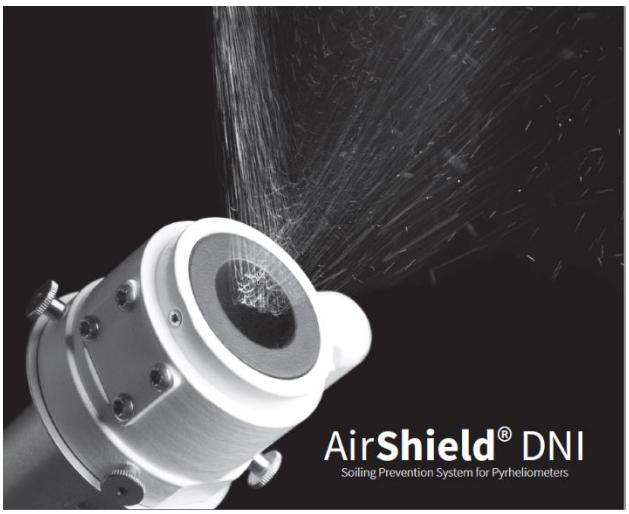
Instruction Manual

AirShield System

for

Kipp & Zonen pyrheliometers



V1904-01

1 Declaration of conformity

Declaration of Conformity

Kipp & Zonen B.V.
Delftechpark 36, 2628 XH Delft
P.O. Box 507, 2600 AM Delft
The Netherlands

declares under our sole responsibility that the product

AirShield DNI

to which this declaration relates, is in conformity with European Harmonised Standards as published in the Official Journal of the EU, based on the following standard

[EMC - Emissions] **EN 61326-1:2013**
[EMC - Immunity] **EN 61326-1:2013**
[Electrical safety] **EN 61010-1:2010**

following the provisions
EMC-directive **2014/30/EC**
RoHS Directive **2011/65/EU**

also, this device complies to
[EMC - FCC] **Title 47CFR part 15**

Delft, 1 November 2017

E. Valks - CEO
Kipp & Zonen B.V.

This Declaration of Conformity is compliant with the European Standard EN 45014 General Criteria for supplier's Declaration of Conformity. The basis for the criteria has been found in international documentation, particularly in ISO/IEC, Guide 22, 1982, *Information on manufacturer's Declaration of Conformity with standards or other technical specifications*

2 Table of contents

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3 Notes

Reading this entire manual is recommended for a full understanding of this product.

The triangle with exclamation mark is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the instrument. Kipp & Zonen reserve the right to make changes in the specifications without prior notice.

Many types of equipment should only be serviced by authorized personnel, meaning people who have been trained and designated as “authorized” by their employers.

3.1 Safety Precautions

Many hazards are associated with installing and maintaining instruments on towers or elevated structures. It is advised to use qualified personnel for installation and maintenance. The client is responsible for following the local safety regulations. The use of appropriate equipment and safety practices is mandatory. Check your company's safety procedure and protective equipment prior to performing any work.) If the AIRSHIELD is mounted at a high position, special care must be taken to secure both the person installing it and the instrument from falling during installation and maintenance.

While every attempt is made to get the highest degree of safety in our products, the client assumes all risk from injuries resulting from improper installation, use or maintenance of the AIRSHIELD.

WARRANTY AND LIABILITY

Kipp & Zonen guarantees that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used according to the instructions supplied by Kipp & Zonen. This product is under warranty for 24 months from the date of purchase.

Modifications made by the customer or on customer request can affect the validity of the CE declaration.

Kipp & Zonen shall in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use and other related exposures, however caused, arising from the faulty and incorrect use of the product.

In the case you have questions, comments or need technical support, please contact us at the following address:

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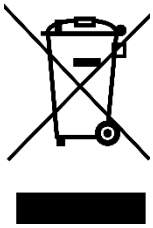
3.2 Waste disposal



- The pictogram showing a waste bin with a cross means that the product is subject to European Union regulations covering segregated waste disposal. This applies both to the product itself and to any accessories marked with the same symbol. Disposal of any such item as unsorted domestic waste is not allowed.

- Please dispose of all packaging materials in accordance with the applicable national waste management regulations.
- Please dispose of cardboard boxes, protective plastic packaging materials and all preservative substances separately and in the proper manner.
- The disposal of the device itself as well as device parts, accessories and consumables, is subject to the applicable national and local waste management regulations and to the environmental protection legislation in force in the country of use.

