



Donaldson
FILTRATION SOLUTIONS

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Downflo® Evolution Dust Collectors



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GENERAL SAFETY REQUIREMENTS

This manual contains specific precautionary statements relative to worker safety in appropriate sections. To avoid dangerous situations we give you the following advice:



Refers to special information on how to use the dust collector most efficiently.



Refers to special information directed towards preventing damage.



Refers to special information designed to prevent injury or extensive damage.



The collector should be stored as supplied. Remove packaging for installation only.

For the purposes of storage:

- *Collector with specification for inside use = IP50*
- *Collector with specification for outside use = IP54*



The dust collector has been built in accordance with state-of-the-art standards and recognised safety rules. Nevertheless if not handled carefully it may put people at risk and also cause damage.



The dust collector should be used only when it is in technically perfect condition, in accordance with its designated use and the instructions set out in the operation manual. Any functional disorders, especially those affecting safety, should therefore be rectified immediately.



Ensure proper training is given to operators before start-up. The dust collector is designed exclusively for use within the scope of delivery, and in accordance with drawing(s) and the specification sheet.



Do not put lit cigarettes or any burning object into the hood or ducting of any dust collection system.



Regular maintenance is important for a good performance of your dust collector. A prudent user of Donaldson Torit equipment should consult and comply with all relevant Fire Codes and/or other appropriate codes when determining the location and operation of dust collection equipment.

A hand-operated supply disconnecting device is necessary for each incoming electrical supply in accordance with EN 60204-1.



To prevent accidents the access to the fan impellor must not be possible during operation. Refer to EN 294.



Disconnect all power before servicing. All electrical work must be done by a qualified electrician according to local codes.



All exposed conductive parts of the electrical equipment and the dust collector shall be connected to the protective bonding circuit (refer to EN 60204-1).



Shutoff and bleed-off compressed air supply before doing any service work.



In each individual case vent design, vent ducts and pressure resistant design are worked out by Donaldson Torit for the specific products, circumstances and environment, and should never be altered unless Donaldson Torit has given explicit admission.



All electrical equipment should be dust explosion proof according to the zoning and surface temperature limitations of the equipment.



The dust collector cannot be used in a potentially explosive atmosphere (according to ATEX directive 2014/34/EU), unless stated otherwise on the nameplate of the unit and the scope of delivery.



When handling explosive or flammable materials, the collector should be located so as to avoid external heat source- e.g. from nearby processes or extreme direct sunlight.



The user of the dust collector is responsible for disposal of any dust generated by the process, in accordance with local regulations.



The dust collector will not prevent explosions;

The main cause of dust explosions in dust collectors are hot and glowing particles which are formed in the process upstream - these are conveyed into the collector and get imbedded on the filter medium. There they either extinguish or develop into a smoldering or even open fire, in the end leading to an explosion.

A prudent user of Donaldson Torit dust collectors should:

- Take every possible precaution to prevent a fire or explosion from occurring.
- Consult with their insurance carrier or local authorities regarding the hazardous nature of dust produced.
- If dust is classified poisonous, corrosive or irritant as per 'Gef-Stoff V', an explosion venting system should not be used. The dust collector will then have to be protected from explosion by other methods (consult your Donaldson Torit representative).
- Sizing of the bursting opening + reinforcement of the dust collector are dependent on the dust collector type, the dust explosiveness (Kst value or St classification) and on the blow-off channel length + size when required.
- Consult and comply with national and local codes or bulletins (VDI 3674) when determining location and operation of Donaldson Torit dust collectors.
- Use only authorised replacement parts supplied by Donaldson Torit.
- Unless otherwise specified, DO NOT exceed negative operating pressure as specified by technical data, DO NOT use on positive pressure systems.
- Insure that the operating temperature of the dust collector does not exceed 120° C.
- Do not locate the bursting panel assembly where people are exposed to the bursting panel itself or to the area above or in front of the bursting panel as they may be injured by the escaping pressure, fire, noise, chemicals and/or fragmenting particles. The location of the bursting panel must be such that the discharge cannot be the ignition source of secondary explosions. Interfacing equipment and/or machinery must also be protected.
- Refer to guidelines VDI 3673.



Gas explosion proof equipment is not necessary but may be used when appropriate.

Maintenance and explosion safety

a. Introduction

The collection systems are designed and installed by Donaldson Torit engineers applying the most appropriate safety measures based upon state of the art knowledge and technology.

It's safety is based upon two main objectives:

- Prevent ignition sources that might be caused by the collection system itself, as far as it is practically possible, by using appropriate dust explosion proof electrical equipment, antistatic filter cartridges, conductive construction materials and ducts which are all bonded and grounded.
- Confine an actual explosion caused by an ignition source coming from the process or induced by the user (hot work collection system) in such a way that no hazardous effects occur:
 - to plant personnel
 - to the location in which the dust collector is installed
 - to equipment connected to the dust collector



If the dust collector's original design or the actual process is changed without implementing the changes in the safety design of the collection system, it's safety can be jeopardised. However, poor and/or incorrect maintenance can also jeopardise the safety of the system.

b. Hazards due to change of dust collector design



The housing is modified; a larger volume, weaker housing (e.g. by installing extra inlets or manholes).

The vent area is reduced; e.g. by obstructing the vent by ducts or other obstacles.

The vent panel type is changed; e.g. by using a panel that has a higher opening pressure or larger inertia.

The vent duct is modified; longer, smaller cross section, bends, obstacles or extra covering on the outlet.

The vent location is altered; e.g. instead of top venting now side venting is applied- besides possibly obstructing the vent process, reaction forces may cause the collector to tumble over.

If applicable, the explosion suppression system is modified.

In these cases the safety measures may not be able to protect sufficiently and the explosion may destroy the housing and or the vent duct causing hazards around the dust collector. In particular when the dust collector is located inside the hazards are eminent.

The rotary valve is taken out or exchanged by a non explosion proof type. Or the explosion resistant receiver bin is exchanged by a non appropriate type. This may lead to flames, or worse, a fireball emerging from the hopper.

The use of plastic bags in the receiver bin under the hopper is not recommended because sometimes, due to very high electrostatic charges, hazardous discharges may occur.

c. Hazards due to relocation of the dust collector



By relocating the dust collector from outside to inside you should be aware that the explosion now is vented inside a room, which is not acceptable, due to the very hazardous flame jets and fire balls.

Also, relocating outside may be hazardous when the explosion vent points into a direction where people may get hurt or property may be damaged.

d. Hazards due to change in process or product



By changing the process, the amount of product, process temperatures and, most importantly, product ranges may alter. If the products explode more violently than initially foreseen the explosion may damage or destroy the dust collector.

e. Hazards due to poor or lack of maintenance



The wrong filter cartridges are installed; non antistatic type may lead to ignition in the dust collector.

The filter cartridge porthole or another part of the housing (access cover) is not fixed correctly and may tear up during an explosion causing a flame jet or fireball.

Retrofitting metal ducts by non-conductive plastic hoses, plastic or flexible ducts may lead to hazardous electrostatic discharges.

Failing of bonding and grounding of metal parts and ducts (resistance between metal parts preferably should be less than 100 Ohms).

Painting of the inside with high resistant coating that may result in hazardous electrostatic discharges.

Welding, cutting etc. (all hot work activities) on an operating or not thoroughly cleaned not operating dust collector will result in strong ignition sources and explosions.

Painting of explosion vents may result in higher opening pressures: collapse of the housing.

If abrasive products are used, in time this may result in thinner walls of ducting and dust collector housing, thus reducing the strength of the equipment and it's explosion resistant properties.

f. Hazards due to wrong actions



Opening of the dust collector during operation: loss of containment.

Vent surrounding: if used as a storage area or frequented by personnel: a vented explosion will cause damage to stored goods and hurt or kill personnel.

g. Do's and don'ts

Based upon several hazards a list of do's and don'ts is given.

Perform a regular maintenance by disposing the dust in a regular fashion and inspecting the cleaning mechanism on a regular basis at least once a month.

Return the installation in its original state after maintenance (fixing, closing and bonding and grounding).

Check the grounding and bonding at least once a year.

The housing of the dust collector should never be changed or painted on the inside with a non-conducting coating.

Vents should never be blocked or painted.

Use the original bursting panel types only.

Do not alter the vent area or vent location.

Vent ducts should never be altered.

Do not tamper with explosion protection systems such as explosion suppression and explosion barriers as quick acting valve.

Use original equipment as filter cartridges, electrical equipment, rotary valves etc..

Do not use non-conductive plastic hoses and pipes.

Prevent goods and forbid personnel to be near such a vent.

Never open the dust collector during operation.

After emptying the receiver bin, fix it as in the original state.

Keep the working place clean.

For any changes in the dust collector, safety system, process, product or dust collector location consult the manufacturer.

h. Applications having a risk of sparks and fires**1. Good Housekeeping**

Accumulation of potentially combustible dust, for example dust layers is considered a potential ignition source. Failure to keep the dust collector clean and empty the hopper / dust bins regularly will increase the risk of fires and/or explosions.

2. EU Directive 99/92/EC.

A reinforced and/or vented dust collector must be used when handling dusts that have the potential to form an explosive atmosphere. If a non-reinforced and/or non vented dust collector is used on these applications then the end user must ensure an equivalent, secure, and fool proof basis of safety, which must be clearly documented in the end users Explosion Protection Document in line with Article 8 of EU Directive 99/92/EC.

3. Self Heating Materials

Please note that some materials have the potential to self generate heat and hence to become an ignition source, that could result in a fire and / or an explosion. For this reason ferrous and non-ferrous materials should not be extracted in to the same dust collector, as when combined they can create a violent thermite reaction that would ignite a fire and/or explosion.

4. Applications having a risk of sparks and fires

Where sparks are generated by the process, this must be considered as a potential ignition source which increases the risk of a fire or explosion. The filter can be supplied with an optional spark trap to help reduce the frequency of spark ignition and should be regarded as part of a risk reducing strategy. The spark trap is not an extinguishment system and should never be relied upon to achieve spark eradication in processes where suppression requirements are absolute. The spark trap does not guarantee complete elimination of sparks and does not preclude the possibility of fire or explosion. Therefore, system redundancy and complementary measures should be taken in conjunction with the spark trap to further reduce the risk of fire and explosion from sparks in applications where there is potential for catastrophic combustion.

On these types of applications the enduser should carry out regular good housekeeping, such as:

- a. Periodically check for dust fall out in ducting and remove.
- b. Pulse down off line regularly to minimise retention of dust cake on filter cartridges.
- c. Empty dust bins frequently.

Other risk reducing strategies could include

- a. Inject with an inert material.
- b. Consider additional spark detection and fire suppression equipment.

INTRODUCTION

Product information

The dust collector is used for the collection of airborne dust and particulate. Whether in response to the problem of air pollution, or as part of a manufacturing process, the dust collector provides highly efficient, continuous, on-line dust collection.

The filter cartridges are the heart of the dust collector. These filter cartridges help ensure that only cleaned air is returned to the plant environment.

The reinforced dust collector can collect explosive dust without putting people at risk and with a minimum of structural damage as a result of an explosion, assuming that all safety guidelines in this manual are followed. For each reinforced model the maximum Kst value for an inside as well as an outside installation is defined (see spec sheet).

Be sure that the explosive (Kst value) of your dust is always below the maximum Kst value defined for your dust collector type.

Technical and field support are available from your local Donaldson Torit representative or distributors to answer your questions.

Function

During operation, contaminated air enters the dust collector through the dirty air inlet area and passes through the filter cartridges.

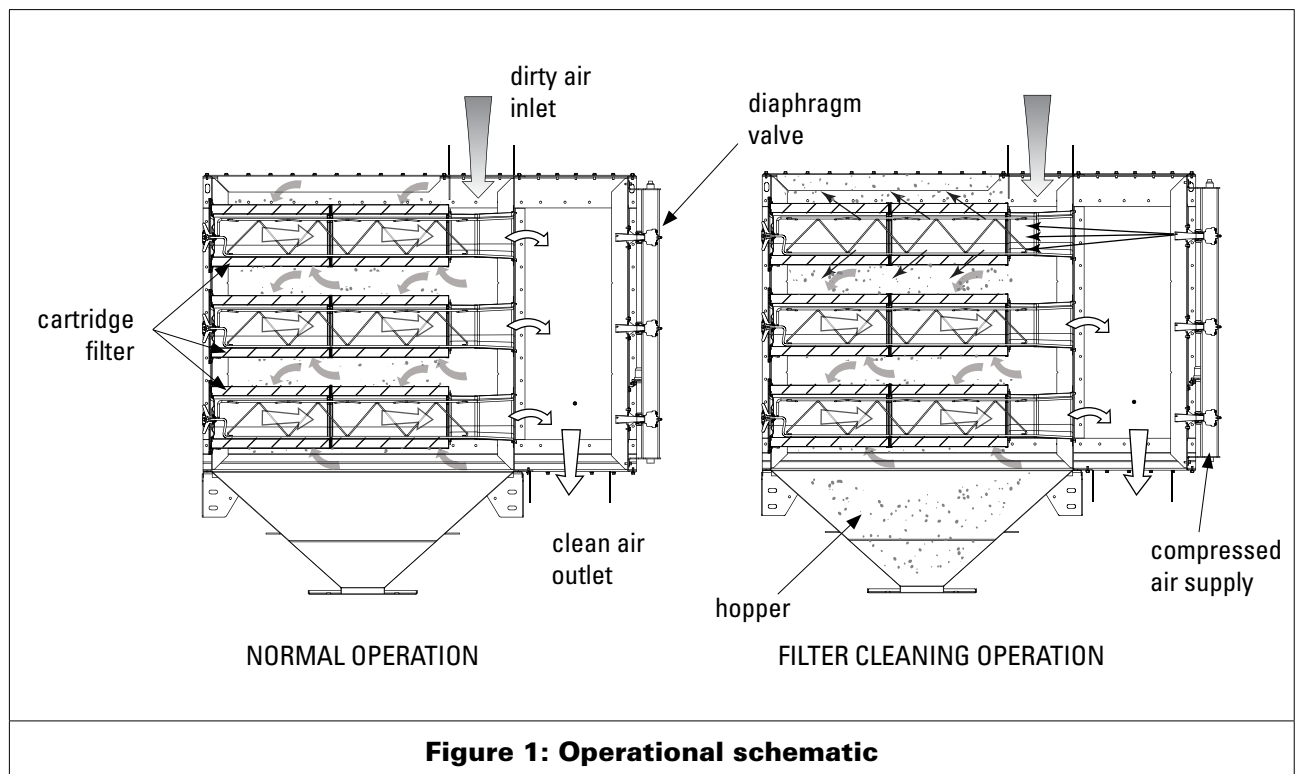
Dust is collected on the outside surface of the filter cartridges.

