it will repeat the message "PLEASE WAIT". After several minutes when the PLEASE WAIT message has stopped the system is ready to start.

DANGER: Beware of Fans Starting!

Turn the air curtain on using the ON/OFF Button on the Remote Controller and the air curtain fans will start straight away.
If a door switch has been installed to change fan speeds from High (door open) to Low (door closed) check this operates correctly.
If there is no door switch a wire link will have been fitted to the fan speed terminals on the air curtain. Set the wire link to one of the three fan speeds (LOW, MED or HIGH) appropriate to the site conditions (see Page 19, 23 and 24). Check there is no mechanical noise coming from the fans at any of the fan speeds and that all fans are working.

Switch the Mode Button on the Remote Controller to 'HEAT' and adjust the target temperature to 28°C maximum setting using the **+ Temp.** Button. Check that the air stream from the discharge grille warms up across the whole length of the air curtain after approximately 15 minutes of operation and that the air stream reaches right down across the doorway with the door open or closed.

If the end user is to operate the air curtain with a Remote Controller it can be set-up to monitor room air temperature at the controller instead of return air temperature at the air inlet of the air curtain. If this is required see the Mitsubishi Electric remote controller instructions for details.

If it is intended that the air curtain is to ever operate in cooling mode* switch the Mode Button on the Remote Controller to 'COOL' and adjust the target temperature to 14°C minimum setting using the **- Temp.** Button. Wait for the air curtain air stream to go cold. Check there is no debris in the outlet spout, there are no kinks in condensate hoses and the condensate pump (if used) will operate. It is unlikely that condensate will fill the drain tray straight away so it will be necessary to fill the tray manually with water to see if the condensate removal system is working satisfactorily. If an alarm sensor is fitted in the drain tray, check it operates to stop the air curtain cooling if the drain tray becomes too full. Test the air curtain for a time in cooling mode with all the panels and grilles fitted and if environmental conditions permit check that condensate is being collected and pumped away by the condensate pump. No condensate should leak out of the air curtain. At the end of the cooling test remove the inlet grilles and the bottom access panel and check that the inside of the air curtain has remained dry and that all condensate was collected by the removal system.

***** For the air curtain to operate in cooling mode the plug must be removed from CNX5 on the PAC-IF011 Interface PCB (see Wiring Diagrams). There must also be a condensate disposal system fitted.

