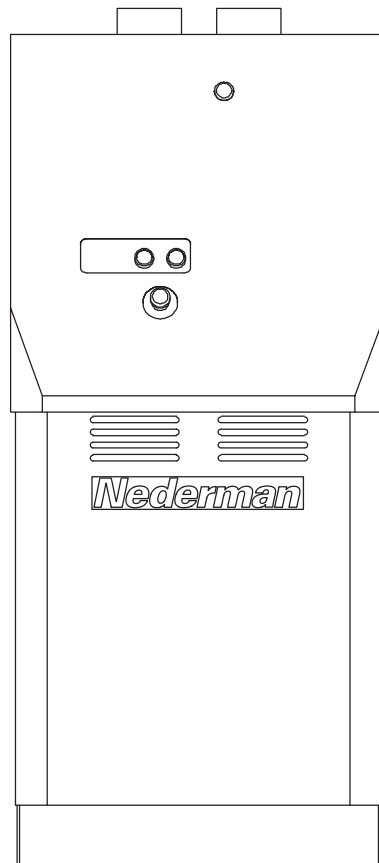


### Vacuum and Control unit

# PAK-M



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**Original user manual**

EN USER MANUAL



# Table of contents

Declaration of Conformity .....	4
Figures .....	5
1 Preface .....	9
1.1 PAK-M specifics .....	9
2 Safety .....	9
2.1 Classification of important information .....	9
2.2 Overall PAK-M safety .....	9
3 Description .....	10
3.1 Power consumption .....	10
3.2 Main parts .....	10
3.3 Control panel .....	11
3.4 Accessories .....	11
3.5 Pressure measuring points and connections .....	11
3.6 Technical data .....	11
3.7 Meaning of symbols .....	12
4 Using PAK-M .....	12
4.1 Controls .....	13
4.1.1 Start (standby) / stop button .....	13
4.1.2 Manual filter cleaning / reset button .....	13
4.1.3 Emergency stop button .....	13
4.2 Signals .....	13
4.2.1 Warnings .....	13
4.2.2 Alarms .....	13
5 Maintenance .....	14
5.1 Maintenance schedule .....	14
5.2 Inspections .....	14
5.2.1 Regular inspection .....	14
5.2.2 Yearly inspection .....	14
5.3 VFD .....	14
5.4 Accessing internal parts .....	14
5.5 The motor and the fan unit .....	14
6 Spare Parts .....	14
6.1 Ordering spare parts .....	14
7 Recycling .....	15

## Declaration of Conformity

We, AB Ph. Nederman & Co., declare under our sole responsibility that the Nederman product: PAK-M (Part No. \*\*, and stated versions of \*\*) to which this declaration relates, is in conformity with all the relevant provisions of the following directives and standards:

### Directives

2006/42/EC, 2014/30/EU

### Standards

EN ISO 12100:2010, EN 60204-1:2018, EN 61800-5-1:2007+A1:2017+A11:2021, EN 61800-3:2004+A1:2012, EN 61000-3-12:2011, EN 61000-6-2:2019, EN 61000-6-4:2019, EN ISO 20607:2019

The name and signature at the end of this document is the person responsible for both the declaration of conformity and the technical file.

\*\*

40057000, 40057001, 40057002, 40057003, 40057004, 40057005, 40057006, 40057007, 40057008

