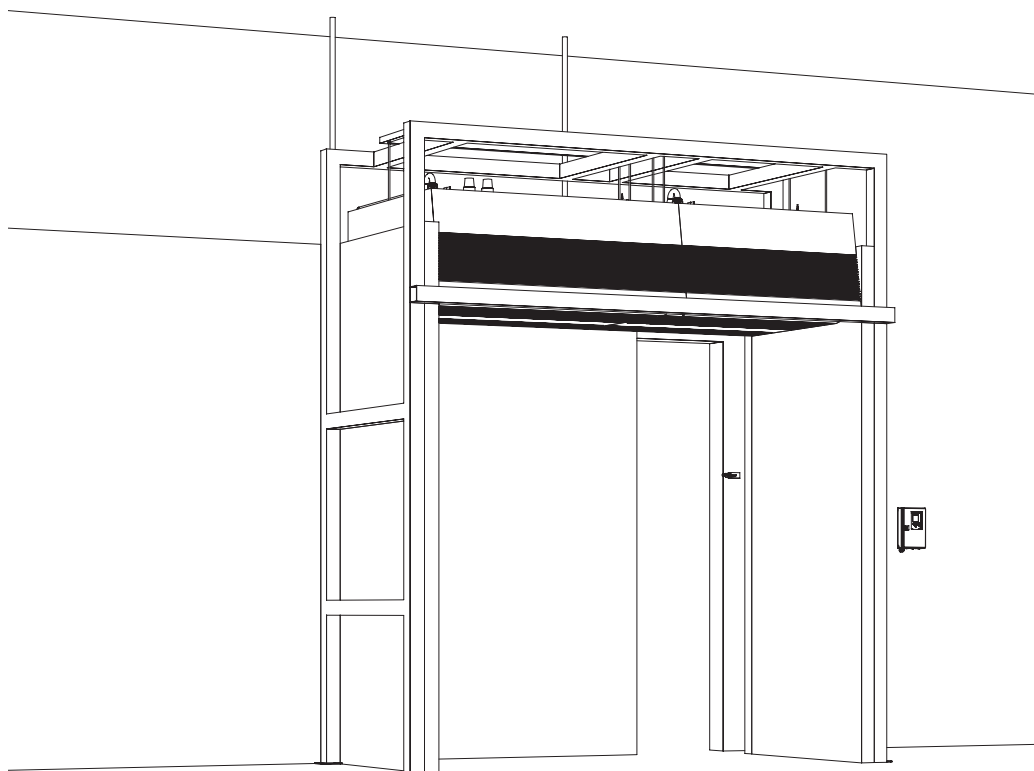


Installation, Operation, and Maintenance Guide

Cold Store Air Curtain

Model MAT



Version of guide: 4.0



biddle

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1. Introduction

1.1 About this guide

This guide describes the installation, operation, and maintenance of the MAT cold store air curtain.

This document contains important instructions in order to ensure that the device works safely, correctly, and effectively.

For that reason, please read through this guide thoroughly before carrying out any action with the device. Familiarise yourself with it and follow the instructions carefully.

1.2 How to use this guide

1.2.1 For whom is this guide intended?

This guide is intended for those involved in the installation, the operation, or the maintenance of a MAT air curtain. Table I-I gives a recommendation of which parts you should read at least.



Note:

Understanding the basic working principles of the MAT air curtain is essential for correctly installing, operating and maintaining the device.

All readers should at least read section 1.3 'About the MAT air curtain' first.

Table I-I Reading recommendation

IF YOU ARE GOING TO...	... YOU SHOULD READ THIS
build and/or apply the insulation to the corridor	<ul style="list-style-type: none">• Chapter 1 'Introduction'• Chapter 2 'Building the corridor'• dimension sketch of corridor (provided separately)
carry out the installation	this entire guide
connect the device to the mains	<ul style="list-style-type: none">• Section 3.6 'Connecting to the mains'
do the technical management of the device in the cold store	<ul style="list-style-type: none">• Chapter 1 'Introduction'• Chapter 4 'Operation'• Chapter 5 'Adjusting the air curtain'• Chapter 7 'Troubleshooting'

Table I-1 Reading recommendation

IF YOU ARE GOING TO...	... YOU SHOULD READ THIS
use the cold store door in everyday work at the cold store	<ul style="list-style-type: none"> • Section 4.2 'Operation in everyday use'
carry out periodical maintenance	<ul style="list-style-type: none"> • Chapter 1 'Introduction' • Chapter 6 'Maintenance' • Chapter 7 'Troubleshooting'
carry out repair	<ul style="list-style-type: none"> • this entire guide • wiring diagram

If you are unfamiliar with the MAT air curtain then read the chapters in sequence.

If you are familiar with the device then you may use this guide as a reference. You can use the Table of Contents and the Index to find information.

1.2.2 Marginal symbols

In this guide the following marginal symbols are used:



Note:

Draws your attention to an important part of the text.
Read this part of the text carefully.



Caution:

If you do not perform this procedure or action correctly you can damage the device.
So follow the instructions carefully.



Warning:

If you do not perform this procedure or action correctly you can cause bodily injury and/or damage.
So follow the instructions carefully.





Danger:

This indicates actions which are not permitted.
Ignoring this warning can lead to serious damage or accidents which may involve bodily injury.
The action concerned may only be performed by qualified technical staff when carrying out maintenance or repair.

1.2.3 Pictograms on the device and in the guide

The pictograms in Table 1-2 refer to possible risks and/or dangers. You will find these pictograms in the text when risky actions are being discussed. The same pictograms will also be found on the device.

Table 1-2 Pictograms

PICTOGRAM	DESCRIPTION
	WARNING: You are entering an area which contains 'live' components. Accessible to qualified maintenance staff only. Caution is urged.
	WARNING: This surface or part can be hot. There is a risk of burns on contact.

1.3 About the MAT air curtain

1.3.1 Application

The MAT cold store air curtain separates the climates of the cold store and the front hall in order to:

- save energy,
- improve maintenance of temperature in the cold store,
- prevent mist and precipitation of ice in the cold store,

without physical or visual obstruction of the doorway.

A MAT air curtain works in cooperation with a common cold store door. It is in effect while the door is open.

The MAT air curtain is intended for this application exclusively. Biddle recommends against any other use.

1.3.2 Components of the MAT air curtain

A MAT air curtain is built up around a cold store door. It is always situated in the front hall, at the outside of the cold store.

A MAT air curtain consists of several standard *components*, which are included in the delivery: they are explained in Figure I-1.

An essential part is the *corridor*, a special structure that is not included in the delivery, but built on location. Its purpose is explained in section 1.3.3.

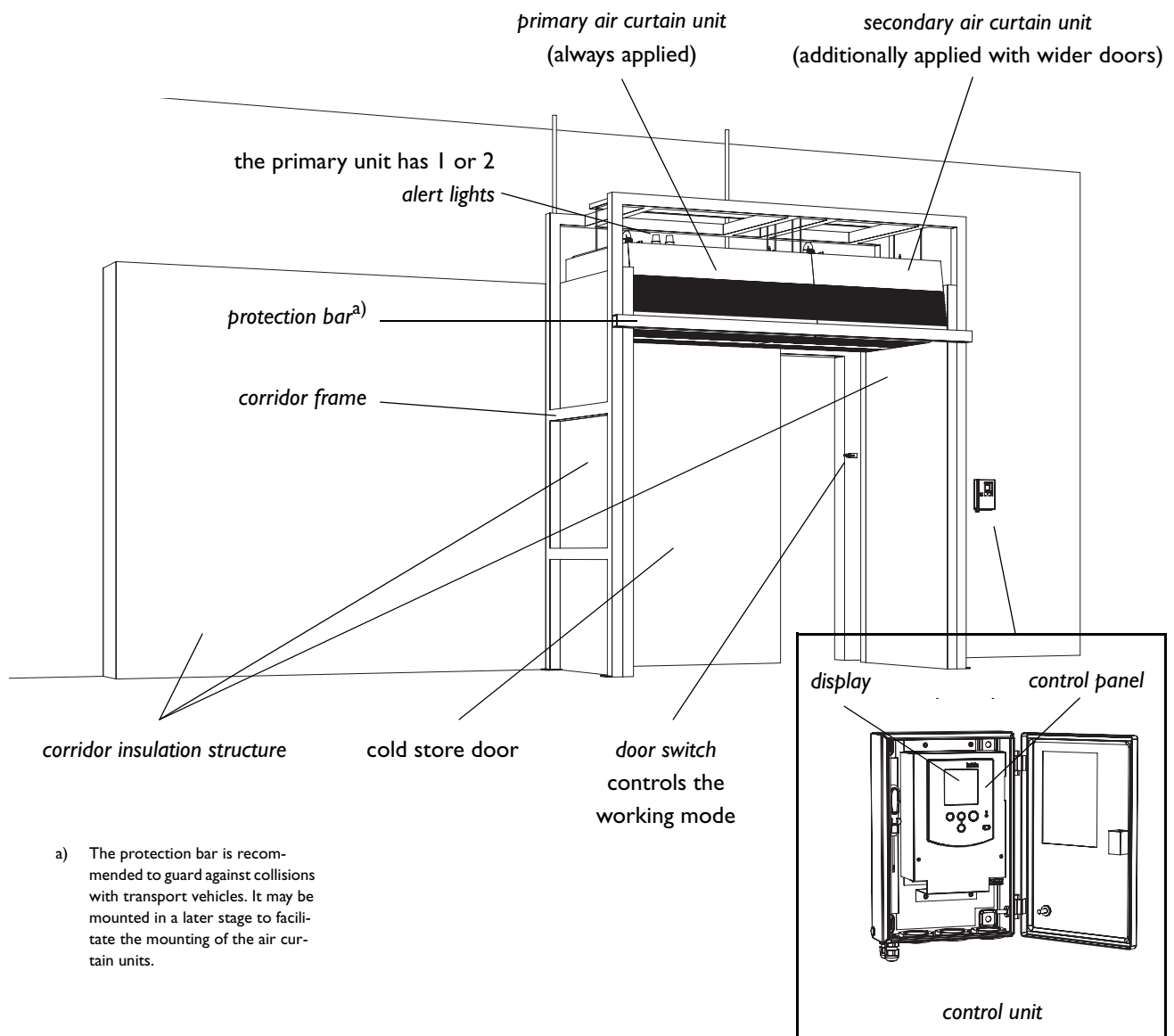


Figure I-1 A typical MAT air curtain and its components

**Note:**

The MAT air curtain shown in the figures in this guide is an example. There may be only one air curtain unit in your MAT air curtain. Also, the size(s) of the air curtain unit(s) may be different to suit the width of the cold store door. However, the procedures are similar, unless specified otherwise.

1.3.3 How does the MAT air curtain work

General

The MAT air curtain unit generates a constant, vertical air stream, throughout the width of the doorway. It works as a barrier between the climates of the cold store and the front hall. By this, the exchange of heat and moisture is reduced.

**Note:**

Climate separation is not in effect, when the air curtain stream is disturbed.¹⁾ Therefore:

- All obstacles in the air curtain stream must be avoided: even small irregularities may cause turbulence, and by this, disturb effective working.
- All inlets and outlets must be kept free entirely.
- The doorway must be entirely open.

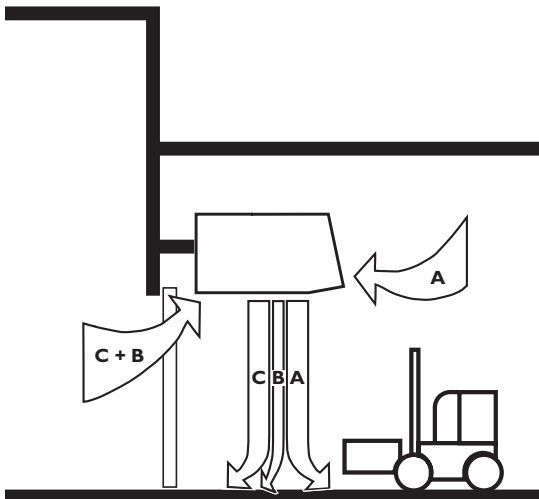


Figure I-2 MAT working principle

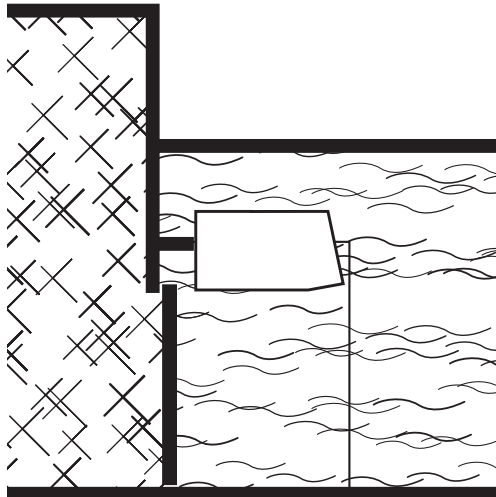
Principle of the MAT air curtain

MAT stands for 'Multi Airstream Technology'. According to this principle, the stream generated by a MAT air curtain consists of three layers, as shown in Figure I-2:

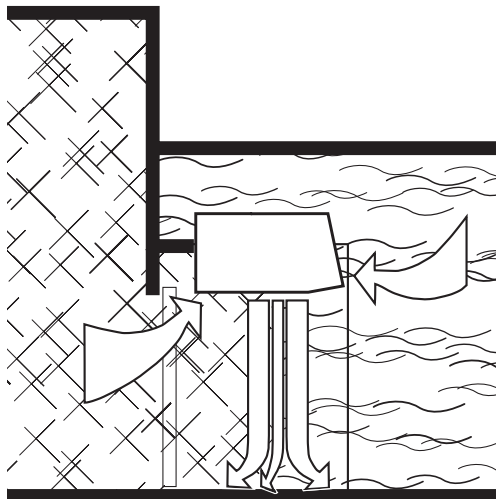
- stream A is extracted from the front hall, and discharged unheated,
- stream B is extracted from the cold store, and heated before discharge,
- stream C is extracted from the cold store, and discharged unheated.