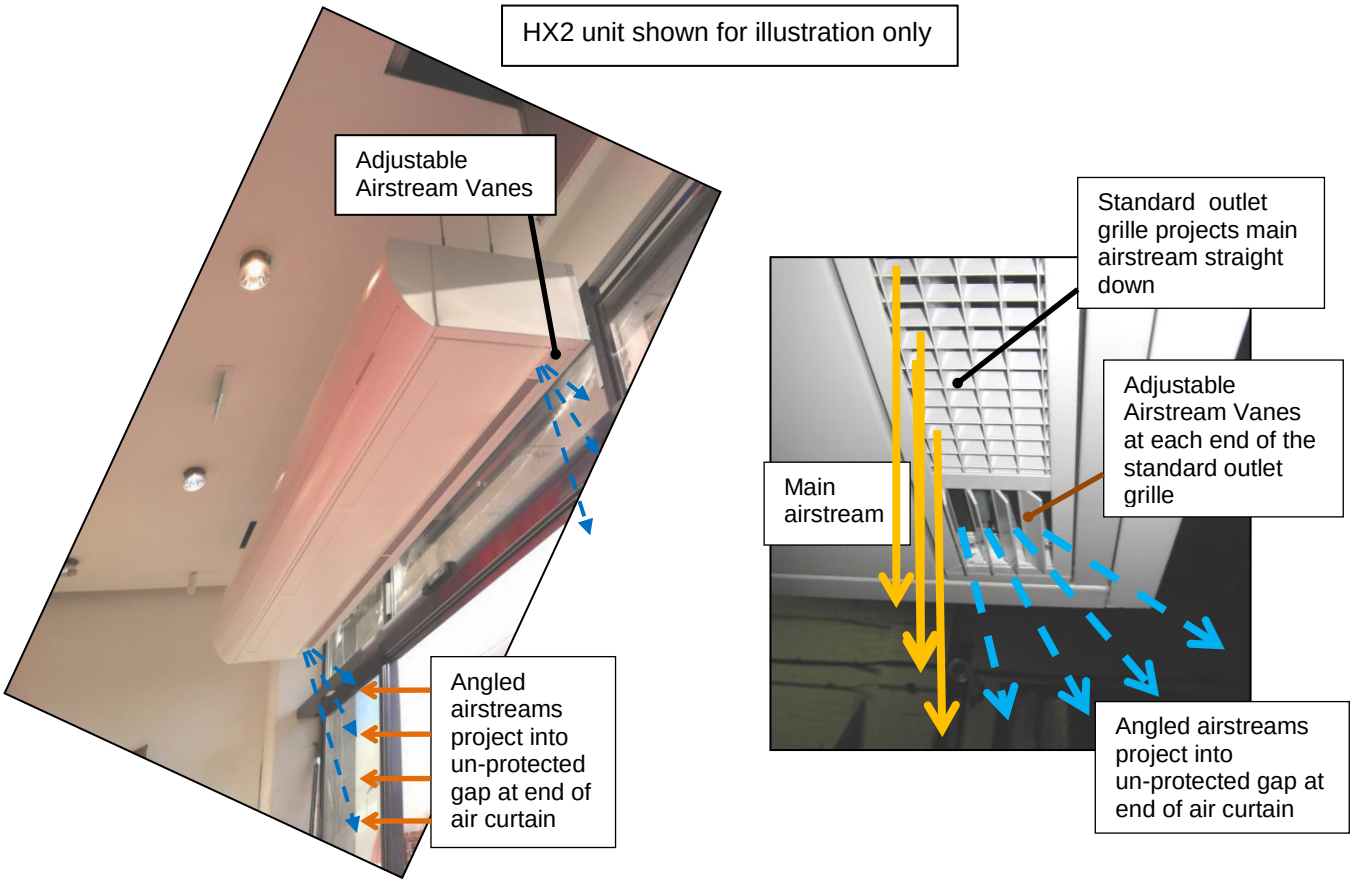
To conserve energy and carbon resources it is recommended to set up the PAR-40MAA Remote Controller, BMS System or Centralised Controller so it operates in HEAT Mode at a target temperature of 24°C. This is the normal mode of operation for the heat pump air curtain and it should run in this set-up with no further adjustments, automatically heating as required. If the target temperature is reached the air curtain fans will still operate but the air stream is then not heated (ambient air curtain).

If the end user is to operate the air curtain with a PAR-40MAA Remote Controller, set up the No.1 locking function on the controller so they can only switch the air curtain ON or OFF, with no control of mode or target temperatures. See user instructions for the Mitsubishi Electric PAR-40MAA Remote Controller.

If the air curtain is to be operated from a BMS System or Centralised Controller this should be configured so that the air curtain can only operate in HEAT or FAN mode if it is not fitted with a condensate disposal system. The air curtain should only be configured to operate in COOL mode if it is fitted with a condensate disposal system.

Adjusting ‘Side-Guard’ Airstream Vanes

If fitted, adjust the airstream vanes at each end of the discharge grille as shown in the diagram.



Switch off the electrical power to the Air Curtain and the Mitsubishi Electric Outdoor Unit. Carefully slide the Interface PCB back into place and re-plug the Filter Indication connection into CN105 if removed earlier. Ensure cables are not trapped inside and refit the retaining screw.