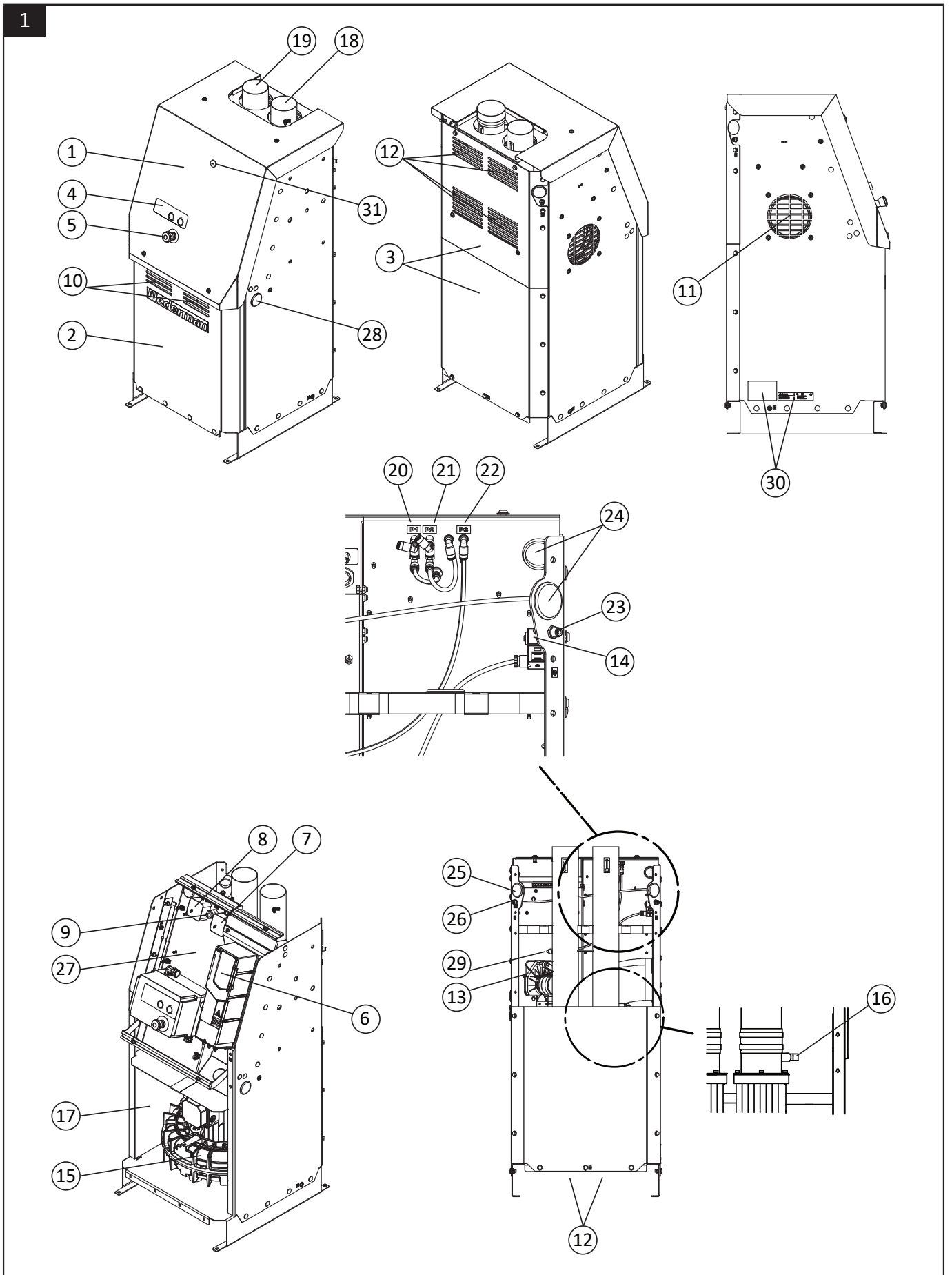


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