



# Thermally adjustable swirl diffusers

**RFD-V****TROX UK Ltd**

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## Product overview

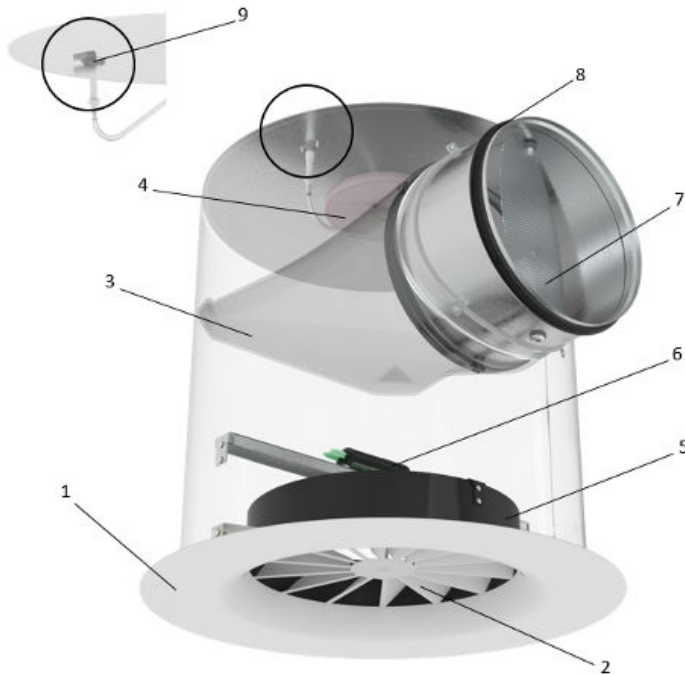


Fig. 1: Schematic illustration

- |   |                          |   |                  |
|---|--------------------------|---|------------------|
| 1 | Discharge nozzle         | 6 | Thermal actuator |
| 2 | Swirl element            | 7 | Spigot damper    |
| 3 | Air distribution element | 8 | Lip seal         |
| 4 | Pressure Diaphragm       | 9 | Pressure tap     |
| 5 | Retractable sleeve       |   |                  |

## Functional description

Ceiling swirl diffusers allow the supply air from ventilation systems to flow into the room in a swirl pattern. The resulting airflow induces high levels of room air, thereby rapidly reducing the airflow velocity and the temperature difference between supply air and room air.

Ceiling diffusers allow for large volume flow rates. The result is a mixed flow ventilation in comfort zones, with good overall room ventilation, creating only very little turbulence in the occupied zone.

Type RFD-V ceiling diffusers have fixed blades and an adjustable internal sleeve, allowing for horizontal and vertical air discharge. During cooling, the air discharge is horizontal and radial, in heating, the air discharge is vertical. The inside retractable sleeve is controlled by a thermal actuator.

The supply air to room air temperature difference may range from -10 to +15K.

To give rooms an aesthetic, uniform look, type RFD-V diffusers may also be used for extract air.

## 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.

### Other applicable documentation

In addition to these instructions, the following documents must be observed:

- Product data sheets

### 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 explanations and illustrations provided in this manual for special versions, the use of additional order options or as a result of recent technical changes.

## Safety

### Correct use

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

Air diffusers are used to supply cooled or heated air to rooms (within the specified supply air temperature differences).

Depending on the area of application, special hygiene requirements must be observed during installation, operation, and maintenance.

Possible installation in humid rooms, areas with potentially explosive atmospheres, or rooms with dust-laden or aggressive air must be checked individually.

### Staff

#### Qualification

##### Trained personnel

Trained 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.

##### Personal protective equipment

Personal protective equipment must be worn for any 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.

### Repair and replacement parts

Only qualified personnel must repair the products, and they have to use genuine replacement parts.

### Transport and storage

#### Delivery check

After 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. After inspection of the goods, put the product back into its packaging 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.

Please note during transport:

- Be careful when unloading or moving the product on site, and pay attention to the symbols and information on the packaging.
- If possible, take the product in its transport packaging up to the installation location.
- Use only lifting and transport gear designed for the required load.
- During transport, always secure the load against tipping and falling.
- Bulky equipment should be transported by at least two people to prevent injury and damage.

### Storage

Please note:

- Store the product only in its original packaging
- Protect the product from the effects of weather
- Protect the product from humidity, dust and contamination
- Storage temperature: -10 °C to 50 °C.
- Relative humidity: 95% max., no condensation

### Packaging

Properly dispose of packaging material.

