

# MANUAL

## Airmix model G

### Controlled ventilation/circulation system



Version: 2023-04

## FOREWORD

This user manual is intended for users of the Airmix model G and for technicians who install and maintain it. The user instructions and operating instructions are combined in a single document. The manual was produced by the inventor, Van der Ende Group (hereafter referred to as VDEG).

Each chapter is numbered and, where necessary, divided into sections. The table of contents on page 4 gives an overview of the chapters and sections, with references to the page numbers. There are numbers in the whole assembly manual referring to the parts described in the pictures.

# CONTENTS

Foreword.....	2
Contents .....	3
1 Identification .....	4
1.1 General .....	4
1.1.1 Description of the system .....	4
1.1.2 Specifications.....	4
1.1.3 Diagram of the system.....	5
1.2 Users .....	6
1.3 Use .....	6
1.4 Authorized servicers .....	6
1.5 Media .....	6
1.6 Operating environment .....	6
1.7 Guarantee conditions .....	6
1.8 Relevant directives .....	6
2 Description .....	7
2.1 General .....	7
2.2 Transport and storage .....	7
3 Safety instructions .....	8
4 Installation .....	9
4.1 Contents of the installation kit.....	9
4.2 Suspending the Airmix model G .....	11
4.2.1 Installing the attachment profiles and Airmix model G .....	11
4.2.2 Installing the condensate plate and fan .....	15
4.2.3 Installing the extension .....	16
4.2.4 Installing the valve position sensor .....	18
4.3 Air flow guide plates .....	20
4.3.1 Configuration of the air flow guide plates .....	20
4.3.2 Assembling the air flow guide plates .....	21
4.4 Modifying the screen .....	23
5 Connecting the thermostatic switch .....	24
6 Operation/using for the first time .....	25
6.1 Connection diagram fan .....	25
6.1.1 Connection diagram ZN045 AC fan 230 V ~1 50 Hz .....	25
6.1.2 Connection diagram ZN045 AC fan 230/400V D/Y ~3 50 Hz .....	25
6.1.3 Connection diagram ZN045 EC-fan 200-277 V AC ~1 50/60 Hz .....	26
6.1.4 Connection diagram ZG045 EC-fan 200-240 V AC ~1 50/60 Hz.....	27
6.2 Valve actuator.....	28
6.3 Connection diagram valve position sensor.....	28
7 Maintenance .....	29
8 Failures and repairs.....	29
9 Disassembly .....	29
10 CE declaration of Conformity.....	30
11 UKCA declaration of comformity .....	31
Attachments.....	32
CE declaration for fan .....	33
CE declaration for gear-rack drive .....	34
UKCA declaration concerning fan.....	35
UKCA declaration concerning gear-rack drive .....	36

## 1 IDENTIFICATION

This overview contains general information about the device. The purpose of this chapter is to indicate the limits and overall operation of the device, and the areas in which it is used.

### 1.1 General

#### 1.1.1 Description of the system

The Airmix consists of a fan attached to an aluminum housing, which is open at the top and has three valves at the rear. The Airmix model G needs attachment profile for mounting the Airmix at a truss. The valves are controlled with a gear-rack drive. The Airmix has a power cord with a plug for the fan (only the 50 Hz variant) and a power cord for the gear-rack drive. The Airmix has no internal controls.

#### 1.1.2 Specifications

General				
Type	Airmix model G			
Maximum dimensions	1270 x 630 x 1005 mm (L x W x H)			
Total weight	approx. 38 kg			
Fan				
	ZN045 ZAplus	ZG045	ZN045	ZN045
Frequency	50 Hz AC	50/60 Hz EC	50/60 Hz EC	60 Hz AC
Power	0.38 kW	0.17 kW	0.42 kW	0.24 kW
Voltage	230 V ~1/ 400 V ~3	200-240 V ~1	200-277 V ~1	230 V ~1
Rotational speed	1250 rpm	1230 rpm	1470 rpm**	960 rpm
Current	1.7 A	1.8 – 1.5 A	2.1 – 1.5 A	1.05 A
Circulation capacity	5800 m <sup>3</sup> /h*	5500 m <sup>3</sup> /h*	5800 m <sup>3</sup> /h**	5060 m <sup>3</sup> /h*
Ventilation capacity	5200 m <sup>3</sup> /h*	4500 m <sup>3</sup> /h*	5200 m <sup>3</sup> /h**	4400 m <sup>3</sup> /h*
Dust and water ingress protection	IP54	IP54	IP54	IP54
Insulation class	THCL155	THCL155	THCL155	THCL155
Power cord	5 m cord plus Type F earthed plug	None	None	None
Certification	CE marking, EAC, UKCA	CE marking, EAC, cURus (E347018 ZB-155), UKCA	CE marking, EAC, cURus (E347018 ZB-155), UKCA	CE marking, EAC, cURus (E111399 ZA-155), UKCA
Gear-rack drive				
Power	1.5 W			
Voltage	24 V AC 50/60 Hz 24 V DC			
Functional range	AC/DC 19.2 to 28.8 V			
Duration	116 sec			
Dust and water ingress protection	IP54			
Adjustment force	150 N			
Power cord	5 m cable 3 x 0.75 mm <sup>2</sup> , without plug			
Certification	CE marking, cULus (E108966), UKCA			
Airmix housing				
Material	Aluminum 2/3 mm			
Number of valves	3			

Table 1 Specifications

\* Measured without air guide plate and grille, and depending on pressure difference.

\*\* The EC fan has a nominal rotational speed of 1470 rpm. A rotational speed of 1250 rpm gives a ventilation capacity of 5200 m<sup>3</sup>/hour. The installation drawings and calculations are based on this rotational speed and ventilation capacity as standard. The EC fan is a fan with internal control. The EC fan is supplied as standard on the basis of factory settings and non-addressed.

### 1.1.3 Diagram of the system

Diagram showing the main components, numbered and named.

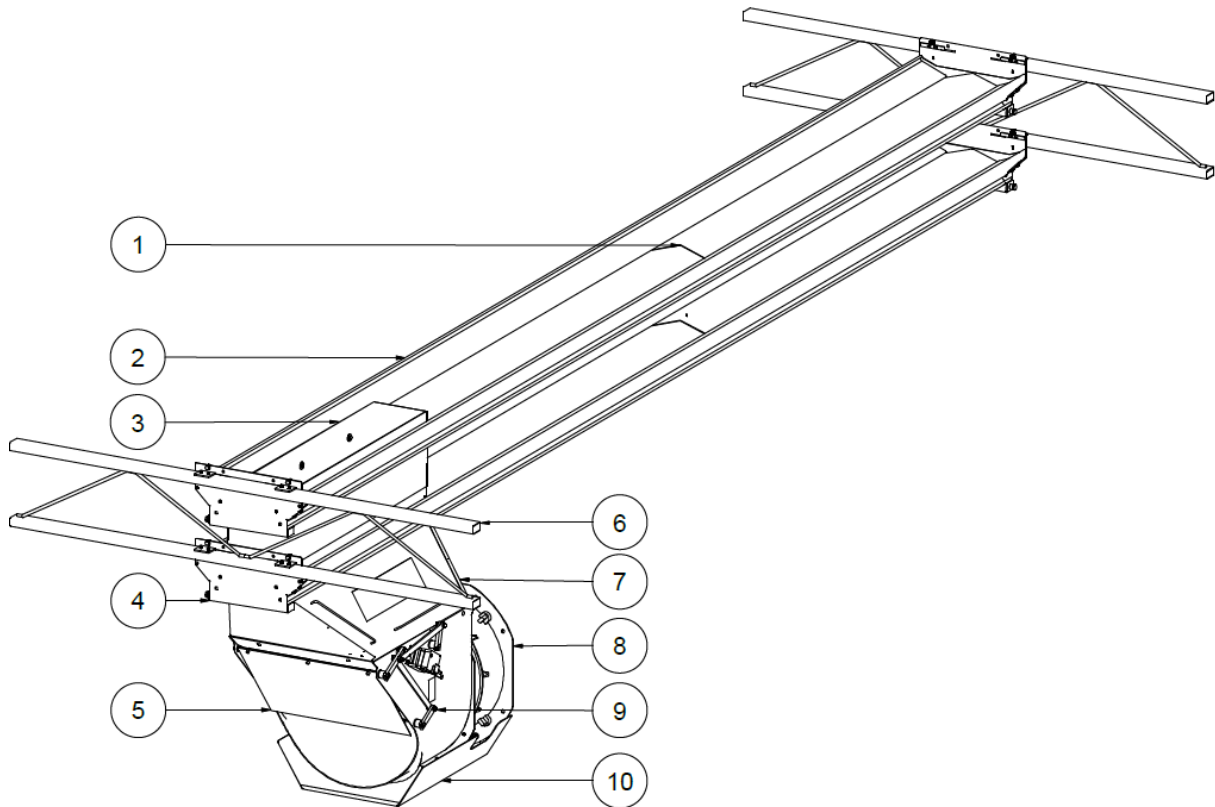


Figure 1 Schematic diagram of the Airmix

No.	Name
1	Cover plate
2	Aluminum attachment profile
3	Extension duct (optional)
4	End plate
5	Valve
6	Truss
7	Airmix housing
8	Fan
9	Gear-rack drive
10	Condensate plate (optional)

Figure 2 Parts of the Airmix model G

## 1.2 Users

In principle, the Airmix is not operated directly, but only controlled externally by an operator or user. These users must be at least 18 years old, employed by the company where the Airmix is installed, and designated by the management as competent and authorized to operate the Airmix.

All those who do not meet the above definition are unauthorized users, and these unauthorized users may create unsafe situations or risks to themselves or others if they use the Airmix.

## 1.3 Use

The Airmix is designed to mix warm, humid air from the growing area in a greenhouse with cold, dry air from above the screen. This circulates air horizontally, and improves the climate distribution in a greenhouse.

The Airmix is not designed to be used for any other purposes than those described above, such as transferring gases other than low-temperature air (-30 °C to +50 °C).

## 1.4 Authorized servicers

The Airmix can be serviced by any maintenance company, but VDEG is recommended. Periodic servicing helps to avoid unnecessary costs or failures, and improves reliability.

## 1.5 Media

Placing an image/comment in relation to the Airmix should always be discussed in advance with the producer/supplier. If this is not observed, any consequential damage can be recovered from this person/company.

## 1.6 Operating environment

The Airmix must be attached to the truss with attachment profiles in a greenhouse. The minimum environmental temperature is -30 °C and the maximum environmental temperature is 50 °C.

The fan must be installed out of reach of people without special equipment (such as a stepladder or aerial platform) and the truss must be strong enough to bear the weight of the fan.

The Airmix is not designed for use in any other environment than that described above. The Airmix is not suitable for use in explosive environments.

## 1.7 Guarantee conditions

The unit is guaranteed for 6 months after first use.

If a claim is made under guarantee, the parts concerned must be presented to the manufacturer for assessment.

The guarantee is void in the event of one or more of the following:

- Improper use
- Repeatedly ignoring the manufacturer's or supplier's advice
- Unauthorized repair, maintenance or use
- Use of inappropriate power supply connections
- Use of the machine in an unsuitable environment
- Intentional damage or modification of the machine

## 1.8 Relevant directives

The Airmix meets the standards stated on the declaration.

The Airmix is classified as a Class I device according to the Low Voltage Directive.

## 2 DESCRIPTION

### 2.1 General

The purpose of the Airmix is to ventilate and dehumidify in an area with a closed screen. The Airmix takes in air from above the screen, and blows it into the growing area below. The system is actually multifunctional, as it also acts as a horizontal recirculation system. This method of operation allows ventilation to be controlled, and the screen to be kept closed for longer. The advantage of this is that it is unnecessary to create a 'slit' in the screen when it is cold outside, thereby preventing cold downdraughts (unwanted air flows and temperature differences).