Filter Dirty Indicator

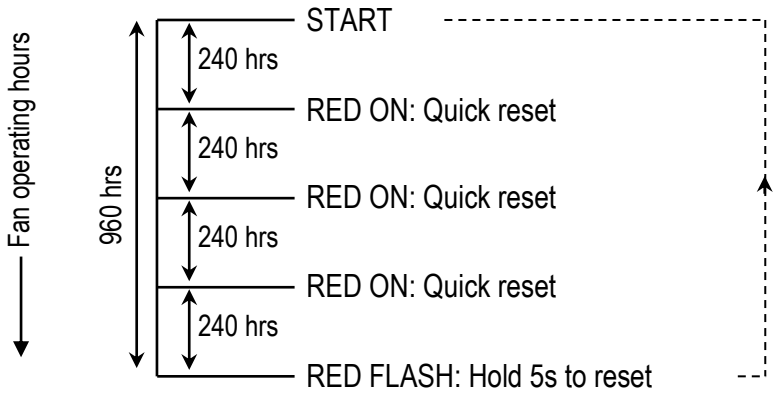
The air curtain is fitted with a Filter Dirty Indicator. It is located at the left-hand end of the outlet grille and signals when the air curtain inlet grille/filters should be vacuum cleaned or the air curtain requires servicing.

NB.The filter dirty interval feature on the Mitsubishi Electric remote controller is not available.

The indicator states are outlined below:

Indicator State	Indicator Light	Action Required	Reset Button
GREEN FLASH	On 0.5s; Off 3s	None	N/A
RED ON	On permanently	Vacuum inlet	Quick reset
RED FLASH	On 0.5s; Off 0.5s	Service filters	Press for 5s

The filter indicator schedule is based on fan operating hours. For the default schedule, shown schematically below, the inlet grilles should be vacuum cleaned every 240hrs of fan operation (3 to 4 weeks depending on use) and a full service should take place every 960hrs of fan operation (4 to 6 months depending on use).



The factory set default schedule is suitable for most applications. However, the actual frequency of cleaning required will depend on the environment. Two alternative filter indicator schedules are available, and can be selected by changing the 'jumper' position (marked 1, 2 or 3) on the Filter Indicator PCB.

Filter Indicator Schedule	Half Period	Default Period	Double Period
Jumper position	**1** 2 3	1 **2** 3	1 2 **3**
Inlet grille vacuum interval	120 hrs	240 hrs	480 hrs
Filter service interval	480 hrs	960 hrs	1920 hrs

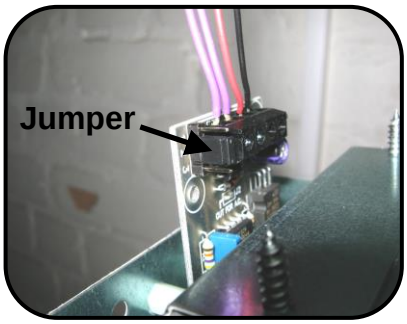
To access the Filter Indicator PCB to change jumper position:-

Switch off the electrical power to the Air Curtain. Remove the plastic end caps, inlet grilles and bottom access panel, see 'To gain access inside the Air Curtain', Page 14.

Unfasten the two screws as shown in the picture at the left hand end of the discharge grille.

Gently lower the left-hand end of the discharge grille, supporting it from below. The Filter Indicator PCB is now accessible to change the jumper position.

Once the filter indicator PCB 'jumper' has been re-positioned, push the discharge grille back up into place and re-fasten the screws. Replace bottom access panel, inlet grilles and plastic end caps in reverse order.



Final Check of the Unit

Replace the bottom access panel, air inlet grilles (with filters) and plastic end caps (see 'To gain access inside the Air Curtain', Page 14).

Power-up both the Outdoor Unit and the Air Curtain and re-check the operation of the unit.

Hand-over to End-User

Before leaving site it is important that the Installer has a 'Hand-Over Meeting' to hand-over the heat pump system and air curtain installation to the end user or their representative. This should include a full and clear explanation of how the system operates and a demonstration showing the air curtain running. Be sure to explain the Filter Indicator Schedule, that the air inlet grilles and air filters must be regularly vacuum cleaned and the unit serviced at regular intervals. See “Servicing the Air Curtain”, Page 32.

If the air curtain is to be operated using a PAR-40MAA remote controller:-

Make sure the end user understands how the heat pump system works. That the air curtain operates in FAN (Ambient) mode or in HEAT mode with a fixed target temperature of, say, 24°C. If a condensate drain system has been installed and it is intended that the unit is to operate in cooling mode, show the end user how the COOL mode operates. Leave the system set to HEAT and lock all buttons on the PAR-40MAA remote controller except the ON/OFF button before leaving site (Locking Function No.1).

