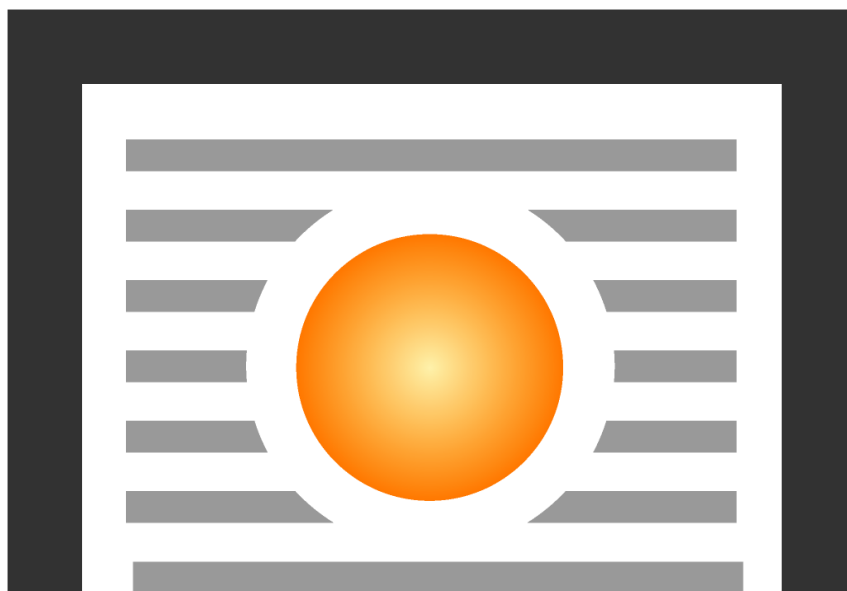


# Non-return valve Model BAR



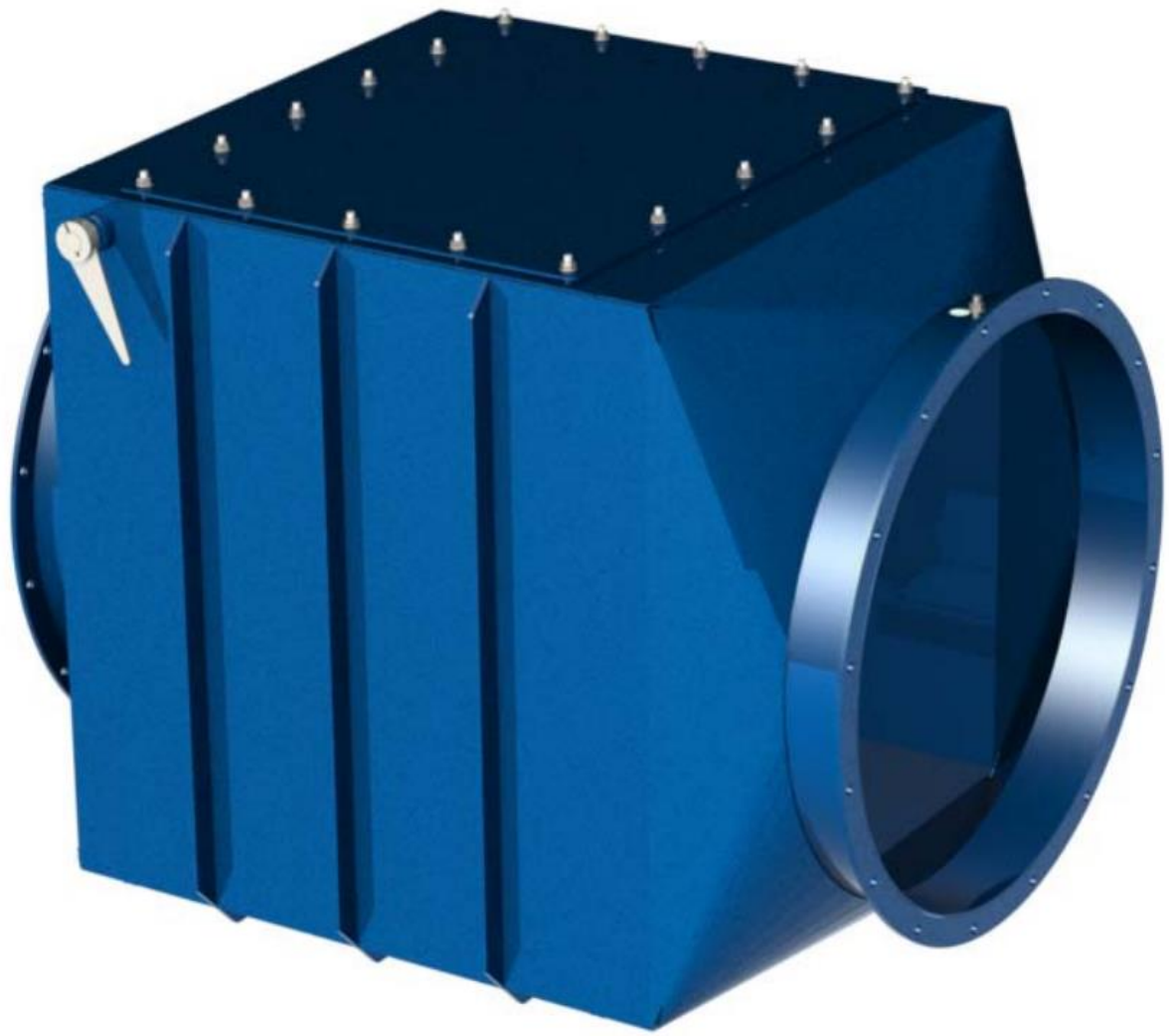
Maintenance manual



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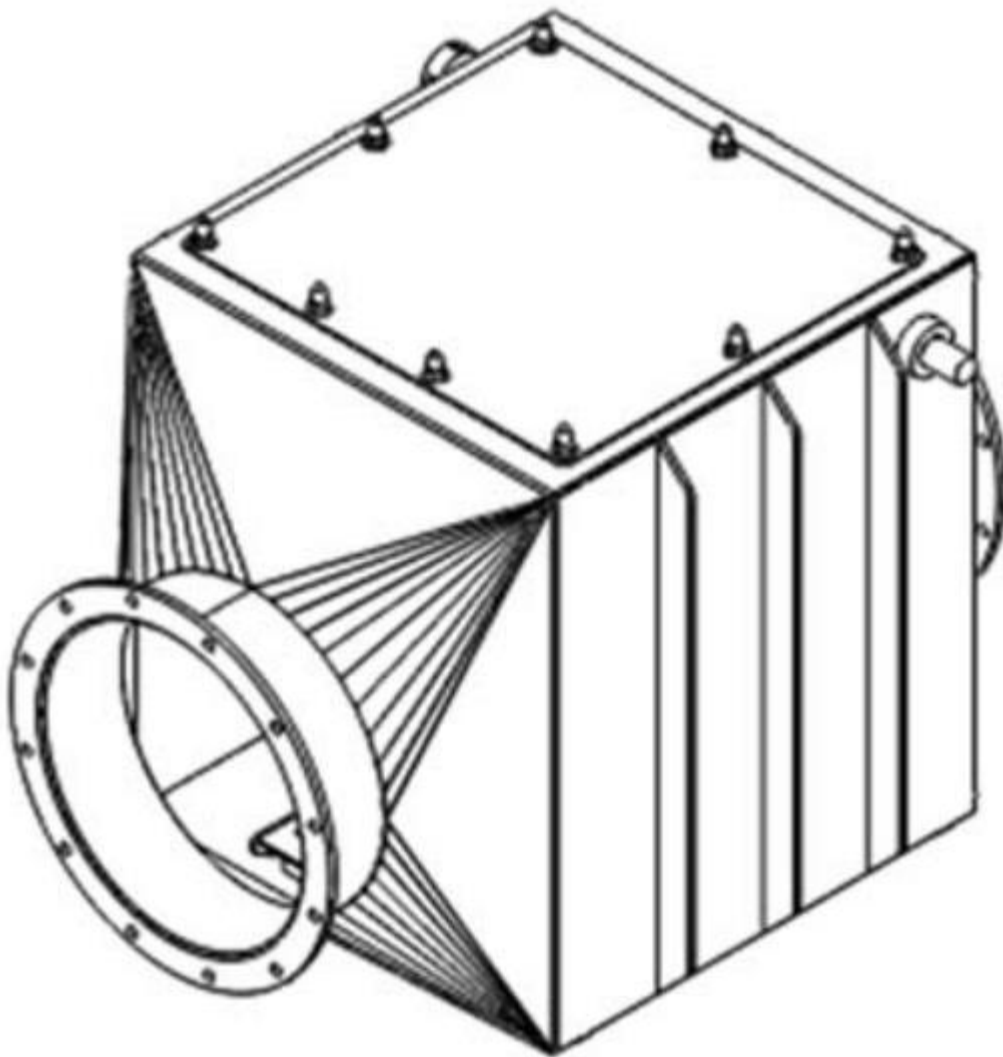
## Product Description

The non-return valves are ATEX certificated protective systems which prevent a dust explosion propagation from a filter (or storage) towards the rest of the installation. The non-return valve cannot isolate a dust explosion when it propagates through the normal air flow direction. The non-return valves are not designed to prevent the transmission of fire or burning powder transported by the normal process flow.

The non-return valves are built in 2 or 3 mm thick steel, powder coated RAL 5010.

The BAR ATEX non-return valves comply with the following norms: **EN 16447**.