The Airmix is fitted with the same fan as the Enfan. The intake side of this fan is attached to the aluminum housing. Three valves are mounted in the housing, so the air can be drawn in from both above and below the screen. When the valves are closed, the Airmix draws air from the growing area, and acts as a horizontal recirculation system. If the valves are open, the air is drawn in from above the screen. The Airmix can be used in combination with all kinds of screen systems.

The valves are controlled by the climate computer, which means that the right mixture of air from above and below the screen can be obtained. This is controlled on the basis of relative humidity, absolute humidity and/or temperature.

The Airmix can be used where all kinds of vegetable, fruit and ornamental plants are grown.

### 2.2 Transport and storage

The Airmix is delivered to customers in the following separate parts:

Part	Number in Figure 1
Aluminum attachment profile	2
Airmix housing, including valves and gear-rack drive	3, 4 & 6
End plates	5
Cover plates	7
Fan	8
Extension	9
Condensate plate (optional)	10
Attachment bracket for air guide plate (optional)	-
Air guide plate (optional)	-
Valve position sensor	-
Attachment materials	-
Power cord for fan (only for 50Hz AC variant)	-

Figure 3 Delivered parts for Airmix model G

### 3 SAFETY INSTRUCTIONS

Always make sure that the fan is unplugged at the socket before starting to work on the Airmix! This will prevent the fan from starting unexpectedly and/or unintentionally.

Do not connect the fan or the gear-rack drive to the power supply until assembly has been completed and the system has been installed.

The regulations below are applicable to the Airmix model G.


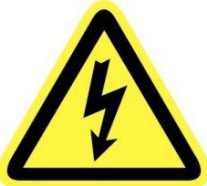



Safety symbol	Description
	Automatic starting machine!
	Electric voltage present!
	Danger of falling!
	Rotating parts!
	Reading instructions obligated!

Figure 4 Safety instructions and possible danger applicable to the Airmix model G



## 4 INSTALLATION

This chapter describes how the Airmix must be installed. You must read the entire manual before starting on the installation.

### 4.1 Contents of the installation kit

Quantity	Description	Contents
Airmix model G		
1	Airmix model G	- Housing excl. fan, incl. valves and gear-rack drive
1	Fan	
1	Power cord for fan (only for 50Hz variant)	- 5m cord plus Type F earthed plug
1	Attachment materials for attaching fan to spacer	- 8 pcs. M10 hexagonal lock nuts - 8 pcs. M10 washers
2	Aluminum attachment profile	
1	Connection set	- 2 pcs. end plates - 4 pcs. Slide-in bracket for end plate - 2 pcs. cover plates - 2 pcs. plugs ¼" - 1 pcs. profile connector - 2 pcs. mounting strips - 10 pcs. M8x16 hexagonal bolts - 8 pcs. M5 fender washers - 6 pcs. M8 fender washers - 8 pcs. M8 washers - 2 pcs. M6x12 set screws, hexagon socket - 12 pcs. metal screws 4,8x16 - 14 pcs. metal screws with tapping point 4,8x13
Extension		
1	Extension	Customer-specific component. The length of the extension depends on the height that has to be bridged
2	Aluminum attachment profile	
1	Connection set	- 2 pcs. end plates - 4 pcs. Slide-in bracket for end plate - 2 pcs. cover plates - 2 pcs. plugs ¼" - 1 pcs. profile connector - 2 pcs. mounting strips - 10 pcs. M8x16 hexagonal bolts - 8 pcs. M5 fender washers - 6 pcs. M8 fender washers - 8 pcs. M8 washers - 2 pcs. M6x12 set screws, hexagon socket - 12 pcs. metal screws 4,8x16 - 14 pcs. metal screws with tapping point 4,8x13

Table 2 Contents of the installation kit

Accessories		
1	Valve position sensor model G	60 <sup>0</sup> /1KΩ incl. attachment materials
1	Condensate drip tray	<ul style="list-style-type: none"> <li>- 1 pcs. condensate drip tray</li> <li>- 2 pcs. M10x25 hexagonal bolts</li> <li>- 2 pcs. M10 hexagonal nuts</li> <li>- 4 pcs. M10 washers</li> </ul>
Options (content for one piece)		
..	Air guide plate	<ul style="list-style-type: none"> <li>- 1 pcs. air guide plate</li> <li>- 3 pcs. M5x16 hexagonal bolts</li> <li>- 6 pcs. M5 washers</li> <li>- 3 pcs. M5 hexagonal nuts</li> </ul>
..	Attachment bracket for air guide plate	<ul style="list-style-type: none"> <li>- 1 pcs. attachment bracket</li> <li>- 4 pcs. M10x25 hexagonal bolts</li> <li>- 8 pcs. M10 washers</li> <li>- 4 pcs. hexagonal nuts</li> </ul>

## 4.2 Suspending the Airmix model G

This chapter describes the sequence of steps that must be taken when suspending the Airmix model G. You start by installing the aluminum attachment profiles, then the Airmix housing is placed between the attachment profiles. The fan and the condensate drip tray are then attached to the housing. Always install the Airmix model G in consultation with the screen installation technician. The minimum equipment required is shown for each step.

### 4.2.1 Installing the attachment profiles and Airmix model G

- Choose a suitable location:
  - o Use the installation diagram that was supplied by VDEG and/or your installation technician;
  - o Make sure that no objects are in the way;
  - o Make sure that no objects can obstruct the Airmix inlets and outlet;
  - o The fan must be installed out of reach of people without special equipment (such as a stepladder);
  - o Check that the truss is in good condition;
  - o Check that there is an electrical connection less than 5 meters away;
- Make sure you have the proper tools and equipment (enough for each person):

Quantity	Description
1	Battery impact wrench
1	Torx 25 bit (in impact wrench)
1	8mm socket bit (in impact wrench)
1	13mm open-ended wrench or socket wrench
1	16mm open-ended wrench
1	3mm hex key

- Make sure that the Airmix can be installed safely; two people are needed for installation, with one person at height for each lattice truss;
- What you will need for each Airmix:

Quantity	Description	No. In Figure 5 to 6	Article no. VDEG
1	Airmix model G	15	720052xx
2	Endplate	5	55014310
4	Slide-in bracket for end plate	11	55014380
2	Aluminum attachment profiles	2	580201xx
2	Aluminum cover plate	14	55014330
2	Mounting strips	3	55014320
1	Stainless steel profile connector	17	55014340
2	Stainless steel set screws, hexagon socket m6x12	4	57023510
10	Stainless steel bolt m8x16	9	57005920
8	Stainless steel fender washer m5	7	57000120
6	Stainless steel fender washer m8	13	57000140
8	Stainless steel washer m8	10	57001140
4	Stainless steel self-locking nut m8	12	57004140
12	Metal screw 4,8x16	6	56033790
17	Metal screw with tapping point 4,8x13	8	56042760
2	Stainless steel plug ¼"	16	68032415

- Fit a mounting strip (3) with an M6x12 set screw (4) in the groove of the profile (2), the first M8 tapped hole 210mm from the end of the profile; tighten the set screw; do this for two profiles. See Figure 5:

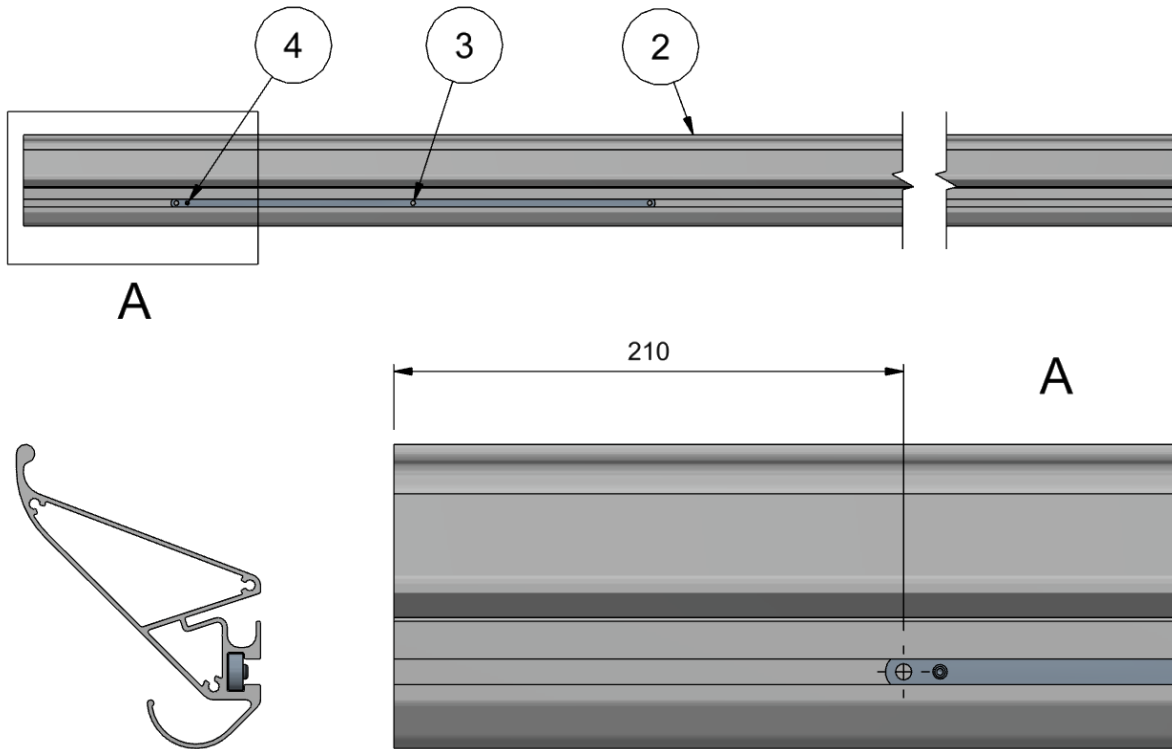


Figure 5 Mounting strip

- Insert a ¼" plug (20) in the end plates;
- Attach two attachment profiles (2) into one end plate (5) with six metal screws 4,8x16 (6). Make sure the holes of the end plate and attachment profiles line up nicely and look if there is no space left between the attachment profiles and the endplate.
  - o When the metal screws (6) have been completely screwed in, a **maximum of 10Nm** may still be applied to prevent the heads of the screws from breaking or ruin the aluminum profile.
- Put two 4,8x13 metal screws with tapping point (8) with corresponding fender washers m5 (7) through the slotted holes in the side of the end plate (5) and into the aluminum attachment profiles. Put the metal screws into the middle of the slotted hole.

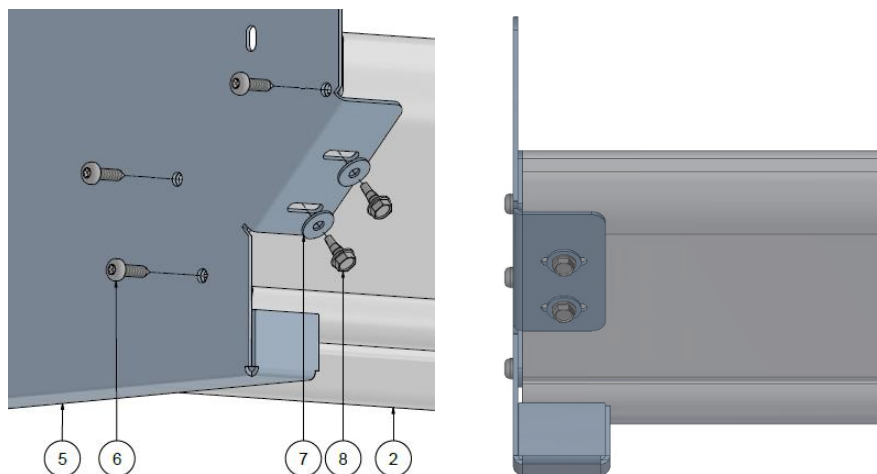


Figure 6 Mounting the metal screws into the end plate

- Fit two cover plates, lying onto each other (14), in the profile;
- Mount the second end plate with six 4,8x16 metal screws (6). Don't screw the metal screws fully fixed so there is some movement into the Airmix housing left.
- Place two 4,8x13 metal screws with tapping point (8) with corresponding fender washers m5 (7) into the second end plate. Don't screw the metal screws fully fixed too so there is space left to fine tune the end plate against the lattice (1).
- Slide the Airmix housing (23) between the profiles up to the end plate; attach it with six M8x16 hexagonal bolts (9) and six M8 fender washers (13);
- Put the cover plates in position and attach to each other with a 4.8x13 metal screw with tapping point (8);
- Lift the whole unit to the lattice and slide four Slide-in brackets (11) through the top of both end plates so these Slide-in brackets rest on the lattice.
  - o Make sure the correct right slot is used for the Slide-in brackets. This is important for the height related to the screen. See Figure 7.
- Make sure the end plate (5) is fully against the lattice. If so, connect the Slide-in brackets to the end plate using one m8x16 stainless steel bolt (9), two washers m8 (10) and one self-locking nut m8 (12).
- Connect the Slide-in brackets (11) to the lattice (1) with two metal screws with tapping point 4,8x13 (8).
- Put the profile connector (17) in place, by turning it in the groove of the profiles, under the overlap of the cover plates.