Explain how the fan speeds operate if there is a door operated fan speed switch or if the fan speed has been fixed.

If the air curtain is to be operated under the control of a BMS System or Centralised Controller, explain all the settings and demonstrate the operation of the system. That the air curtain should be operated in FAN (Ambient) mode or in HEAT mode with a fixed target temperature of, say, 24°C. It is vital they understand that the air curtain must not be run in COOL mode if a condensate drain system has not been installed.

If a condensate pump and drain system has been fitted and the air curtain is to be operated in COOL mode explain that the target temperature should be adjusted to a comfortable level of cooling, not necessarily to the lowest target temperature possible as this uses a lot more energy and increases the carbon footprint.

Explain that a competent maintenance technician with F-gas qualifications must inspect the refrigerant system annually for refrigerant leaks and be employed in the event of leakage or breakdown.

Explain to the end user that the doorway should be closed whenever possible but that during times of high pedestrian use it will become effectively ‘open doorway’. The air curtain then serves an essential purpose by saving energy and providing comfort to the occupants when compared to an open doorway with no air curtain fitted.

The Installer needs to provide signed onsite information according to EN378-2:2016, Clause 6.4.3.3 using information within these instructions and if necessary make reference to protective measures in the event of emergencies.

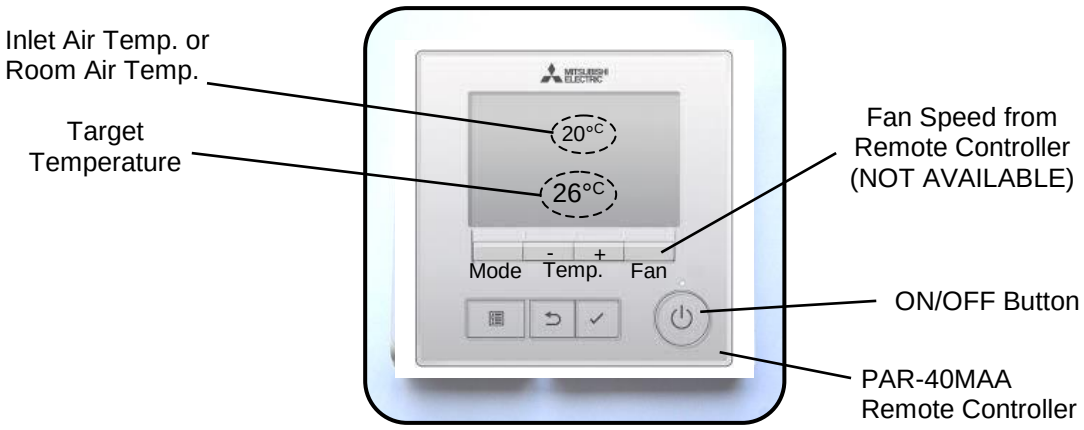
The Installer needs to produce a logbook for the air curtain installation in accordance with EN378-2:2016, Clause 6.4.3.5. This should give details of maintenance and repair works, source/quantities of refrigerant charge, component replacements, periodic routine testing and significant periods of non-use, etc. Ensure that all instructions and manuals are handed to the end user or their representative.

USER INSTRUCTIONS FOR THE AIR CURTAIN

For Inlet Air Temperature Control
or
Room Air Temperature Control

To Switch On and Off:

Turn the air curtain ON by pressing the ON/OFF Button on the PAR-40MAA Remote Controller and the air curtain fans will start within a few seconds. As set up by the Commissioning Technician the air curtain will operate in **Heat** mode, automatically heating as required, with a target temperature of 24°C - all other buttons on the Remote Controller are locked out.



Turn the air curtain OFF by pressing the ON/OFF Button on the Remote Controller and the air curtain fans will stop within a few seconds. Do not turn off if **DEFROST** shows on the screen, wait until 3 minutes after defrost has finished.