The streams are discharged at the same speed, and combined in a rectifier grille. By this, turbulence is avoided, and mixing of air between the streams is strongly reduced.

¹⁾ The air curtain stream is actually disturbed during the passage of a person or vehicle. However, it restores itself in seconds, as soon as the person or vehicle has passed.



Separation between the climates while the door is closed.



Separation between the climates by the MAT air curtain, while the door is open.

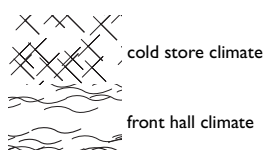


Figure I-3 Working principle of the corridor

Purpose of the heating

By the heating of stream B, its relative humidity is reduced: this prevents the development of mist in the air curtain.

To save energy, the heating level should be as low as possible. The minimum required level depends on the climate conditions in the cold store and the front hall. If your MAT air curtain has a humidity sensor (optional), it can set the heating temperature automatically.

Purpose of the corridor

The corridor is essential for the working of the MAT air curtain.

While the cold store door is closed (Figure I-3, above), it separates the climates of the cold store and the front hall. When it is opened, the MAT air curtain becomes the effective separation instead (Figure I-3, below). The corridor is then necessary:

- to keep both climates separate, there where they are not separated by the air curtain,
- to lead the air from the cold store into the air curtain unit and back without disturbance.



Note:

Even small openings disturb the working of the air curtain, making it ineffective. Therefore:

- the corridor must be free of air leaks at all places,
- the corridor must fit narrowly to the air curtain unit.



Note:

While the MAT air curtain is in effect, the walls of the corridor separate the air that is lead from the cold store, from the warm and humid air in the front hall. Therefore:

- the corridor must be thermally insulated at all places,
- cold bridges must be avoided.

Otherwise, undesired precipitation of water and/or ice will occur on the outside, which may cause unhygienic situations.

1.4 Safety instructions

1.4.1 Using



Warning:
High temperatures

Do not block the inlets and outlets of the air curtain unit.

The upper surface of the air curtain unit can become very hot: do not put inflammable objects on it.



Danger:
High voltages

The air curtain unit is not water proof: do not spray water on it.

1.4.2 Installing, maintaining, or repairing



Danger:
High temperatures
High voltages

Do not attempt to carry out installation, maintenance, or repair, unless you are technically qualified.



Warning:
Before accessing the interior of the air curtain unit:

1. Set the insulation switch which is located on top of the unit in position "0" (off).
2. Wait until the fans have stopped.
3. Allow the unit to cool down before you start to work near the heating elements.
4. If you are going to access the electronics compartment, switch off the mains power supply also.



2 . . Building the corridor

2.1 Introduction

This chapter contains instructions for building the insulation of the corridor.

At this stage, the corridor frame is supposed to be built and ready, as shown in Figure 2-1.



Note:

The required dimensions of the corridor depend on the individual situation. They are shown on the dimension sketch, that is provided separately.

2.2 Basic requirements

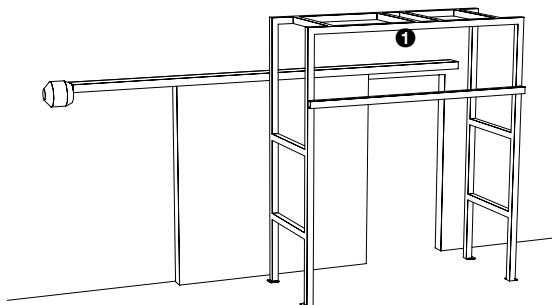


Figure 2-1 Example of a corridor frame

2.2.1 Essential features

An example of a corridor is shown in Figure 2-2. Its essential features are:

- the corridor frame ❶, which carries the corridor, and the air curtain unit(s) (to be installed later)
- two thermally insulating side panels ❷, narrowly enclosing the air curtain unit(s),
- an entirely closed thermally insulating structure ❸ between the air curtain unit(s) and the side panels on one side, and the cold store door opening on the other side.

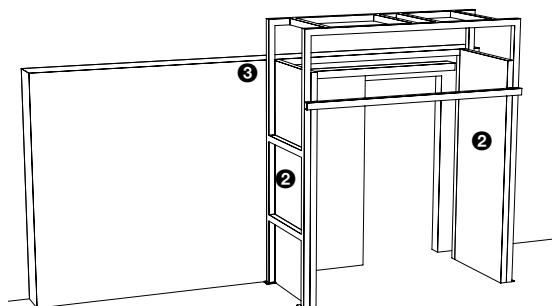


Figure 2-2 Example of a corridor, built around the frame and the cold store door

2.2.2 Essential construction rules

The construction of the corridor is critical for the correct working of the MAT air curtain. The rules in this section must be followed carefully.

Rules on geometry

1. The entire corridor must be *free of air leaks at all places*. Even small holes or gaps letting air through will disturb the working.
2. The side panels must *fit narrowly* to the air curtain unit.
3. The surface of the side panels must be *smooth*. Even small irregularities will disturb the working.



Caution:

Follow these rules strictly. Otherwise:

- there will be no effective climate separation, making the MAT air curtain useless,
- side effects, like mist and precipitation of water and ice, may occur, causing unhygienic, and possibly dangerous situations.

Rules on materials

4. The corridor must be thermally *insulated at all places*.
5. *Cold bridges* must be avoided.



Caution:

Do not leave any part without insulation.

Otherwise, precipitation of ice and water will occur on the outside, causing unhygienic situations.

2.3 Additional instructions

2.3.1 Possible corridor constructions

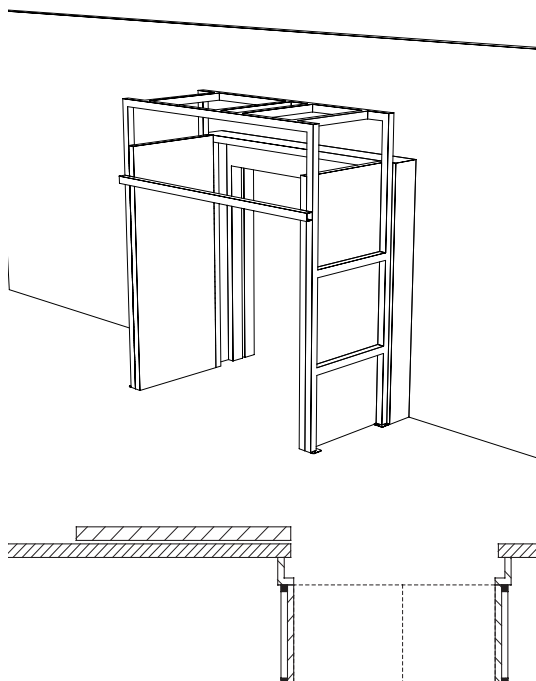
Depending on the situation in the cold store, the following principles for the corridor are possible:

1. *With the door inside the cold store:* the corridor fits directly to the door opening. (preferable)
2. *With the door outside the cold store:* the corridor is built entirely surrounding the door. (preferable)

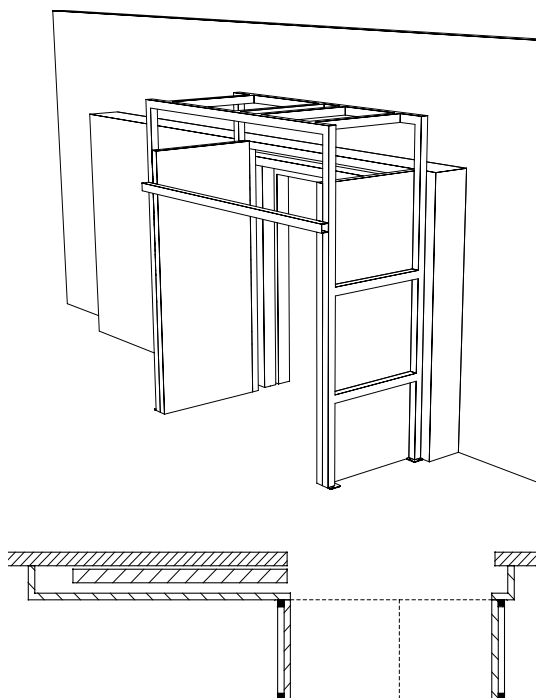
To enable access to the door mechanism for maintenance, parts of the corridor structure should be made removable, or enough space should be left between the corridor structure and the door.

3. *With the door outside the cold store:* the corridor fits to the door. (not preferable)

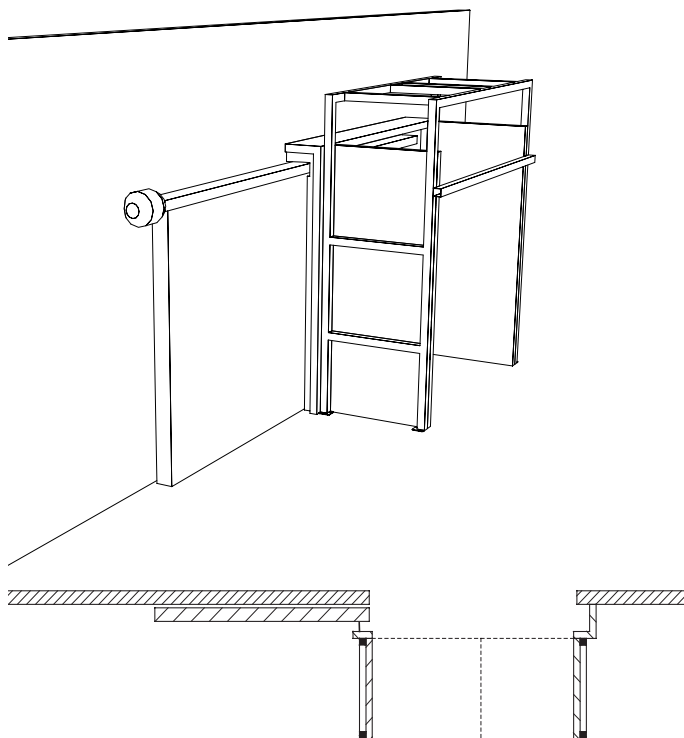
All gaps between the opened door and the corridor must be sealed with a flexible material, like PVC sheet.