The filtered air flows through the centre of the filter cartridges into the clean air chamber, where it exits through the clean air outlet and can be recirculated into the environment.

To ensure the optimal performance of your dust collector it is necessary that the filter cartridges are cleaned automatically and sequentially.

During the cleaning sequence, the timer energizes a solenoid valve, causing the corresponding diaphragm valve to send a pulse of compressed air through the filter cartridges (from the inside outward), removing the collected dust from the outside surfaces of the filter cartridges.

The dust falls through the hopper into the dust disposal system.



Protection of the dust collector against dust explosion

The reinforced dust collectors are protected against dust explosions both by preventive and by constructional measures.

Preventive measures are to prevent ignition sources in the delivered installations:

- Electrical equipment is dust explosion proof: IP6X for zone 20 and IP5X for zone 21 plus equipment surface temperature limitation (depends upon the product). Gas explosion proof equipment is not necessary but may also be applied when appropriate.
- If necessary, the filter cartridges are antistatic. (see scope of delivery).
- All conducting parts are grounded or bonded and connected to ground.
- Internal coatings do not cause static hazards etc.

However, these measures do not prevent ignition sources due to the process or outside influences. Means to eliminate ignition sources from entering the dust collector are a preseparator, a spark trap or a spark detection with extinguishing system. Supply of these items are optional and will depend upon the typical process parameters (see scope of delivery).

So-called constructional or post-operative measures are measures to limit the potential explosion effects in case an explosion still takes place in spite of the preventive measures.

The measures taken on the reinforced dust collector are:

- Explosion venting in combination with explosion resistant design for the expected reduced overpressure and compartmentation

This is a typical mean against the effects of explosions. Of course against fire hazards alone the dust collector can be delivered with optional sprinkler systems or other extinguishing systems.

By venting the explosion to the outside in a safe direction (outside), the pressure inside the dust collector is limited such that it will not collapse. The vent area is designed using:

- VDI 3673. Pressure Venting of Dust Explosions, VDI-Kommision Reinhaltung der Luft, July 1995.
- NFPA 68. Guide for Venting of Deflagrations, 1994 Edition.
- EN 14491. Dust explosion venting protective systems, March 2006.
- IChemE. Dust explosion prevention and protection, 2002.

The explosion panels are certified and provided with a device to detect its actual opening up. This device should be used to stop the plant automatically by interlocking and can be used to activate a sprinkler system to extinguish a fire following the explosion.

By using vent ducts in case of indoor installation, the explosion is lead to the outside and into a safe direction. Vent ducts, however, will increase the expected reduced explosion pressure considerably. To prevent that the expected reduced explosion pressure exceeds the design strength of your Donaldson Torit dust collector, the maximum Kst value of your dust to be collected has to be considerably lower in case of using vent ducts .

There also should be taken into account that, due to the venting explosion, the dust collector is subjected to a reaction force.

Standard Donaldson Torit dust collectors are vented vertically and the reaction forces will be directed downwards into the foundation of the dust collector: this causes no hazards.

However, when the dust collector is side vented, the reaction forces also are directed horizontally and may push the dust collector over if not secured well. Therefore in case of horizontal vents the Donaldson Torit dust collectors should be specially secured. See figure 5: Typical foundation anchor, page 17.



In case of side venting, the dust collector will have to be adequately supported in order to cope with horizontal recoil forces. See figure 5: Typical foundation anchor, page 17.

To prevent that the explosion runs back to connected equipment, a back-flap valve or other explosion barriers should be installed.

To prevent propagation of fire, burning products or explosion from the hopper to the outside or process, through the hopper outlet, either an explosion proof rotary valve should be installed that automatically stops at explosion detection or an explosion proof reception bin or other explosion proof dust discharge systems.

PRIOR TO INSTALLATION

Location

The dust collector should be located with consideration for:

- emptying the dust disposal (see figure 1, page 8)
- shortest runs of inlet and outlet ductwork
- radius bends on elbows as big as possible
- easy access to electrical and compressed air connections
- convenience of maintenance



Consult the technical specification sheet and drawings for the dust collector weight and dimensions.

For calculating for foundation or supporting structure consider the following factors:

- the weight of the dust collector
- the material being collected
- all auxiliary equipment
- live loads
- for outdoor installation: snow and wind loads

Required tools and equipment

- crane/fork lift
- slings/clevis pins and adequate lifting equipment
- standard tools (screwdrivers, wrenches, etc.)
- drill
- pipe sealant

Delivery and inspection



The dust collector is normally shipped by truck and should be checked for any damage that may have occurred during shipping.

Note that the bursting panel is always shipped mounted upside-down on the dust collector top flange to prevent any damage.

On top of the bursting panel a galvanised plate is positioned to protect the panel from damage during transportation. The bursting panel and galvanised plate are secured in place with 4 bolts. The other bolts, nuts and washers and the burst indicator switch are delivered together with the dust collector.

Compare the parts received against the packing list. If there is damage or parts missing, notify the delivery company and your local Donaldson Torit representative.

Parts shipped loose with the delivery (depending on your order):

- | | | |
|------------------------|--------------------|-----------------------|
| • dust disposal system | • platform | • legs and bracings |
| • transition pieces | • spare parts | • control box |
| • fan set | • anchor bolts | • damper pack |
| • fan box | • hardware/sealant | • bursting panel |
| • silencer | • hopper | • burst indicator set |

INSTALLATION



All external equipment connected to the inlet, outlet or discharge (e.g. ducting, rotary valve) should be correctly sealed. This can be achieved by applying a continuous 5 mm bead of sealing compound to the mounting surface, along each side of the hole pattern. For non-Donaldson Torit equipment please also check supplier's IOM manual for any specific requirements.

Unloading and transport to location



Before unloading, remove all packing and strapping.

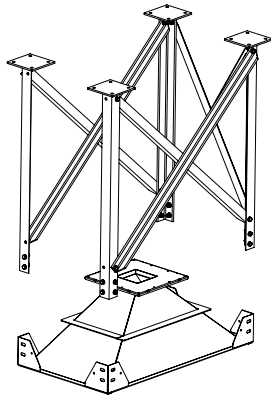
A crane is recommended for the unloading, transport and installation of the dust collector.



Connect lifting sling to the lifting lugs with clevis pins and distribute loads equally. Use spreader bar if necessary.

In case of inside installation, a vented dust collector will be provided with a special roof flange. This allows the mounting of a blow off channel (max 3m) around the bursting panel. Channel will divert escaping pressure outside the premises.

Ensure blow off channel is mounted on roof flange with the pre-drilled hole on the same side as the sensor brackets of the bursting panel. This hole is used to pass the cable of the sensor through the blow off channel.



STEPS 1-2

1. Place hopper discharge-side up on ground or other level surface and attach legs to hopper.
2. Assemble leg cross braces.
3. Turn hopper and leg assembly over and lift into position over anchor bolts.
4. Level hopper.
5. Tighten all fasteners securely, including all anchor bolts.



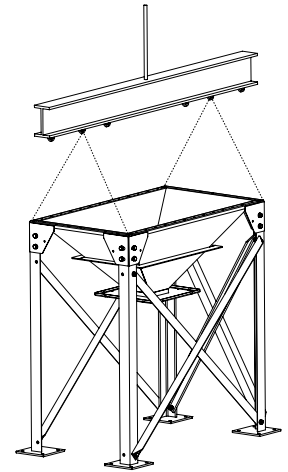
Tighten all hardware before removing crane.

6. Apply sealant to hopper flange
7. Lift unit over leg and hopper assembly and lower slowly.
8. Secure with bolts, washers, and nuts supplied.
9. Apply sealant around inlet opening.
10. Lift inlet onto collector. Secure with bolts, washers, and nuts supplied.

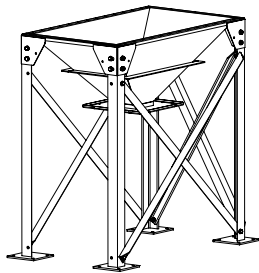
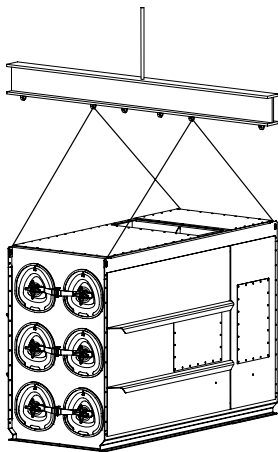


Tighten all hardware before removing crane.

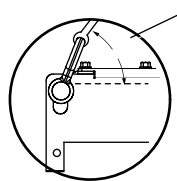
11. Remove crane.
12. Apply sealant to hopper/cabinet and cabinet/inlet seam.



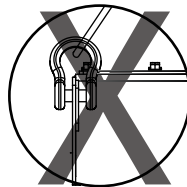
STEPS 3-6



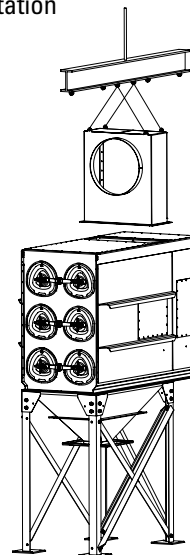
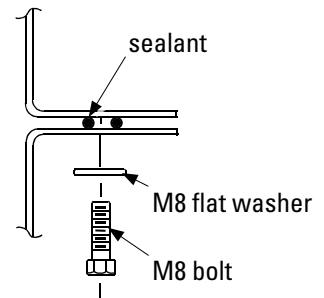
STEPS 7-9



Angle not to exceed 30° from vertical (min. 60° from horizontal)



Do not lift with this orientation



STEP 10

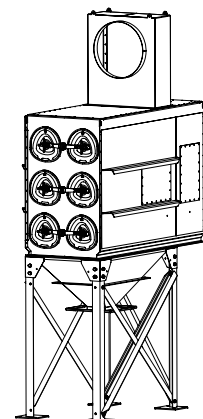


Figure 2: Typical installation

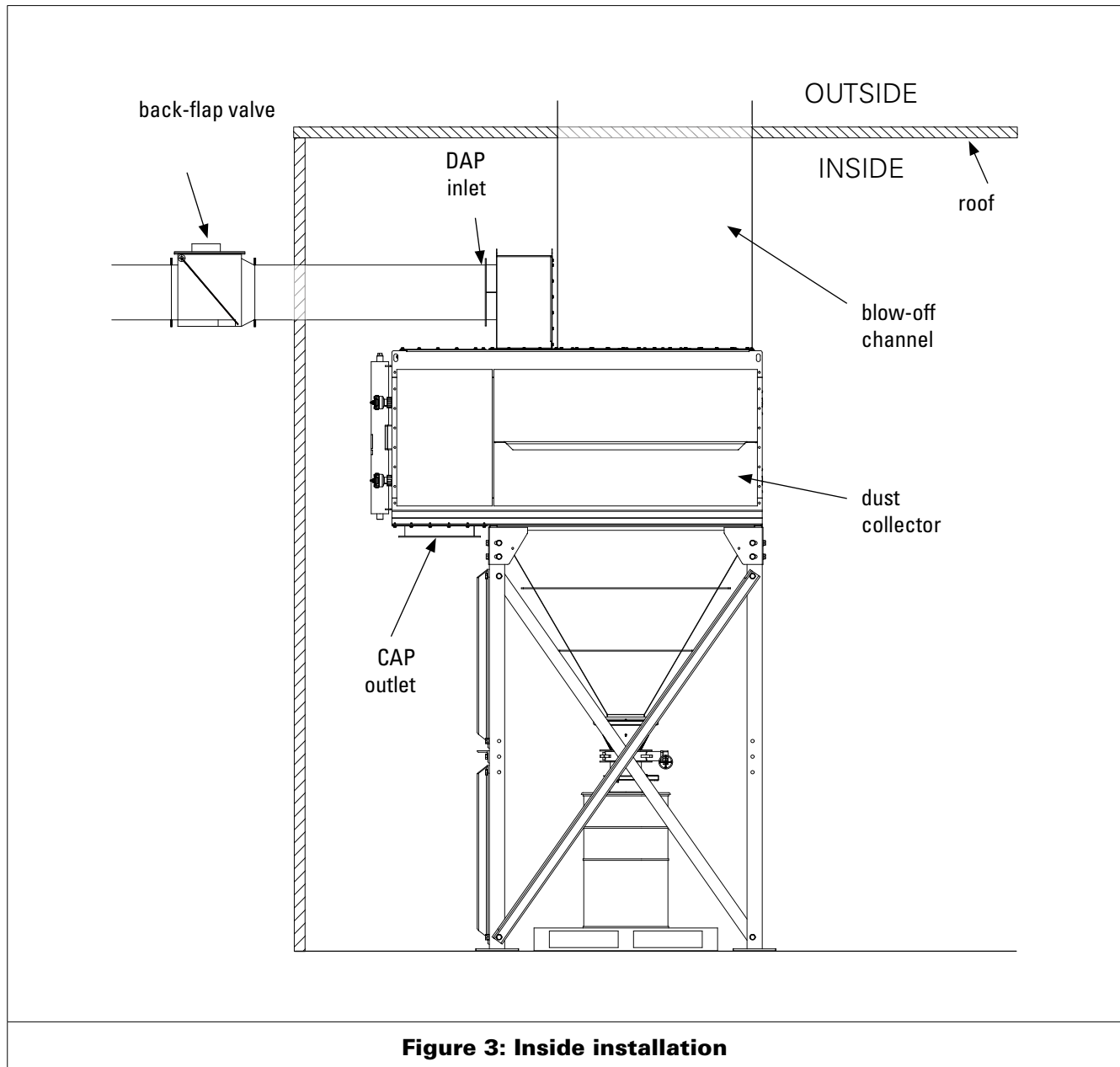


Figure 3: Inside installation

Installation and assembly



Anchor the dust collector to the foundations.