If the PAR-40MAA Remote Controller is not locked the following functions operate:-

HEAT Mode:

Press the Mode Button on the Remote Controller until **Heat** appears on the display. Adjust the target temperature using the **- or + Temp.** buttons between 22°C and 28°C maximum. This is the normal mode of operation for the heat pump air curtain and it should run in this set-up with no further adjustments, automatically heating as required. Allow time for the air stream to heat up.

FAN Mode (Fan only - no heating or cooling):

Press the Mode Button on the Remote Controller until **Fan** appears on the display.

COOL Mode: (only use if a condensate pump and drain system is fitted)

Press the Mode Button on the Remote Controller until **Cool** appears on the display. Adjust the target temperature using the **- or + Temp.** buttons between 24°C and 19°C (minimum recommended). Allow time for the air stream to cool. Do not necessarily use the lowest target temperature possible as this uses more energy and carbon resources.

SERVICING, MAINTENANCE & REPAIR

Vacuum Clean the Air Inlet Grilles / Filters

(Fortnightly, or when the Filter Dirty Indicator shows PERMANENT RED)

With the air curtain switched OFF, a vacuum cleaner with an extension tube and brush attachment at its end should be used to clean the face of the air inlet grilles. This is important to minimise the build-up of dust and lint on the air filters inside the inlet grilles which will affect the performance of the air curtain. This is a simple service task that can be carried out by the Cleaner or Janitor on a weekly basis from floor level without having to access the air curtain at high level. This should be done weekly as a regular service task and/or when the Filter Dirty Indicator shows permanent red.

ONLY if the Filter Dirty Indicator shows PERMANENT RED

Reset the Filter Dirty Indicator after cleaning by a quick press of the Reset Button.

NB.The filter dirty interval feature on the Mitsubishi Electric remote controller is not available.

Service and Maintenance of the Air Curtain

(Service every 6 Months, or if the Filter Dirty Indicator shows FLASHING RED)

Before servicing, maintaining or repairing the Air Curtain always isolate the local electrical supply to the Air Curtain and the electrical supply to the Mitsubishi Electric Outdoor Unit.

Note: All servicing, maintenance and repairs to the air curtain must be carried out only as recommended by the manufacturer by a competent maintenance technician with R32 F-gas qualifications. Keep any loose fixings for re-assembly.

For air curtains with R32 refrigerant the following safety checks shall be carried out prior to beginning service, maintenance or repair work on the system:

Work shall be carried out under a controlled work procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed.

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

The area shall be checked with a refrigerant detector suitable for R32 prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Do not use a naked flame, halide torch, etc. to detect leaks.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, ensure the area is adequately ventilated and appropriate fire extinguishing equipment is available to hand, i.e. a dry powder or CO_2 fire extinguisher adjacent to the charging area.

All possible ignition sources, including cigarette smoking, should be kept away from the refrigeration system, units and pipework, during operations when refrigerant can be released to the surrounding space or if a leak is detected.

Prior to work taking place the area around the installation is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

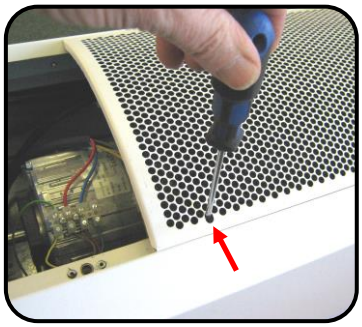
Check that the refrigerant charge is in accordance with the room size, see Page 6 & 7.

Check that any ventilation system and associated equipment are operating properly.

That any safety markings and signs are still legible, if they are not make them so.

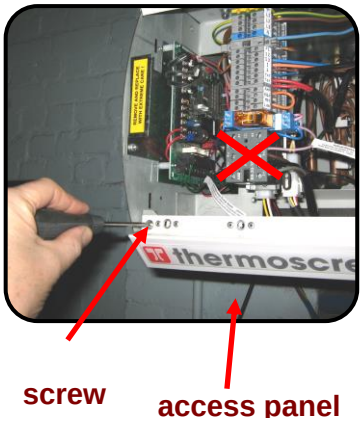
That refrigerating pipe or components are not exposed to corrosive substances.

