



# Air terminal devices

## Ceiling diffusers

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### Product overview

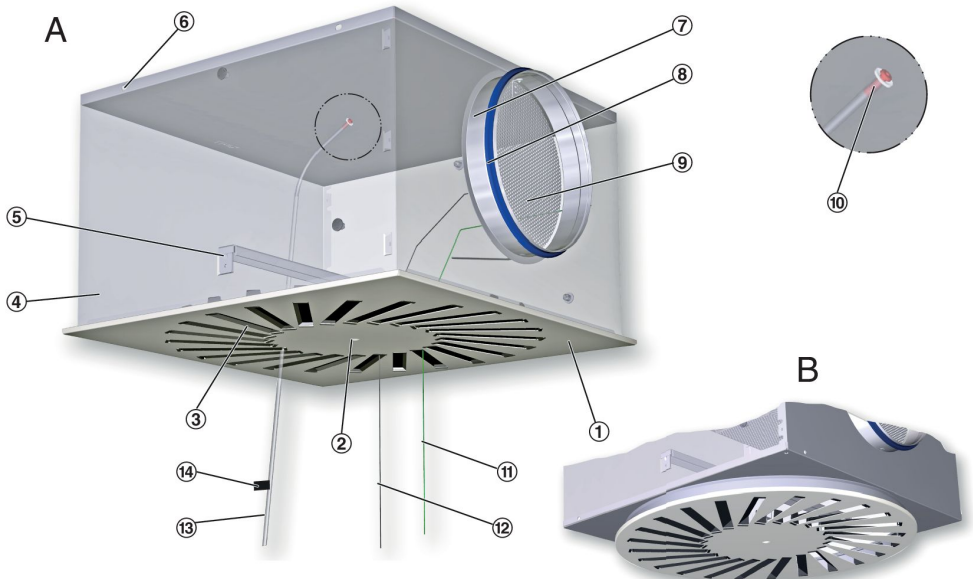


Fig. 1: Schematic illustration, VDW shown

- |                           |   |   |   |
|---------------------------|---|---|---|
| A                         | VDW-Q                                     | ⑦ | Spigot                                      |
| B                         | VDW-R                                     | ⑧ | Lip seal                                    |
| ①                         | Diffuser face                             | ⑨ | Damper blade for volume flow rate balancing |
| ②                         | Central fixing screw with decorative cap  | ⑩ | Pressure tap                                |
| ③                         | Adjustable air control element (only VDW) | ⑪ | Green cord for closing the damper blade     |
| ④                         | Plenum box                                | ⑫ | White cord for opening the damper blade     |
| ⑤                         | Cross bar                                 | ⑬ | Measuring tube                              |
| ⑥                         | Suspension hole                           | ⑭ | Text label indicating plenum box variant    |
| ⑮ – ⑳: Optional equipment |   |   |   |

This manual describes the following product types: - AIRNAMIC, VDW, TDV Silent Air, RFD, FD, TDF Silent Air, VD, VDL, FDE, XARTO, ADD, DCS, VDR, ADLQ, DLQ, ADLR, DLQL, DLQ-AK, DLK-Fb, Universal plenum box

## Important notes

### Information on the installation manual

This manual enables operating or service personnel to correctly install the product described below and to use it safely and efficiently.

It is essential that these individuals read and fully understand this manual before starting any work. The basic prerequisite for safe working is to comply with the safety notes and all instructions in this manual.

The local regulations for health and safety at work and general safety regulations also apply.

### Qualified staff

#### Skilled qualified electrician

Skilled qualified electricians are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to work on electrical systems, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

#### Specialist personnel

Specialist personnel are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to carry out their assigned duties, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

### Limitation of liability

The information in this manual has been compiled with reference to the applicable standards and guidelines, the state of the art, and our expertise and experience of many years.

The manufacturer does not accept any liability for damages resulting from:

- Non-compliance with this manual
- Incorrect use
- Operation or handling by untrained individuals
- Unauthorised modifications

The actual scope of delivery may differ from the information in this manual for special constructions, additional order options or as a result of recent technical changes.

## Personal protective equipment

Personal protective equipment must be worn for all work in order to reduce health or safety hazards to the minimum.

The appropriate protective equipment for a job must be worn for as long as the job takes.