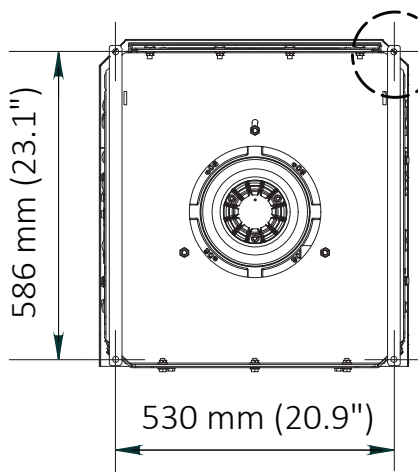
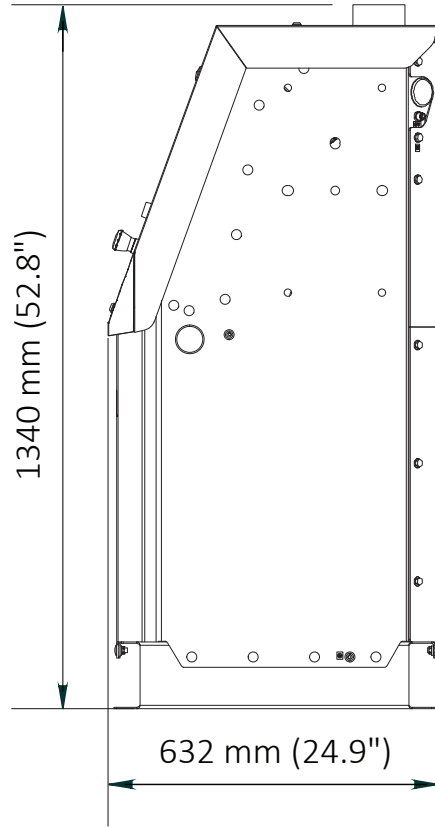
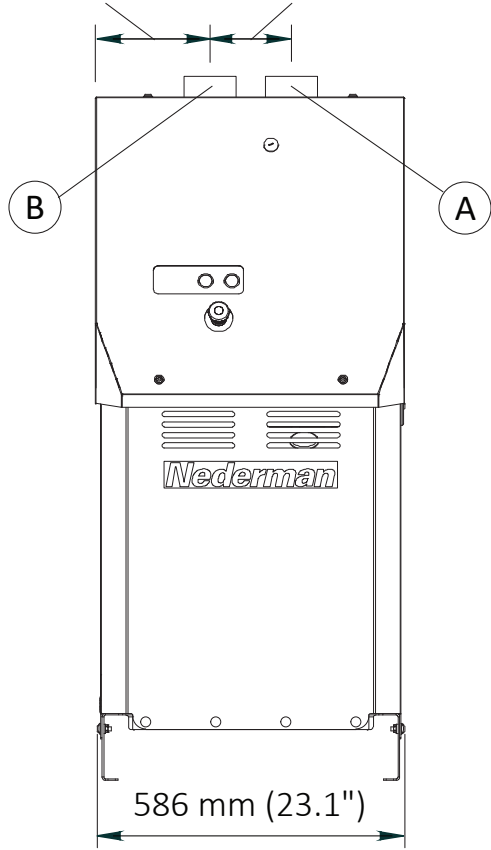