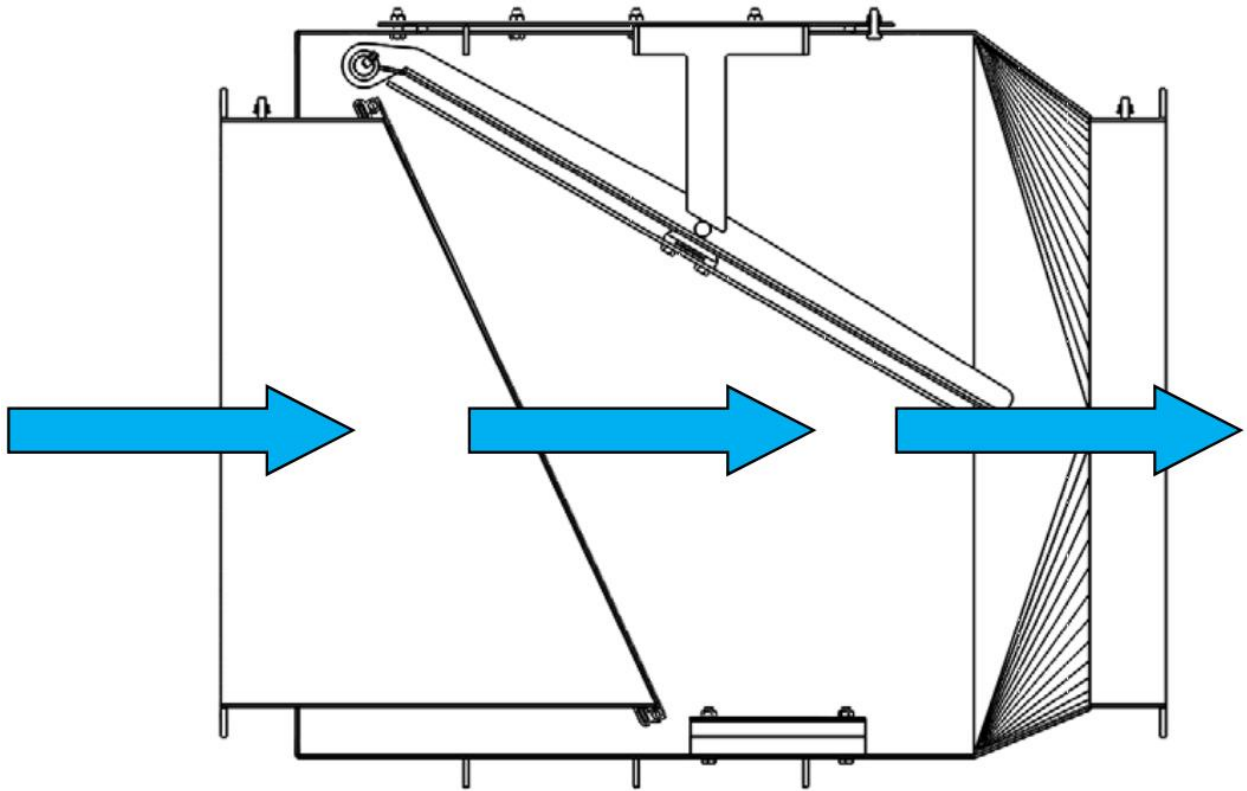
Figure 1 shows a non-return valve



**Figure 1: Non-return valve**

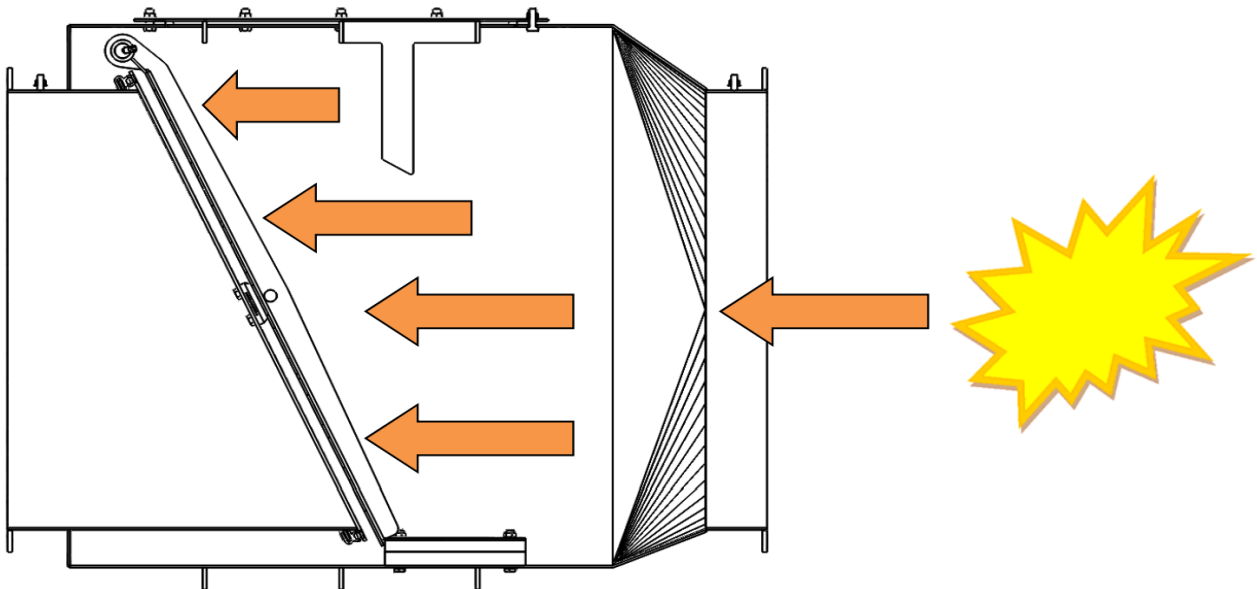
## How it works

During the normal process, the non return valve's flap remains opened due to the airflow (Figure 2). At deadlock, the valve closes due to the flap's own weight.



**Figure 2: Non-Return Valve in open airflow configuration**

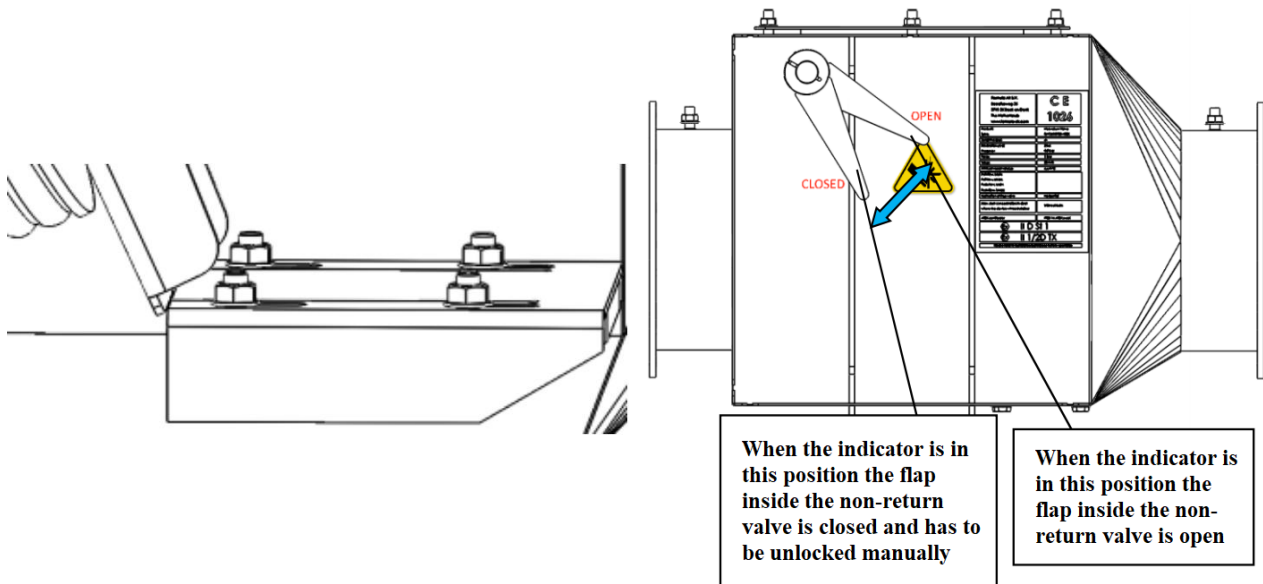
When an explosion takes place, the ATEX certified non-return valve blocks the expansion of the explosion due to the front spreading pressure along the ductwork (Figure 3).



**Figure 3: Non-Return Valve in closed configuration**

After an explosion and due to pressure oscillations the valve could re-open. To avoid the re-opening, a safety lock system keeps the valve closed long enough to avoid the propagation of flames during the explosion event, as can be seen in Figure 4. The locking system consists of a spring metal that allows it to bend easily. Therefore, if the flap closes the arm hits the locking system and the top of the locking system will give in.

This way, the flap gets locked beneath the top plate of the locking system. Once the explosion is completely over, the lock has to be unlocked manually. The indicator on the outside of the non-return valve shows the current position of the flap. Therefore, it can be easily seen if the flap is closed and locked (see Figure 5).



