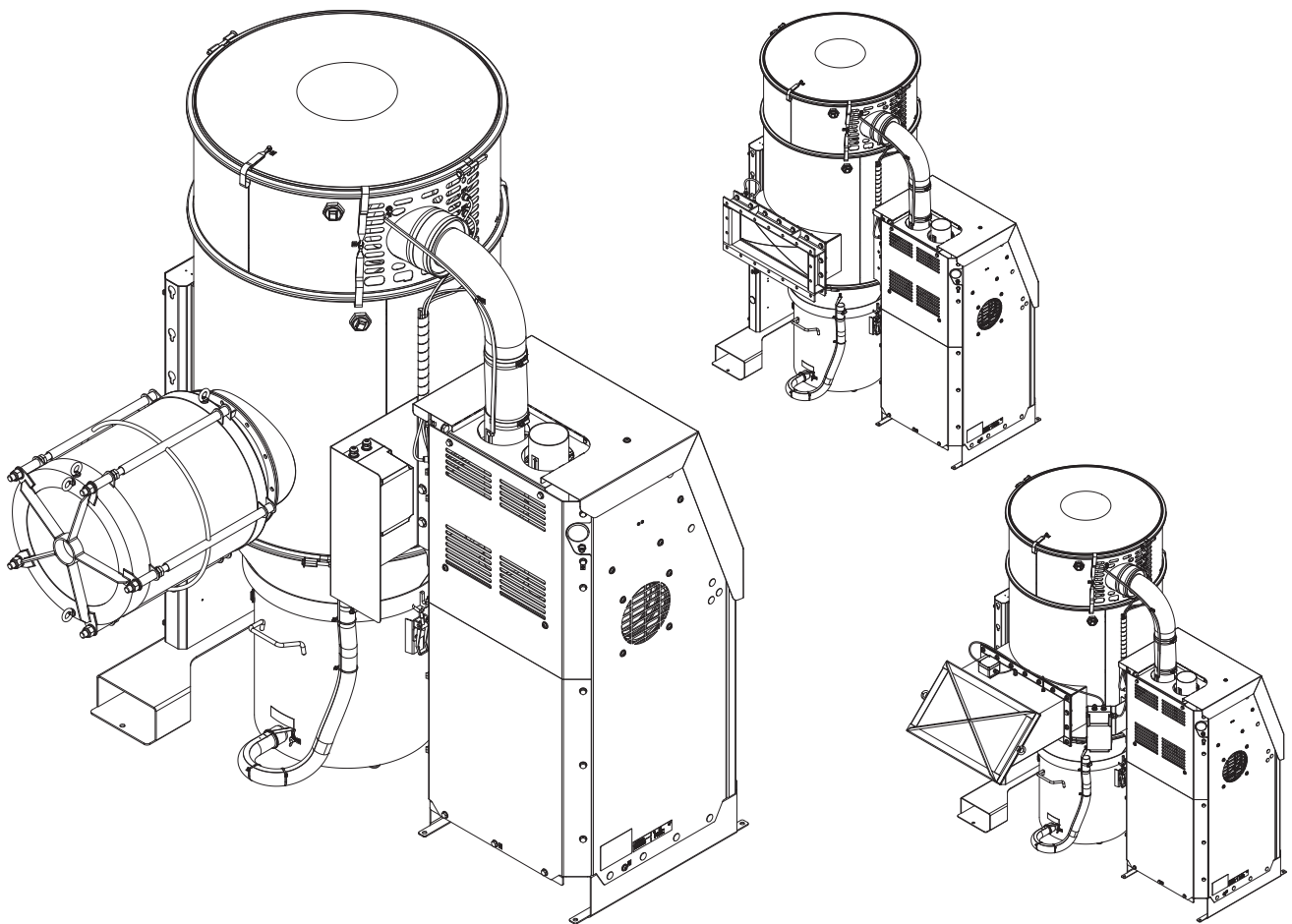


PAK-M DX

PAK-M



Original installation and service manual

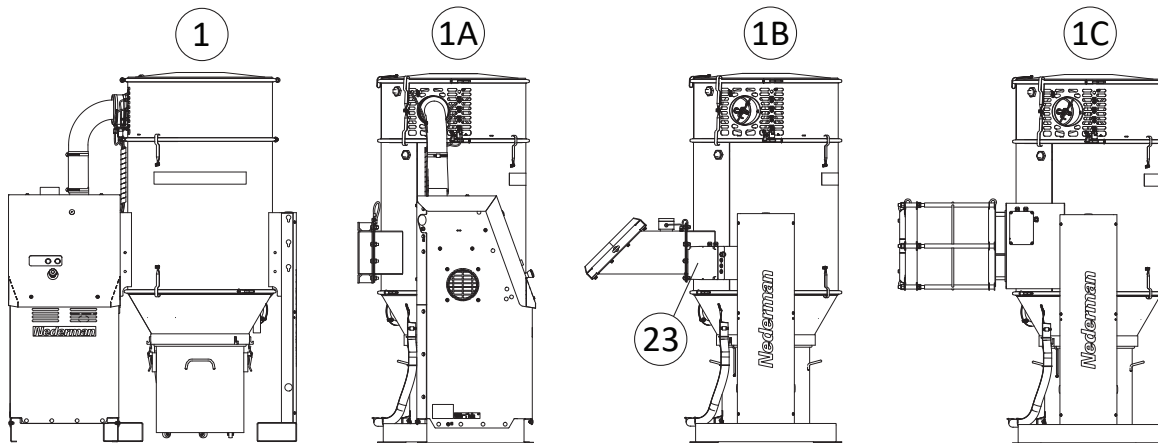
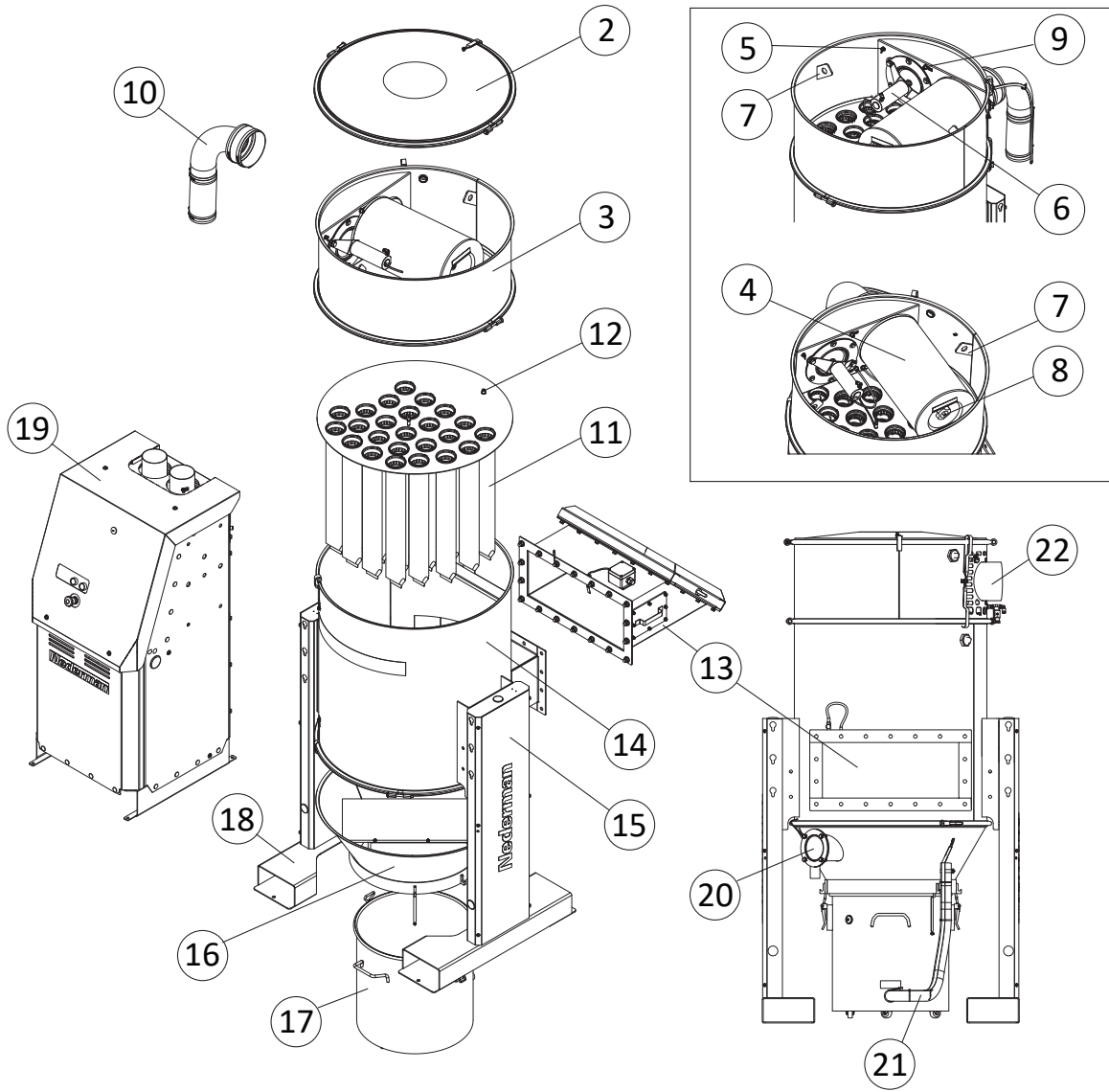
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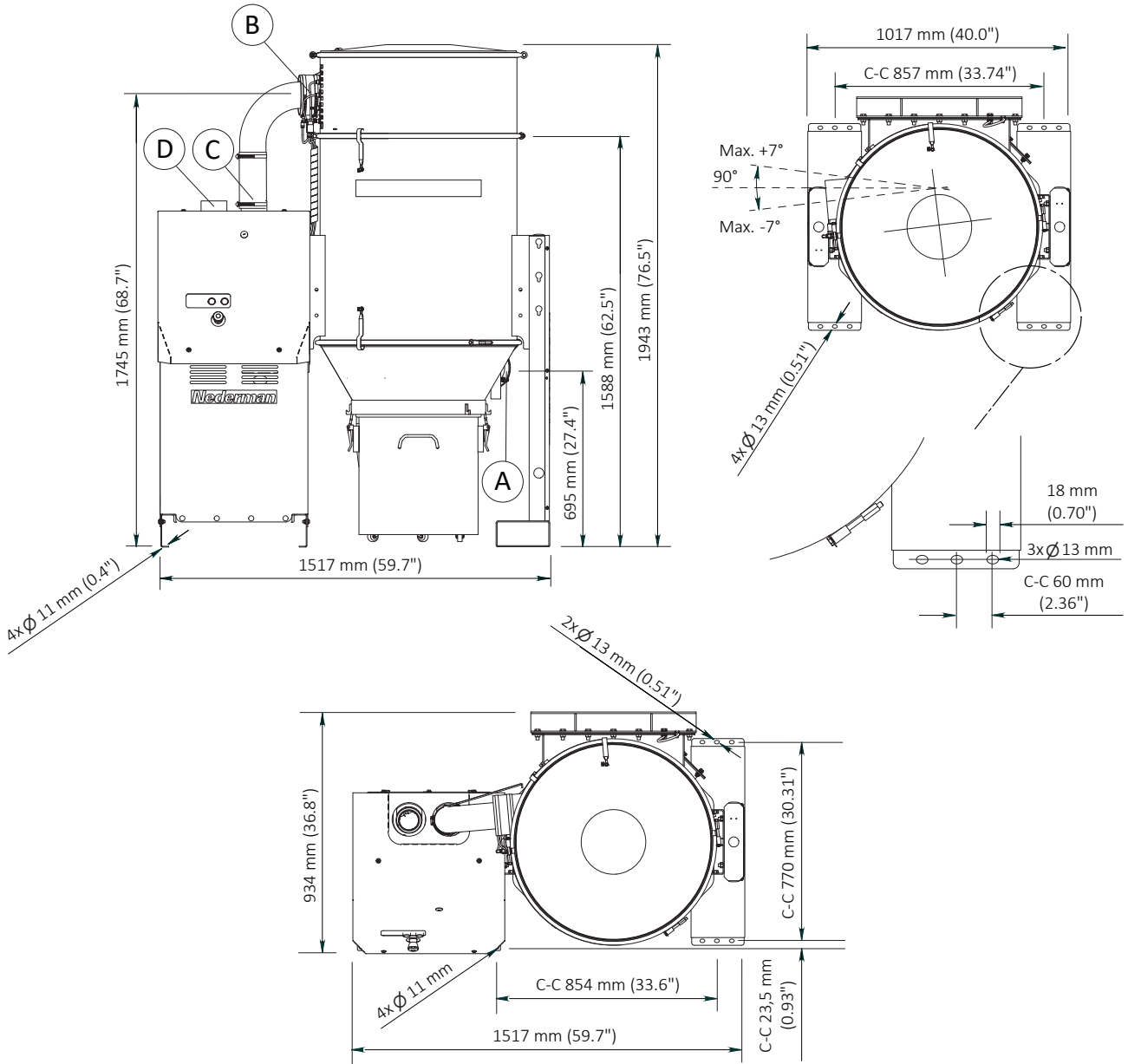