4 Introduction

The AirShield consists of a high performance air blower that drives double-filtered compressed air to a special injector head that creates an air barrier in front of the pyrheliometer front window. The system can be operated on 110-230V AC power and is intended for outdoor use only.

The AirShield soiling prevention system increases the long term accuracy of sensor readings and reduces cleaning frequency requirements by providing a constant air barrier to prevent dust and dirt from settling.

The AirShield DNI is designed to work with Kipp & Zonen CHP1 or SHP1 pyrheliometers.

Figure 1: CHP1 pyrheliometer with injector head

5 Installation and usage

Please read the following instructions carefully, they are essential for a safe use of the AirShield and to help achieve best measurement results.

There are four major components in an AirShield system for pyrheliometer measurements:

1. An injector head which is mounted on top of the pyrheliometer
2. A cabinet for the supply of filtered air
3. A connection hose
4. Optional pole mount kit to be released later

The injector head must be mounted firmly on the pyrheliometer as explained in this manual. The **secure mounting must be checked regularly** to assure safe operation and valid measurement results.

The air supply cabinet contains electrical equipment and **is only to be opened by experienced electrical personal** with all proper training and licensing for servicing electrical appliances operating at local grid voltages.

The system must be **regularly serviced**. The interval between two services depends on the environment where the system is operated in and on the level of measurement accuracy needed.

5.1 Assembly

The AirShield system for pyrheliometers consists of three components: (1) the injector head, (2) the connection hose, and (3) the cabinet for clean air supply (see Figure 2).

Figure 2: the injector head, connection hose and the air supply cabinet

Figure 3: optional pole mount

5.2 Mounting of the AirShield System

Installation is fairly simple and straightforward.

5.2.1 Mounting the injector head

The injector head must be secured by moderately tightening the 4 screws indicated by a red arrow in the pictures below (0.5 Nm torque or “finger tight”).

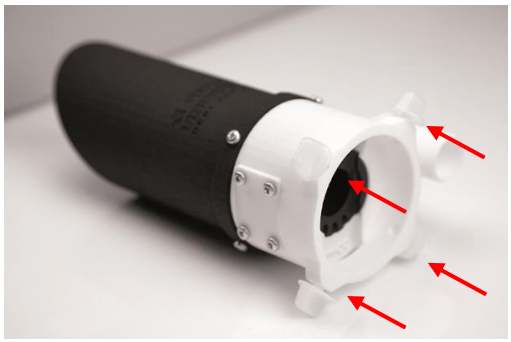


Figure 3: mounting of the injector head

5.2.2 Mounting the air hose on the injector head

The connection hose is mounted onto the injector head by gently turning the hose clockwise while at the same time pushing it over the hose nozzle.

Figure 4: mounting of the connection hose on the hose nozzle

Secure the 25mm hose with the supplied stainless steel hose clamp. Preferably, pre-tighten the clamp when not yet placed on the hose, to a diameter just larger than the hose. Then fit the clamp on the hose and the hose on the injector head. Turn the hose close wise to ease it onto the injector head.

Tighten the clamp. For best result, use a 7mm socket wrench instead of a phillips screwdriver and do not overtighten.

5.2.3 Changing air hose connection left to right

The injector is made in such a way that it can be used on the left and right-hand side of a tracker. Since the injector has a top and bottom and can't be turned up-side-down the hose nozzle has to be moved from one side to the other when the injector is used on the left side. Otherwise, it would interfere with the tracker side plate and the pyrheliometer wouldn't fit.

Standard setup of a CHP1 or SHP1 pyrheliometer on a Solys2 tracker is on the right-hand side when standing in front of the tracker. Therefor the hose nozzle is on the right too.

The injector head has two openings: one for the hose nozzle and the other is covered with a blind. Each secured with four screws. Removing all eight screws and flipping the hose connector and blind over is enough to be able to use the injector on the left side of the tracker.

Do not overtighten the screws.

5.2.4 Mounting the air hose on the air supply cabinet

The other side of the air connection has a Camlock locking system, which sits on its counterpart on the cabinet. After connecting, the two levers need to be pulled back to secure the connection.