If any of the following equipment is ordered and mounted please follow the respective instructions.

Hopper & leg installation

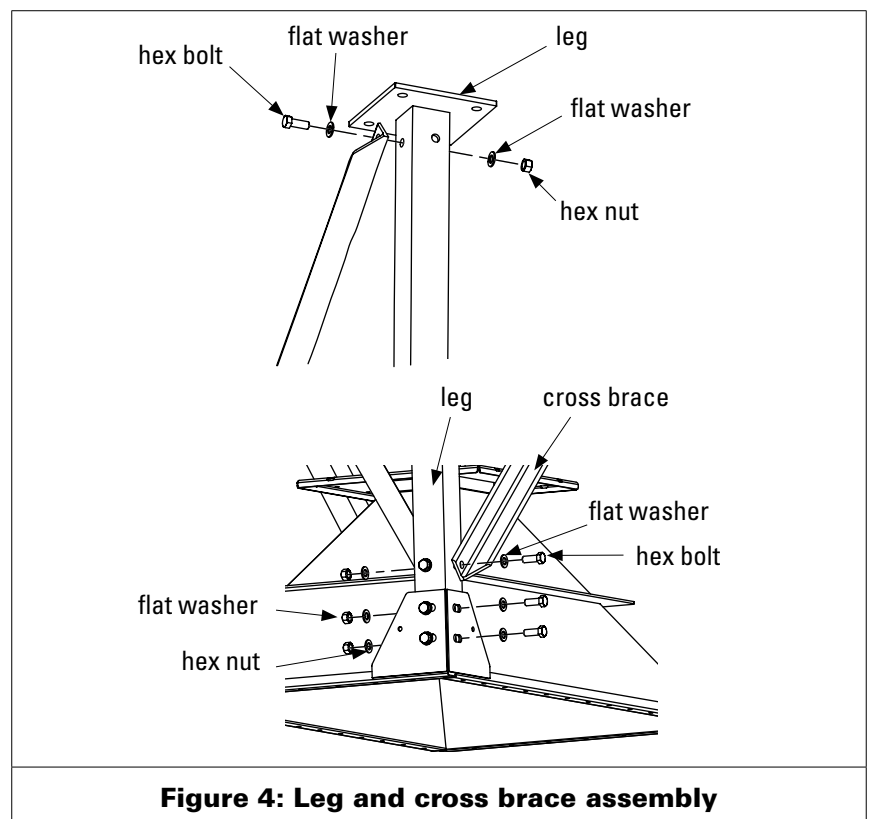
(see figure 'Hopper & Leg Installation')

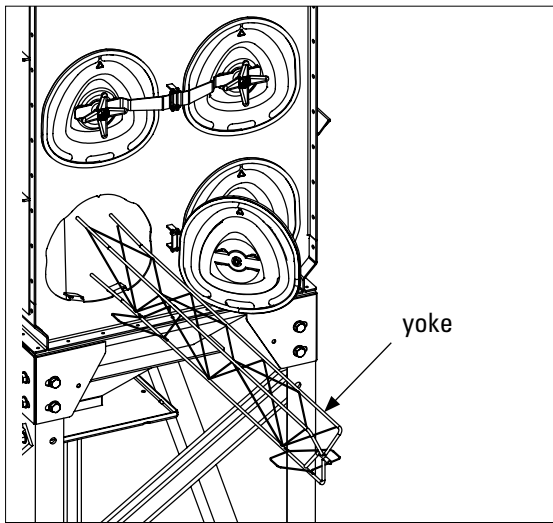
There are three types of hoppers for your dust collector:

1. a single module wide which spans two portholes
2. a single module wide which spans three portholes
3. a double module wide which spans four portholes

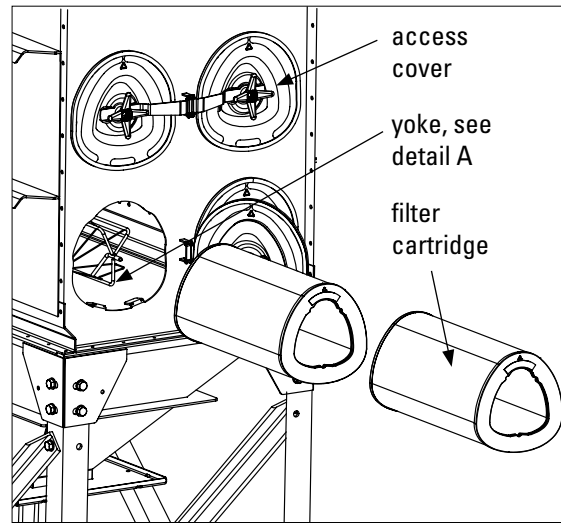
Each of these styles transition to a single outlet opening. All of the leg arrangements are shown in figure 6, 'Leg positioning'. The position of the legs, cross bracing and hoppers for each dust collector size is shown.

1. Stand the hopper(s) up with the disposal end up (hopper outlet).
2. Use drift pins to align the holes in the hopper gussets and legs, and attach the legs with the bolts, washers and nuts. **Do not tighten hardware at this time!**
3. Use drift pins to align the holes in the cross bracing on the rear side of the leg set.
4. Recheck the position of the legs and cross bracing against figures 'Leg Bolting Details' and 'Standard Leg Packs' and the drawing.
5. Join hoppers together at the hopper gussets using bolts, washers and nuts. **Do not tighten hardware at this time!**
6. Flip over the now-assembled hopper/leg pack assembly so that it is standing on its legs (hopper outlet pointing down). This step may require a crane. Another option is to divide the hopper/leg pack assembly into smaller sections to flip over. Make sure to join hopper together after flipping over.
7. Lift the assembled collector onto the foundation. Fasten each footplate of the leg anchor bolts with flat washers, lock washers and nuts. **Do not tighten hardware at this time!** (Depending on the type of anchor bolts, anchor bolts can be mounted afterwards).

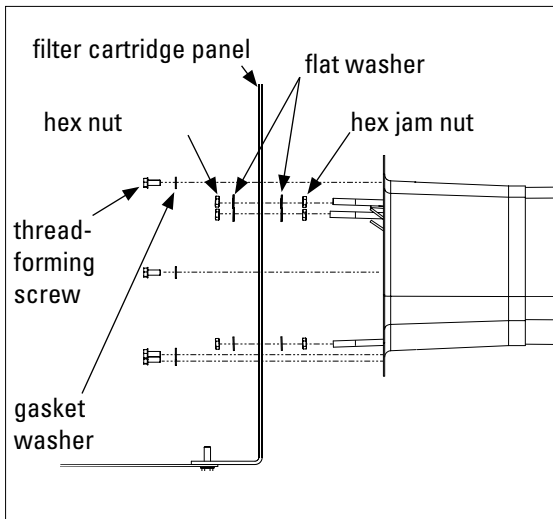




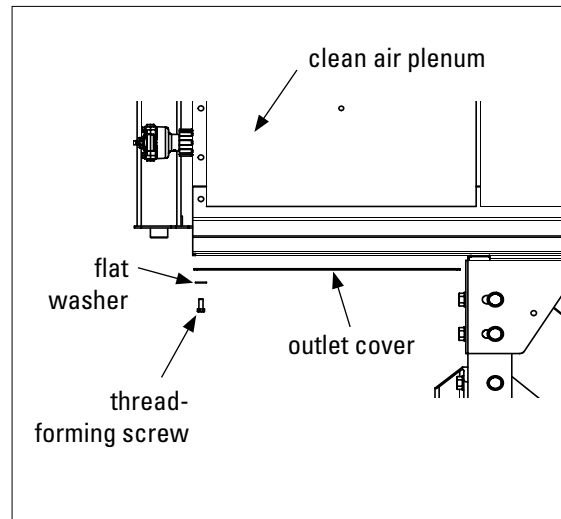
detail A



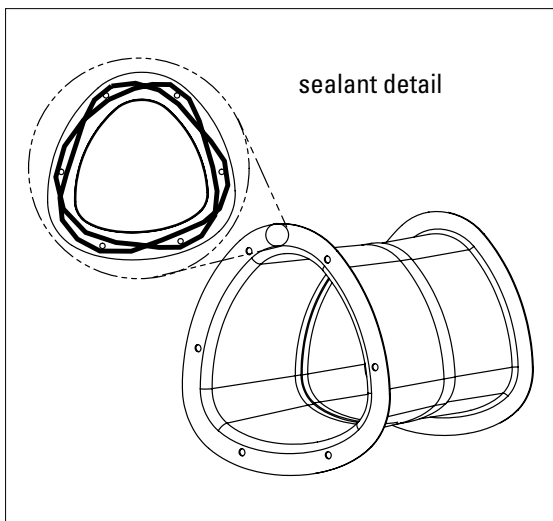
detail B



detail C



detail D



detail E

Figure 5: Yoke, venturi and filter installation

Provisional anchor bolt recommendations

9. Consider Hilti HIT-HY 200 Anchor System or equivalent.
Quantity of anchor bolts should match the number of holes provided in the base plates
10. Anchor diameter is typically 3 mm less than baseplate hole diameter.
11. Corrosive environment or outdoor installation may require stainless steel anchors.

Anchor should project a minimum of 45 mm and account for nut, washer, base plate and shims/grout.

Embedment depth

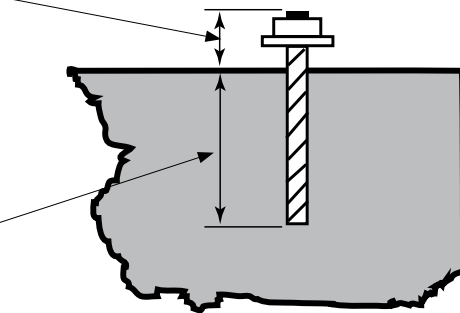


Figure 6: Typical foundation anchor

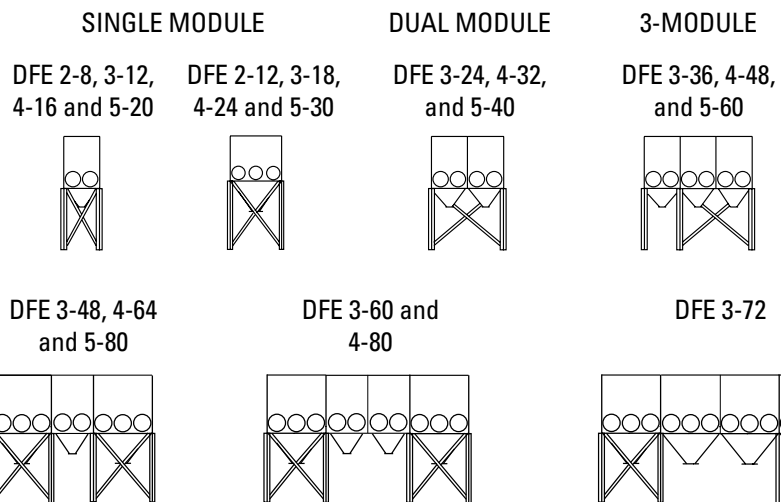


Figure 7: Leg positioning

Field joining installation

(See figure 'Field Joining Installation')

The dust collector is a modular unit that may require field joining. The field joint may be a result of truck capacity, crane capacity or specific customer requirement.

A detailed drawing of how to join your dust collector has been shipped with your dust collector. Most of the joining hardware is on the inside of the collector. A stepladder will be helpful in assembling the flanges near the top of the collector. Both the dirty air and the clean air chambers will have to be accessed during joining.



Two cranes are required.

Read all instructions for assembly.

Leave one hopper off the collector on either side to the joint.

The yokes, filter, cartridge baffles and outlet covers have been left off the joint side.

Follow all safety precautions when installing your dust collector.

1. Remove the protective shipping cover from each module.
2. Remove one inspection cover on the clean chamber.
3. Apply sealant to one side of the joint. Follow the sealant pattern exactly as it is shown in Figure 'Field Joining Installation'.
4. Lift both units with cranes into position for joining. Align the bolt holes in the flanges with drift pins. Bolt the joint together with the bolts, washers and nuts. Do not tighten hardware.
5. When all of the hardware has been attached to the collector, make sure that the joints are flush and tighten all hardware.
6. During the tightening sequence, some sealant may loosen out of the joint.



Wearing protective rubber gloves, proceed to move any excess. Dispose of excess sealant properly.

7. Proceed with the assembly of the collector.
8. Reinstall the inspection cover.



Two cranes are required to lift and assemble modules.

1. Remove the protective cover from the end of each module.
2. Remove one column of access covers, filters, venturis, and yokes from the joint side of each module as shown in Detail A.
3. Remove outlet cover from the bottom of the clean-air plenum and set aside.
4. Apply a generous amount of sealant to one module to create an airtight seal between the clean- and dirty-air plenums as shown in Detail B.
5. Lift both modules into position using two cranes.
6. Use drift pins to align the bolt holes in the mating flanges.