### Industrial safety helmet



Industrial safety helmets protect the head from falling objects, suspended loads, and the effects of striking the head against stationary objects.

### Protective gloves



Protective gloves protect hands from friction, abrasions, punctures, deep cuts, and direct contact with hot surfaces.

### Safety shoes



Safety shoes protect the feet against crushing, falling parts, and slipping on slippery ground.

### Correct use

Air terminal devices are used for the ventilation of rooms in industrial and comfort areas. The air terminal devices are connected to a supply air or extract air system (by others), which is typically connected to an air handling unit.

Air terminal devices supply cold or warm air to rooms (within the stated supply air to room air temperature differences).

Installation, operation and maintenance may have to meet increased hygiene requirements for certain areas of application.

The installation of air terminal devices in humid rooms, areas with potentially explosive atmospheres or rooms with dust-laden or aggressive air has to be assessed for each individual case.

## Transport and storage

### Delivery check

Upon delivery, carefully remove the packaging and check the unit for transport damage and completeness. In case of any damage or an incomplete shipment, contact the shipping company and your supplier immediately. Put the product back into its packaging after the delivery check to protect it from dust and contamination.



### **Fixing and installation material**

*Fixing and installation material is not part of the supply package (unless stated otherwise), but has to be provided by others; it has to be suitable for the installation situation.*

## Transport on site



### **CAUTION!**

**Danger of injury from sharp edges, sharp corners and thin sheet metal parts!**

Sharp edges, sharp corners and thin sheet metal parts may cause cuts or grazes.

- Be careful when carrying out any work.
- Wear protective gloves, safety shoes and a hard hat.

If the device has to be moved:

- Be careful when unloading or moving the product, and pay attention to the symbols and information on the packaging.
- If possible, take the device in its transport packaging up to the installation location.
- Use only lifting and transport gear designed for the required load.
- Always secure the load against tipping and falling.
- Do not move bulky items just by yourself. Get help to prevent injuries and damage.

## Storage

Please note:

- Store the unit only in its original packaging
- Protect the unit from the effects of weather
- Protect the unit from humidity, dust and contamination
- Storage temperature: –10 to 50 °C
- Relative humidity: 95 % max., non-condensing

## Packaging

Properly dispose of packaging material.

## Installation

### General information

#### Personnel:

- Specialist personnel

#### Protective equipment:

- Industrial safety helmet
- Protective gloves
- Safety shoes

#### Installation notes:

- Fix the device only to load-bearing structural elements.
- Load suspension systems only with the weight of the device. Adjacent components and connecting ducts must be supported separately.
- Use only approved and adequately sized fixing material (fixing material is not included in the supply package).
- Refer to the technical leaflets for product weights and dimensions.
- The diffusers must remain accessible for cleaning even after installation.
- Installation and sealing material which the manufacturer provides is usually supplied in an extra bag.

Before you install the device, take suitable precautions to protect air distribution components from contamination during installation (VDI 6022). If this is not possible, at least cover the devices or take other precautions to protect them from contamination. In this case you have to ensure that the devices cannot be activated. Ensure that the components are clean before you install them. If necessary, thoroughly clean them. If you have to interrupt the installation procedure, protect all openings from the ingress of dust or moisture.

### Ceiling diffusers

If possible, install the device before fixing the ceiling tiles; if this is not possible, remove the adjacent ceiling tiles.

Use only approved and adequately sized suspension systems (fixing material is not included in the supply package). Dimensions and weights are given in the technical leaflets.

Only work in pairs; preferably use a lift.

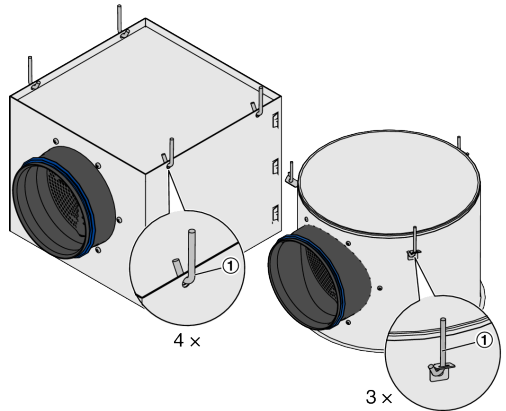


Fig. 2: Plenum box (square/circular)

- ▶ Fix the suspension parts such as ropes, cables or metal hangers (Fig. 2/1) to the ceiling.
- ▶ Use all of the available suspension points on the plenum box.