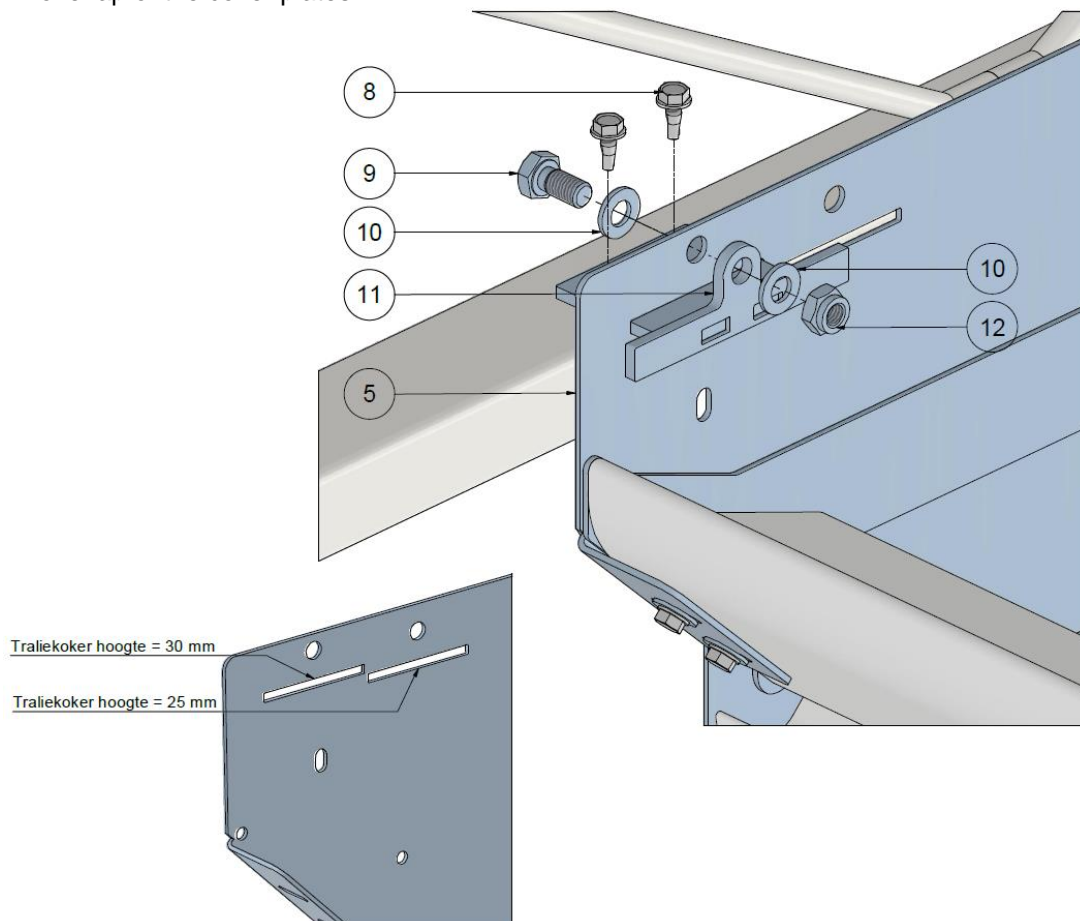


Figure 7 Mounting the Slide-in brackets into the end plate

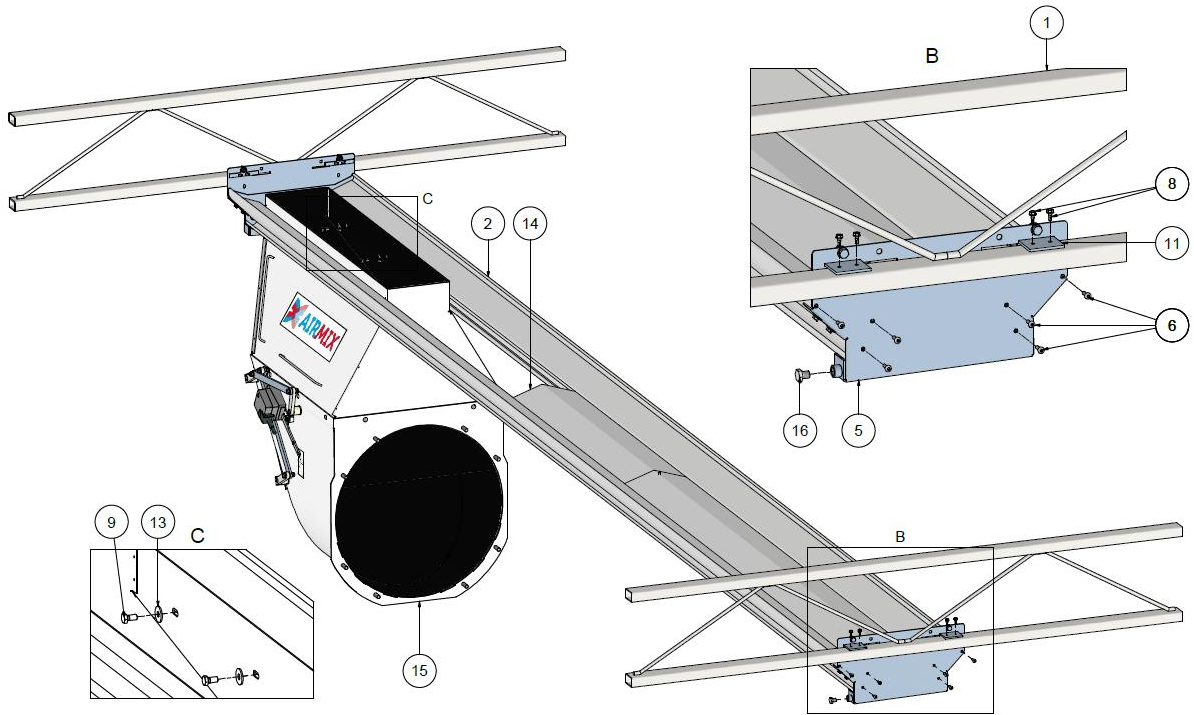


Figure 8 Installing the Airmix

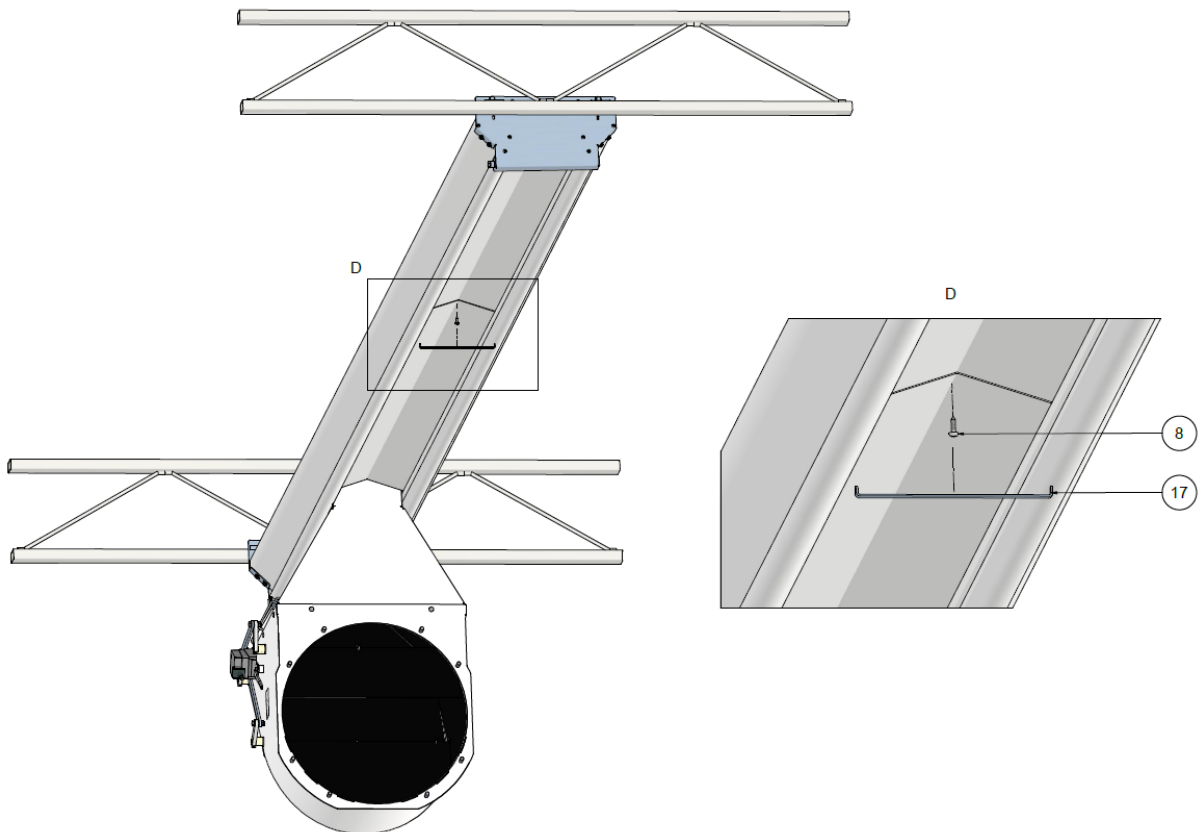


Figure 9 Profile connector and cover plates

## 4.2.2 Installing the condensate plate and fan

After the Airmix housing has been suspended, the condensate drip tray and the fan can be attached to it. Depending on the type of fan, it is best to prepare this first; see chapter 6. To attach the fan and condensate plate correctly, go through the following steps:

- make sure you have the proper tools and equipment:

Quantity	Description
2	17mm open-ended wrench or socket wrench

- make sure that the fan can be installed safely – get help if necessary;
- what you will need for each Airmix:

Quantity	Description	No. in Figure 10	Article no. VDEG
1	Fan	21	720034XX
1	Condensate drip plate	22	72005120
8	m10 self-locking nut	23	56016220
12	m10 washer	24	56019220
2	m10x25 bolt	25	56013230
2	m10 nut st vz	26	56015220

Figure 10 Installation (See Figure 10);

- Attach the fan (21) to the Airmix housing by inserting it over the protruding M10 threads;
- position the fan with the cable gland connection facing downward;
- Secure the fan to the upper six M10 threads with six M10 washers (24) and six M10 self-locking nuts (23);
- Attach the condensate plate (22) to the Airmix housing by inserting it over the protruding M10 threads;
- Secure the condensate plate to the lower two M10 threads with two M10 washers (24) and two M10 nuts (not self-locking nuts) (26);
- Secure the condensate plate to the fan with two M10x25 bolts (25), four M10 washers (24) and two M10 self-locking nuts (23).