## Installation

### General installation information

#### Personnel:

- Trained personnel

#### Protective equipment:

- Industrial safety helmet
- Protective gloves
- Safety shoes

#### Observe during installation:

- Fix the product only to load-bearing structural elements.
- Load suspension systems only with the self-weight of the unit. Adjacent components and connecting ducts must be supported separately.
- Use only approved and adequately sized fixing material (fixing material not included in the supply package).
- Refer to the technical leaflets for product weights and dimensions.
- After installation, the air diffusers must be easily accessible for cleaning purposes.

Before the installation, take suitable precautions to protect air distribution components from contamination during installation (VDI 6022). If this is not possible, at least cover the unit or take other precautions to protect it from contamination. In this case, make sure the unit is not in operation. Ensure that all components are clean before you install them. If necessary, clean them thoroughly. When interrupting the installation procedure, protect all openings from the ingress of dust or humidity.

### Ceiling diffusers

If possible, install the unit 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 not included in the supply package). Dimensions and weights are given in the technical leaflets.

Only work in pairs; preferably use a lift.

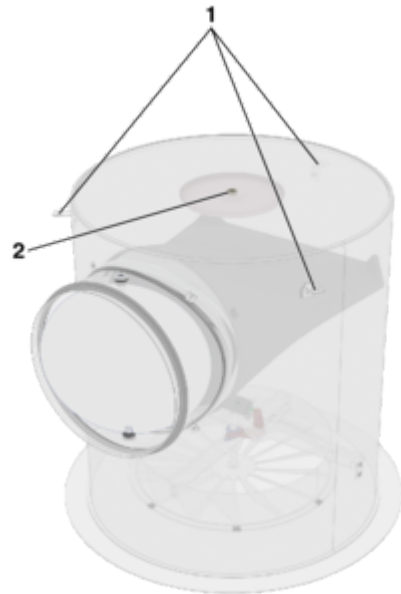


Fig. 2: RFD-V fixing options

#### With fixing brackets (SB)

1. ▶ Attach suspensions such as ropes or hangers (provided by others) to the ceiling and suspend the swirl diffuser using suspension brackets (Fig. 2/1).

#### Without fixing brackets (SB)

2. ▶ Fasten the threaded rod (M8, provided by customer) to the ceiling, fasten the swirl diffuser to the threaded rod using a captive nut (Fig. 2/2).

Installation types

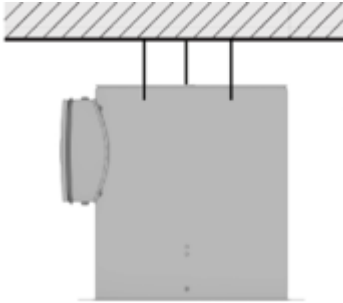


Fig. 3: Free-hanging, on three fixing brackets

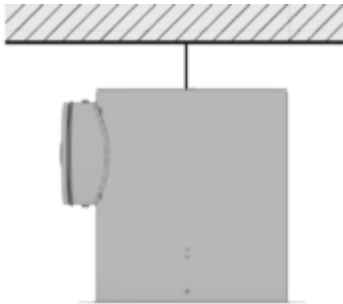


Fig. 4: Free-hanging, on an M8 threaded rod

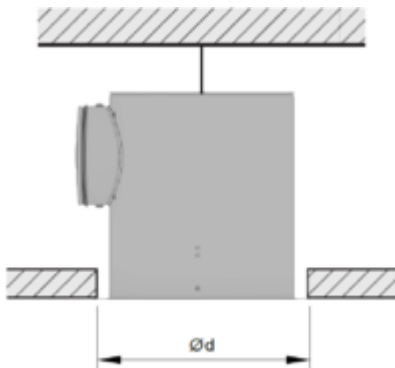


Fig. 5: Flush ceiling installation, on an M8 threaded rod



The optimum aerodynamic function is only achieved with flush ceiling installation

Nominal size RFD-V	160	200	250	315
Ceiling cutout Ød [mm]	299	346	397	551

Ceiling systems

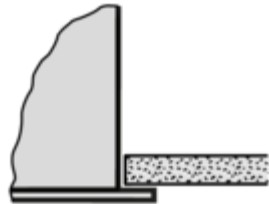


Fig. 6: Installation in continuous ceilings

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) to protect the interior and avoid cumbersome cleaning procedures at the time of commissioning.