**Figure 4: Locking system inside the Non-Return Valve**

**Figure 5: Illustration how the indicator works**

## Overall dimensions

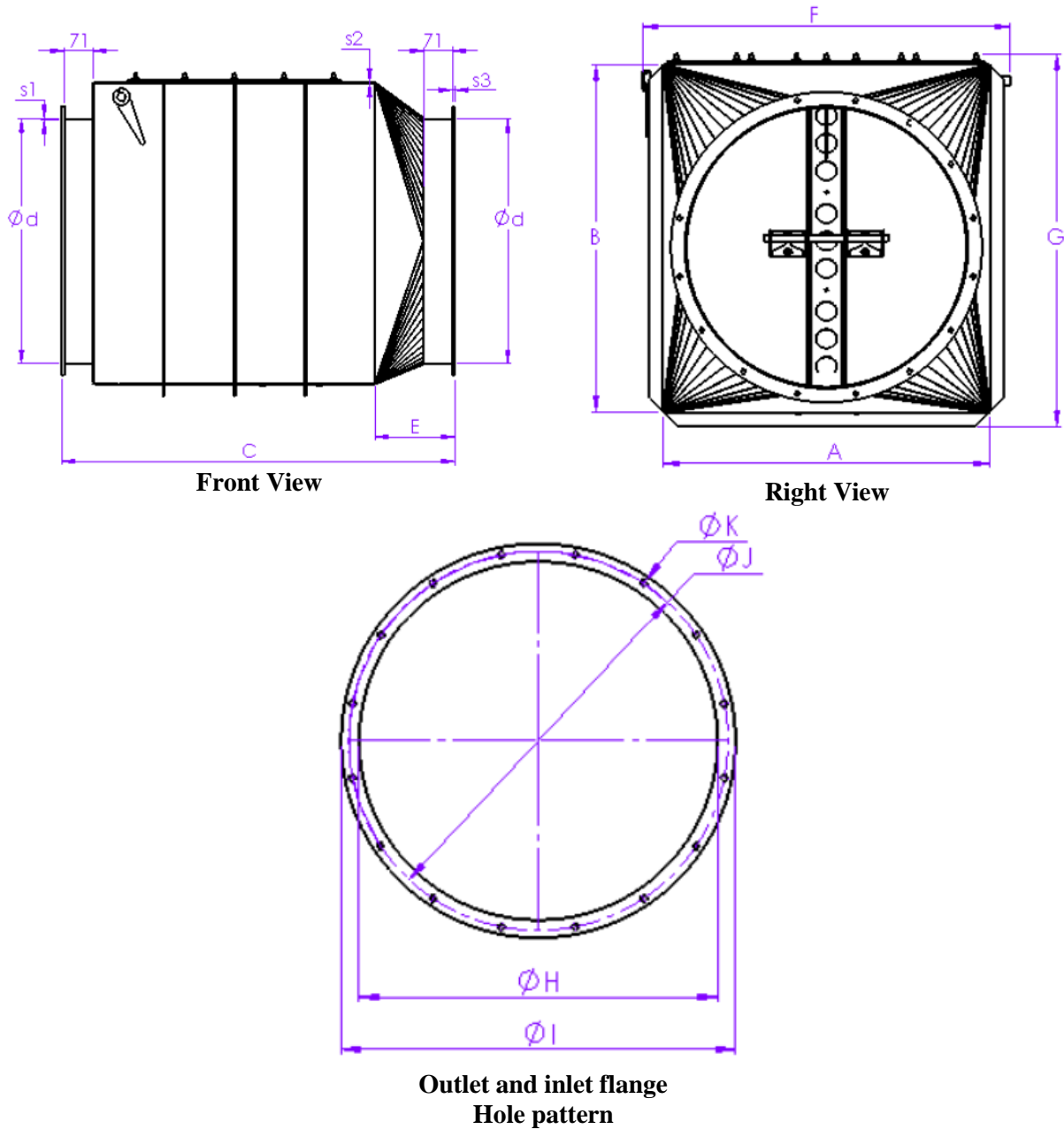


Figure 6: Overall dimensions

| Type            | $\varnothing d$<br>(mm) | A<br>(mm) | B<br>(mm) | C<br>(mm) | E<br>(mm) | F<br>(mm) | G<br>(mm) | Mass<br>(kg) |
|-----------------|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|
| BAR200FF20-ATEX | 204                     | 334       | 334       | 571       | 85        | 436       | 397       | 25           |
| BAR250FF20-ATEX | 254                     | 406       | 466       | 647       | 90        | 500       | 518       | 47           |
| BAR300FF20-ATEX | 304                     | 406       | 466       | 647       | 90        | 500       | 518       | 49           |
| BAR350FF20-ATEX | 354                     | 506       | 566       | 750       | 93        | 600       | 618       | 68           |
| BAR400FF20-ATEX | 404                     | 506       | 566       | 750       | 93        | 600       | 618       | 70           |
| BAR450FF20-ATEX | 454                     | 606       | 666       | 857       | 102       | 700       | 718       | 91           |
| BAR500FF20-ATEX | 504                     | 606       | 666       | 857       | 102       | 700       | 718       | 94           |
| BAR550FF20-ATEX | 554                     | 697       | 746       | 972       | 122       | 785       | 798       | 115          |
| BAR600FF20-ATEX | 604                     | 697       | 746       | 972       | 122       | 785       | 798       | 117          |

| Type            | Ø H (mm) | Ø I (mm) | Ø J (mm) | Ø K (mm) | Qty. Flange holes | s1 (mm) | s2 (mm) | s3 (mm) |
|-----------------|----------|----------|----------|----------|-------------------|---------|---------|---------|
| BAR200FF20-ATEX | 205      | 255      | 235      | 9        | 12                | 2       | 2       | 6       |
| BAR250FF20-ATEX | 255      | 305      | 336      | 9        | 12                | 3       | 3       | 6       |
| BAR300FF20-ATEX | 305      | 355      | 336      | 9        | 12                | 3       | 3       | 6       |
| BAR350FF20-ATEX | 355      | 415      | 389      | 11       | 12                | 3       | 3       | 6       |
| BAR400FF20-ATEX | 405      | 465      | 439      | 11       | 16                | 3       | 3       | 6       |
| BAR450FF20-ATEX | 455      | 515      | 489      | 11       | 16                | 3       | 3       | 6       |
| BAR500FF20-ATEX | 505      | 565      | 540      | 11       | 16                | 3       | 3       | 6       |
| BAR550FF20-ATEX | 555      | 615      | 590      | 11       | 16                | 3       | 3       | 6       |
| BAR600FF20-ATEX | 605      | 665      | 640      | 11       | 16                | 3       | 3       | 6       |

## Technical datasheet

Characteristics of dust in relation with the ATEX non-return valve:

| TYPE            | ZONE                                  |
|-----------------|---------------------------------------|
| BAR200FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR250FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR300FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR350FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR400FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR450FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR500FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR550FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |
| BAR600FF20-ATEX | Internal: 20-21-22<br>External: 21-22 |

### Push flow situation

Considering the normal process flow direction, the situation where the fan is located upstream of the explosion source (Figure 7).

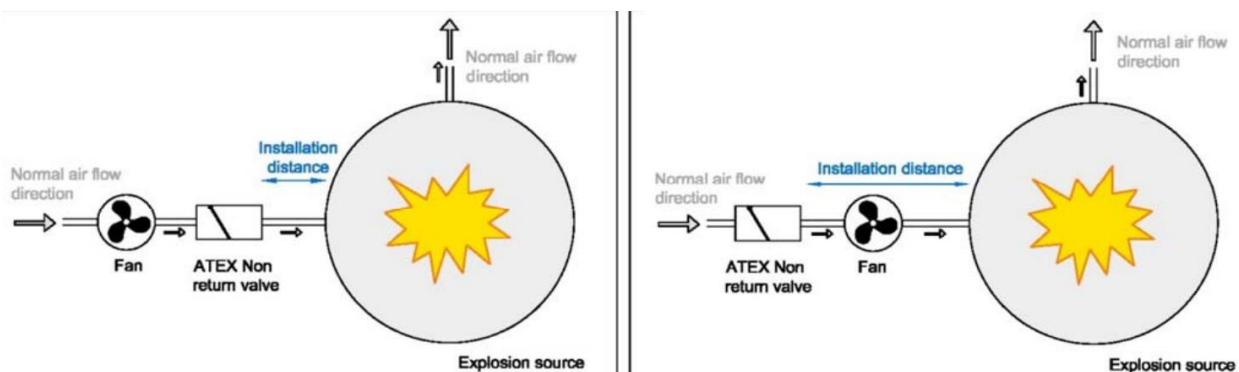


Figure 7: Push flow situation



## Pull flow situation

Considering the normal process flow direction, the situation where the fan is located downstream of the explosion source (Figure 8).