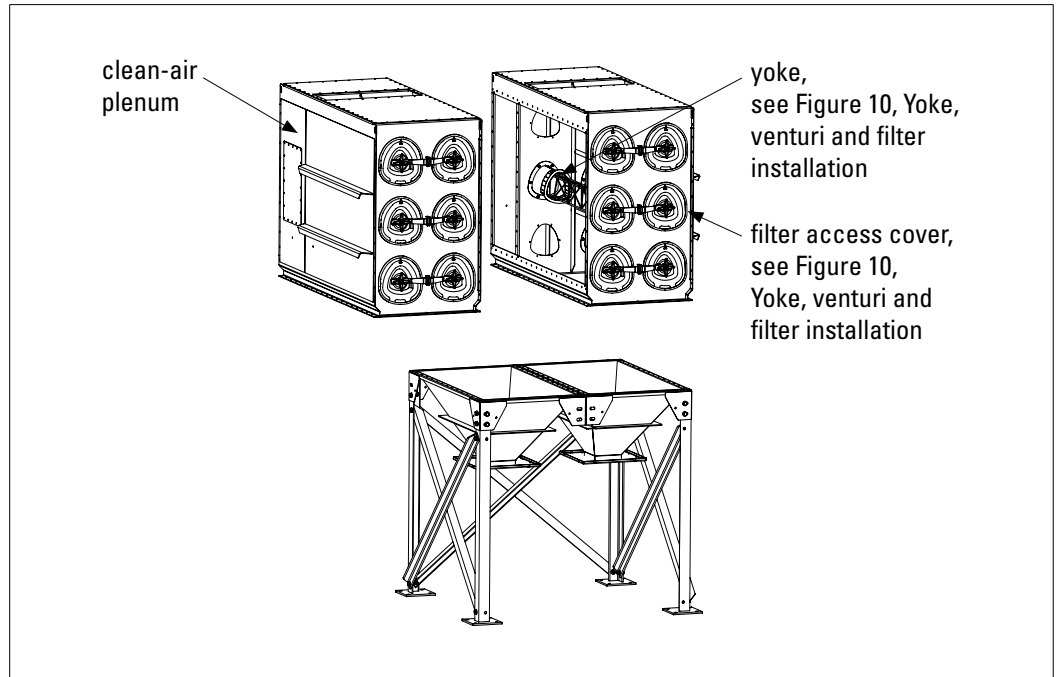


Figure 8: Field joining Detail A

7. Bolt the modules together using bolts, washers and nuts as shown in Details B and C. Do not tighten hardware at this time.

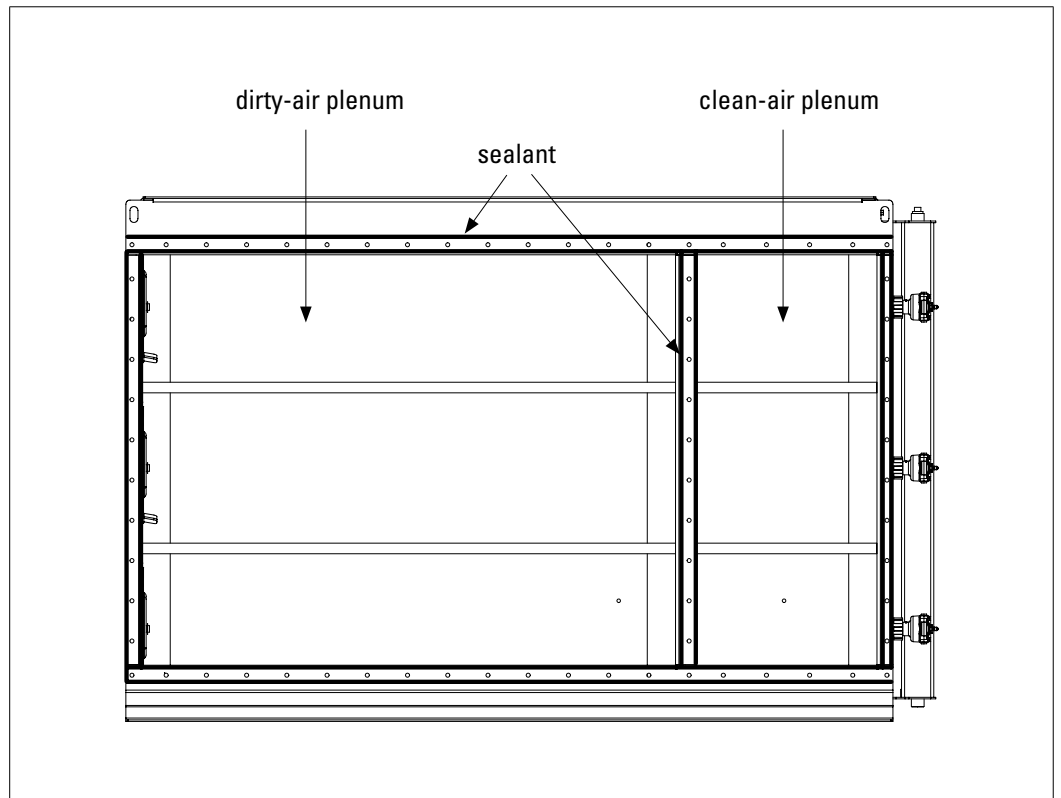


Figure 9: Field joining Detail B

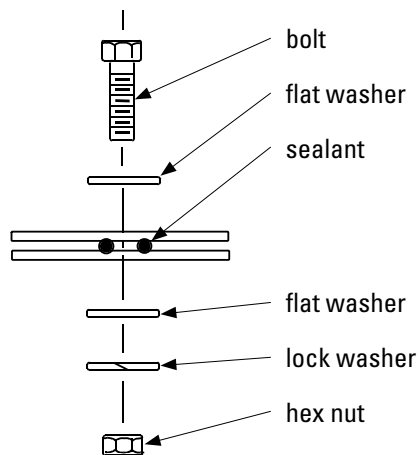


Figure 10: Field joining Detail C

8. Check that all joints and flanges are flush and tighten hardware starting with the joint between the clean- and dirty-air plenums. Remove excess sealant.

Yoke, venturi and filter installation



Installing yokes requires two people.

1. From the clean air plenum (to access, remove the outlet cover, see Detail D in Figure 10 -Yoke, venturi and filter installation), thread a hex jam nut and flat washer to the shoulder of each of the three yoke rod ends. See Detail C.
2. Starting at the top access port work downward. Orient the yoke as shown in Detail A and insert into the housing so the yoke is positioned in the appropriate holes in the tube sheet. From the filter section, have one person hold the yoke in position while another person installs a flat washer and hex nut on each yoke rod end from the clean-air plenum. Do not tighten hardware at this time.
3. Adjust jam nut against the filter cartridge panel. Have one person hold the yoke in position as shown in Detail B while another person tightens the three hex nuts from the clean-air plenum. Repeat to install all yokes.
4. Apply sealant to venturi as shown in Detail E. Slide venturi over the yoke with sealant end first. Hold venturi in place while installing venturi hardware (thread forming screws and gasket washers) from the clean-air plenum.
5. Slide the filter cartridges into the collector on the yoke gasket-end first. Replace access cover and tighten securely by hand following instructions found in Maintenance Information. Repeat for all filter cartridges.
6. Replace the outlet cover on the bottom of the clean-air plenum shown in Detail D.

Platforms and ladders

Stationary platforms are available for each size collector.

For two filter wide models the platform is available for standard or steep-sided hoppers with the ladder located left, right, or front of the platform.

On three filter wide models the platform is available for standard hoppers only with ladder access on the left or right side only. Complete installation and assembly instructions are shipped with the platform.



Dropping the platform can result in personal injury and/or property damage. Secure the platform assembly to the crane or forklift with straps or clamps.

1. Pre-assemble the platform according to the instructions shipped with the platform. The hardware and placement is called out on the assembly drawing.
2. Lift the assembled platform into position and secure following the assembly drawing instructions.
3. Tighten all hardware before removing crane or forklift.
4. Check platform hardware each time the platform is used.

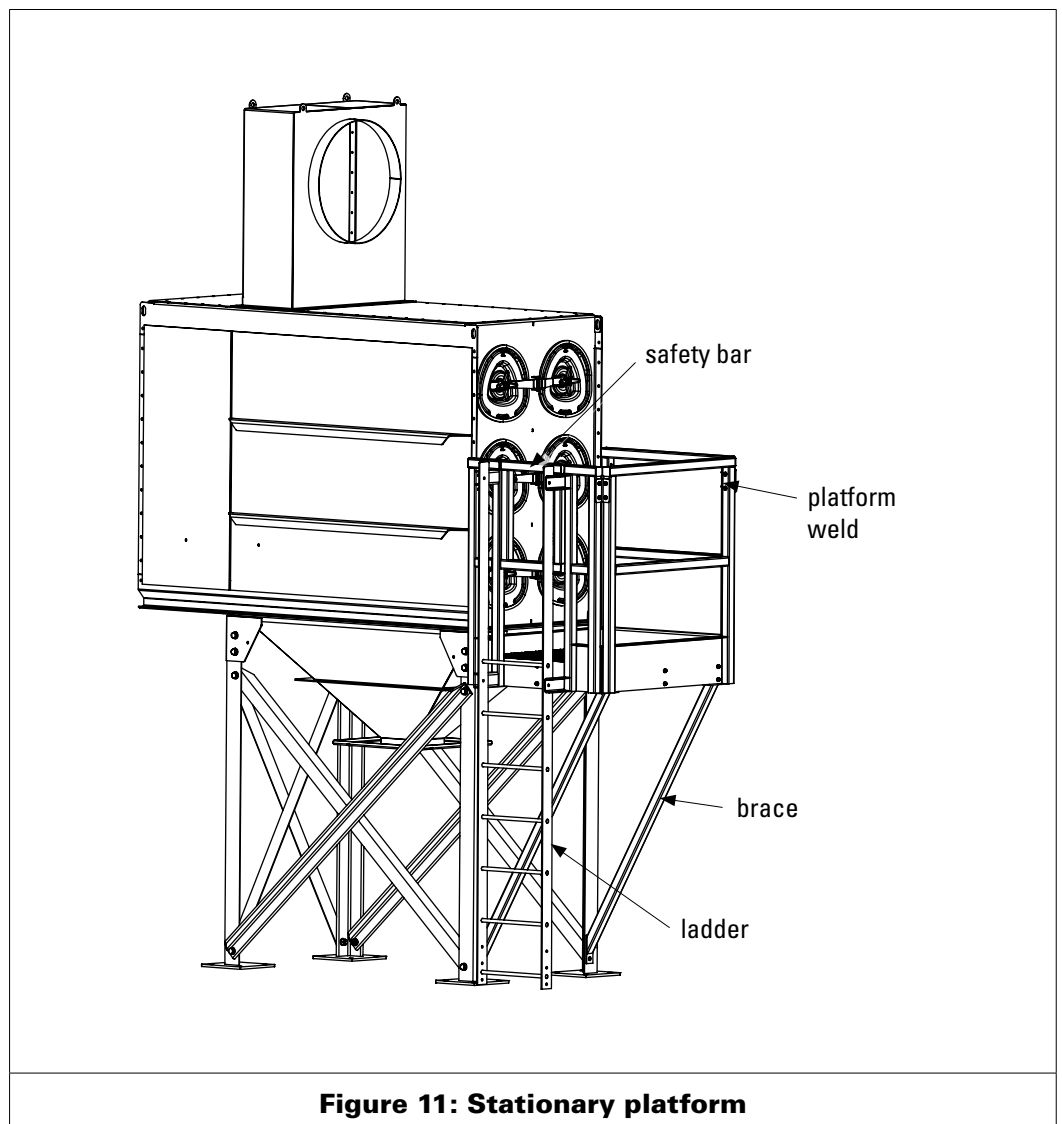


Figure 11: Stationary platform

Control box



The controlbox is factory mounted on the hopper according to our standards (except when specified by order).

If not pre-mounted please make sure that the in-line filter is positioned correctly on the dirtyside tapping point connection to the control box (refer to figure 12 for mounting details).



All the instructions related to the controlbox are mentioned in separate manuals.

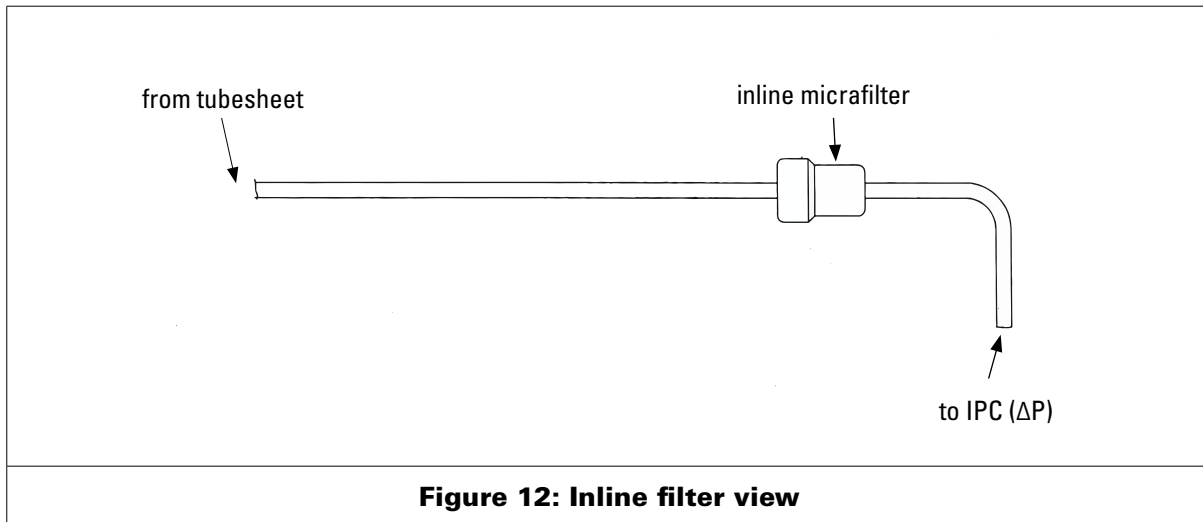


Figure 12: Inline filter view

Compressed air connection



Compressed air pressure must be between 6 and 7 bar.

Be sure that all compressed air components are adequately sized to meet the maximum system requirements of 45 Nliters per pulse at max 7 bar supply pressure (= design pressure).

It is a requirement that adequate precaution is taken to avoid exceeding this pressure. A relief, safety valve, is required if the connected supply can exceed this pressure. A label is also attached to each manifold indicating manifold design details.