### Installation types

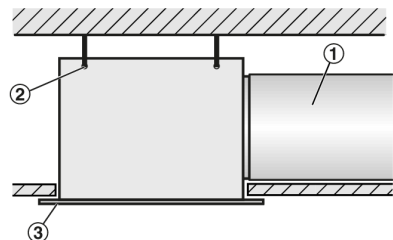


Fig. 3: Flush ceiling installation with square plenum box

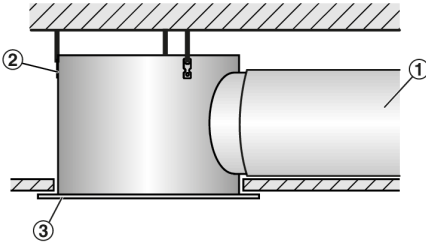


Fig. 4: Flush ceiling installation with circular plenum box

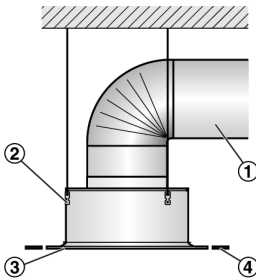


Fig. 5: Freely suspended installation

- ① Duct
- ② Suspension holes or lugs
- ③ Diffuser face
- ④ Extended border



The optimum aerodynamic function is only achieved with flush ceiling installation

**Installation without plenum box**

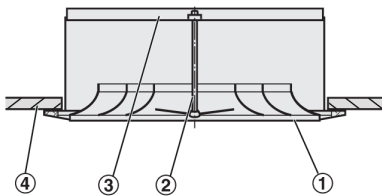


Fig. 6: Flush ceiling installation with standard cross bar G1, screw-fixed to ceiling

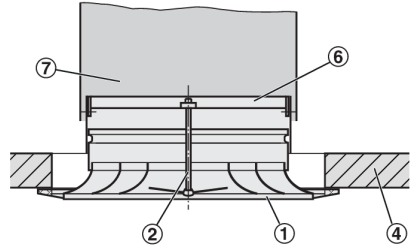


Fig. 7: Flush ceiling installation with duct cross bar E1

- ① Diffuser face
- ② Central fixing screw
- ③ Standard cross bar
- ④ Ceiling tile
- ⑤ Fixing tab
- ⑥ Duct cross bar
- ⑦ Duct

**Ceiling systems**

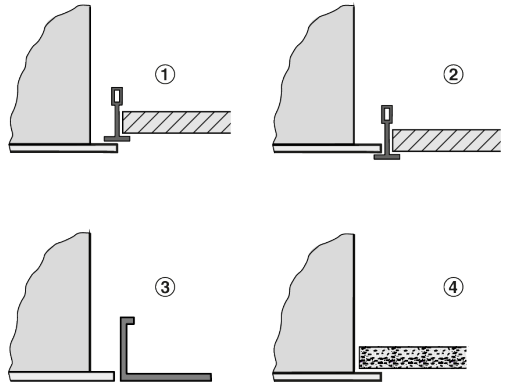


Fig. 8: Ceiling systems

- ① Installation in T-bar ceilings
- ② Installation in T-bar ceilings, diffuser face rests on T-bars
- ③ Installation into grid ceilings
- ④ Installation in continuous ceilings

## Installing the diffuser face

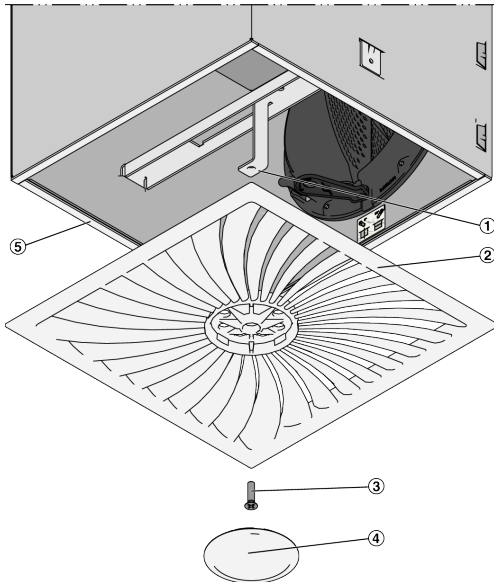


*In order to protect the surface of the diffuser face, unpack and install it only after all other construction steps have been completed.*

*If there is a lengthy break between installation and commissioning, cover all openings of the casing (e.g. with plastic foil) to protect the interior and avoid cumbersome cleaning procedures at the time of commissioning.*

## Air connection

The diffuser has a spigot to connect it to the ducting. Variants with a double lip seal allow for a sufficiently tight connection; additional sealing is not required.