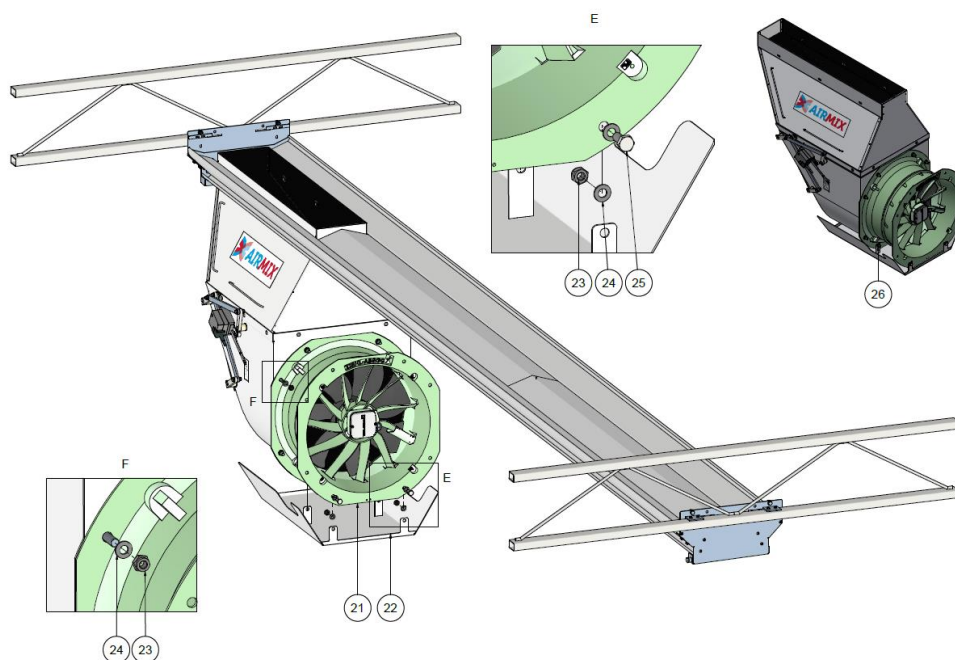


Figure 10 Installing the fan

### 4.2.3 Installing the extension

If the greenhouse has multiple screens, an extension will be required. An extension is fitted to two attachment profiles in the same way as the Airmix.

- Make sure you have the proper tools and equipment:

Quantity	Description
1	Battery impact wrench
1	Torx 25 bit (in impact wrench)
1	8mm socket bit (in impact wrench)
1	13mm open-ended wrench or socket wrench
1	16mm open-ended wrench
1	3mm hex key

- Make sure that the extension can be installed safely; two people are needed for installation, with one person at height for each lattice truss;
- What you will need for each extension for each Airmix:

Quantity	Description	No. In Figure 5 to 6	Article no. VDEG
1	Airmix model G	15	720052xx
2	Endplate	5	55014310
4	Slide-in bracket for end plate	11	55014380
2	Aluminum attachment profiles	2	580201xx
2	Aluminum cover plate	14	55014330
2	Mounting strips	3	55014320
1	Stainless steel profile connector	17	55014340
1	Extension	30	72005150
2	Stainless steel set screws, hexagon socket m6x12	4	57023510
10	Stainless steel bolt m8x16	9	57005920
8	Stainless steel fender washer m5	7	57000120
6	Stainless steel fender washer m8	13	57000140
8	Stainless steel washer m8	10	57001140
4	Stainless steel self-locking nut m8	12	57004140
12	Metal screw 4,8x16	6	56033790
17	Metal screw with tapping point 4,8x13	8	56042760
2	Stainless steel plug ¼"	16	68032415

- For installation, see figures in the chapter "Installing the Airmix model G" and Figure 11;
- Fit a mounting strip (3) with an M6x10 set screw (4) in the groove of the profile (2), the first M8 tapped hole 210mm from the end of the profile; do this for two profiles.
- Insert a plug (20) in the end plate; do this for two end plates;
- Attach an end plate (5) to a lattice (1) with two Slide-in brackets (11). Attach the Slide-in brackets to the end plate with two stainless steel bolts m8x16 (9), four m8 washers (10) and two self-locking nuts m8 (12).
- Put two metal screws with tapping point 4,8x13 (6) through each Slide-in bracket (11) and into the lattice (1);
- Attach a second end plate directly opposite to the first end plate on the next lattice with two metal screws with tapping point 4,8x13 (6);
- Mount a profile (2) between two end plates with six 4.8x16 self-tapping screws (12);
- Fit two cover plates, lying on each other (7), in the profile;
- Place the extension (19) on the Airmix housing (see Figure 11);
- Mount a second profile between the end plates with six 4.8x16 self-tapping screws;
- Attach the extension with six M8x16 bolts (10) and six M8 fender washers (9);
- Put the cover plates in position and attach to each other with a metal screws with tapping point 4,8x13 (6);



- Put the profile connector (11) in place, by turning it in the groove of the profiles, under the overlap of the cover plates.

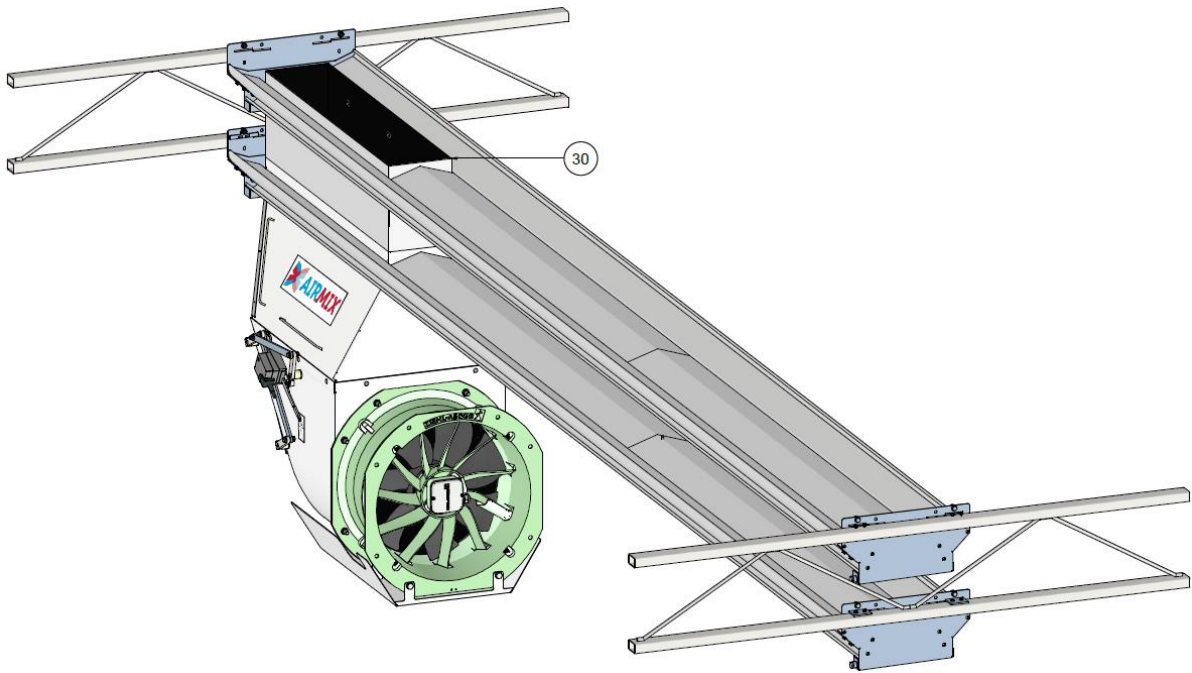


Figure 11 Installing the extension

#### 4.2.4 Installing the valve position sensor

The valves of the Airmix must be controlled by a climate computer. A valve position sensor must be installed on one Airmix per section to give feedback on the actual position of the valves to the climate computer. In practice, a greenhouse might be divided into multiple sections, where each section has its own climate control. This is why one Airmix in each section has to be equipped with a valve position sensor. The valve position sensor must be mounted before the Airmix is suspended. The valve position sensor must be mounted as follows:

- Make sure you have the proper tools and equipment:

Quantity	Description
1	Battery impact wrench
1	5.5mm drill
2	8mm open-ended wrench
2	10mm open-ended wrench
2	13mm open-ended wrench
1	5mm hex key

- Make sure that the valve position sensor can be installed safely – get help if necessary;
- What you will need for each valve position sensor:

Quantity	Description	Item number	Number in Figure 13
1	Valve position sensor 60°	11012451	6
1	Attachment bracket	55014350	9
1	Lever	55014360	7
1	Stainless steel M5x20 hexagonal bolt	57005340	3
2	Stainless steel M5 lock nut	57004120	5
4	Stainless steel M5 washer	57001120	4
1	Stainless steel M5x25 internal hexagonal countersunk bolt	57020215	8
1	Stainless steel M8x35 hexagonal bolt	57005960	10
1	Stainless steel M8 lock nut	57004140	12
4	Stainless steel M8 washer	57001140	11

- Installation (see Figure 12 and Figure 13);
  - o Drill two holes with 5.5mm diameter in the Airmix housing (see Figure 12);
  - o Mount the valve position sensor by securing two M5 nuts and M5 washers from the inside of the Airmix (if necessary, temporarily remove the top valve);
  - o Close the valves / set the valves to horizontal, and keep in place by securing a pivot point (2);
  - o Mount the attachment bracket (9) behind the rail of the actuator (1) with the M8x35 bolt (10), M8 washers (11) and M8 lock nut (12) (replace the M8x30 bolt);
  - o Attach the lever (7) to the end of the spindle of the valve position sensor with the M5x20 bolt (3), M5 washer (4) and M5 lock nut (9). Make sure that the countersunk hole points towards the Airmix housing.
  - o Mount the lever to the attachment bracket with the M5x25 countersunk bolt (8), M5 washers (4) and M5 lock nut (5);
  - o Release the secured pivot point (2).