Remove the plastic end caps at each end of the unit by pulling off to the side as shown in the picture.



Remove each air inlet grille with its air filter by unfastening the quarter-turn Philips Head fastener at the bottom corner of the grille. Use a Philips No.1 screwdriver to access the screw via the elongated hole at the bottom corner of each grille and turn anti-clockwise to remove (see picture).

Remove the air filters from the air inlet grilles by gently prizing them free as shown. Gently vacuum clean and refit the filters into the curved air inlet grilles. The filters are durable but may need to be replaced after a number of service intervals.



To remove the bottom access panel unfasten the access panel securing screws, one at each end, plus two in the centre (HP1500 DX 2.0 and HP2000 DX 2.0 units) and slide the panel out forwards (see picture).

Do not adjust fan speeds, these were set during commissioning !

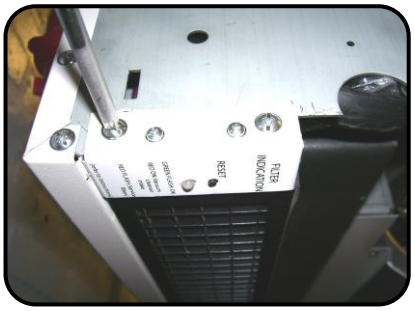
Vacuum clean and remove any build-up of dust, dirt and debris within the air-curtain, especially on the fans.

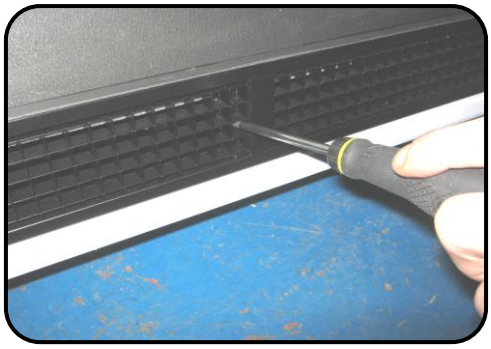
Note: Fan motors are permanently lubricated and require no additional lubrication.

Carry out safety inspection checks on electrical components; cabling, circuit boards and electrical components. Check for damage or wear to cables (e.g. sharp edges), tightness of cable terminals, earth continuity, component damage and corrosion to metal parts of the unit. Repair if necessary. If LEVs are fitted in the air curtain that refrigerant seals are satisfactory. Ensure that the air curtain is mounted securely. Repairs should be reported to the owner of the equipment.

If the Air Curtain has been used in Cooling:-

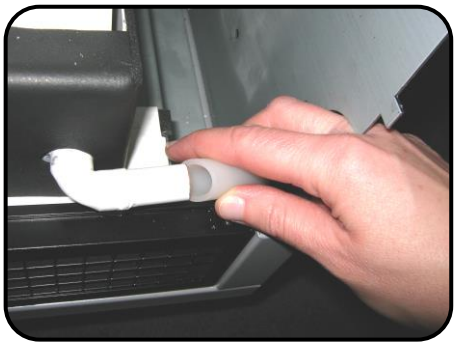
Remove two screws from each end of the air curtain that attach the air discharge grille assembly to the unit. Remove the discharge grille assembly from the unit.

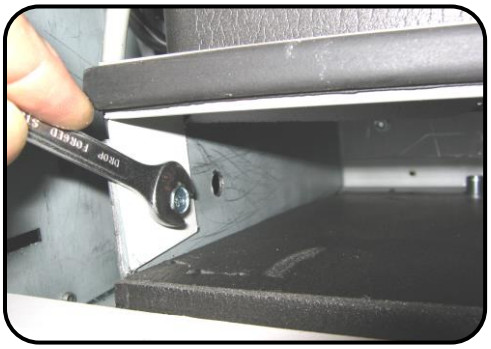




On the HP1500 DX 2.0 and HP2000 DX 2.0 air curtains there is an additional screw at the middle of the grille that also needs to be removed.