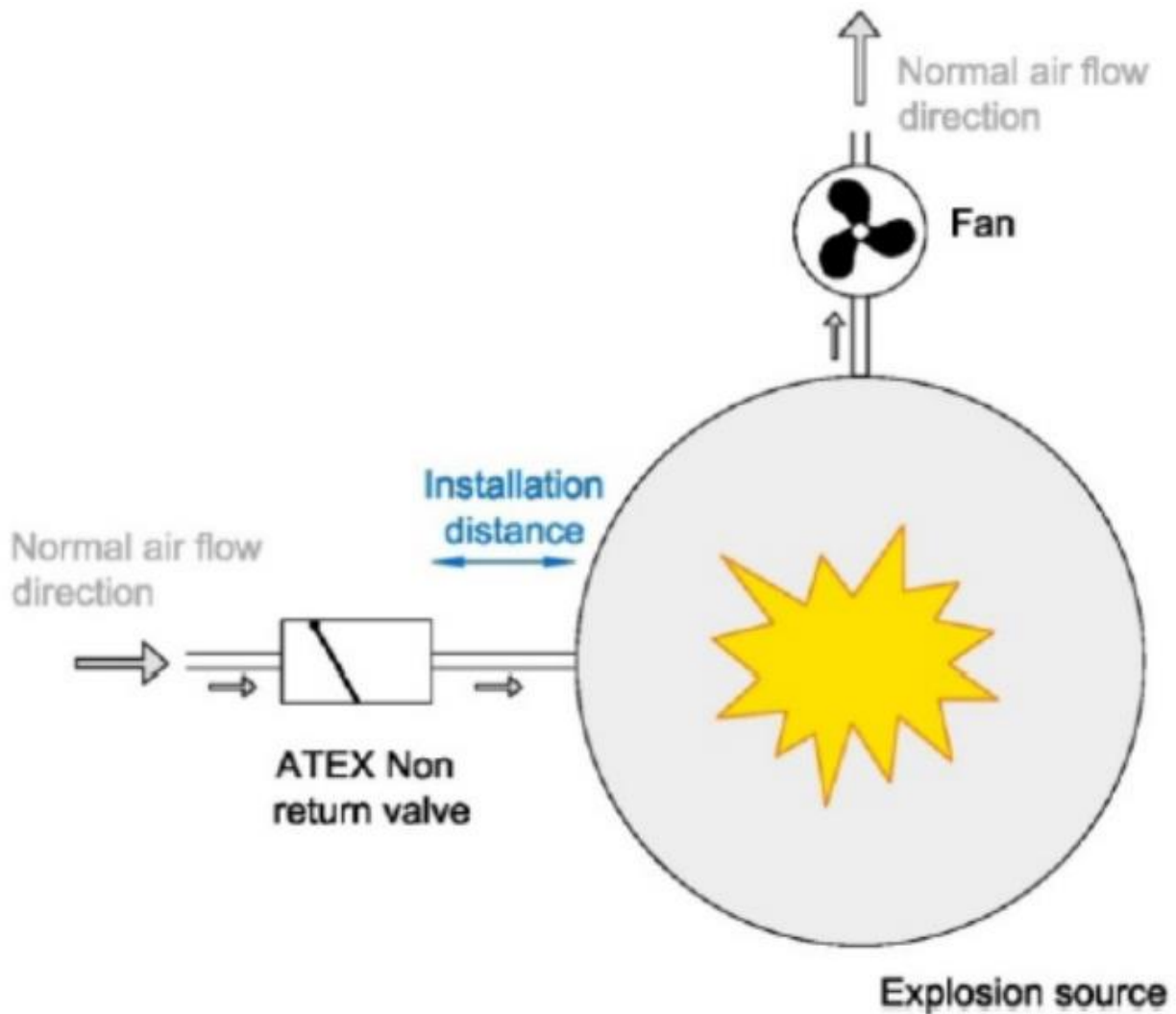


Figure 8: Pull flow situation

## Special Conditions for safe use

### Installation

- The valve should only be exposed to organic or non-metallic dust.
- Ambient temperature from -20 °C to 60 °C.
- Dust parameters:  $K_{st,max} \leq 200 \text{ MPa}\cdot\text{ms}^{-1}$ ,  $\text{MESG} \geq 2 \text{ mm}$ .
- DN 200 – 400: Pull and push, straight pipes between the protected vessel and the flap.
- DN 450 – 600: Pull flow situation, straight pipes between the protected vessel and the flap and venting on the protective vessel only non-reclosing vent devices. (this excludes e.g. suppression and venting with reclosing vent devices).
- The maximum allowable opening angle of the blade is 60° to the vertical.
- The maximum flow velocity is: 25 m/s.
- Flap position is horizontal.

## Parameters dependent on the size of the flap

| Parameters of flap (unit):                                      | Sizes DN (mm): |           |         |
|---|----------------|-----------|---------|
|   | 200            | 250 - 400 | 450-600 |
| $p_{red,max}$ (bar)   | 0,50           |           |         |
| $p_{max}$ (bar) design pressure - EN 14460                      | 1              |           |         |
| minimal vessel volume (m <sup>3</sup> )                         | 0,4            | 0,9       | 6       |
| minimal installation distance (m)                               | 2              | 2         | 3       |
| maximal installation distance (m)                               | 7              |           |         |
| inclination of flap valve                                       | Horizontal     |           |         |
| maximal speed flow (m.s <sup>-1</sup> )                         | 25             |           |         |
| max. dust concentration in duct where device will be installed; | Without limits |           |         |

## Installation



⚠ **CAUTION!** The non-return valve installation, connection, start-up and maintenance has to be performed in absence of potentially explosive atmosphere through the process interruption.

⚠ **CAUTION!** The installation, connection, start-up and maintenance of the non-return valves have to be performed by qualified personnel. Use the right equipment and costumes, and do not work alone.

### Valve installation direction

For a right installation, the air flow direction in normal working conditions has to be the same as indicated by the arrows on Figure 9.