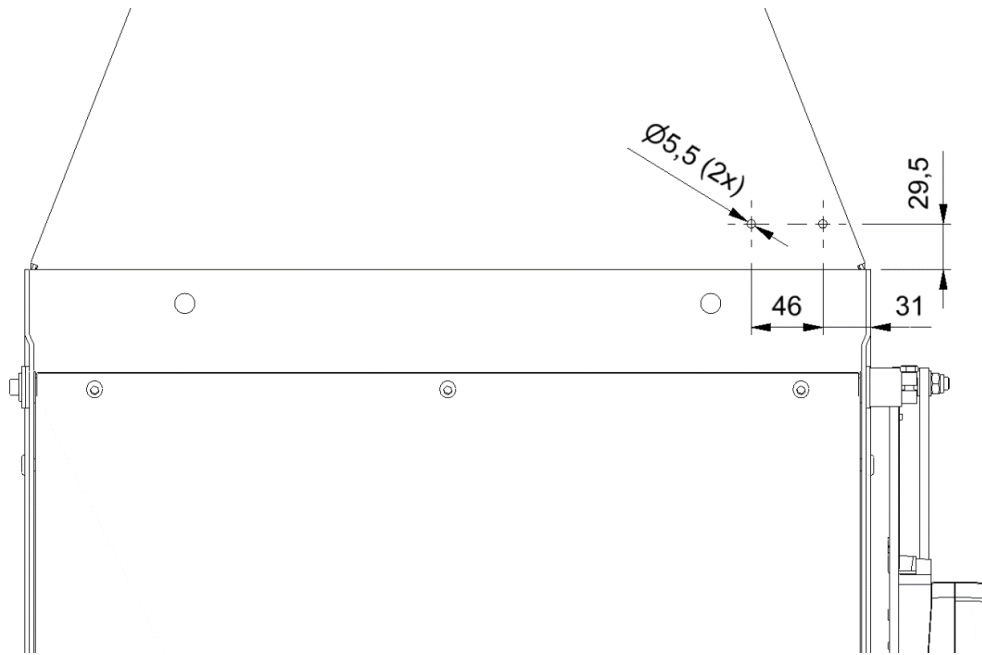


Figure 12 Measurements of holes for valve position sensor

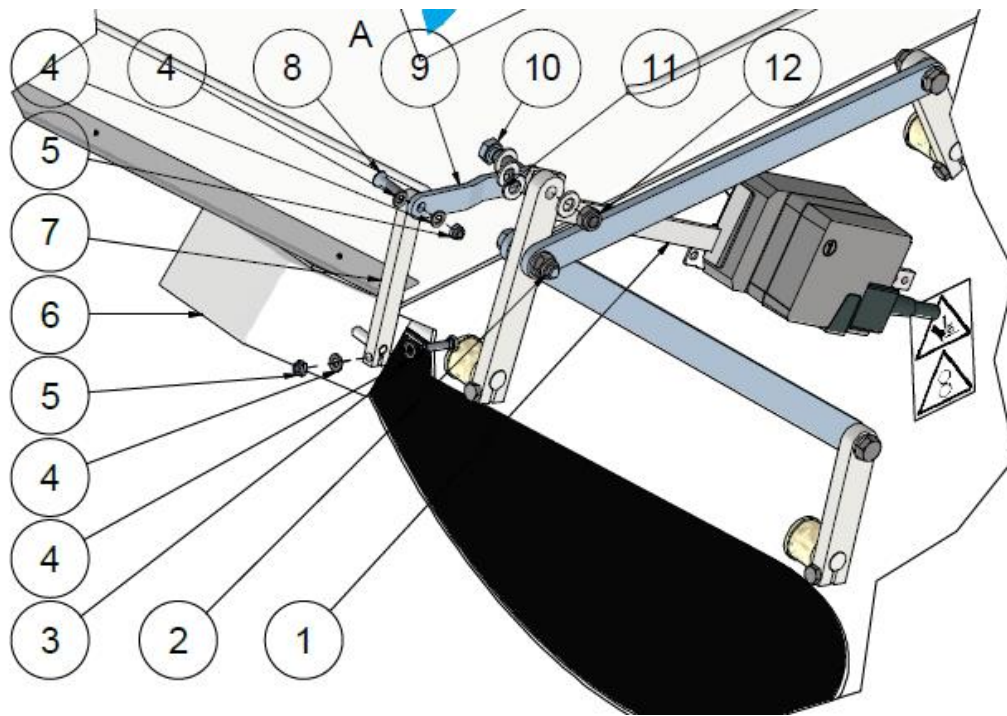
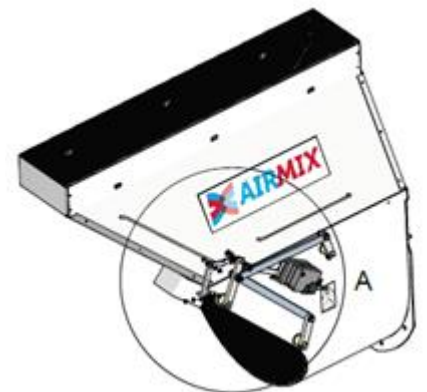


Figure 13 Installing the valve position sensor



### 4.3 Air flow guide plates

Air flow guide plates direct the air that is blown from the ventilator. Various configurations are possible to control the air flow. The configurations presented in chapter 4.3 are tested by VDEG on their desired effect. However, due to differences in installations, it is recommended to perform a single test prior to implementation, in order to obtain the most desirable effect.

#### 4.3.1 Configuration of the air flow guide plates

The number of guide plates attached to the Airmix and their orientation are vital for determining the air flow. The configurations with one guide plate are shown in Figure 14. The left configuration restricts the airflow downwards whilst the right restricts the flow upwards. A downwards restriction might be necessary if the airflow affects the crop too much. An upwards air flow restriction is imposed when the flow affects the screen cloth too much.

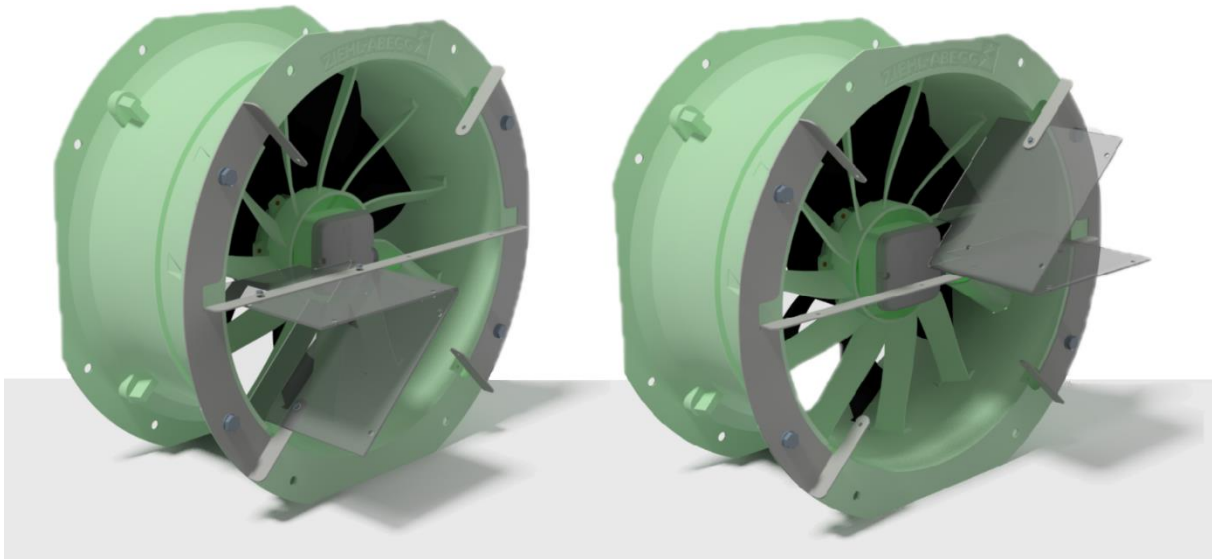


Figure 14 Downward (left) and upward (right) air flow restriction

If the configurations in Figure 14 do not influence the air flow enough, one can choose to use two air flow guide plates to restrict the flow. Figure 15 shows these configurations. The left configuration is used to limit the downward air flow even more. Respectively, the right configuration limits the upward flow even more than the one in Figure 14 does.

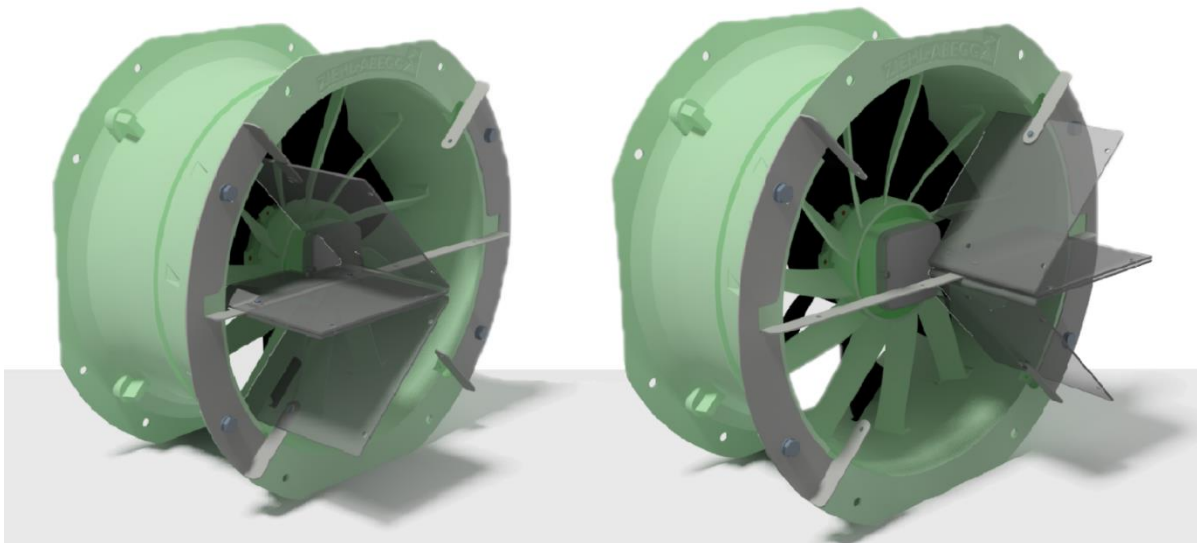


Figure 15 Extra downward (left) and upward (right) air flow restriction

### 4.3.2 Assembling the air flow guide plates

To attach the guide plates to the Airmix, the mounting bracket must first be attached to the fan. One can also choose to attach the guide plates to the mounting bracket before connecting the bracket to the Airmix.

Requirements:

- 1x mounting bracket
- 4x hexagonal tap bolt m10 x 25
- 8 x washer m10
- 4x lock nut m10

The mounting bracket will be connected to the fan according to Figure 16. Depending on the configuration, the bolts passing through horizontal strip of the mounting bracket will fixate either one or two air flow guide plates.

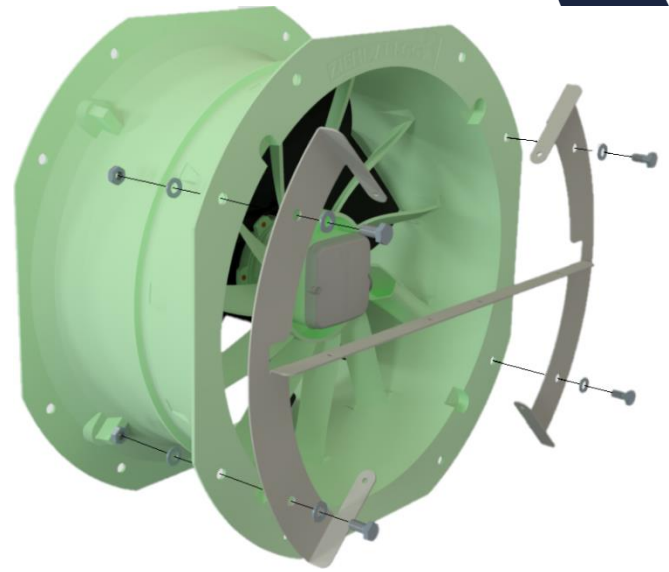


Figure 16 Assembling the mounting bracket

Requirements:

- 1x Air flow guide plate
- 3x hexagonal tap bolt m5 x 16
- 6x washer m5
- 3x lock nut m5

When one air flow guide plate is connected to the mounting bracket, Figure 17 shows how it needs to be assembled .