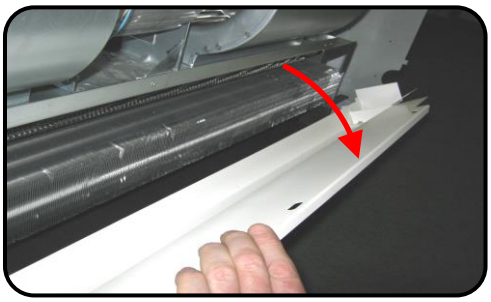
Remove condensate hose from the drain tray outlet pipe, see picture.





Using a 10mm spanner loosen the two bolts, one at each end of the air discharge opening, by 2 turns. Do not remove these two bolts completely.

Remove the row of fixing screws along the whole length of the drain tray (see picture).



The drain tray now hinges down along its front edge and the inside surface of the tray can be cleaned. Remove all debris and deposits from the coil face, drain tray, outlet pipe, condensate hoses and the condensate disposal system.

Check there are no kinks in condensate hoses. If the condensate pump is a peristaltic type change the rubber pump head tube. Refit drain tray opposite to removal

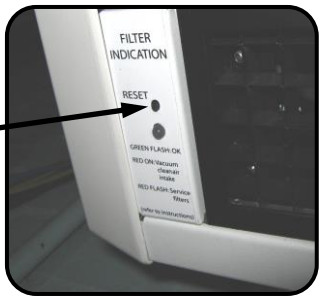
Final Inspection:-

Once the air curtain has been cleaned, visually inspect the air curtain components. Ensure pipe temperature sensors are located in their pockets and any foam insulation covering these pockets is un-damaged. Re-Check all electrical connections and terminals within the unit are tight and that crimp connections have not become loose.

Inspect refrigerant system for leaks with a R32 refrigerant detector at least annually, checking all over the coil matrix, return bends and fittings at each end of the coil and all external pipework. Refer to EN378-4:2016/ISO5149 for details. If a leak is suspected all naked flames or sources of ignition shall be removed/extinguished.

Refit the bottom access panel and air inlet grilles with filters. Switch on the electrical supplies and fully function test the air curtain to ensure correct operation (see Section – Commissioning, Page 21).

Reset the Filter Dirty Indicator after the service by pressing the Reset Button for at least 5 seconds (even if the indicator has not gone flashing red) and hand back the unit to the end user.



Repair Work

For air curtains with R32 refrigerant the following must be adhered to during repair work on the system:

That AC fan motor capacitors are discharged in a safe manner.

That earth bonding continuity is satisfactory.

Electrical supplies are disconnected if work is done to sealed components.

Replace mechanical or electrical components only with parts specified by the manufacturer and in accordance with the manufacturer's guidelines.

Do not use sources of ignition to search for refrigerant leaks, only use detection equipment intended for use with R32.

If a leakage of refrigerant is found which requires brazing refer to EN378-3:2016/ISO5149 or IEC60335-2-40:2018 for details of safe refrigerant removal, evacuation and charging.

Fault Finding

If the Thermoscreens Heat Pump Air Curtain System does not operate as expected refer to the fault finding table below:

Symptom	Possible Cause	Action Required
Air curtain fans do not operate	Electrical power is not switched on at the Mitsubishi Electric Outdoor Unit	Switch on power to Mitsubishi Electric Outdoor Unit and wait for system to boot-up
	Air curtain is not switched On	Switch on air curtain using the PAR-40 Remote Controller, BMS System or Centralised Controller
	Air Curtain fans are not wired to operate, no wire link on fan terminals in air curtain or door switch	Wire in the wire link or a door switch – see Wiring Diagrams
	Problem with air curtain fan motor(s), internal wiring, controls or fan speed door switch if fitted	Use wiring diagram to investigate possible cause of fault
Air curtain discharge air stream is not heating or cooling when required	Air curtain has been running for less than 15 minutes and is still warming up or cooling down	Give system sufficient time to reach operating condition
	Inlet air temperature or Room temperature has reached the target temperature	This is normal and shows that air curtain is saving energy by working in Fan only mode
	Target temperature is set incorrectly, i.e. too low for heating or too high for cooling	Adjust the target temperature on the Remote Controller, BMS System or Centralised Controller
	The operating mode is set incorrectly, i.e. set on COOL when heating is required, or vice versa	Select the correct mode for the conditions on the Remote Controller, BMS System or Centralised Controller
	Air curtain will not COOL, if installation allows (must have condensate disposal system fitted)	Rectify condensate alarm circuit which must be open circuit for air curtain to operate in cooling. Also check plug is removed from CNX5 on PCB
	Air Curtain filters and/or coil is dirty.	Service air curtain as described in Section – Servicing, Pages 32 to 35
Mitsubishi Electric system is indicating an error code	Error Code indicating condensate alarm from condensate pump alarm system	Inspect air curtain condensate tray and condensate pump, service or repair if necessary
	A variety of error codes can occur because of a fault within the air curtain	Refer to Mitsubishi Electric Service Manual to understand fault, then inspect and repair air curtain if there is a fault