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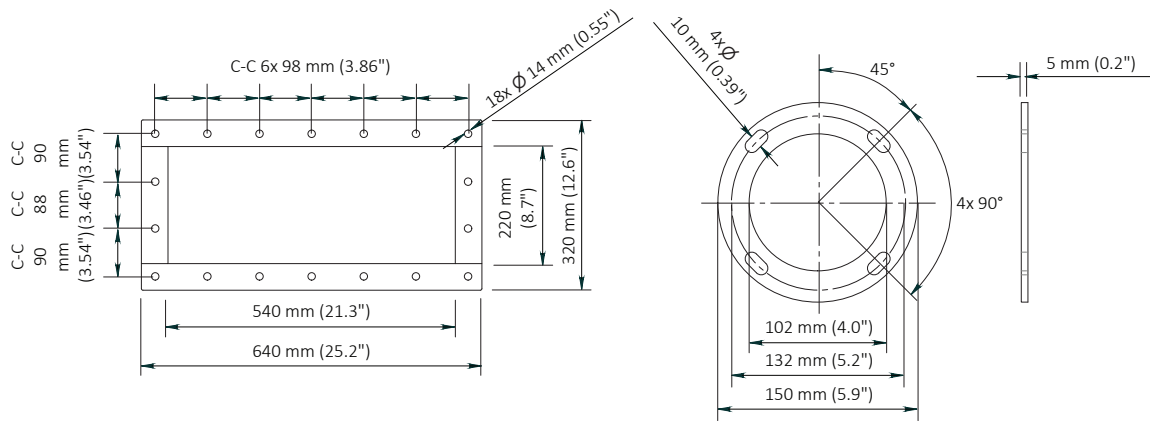
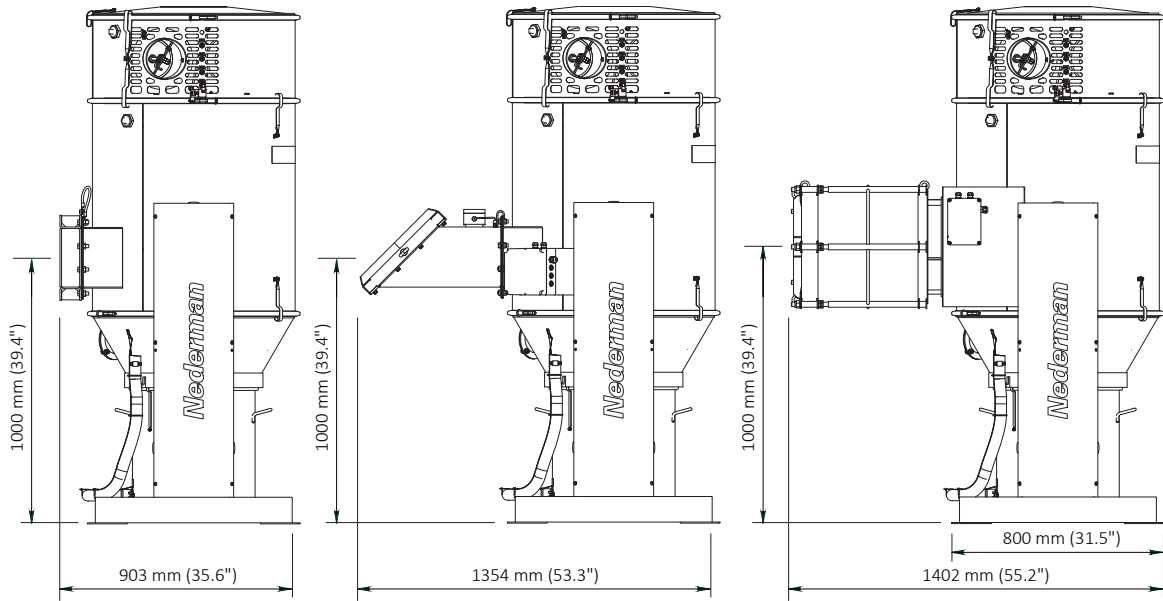
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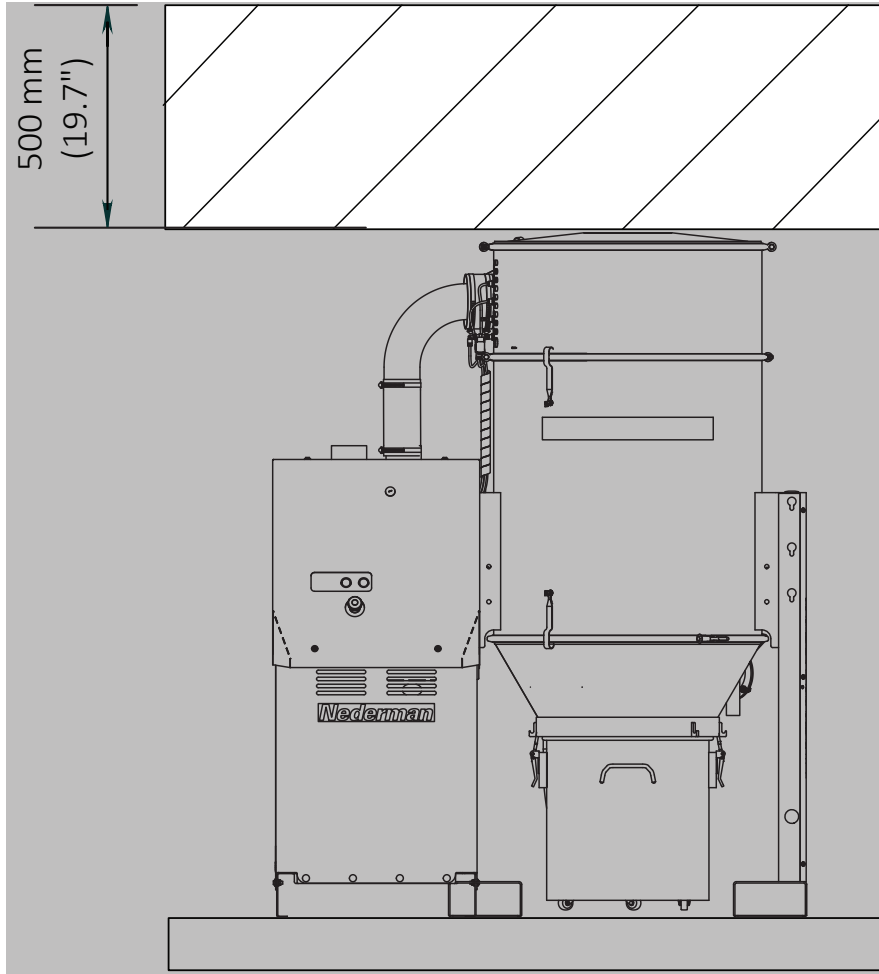
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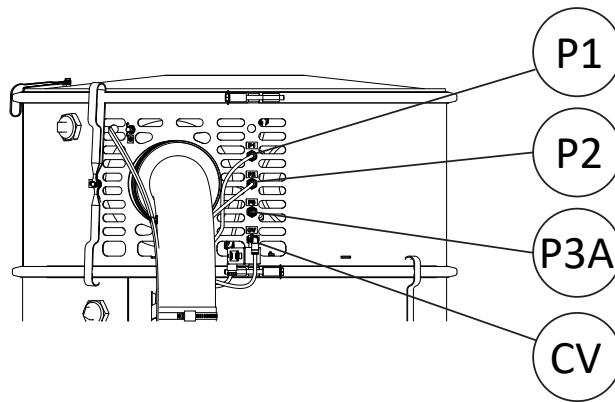