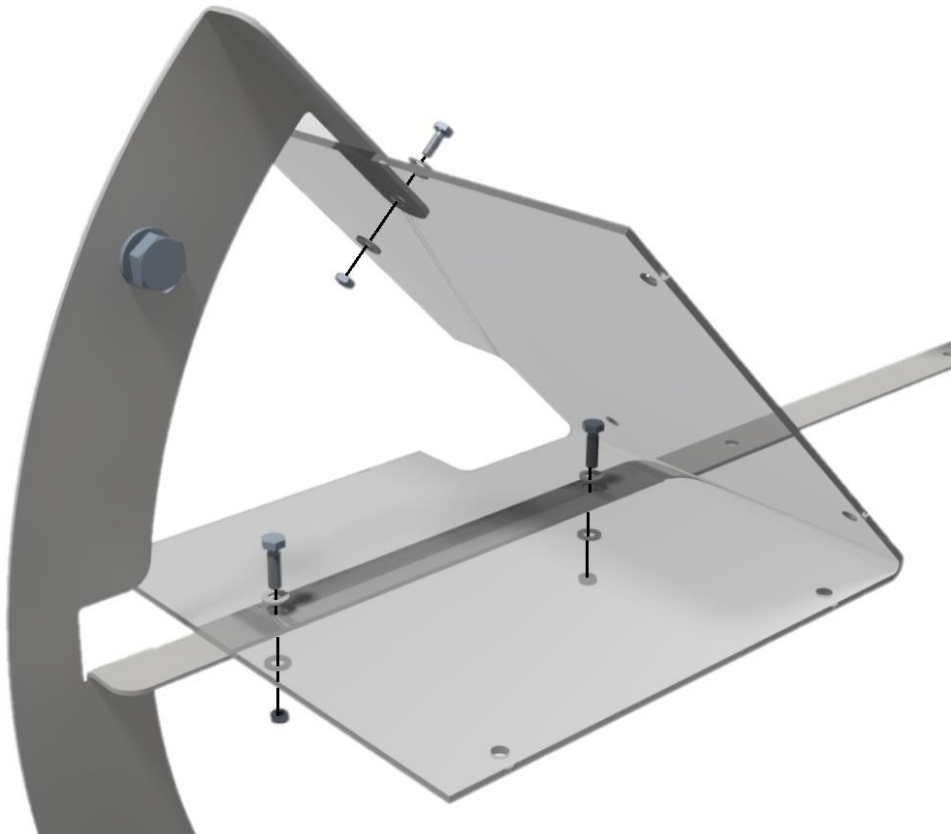
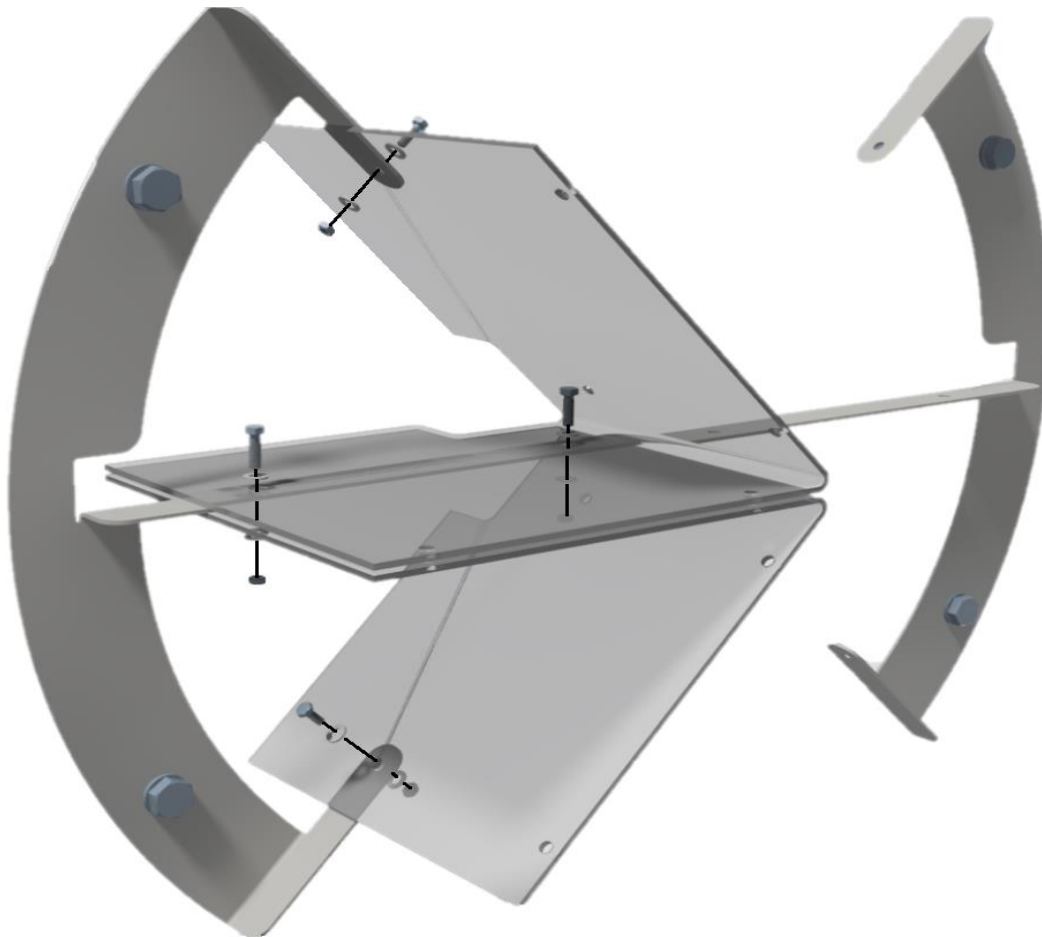


Figure 17 Connecting one air flow guide plate to mounting bracket

If two guide plates are used to restrict the air flow, Figure 18 shows how they are connected to the mounting bracket.

Requirements:

- 2x Air flow guide plate
- 4x hexagonal tap bolt m5 x 16
- 8x washer m5
- 4x lock nut m5



*Figure 18 Connecting two air flow guide plate to mounting bracket*

The Airmix comes with an outlet grill which can be mounted in front of the fan outlet by means of four torx screws.

Whenever air flow guides plates are used in combination with the outlet grill, the plates need to be mounted in reversed position. The guide plates should be attached to the outlet grill with Ty-raps.

## 4.4 Modifying the screen

The Airmix system requires modifications to the screen, since the screen system must be changed so that the Airmix can draw in air from above the screen. This must always be done in consultation with the screen installation technician.

Figure 19 shows a cross-section of the screen modification required for Airmix model G in the case of a double-screen system. A turn-down must be made in the screen at the aluminum attachment profile of the Airmix. This is similar to the turn-down in the screen at the greenhouse wall. In a situation with a double screen, the lower aluminum screen profile must be sawn through. It should be noted that extra pulling wires may then need to be fitted. In the case of a single-screen system, the aluminum profile can remain in one piece.

One condition for adding the hole in the screen is that with a new screen the screen has to rest for 2 months before the holes are made.

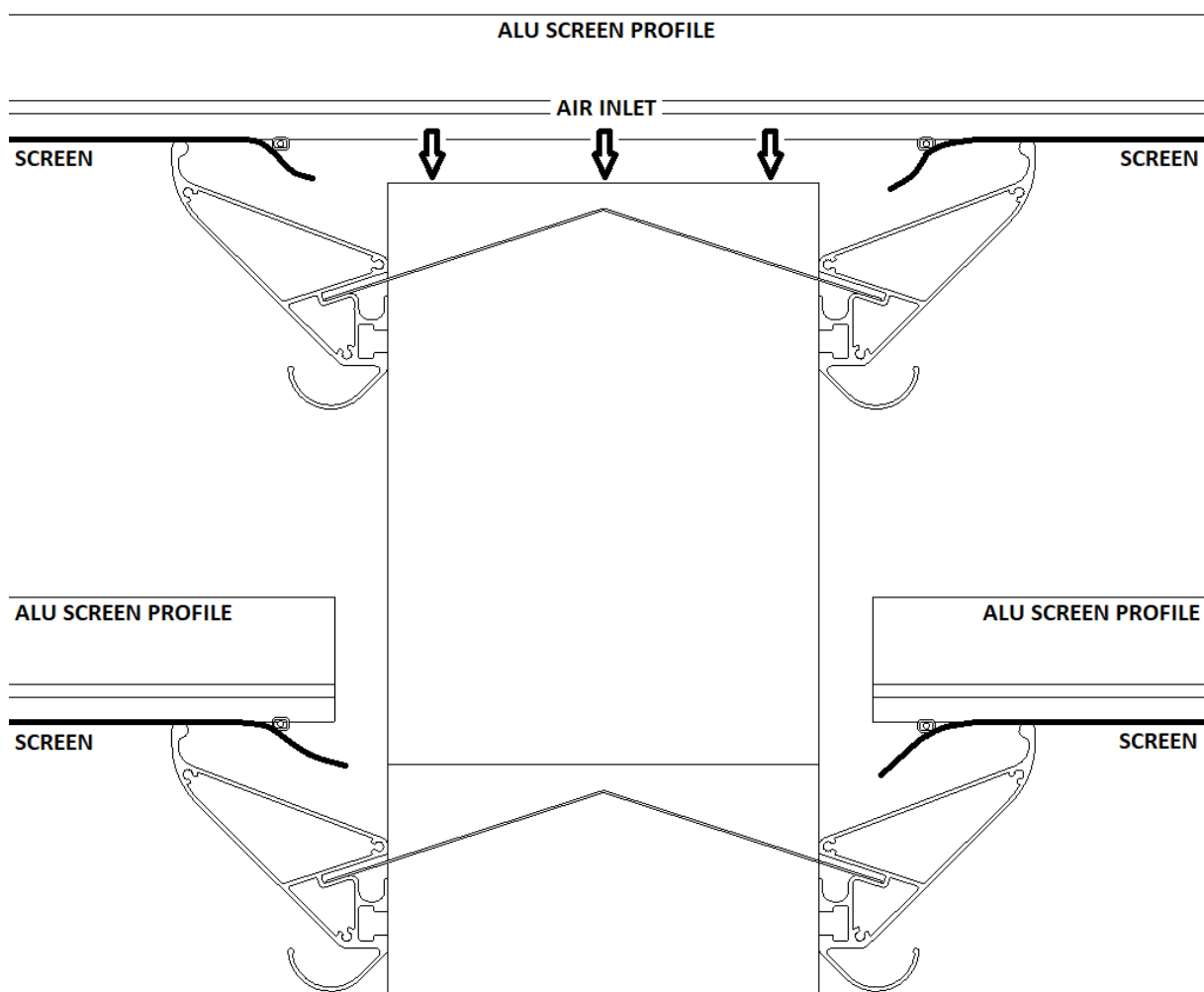


Figure 19 Cross-section of screen modification

## 5 CONNECTING THE THERMOSTATIC SWITCH

A thermostatic switch is built into the winding of every fan as standard. When connected, this switch turns the engine off if voltage levels are exceeded and the internal temperature rises above 100 °C. The motor gets too hot if the fan becomes locked, or similar.

Connecting the fan as shown in Figure 20 and 18 increases its life span. The thermostatic switch is connected in series with the phase. The red line in Figure 20 is the connection between TB and U1.

**PLEASE NOTE: This thermostatic switch has no hard reset, so when the engine has cooled sufficiently it will restart. Therefore, always disconnect the plug from the power supply during maintenance!**

NB: an external protective device with a hard reset is available on request.

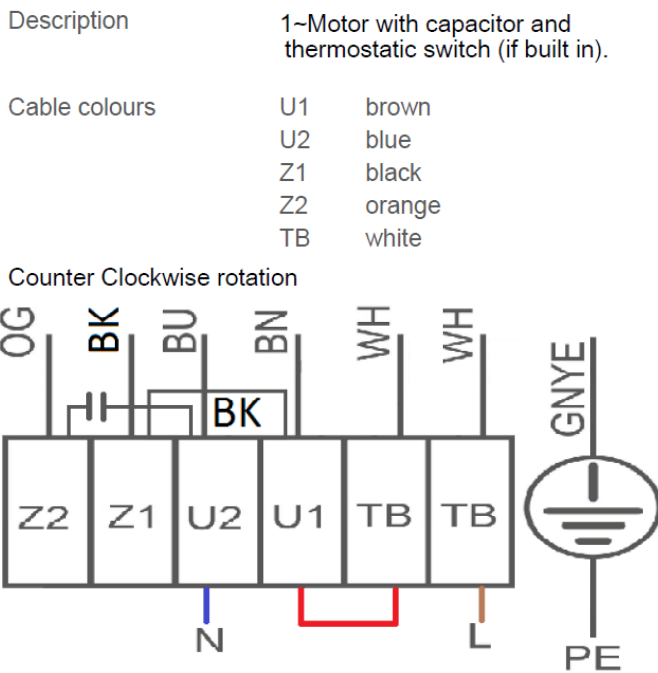


Figure 20 Wiring diagram

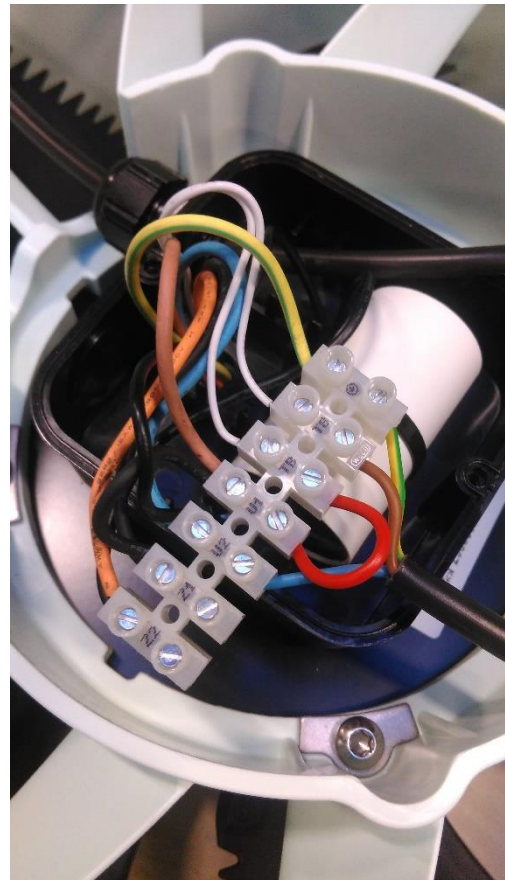


Figure 21 Connecting the thermostatic switch



## 6 OPERATION/USING FOR THE FIRST TIME

Operating the fan of the Airmix is simple: if it is connected to the power supply it will start ventilating, if it is disconnected it will stop ventilating. It is possible to set the speed by adjusting the voltage at the plug with a control transformer, but this is however, lies outside the scope of the Airmix manual.