# Figures

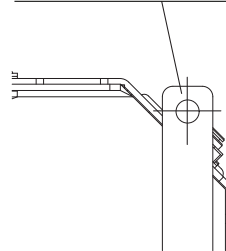


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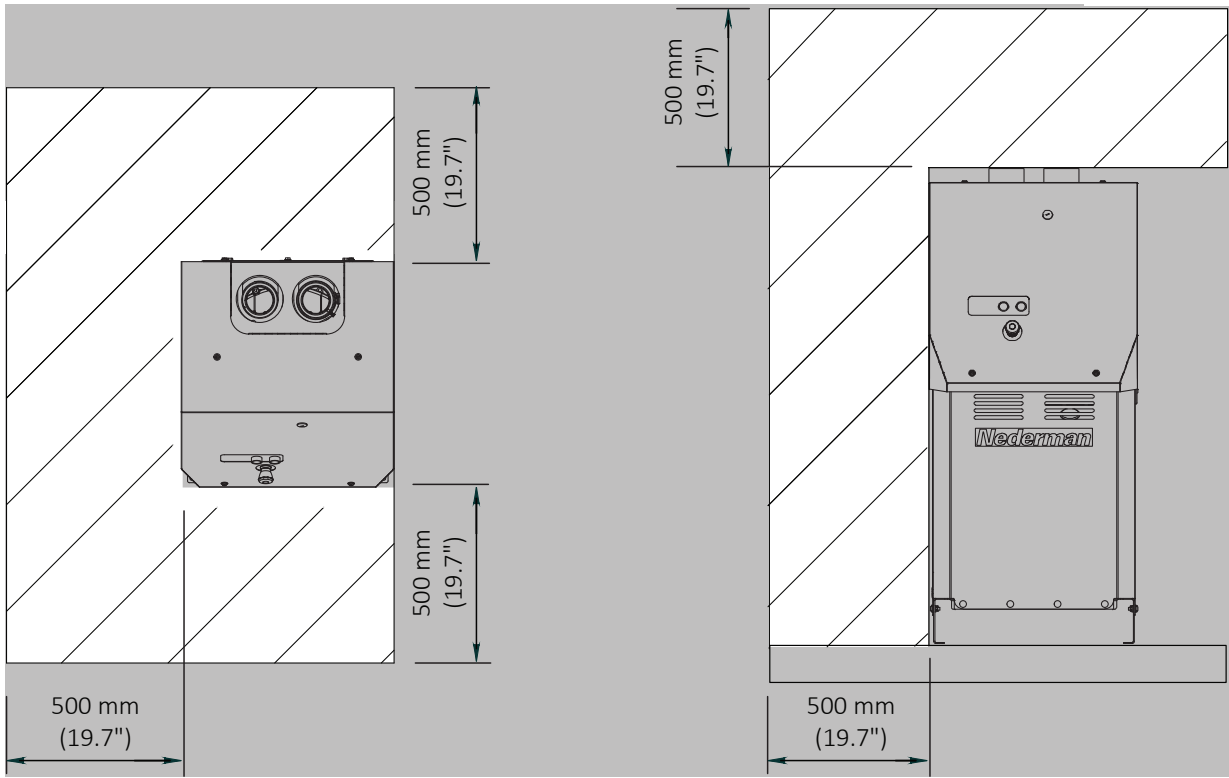
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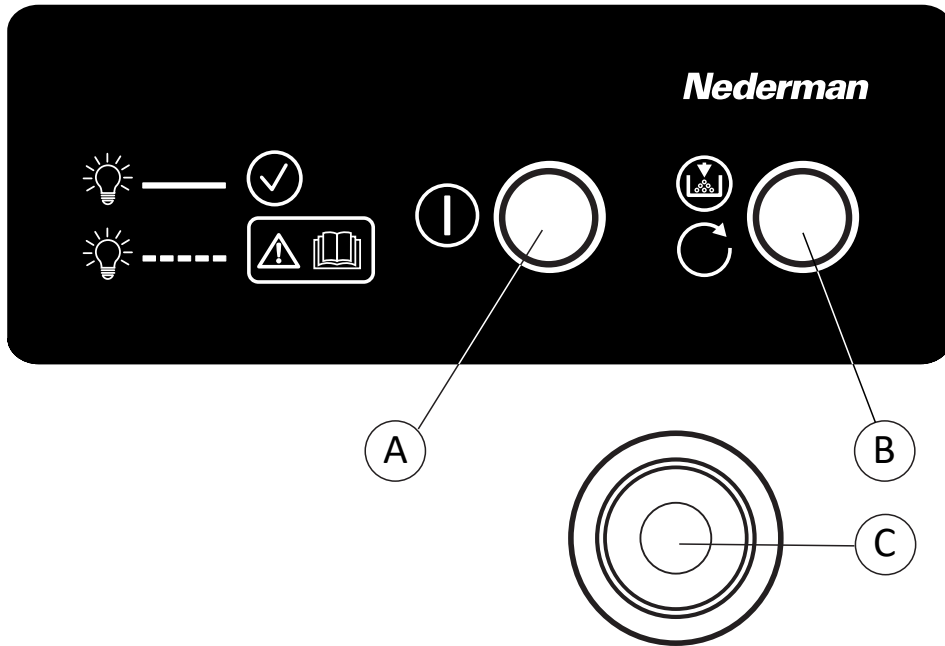
4x Ø 11 mm (0.4")