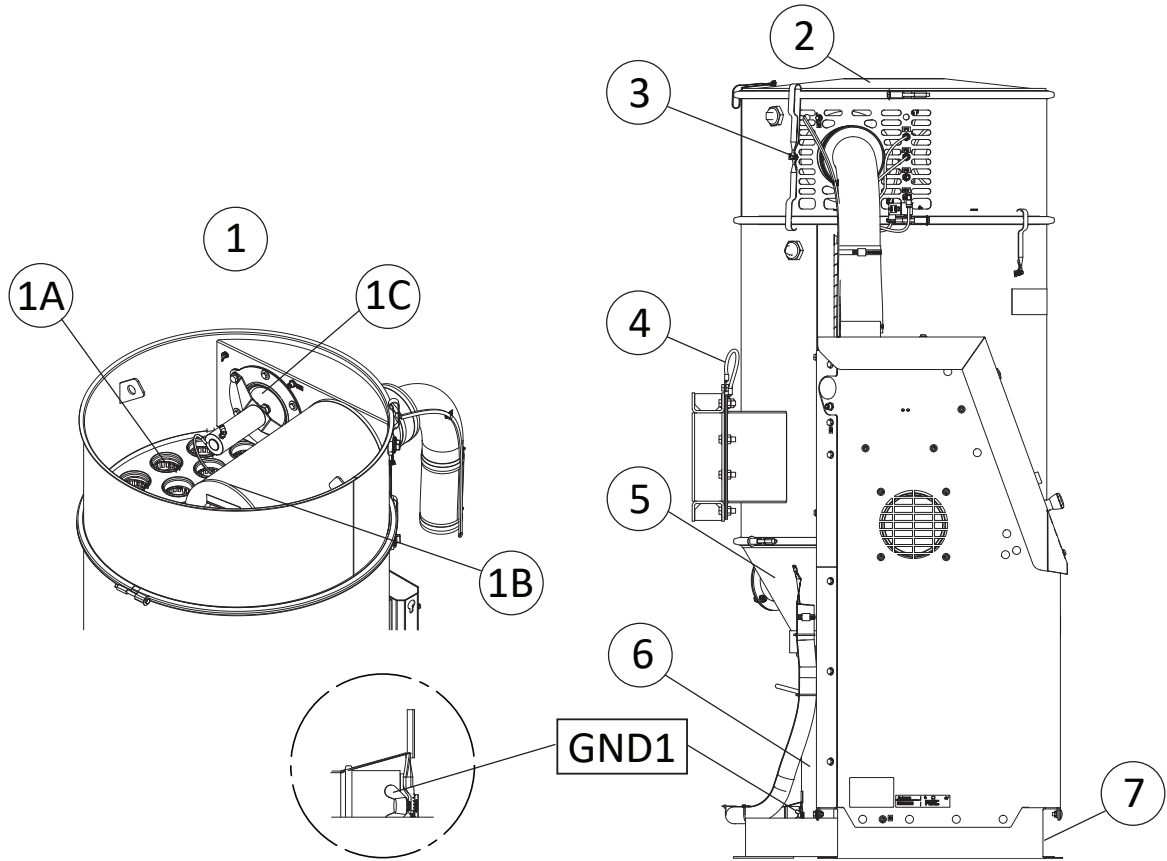
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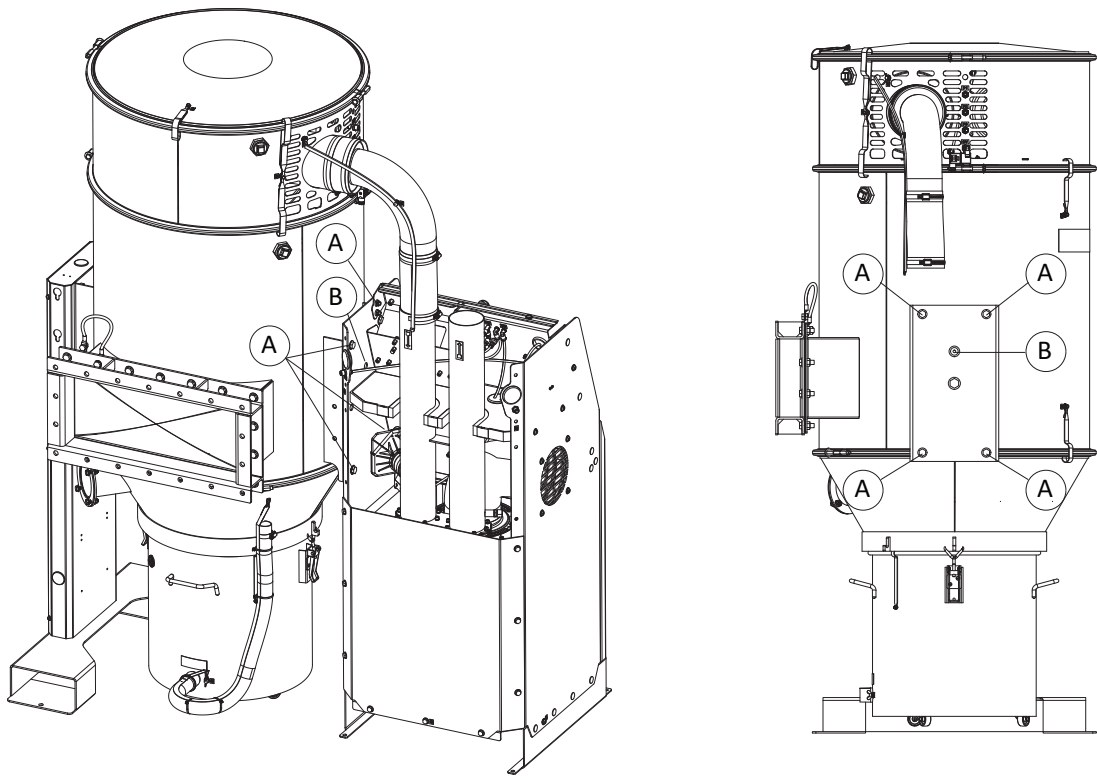
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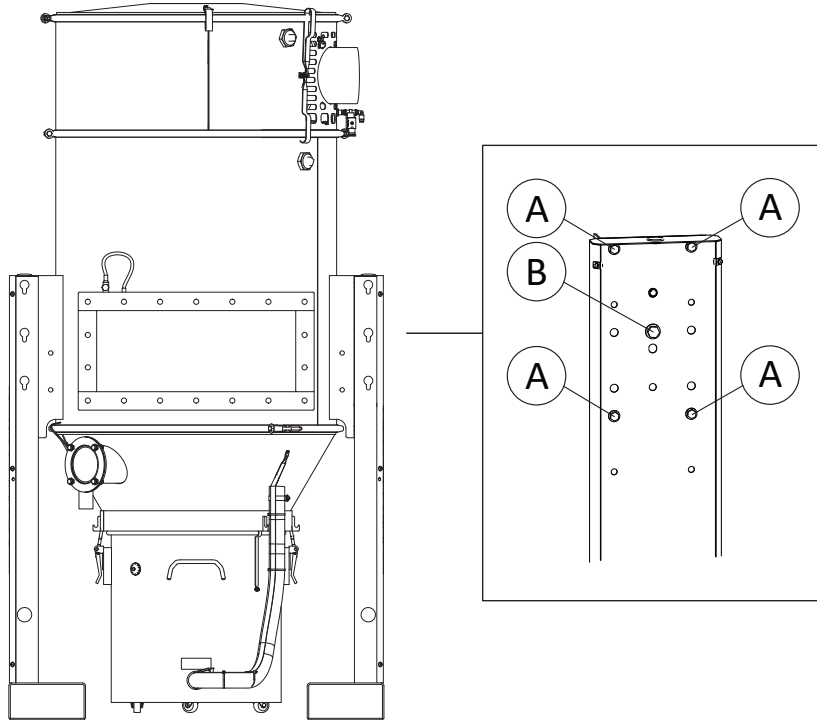
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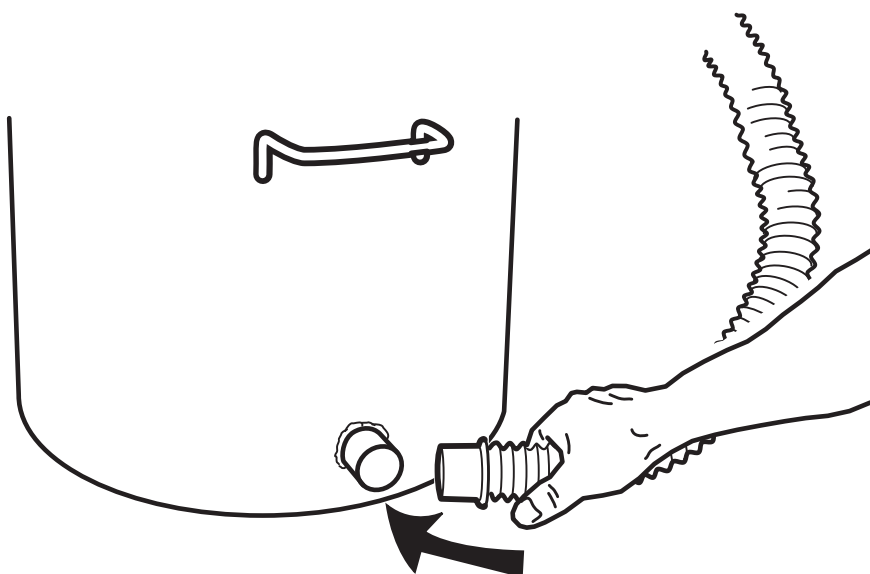
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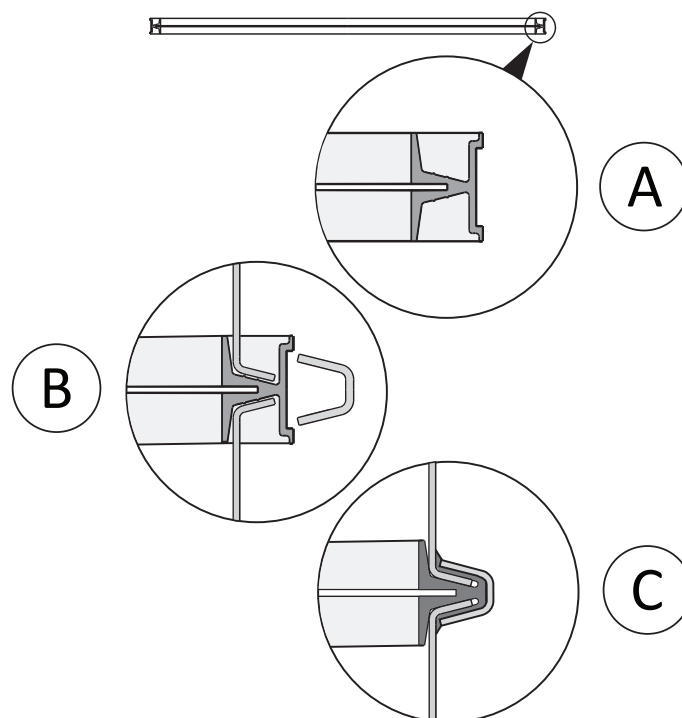
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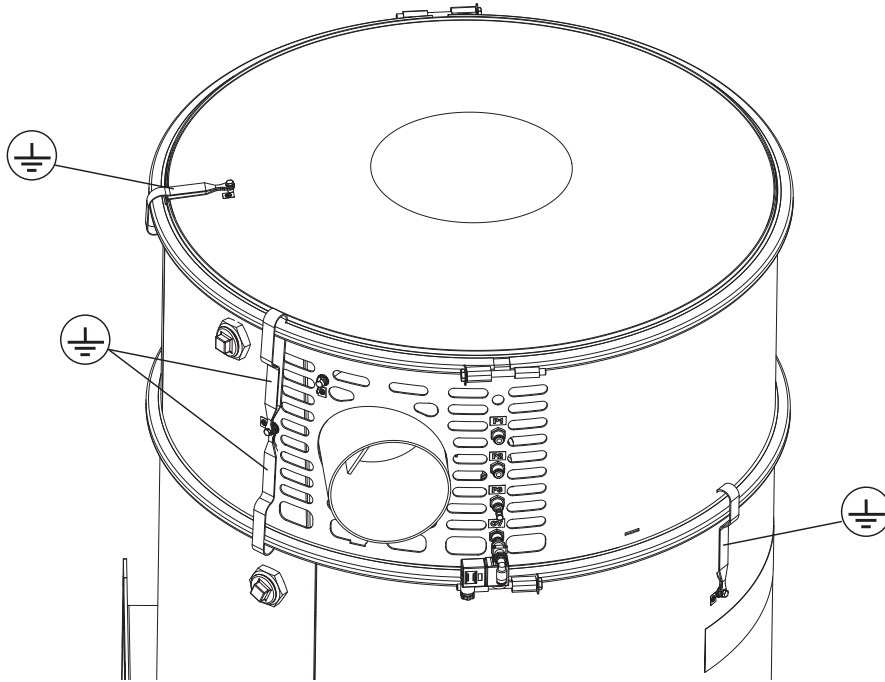