### 6.1 Connection diagram fan

#### 6.1.1 Connection diagram ZN045 AC fan 230 V ~1 50 Hz

If the ZN045 AC 230 V ~1 fan has a connection frequency of 60 Hz, it is connected identically to the fan operating at 50 Hz. **Note: In this scheme, the thermostatic switch is not connected yet (see Figure 20 and 21)!**

1360-104XA

Clockwise rotation

1~Motor with capacitor and thermostatic switch (if built in).

BN brown  
 BU blue  
 BK black  
 OG orange  
 WH white  
 GNYE green-yellow

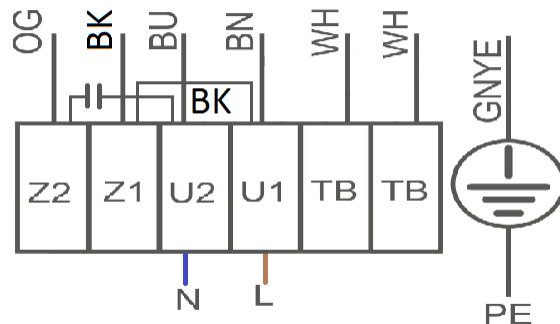


Figure 22 Wiring diagram of the ZN045AC ~1

#### 6.1.2 Connection diagram ZN045 AC fan 230/400V D/Y ~3 50 Hz

1360-106XA

3~ motor with one speed and thermostatic switch (if built in).

U1 brown  
 V1 blue  
 W1 black  
 U2 red  
 V2 grey  
 W2 orange  
 TB white

Δ-connection

Y-connection

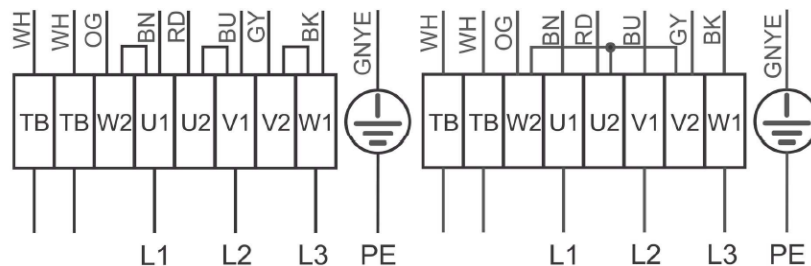


Figure 23 Wiring diagram of the ZN045AC ~3 Left wiring 230V / Right wiring 400V

### 6.1.3 Connection diagram ZN045 EC-fan 200-277 V AC ~1 50/60 Hz

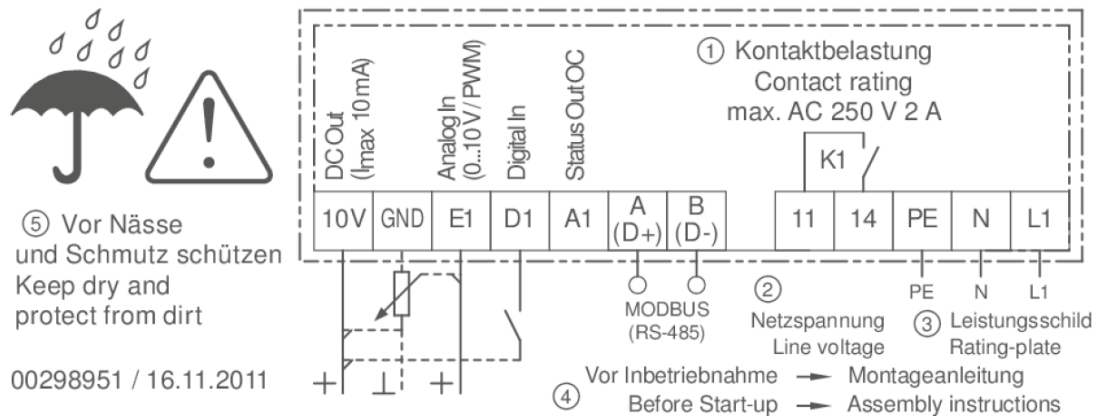


Figure 24 Connecting diagram ZN045-6IL

The power cable for the ZN045 is an 1-phase cable. This power cable must be connected to the following terminals inside the terminal box of the fan (see Figure 24):

- Live-wire (brown) to 'L1'
- Neutral-wire (blue) to 'N'
- Earth wire (green/yellow) to 'PE'

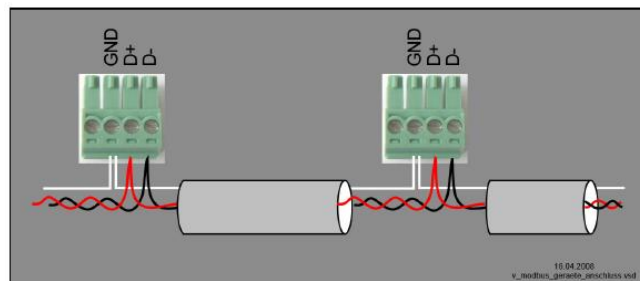
The main voltage where the EC-Fan is connected to must be corresponding to the voltage which is given on the type plate/sticker on the side of the fan. This main voltage must meet with the quality characteristics of EN50160 and the defined voltages of IEC60038.

The digital input (D1) is the external start on which the fan is turning on and off. When the terminals 'D1' and 'DC Out' are connected, the fan is enabled to switch on and off. The fan will operate following the preferred speed. The applied wire diameter is dependent on the length of the wire.

It is possible to regulate the RPM of the ZN045 by an external signal. The advice is to use a shielded cable for this external signal. There are multiple options to apply as an external signal:

- 0...10V + on E1, - on GND
- 0...100% PWM + on E1, - on GND
- Potentiometer + on 10V, - on GND and the signal on E1

The ZN045 EC-Fan is equipped with the possibility of MODBUS communication with a RS-485 interface. To use the MODBUS communication, terminals 'A (D+)' and 'B (D-)' must be connected. In the case of attaching multiple fans to each other with MODBUS, this must be done in a serial circuit like it's done in the following figure.



The recommended cables for using MODBUS communication;

- CAT5 / CAT7 wires
- J-Y (ST) Y 2x2x0,6
- AWG22 (2x2 twisted pair)

## 6.1.4 Connection diagram ZG045 EC-fan 200-240 V AC ~1 50/60 Hz

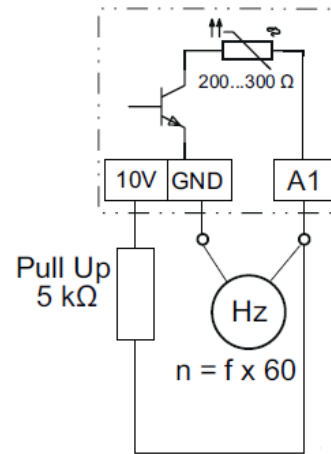
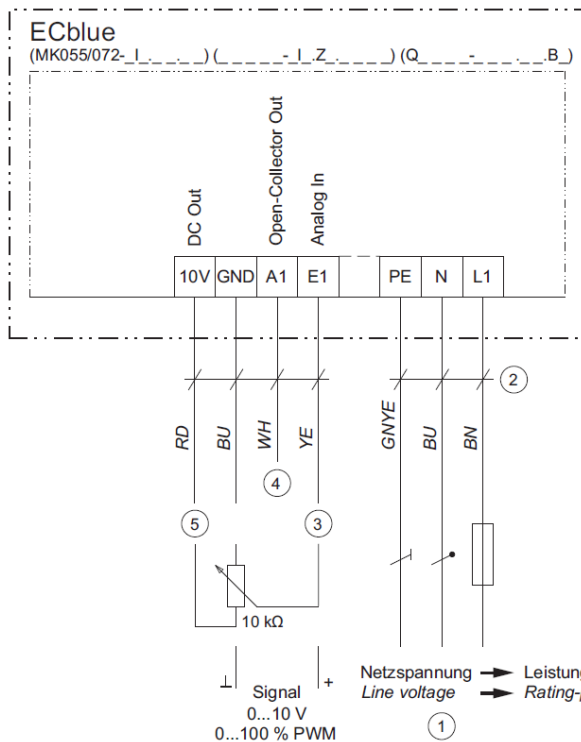


Figure 25 (left) Connecting diagram ZG045-ZIL

Figure 26 (right) Connecting feedback signal

The power cable for the ZG045 is an 1-phase cable. This power cable must be connected to the following terminals inside the terminal box of the fan (see Figure 25):

- Live-wire (brown) to 'L1'
- Neutral-wire (blue) to 'N'
- Earth wire (green/yellow) to 'PE'

The main voltage where the EC-Fan is connected to must be corresponding to the voltage which is given on the type plate/sticker on the side of the fan. This main voltage must meet with the quality characteristics of EN50160 and the defined voltages of IEC60038.

It is possible to regulate the RPM of the ZN045 by an external signal. The advice is to use a shielded cable for this external signal. There are multiple options to apply as an external signal:

- 0...10V + on E1, - on GND
- 0...100% PWM + on E1, - on GND
- Potentiometer + on 10V, - on GND and the signal on E1

The ZG045 has no external start. The EC-Fan will start as soon as the above described wiring is properly connected and the external signal is sufficient enough to run the fan.

The ZG045 has no possibility to use Modbus communication.

To read out the current RPM of the fan for feedback is possible by the connecting diagram of Figure 26. Place a 5kΩ resistor between the terminals '10V DC OUT' and 'A1 open-collector out'. The measured the frequency between A1-GND gives the revolutions per second. Multiply he measured frequency with 60 to get the revolutions per minute (RPM).

## 6.2 Valve actuator

The drive (Figure 27) of the valves must be controlled by the climate computer. A 3-core flexible cable exits the valve actuator. Core number 1 is neutral, and cores number 2 and 3 respectively open and close the linear gear-rack drive. 24 V AC 50/60 Hz. 24 V DC.