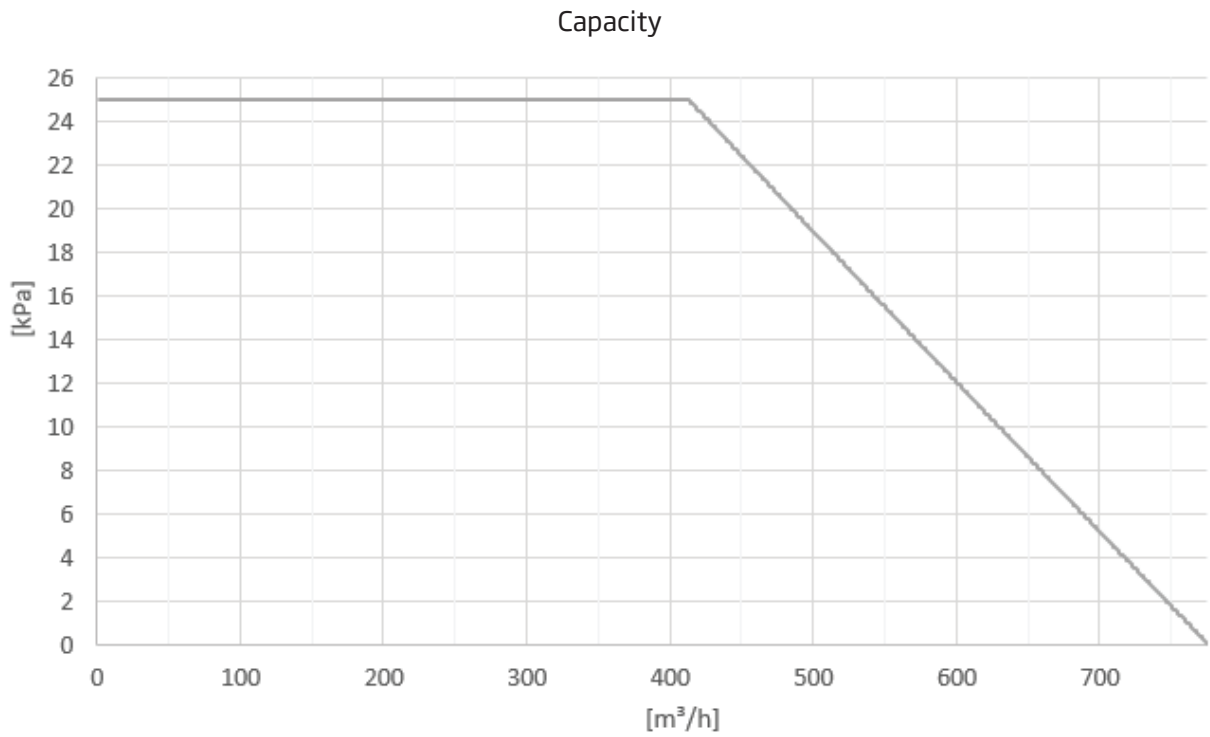
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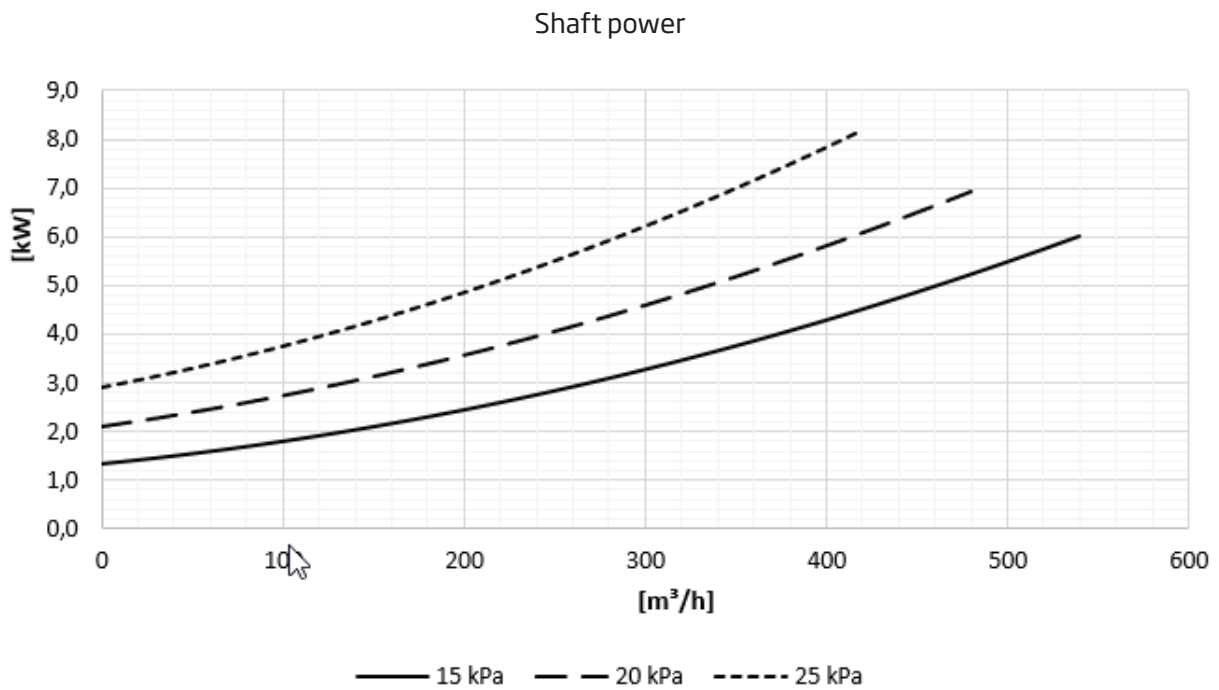
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## 1 Preface