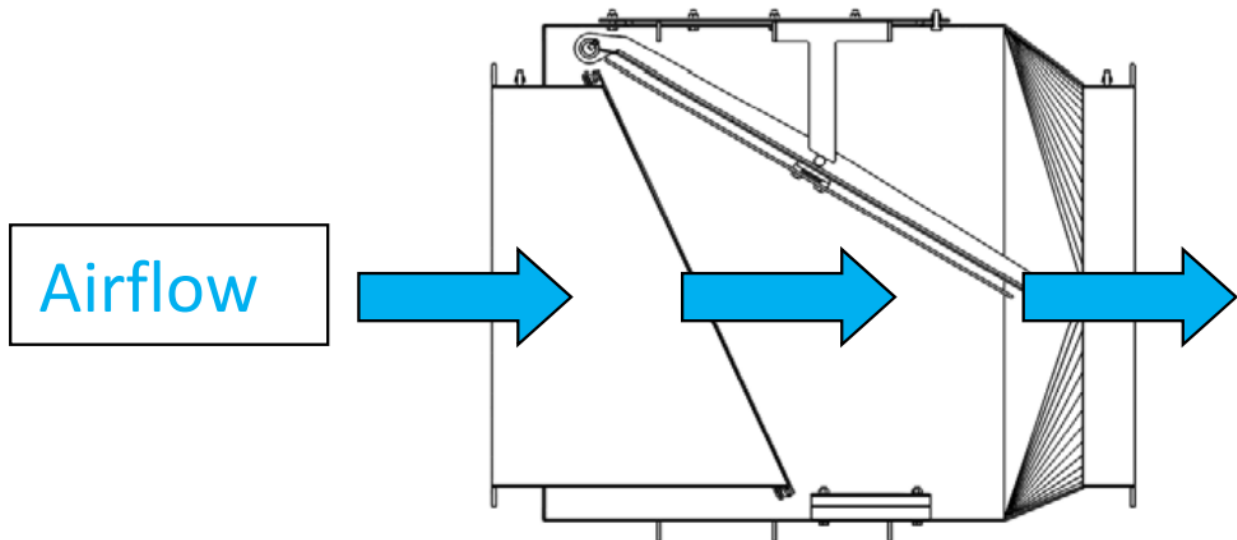
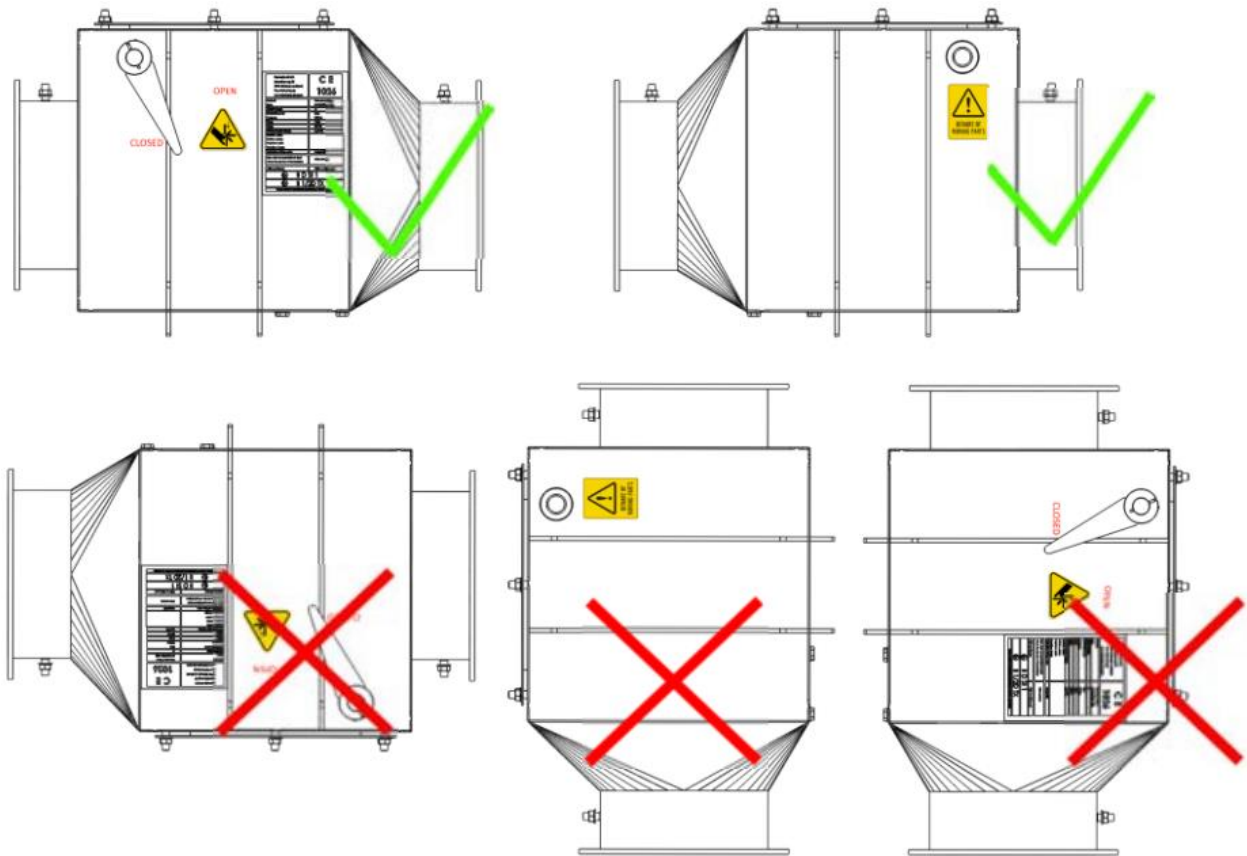


Figure 9: Installation direction regarding to the airflow

The non-return valve needs to be installed horizontally. The inspection panel must always be set upwards, see Figure 10.