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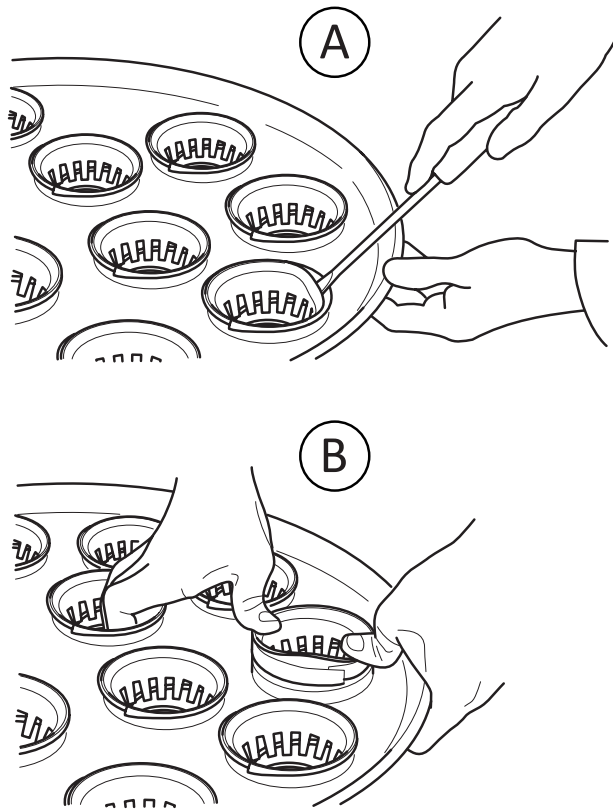
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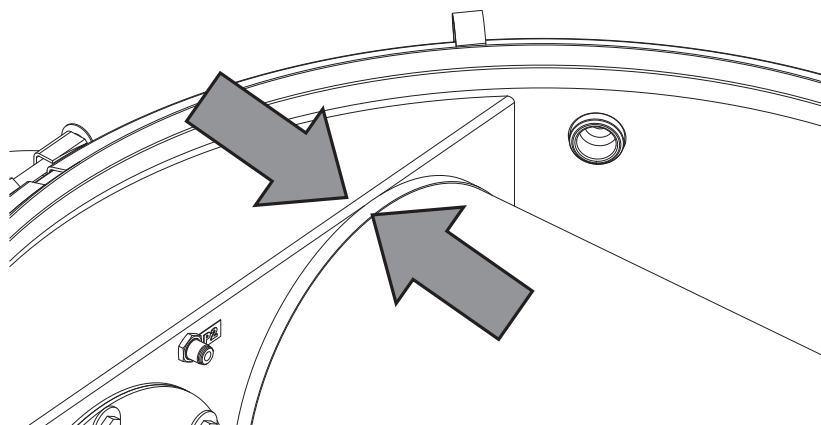
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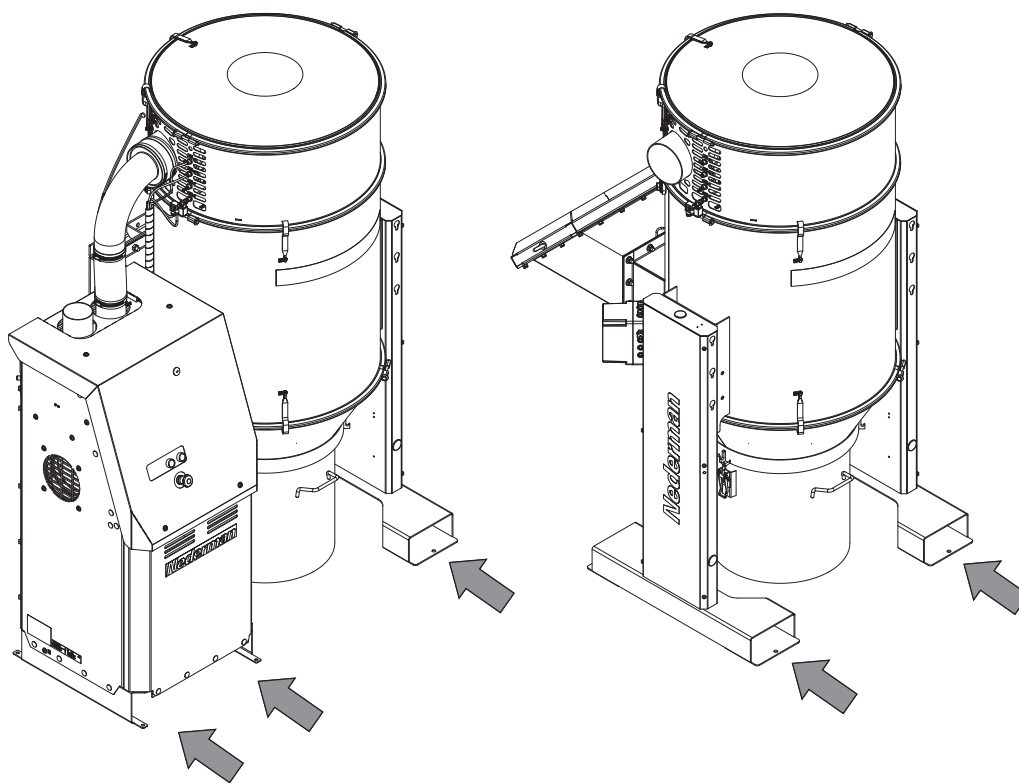
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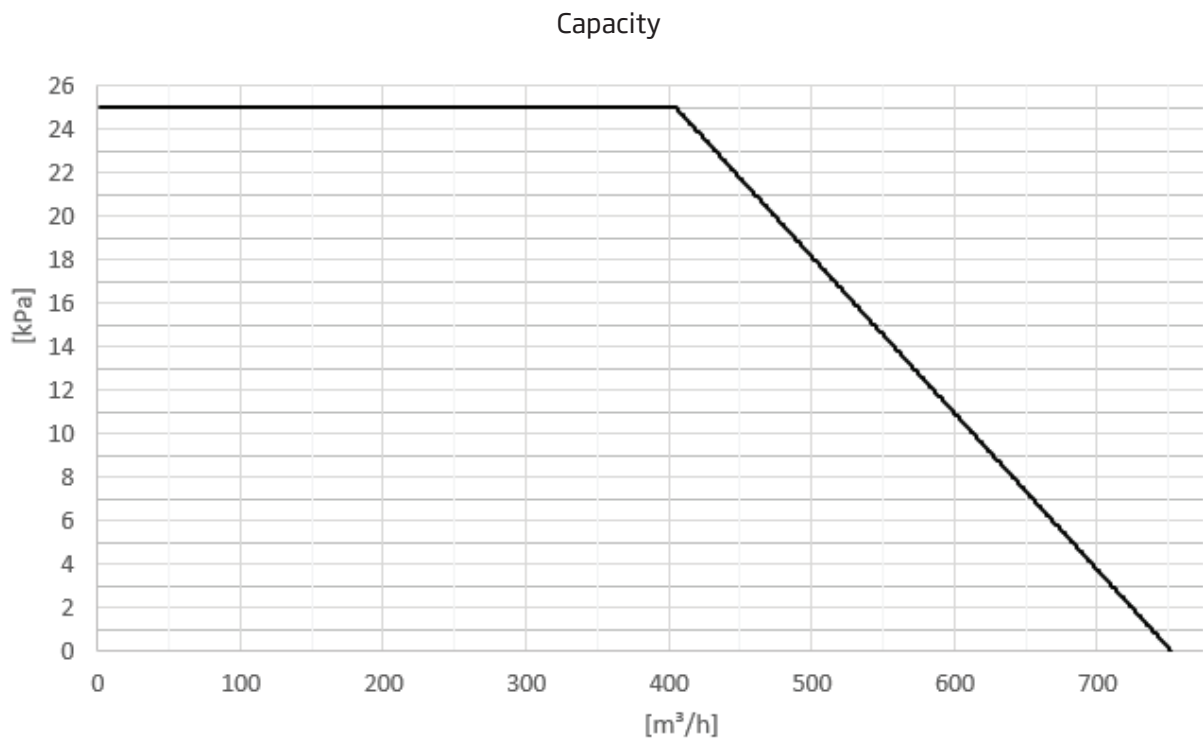
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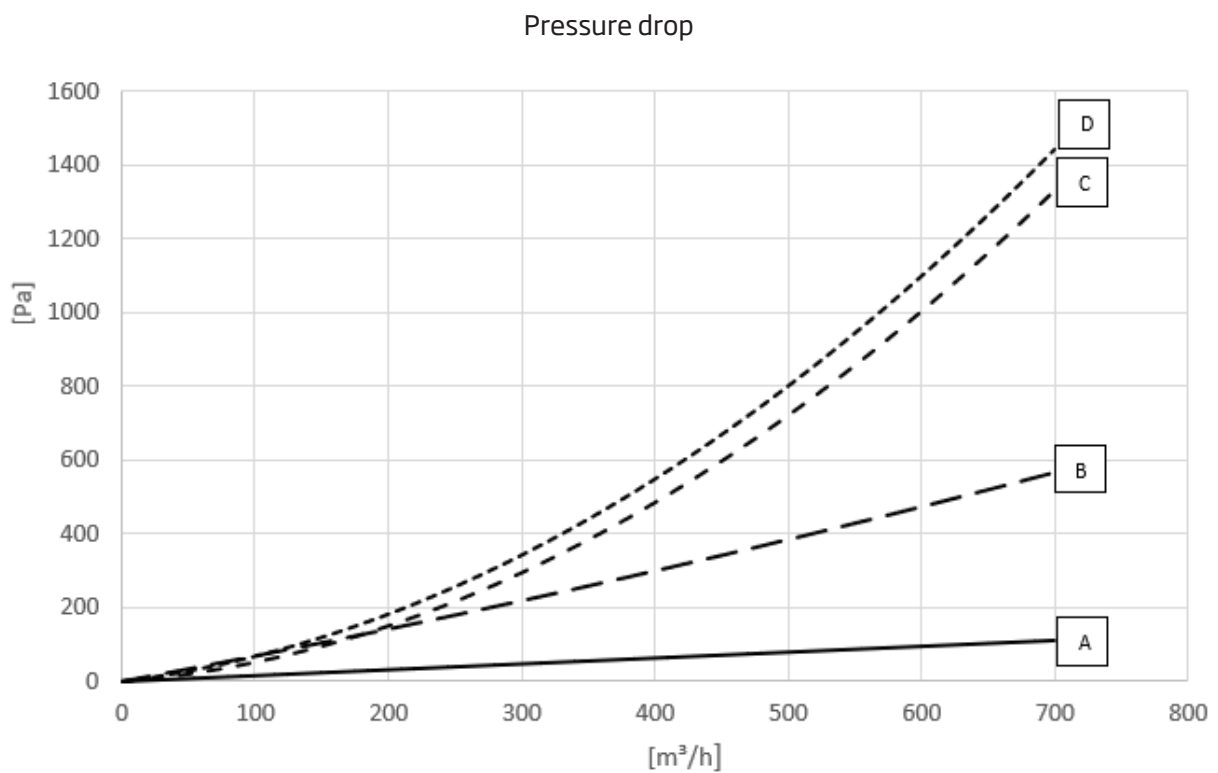
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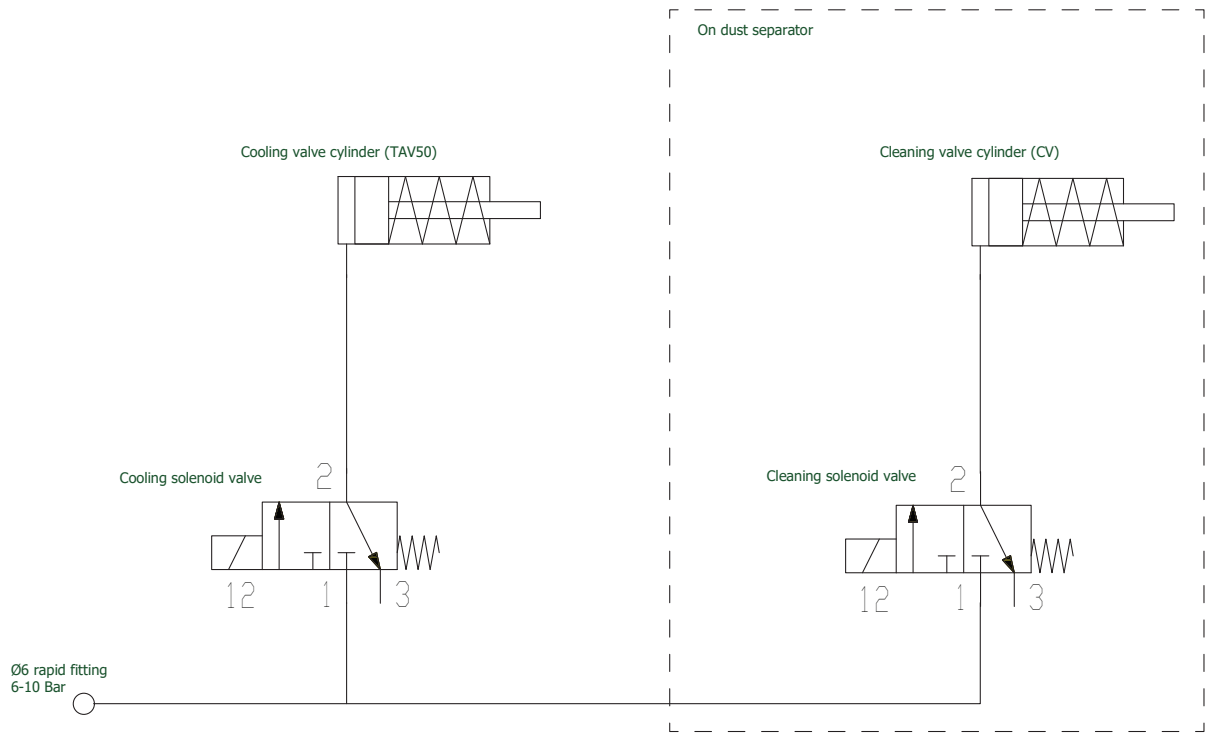