1. example of corridor fitting to the door opening (door inside)



2. example of corridor surrounding the door (outside)



3. example of corridor fitting to the door, using flexible sheet material (door outside)

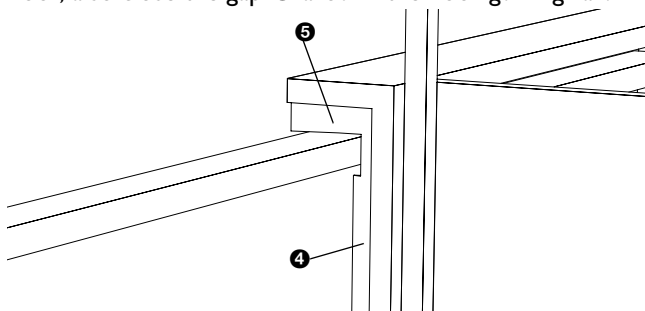
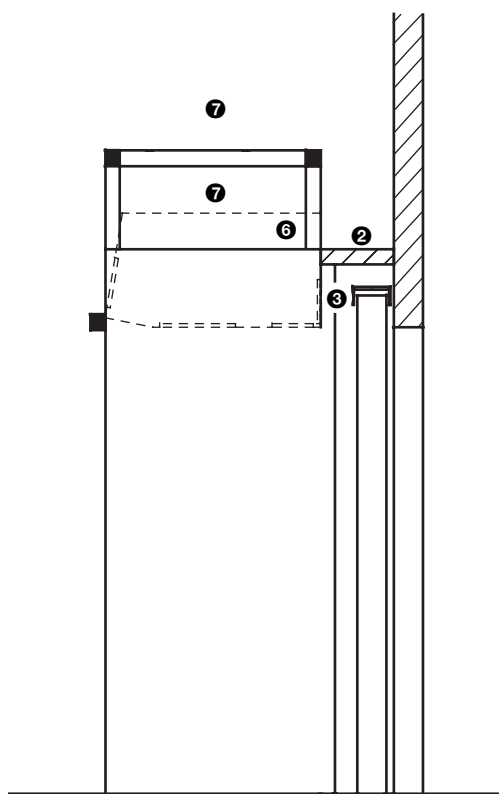
2.3.2 Points of attention



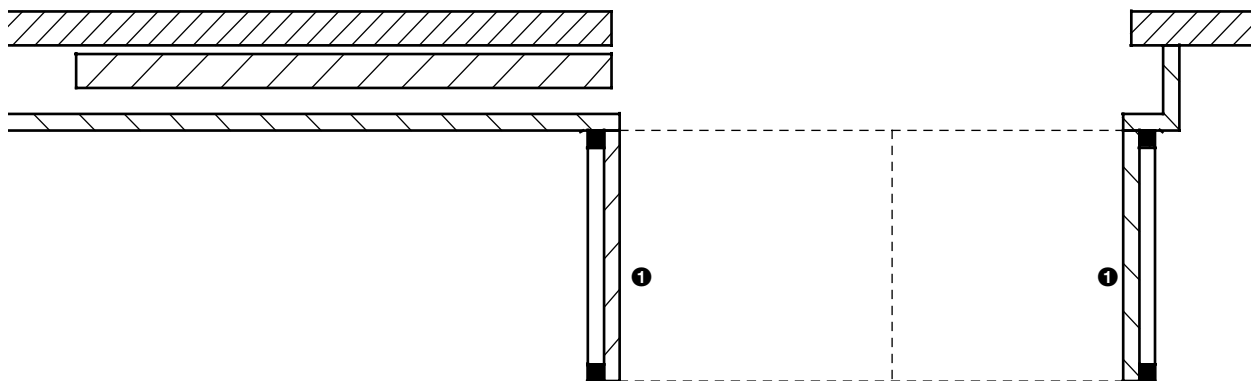
Note:

When building the corridor, pay special attention to the following:

- Attach the side panels **1** *inside* the frame as shown in the pictures, *not outside*.
- Seal gaps between insulating elements.
- Also close the space **2** above the door opening, between the wall and the air curtain unit.
- Leave the space for the inlet **3** at the back side of the air curtain unit free: it must be entirely inside the corridor.
- If you use a flexible material to seal the gap **4** near the door, also close the gap **5** around the door guiding rail.



- The housing of the air curtain unit **6** is thermally insulated itself. If it fits narrowly to the corridor, it is not necessary to apply insulating material there.
- Leave some space **7** above the air curtain unit(s) free: it will be needed to enable access for maintenance.



3 . . Installation

3.1 Introduction

This chapter describes how to mount the components of the MAT air curtain, how to connect them, and how to make the device ready for use.

At this stage, the corridor is supposed to be ready.



Danger:

Do not attempt to carry out the installation, unless you are a qualified installation technician.

3.2 Before you begin

- On delivery, check the components of the MAT air curtain and their packaging. Report any transport damage to the supplier immediately.
- Make sure that all components and accompanying parts have been supplied.
- A lifting device, e.g. a lifting platform, or a fork lift truck, is necessary to carry out the installation.



Warning:

Read the safety instructions in Section 1.4 on page 12.

3.3 Mounting the air curtain unit

If there are two air curtain units

The primary unit may be placed either on the left side or on the right side. However, take into consideration the placement of the control unit (see Section 3.4.1).

Follow the instructions in this section for each unit.

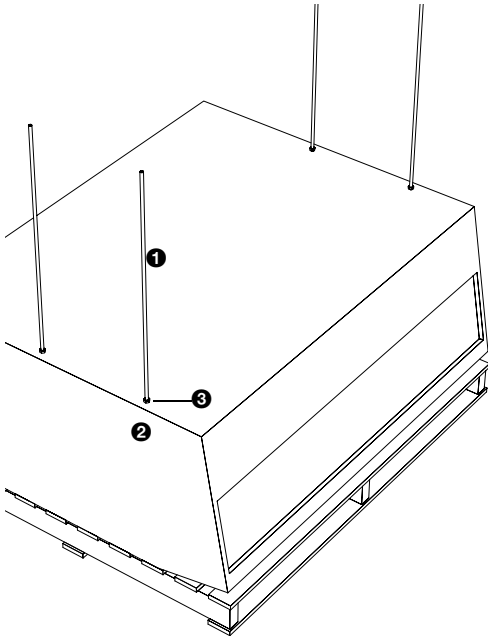


Figure 3-1 Attaching the thread rods to the air curtain unit

3.3.1 Preparing

1. Remove the package material from the unit, but leave the unit itself on the pallet.
2. Screw a thread rod ① into each of the 4 rivet holes ② on top of the unit, approximately 3 cm deep.
3. Secure each thread rod with a counter nut ③. Fasten them tightly.



Warning:

The thread rods must be secured.

If the pallet is too wide

If the pallet does not fit between the corridor walls, you can interchange the pallet for a smaller one, as follows:

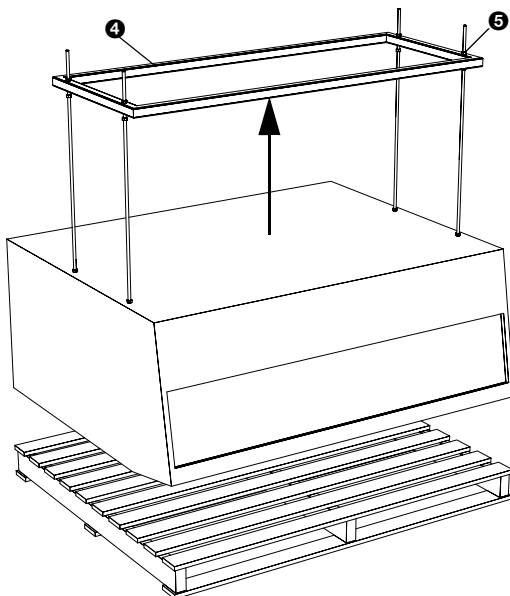


Figure 3-2 Lifting the air curtain unit to interchange pallets

1. Place the suspension frame ④ onto the thread rods.
2. Fix the suspension frame onto each thread rod with a nut ⑤.
3. Lift the unit by the suspension frame, using a fork lift truck.
4. Interchange the pallets.
5. Lower the unit onto the pallet.
6. Dismount the suspension frame.

3.3.2 Suspending

1. Lift the unit by its pallet, and place it approximately into its final position, according to Figure 3-3. Use a lifting device.
2. Place the suspension frame ④ onto the thread rods, over the horizontal bars of the corridor frame.
3. Fix the suspension frame, by applying a nut ⑤ on each thread rod.
4. Take the lifting device with the pallet away. The unit should now be hanging freely.

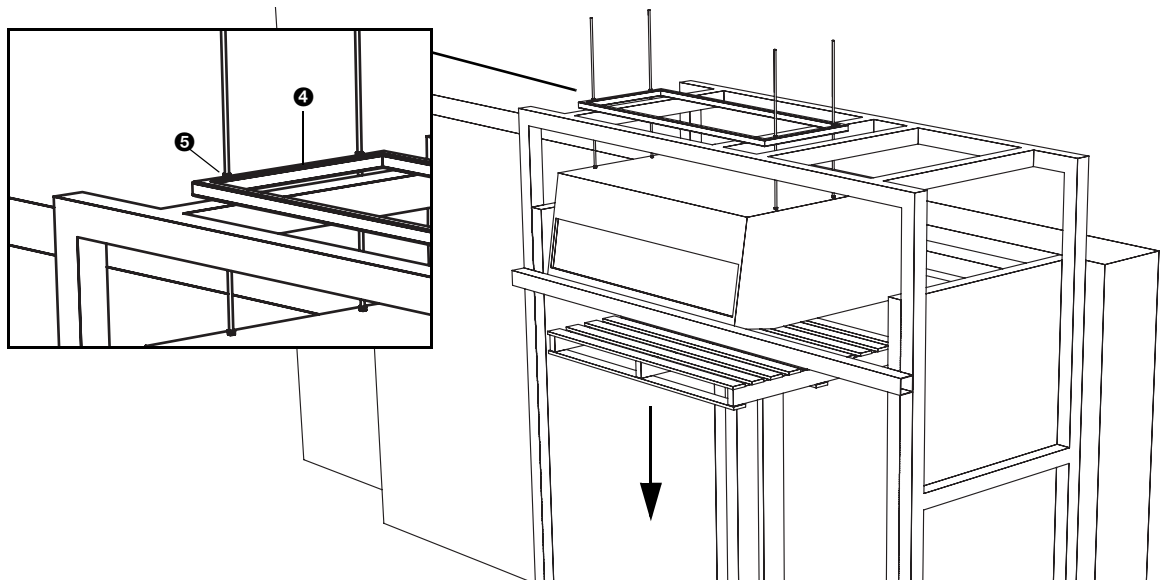


Figure 3-3 Suspending the air curtain unit to the corridor frame

3.3.3 Adjusting vertically and securing

1. Adjust the vertical position of the unit with the nuts ⑥, according to Figure 3-5.



Caution:

The unit must be suspended level.

2. Secure the nuts by applying a counter nut ⑥ on each thread. (Figure 3-4)



Warning:

The nuts on the thread rods must be secured.

3. Saw off the superfluous parts ⑦ of the thread rods. (Figure 3-4) Leave approximately 10 cm.

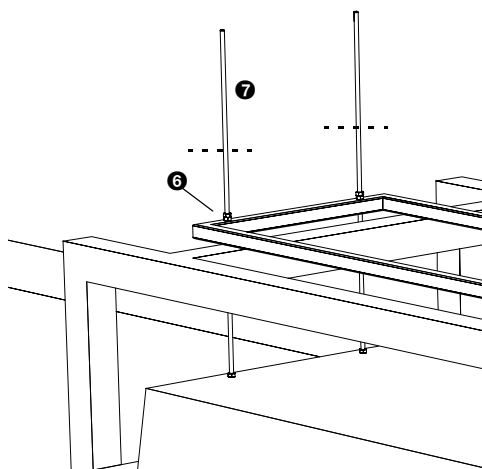


Figure 3-4 Finishing the suspension

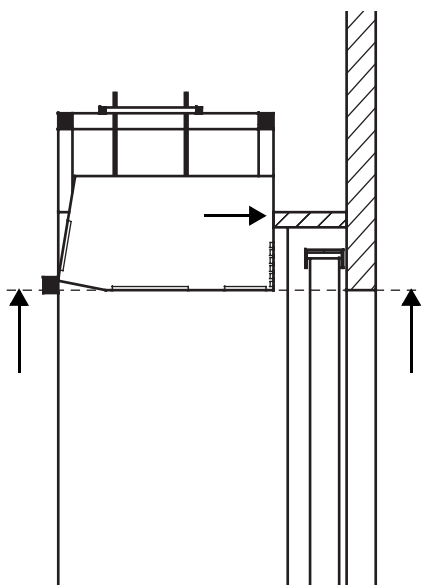


Figure 3-5 Correct horizontal and vertical placement of air curtain unit

3.3.4 Adjusting horizontally

- Place the unit into exact position, according to Figures 3-5 and 3-6, by moving it by its suspension frame over the horizontal bars of the corridor frame.



Warning:

Make sure that it is impossible to move the suspension frame off the corridor frame in any way. Attach them to each other if necessary

If there are two air curtain units

- Position the units with their sides against each other, according to Figure 3-6.



Caution:

Do not leave any space between the air curtain units, nor between the air units and the corridor.

Otherwise, the MAT air curtain will not work effectively, and undesired effects like mist and icing will occur.