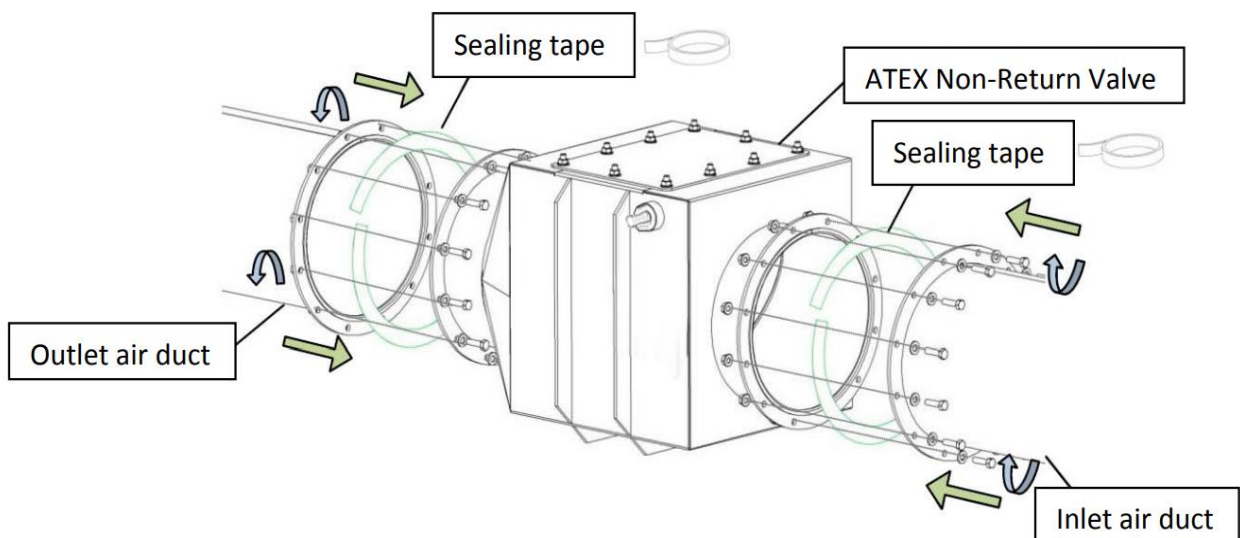


**Figure 10: Installation direction**

### Connecting the non-return valve

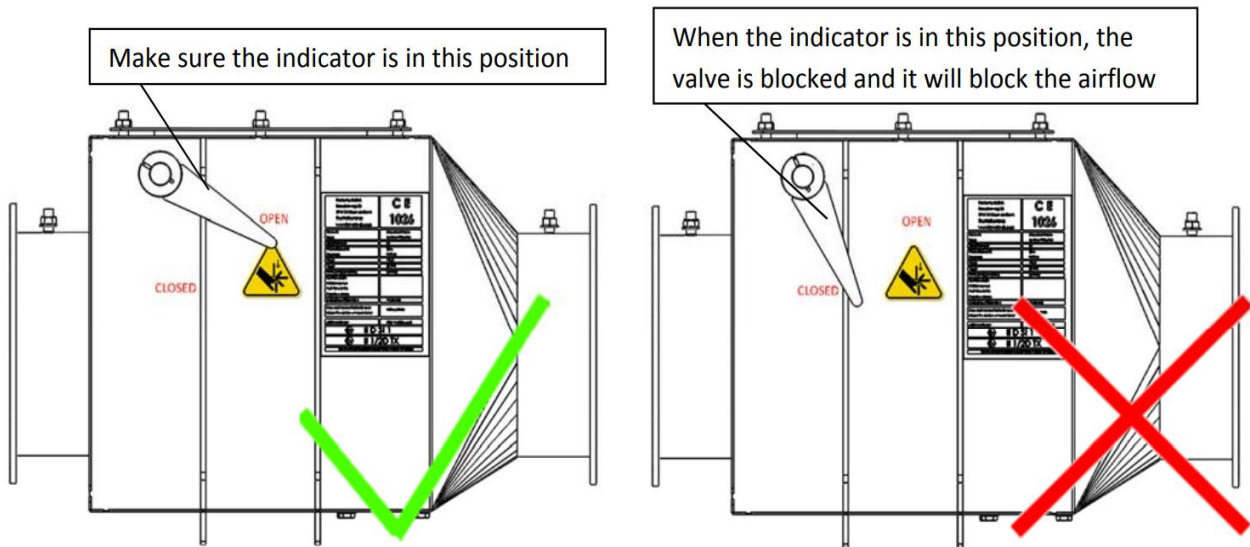
For the best isolation effectiveness, the non-return valve needs to be installed in proximity of the risk zone which it is wanted to be isolated.

**Step 1:** Connect the inlet and outlet to the duct system with the correct fasteners (Figure 11). Use non electrostatic sealing to make it airtight.



**Figure 11: Installation step 1**

**Step 2:** Make sure that the indicator is in the correct position (Figure 12).



**Figure 12: Indicator Position**






## Precautions for proper use

### ⚠ CAUTION!

- It is strictly forbidden to open the inspection panel while the air flow is running through the duct.
- During maintenance keep the system disconnected and all the electrical equipment turned off.
- The valve should not be placed in an environment that could create a vibration in the non- return valve.
- After the event of an explosion, do not unblock or manipulate the non-return valve until the explosion is completely extinguished. Check if the non-return valve and its parts' are working properly. Clean the valve. If any port got damaged, replace it!

### ⚠ CAUTION!

Be aware of hot particles remaining inside the valve, even if the explosion is over. While opening the inspection panel, parts can fall off from the inside, damaging the operator or goods.