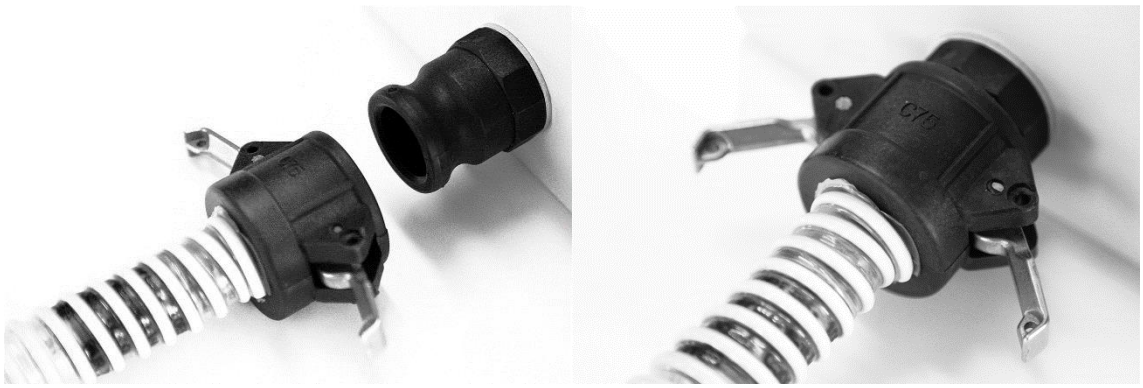


Figure 5: connecting the hose to the air supply cabinet.

Once the Camlock has been placed it can be secured with the supplied pins (see red arrow)

Figure 6: securing the Camlock

During the installation, the **connection hose** must be mounted and secured in a way that it **does not interfere with the movement of the solar tracker**). Also it must be made sure, that the solar tracker can perform all movements it normally performs, including normal sun tracking and startup and reference runs.

- Please note that the movement range of the tracker will change over the course of the year as it tracks the seasonal path of the sun.
- Reference or start up runs can be as big a +270 and -270 degrees from the home position which in most cases is looking eastwards.

Figure 7: Example of mounting the air supply cabinet

5.2.5 Mounting the air supply cabinet

The Air Supply Cabinet must be mounted so that the electrical connection cable points to the ground. It should be mounted at least 0.5 m above ground level to preclude dust and splashing water from the ground entering the air inlet.

The cabinet can be mounted using the four screw holes each on the corner of the cabinet. The holes our outside of the waterproof compartment.

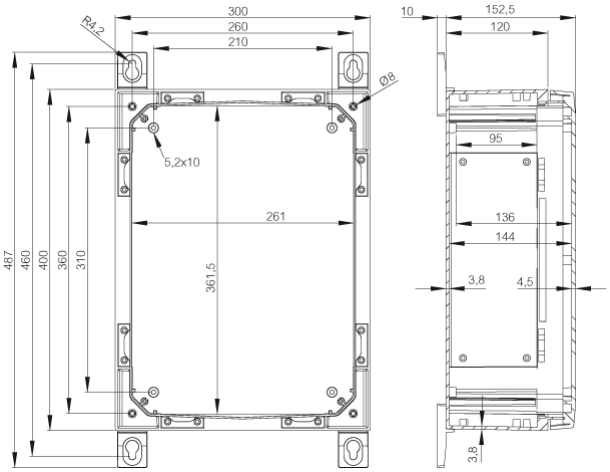


Figure 8: cabinet dimensions

Optionally a pole mount is available that fits to the 4 screw holes and then to a pole using the two supplied and oversized hose clamps.

Figure 9: optional pole mount

6 Electrical and mechanical

IMPORTANT: Electrical Installation is only to be performed by trained electrical professionals with all necessary training and accreditation for connecting electrical components to the local electricity grid.

6.1 Electrical properties

The Airshield accepts 100 V- 240 V 50/60 HZ AC and uses 20W max.

The Airshield is certified to work between 0 and 3000m altitude.

6.2 Electrical connection

The system has no AC fuse other than the unserviceable one inside the power supply and must therefore be connected only to fused power outlets.

A power on/off switch is not a part of the AIRSHIELD; requirements for electrical equipment installed outdoors specify that:

- A power isolator (switch or circuit-breaker) must be included in the cable installation
- The isolator (switch or circuit-breaker) must be in close proximity to the equipment and within easy reach of the operator
- The isolator (switch or circuit-breaker) must be marked as the power disconnection device for the equipment used in weather conditions with all types of precipitation.

The system is delivered with the cable plug (figure 10 and 10a) and the user needs to supply his own power cord.

Description	Straight cable socket, integrated strain relief
Type	CA 3 LD
Order No.	934 125-100
Number of contacts	3 + PE
Cable gland	M 22x2
Cable diameter	6 mm to 12 mm
Conductor size	max. 2.5 mm^2
Housing Color	Black
Rated voltage	AC 400 V / DC 250 V
Rated current	DC 10 A / AC 16 A

Figure 10: Electrical plug

Figure 10a. Pin numbering in power connector

The pin numbers and ground connection for the individual wires are visible when opening the connector.