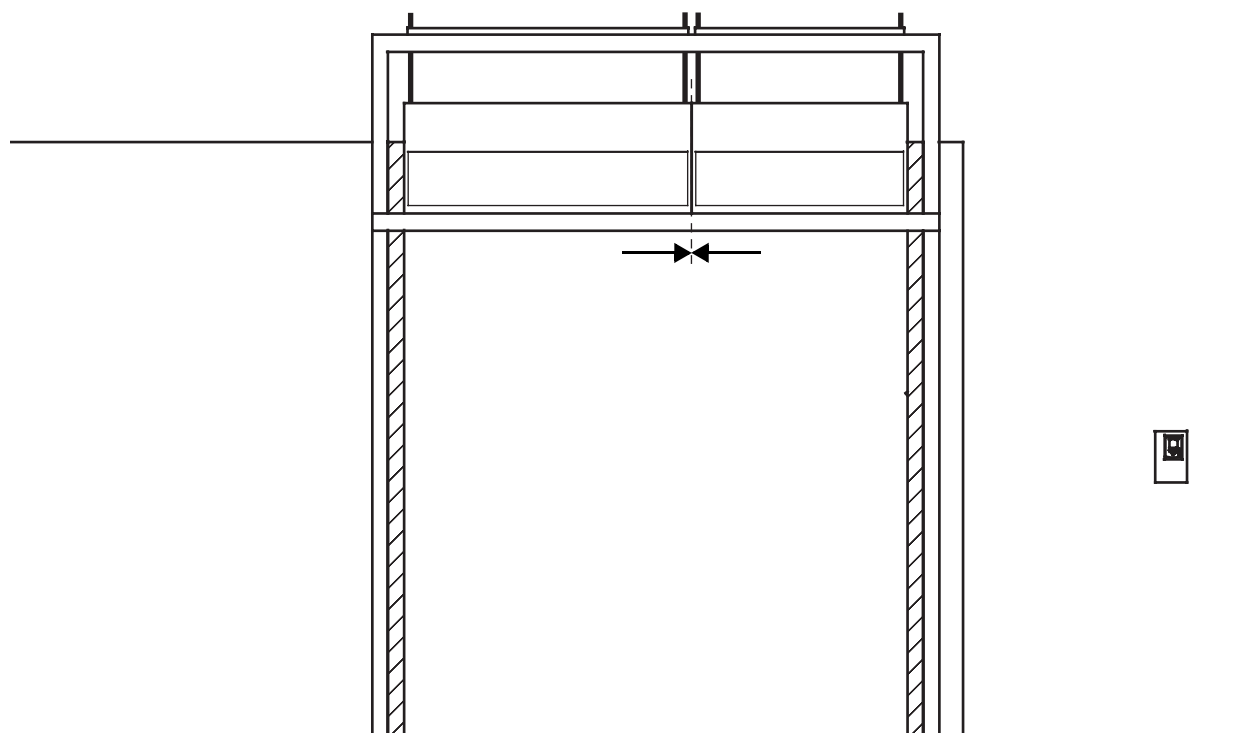


Figure 3-6 Correct placement of two air curtain units

3.3.5 Finishing the insulation

- Seal the gaps between the air curtain unit(s) and the corridor with silicon paste, according to Figure 3-7.
- If there are two air curtain units, seal the gap between them also.

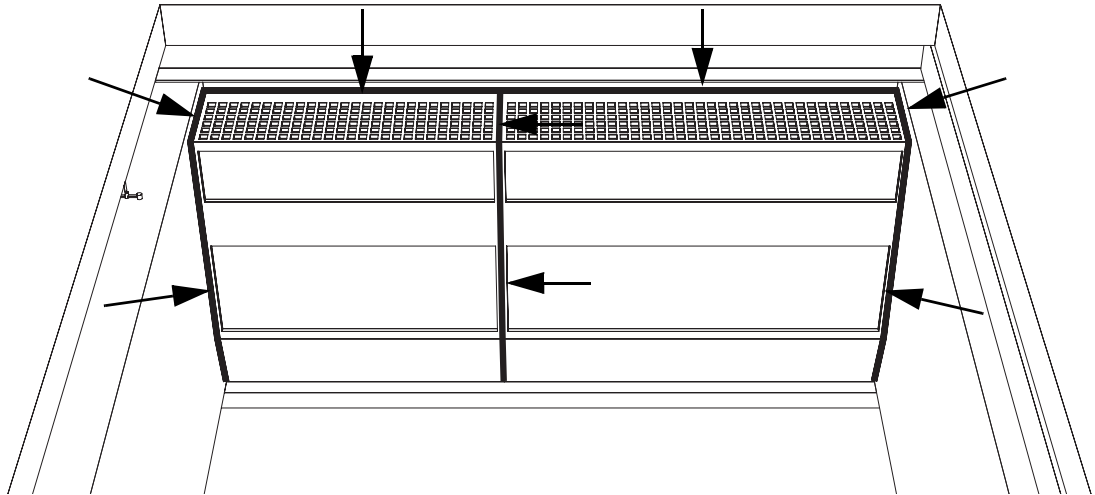


Figure 3-7 Gaps that must be sealed (seen from the cold store side)

- Check for holes and gaps in the corridor between the air curtain unit or units, and the cold store door opening:
 - Seal all leaks.
 - Close larger openings with a thermal insulation material.



Caution:

All gaps and holes in the corridor must be closed air leak free.

Even small openings will make the MAT air curtain ineffective, and may also cause undesired side effects like mist and icing.



Caution:

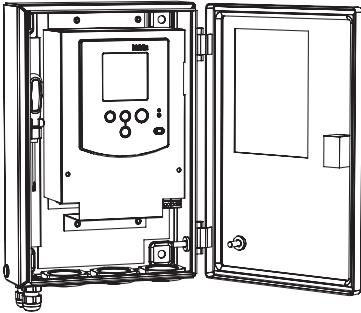
Larger openings must be filled with an thermally insulating material.

Otherwise, precipitation of water and/or ice will occur on the outside, causing unhygienic situations.

3.4 Installing the control unit

3.4.1 Mounting

1. Determine the placement of the control unit:
 - It must be placed in the front hall, *not* in the cold store.
 - Place it near the primary air curtain unit: take into account the length of the connection cable. (10 m)
 - Its place should be convenient for operation.
2. Mount the control unit to the wall, using the external brackets. The connectors must be at the bottom side.



Caution:

The housing of the control unit is water-proof.
Do not make any holes in it.

3.4.2 Connecting the control unit to the air curtain unit

- Lay the connection cable, that is attached to the control unit, to the air curtain unit. Connect them by the M8 connector.

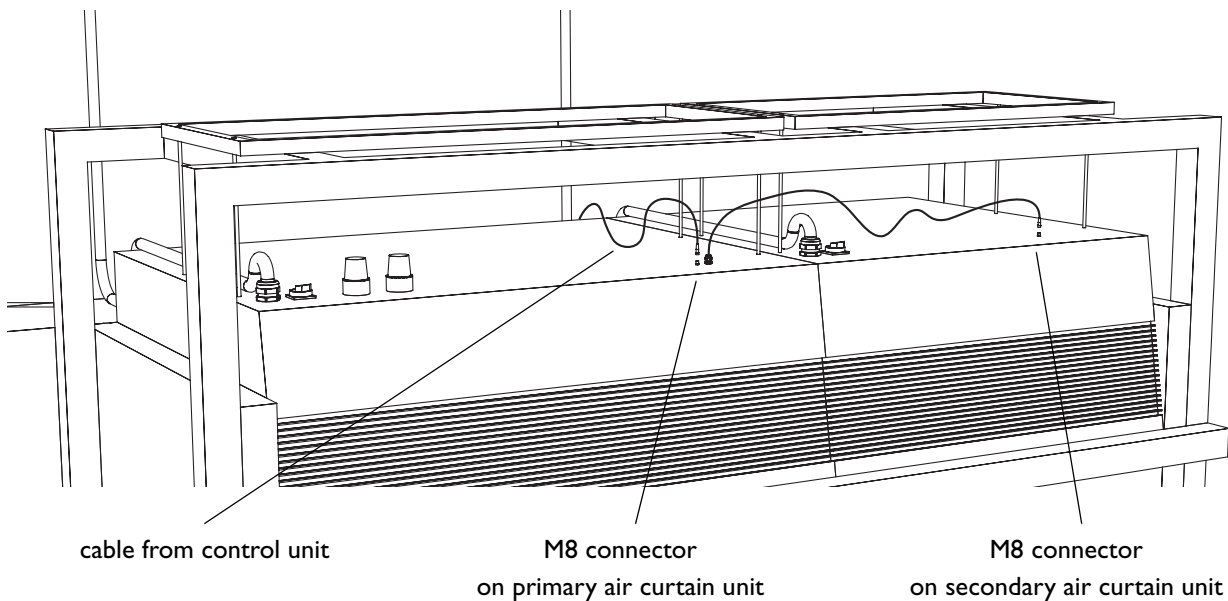


Figure 3-8 Interconnection of the air curtain units and the control unit

If there are two air curtain units

- Connect the control unit to the primary air curtain unit as described above.
- Connect the cable, that is attached to the primary air curtain unit, to the secondary air curtain unit by the M8 connector.

**Note:**

Screw each connector down tightly to protect against water and dust.

3.5 Installing the door switch

3.5.1 Mounting

Mount the door switch onto the frame of the cold store door, according to the instructions provided by its manufacturer.

Place the door switch in such a position, that electrical contact is made when the door is slightly opened, according to the principle shown in Figure 3-9.

**Note:**

In order to prevent damage, mount the door switch at a place, where it is safe from collision with vehicles or persons moving through the cold store door.

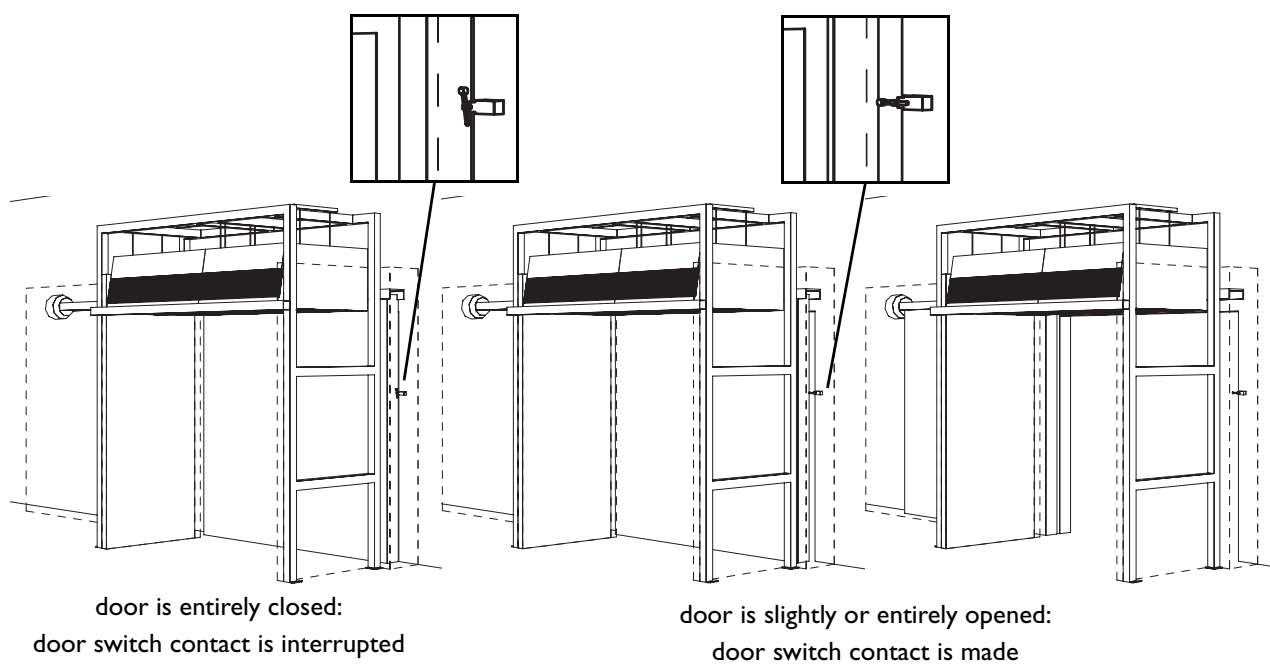
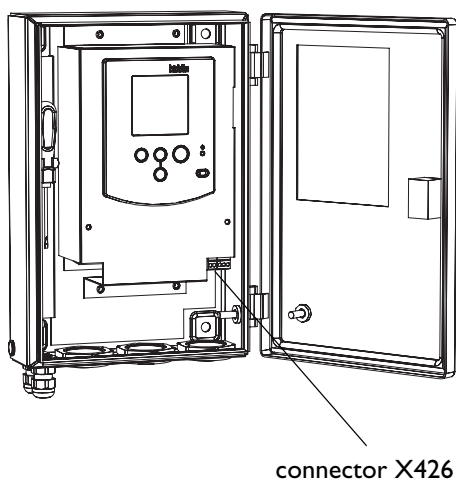


Figure 3-9 Working principle of the door switch



3.5.2 Connecting

- Connect the door switch to the control unit with a two-thread cable:
 1. Open the door of the control unit.
 2. Lead the cable through the free swivel.
 3. Connect the cable to the two-pin connector (X426).
 4. Screw the swivel down tightly to protect against water and dust.
- Connect the other side of the cable to the door switch: follow the instructions provided by its manufacturer.

3.6 Connecting to the mains

3.6.1 Introduction

This section describes how to connect the MAT air curtain to the mains power supply.



Danger: High voltages

Do not attempt to do this, unless you are qualified to work with high-voltage power current.