- Every time there is a potentially explosive atmosphere danger, special safety steps must be taken, as the following:
  -  The non-return valve is allowed to be used in places where the risk of igniting the explosive atmosphere can't be brought to the minimum tolerable.
  -  Tools or operations which can produce sparks, which can cause gas ignition, or flammable vapors, are not allowed to be used in any procedure that takes place in any area classified as explosion risk.
  -  Avoid dust removal by blowing while cleaning.
  -  The use of free flames near the explosion risk area is strictly forbidden.
  -  The use of electric material that is not marked II of the Directive 99/92/CE is not allowed.

## Maintenance and troubleshooting



**⚠ CAUTION!** The non-return valve installation, connection, start-up and maintenance has to be performed in absence of potentially explosive atmosphere through the process interruption.

**⚠ CAUTION!** The installation, connection, start-up and maintenance of the non-return valves have to be performed by qualified personnel. Use the right equipment, clothing and individual protection devices according to the situation, and do not work alone.

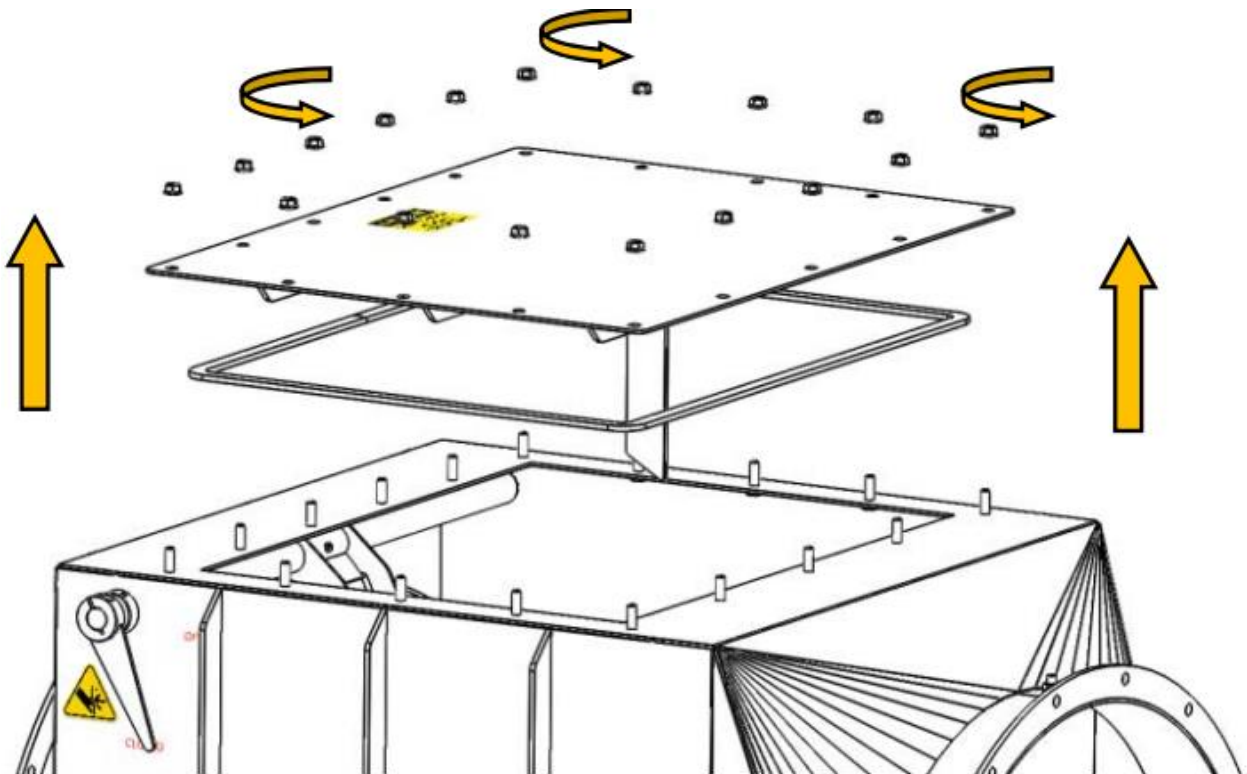
**⚠ CAUTION!** Any modifications done by the user on the non-return valve are at the user's own risk!