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1 Preface and safety

Read all product documentation and the product identification plate carefully before installation, use, and service of this product. Replace documentation immediately if lost. Nederman reserves the right, without previous notice, to modify and improve its products including documentation.

This product is designed to meet the requirements of relevant EC directives. To maintain this status, all installation, maintenance, and repair is to be done by qualified personnel using only Nederman original spare parts and accessories. Contact the nearest authorized distributor or Nederman for advice on technical service and obtaining spare parts. If there are any damaged or missing parts when the product is delivered, notify the carrier and the local Nederman representative immediately.

1.1 PAK-M specifics

The Vacuum and Control unit can be used as a standalone vacuum source or be part of a complete PAK-M fitted with different dust separators, filters and accessories.

PAK-M comes in three main configurations:

- 1 A stand alone Vacuum and Control unit.
- 2 A Vacuum and Control unit with a Standard Dust Separator.
- 3 A Vacuum and Control unit with a Dust Separator in a DX/EX configuration.

The main manual is the User Manual for the stand alone Vacuum and Control unit. Other manuals are extensions of this manual. Please consider these notes:



NOTE!

- For each variant of PAK-M: Manuals are separated into User Manuals, Installation and Service Manuals, a Program Manual and accessory manuals.
- Refer to the correct manual in case of missing information. A manual generally describe the specific configuration; Dust Separator, ATEX, accessory, and so on.
- All manuals must be kept with care and made available to all persons involved in operating the equipment.
- Images in this Installation and Service Manual may differ slightly from your model.

1.2 Overall PAK-M safety

- PAK-M, including its configurations must be installed, used and maintained according to all related manuals in such a way that safety not will be neglected.
- All related manuals must be easily available, otherwise, the product will lack one of its fundamental safety requisites.



WARNING! Risk of personal injury

- Any functional disorders, especially those affecting the safety of the machine, must be rectified immediately. If improperly used, poorly connected, or altered, no matter how minor, the safety and reliability could be jeopardized.
- Grinding, welding or other hot works on PAK-M or the duct system should not be done without first stopping and cleaning the system.
- Do not collect items that may cause ignition or blocking. It is strictly prohibited to collect material that can undergo dangerous chemical or thermal reactions and/or self-ignite.
- Each PAK-M system must be dimensioned individually. To ensure that your system will be safe, a risk analysis must be performed for each installation and intended use.
- Do not make any changes to this product without consulting Nederman.
- PAK-M DX is specially designed to comply with official regulations concerning the risk of explosion. If improperly used, badly connected, or altered, no matter how minor, the safety and reliability could be jeopardized.
- Place fire alarms and an appropriate extinguishing system in all locations where collected dust is stored.