Compressed air supply should be both oil and moisture free.

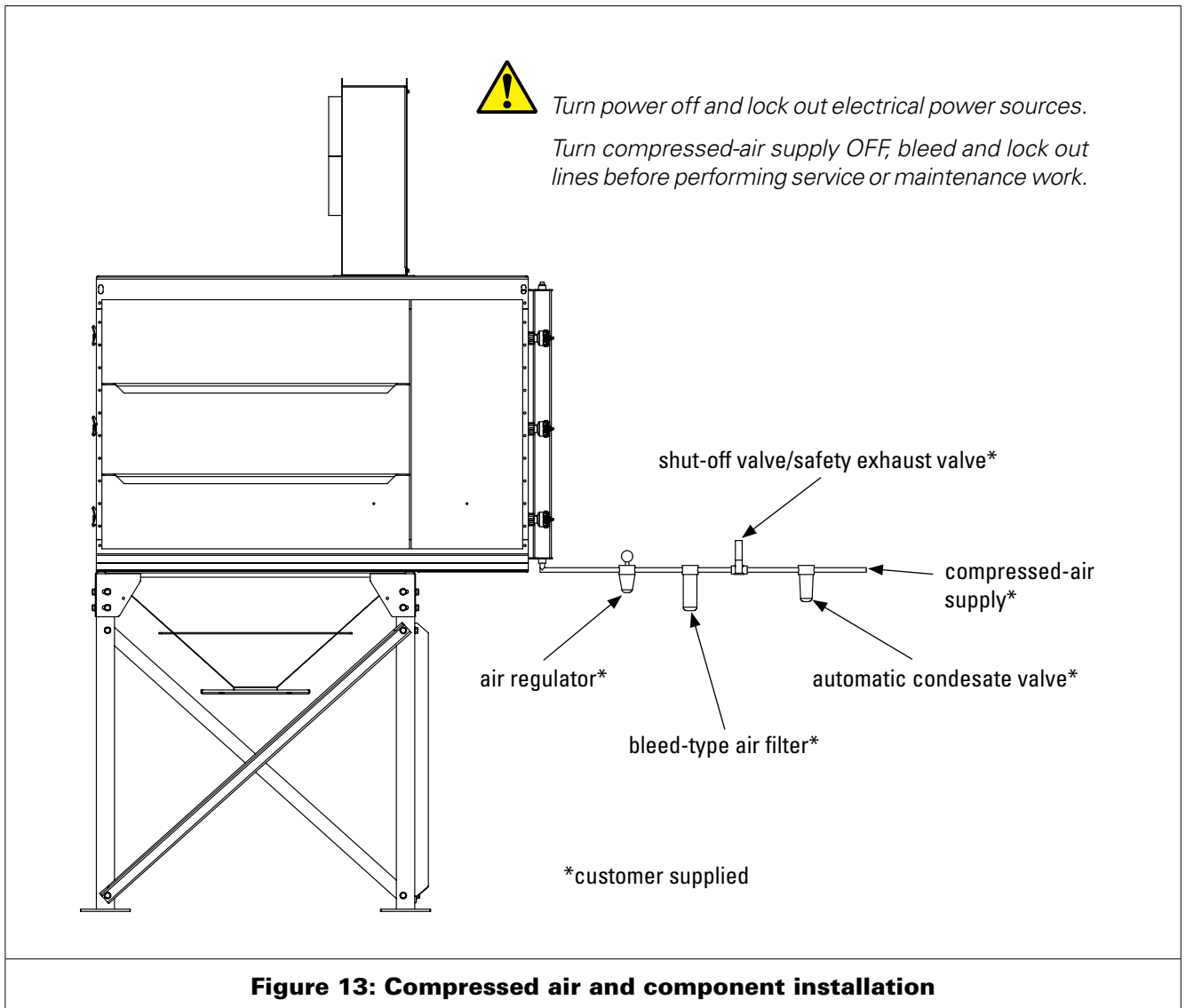
The piping should be installed to provide a fall in the directions of the air flow to assist in the drainage. A moisture separator should be provided at the lowest point of the installation.

Purge compressed air supply lines to remove debris before connecting to the compressed air manifold.

Connect the compressed air supply line to the compressed air connection at the bottom of the dust collector.

Use thread-sealing tape or pipe sealant on all compressed air connections.

A compressed air shut-off valve, a filter/water separator with automatic condensate drain, a pressure regulator with gauge must be installed in the compressed air supply line. Locate these components for convenient service, in the immediate vicinity of the dust collector.



Electrical connection



Amperage and voltage information is shown on the nameplate ratings of the fan motor. Over amperage of manufacturer's recommended service of motor will cause damage.

- If the fan is not premounted, connect the fan motor to the control box according wiring diagram.
- Connect the main power to the control box according the wiring diagram included in the control box.



Check the rotation of the fan wheel (direction of the arrow on the fan housing). If the fan is running in the wrong way, it will deliver only approximately 40% of its rated air volume.

Lock out all electrical input power and interchange any two wire leads (3 phase only) on the output side of the motor starter to reverse fan rotation.

Solenoid valves

See C-series controller manual.

Inlet plenum

The inlet plenum is standard on Downflo® Evolution collectors unless another inlet plenum option has been selected.

The inlet plenum directs the dirty air stream to the back of the dirty-air plenum over the venturi section.

1. Remove the unit's shipping cover plate. Remove excess sealant from opening.
2. Apply sealant around the opening toward the inside edge of the bolt pattern.
3. Align the holes on the inlet collar with the holes in the unit and secure using bolts and flat washers supplied.

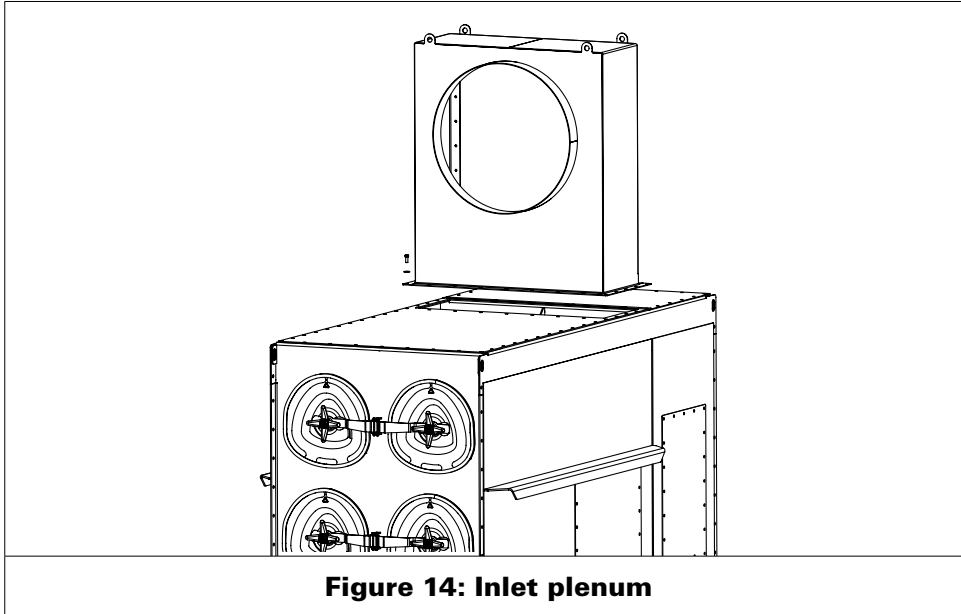


Figure 14: Inlet plenum

High Flow Inlet Plenum

The high flow inlet plenum is used in applications with higher flow rates. Please contact application engineering.

The high flow inlet plenum is supplied with standard service access panels on the front, back and top of the plenum.

The top access panel is available with and without an explosion vent.

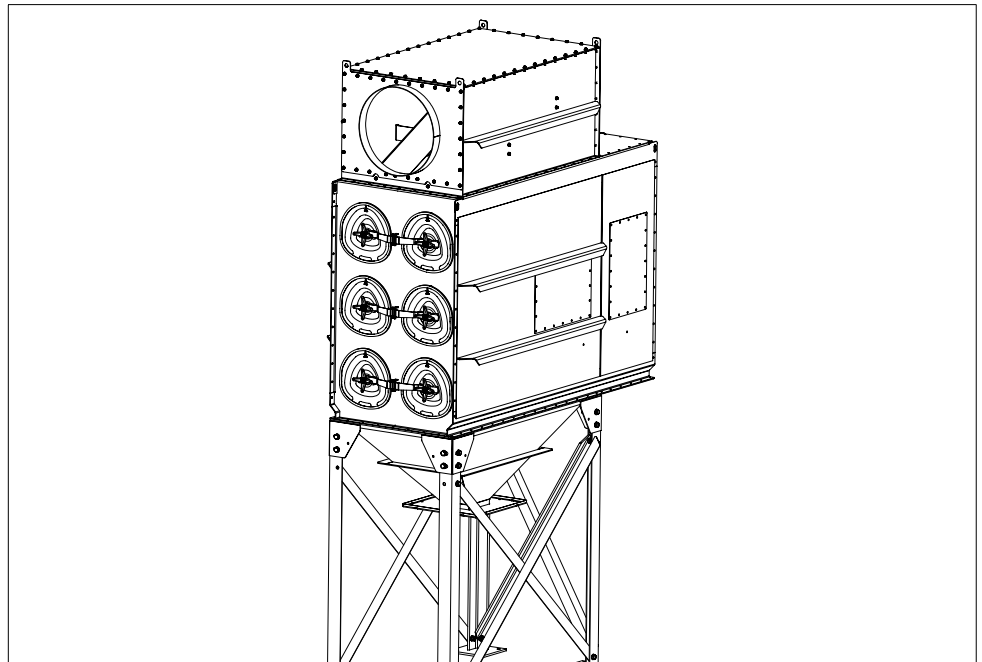


Figure 15: High flow inlet plenum

Extended Dirty-Air Plenum

The extended dirty-air plenum is used in applications requiring an air management module or when a single inlet serves multiple modules.

The extended dirty-air plenum is supplied with standard service access panels on the sides and top of the plenum.

The top access panel is available with and without an explosion vent.

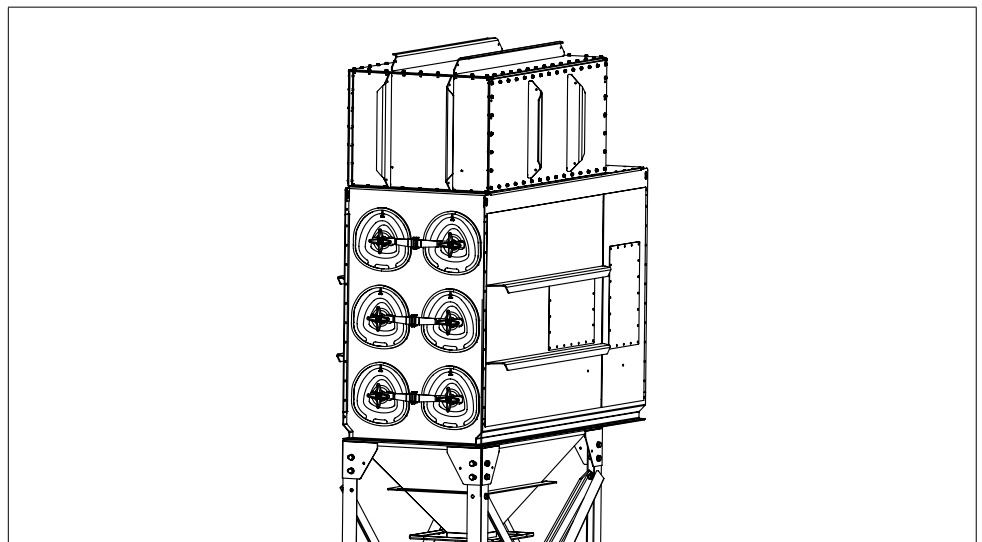


Figure 16: Extended Dirty-Air plenum

Air management module

The air management module is used in applications involving heavy grain loading, large or abrasive particles in the airstream, or in applications when a collector with a single inlet serves multiple modules. It is equipped with a louvered panel near the bottom, which prevents re-entrainment of the dust that falls through to the hopper. This module does not contain filters, and is available for use with an extended dirty-air plenum only.

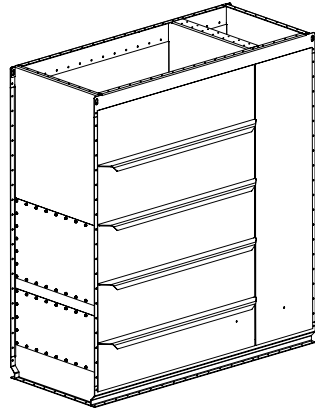


Figure 17: Air management module

Sprinkler



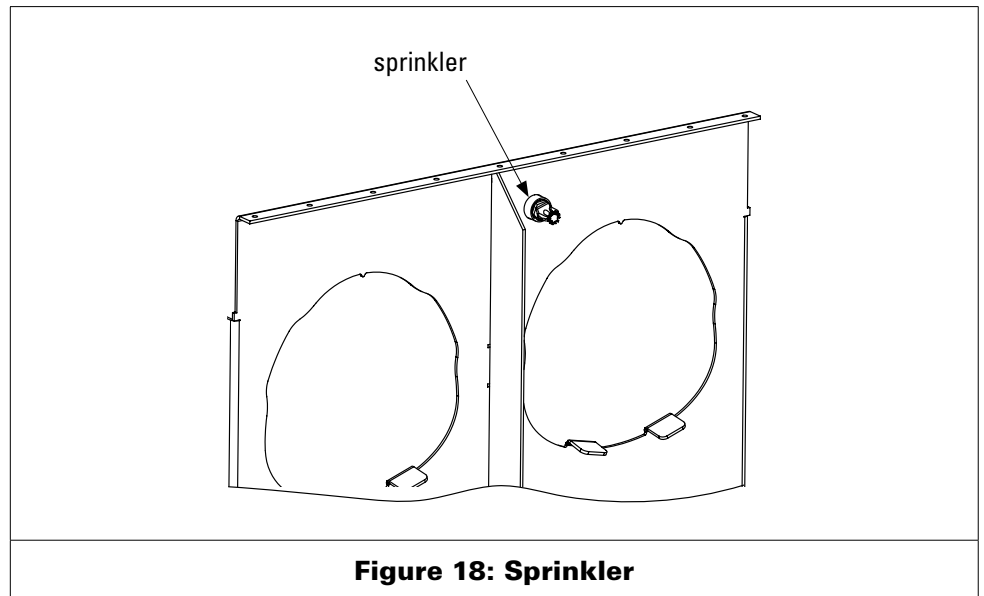
Sprinklers can place a large quantity of water in the dust collector when activated. Provide adequate drainage to remove water. Excess water weight can cause the leg structure to collapse.