Thank you for using a Nederman product!

The Nederman Group is a world-leading supplier and developer of products and solutions for the environmental technology sector. Our innovative products will filter, clean and recycle in the most demanding of environments. Nederman's products and solutions will help you improve your productivity, reduce costs and also reduce the impact on the environment from industrial processes.

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 User Manual may differ slightly from your model.

## 2 Safety

### 2.1 Classification of important information

This document contains important information that is presented either as a warning, caution or note, according to the following examples:



#### **WARNING! Risk of personal injury**

Warnings indicate a potential hazard to the health and safety of personnel, and how that hazard may be avoided.



#### **CAUTION! Risk of equipment damage**

Cautions indicate a potential hazard to the product but not to personnel, and how that hazard may be avoided.



#### **NOTE!**

Notes contain other information that is important for personnel.

### 2.2 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.
- 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.

**3 Description**

PAK-M Vacuum and Control unit is complete with a direct-driven side channel fan fitted on a steel frame. The Vacuum and Control unit is controlled by a Variable frequency drive (VFD), and has automatic start/stop, overheat protection and automatic filter cleaning control.

The Vacuum and Control unit monitors and keeps a constant vacuum level in the duct system. This is usually connected on the dirty side, upstream of the main filter of the installation.

The Vacuum and Control unit can be used separately or combined with a Dust Separator. When combined, the Dust Separator functions as one leg. It can also be used as a vacuum source in a local exhaust ventilation system with other filters.

**NOTE!**

The Vacuum and Control unit is not ATEX approved and may not be placed in a classified zone.

**3.1 Power consumption**

Power consumption depends on the flow and the vacuum level at the fan. See [Figure 6](#) where the flow is shown in m<sup>3</sup>/h and shaft power in kW.

Highest shaft power is when the Vacuum and Control unit is running at full speed, that is the frequency is 72 Hz. For higher flows, the vacuum level cannot be maintained, the power consumption goes down.

**3.2 Main parts**

[Figure 1](#) shows the main components of the Vacuum and Control unit.