If the Heat Pump Air Curtain system is still not operating correctly call for a Mitsubishi Electric Service Agent.

Warranty

If any problems are encountered with the heat pump warm air curtain please contact your Mitsubishi Electric Service Agent.

Care has been taken in compiling these instructions to ensure they are correct, although Thermoscreens Ltd. disclaims all liability for damage resulting from any inaccuracies and/or deficiencies in this documentation. Thermoscreens Ltd. retain the right to change the specifications stated in these instructions.

Thermoscreens Ltd
St. Mary's Road Nuneaton
Warwickshire England
CV11 5AU

Email: sales@thermoscreens.com
Tel: + 44 (0) 24 7638 4646
Fax: + 44 (0) 24 7638 8578
www.thermoscreens.com

Thermoscreens Ltd
St. Mary's Road
Nuneaton
Warwickshire
CV11 5AU
United Kingdom
Telephone: +44 (0)24 7638 4646
Fax: +44 (0)24 7638 8578

EC DECLARATION OF CONFORMITY
as defined by the EC Council Directive on Machinery 2006/42/EC, the Low Voltage Directive 2014/35/EU, Electromagnetic Compatibility Directive 2014/30/EU, the Pressure Equipment Directive 2014/68/EU, the Energy related Products Directive 2009/125/EC

Herewith we declare that the air movement equipment designated below, on the basis of its design and construction in the form brought onto the market by us in accordance with the relevant safety, health and performance requirements of the Machinery. If alterations are made to the machinery without prior consultations with us, this declaration becomes invalid.

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Designation of Equipment:	THERMOSCREENS HEAT PUMP AIR CURTAINS used with a MITSUBISHI ELECTRIC MR SLIM R32 or R410A HEAT PUMP SYSTEM
Series Type:	HP1000 DX 2.0; HP1000R DX 2.0; HP1500 DX 2.0; HP1500R DX 2.0; HP2000 DX 2.0; HP2000R DX 2.0

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Relevant EC Council Directives:	the Machinery Directive (2006/42/EC) the Low Voltage Directive (2014/35/EU) the Electromagnetic Compatibility Directive (2014/30/EU) the Pressure Equipment Directive (2014/68/EU) the Energy related Products Directive (2009/125/EC)
Applied Harmonised Standards:	Machinery - BS EN ISO 12100:2010, BS EN ISO 13857:2008 LVD - EN 60335-1:2012+A13:2017, EN 60335-2-30:2009+A11:2012, IEC 60335-2-40:2018 EMC - EN 61000-6-1:2007, EN 61000-6-3:2007+A1:2011, EN 61000-3-2:2014, EN 61000-3-3:2013 PED - EN 13133:2000, EN 13134:2000 ErP - ISO 5801:2017, ISO 12759:2010
Basis of Self Attestation:	Quality Assurance to BS EN ISO 9001 : 2015 B.S.I. Registered Firm Certificate Number FM 02234 SGS Test Report DUR 43908/2/R/RG/05; GL Test Report TR/09/149; Wemtech Test Report 6620
Responsible Person:	Carole Keane, Group Marketing Director, Thermoscreens Ltd.
Date:	3rd July 2020
Signed:	Carole Keane