Technical data

Dimensions and weights

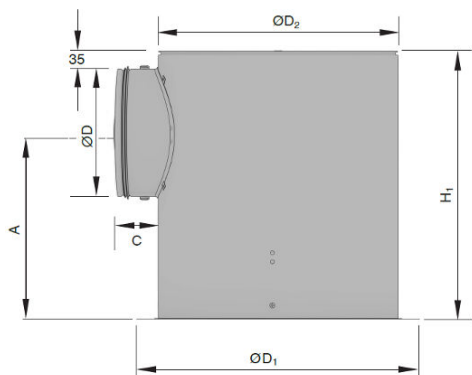


Fig. 7: RFD-V

Nominal size [mm]	ØD [mm]	H1 [mm]	A [mm]	ØD1 [mm]	ØD2 [mm]	C [mm]	Weight [kg]
160	158	346	232	350	269	76	4.1
200	198	381	247	400	316	76	6.0
200	248	451	292	400	316	76	6.3
250	198	381	247	450	367	76	7.2
250	248	451	292	450	367	76	7.4
315	248	521	362	550	521	76	10.5
315	313	521	330	550	521	76	10.6

Thermal actuator

Switching point supply air temperature	Air discharge direction
> 28 °C	Vertical (heating)
< 22 °C	Horizontal (cooling)

**Initial commissioning, maintenance and cleaning**

**Initial commissioning**

Before you start commissioning, check the following points:

- Check that the air diffusers are fitted correctly.
- Remove protective foils, if any.
- Make sure that all air diffusers are clean and free from residues and foreign objects.
- Check that electrical connections (if any) for correct installation.
- Check proper fastening and connection with air duct

For commissioning, see also VDI 6022, Sheet 1 - Hygienic requirements for ventilation and air conditioning systems.

**Volume flow rate balancing**

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

**Setting the flow adjustment damper**



Fig. 8: Setting the flow adjustment damper

The flow adjustment damper (Fig. 8/2) in the spigot (spigot damper) can be adjusted between 0 and 90° from the outside on the cam (Fig. 8/3). No need to remove the diffuser face for this adjustment. The flat edges of the cam run parallel to the spigot damper.

A pressure tap is available for differential pressure measurement and volume flow calculation (Fig. 8/1) .

**Volume flow rate calculation**

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

Fig. 9: Volume flow rate calculation for an air density 1.2 kg/m³

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

Fig. 10: Volume flow rate calculation for other air densities

Nominal dimensions[mm]	C factor	
	With air discharge direction	Without air discharge direction
160 × 158	7.3	8.2
200 × 198	11.5	13.3
200 × 248	10.6	13.4
250 × 198	19.7	18.2
250 × 248	18.2	20.4
315 × 248	27.0	28.2
315 × 313	23.1	29.9

## Maintenance and cleaning

During 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.
- Do not use cleaning agents that contain chlorine.
- Do not use equipment for removing stubborn contamination, e.g., scrubbing sponges or scouring cream, as it may damage the surfaces.
- Replace contaminated air distribution elements (nonwoven). For hygiene reasons, cleaning by vacuuming or rinsing is not permitted.

## Replacing the thermal actuator

### Protective equipment:

- Industrial safety helmet
- Protective gloves

### Tool:

- Screwdriver PH1 and PH3

The swirl diffuser can remain on the ceiling when replacing the thermal actuator. For easier replacement, we recommend removing the RFD-V.



*Fig. 11: Removing the swirl diffuser*

1. ▶ Remove the screw cap and the central fixing screw (Fig. 11/1) while holding the swirl diffuser (Fig. 11/2).



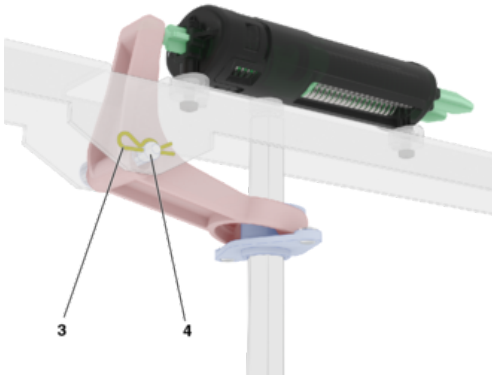


Fig. 12: Removing the bolt

2. ▶ Release the cotter pin (Fig. 12/3) and pull out the bolt (Fig. 12/4).