**NOTE!**

Some materials may undergo chemical reactions in combination with humidity/water. Such humidity may, for example, form if the humidity in the extracted air is condensed in the filters.

2 PAK-M DX and ATEX

**WARNING! Risk of personal injury**

For information regarding ATEX, please read the User Manual.

3 Installation

**NOTE!**

- Copy the installation protocol (appendix A), during installation, fill it in and save it as a service record. See [Chapter 5 Appendix A: Installation protocol](#).
- A value outside the limit or an incorrect/missing result is to be rectified before initial start-up and operation.

3.1 Transport and delivery check

It is recommended to transport PAK-M to the installation site while still in the factory packing. For lifting points, see [Figure 15](#).

**NOTE!**

- Ensure that the forks stick out at the back, so it is a level lift.
- If PAK-M needs to be moved to another location. Make sure to empty the collecting bin first.

PAK-M should be checked for any damage that may have occurred during transport. If there is damage or parts missing, the carrier and your local Nederman representative should be notified immediately.

3.2 Pre-installation

All installation is to be done by qualified personnel using only Nederman original parts and accessories.

**WARNING! Risk of personal injury**

- The explosion protection system must be installed and serviced by qualified and trained personnel using only original RSBP spare parts and according to the manual for the explosion protection system supplied with your PAK-M DX.
- Measures must be taken to ensure that no person is in the vicinity of the explosion protection system while PAK-M DX is operational. The risk area must be clearly marked, and operators must be educated regarding the risks. See the User Manual.
- Read and follow all the applicable installation requirements during installation.
- Use proper lifting equipment and protective gear.
- Never run PAK-M DX without the required filters inserted.
- Do not completely seal a room where the filter is installed since the cleaning can generate dangerous negative pressure in the room.
- Adequate protective measures need to be installed if the Standard Dust Separator is placed in an elevated position. Consider its total weight.
- Place PAK-M DX in a sufficiently ventilated room. Also consider the size of the room, a general rule is 300 x the main filter volume if used inside with flameless explosion relief venting (300*0,372 m³).

The location where PAK-M is to be placed must be prepared before the installation.

- Consider the space required for use, service and maintenance, such as changing the filters. Ensure that handling is convenient.
- Also consider the risk area. See the User Manual.

Tilting is used to access the main filter when PAK-M is placed in an area with little access above the unit. It is only recommended as a last resort when it cannot be placed in another location.

PAK-M shall be anchored to a hard, level and firm foundation. A general example would be a reinforced concrete foundation at least 190 mm (7,5 in) thick. When calculating for foundation or supporting structure the following factors should be considered:

- Total weight of the Vacuum and Control unit and the Dust Separator with accessories. See [Section 3.11 Technical data](#).
- Environmental and ambient conditions. See [Section 3.11 Technical data](#).
- Max weight of the collected material.
- Possible wind load.
- Traction forces generated by the explosion relief venting panel.
- Each of the anchor bolts securing PAK-M DX, must withstand traction forces of 5 kN vertically and 3 kN horizontally.
- Recommended bolts for concrete are Hilti HDA-P/PF M10x50 or HSC-A/HSC-AR M8x50 or equivalent. If expansion bolts are to be used, the concrete foundation must be prepared according to bolt recommendations.

NOTE!

- PAK-M DX needs approx. 500 mm of free space above the top to facilitate the changing of main and secondary filters. See [Figure 4](#).
- If the ceiling is low the Dust Separator may be tilted to empty the filter. In this case, less ceiling height is required, approximately 2200 mm, as access is required to the front and back.
- PAK-M should not be installed close to heat sources or hot surfaces.
- Consider the room volume for flameless explosion relief venting.
- The Vacuum and Control unit and Dust Separator are connected at delivery. If you wish to separate them, the Dust Separator should be treated as a standalone filter unit.
- Always follow local regulations and legislation for all steps in the installation process.
- Read all required product manuals before the assembly of PAK-M and pay close attention to the recommendations. Refer to the correct manual in case of missing information.
- It is recommended that a layout is made for the entire system before installation.

3.3 Main installation

WARNING! Risk of personal injury

Standards relating to the connection and use of filters in hazardous areas must be taken into consideration, especially national standards for installation. Only trained personnel familiar with these standards should handle this type of filters.

WARNING! Risk of explosion

Do not open electrical connections when explosive atmosphere or dust is present.

NOTE!

- Fill in the installation protocol during the installation.
- The explosion relief venting panel should be handled with great care. Never poke at the pressure-sensitive membrane and do not bend the membrane or the frame.

- 1 Remove the factory packaging.
- 2 Position PAK-M in the installation location.
- 3 Anchor the Vacuum and Control unit and the filter housing firmly to a hard, level and firm foundation. Also secure the tilting possibilities. Three oval holes in the legs facilitate this, and you can select either of them, one per leg is enough. See [Figure 2](#).
- 4 Follow the steps in related installation sections; duct, electrical and so on.

NOTE!

After all installation and maintenance work: verify the earth connection. See [Section 3.7 Earth control measuring](#).

3.3.1 Direction of inlet and outlet

The Dust Separator inlet can be rotated to two positions: 45 degrees or straight back. You need to consider the placement of the collecting bin hooks, so they are not blocked by legs. There is an extra set of hooks to handle 45 degrees rotation.

The outlet can also be rotated, but that will partially block some filter tubes. Outlet should be kept in the relevant position ($90^\circ \pm 7^\circ$) as shown by the angle in [Figure 2](#).

3.4 Duct installation

- 1 Connect the duct to the flanged inlet, see [Figure 1](#), item 20.
- 2 Connect the pipe/hose (clean side) to the outlet, see [Figure 1](#), item 22.

Consider the following when designing duct systems:

- It is important to use a correct duct diameter to avoid pressure losses and dust deposits in the system.
- Ensure that the correct transport velocity is achieved.
- Velocity should never decrease en route to the Dust Separator.
- Velocity may vary depending on how much of the vacuum system is used (infrequent use).
- Correct velocity depends on the properties of the transported material. Some composite applications can require velocities up to 25 m/s (82 ft/s).
- To keep the pipes clean a principle called "flushing" may be used. By fitting a valve at the end of the duct system each branch of the vacuum system can be flushed separately to reduce the risk of dust deposits. By not using the rest of the system, and opening the "flush valve", a high amount of air will flush the system clean.
- Do not connect several PAK-M or other vacuum sources to the same duct system. This will cause errors in the vacuum regulation and undesired behaviour.
- If the dust is abrasive it may be necessary to use thick-walled (or rubber-coated) material in bends and other exposed areas.
- To avoid pressure losses, the duct system should be as short as possible and designed with two or more branches. Use larger diameters on the clean side to reduce pressure losses.
- Length to the suction source should be less than 25 meters.



NOTE!

This will affect capacity due to pressure drops, see [Figure 16](#), [Figure 17](#) and the User Manual for the Vacuum and Control unit.

- All connecting piping must be conductive and connected to earth.



WARNING! Risk of personal injury

- Place a sign with the intended use of the vacuum system on every workstation. Inform all personnel of the intended use.
- Ensure that personnel using the equipment do not collect items that may cause ignition or blocking.
- It is strictly prohibited to collect material that can undergo dangerous chemical or thermal reactions and/or self-ignite.
- Install an isolation device/valve to prevent an explosion from striking back into the plant. The pipe between PAK-M and the insulation device / valve must be pressure resistant to an overpressure of at least 0.5 Bar and have a minimum length as specified in the manual for the insulation device.

3.4.1 Isolation valves

Opening the cleaning valve will cause a backflow of air from the filter to the duct system. The strength of this backflow depends mainly on the size and vacuum level of the duct system. If this backflow is too strong it can cause simple isolation flap valves to close. This normally occurs when the vacuum level is ≥ 28 kPa.

However, there are still cases where there can be issues:

- Other vacuum sources can cause a backflow in the system.
- Large and rapid reductions in flow might cause the vacuum level to spike for a few seconds, which in turn will open the cooling valve to mitigate the amplitude of the spike.
- Going from full speed to closed inlet generates vacuum levels around 11 kPa above set point for around five seconds. The large reduction in flow, followed by a cleaning pulse, can in rare cases cause the isolation valve to close.

The following steps can be taken to correct:

- Reduce vacuum level. Tests show that a vacuum level of 15 kPa should be free of this risk.
- Some holes of the air intake for the cleaning valve can be covered. This will reduce the strength of the cleaning pulse and make it less sensitive. Running at high pressure the cleaning pulse is stronger and airflow can be reduced.
- Run a duct isolation damper that blocks the duct 1 m upstream the isolation valve. This requires an accessory that splits the cleaning signal into two separate signals. The advanced control box or the delay box is recommended for PAK-M DX.



NOTE!

- The normal max setting for PAK-M DX is 21 kPa due to the secondary filter.
- PAK-M has been tested with a Ø100 B-Flap ST3 from RSBP and a duct volume representing 50 m of Ø100 ducting. There are no issues with B-Flap ST3 if properly set up.

3.5 Electrical installation

In order for PAK-M to function properly and operate safely, several specific setting must be made to the control system controlling the filter.

- Cleaning valve operation; 24 V DC, Signal opens the valve.
- Explosion relief venting panel sensor indicates an open explosion relief venting panel. Signal 24 V DC, closed circuit when the explosion relief venting panel is closed (intact). Alarm if open circuit.



WARNING! Risk of personal injury

- Global as well as national and local electric regulations must be fulfilled.
- The special conditions for installations in areas classified as zones with explosive atmospheres according to ATEX, must be fulfilled.
- The electrical installation must be done by a certified electrician. Use electrical diagrams.
- Correct voltage must be connected. Control signals must be fused, maximum 5A, to avoid heating of cables and equipment in case of damage, short circuit or malfunction.
- Always replace worn, faulty or defective electrical components with new original parts.
- Check that proper measures have been taken to avoid all types of electrical stray currents to and/or from the piping system and electrical wiring.
- A lightning conductor must be installed if PAK-M is installed outdoors.
- It is highly recommended that a fire alarm is connected to the control system. A triggered fire alarm must immediately stop PAK-M from operating.



NOTE!