Fire control sprinklers are available for models operating under negative pressure. Donaldson Torit supplied sprinklers require a minimum of 1 bar water pressure which will produce a discharge per sprinkler head of 77 liters per minute.

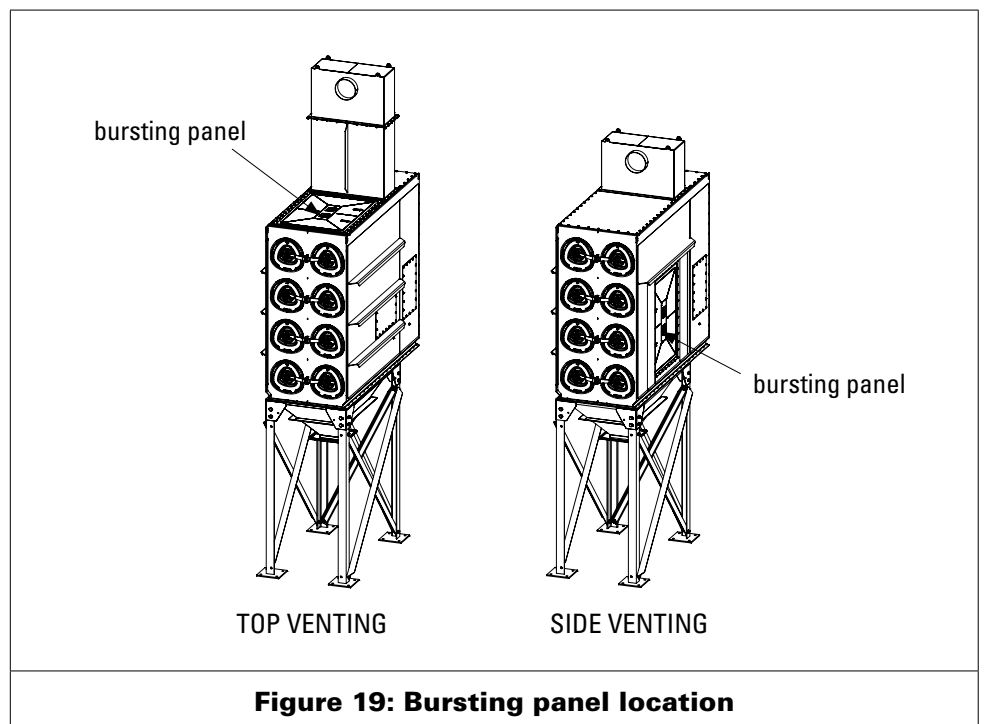


Consult with local authorities when installing fire control systems on dust collector equipment.

1. Remove or open the filter access covers to access the sprinkler tap located in the dirty-air plenum.
2. Apply pipe sealant to the threads of the pipe reducer located on the sprinkler assembly.
3. Thread sprinkler assembly onto the 1-in diameter sprinkler tap.
4. Tighten securely.



Bursting panel and indicator



1. Remove protective shipping cover from top of collector (underneath is the explosion panel positioned upside-down).
2. Inspect the panel and ensure it is clean.



Handle the panel with extreme care.



Check the location and system specifications correspond with the serial number and data on the panel serial plate.

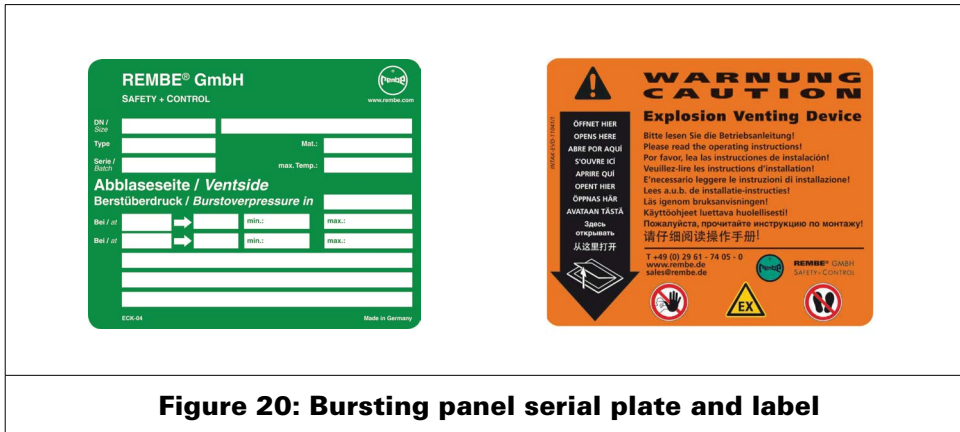


Figure 20: Bursting panel serial plate and label

3. Apply sealant to top flange of collector, making a continuous 5 mm bead along each side of the holes.
4. Place panel on flange (bulged side facing upwards) and align bolt holes in flanges with drift pin.
5. Bolt panel and flange together using bolts, washers and nuts supplied.



Use washers between panel and bolts.



Follow the torque value specified on the panel serial plate. Torque should be applied crosswise and in a least two stages. Torque values are based on new free running bolts coated with light oil. After initial start-up, check torque values.

6. Assemble the explosion detection device (bracket and signalling cable) and place into position. The signalling unit including cable loop must be integrated into the threaded cable connected in such way that the loop is matching the other side of the explosion panel.
7. Pull the steel cable carefully through the cable loop and fix both mounting eyes with the mounting screw (min. M10) of the vent panel.
8. Now pull the signalling unit carefully to a slight tension and tighten the threaded cable connection. The cable shall be at the crest to the dome of the panel or lead straight across in case of flat panels.



Do not bend the stiffened part of the cable as damage could occur.



It is mandatory that the cable connection is pulled tight otherwise the signalling unit does not break and no alarm signal is actuated. This means that no alarm contact or plant shut off is triggered. Heavy damages (e.g. due to further transport of burning material or uncontrolled product release) can be the consequence.

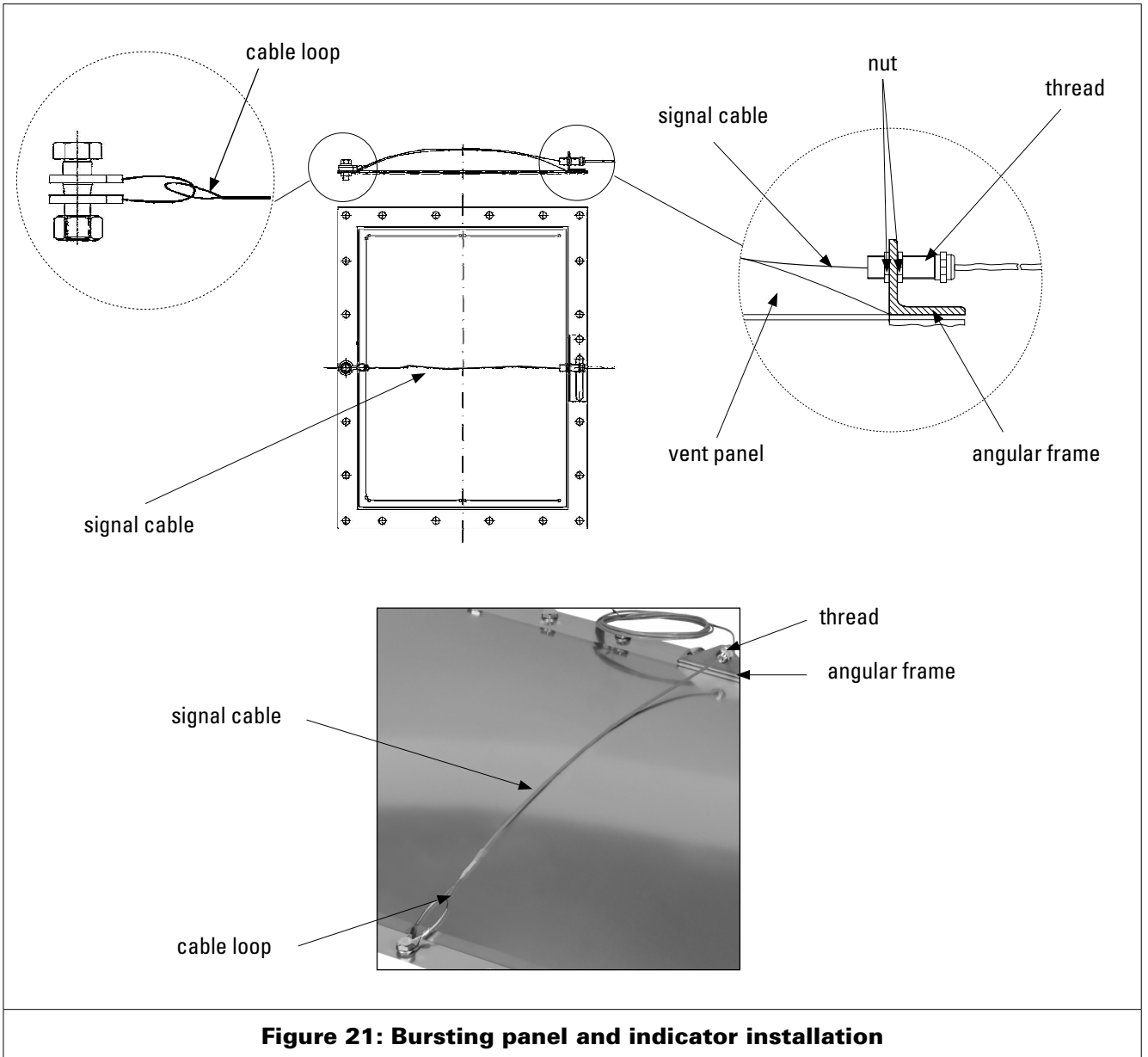


Figure 21: Bursting panel and indicator installation

Bursting panel indicator switch

According VDI, each bursting panel may be combined with signalling devices which will trigger a shut down or a controlling mode. Therefore Donaldson Torit will supply a bursting disc indicator switch with each bursting disc (see scope of delivery).

When connecting the indicator switch, the following must be taken into account:

- maximum supply voltage : 30 Volt DC
- maximum current : 100 mA / 3 Watt

When the indicator is located in a hazardous area, the electrical circuit to the indicator must be intrinsically safe. (an optional isolation amplifier is a perfect solution)

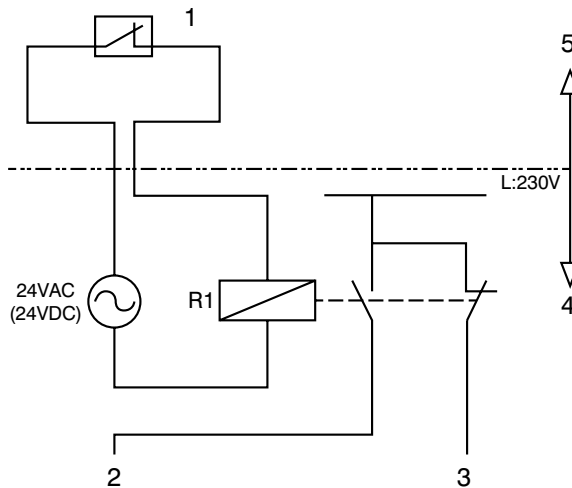


As the burst indicator is a very sensitive device, it is recommended to use always a isolation amplifier, this gives the best guarantee for TROUBLE FREE electrical functioning of the indicator.

Typical wiring diagrams



These diagrams are only for information as the wiring diagram will be different for each individual dust collector installation (depending on the configuration of the dust collector; availability of dust release system, damper valve actuator, alarm, fan, etc. and requirements of the customer).