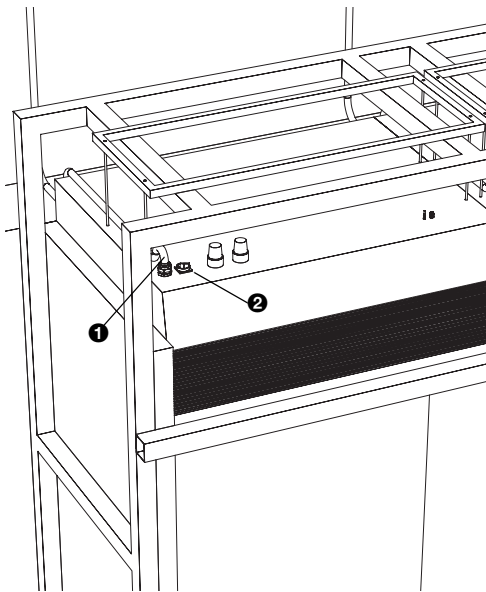
At this stage, at least the air curtain unit(s) must be physically installed in their final position.

3.6.2 Instructions

Connect the air curtain unit to the mains power supply by the power cable ❶ that is attached to the unit. If there are two air curtain units, each unit is connected to the mains supply separately.

When laying the connection, mind the following:

- The air curtain unit must be connected to a 3-phase 400 V power source. Both the neutral and ground (earth) connections are required.
- Each air curtain unit has a built-in 4-pole isolating switch ❷.
- Make sure that the power source and connections are able to support the power consumption of the air curtain unit(s).
- The connection must be done in compliance with the laws, regulations, and standards that apply locally.



Warning: Each air curtain unit must be earthed (grounded).



Warning: Do this before you start:

- Put the isolating switch ❷ in position “0” (off). Do this for each air curtain unit, if there are two of them.
- Make sure that the mains supply group on which you are working is switched off.

3.7 Making the MAT air curtain ready for use

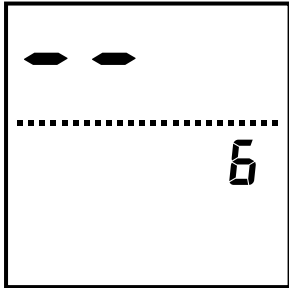


Figure 3-10 Example of display during initialization

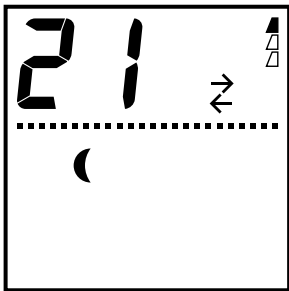



Figure 3-11 Example of display after successful initialization

3.7.1 Initializing and testing the MAT air curtain

The MAT air curtain must be initialized once after the installation, and also after a component has been without power, disconnected, or replaced.

1. Set the isolating switch on top of the air curtain unit in position “I” (on).
If there are two air curtain units, do this for both units.

2. Press the  button on the control panel once.

The fans in the air curtain unit(s) start working. The control unit searches for connected components. After some time, the display will briefly show either “3” (one air curtain unit) or “6” (two air curtain units), similar to Figure 3-10.



3. Press the  button once again.

The fans stop running. The display should now look similar to Figure 3-11.

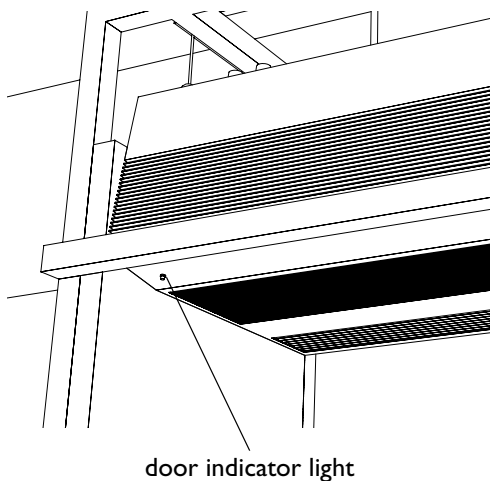
If the MAT air curtain does not work as described here, or if the display shows **SERVICE** and/or **Er**, it is not working correctly. See Chapter 7 'Troubleshooting' for instructions.

3.7.2 Adjusting the door switch

Verify that the door switch works correctly:

- When the cold store door is slightly or entirely opened:
 - the control panel display should show the  symbol,
 - the door indicator light on the air curtain unit should be on.
- When the cold store door is closed entirely:
 - the  symbol in the display should have disappeared,
 - the door indicator light should be off.

Adjust the door switch, until it works as described here.



3.7.3 Settings

Do the following settings to prepare the MAT air curtain for use. Their operation is explained in Chapter 4.

1. Adjust the air curtain velocity according to Section 5.3.
2. If your MAT air curtain has a humidity sensor:
 1. Set the heating control mode to automatic (function no. 51 in the expert menu, setting 'AU').
 2. Adjust the offset for the automatic heating control according to Section 5.4.2.

If your MAT air curtain does not have a humidity sensor, or if manual heating control is required for an other reason:

1. Adjust the heating level according to Section 5.4.1.
 2. Optionally, lock the heating setting (function no. 51 in the expert menu, setting 0).
3. Optionally, adjust the defrosting parameters (functions no. 10 up to 20 in the advanced menu).
4. Disable the manual working mode control (function no. 52 in the expert menu, setting 1).

4. . Operation

4.1 Introduction

This chapter explains how to operate the MAT air curtain.

At this stage, the MAT air curtain is supposed to be entirely installed and made ready for use.



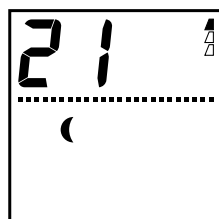
Warning:
High temperatures
high voltages

Before you start to use the MAT air curtain, read the safety instructions in Section 1.4 on page 12.

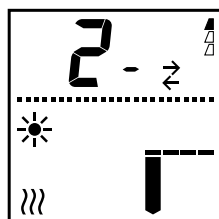
4.2 Operation in everyday use

4.2.1 Working modes

In normal situations, you do not need the control panel to operate the MAT air curtain. The working of the MAT air curtain is controlled automatically by opening and closing the cold store door. You can read the working mode from the control panel display.

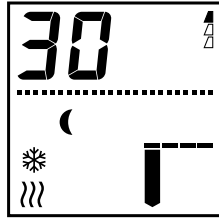


- While the door is closed, the MAT is in *stand-by mode*. The control panel display shows the ☾ symbol.



- When you open the door, the MAT starts working in *separation mode*. The display shows the ☀ symbol.

The climate between the cold store and the front hall is now separated by the MAT air curtain.



- When you close the door, and if the MAT has been in separation mode for at least some time, it will start working in *defrost mode*: The display shows the ❄️ symbol.

The defrosting is necessary because icing-up is occurring in the interior of the air curtain unit while the door is open.

The defrost mode works in two stages:

1. Air is heated and blown through to melt and remove the ice,
 2. Air is blown through unheated to make the interior dry.
- After the defrosting has been done, the MAT air curtain goes back into stand-by mode. The ❄️ symbol disappears.



Note:

Always either entirely open or entirely close the door. Otherwise, there will be no effective climate separation.



Note:

Do not leave large objects (e.g. vehicles, stored goods) standing in the air curtain stream. Otherwise, there will be no effective climate separation.

4.2.2 Controlling the working mode manually

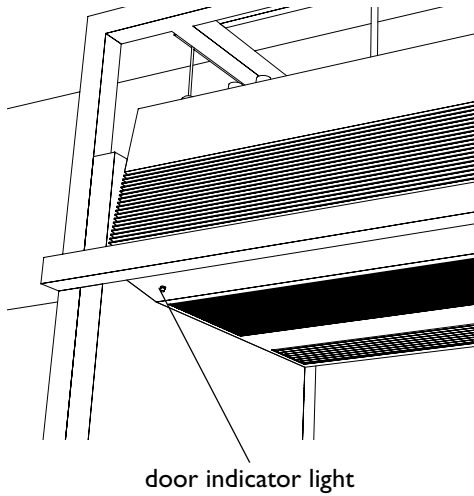
For the convenience of installing, maintenance, repair, and testing, you can also control the working mode manually:

- Press the ⏻ button to change the current working mode.
- When you open or close the door, the MAT air curtain works normal again, in accordance with the position of the door.



Note:

Manual control serves no purpose in normal use. To prevent improper operation, you should disable this function when you have finished the installation, maintenance, or repair (function no. 52 in the expert menu: see Section 4.5).



4.2.3 Verifying the door position

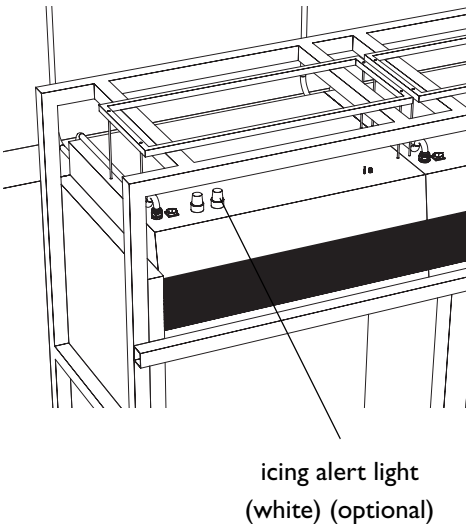
You can verify the position of the door by the door indicator light: it turns on as soon as the door is opened slightly. It will turn off only when the door is entirely closed.



Note:

When you have closed the door, always verify that the door indicator light is off.

Otherwise, the MAT air curtain will not stop working in separation mode.



4.2.4 Icing indication and alert light



The time that the MAT has been in separation mode without defrosting is indicated by the triangle symbols in the control panel display.



When all triangles are full, the icing-up is supposedly at its acceptable maximum. Then the icing alert light (optional) turns on also. At this time you should close the door to allow defrosting.



Caution:

Allow the MAT air curtain to defrost at least when all triangles are showing and/or the icing alert light turns on.

Too much icing-up will disturb the working, and may also damage the air curtain unit(s).

4.2.5 Additional indications on the display

The display shows some extra indications by which you can verify the working of the MAT air curtain: see the figure below.

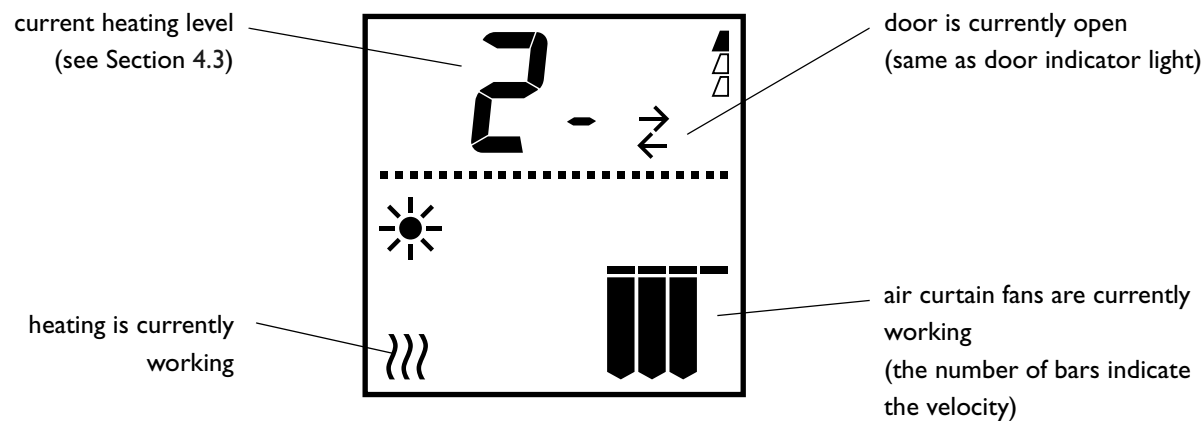
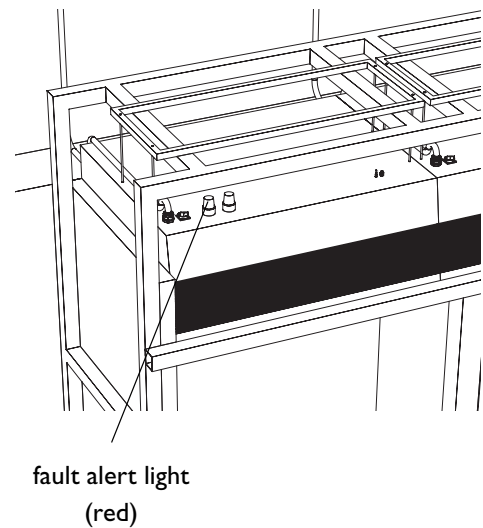


Figure 4-1 Additional indications on the display

4.2.6 Faults

When the MAT air curtain detects a problem, the fault alert light turns on. The display shows a fault messages similar to Figure 4-2.