- Signal from the explosion relief venting panel sensor must immediately trigger a full stop of PAK-M. Furthermore, indication of burst explosion relief venting panel should trigger a work area alarm (visual and sounding), warn employees and others of a detected explosion and possible fire in the main filter.
- To minimize possible secondary damage and spread of fire, it is important to develop the proper documentation and checklists of how to handle a fire in the main filter. Such documents should be developed in co-operation with the local fire authorities and take into account the properties of the collected material.

3.5.1 Electrical components

- Explosion relief venting panel sensor
- Solenoid valve cleaning cylinder

3.6 Compressed air installation

See [Figure 18](#) and [Section 3.11 Technical data](#).



WARNING! Risk of personal injury

Use ear protection and safety goggles.

- Connect a compressed air supply to the cleaning valve. See [Figure 5](#).

Consider the following:

- As new ducts may contain dirt/particles/debris, the compressed air duct should be blown clean before connecting PAK-M.
- A compressed air filter must be installed to ensure safe operation of PAK-M. A main valve that bleeds the remaining pressure should be installed.
- It is recommended that a pressure switch, warning for insufficient pressure, is connected to the control system.
- The specified air consumption of PAK-M is limited to the short operation of the cleaning valve.
- Take necessary measures to avoid water/humidity in the compressed air when installed in cold environments.
- If anti-freeze additives are used, ensure continuous use. Once added, the removal of the anti-freeze additive can cause malfunction of the pneumatic components.
- To avoid personal injuries during maintenance, the main valve should be locked in a closed position.
- Use black tubing to differentiate compressed air from pressure measurements.

3.6.1 Pneumatic components

Figure 18 shows the pneumatic circuit diagram with the following components:

- 1 Connector Solenoid
- 2 Solenoid
- 3 Solenoid Cleaning Valve (SCV)
- 4 Cleaning Cylinder (CC)

3.7 Earth control measuring

Proper earth connection shall be checked after both main installation and regular maintenance work. If a component, such as for example the top module, is removed and refitted, earth connection must be verified.

A suitable measuring instrument must be used. $R \leq 10 \Omega$ unless otherwise stated.



NOTE!

Make sure there is contact between the measuring point and the instrument.

- 1 Disconnect the duct system (in- and outlet).
- 2 Disconnect the net earth from GND1. See Figure 6.
- 3 Measure between all components according to the component measuring list and GND1. Measure and verify contact between incoming duct system and the free coupled incoming net earth ($\leq 10^5 \Omega$).
- 4 Reconnect the incoming duct system. Make sure that there is a 2nd earth connection between the duct system and PAK-M and that it is properly earthed. Measure and verify contact between GND1 and external net earth ($\leq 10^5 \Omega$).
- 5 Reconnect net earth to GND1.
- 6 Reconnect the outgoing duct system. Make sure that there is an earth connection between the duct system and the bottom frame of the Vacuum and Control unit.

Component measuring list

- See Figure 6. Measure the earth connection between GND1 and the following:
 - 1 Filters and cleaning valve, item 1. With the top lid removed:
 - A Spring in main filter bags (test 3). $R < 1M \Omega$ (for PTFE coated filters $R < 10M \Omega$).
 - B Metal mesh on secondary filter. $R < 10 \Omega$.
 - C Plate on cleaning valve. $R < 10 \Omega$.
 - 2 Lid. $R < 10 \Omega$.
 - 3 Outlet module. $R < 10 \Omega$.
 - 4 Relief panel / Flameless venting device. $R < 10 \Omega$.
 - 5 Inlet module. $R < 10 \Omega$.
 - 6 Collecting bin. $R < 10 \Omega$.
 - 7 Bottom frame of the Vacuum and Control unit. $R < 10 \Omega$.

3.8 Main parts

See User Manual and Figure 1.

3.9 Accessories

Nederman is prepared for Nederman accessories and customer connections.

The installation of accessories, extra equipment, and functions are described in the manual for each product and according to the electrical diagrams that came with it. Consult your local Nederman representative for available accessories.

3.10 Pressure measuring points and connections

Figure 5 shows the pressure measuring points and connections.

P1: Pressure sensing tube. Pressure measuring point for pressure upstream main filter, Ø 6 mm (0.24 ")

P2: Pressure sensing tube. Pressure measuring point for pressure downstream main filter, Ø 6 mm (0.24 ")

P3A: Pressure sensing tube. Pressure measuring point for pressure downstream secondary filter , Ø 6 mm (0.24 ")



NOTE!

P3A is disconnected at delivery. Use P3B on the Vacuum and Control unit instead. See the User Manual for the Vacuum and Control unit.

CV: Cleaning Valve, Ø 6 mm (0.24 ")



CAUTION! Risk of equipment damage

- Do not switch connections for pressure measuring points.
- Blue tubes are used for measuring and black for compressed air.

3.11 Technical data

PAK-M DX	
Capacity and pressure drop * :	Flow is shown in m ³ /h and pressure/pressure drop in kPa/Pa
- Capacity	See Figure 16
- Pressure drop P1-P2 (main filter)	See Figure 16 , item A
- Pressure drop P2-P3 (secondary filter)	See Figure 16 , item B
- Pressure drop P2-P3 (secondary filter and outlet)	See Figure 16 , item C
- Pressure drop Dust Separator	See Figure 16 , item D
Max operating air flow Dust Separator	600 m ³ /h
Max vacuum Dust Separator	-50 kPa (-7.25 PSI)
Process air (dry) temperature	0 - 60°C (32 - 140°F)
Operating temperature	-10 - +40°C (14 - 104°F)
Main filter, area	3 m ² (1x129 sqft)
Main filter, material	Conductive (<10 ⁶ Ω) polyester
Main filter, material PTFE	Dissipative (<10 ⁹ Ω) polyester PTFE coating
Main filter, material efficiency	Class M according to EN 60335-2-69

PAK-M DX	
Secondary filter (optional):	See Figure 1 , item 4
- Area	5,4 m ²
- Material	Polyester
- Material efficiency	Class M according to EN 60335-2-69
- Area H14	5,18 m ²
- Material H14	3 layers, polyester/glass fibre/polyester
- Efficiency H14	HEPA H14 (99.995% MPPS)
Protection class Dust Separator	IP65
Protection class PAK-M DX	IP54
Weight, approx:	Depends on explosion protection system
- PAK-M DX	378-393 kg (833-866 lb)
- Dust Separator only	195-210 kg (430-463 lb)
- Deflector (optional)	11 kg (24,25 lb)
Dimensions:	See Figure 2 and Figure 3
- Inlet, Dust Separator (A)	Flanged Ø 100 mm (3.94 ")
- Outlet, Dust Separator (B)	Ø 150 (5.90 ") / Ø 100 mm (3.94 ")
- Inlet, Vacuum and Control unit (C)	Ø 100 mm (3.94 ")
- Outlet, Vacuum and Control unit (D)	Ø 100 mm (3.94 ")
Secondary filter, pressure warning recommendation	4 kPa (1.16 PSI)
Compressed air connection	Ø6 mm (0.24 ")
Compressed air quality	Clean dry, ISO 8573-1 class 5
Compressed air pressure	6 - 10 bar (87 - 145 PSI)
Max air consumption (intermittent)	700 N-Litres/min (25 cfm)
Control voltage Dust Separator	24 V DC ± 10%
Explosion relief venting panel: area	0,096 m ² (1,03 sqft)
Explosion relief venting panel: burst pressure	0,1 bar (1.45 PSI)
Flameless venting: minimum room volume	>115 m ³
Material Dust Separator	Powder coated steel + Primer, rubber (EPDM)

PAK-M DX	
Corrosion protection level Dust Separator	Powder coat C3, other C2. According to ISO 12944-2.
Material recycling Dust Separator, approx	96 weight-%
Collecting bin volume	70l
Protection system limitations and dust data	See "Data Sheet for Protection Systems, Sweden Manufacturing" delivered with your PAK-M DX.

* New clean filters. See the Vacuum and Control unit User Manual for max pressure set point.

4 Service and maintenance



WARNING! Risk of personal injury

- The explosion protection system must be handled by qualified personnel according to the manual for the explosion system supplied with your PAK-M DX.
- Maintenance work in elevated positions requires adequate safety measures.
- Use proper protective equipment where there is a risk of exposure to dust.
- Use proper lifting equipment and protective gear.
- Wear ear protection when work is carried out near the upper section of the Dust Separator.
- The compressed air supply needs to be securely disconnected during maintenance.
- Avoid spilling materials.
- After all installation and maintenance work: verify the earth connection. See [Section 3.7 Earth control measuring](#).



WARNING! Risk of explosion

- Before performing any grinding, welding or other hot works on PAK-M, stop operation and clean all parts in contact with dust: filter housing, filters, collecting bin and so on.
- Do not open the connection box when there is an explosive atmosphere present.



NOTE!

Fill out the service protocol for all maintenance performed on PAK-M. See [Chapter 6 Appendix B: Service protocol](#).

4.1 Maintenance schedule

Type of maintenance	Frequency
Regular inspection	Regularly and after changed operating conditions
Yearly inspection	One month after installation and every year
Main filter change	6000 hours
Secondary filter change	6000 hours
Explosion relief venting panel inspection	3 months

4.2 Inspections

At least yearly:

- 1 Inspect all parts of PAK-M and pay special attention to the seals for the collecting bin and main filter. Also inspect the steel clamping rings holding together the housing/inlet/cone-modules. Replace damaged parts.
- 2 Check all parts of all attachments. Tighten bolts if necessary.
- 3 Make sure the outside, particularly the solenoids, sensors and connection box, are free from dust layers.
- 4 Make sure the inside of PAK-M and the connection pipes are free from deposits. Build up of deposits inside the piping system may cause discharge of static electricity.
- 5 Clean the area around PAK-M, including all areas where the collected material is stored to ensure that there are no dust deposits. Ensure that no combustible material is placed in the risk area.
- 6 Check that all signs/markings regarding safe operation are in place and that personnel know about them.
- 7 Test the magnets on the explosion relief venting panel by isolating them or moving them apart.

4.3 Changing the main filter package or replacing a filter bag in the main filter

The main filter should normally be replaced after 6000 hours of operation or when damaged. It should also be replaced if the filter function is insufficient.

The Dust Separator can be tilted if there is no clearance above to remove the filter. See [Section 4.4 Tilting the Dust Separator](#).