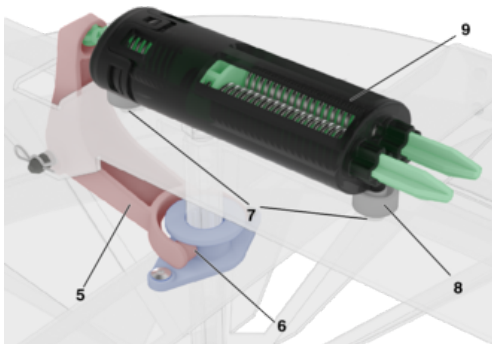


Fig. 13: Remove operating lever and remove actuator

3. ▶ Remove the operating lever (Fig. 13/5) from the sleeve of the linear bushing (Fig. 13/6).
4. ▶ Loosen the two fastening screws (Fig. 13/7) of the thermal actuator. Make sure to retain the two screws and the spacers (Fig. 13/8).
5. ▶ Remove and dispose of the old actuator (Fig. 13/9).
6. ▶ Position the new actuator with spacers and fasten with the screws.
7. ▶ Reattach the operating lever, making sure that the ball of the actuator engages in the lever base.

8. ▶ Refit the plenum box to the ceiling (if applicable).
9. ▶ When the plenum box has been fixed in its final position, fix the swirl diffuser with the central fixing screw, but do not tighten the screw yet.

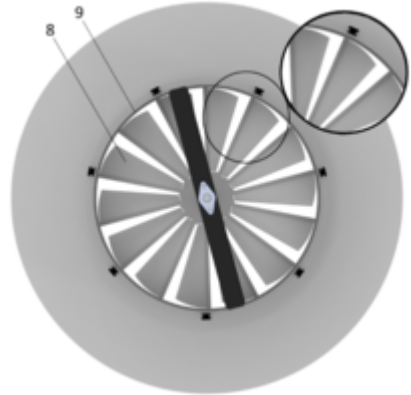


Fig. 14: Swirl element

10. ▶ Make sure the swirl element (Fig. 14/8) does not come into contact with the discharge nozzle (Fig. 14/9).

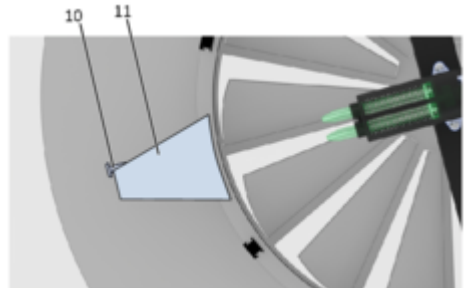


Fig. 15: Travel stop

11. ▶ Turn the swirl diffuser anti-clockwise until the anti-rotation bracket (Fig. 15/11) rests against the stop screw (Fig. 15/10).

For RFD-V with insulation, insert the swirl diffuser so that the anti-rotation bracket (Fig. 15/11) sits in the recess of the insulation.

12. ▶ Tighten the central fixing screw hand-tight, insert the cap into the screw head.

### Decommissioning and dismantling

After the end of use, disassemble the device and dispose of it in an environmentally friendly manner.

#### Protective equipment:

- Industrial safety helmet
- Protective gloves

1. ▶ Disconnect the air duct from the air diffuser.
2. ▶ Take down the air diffuser.

#### Disposal



#### ENVIRONMENT!

#### Risk of harm to the environment due to incorrect disposal!

Incorrect disposal can harm the environment.

- Be sure to comply with the relevant national guidelines and regulations.
- Have electrical waste, electronic components, lubricants and other auxiliary materials disposed of by authorised specialist companies.
- In case of doubt, contact your local authorities or a specialist disposal company.

**Note:** The appliance must be dismantled for disposal.

If no disposal or return agreement with TROX GmbH is in place, we recommend disposing of the materials as follows:

#### Disposal information

Pos.	Component	Material/waste code	Type of disposal
1	Discharge nozzle	Aluminium, EWC 17 04 02	Scrap metal recycling.
2	Swirl element	Sheet steel, galvanised, EWC 17 04 05	Scrap metal recycling.
3	Equalising element	Polyester EWC 07 02 13 – waste plastic	Disposal according to EWC.
5	Retractable sleeve	Sheet steel, galvanised, EWC 17 04 05	Scrap metal recycling.
6	Thermal actuator	ABS EWC 07 02 13 – waste plastic	Disposal according to EWC.
7	Spigot damper	Sheet steel, galvanised, EWC 17 04 05	Scrap metal recycling.
8	Lip seal	Evoprene EWC 07 02 13 – waste plastic	Disposal according to EWC.
	Pressure tap	Plastic EWC 07 02 13 – waste plastic	Disposal according to EWC.

Material components according to Fig. 1

EWC: European Waste Catalogue