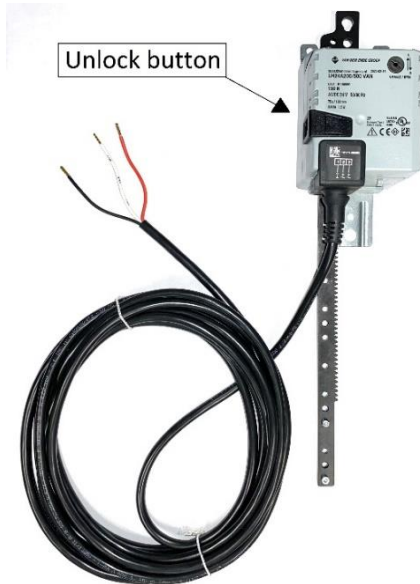


Figure 27 Valve actuator

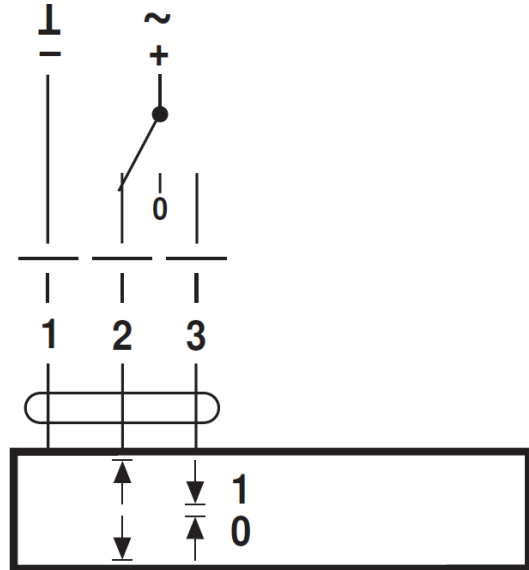


Figure 28 Valve actuator connection diagram

## 6.3 Connection diagram valve position sensor

The climate computer can readout the current position of the valves through connection 2 of the valve position sensor. The valve sensor axle (right in Figure 29), can be rotated 56 degrees by the valve actuator. This angle is converted into nearly a full rotation of a potentiometer (1 k $\Omega$ ) through a gear transmission. Because the voltage over connection 2 is dependent on a variable resistance, the computer is able to determine by what angle the valve was originally rotated.



Figure 29 Valve position sensor

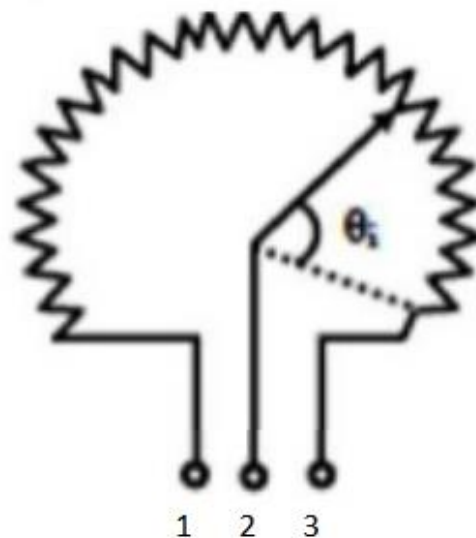


Figure 30 Schematic valve position sensor

## 7 MAINTENANCE

When servicing the Airmix, the fan plug must be removed from the socket, and the drive disconnected, to prevent unexpected and unwanted starting of the fan or gear-rack drive.

The Airmix requires a minimum of maintenance:

- Keep the intake side of the fan free of foreign objects and dirt.
- If the fan blades, fan housing or aluminum housing of the Airmix are dirty, wipe them down with a damp cloth.
- Replace the capacitor (AC variant) after 10,000 operating hours. This will help maintain the correct speed and avoid excessive power consumption (reduced efficiency).

## 8 FAILURES AND REPAIRS

Experience has shown that failures are virtually non-existent. What can happen in practice is that the thermal protection of the fan is triggered due to an internal defect, but if this does happen, it means that the fan has reached the end of its service life and must be replaced.

If the Airmix valves do not move to the desired position, it means the gear-rack drive is defective or a valve has jammed. Defective drives must be replaced. The valves can be manually opened or closed if the drive is unblocked (see unblock button in Figure 27). This allows the place where the valve is jammed to be determined and fixed.

## 9 DISASSEMBLY

Check that the plug has been removed from the power supply at the socket and the gear-rack drive is disconnected, to prevent unintentional and unwanted starting of the fan, or the valves opening or closing. Make sure that the workplace is safe.

## 10 CE DECLARATION OF CONFORMITY

### EC DECLARATION OF CONFORMITY

(In accordance with Annex II A of the Machinery Directive 2006/42/EC)

We, Van der Ende Pompen  
Aartsdijkweg 23  
2676 LE Maasdijk  
The Netherlands

declare, under our sole responsibility, that the machine:

Airmix

to which this declaration relates, is in conformity with the provisions of the following Directives:

Machinery Directive	2006/42/EC
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC

It is also, where appropriate, in conformity with the following standards or other normative documents:

n/a

The Netherlands  
Maasdijk  
25 October 2019

L. van der Ende



## 11 UKCA DECLARATION OF CONFORMITY

### UKCA DECLARATION OF CONFORMITY

Van der Ende Pompen  
Aartsdijkweg 23  
2676 LE Maasdijk  
The Netherlands

declare, under our sole responsibility, that the following machine

Airmix

to which this declaration relates is in conformity with the following directives and their admendments;

Supply of Machinery (Safety) Regulations	2008:1597
Electrical Equipment (Safety) Regulations	2016:1101
Electro Magnetic Compatibility Regulations	2016:1091

It is also, where appropriate, in conformity with the following standards or other normative documents;

BS EN ISO 12100:2010      Safety of Machinery – Risk assessment and Risk reduction

The Netherlands  
Maasdijk  
10 November 2022

L. van der Ende



## ATTACHMENTS

- CE declaration for fan
- CE declaration for gear-rack drive
- UKCA declaration for fan
- UKCA declaration for gear-rack drive



# CE declaration for fan

## EC-Declaration of conformity

as defined by the EC Low Voltage Directive 2006/95/EC, the EMC guideline 2004/108/EC, as well as ErP guideline 2009/125/EG.

### The type of machinery:

- External rotor motor MK..., MW..
- Axial fan FA..., FB..., FC..., FE..., FF..., FS..., FT..., FH..., FL..., FN..., VR..., VN..., ZC..., ZF..., ZN..
- Centrifugal fan RA..., RD..., RE..., RF..., RG..., RH..., RK..., RM..., RR..., RZ..., GR..., ER..

### Motor type:

- Asynchronous internal or external rotor motor with integrated frequency inverter for EDP system
- Electronically commutated internal or external rotor motor with integrated EC controller for EDP system

is developed, designed and manufactured in accordance with the EC Directives 2006/95/EC, 2004/108/EC and 2009/125/EC, on the own responsibility of

**ZIEHL-ABEGG SE**  
Heinz-Ziehl-Strasse  
D-74653 Kuenzelsau

### The following standards are applied:

EN 60034-1:2010+Cor.:2010, EN 60204-1:2006, EN 60529:1991 + A1:2000, EN 61000-6-4:2007, EN 61000-6-2:2005

Compliance with the ErP Directive 2009/125/EC does not refer to external rotor motors MK..., MW..

Compliance with the EMC Directive 2004/108/EEC only applies to this product if it is connected according to the operating instructions. If this product is integrated in a system or complemented and operated with other components (e.g., switching and control equipment), the manufacturer of or company operating the overall plant is responsible for compliance with the EMC Directive 2004/108/EEC.

The complete technical documentation is available.

22.11.2013

Dr. W. Angelis - Technical Director Air Movement  
Division

*Dr. W. Angelis*

## CE declaration for gear-rack drive

### DECLARATION OF CONFORMITY

We BELIMO Automation AG  
(manufacturer)

Brunnenbachstrasse 1  
CH-8340 Hinwil  
(adress)

declare under our sole responsibility that the product

LH24A200

to which this declaration relates is in conformity with  
the following standard(s) or other normative  
document(s).

EN/IEC 60730-1, EN/IEC 60730-2-14,  
EN 50121-3-2:06 (railway),  
EN 61000-6-2:05 (imm ind),  
EN 61000-6-3:07 (em hh)

following the provisions of Directive

2006/95/EC, 2004/108/EC



Hinwil, 27.05.2008  
(Place and date of issue)

Dieter Müller  
(name and signature)

# UKCA declaration concerning fan

## UKCA Declaration of Incorporation

as defined by the Supply of Machinery (Safety) Regulations 2008  
No. 1597, PART 2 / Annex II B

- Original -  
(english)

ZA87\_UK-GB  
2022/17 Index 002

### The design of the incomplete machine:

- Axial fan DN..., FA..., FB..., FC..., FE..., FF..., FG..., FH..., FL..., FN..., FP..., FS..., FT..., FV..., VN..., VR..., ZC..., ZF..., ZG..., ZN...
- Centrifugal fan ER..., GR..., HR..., RA..., RD..., RE..., RF..., RG..., RH..., RK..., RM..., RR..., RZ..., WR...
- Cross-flow fan QD..., QG..., QK..., QR..., QT...

### The motor type:

- Asynchronous internal or external rotor motor (also with integrated frequency inverter)
- Electronically commutated internal or external rotor motor (also with integrated EC controller)

complies with the requirements in Annex I, Articles 1.1.2, 1.1.5, 1.4.1, 1.5.1 in Supply of Machinery (Safety) Regulations 2008 No. 1597.

The manufacturer is **ZIEHL-ABEGG SE**  
Heinz-Ziehl-Straße  
D-74653 Künzelsau

### The following harmonised standards have been used:

EN 60204-1:2018	Safety of machinery; electrical equipment of machines; Part 1: General requirements
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13857:2019	Safety of machinery; safety distances to prevent danger zones being reached by the upper limbs
Note:	The maintenance of the EN ISO 13857:2019 relates only to the installed accidental contact protection, provided that it is part of the scope of delivery.

The specific technical documentation in accordance with Annex VII B has been written and is available in its entirety.

The following persons are authorized to compile the technical documents, address see above.

The specific documentation will be transmitted to the official authorities on justified request. The transmission can be electronic, on data carriers or on paper. All industrial property rights remain with the above-mentioned manufacturer.

**It is prohibited to commission this incomplete machine until it has been secured that the machine into which it was incorporated complies with the stipulations of the Machinery (Safety) Regulations.**

Künzelsau, 27.04.2022  
(location, date of issue)

ZIEHL-ABEGG SE  
Tobias Gauss  
Deputy Head of Technics Ventilation Technology  
(name, function)



(signature)

ZIEHL-ABEGG SE  
Moritz Krämer  
Head of Electrical Systems  
(name, function)



(signature)

**ZIEHL-ABEGG** 

## UKCA declaration concerning gear-rack drive

<b>UK DECLARATION OF CONFORMITY</b>		
<b>Document ID</b>		
<b>1. Type</b>	<b>LH24A200</b>	
<b>2. Manufacturer</b>	<b>BELIMO Automation UK Ltd</b> Shepperton Business Park Govett Avenue Shepperton Middlesex TW17 8BA ENGLAND	
<b>3. Responsibility</b>	declare under the sole responsibility that the product	
<b>4. Product</b>	Electric Actuator	
	to which this declaration relates is in conformity with the following regulations	
	<b>UK S.I. 2016 No. 1091 (EMC)</b>	<b>UK S.I. 2016 No. 1101 (LVD)</b>
		<b>UK S.I. 2012 No. 3032 (RoHS)</b>
<b>5. Legislations</b>		
	and designated standard(s)	
<b>6. Standards</b>	EN 60730-1:11 EN 60730-2-14:97+A1:01+A11:05+A2:08 EN 61000-6-2:05 (imm ind) EN 61000-6-3:2:07+A1:11 (em hh)	
<b>7.1 Type examination</b>	Not applicable	
<b>7.2 Certified module</b>	Not applicable	
<b>8. Necessary accessories and components</b>	Not applicable	
<b>9. Additional information</b>	Designed according to EN 60730-2-14 for incorporation and/or integration in assembly with exclusion of the risk assessment for the electrical connections.  <b>BELIMO Automation UK Ltd</b>	
<b>Signed for and on behalf of</b>	  Andy Bartlett Managing Director	
<b>Place and date of issue</b>	Shepperton, 03 November 2022	
		<i>Colors and details may differ from sample.</i>









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+31 174 51 50 50 · [info@vanderendegroup.com](mailto:info@vanderendegroup.com) · [www.vanderendegroup.com](http://www.vanderendegroup.com)