If a fault occurs, the MAT air curtain stops working normally: you should take immediate action, as described in Section 7.5.



Note:
While **SERVICE** is on the display, the fault is still in effect., even if the rest of the display has turned back to normal.

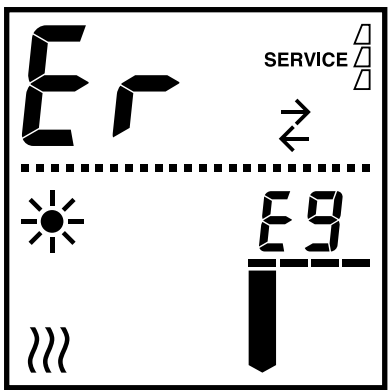
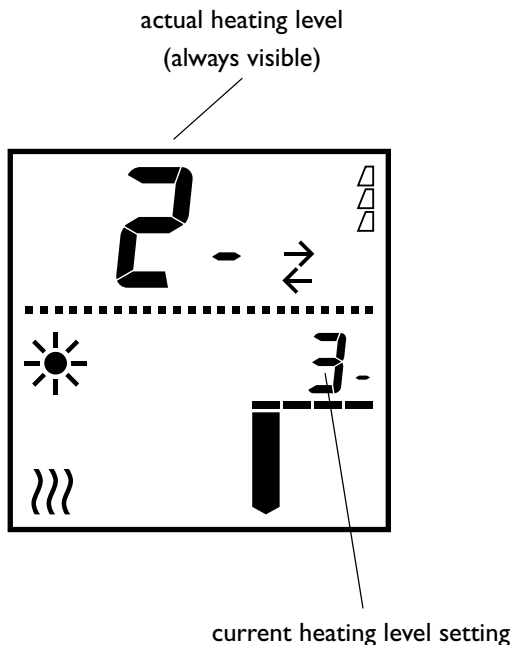


Figure 4-2 Example of a fault message

4.3 Controlling the heating level



4.3.1 General

While working in separation mode, the MAT air curtain keeps the heating of stream B at a constant level.

The small digits on the display show the heating level that has been set: they appear when you press the \oplus or \ominus buttons.

The large digits show the actual heating level of stream B at all times. The heating level is different when the MAT air curtain is in stand-by mode or defrost mode.

4.3.2 Setting the heating level

Automatic heating control

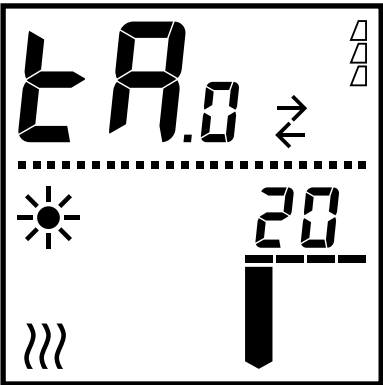
If the display shows the \gg symbol, the heating level is controlled automatically. You do not need to set it.

Manual heating control

- Press the \oplus and \ominus buttons to set the heating level.

After a while, the actual level becomes the level that has been set by you.

If the level setting does not change when you press the \oplus or \ominus buttons, the setting is locked. You can change this with function no. 52 in the expert menu (see Section 4.5).



4.3.3 Reading climate conditions

As an aid for controlling the heating level, you can read additional information on the climate conditions in the cold store and the front hall from the control panel display.

Press the button on the control panel repeatedly, and read the climate factors, according to Table 4-1.

If the button has not been pressed for a while, the control panel display will go back to normal.

Table 4-1 Displaying climate conditions

TIMES THAT »» BUTTON IS PRESSED	LARGE DIGITS	SMALL DIGITS
1 st time	tA.0	warmness of stream A in primary unit (extracted from the front hall)
2 nd time	tA.5	warmness of stream A in secondary unit ^{a)}
3 rd time	rh	humidity ^{a)} (extracted from the front hall)
4 th time	tb.0	actual heating level of stream B in primary unit
5 th time	tb.5	actual heating level of stream B in secondary unit ^{a)}
6 th time	tc.0	coldness of stream C in primary unit (extracted from the cold store)
7 th time	tc.5	coldness of stream C in secondary unit ^{a)}
8 th time	back to 1 st	
a) If the small digits show “-.-”, the information is not available, either because there is no secondary air curtain unit, or because your MAT air curtain does not have a humidity sensor.		

4.4 Settings in the advanced menu

4.4.1 Introduction

By the *advanced menu* you can access some settings for adjustments that are usually done only once in a while.

An overview of these settings is provided in Section 4.4.3 on page 35.



Note:

The air curtain velocity (function no. 1) is usually set once when the MAT air curtain is adjusted (see Chapter 5).

The other settings are optional: in most situations the default settings will be sufficient.

4.4.2 Operation



Entering the advanced menu

- Press the  button for 3 seconds.

The text **PROGRAM** appears in the display. You are now in the advanced menu.





Selecting the function

The large digits in the display show number of the current function in the menu, according to Section 4.4.3.

- Press the  button to step to the next function. After the last function, the first function will reappear.
- Press the  button to step back to the previous function.

Changing the setting

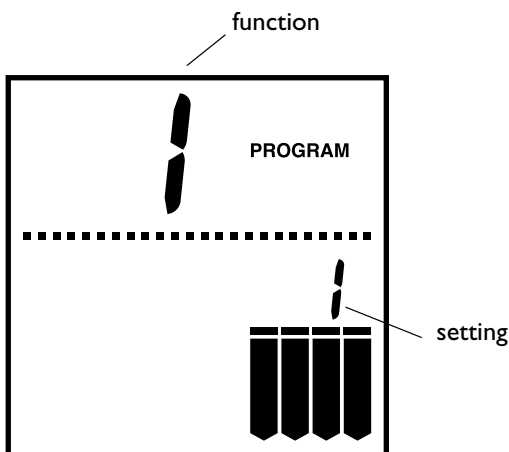
The small digits in the display show the current setting of the function.

- Press the  and  buttons to change the setting.
- Press the  and  buttons simultaneously to set it to the default setting.





Note:

Any changes you make will become effective only after you have left the menu.



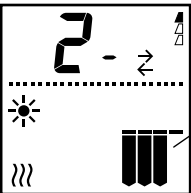
Leaving the menu

- Press the  button for 3 seconds to keep the changes you have made.
- Press the  button to leave the menu without keeping any changes.

The text **PROGRAM** disappears from the display. The control panel is now back to normal.

If there is no button pressed during two minutes, the control panel will automatically leave the menu without keeping any changes.

4.4.3 Functions in the advanced menu

NO.	FUNCTION	SETTING OPTIONS	YOUR SETTING
1	air curtain velocity	setting range: level 1 to 4 (default setting = 1)  <p>In normal display, the number of bars represents the velocity level.</p>	
10	heating level in defrost mode	setting range: -30 to 45 (default setting = 30)	
11	duration of first stage of defrost mode (with heating)	setting range: 0 to 99 minutes (default setting = 20 minutes)	
12	duration of second stage of defrost mode (without heating)	setting range: 0 to 99 minutes (default setting = 30 minutes)	
15	time threshold for defrost mode	minimum time that the MAT air curtain must work in separation mode to have the defrost mode started, in order to suppress defrosting when the door is opened for only a short while setting range: 0 to 99 minutes (default setting = 10 minutes)	
20	icing-up time limit	time that the MAT air curtain is allowed to work in separation mode, before the icing-up is supposedly at its acceptable maximum setting range: 1 to 99 hours 0 = no icing alert nor indication on the display (default setting = 12 hours)	

4.5 Settings in the expert menu

4.5.1 Introduction

Some functions are intended for installation, maintenance or repair only: these are accessed by the *expert menu*. An overview of these functions is provided in Section 4.5.3 on page 37.



Note:

Most of the settings in these functions are optional. If you change them inconsiderately, the MAT air curtain may not work correctly any more.

You should not change these settings, unless you are instructed to do so.

4.5.2 Operation

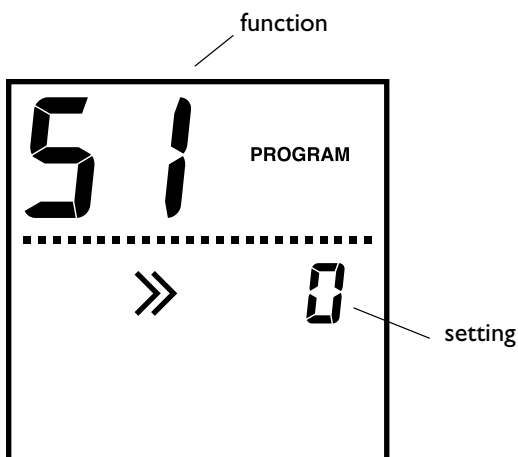
Entering the expert menu

- Press the  and  buttons simultaneously during 3 seconds.




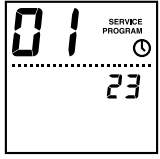




The text **PROGRAM** appears in the display. You are now in the expert menu.

Operation within the expert menu

Selecting the functions, changing the settings, and leaving the expert menu, are done in the same way as in the advanced menu. See Section 4.4.



4.5.3 Functions in the expert menu

No.	FUNCTION	OPTIONS	YOUR SETTING
51	heating level control mode (see Section 4.3.2)	<p>0 = the heating level is locked at its current manual setting: it can not be changed</p> <p>1 = manual setting of the heating level is enabled (default setting, recommended for MAT air curtain without humidity sensor)</p> <p>AU = the heating level is set automatically (recommended setting for MAT air curtain with humidity sensor^{a)})</p>	
a) If your MAT air curtain does not have a humidity sensor, the maximum humidity will be assumed.			
52	enable/disable manual control of working mode (see Section 4.2.2)	<p>0 = the working mode can be controlled by both the door position and the  button (default setting)</p> <p>1 = the working mode is controlled by the door position only: the  button is disabled (recommended setting for normal use)</p>	
60	offset for automatic heating level control	<i>works in conjunction with setting AU in function no. 51</i> setting range: -30 to 30 (default setting = 0)	
65 66 67	PID factors of heating level control	<i>Do not change these settings unless you are instructed by Biddle to do so.</i>	
70	software version of control panel	displays the current version number (can not be set)	
71 up to 80	history of durations of working in separation mode without defrosting	<i>For internal use by Biddle only.</i>	
81 up to 85	history of heating level and velocity settings	<i>For internal use by Biddle only.</i>	
91 up to 95	history of fault messages (see Section 7.5) 91 = eldest message 95 = most recent	<p>A shows the fault code. B shows the time elapsed since the fault occurred. A and B are displayed intermittently. (In this example: fault E7 occurred 123 hours ago.)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>A</p> </div> <div style="text-align: center;">  <p>B</p> </div> </div>	
97	test program	To start: press  and  buttons simultaneously <i>For internal use by Biddle only.</i>	
98	reset control unit	<p>dF = all settings are according to defaults - - = some settings have been changed</p> <p>To reset: press  and  buttons simultaneously. <i>Note your settings first: they will be reset to the defaults.</i></p>	


5. . Adjusting the air curtain

5.1 Introduction

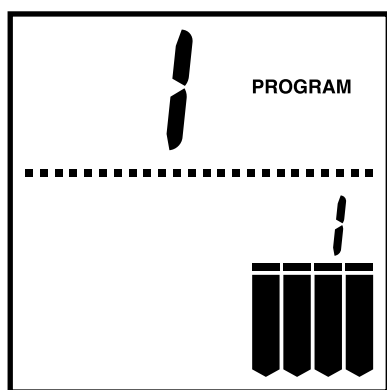
This chapter gives directions on how to adjust the MAT air curtain to suit the climate conditions, in order to have an effective climate separation and to minimize energy consumption.

It is assumed, that the MAT air curtain, including the insulation structure and finishing, has been installed correctly.

5.2 General working order

1. Open the cold store door entirely, and verify that the MAT air curtain is working in separation mode. (The display in the control unit shows . See Section 4.2 on working modes.)
2. Adjust the air curtain velocity (see Section 5.3).
3. Adjust the heating setting (either for manual or for automatic control: see Section 5.4.1 or 5.4.2 respectively).

5.3 Adjusting the air curtain velocity



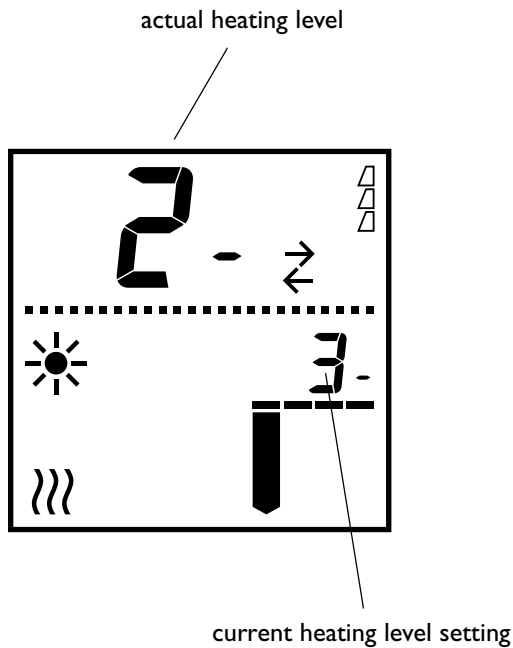
The air curtain velocity is set with function no. 1 in the advanced menu (see Section 4.4).