AC power connections	
Pin 1	Brown (L)
Pin 2	Blue (N)
Pin 3	Not used
Pin 4	Green/Yellow Earth

Care must be taken to connect the right wires to the right pins, making sure that the wires are sufficiently isolated right up to the pin.

6.3 Mechanical

- One pre-filter and one primary air filter with a filter surface of more than 1 m^2
- Central air supply unit for outdoor operation (IP 53)
- Built-in power supply for 110 to 230 V and 50/60 Hz AC, 15 Watt
- Operating and storage temperature -20 to +45 °C
- Altitude 0 – 2000m
- Air pressure 80 – 110 kPa
- Dimensions of central unit: 439 x 300 x 196 mm
- Dimension of the air injector 180 x 100 x 70 mm
- UV resistant highly flexible connection hose
- Length of flexible connection hose: 4 m
- Weight of air supply unit: 7,4 kg, injection head: 260 g

7 Service

7.1 Cleaning outer filter parts

Filter stages 1 and 2 are reachable by removing the stainless steel rain shield at the front of the cabinet :

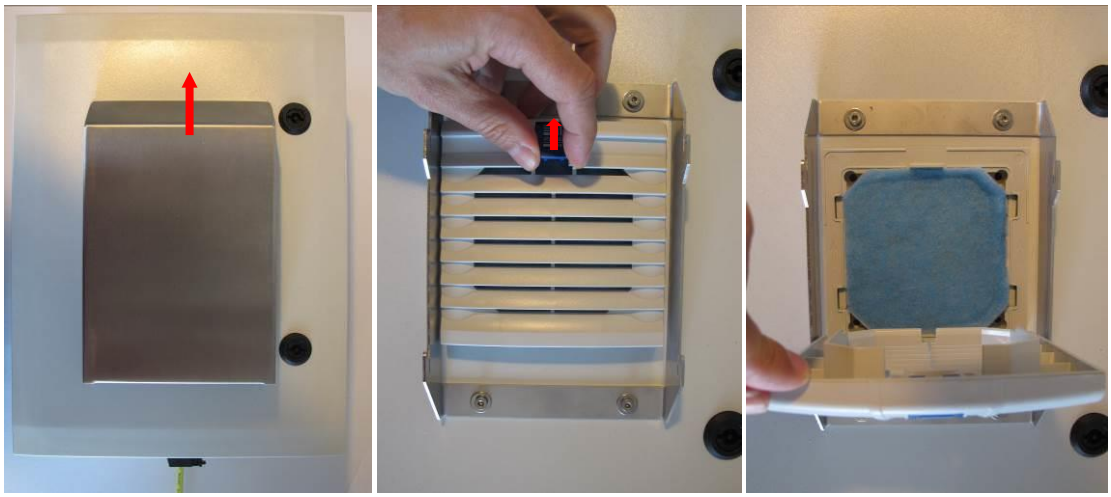


Figure 11: Filter removal

The stainless steel rain hood can be removed by sliding up. Lifting the blue clip opens the filter holder. The filter stages 1 and 2 (combined in a single filter pad) can now be accessed and replaced.
The filter pad can be dusted off or washed in warm water with soap to be cleaned.
When the filter is too dirty it can be replaced with a widely available Rittal SK 3321.700

7.2 Cleaning inner filter

To service the inner filter, the air supply cabinet needs to be opened using the supplied key. These steps are only to be performed by a trained and certified technician. Always disconnect the power before opening the cabinet.
Inside the cabinet, the stage 3 filter is hold in place by a metal frame screwed to the cabinet

key to open the cabinet

Figure 12: metal frame to hold the filter in place and the 6 screws to be removed in order to replace the filter.

After the 6 screws have been removed, the filter can be taken out. Dust accumulated in the filter can be mechanically removed by gentle tapping against a pole or hard surface. If this does not remove dust sufficiently, please use a new filter.

The filter used should be easy to source locally as it is also used in the automotive industry.

Purflux A214 dimensions 57 x 178 x 242mm (height x width x length)

Some other references to the same size filter are:

BOSCH: 1457433004 or 73457
CHAMPION: U607/606
FRAM: CA5344 - CA5350
UNIPART: GFE1140

8 Troubleshooting

If the system doesn't start up although the system is connected to a checked power source, please proceed as follows:

These steps are only to be performed by a trained technician, as the electrical cabinet needs to be opened!
- Switch off main switch and disconnect system from power
- open air supply cabinet

- check the fuse that protects the ventilator and the air turbine from over current conditions. The fuse is located in a fuse box as shown in figure 12.