1	burst indicator
2	disconnect:
	fan set
	dust release system (rotary airlock, screw conveyor, etc)
3	engage:
	alarm
	lamp
	horn
	signal to central fire dispatching
	damper valve actuator (if required)
4	customer delivery
5	Donaldson delivery

Figure 22: Typical wiring diagram - non-hazardous area

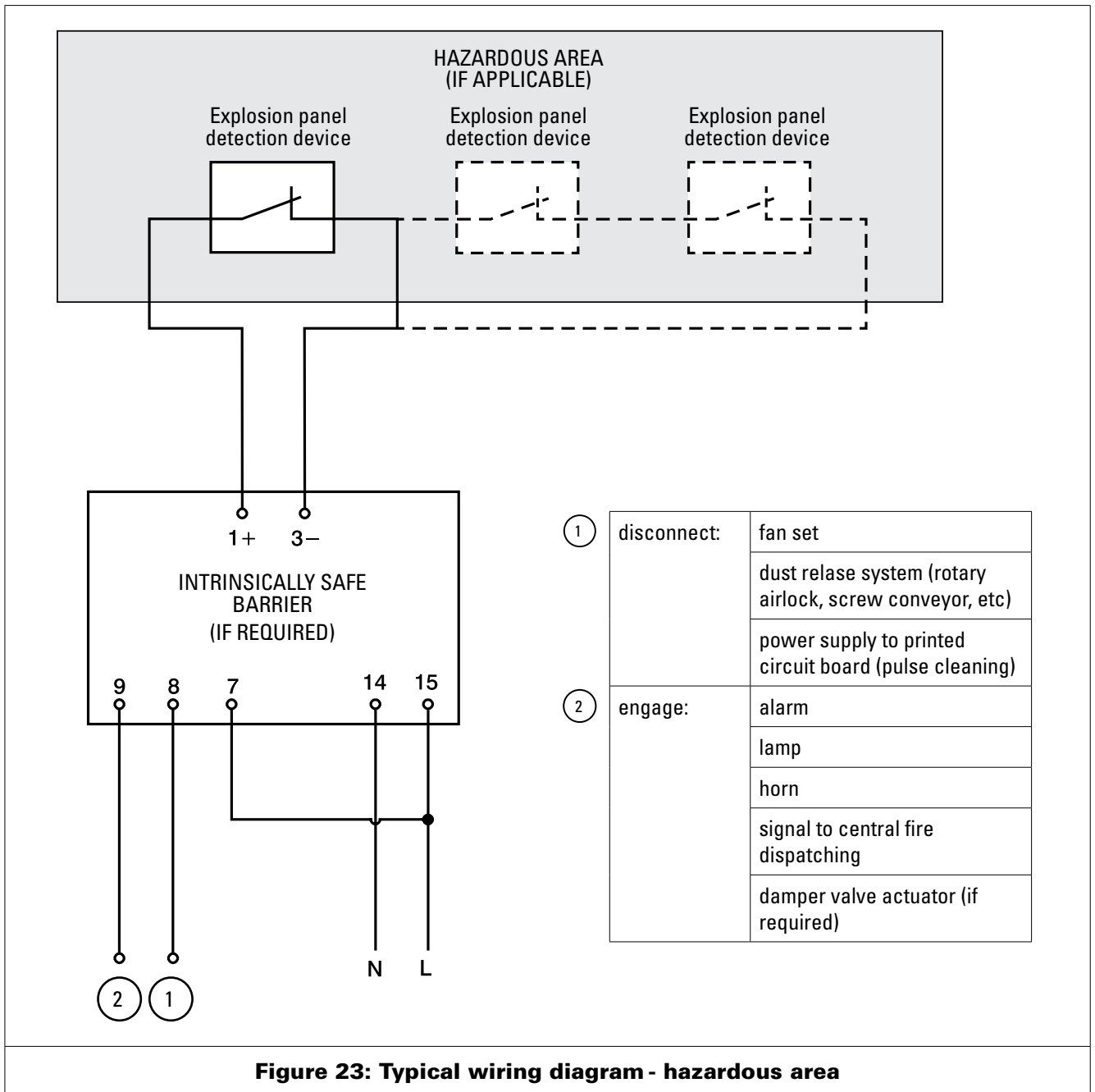


Figure 23: Typical wiring diagram - hazardous area

Dust outlet connection

When using rotary airlock or screw conveyor:

- A sealant must be fitted between all connecting flanges.
- Check the rotation (direction of the arrow).
- Electrical connections shall be made by a qualified electrician.



The access to the rotor/screw or butterfly valve must be made impossible during operation.

See Manual of your dust disposal system.

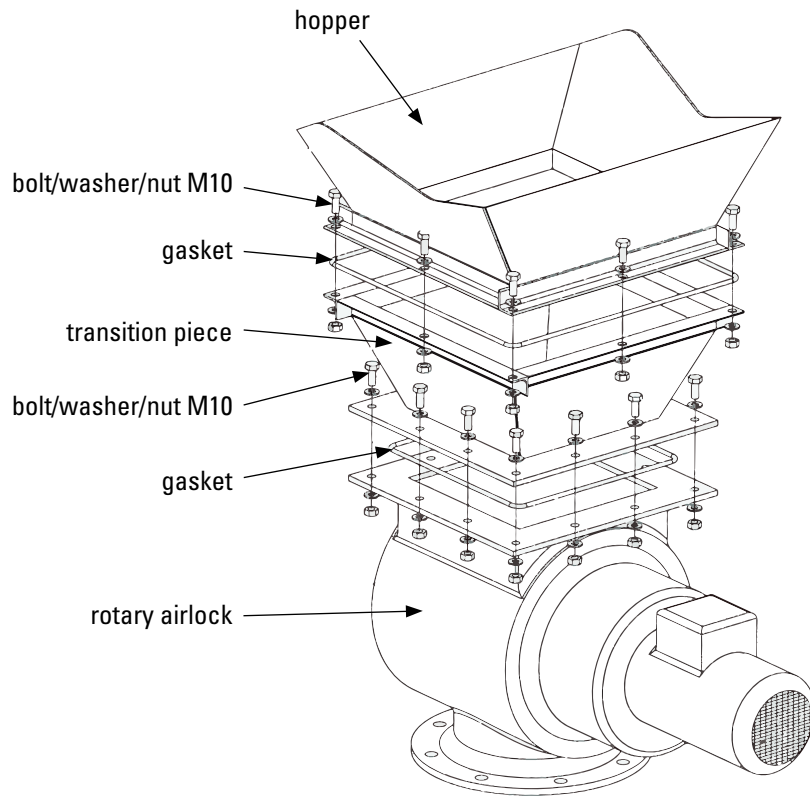


Figure 24: Dust outlet connection

START-UP CHECKLIST

Electrical connection



Follow all steps before first start-up and when the dust collector is not been used for a long period.

For daily use follow steps 1, 2, 3, 5, 6 and 8.

1. Check that the outlet of the fan is free of debris before starting.
2. Make sure the dust disposal system is properly installed under the hopper.
3. Turn on the hopper disposal system (where so equipped and on a separate control). The direction of rotation must be checked. The system must always be operating when the dust collector is operating.



Too much airflow can cause electrical failure of the fan motor or dramatically reduce the life of the filter cartridges.

4. Check if the damper valve is 50% closed.
5. Check if the covers are closed.
6. Switch main power on.
7. Check the airflow with a pitot tube and a micro-manometer in the ductwork and adjust the damper valve to the desired airflow.
8. Turn on the compressed air supply. Adjust to 6.5 bar of pressure with the compressed air regulator.



Do not increase compressed air pressure beyond 7 bar as component damage may result.

The cleaning cycle only starts when necessary. For customized settings see the controls manual.

OPERATION SCHEDULE

To ensure a good performance of your dust collector follow the checkpoints mentioned below according the timetable.

No.	Checkpoint	Type of control	Measures	day	Weeks			
					2	4	8	26
1	Control box	Visual check ΔP	See trouble shooting guide in Control manual	•				
2	Dust disposal system	Check contents of dustbin(s)	If $\frac{3}{4}$ full, empty dustbin (see section 'Dust removal')	•				
3	Fan set	Excessive noise	See Troubleshooting guide	•				
4	Clean air chamber	Emission : dust carry over in clean air chamber	See Troubleshooting guide		•			
5	Controls settings	Check settings of both potentiometers (pulse time 100 milliseconds, interval time 10 seconds) on the control box (see separate manual)	Interval time normally to be set at 10 seconds. Pulse time 100 milliseconds.		•			
6	Filter/regulator	Oil and/or water is in the reservoir	Switch off and bleed compressed air prior servicing. Clean oil water separator. Check compressor.		•			
7	Solenoid valves	Noise of escaping air is produced	See Troubleshooting guide		•			
8	Diaphragm valves	Noise of escaping air is produced	See Troubleshooting guide			•		
9	Doors	Visual check gaskets	Replace gaskets if necessary			•		
10	Connecting ducts	Check for leakage	Repair if necessary				•	
11	Dust collector and platform	Check damage, strength and corrosion	Repair or replace if necessary					•
12	Filter cartridge	Preventive replacement of all filter cartridges	Unless otherwise specified in the scope of delivery <u>every 2 years.</u>					
13	Bursting panel	Periodic visual inspection	Bursting panel to be replaced if it appears damaged, corroded or leaking				•	

SERVICE



Disconnect electrical power before servicing.

Shut off and bleed compressed air supply before servicing any compressed air components.

No welding should be performed inside without fire protection.

Avoid contact or exposure to dust during servicing or maintenance.

Dust removal



Do not let the dustbin overfill. It can cause poor dust collector performance.

1. Turn off the dust collector and empty the dust disposal on a regular base (recommended to empty the dustbin when 3/4 full).
2. If the hopper has a butterfly valve, close before servicing the dust bin. Remove and empty the bin.
3. Reinstall the bin and open the valve. The fan does not have to be shut off if this procedure is followed.

Change of filter cartridges

(see figure 25 - Exchanging filter cartridge)

Filter cartridge removal



All filter cartridges should be changed at the same time.



Dust laden filters may be heavy and difficult to handle. Provide appropriate means of access to replace filter cartridges safely in case no platform is installed.



Generally filter cartridges cannot be washed and re-used. Only non-cellulose based media types can in some instances be cleaned with water, but contact your Donaldson Torit representative before doing so.

1. Turn off power to the collector.
2. Begin filter cartridge replacement at one of the top filter access ports. Continue by replacing the remaining filter cartridges in the top row. Proceed to replace filter cartridges in the next rows. Replacing filter cartridges row by row starting at the top will help limit dusting during replacement.
3. Remove access cover by turning knob counterclockwise.



Do not use the access cover features as climbing equipment. Use safe practices for maintenance and installation.



The genuine Donaldson Torit filter cartridge is the only replacement filter that will provide the high level of performance that you expect from your investment in the Donaldson Torit dust collector.



Do not drop or rap the new filter cartridge on the floor or any other hard surface. Damage to the filter cartridge will occur, resulting in leakage. It is necessary to clean the dust off of the tube sheet all around the opening to ensure a positive seal of the filter gasket.

4. Break the seal between the filter cartridge and the sealing surface.
5. Slide each filter cartridge out the access port along the suspension yoke and dispose of properly.
6. Inspect and clean the sealing surface if necessary.
7. Clean any dust from the yoke threads that may have accumulated during the filter removal.
8. Check for any accumulation of dust in the storage area and remove as necessary.



If the gasket is damaged the cover has to be replaced.



Lack of compression of the filter gaskets can cause leakage.

Filter cartridge installation

1. Slide the gasket end of each new filter onto the end of the suspension yoke.



The filter shape and yoke work together to ensure proper filter alignment during filter installation. To assist with alignment, an alignment mark (Δ) at the top of the filter endcap (non-gasketed end) must match with the alignment mark (∇) at the top of the filter access opening.

2. Inspect cover gaskets. Clean and/or replace as necessary.
3. After new filter cartridges have been installed, place the access cover on the yoke and hold it in position while tightening the knob securely by hand (3 turns) before using tool assist option.
4. If knob fails to thread onto yoke, on the opposite side of the hinge, apply slight pressure to the access cover using other hand. Continue to turn knob to start threading onto the yoke.



The access cover must be properly aligned to ensure a dust tight seal to the housing.

*Do not exceed 17 N*m (150 inch*lb) tightening torque to secure access cover as over tightening may cause damage to the filter and/or equipment.*

*After securing the access cover check that access cover is properly seated and sealed against the collector cabinet front panel (a.k.a. access panel). If access cover is properly seated it will seal correctly with no more than 150 in*lb tightening torque.*

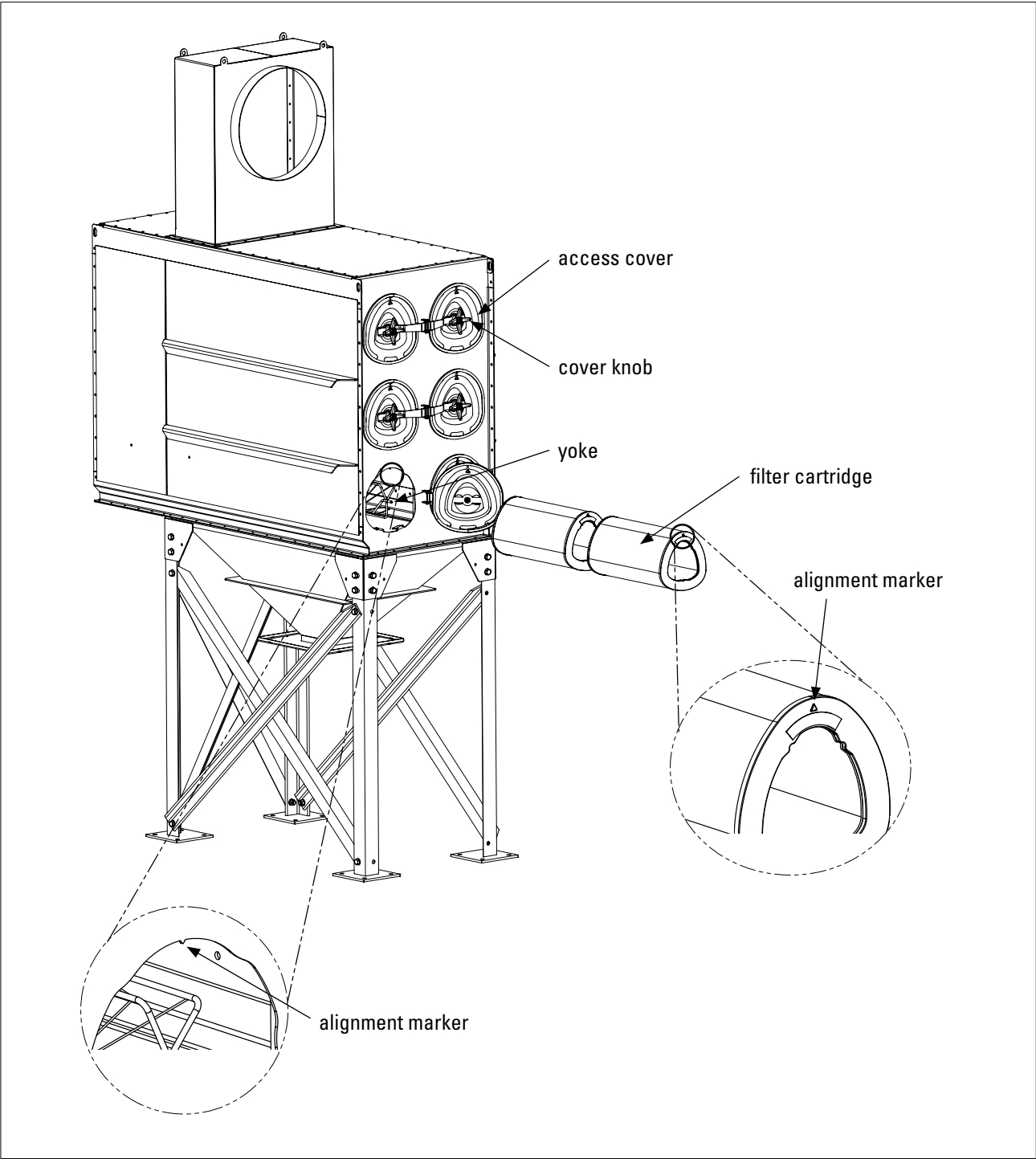


Figure 25: Exchanging filter cartridge

Diaphragm valve

Valve disassembly

Disassemble in an orderly fashion. Pay careful attention to exploded views provided for identification of parts.