**Fig. 9: Installing the diffuser face**

1. ► Glue the seal (Fig. 9/5) onto the reverse edge of the plenum box.
2. ► Fix the diffuser face (Fig. 9/2) with the central fixing screw (Fig. 9/3) to the cross bar (Fig. 9/1) and cover it with the decorative cap (Fig. 9/4).

The diffuser face and the fixing elements may vary from the variant shown.

**Electrical connection****Personnel:**

- Skilled qualified electrician

**DANGER!**

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Only skilled qualified electricians are allowed to work on the electrical system.
- Switch off the power supply before working on any electrical equipment.

Order code	Type	Supply voltage	Max. power rating	Control input signal	Wiring diagram	Diffuser type
E1	NM230A	85 – 265 V AC, 50/60 Hz	6 VA	1-wire control or 2-wire control (3-point)	Fig. 10, Fig. 11, Fig. 12	VD, VDL, VDR, DUK
E2	NM24A	24 V AC $\pm 20\%$ , 50/60 Hz 24 V DC $\pm 20\%$	4 VA 1.5 W	1-wire control or 2-wire control (3-point)	Fig. 10, Fig. 11, Fig. 12	VD, VDL, VDR, DUK
E3	NM24A-SR	24 V AC $\pm 20\%$ , 50/60 Hz 24 V DC $\pm 20\%$	4 VA 2 W	2 – 10 V DC, Ra > 100 k $\Omega$	Fig. 13	VD, VDL, VDR, DUK

**Electric open/close actuators**

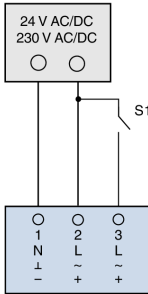


Fig. 10: 1-wire control

S1 closed: Direction of rotation 1  
 S1 open: Direction of rotation 2

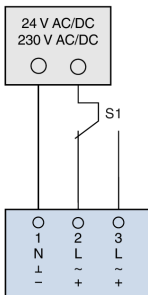


Fig. 11: 2-wire control (open/close)

S1 not actuated: Direction of rotation 1  
 S1 actuated: Direction of rotation 2

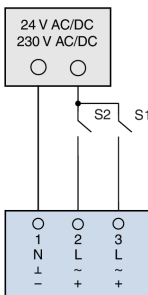


Fig. 12: 2-wire control (3-point)

S1 open and S2 open: Actuator has stopped (any position)

S1 closed: Direction of rotation 1  
 S1 open, S2 closed: Direction of rotation 2

**Modulating actuators**

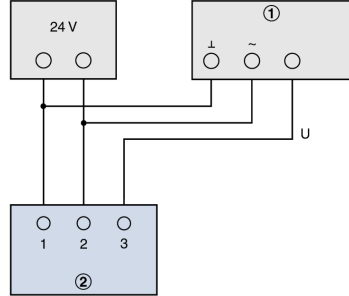


Fig. 13: Variable control

- ① Setpoint adjuster: U = voltage signal  
 0-10 V DC or 2-10 V DC
- ② Modulating actuator



**Commissioning, maintenance and cleaning**

**Initial commissioning**

Before you start commissioning:

- Check that the air terminal devices are correctly seated.
- Remove protective films, if any
- Ensure that all air terminal devices are clean and free from residues and foreign matter.
- Check that electrical connections (if any) have been correctly made
- Ensure that the device has been correctly fixed and connected to the ducting.

For commissioning see also VDI 6022, part 1 – 'Hygiene requirements for ventilation and air-conditioning systems and units'.

**Volume flow rate balancing**

When several diffusers are connected to just one volume flow controller, it may be necessary to balance the volume flow rates.