Find the lowest velocity setting, that is just enough to make the air curtain stream reach the ground. Test this by feeling the air stream: start at the discharge grille and follow the stream down to about 20 cm above the ground. (The air stream may flow about 10 - 20 cm towards the cold store.)

Always start at the maximum velocity setting, and try lower settings one by one.

If you feel no air stream going downwards, then it does not reach the ground. Close the door first, set a higher velocity, and try again.

5.4 Adjusting the heating



5.4.1 Adjusting the heating with manual control

First, make sure that the heating control mode has been set to manual. (function no. 51 in the expert menu, setting 1)

Find the lowest heating level that is just enough to have no mist appearing. Do this by setting the heating level lower or higher (see Section 4.3), and observing the result. Wait each time until the actual heating level has reached the heating level setting.

- If you see *mist flowing both towards the cold store* (typically above), *and towards the front hall* (typically below), then the velocity is too low. Go back to Section 5.3 and try a higher velocity setting.
- If you see *mist flowing towards the cold store only*, then the heating level is too low. Try a higher setting.
- If you see *no mist*, the heating level may be too high, or just enough. Try a lower setting.

The recommended heating level setting is 3 to 5 steps above the level that is just enough to have no mist appearing.

5.4.2 Adjusting the automatic heating control

First, make sure that the heating control has been set to automatic (function no. 51 in the expert menu, setting 'AU').

The automatic heating control is adjusted by the *offset* setting (function no. 60 in the expert menu). Find the lowest offset that is just enough to have no mist appearing. Do this by setting the offset lower or higher and observing the result. Wait each time until the actual heating level has become stable.

- If you see *mist flowing towards the cold store* (typically above), *and also towards the front hall* (typically below), then the velocity is too low. Go back to Section 5.3 and try a higher velocity setting.
- If you see *mist flowing towards the cold store only*, then the offset is too low. Try a higher setting.
- If you see *no mist*, the offset may be too high, or just enough. Try a lower setting.

The recommended offset setting is 3 to 5 steps above the level that is just enough to have no mist appearing.

6. Maintenance

6.1 Periodical maintenance

6.1.1 Introduction

This section gives directions on regular maintenance, that is recommended by Biddle, in order to ensure the safety and proper working, and to extend the life of the MAT air curtain.

6.1.2 Weekly check-up

Biddle recommends to carry out the following checks once a week:

- Verify that the door switch works correctly, by opening and closing the door and checking the door indicator light.
- Check the display on the control panel: there should be no fault messages.
- Read the humidity level from the display (see Section 4.3.3 'Reading climate conditions'). The level displayed should be reasonable. If it reads "99", there is probably a defect.
- If there are two air curtain units, read and compare the conditions from streams A, B, and C (see Section 4.3.3). The differences between the two air curtain units should be reasonably small.
- Verify that each fan works, by feeling the air stream near the outlet.
- Inspect the exterior of all components of the MAT air curtain.

6.1.3 Three-monthly check-up

Biddle recommends to carry out the following checks every three months:

- Test and inspect the corridor frame and the suspension of the air curtain units. They should show no sign of play or rust.
- Inspect the electrical connections. The cables should be well connected and the cable sleeves should be intact.
- Inspect the corridor. The insulation should show no leaks.

6.1.4 Yearly maintenance

Biddle recommends to have the following maintenance done every year.

**Danger:**

Do not attempt to carry out maintenance, unless you are technically qualified.

- Clean the interior of the air curtain unit(s) and the fans.

**Note:**

The fan motors do not need to be lubricated.

- Visually inspect the electronic parts and wires within the electronics compartment of the air curtain unit(s).

See Section 6.2 on how to access the interior of the air curtain unit.

6.2 Access to the interior of the air curtain unit



Danger:

Do not attempt to carry out maintenance inside the air curtain unit unless you are technically qualified.

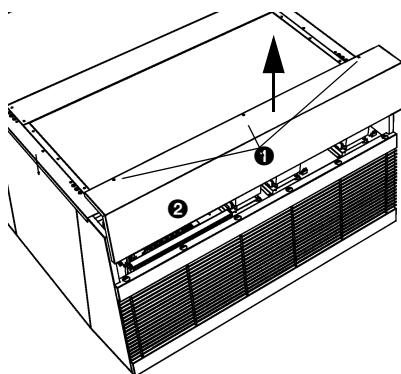


Warning:

High voltages

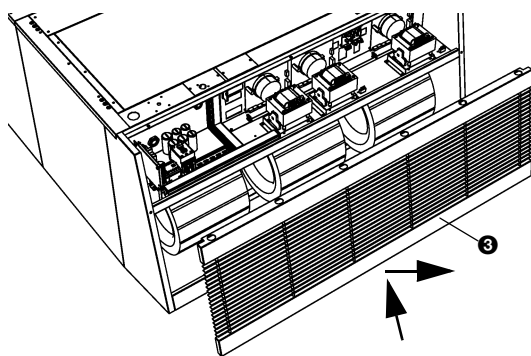
High temperatures

Before accessing the interior of the air curtain unit, follow the safety instructions in Section 1.4.



6.2.1 Access to the electronics compartment

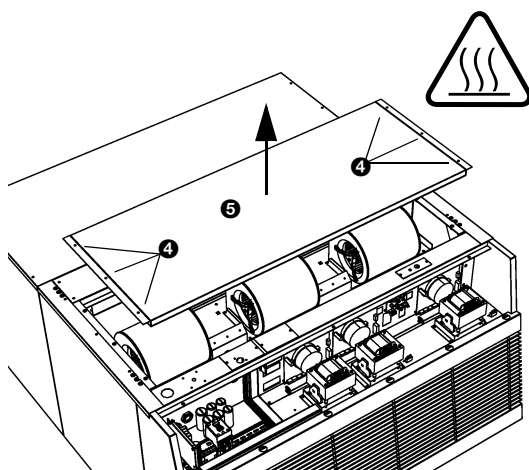
1. Remove the bolts ❶.
2. Move the front panel ❷ upwards and take it away.



6.2.2 Access to the A section

The A section contains the fans for the A stream.

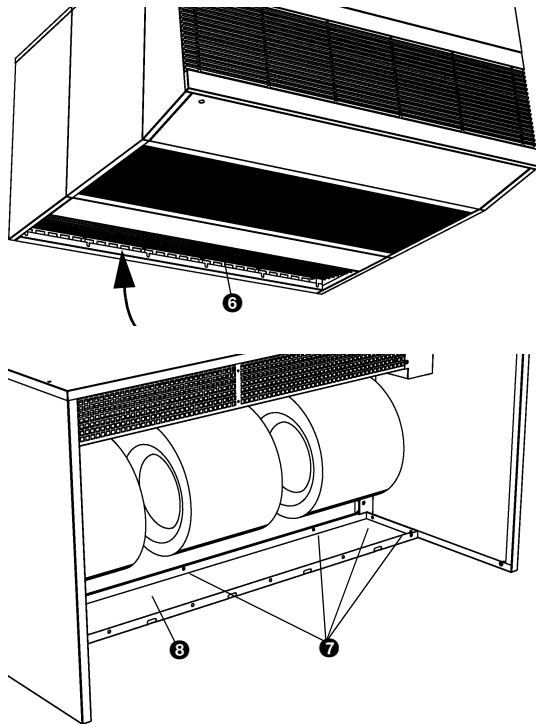
1. Remove the front panel (see Section 6.2.1).
2. Move the front grille section ❸ upwards and take it away.



6.2.3 Access to the B section

The B section contains the fans and the heating elements for the B stream.

1. Remove the bolts ❹.
2. Lift the top cover ❺.



air curtain unit seen from the cold store side
(wall, corridor, and back side panel omitted)

6.2.4 Access to the C section

The C section contains the fans for the C stream.

1. Move the grille ⑥ upwards at the rear site (some force may be needed for this) and take it out.

For your convenience, you can also take out the blind plate ⑧:

2. Remove the bolts ⑦ at both sides.
3. Take out the blind plate ⑧.

6.3 Access to the fuses

All fuses are inside the electronics compartment. See section 6.2.1 on how to access it.

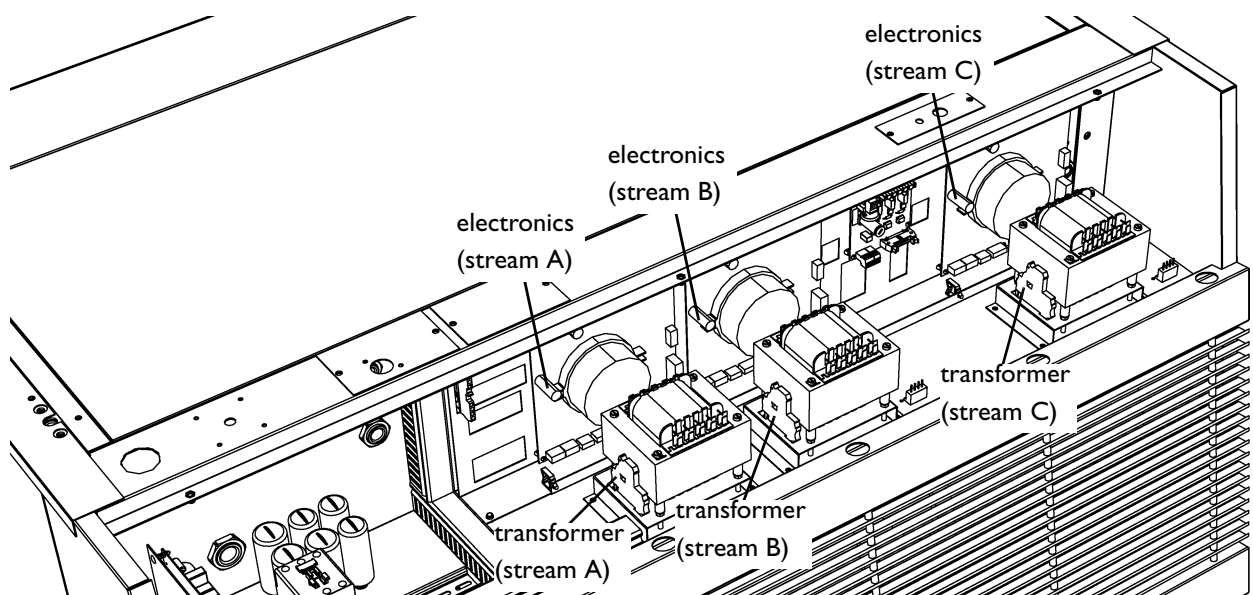


Figure 6-1 Location of fuse holders in the electronics compartment

7. . Troubleshooting




7.1 Introduction

This chapter gives directions on what you can do if problems occur with the working of the MAT air curtain. It provides help on identifying the cause and suggests solutions.

7.2 What to do if you found a problem

- If the MAT air curtain shows *unexpected behaviour*, refer to Section 7.3 to check if there is really a problem. You may also find the solution there.
- If *undesired side effects* are occurring, like mist and excessive icing, first verify with Section 7.3 that the MAT air curtain is working as it should. If it seems to work normally, refer to Section 7.4 to find the solution to the problem.
- If there is a *fault* message, you should always refer to Section 7.5.
- If this chapter does not provide a solution, or if the problem occurs recurrently, you should contact Biddle.