1. Remove the clipping from the valve body to remove the bonnet. Use a screwdriver on 3 places at the bonnet, start removing the clipping on the inlet side. Then remove the piston/diaphragm assembly.
2. Remove pipes if necessary and in that case remove the pipe o-rings from the body with a suitable device.
3. All parts are now accessible for cleaning or replacement.

Valve reassembly

Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.



Lubricate all gaskets and o-rings with high quality silicone grease.

1. Replace piston/diaphragm-assembly.



Locate bleedhole in piston/diaphragm opposite to the valve inlet for the best performance.

2. Replace the clipping on the body, with the open end towards the inlet side of the body. The legs of the clipping should point outwards from the valve and they should be evenly spaced from the stop in the groove.
3. Replace the bonnet by pressing it firmly against the piston/diaphragm. Use pliers to press the ends of the clipping together.
4. Replace pipe o-rings, then slip the clamp o-rings over the inlet pipe. Replace the valve on the pipe and move the clamp o-ring over the pipe against the valve body. Replace the clamps and torque the clamp screws according to torque chart (16 Nm \pm 2Nm). The clamp o-ring is necessary to fixate the valve in place.
5. After maintenance, operate the valve a few times to be sure of proper operation.

TROUBLESHOOTING GUIDE



Please consult other manuals if necessary (e.g. controls, fans, ...)



Disconnect all power and compressed air supply before services.

Problem	Probable cause	Remedy
Fan blower and motor do not start	Improper motor wire size	Rewire using the correct wire gauge as specified by national and local codes.
	Not wired correctly	Check and correct motor wiring for supply voltage. See motor manufacturer's wiring diagram. Follow wiring diagram and the National Electric Code.
	Input circuit down	Check power supply to motor circuit on all leads.
	Electrical supply circuit down	Check power supply circuit for proper voltage. Check for fuse or circuit breaker fault. Replace as necessary.
Fan blower and motor start, but do not stay running	Incorrect motor starter installed	Check for proper motor starter and replace if necessary.
	Access doors are open or not closed tight	Close and tighten access doors. See Filter Installation.
	Hopper discharge open	Check that dust container is installed and properly sealed.
	Damper control not adjusted properly	Check airflow in duct. Adjust damper control until proper airflow is achieved and the blower motor's amp draw is within the manufacturer's rated amps.
	Electrical circuit overload	Check that the power supply circuit has sufficient power to run all equipment.
Clean-air outlet discharging dust	Filters not installed correctly	See Filter Installation.
	Filter damage, dents in the end caps, gasket damage, or holes in media	Replace filters as necessary. Use only genuine Donaldson Torit replacement parts. See Filter Installation.
	Access cover(s) loose	Tighten access doors securely. See Filter Installation.
Insufficient airflow	Fan rotation backwards	Proper fan rotation is clockwise from the top of the collector. The fan can be viewed through the back of the motor. See Preliminary Start-Up Check.
	Access doors open or not closed tight	Check that all access doors are in place and secured. Check that the hopper discharge opening is sealed and that dust container is installed correctly.
	Filter cartridge covers not airtight	Tighten covers securely and check sealing

Problem	Probable cause	Remedy
Insufficient airflow	Fan exhaust area restricted	Check fan exhaust area for obstructions. Remove material or debris. Adjust damper flow control.
	Filters need replacement	Remove and replace using genuine Donaldson Torit replacement filters. See Filter Removal and Installation.
	Lack of compressed air	See Rating and Specification Information for compressed air supply requirements.
	Lack of compressed air	See Rating and Specification Information for compressed air supply requirements.
	Pulse cleaning not energized	Use a voltmeter to check the solenoid valves in the control panel. Check pneumatic lines for kinks or obstructions.
	Dust storage area overfilled or plugged	Clean out dust storage area. See Dust removal.
	Pulse valves leaking compressed air	Lock out all electrical power to the collector and bleed the compressed air supply. Check for debris, valve wear, pneumatic tubing fault, or diaphragm failure by removing the diaphragm cover on the pulse valves. Check for solenoid leaks or damage. If pulse valves or solenoid valves and tubing are damaged, replace.
	Solid-State timer failure	Using a voltmeter, check supply voltage to the timer board. Check and replace the fuse on the timer board if necessary. If the fuse is good and input power is present but output voltage to the solenoid is not, replace the timer board. See Solid-State Timer Installation.
Solid-State timer out of adjustment	See Solid-State Timer and Solid-State Timer Wiring Diagram.	
No display on the Delta P Controller	No power to the controller	Use a voltmeter to check for supply voltage.
	Fuse blown	Check the fuse in the control panel. See wiring diagram inside the control panel. Replace if necessary.
Display on Delta P Controller does not read zero when at rest	Out of calibration	Recalibrate as described in Delta P Maintenance Manual.
	With collector discharging outside, differential pressure is present from indoor to outdoor	Recalibrate with the pressure tubing attached as described in the Delta P Maintenance Manual.
Delta P Controller ON, but cleaning system does not start	Pressure tubing disconnected, ruptured, or plugged	Check tubing for kinks, breaks, contamination, or loose connections.
	Not wired to the timing board correctly	Connect the pressure switch on the timer board to Terminals 7 and 8 on TB3.
	Faulty relay	Using a multimeter, test relay for proper closure. Replace if necessary.

Problem	Probable cause	Remedy
Pulse cleaning never stops	Pressure switch not wired to the timer board correctly	Connect the pressure switch on the timer board to Terminals 7 and 8 on TB3.
	Pressure switch terminals on the timer board jumpered	Remove jumper wire on Solid-State Timer board before wiring to the Delta P Control.
	High Pressure On or Low Pressure Off setpoint not adjusted for system conditions	Adjust setpoints to current conditions.
	Pressure tubing disconnected, ruptured, plugged, or kinked	Check tubing for kinks, breaks, contamination, or loose connections.
Alarm light is ON	Alarm setpoint too low	Adjust to a higher value.
	Excess pressure drop	Check cleaning system and compressed air supply. Replace filters if filters do not clean down.
	Pressure tubing disconnected, ruptured, plugged, or kinked	Check tubing for kinks, breaks, contamination, or loose connections.
Delta P arrow keys to not work	Improper operation	Press and hold one of the three setpoint keys to use arrow keys.
	Programming keys disabled	Remove the Program Disable jumper from Terminals 3 and 4 on TB2.
Cleaning light is ON, but cleaning system not functioning	Improper wiring	Check wiring between the Delta P Control and the timer board, and between the timer board and solenoid valve coils.
	Defective solenoids	Check all solenoid coils for proper operation.
	Timer board not powered	Check power ON light on timer board's LED display. If not illuminated, check the supply voltage to the timer board. Check the fuse on the timer board. Replace if necessary.
	Timer board defective	If LED is illuminated, observe the output display. Install a temporary jumper across the pressure switch terminals. Output levels should flash in sequence. Check output using a multimeter set to 150-Volt AC range. Measure from SOL COM to a solenoid output. The needle will deflect when LED flashes for that output if voltage is present. If LED's do not flash, or if no voltage is present at output terminals during flash, replace the board.

SUPPLEMENTARY INFORMATION

ATEX (2014/34/EU)

Please read this information carefully before commencing any work. Product reliability, warranty and safe operation may be compromised by not following the guidance given in these documents.

1. The dust collector should be used only when it is in a technically acceptable condition. Regular maintenance, as set out in this manual, is required to minimise technical failure. Third party supplied components (for example motors) should be maintained according to the manufacturer's instructions.
2. In order to maintain the original collector specification and to ensure the same level of safety, only genuine spare parts should be fitted.
3. You should ensure any persons carrying out work on the supplied equipment follow any relevant recognised standards/codes and are competent to do so. Areas requiring a competent person include:
 - Maintenance on any component identified as a potential ignition source.
 - Lifting and erection.
 - Electrical installation, inspection and maintenance work.
 - Pneumatic installation, inspection and maintenance work.
 - Any access to internal classified Potentially Explosive Atmospheres where the risks due to explosion and dust contact are reduced to a safe level.

During assembly/installation or dismantling of equipment, potential ignition sources may occur that were not considered in the risk assessment of the unit in operation (for example, grinding, welding sparks, etc.)

4. You should use the dust collector in full accordance with the conditions set out in the Order Acknowledgment or relevant Scope of Delivery. Failure to do so may compromise product reliability, warranty and safety.
5. Other items of equipment, not supplied under the Scope of Delivery from Donaldson Torit, should be installed, operated and maintained according to the documentation supplied with the respective equipment.
6. Before any work is carried out, ensure the equipment is adequately isolated.
7. Where necessary for safety, the dust collector is fitted with fixed guards. Removal of these guards and any subsequent work should only be carried out after adequate precaution is taken to ensure it is safe to do so. All guards should be refitted before re-energising.
8. Ensure the pneumatic system is fully isolated and depressurised before any work is carried out.
9. Access to the dirty air chamber of the equipment may create risks and hazards that under normal circumstances are not present and as such this work must be carried out by competent personnel. These risks include inhalation of dust and potential explosion hazards.
10. The equipment supplied is suitable for working within a Potentially Explosive Atmosphere (as defined by Directive 2014/34/EU) according to the categories and conditions marked on the collector serial nameplate. You should ensure the equipment supplied by others is also suitable. If no marking is given on the serial nameplate then the supplied equipment is not suitable for use in Potentially Explosive Atmospheres.
11. Care should be taken to ensure that any explosive atmosphere is not present when performing operations that increase the risk of ignition (opening of controller for adjustment or electrical repair for example). Ensure the installation is always returned to its original state.

12. If it is unavoidable to work on the equipment while an explosive atmosphere is present, care should be taken to avoid introducing ignition sources not present during the expected operation. Non-sparking tools should be used.
13. Where equipment is installed in a Potentially Explosive Atmosphere, care should be taken not to locate the collector where external ignition sources can be introduced, for example stray electric currents, lightening, electromagnetic waves, ionising radiation, ultrasonic waves.
14. Where the dust being processed can ignite due to exothermic reaction, including self ignition, the collector **MUST** be fitted with a suitable explosion protection method (venting for example). The risk of ignition can be minimised by avoiding the accumulation of dust layers with regular cleaning.
15. Every care has been taken to avoid the risk of ignition. The measures taken to avoid ignition should not be altered since this may result in unsafe operation. Particular care should be taken during maintenance and component replacement to ensure the same level of safety is maintained. When replacing fan impellers, avoid any rubbing of components (to prevent mechanical sparks).
16. This dust collector may be fitted with explosion protection in the form of a vent panel. Precautions, as set out in the Scope of Delivery, are used to minimise the risk of ignition of any dust clouds contained within the dust collector. The possibility of other ignition sources being introduced into the collector during periods where any dust cloud may be present should be minimised. Particular care should be taken to avoid introducing glowing particles via the collector inlet ducting.
17. The explosion vent panel, where fitted, has been designed to provide adequate safety from an explosion initiated from within the collector, for the given dust explosion characteristics and collector arrangement as set out in the Scope of Delivery. You should ensure that explosions are not allowed to propagate into the dust collector (using suitable isolation devices) since pressures may be generated leading to unsafe equipment rupture.
18. Where applicable, equipment connected to the dust collector (for example, a cyclone) should be protected, using suitable isolation devices, against the transfer of flame and pressure if, in the event of an explosion initiating inside the dust collector, the connected equipment is not capable of safely withstanding these effects.
19. The explosion venting device, where fitted to the dust collector, is not suitable for use with dusts that are classified as poisonous, corrosive, irritant, carcinogenic, teratogenic or multigenic unless the dust released during the explosion venting process can be contained to a safe level.
20. Where applicable, care is required when siting the dust collector to ensure that the effects (flame, pressure, noise and fire) produced during and after the explosion venting process do not put at risk personnel and nearby plant.
21. In order to ensure the required venting efficiency is maintained, the explosion vent panel, if fitted to the collector, should not be obstructed in any way.
22. Any modification carried out on the 'as supplied' equipment may reduce reliability and safety, and will nullify warranty; such actions fall outside the responsibility of the original supplier.
23. On a day to day basis there is minimal interaction between the operator and the collector, however dust containers may require regular emptying. If the dust being handled is explosive, then care should be taken to ensure that dust spillage is kept to a minimum to avoid the creation of potentially explosive atmospheres and secondary hazards. Dust containers should be securely replaced and resealed prior to collector restart. This is a good time to check the dust container for damage, which may lead to a dust leak or flame emission in the rare instance of an internal explosion.

24. Compressed air is recommended for collectors that operate using reverse jet cleaning. Alternative gases should be assessed before use to ensure that explosive atmospheres are not introduced during media cleaning.
25. It may be necessary to provide a facility to shut down the equipment in the event of an explosion (where collectors are fitted with explosion relief panels). The signal should be taken from the bursting panel detection device.
26. Care should be taken during cleaning and maintenance to avoid creating static discharges that have the potential to ignite a flammable atmosphere.
27. Earthing of the equipment is an integral safety feature. Regular checks should be made (annually) to ensure continuity.