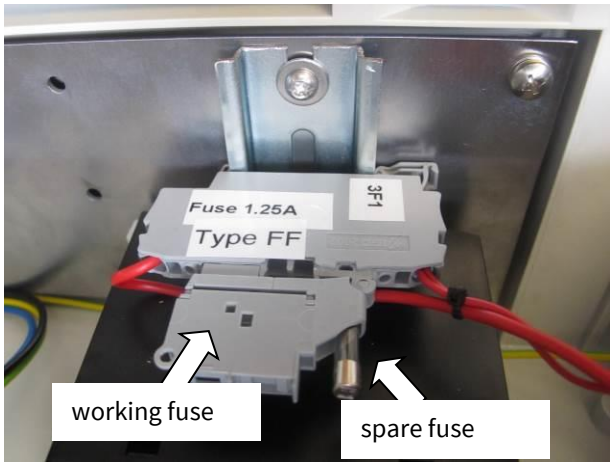


Figure 13: Fuse box

To check the fuse or replace it, the fuse box needs to be turned into the service position as shown below.

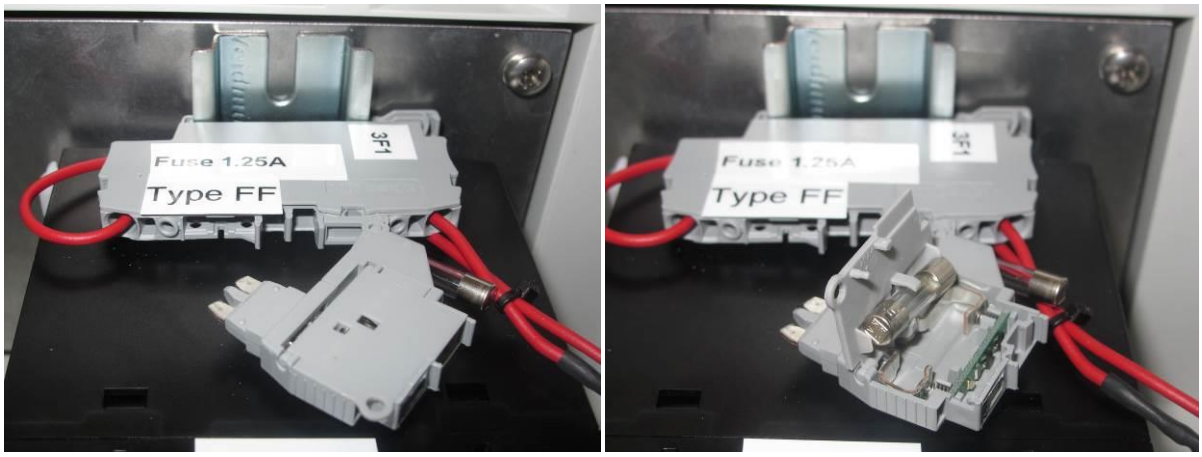


Figure 14: left: fuse box turned into service position. right: fuse box opened to replace fuse.

After the fuse box has been turned into service position, the fuse can be checked with a multimeter and be changed when needed.

If the fuse needs to be replaced, this means that the motor might have been blocked, or is not functioning properly. It could also mean there is a short circuit in on the DC supply lines.

Please contact your local distributor or our headquarters for further service instructions. Do not just switch back on until the reason for the failure is known and the cause of the failure is fixed.

8.1 Local support

Your local support can be found on: www.kippzonen.com/Contact

If the cabinet needs to be sent back to the head office, please send the device in its original case or another suitable case to:

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Delftechpark 36, 2628 XH Delft
The Netherlands
Tel +31 15 2755 234
support@kippzonen.com
www.kippzonen.com

Our customer support remains at your disposal for any maintenance or repair, calibration, supplies and spares.

Für Servicearbeiten und Kalibrierung, Verbrauchsmaterial und Ersatzteile steht Ihnen unsere Customer Support Abteilung zur Verfügung.

Notre service 'Support Clientèle' reste à votre entière disposition pour tout problème de maintenance, réparation ou d'étalonnage ainsi que pour les accessoires et pièces de rechange.

Nuestro servicio de atención al cliente esta a su disposición para cualquier actuación de mantenimiento, reparación, calibración y suministro de repuestos.

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