### Maintenance

Clean and check the performance of the non-return valve regularly. Checking is suggested every two months and after any incident that can block or damage the non-return valve.

### Cleaning and checking the inside of the non-return valve

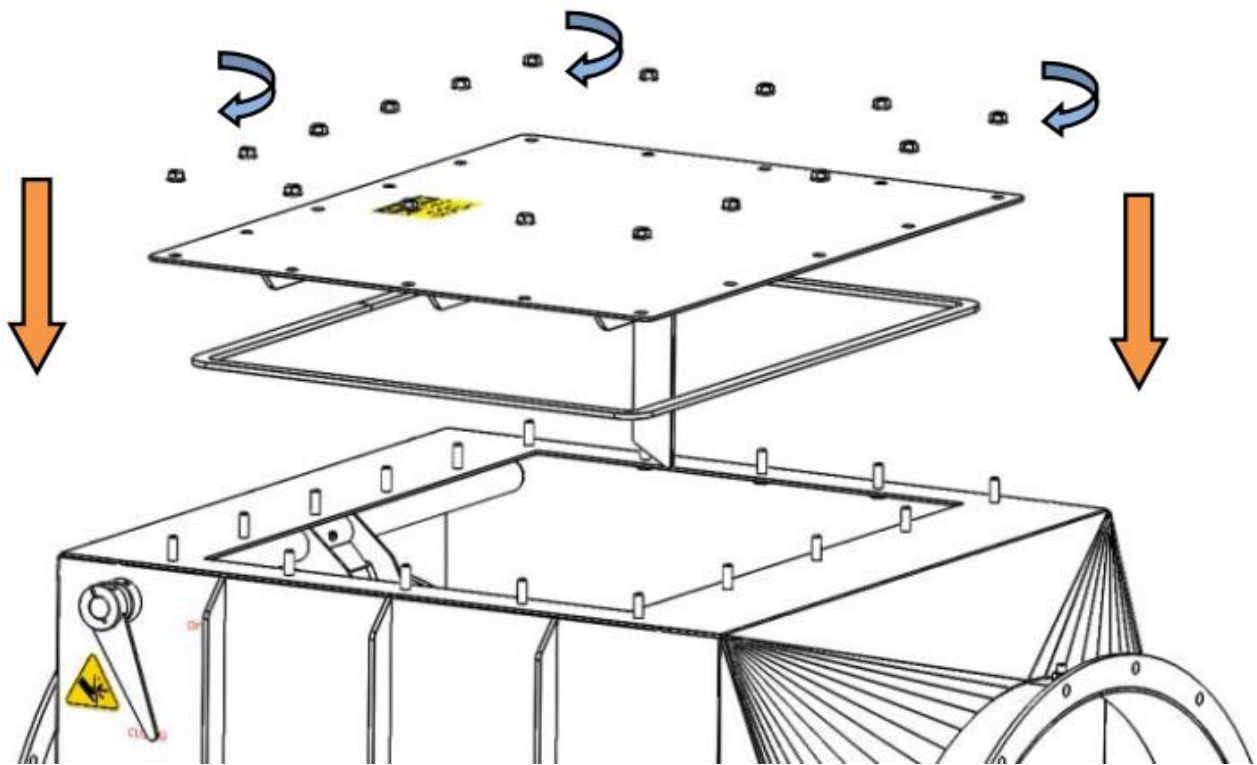
**Step 1:** Open the inspection panel by unscrewing the M8 nuts (Figure 13).



**Figure 13: Unscrew the M8 nuts**

**Step 2:** Clean the inside of the valve and check the condition of every part.

**Step 3:** Close the inspection door by tightening the M8 nuts. If necessary, renew the sealing tape to make sure it remains airtight (Figure 14).



**Figure 14: Tightening of the M8 nuts**

## Dismantling and recycling

When dismantling a unit, be sure to keep in mind the following important information:

**⚠ CAUTION!** Make sure there is no remaining any explosion potential dust of similar before dismantling. As the unit is dismantled, set aside all still functioning parts in order to re-use them on another unit. You should always separate the different materials depending on their type: steel, stainless steel, rubber, foams, etc...

Recyclable parts must be disposed in the appropriate containers or brought to a local recycling company.

The rubbish must be collected in special containers with appropriate labels and disposed in compliance with the nation laws and/or local legislations if force.

**⚠ CAUTION!** It is strictly forbidden to dispose toxic wastes in municipal sewerage and drain systems. This concerns all oils, greases, and other toxic materials in liquid or solid form.



# ATEX CERTIFICATION



## EXPLOSIVE ATMOSPHERE DANGER

This symbol indicates information concerning the directive ATEX 94/9/CE.

Every information attended by this symbol must be executed by highly qualified personnel, competent in safety environments regarding to places characterized by the presence of potentially explosive atmospheres.

### Potentially explosive atmosphere

An explosive atmosphere for the purpose of Directive 94/9/EC is defined as a mixture with air, under atmospheric condition, of flammable substances in the form of gases, vapors, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

A potentially explosive atmosphere is an atmosphere which could become explosive due to local and operational conditions.

### Dangerous areas classification

In carrying out the obligations laid down in Directive 99/92/EC, hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere.

**Zone 0:** A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mist is present continuously or for long periods for frequently.

**Zone 1:** A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mist is likely to occur in normal operation occasionally.

**Zone 2:** A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

**Zone 20:** A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.

**Zone 21:** A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.

**Zone 22:** A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

### Protective system's selection criteria

The ATEX 94/9/EC Directive classifies the protection system (in this case the non-return valve) into 3 categories, with different protection levels, guaranteed to the related protection.

| Protection level | Mine     | Plant        |               |
|------------------|----------|--------------|---------------|
|                  | Category | Gas category | Dust category |
| Very high        | M1       | 1G (zone 0)  | 1D (zone 20)  |
| High             | M2       | 2G (zone 1)  | 2D (zone 21)  |
| Normal           | -        | 3G (zone 2)  | 3D (zone 22)  |

## ATEX code description

| Code  | Description   |
|---|---|
| <b>CE</b>   | CE Mark   |
| The symbol consists of a hexagon with a diagonal line from the top-left to the bottom-right, and the letters 'Ex' inside. | Explosive atmosphere danger symbol (ATEX)                         |
| <b>II</b>   | Protection system group (II = above ground)                       |
| <b>1/2</b>  | Zones (1 = zones 20, 21, 22 inside; 2 = zones 21, 22 outside)     |
| <b>D</b>  | Explosive atmosphere caused by the presence of dust (D)           |
| <b>Ex</b>   | Protection group (Ex = explosion proof)                           |
| <b>IIIC</b>   | Dust group (III = dust, C = category C)                           |
| <b>TX</b>   | Temperature class (X = special case specified within this manual) |