**AIRNAMIC, XARTO**

The diffuser face can be removed to access the damper blade; the damper blade can then be set in 15° intervals between 0 and 90°

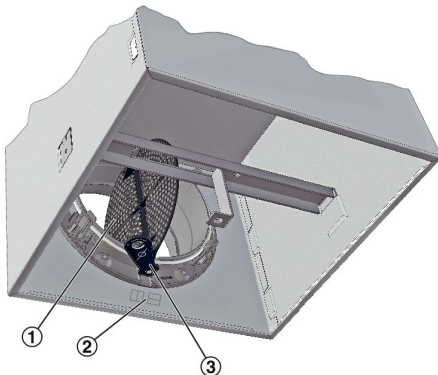


Fig. 14: Damper blade

- ① Damper blade
- ② Sticker explaining the damper blade position
- ③ Setting lever

**Ceiling diffusers, variant -M**

The diffuser face can be removed to access the damper blade (Fig. 15/1); the damper blade can then be set to any position between 0 and 90°

**Ceiling diffusers, variant -MN**

The diffuser face need not be removed since the damper blade can be set with two cords (white and green).

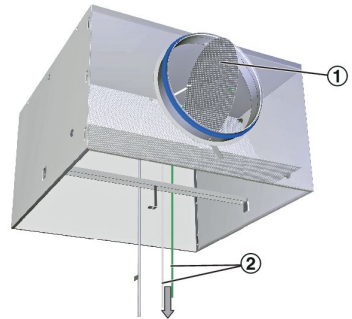


Fig. 15: Damper blade, variant -MN

- ① Damper blade
- ② Cord: white cord for opening, green cord for closing

Once volume flow rate balancing is complete, put the cords through the diffuser face into the plenum box.

**Ceiling diffusers, variant -MN - volume flow rate measurement**

Ceiling diffusers with universal plenum box, damper blade and pressure tap (variant -MN) allow for volume flow rate balancing even with the diffuser face in place.

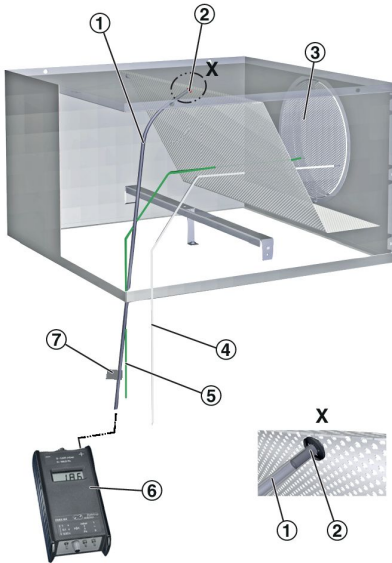


Fig. 16: Volume flow rate measurement

- ① Measuring tube
- ② Pressure tap
- ③ Damper blade for volume flow rate balancing
- ④ White cord for opening the damper blade
- ⑤ Green cord for closing the damper blade
- ⑥ Digital manometer
- ⑦ Text label indicating plenum box variant

1. ▶ Connect the measuring tube to the digital manometer.
2. ▶ Read the effective pressure.
3. ▶ Read the volume flow rate from the characteristic curve or calculate it; each AK-Uni plenum box comes with a characteristic curve. The plenum box variant is given on the text label (Fig. 16/7).
4. ▶ If necessary, adjust the damper blade position with the cords.

**Volume flow rate calculation**

$$\dot{V} = C \times \sqrt{\Delta p_w}$$

Fig. 17: Volume flow rate calculation for air density 1.2 kg/m³

$$\dot{V} = C \times \sqrt{\Delta p_w} \times \sqrt{\frac{1.2}{\rho}}$$

Fig. 18: Volume flow rate calculation for other air densities

The K values are given in the technical leaflet for the plenum box.

**Maintenance and cleaning**

Please note:

- The cleaning intervals given in the VDI 6022 standard apply.
- Clean surfaces with a damp cloth.
- Use only common household cleaners, do not use any aggressive cleaning agents.
- Cleaning agents that contain chlorine must not be used.
- Equipment for removing stubborn contamination, e.g. scrubbing sponges or scouring cream, may damage the surfaces and must not be used.
- Replace contaminated equalising elements (fleece). For hygiene reasons you should not use a vacuum cleaner or wash the interior of the device.