**NOTE!**

- Individual replacement of filter bags is possible but replacing the whole main filter package, including the filter panel and locking rings, is recommended as it is quicker and causes less spreading of dust.
- Replacement of filters should be registered in the Service protocol.
- It is recommended that the secondary filter is replaced when changing the main filter.

**WARNING! Risk of personal injury**

- Never run PAK-M without the required filters inserted.
- The vacuum and compressed air must be turned off before commencing a filter change.
- Use proper lifting equipment and protective gear.

4.3.1 Changing the main filter package

- 1 Disconnect the outlet hose from the outlet.
- 2 Disconnect the pneumatic 3/2 cleaning valve from CV.
- 3 Remove the pressure sensing tubes, see [Figure 5](#), items P1, P2 and P3A (if used). Continue with other added connections.
- 4 Remove the lid from the outlet module.
- 5 Disconnect the earth connection and pressure sensing tube from the filter.
- 6 Separate the outlet module from the housing and lift it down using the lifting lugs. See item 7 in [Figure 1](#).
- 7 Take out the main filter package and put it in a large plastic bag, or wrap it in plastic foil to avoid dust spreading.
- 8 Fit the new main filter package.

**NOTE!**

The bar in the main filter housing only lets you put the main filter in one position so that it is not blocking the explosion relief venting panel on the inside.

- 9 It is recommended to change the secondary filter. See [Section 4.5 Changing the secondary filter](#).
- 10 Refit the outlet module.
- 11 Refit the earth connection and pressure sensing tube to the filter.
- 12 Do earth control measuring for the filters and fit the lid on the outlet module.
- 13 Reconnect the pressure sensing tubes, pneumatic valve and outlet hose.

4.3.2 Changing a filter bag in the main filter

Individual main filter bags that have been damaged can be replaced.

- 1 Use a screwdriver to detach the plastic locking ring and remove the old filter bag including the coiled spring, see [Figure 13](#), item A.
- 2 Insert the new filter bag including the coiled spring.
- 3 Attach a new plastic locking.

**NOTE!**

- A certain quantity of fine particles on the filter bags improves particle separation compared to using clean bags.
- The coiled spring can be reused with the new filter bag, but the locking ring must be replaced when securing the new filter bag, see [Figure 13](#), item B.
- Never re-use an old locking ring.

4.4 Tilting the Dust Separator



WARNING! Risk of personal injury

- Avoid placing PAK-M in an area that requires the Dust Separator to be tilted to access the main filter, consider it a last resort. Do a risk assessment before tilting.
- Use proper lifting equipment and protective gear.
- PAK-M must be firmly anchored to the floor.
- Units with heavy flameless devices should not be tilted due to safety concerns. See [Figure 1](#) items 1B and 1C.



NOTE!

- Tilting is easier when the Dust Separator is used as a stand alone with two legs.
- When the Dust Separator is fitted to the Vacuum and Control unit you need to make a gap of around 4 mm between the leg and the Vacuum and Control unit in order to tilt the filter.
- How to remove the Vacuum and Control unit panels is described in the Installation and Service Manual for the Vacuum and Control unit.

The Dust Separator tilts and swivels around two M16 bolts.

- 1 Remove ducting from the inlet.
- 2 Follow steps 1-3 in [Section 4.3.1 Changing the main filter package](#).
- 3 Remove the required Vacuum and Control unit panels and remove the protective sheet metal from the leg.
- 4 Ensure that the M16 bolts are not tightened so the Dust Separator can pivot around them. Loosen to a gap of around 4 mm.
- 5 Remove the four M12 bolts in the brackets. See items A in [Figure 7](#) and [Figure 8](#).
- 6 Turn the filter housing by releasing the push-in lock pin. See item B in [Figure 7](#).
- 7 Rotate the filter housing 90°. The lock pin will automatically lock the position.
- 8 Follow steps 4-8 in [Section 4.3.1 Changing the main filter package](#).
- 9 Tilt the Dust Separator back into an upright position and fit the four M12 bolts on each side. See items A in [Figure 7](#).
- 10 Reconnect the ducting to the inlet.

4.5 Changing the secondary filter

The secondary filter should normally be replaced after 6000 hours of operation. It must also be replaced if damaged or if there is a high pressure drop over the secondary filter.



NOTE!

Always check the main filter for damage when replacing the secondary filter.

- 1 Remove the lid from the outlet module.
- 2 Remove the knob on the back of the secondary filter.
- 3 Put a plastic bag over the filter to avoid exposure and spreading of dust.
- 4 Remove the old secondary filter. The threaded rod can tilt at an angle, so the filter can be removed.
- 5 Fit a new filter cartridge on the threaded rod. It helps by holding a finger in the hole of the bottom of the filter, so you can feel and guide the rod (or look through the hole).
- 6 Put the knob back on and try to get it as straight as possible when tightening. The top of the filter should be in line with the edge of the plate. See [Figure 14](#).
- 7 After tightening, shake the filter by holding the back of the filter. It is normal that it loosens, and the knob can be tightened more. Tighten it by hand as hard as you can: > 5Nm (> 3.7 ft-lb) and repeat this procedure until you can not tighten the knob more after shaking the filter.



NOTE!

This is very important to avoid that the filter loosens during operation.

- 8 Continue with steps 10-13 in [Section 4.3.1 Changing the main filter package](#).

4.6 Separating PAK-M DX modules

The Dust Separator modules can easily be separated for service and maintenance.

[Figure 11](#) items A-C show how the rubber sealing rings, the steel retainer rings and the earth connections should be assembled. [Figure 12](#) shows how the steel retainer rings, keeping the modules together, are correctly reassembled with the earth connection intact.



NOTE!

When a used sealing ring is refitted, it no longer has the flat shape as shown in [Figure 11](#) item A. The rubber ring has a curved shape.

- Use, for example a screwdriver to fit the edge of the module between the rubber lips. The steel ring is correctly fitted as shown in [Figure 11](#) item C.

4.7 Servicing ATEX equipment

To ensure the required level of protection regarding the equipment category, check the following points:

- Regularly inspect PAK-M DX for damage or malfunction. If damaged, shut down and remove possible explosive conditions.
- Ensure that no explosive atmosphere and/or dust layers are present when cleaning, servicing or inspecting PAK-M DX. Prevent dust accumulation by setting up routines for regular cleaning and include these in the explosion protection document.



WARNING! Risk of personal injury

- Check that the risk area is clearly marked and kept clear of obstacles.
- The explosion relief venting panel must be kept free from debris such as snow, ice, leaves and other items that might block or prevent the panel from opening.
- The explosion relief venting panel is designed to rupture and open at very low over pressures and must be handled with great care. Never poke/press or lean against the panel and do not bend the frame securing it.
- Inspect the explosion relief venting panel with the Vacuum and Control unit switched off. Replace it at the first sign of corrosion or other damage. No other preventive maintenance is required.
- For other protection methods follow the maintenance procedure in the manual for the protection device.

5 Appendix A: Installation protocol

Type (PAK-M, PAK-M DX or PAK-M VAC):	Performed by:
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Date:	Art. No.:	Serial No.:
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Control item	Yes	No	Comment
Transport damages			
All components delivered			
Machine label matches the order			
Required User Manuals included			
Required Installation and Service Manuals included			
Factory test report included			
Radiation heat from surroundings is low			
Protection from wind, rain, snow, dust, etc. is good			
Foundation is according to specifications (can withstand total weight and strain on bolts)			
Ambient temperature is within range			
Access for service and maintenance			
Ventilation openings in the installation room are as specified			
Cooling intakes are free from blocking			
Process air temperature is within range			
Earth leakage circuit breaker works with VFD			
All power cables are adequately tightened			
Pilot signal is used			
Maintenance switch is used			
Compressed air tubes are cleaned and connected			
Compressed air is clean and dry			
A shut-off valve is installed for compressed air			
Inlet and outlet ducts are connected			
Accessories are installed			
Signs and warnings are appropriate			

Control item	Yes	No	Comment
Measuring tubes, P1, P2 and P3 are functioning			
Emergency stop works as expected			
Reset works as intended			
Vacuum reads expected value			
Filter cleaning works as intended			
Temperature reads expected value			
Date & time is set (if week timer is used)			

Electrical values

Mains voltage (V):	Mains fuse size (A):
Mains frequency (Hz):	Mains fuse type:

Vacuum levels

Ambient temp., derating value (kPa):	Main filter DPS1 set point (kPa):
Process air temp., derating value (kPa):	Secondary filter DPS2 set point, if used (kPa):
Altitude derating value (kPa):	Vacuum level (PID) setting (kPa):
Exhaust ducting length & size resistance (kPa):	Vacuum level at fan (kPa) * :
Other resistance in exhaust ducting (kPa):	

* Compare with max in technical data

6 Appendix B: Service protocol

Type (PAK-M, PAK-M DX or PAK-M VAC):		Performed by:	
Date:	Art. No.:	Serial No.:	
Control item	Yes	No	Comment
Radiation heat from surroundings is low			
Protection from wind, rain, snow, dust, etc. is good			
Foundation is according to specifications (can withstand total weight and strain on bolts)			
Ambient temperature is within range			
Access for service and maintenance			
Ventilation openings in the installation room are as specified			
Cooling intakes are free from blocking			
Dust deposits in work area			
Dust deposits inside			
Inlet and outlet ducts are connected			
Signs and warnings are appropriate			
VFD reads expected temperature value			
Compressed air shut-off valve is installed			
Compressed air pressure is correct			
Maintenance switch works as intended			
Mains fuse is correct type and size			
All power cables are adequately tightened			
Changes in duct system since installation (including exhaust)			
Changes in ambient conditions since installation			
Emergency stop works as expected			
Reset works as intended			
Cooling valve tested (optional)			
Filter cleaning works as intended			
Start and run is normal			

Vacuum levels

Main filter DPS1 set point (kPa):	Measured duct pressure (kPa):
Secondary filter DPS2 set point, if used (kPa):	Measured pressure (P3B/DPS2) at fan (kPa) *:
Vacuum level (PID) setting (kPa):	

* Compare with max in technical data and installation protocol

Additional notes

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2.
3.
4.
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