7.3 Unexpected behaviour

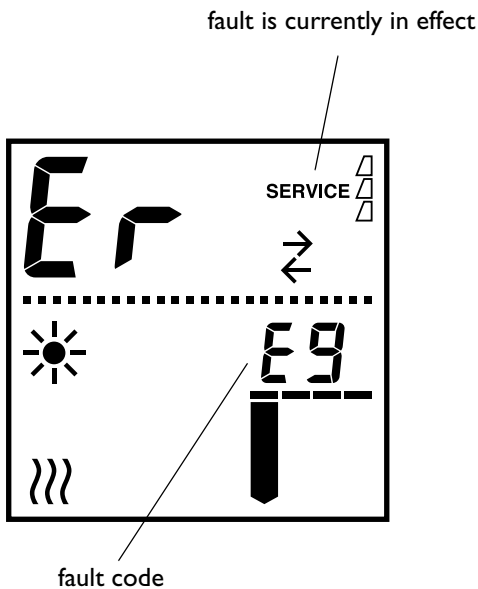
PROBLEM	PROBABLE CAUSE	WHAT TO DO
1. The fault alert light (red) is on. The display shows SERVICE and/or Er .	The MAT has detected a fault.	<ul style="list-style-type: none"> Take immediate action: see Section 7.5.
2. The icing alert light (white) is on.	The icing-up time limit for working in separation mode has exceeded.	<ul style="list-style-type: none"> Close the door to allow the MAT air curtain to defrost, and wait until the defrosting is done completely.
3. The  button does not work.	Manual working mode control has been disabled. (recommended for normal use)	<p>No action is required.</p> <p>You may enable the manual control with function no. 52 in the expert menu.</p>
4. The  and  buttons do not work.	The heating level setting is locked or controlled automatically.	<p>No action is required.</p> <p>You may enable manual setting with function no. 51 in the expert menu.</p>
5. The control panel display is blank.	<p>The control panel has no power because either:</p> <ul style="list-style-type: none"> the air curtain unit has been switched off (or both units if there are two of them), there is a power failure (maybe in one phase), the connection is faulty, a fuse is defect. 	<p>Check the following:</p> <ul style="list-style-type: none"> the isolating switch(es) on the air curtain unit(s): they should be in position “I”, the mains power supply, the connection between the control unit and the air curtain unit, the fuses: they are in the electronics compartment (see Section 6.2).

PROBLEM	PROBABLE CAUSE	WHAT TO DO
6. The MAT air curtain does not stop running when the door is closed.	The MAT air curtain is in defrosting mode. (The display shows ❄ .)	The MAT air curtain is working correctly; no action is required.
	The door switch is not working correctly because either: <ul style="list-style-type: none"> the door does not move the door switch handle far enough to break the contact, the connection is faulty. 	<ul style="list-style-type: none"> Check the working of the door switch by the door switch indicator light. Readjust the door switch: see Section 3.7.2. Check the connection of the door switch to the control unit.
	<i>In exceptional cases:</i> the MAT air curtain is cooling down automatically as a safety precaution. (The display shows ())	<ul style="list-style-type: none"> Increase the duration of the defrosting mode with function no. 12 in the advanced menu.
7. The MAT air curtain does not start running when the door is opened.	The door switch is not working correctly because either: <ul style="list-style-type: none"> the door switch is stuck by dirt or ice, the connection is faulty. 	<ul style="list-style-type: none"> Check the working of the door switch by the door switch indicator light. Remove dirt and/or ice from the door switch. Readjust the door switch: see Section 3.7.2. Check the connection of the door switch to the control unit.

7.4 Undesired side effects

PROBLEM	PROBABLE CAUSE	WHAT TO DO
1. Mist is occurring. Possibly, the air curtain seems to be disturbed.	The door is partially open.	Open or close the door entirely.
	An object (cargo or vehicle) is standing under the air curtain.	Remove the object.
	Draft is coming from an other open door nearby.	Close the other door while the cold store door is open.
2. Mist is occurring, possibly in the air curtain stream.	The heating is not sufficient for the current climate conditions in the cold store and the front hall.	<i>With manual heating control:</i> Try a higher heating setting (see also Section 5.4.1).
		<i>With automatic heating control:</i> Try a higher offset setting (see also Section 5.4.2).
3. Mist is occurring, possibly both in the cold store and in the front hall.	The air curtain stream does not reach the ground.	Try a higher velocity setting. Close and reopen the door on each try (see also Section 5.3).
4. Turbulence is occurring, and cold air is flowing into the front hall over the ground.	The air curtain stream is too strong.	Try a lower velocity setting (see also Section 5.3).
5. Mist is occurring locally at the outlet.	Excessive icing-up is slowing the stream down	See item 6 in this table.
	The inlet or outlet is obstructed.	Make sure that the inlets and outlets are free entirely.
	A fan is not working.	Contact Biddle.
6. Excessive icing-up in the fans and/or the outlet is occurring.	The air curtain is disturbed	See item 1 in this table.
	The MAT air curtain has been running too long without defrosting.	Close the door earlier to allow defrosting. Decrease the icing-up time limit. (function no. 20 in the advanced menu)
	The defrosting is not sufficient.	Try adapting the defrosting settings in the advanced menu.
7. The cold store is warming up excessively.	The air curtain stream does not reach the ground.	Try a lower velocity setting (see also Section 5.3).
	The heating level is too high.	<i>With manual heating control:</i> Try a lower heating setting. (see also Section 5.4.1)
		<i>With automatic heating control:</i> Try a lower offset setting (see also Section 5.4.2).

7.5 Fault messages



7.5.1 Display of fault messages

When a fault occurs, the control panel display shows **Er** together with a fault code.

If the display shows **Er** and a fault code without **SERVICE**, then the fault has cleared up by itself: the fault message remains on the display to inform you that it has occurred. The display will turn back to normal when you press any button.

If the display shows **SERVICE**, then the fault is still in effect. The fault message will keep reappearing as long as the fault has not been cleared up.

You can read a history of faults with functions no. 91 up to 95 in the expert menu (see Section 4.5.3 on page 37).

7.5.2 Resetting faults

Most faults clear up by themselves as soon as the cause is taken away. However, some faults require that you reset them.

To reset a fault, press the **+** and **-** buttons simultaneously for 3 seconds.

7.5.3 What to do if there is a fault

Take the appropriate actions to clear up the fault, depending on the fault code, according to Section 7.5.4.

If the fault keeps recurring, or if it occurs recurrently, there is probably a defect: you should always contact Biddle.

7.5.4 Fault codes

FAULT CODE	MEANING, PROBABLE CAUSE	WHAT TO DO
E1	The communication between the control unit and an air curtain unit (or an electronic component within it) is lost or faulty, probably because either: <ul style="list-style-type: none"> the component has no power, the connection is faulty. 	Check the following: <ul style="list-style-type: none"> the isolating switch on the air curtain unit(s): they should be in position “I”, the power supply (there may be a failure in one phase), the connections between the control unit and the air curtain unit(s), the fuses in the electronics compartment (see Section 6.3).
	A control unit or an air curtain unit (or an electronic component within it) has been changed.	<ol style="list-style-type: none"> Reset the control unit with function no. 98 in the expert menu (see Section 4.5.3 on page 37). Contact Biddle if this does not help.
E2	The control unit has power, but no communication with any electronic component in the air curtain unit(s).	<ol style="list-style-type: none"> Check the connections between the control unit and the air curtain unit. Reset the control unit with function no. 98 in the expert menu (see Section 4.5.3 on page 37). Contact Biddle if this does not help.
	The electronic components are incompatible.	<ul style="list-style-type: none"> Contact Biddle.
E3	A particular defect in some electronic component (rare)	<ol style="list-style-type: none"> Reset the fault. Contact Biddle if this does not help.
E4	The overheat thermostat has switched off the heating. This is a safety provision. This situation may occur if the power has been interrupted. In other cases, there is probably a serious defect.	<ol style="list-style-type: none"> Allow the MAT to cool down. Reset the fault. <p>If the fault keeps recurring, or occurs regularly:</p> <ol style="list-style-type: none"> Set the insulating switches on the air curtain unit into the “0” position. If there are two units, do this for both of them. Contact Biddle
E5	The heating does not stop, probably because of a serious defect. This situation can cause danger to persons, or damage to the device.	<ol style="list-style-type: none"> Reset the fault. <p>If the faults keeps recurring, or occurs regularly:</p> <ol style="list-style-type: none"> Immediately set the insulating switches on the air curtain unit into the “0” position. If there are two units, do this for both of them. Contact Biddle.
E7	A defect fan in stream B has been detected by a thermocontact.	<ol style="list-style-type: none"> Reset the fault. Contact Biddle if this does not help.
E8	A defect fan in stream A or C has been detected by a thermocontact.	<ol style="list-style-type: none"> Reset the fault. Contact Biddle if this does not help.

FAULT CODE	MEANING, PROBABLE CAUSE	WHAT TO DO
F3	The heating does not work, probably because of a defect.	<ul style="list-style-type: none">• Contact Biddle.
F5	The temperature sensor of stream B is defect.	<ul style="list-style-type: none">• Contact Biddle.
F6	The temperature sensor of stream C is defect.	<ul style="list-style-type: none">• Contact Biddle.
F7	The tempereature sensor of stream A is defect.	<ul style="list-style-type: none">• Contact Biddle.
F8	The humidity sensor is defect.	<ul style="list-style-type: none">• Contact Biddle.

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NL EG-verklaring van overeenstemming (richtlijnen 89/336/EEG en 73/23/EEG)

Middels dit schrijven verklaren wij, Biddle BV, dat het hieronder genoemde product in overeenstemming is met de bepalingen van de EMC-richtlijn 89/336/EEG en de Laagspanningsrichtlijn 73/23/EEG zoals laatstelijk gewijzigd. Voorts verklaren wij dat de normen EN55014-1 en EN55014-2 zijn toegepast. Door te voldoen aan deze richtlijnen is het product ook in overeenstemming met de nationale wetgeving.

D EG-Konformitätserklärung (Richtlinie 89/336/EWG und Richtlinie 73/23/EWG)

Hiermit erklären wir, Biddle BV, daß unterstehendes Produkt die Bestimmungen der EMC-Richtlinie 89/336/EWG und der Niederspannungsrichtlinie 73/23/EWG in ihrer momentan gültigen Fassung erfüllt. Außerdem erklären wir, daß die Normen EN55014-1 und EN55014-2 angewendet worden sind. Mit der Erfüllung dieser Richtlinien entspricht das Produkt auch der nationalen Gesetzgebung.

GB EC declaration of conformity (directive 89/336/EC and directive 73/23/EC)

Please take this form as a formal declaration that the product listed below conforms to the regulations of the directive for machines 98/37/EC, the EMC-directive 89/336/EC and the low voltage directive 73/23/EC, including recent changes. Moreover, we declare that the standards EN55014-1 and EN55014-2 have been applied. By complying with these directives, the products are also in accordance with the national law.

F Déclaration CE (directive 89/336/CEE et directive 73/23/CEE)

Veuillez considérer ce document comme la déclaration formelle que le produit listé ci-dessous est conforme à la législation EMC 89/336/CEE et à la législation voltage basse 73/23/CEE, ayant récemment modifié la législation sur la sécurité et la santé. De plus nous déclarons que les standards EN55014-1 et EN55014-2 ont été appliqués. Du fait qu'ils respectent ces exigences, les produits sont aussi conformes à la législation nationale.

E Declaración de la CEE (directiva 89/336/CEE y directiva 73/23/CEE)

Rogamos sirvanse encontrar este documento como una declaración oficial de que los productos abajo citados cumplen con las normativas la directiva EMC 89/336/CEE y la directiva bajo voltage 73/23/CEE, de acuerdo con la reciente modificación de las normativas de esta ley. Además certificamos que las normas EN55014-1 y EN55014-2 han sido observadas. Al dar cumplimiento a lo anteriormente expuesto, los productos están de acuerdo con la ley nacional.

I Dichiarazione di conformità (direttiva 89/336/EC e direttiva 73/23/EC)

Vogliate considerare questo scritto come una dichiarazione formale che i prodotti sotto indicati sono conformi la Direttiva EMC 89/336/EC e la Direttiva bassa tensione 73/23/EC e successive modifiche. Inoltre dichiariamo che le normative EN55014-1 e EN55014-2 sono state rispettate. Rispettando queste direttive i prodotti sono in accordo con la legge nazionale.

S EG-försäkrän om överensstämmelse (direktiv 89/336/EEC och direktiv 73/23/EEC)

Härmed försäkras vi, Biddle BV, att nedannämnda produkt överensstämmer med bestämmelserna i EMC-direktivet 89/336/EEC och i Lågspänningsdirektivet 73/23/EEC, inklusive de senaste ändringarna. Försättningsvis försäkras vi att standarderna EN55014-1 och EN 55014-2 har tillämpats. Genom att uppfylla dessa direktiv överensstämmer produkten även med den nationella lagstiftningen.

DK EU-erklæring direktivet (89/336/EEC og 73/23/EEC)

Denne erklæring bedes opfattet som en formel bekræftelse af, at det anførte produkt er i overensstemmelse med forskrifterne i EMC-direktivet 89/336/EEC og lavspændingsdirektivet 73/23/EEC, som følge af en nylig ændring i loven om regulativerne. Endvidere erklærer vi, at normerne EN55014-1 og EN55014-2 er den standard vi har brugt. Ved at gennemføre disse anvisninger er produktet i overensstemmelse med den nationale lov.

Brand: BIDDLE

Type: MAT-135-P-E, MAT-135-P-EE, MAT-135-S-E, MAT-135-S-EE
MAT-180-P-E, MAT-180-P-EE, MAT-180-S-E, MAT-180-S-EE
MAT-225-P-E, MAT-225-P-EE, MAT-225-S-E, MAT-225-S-EE

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