- 1 Top cover
- 2 Front cover
- 3 Rear cover
- 4 Control panel
- 5 Emergency stop
- 6 VFD
- 7 Pressure switch (main filter), DPS1
- 8 Pressure switch (secondary filter), DPS2
- 9 Pressure sensor, PID
- 10 Cooling intake VFD
- 11 Cooling intake motor
- 12 Hot air exhausts
- 13 Cooling valve
- 14 3/2 cooling valve
- 15 High-pressure side channel fan, with pump characteristics,
- 16 PT100 sensor (exhaust temperature)
- 17 Acoustic enclosure
- 18 Inlet
- 19 Outlet
- 20 Pressure measuring connection to point: P1, Ø 6mm (0.24 ")
- 21 Pressure measuring connection to point: P2, Ø 6mm (0.24 ")
- 22 Pressure measuring connection to point: P3B, Ø 6mm (0.24 ")
- 23 Compressed air connection
- 24 Entrance for incoming cables (main power, pilot signal)
- 25 Exit for upper cables and connections to a Dust Separator
- 26 Compressed air connection for connecting cleaning valve
- 27 Position reserved for extended control box with PLC (optional)
- 28 Exit for lower cables and connections to a Dust Separator
- 29 Pressure measuring point at blower, P3B
- 30 Machine label and ground label

31 Connection point for VFD display extension

### 3.3 Control panel

See [Figure 4](#) and [Section 3.7 Meaning of symbols](#).

- A Start (standby) / stop button
- B Manual filter cleaning / reset button
- C Emergency stop button

For more details regarding the control panel, see [Section 4.1 Controls](#) and [Section 4.2 Signals](#).

### 3.4 Accessories

PAK-M is prepared for Nederman accessories and customer connections.

### 3.6 Technical data

Vacuum and Control unit	
Rated motor power	7,5 kW 50Hz / 9 kW 60 Hz
Power consumption	See <a href="#">Section 3.1 Power consumption</a>
Mains voltage/Frequency	380-480 V±10% / 50-60 Hz
Recommended input protection fuses	IEC fuse: 25A qG / UL fuse: 30A UL Class T
Protection class	IP54
Compressed air connection	Ø 6mm (0.24 ")
Compressed air quality	Clean dry, ISO 8573-1 class 5
Compressed air pressure	6 - 10 bar (87 - 145 PSI)
Capacity	See <a href="#">Figure 5</a> *
Maximum vacuum at fan	-27 kPa
Maximum frequency on VFD	72 Hz
Weight	183 kg (403 lb)
Dimensions:	See <a href="#">Figure 2</a>
- Inlet, (A)	Ø 100 mm (3.94 ")
- Outlet, (B)	Ø 100 mm (3.94 ")
Sound level	<70 dB(A) according to ISO 11202:2010
Ambient temperature range (standard)	-15 - +30 °C (5 - 86 °F)
Max ambient temperature (derated)	+45 °C (113 °F)
Process air temperature	-15 - +60 °C (5 - 140 °F)
Max exhaust air temperature	120 °C (248 °F)

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.



#### NOTE!

If you desire a remote start/stop signalling from the valves on the duct system, a Nederman PS cable is recommended.

### 3.5 Pressure measuring points and connections

See [Section 3.2 Main parts](#).










Vacuum and Control unit	
Relative humidity	Max. 90%
Maximum installation altitude	1000 m above sea level (4000 m with derating).
Corrosion class	C2 according to ISO 12944-2
Transformer voltage	24 VDC $\pm$ 5%
Internal fuses	2 x 4A D=10x38mm CC Slow Blow
Vacuum level preset	15,0 kPa (2.2 PSI)
Main filter pressure switch, range	0,25 - 5,0 kPa (0.04 - 0.73 PSI)
Main filter pressure switch, preset	2,0 kPa (0.29 PSI)
Secondary filter pressure switch, range	0,25 - 5,0 kPa (0.04 - 0.73 PSI)
Secondary filter pressure switch, preset	4,0 kPa (0.58 PSI)
Material recycling, approx	98 weight-%
Main materials	Powder coated steel, cast aluminium, EEE components, rubber (EPDM)

\* Clean filters, no derating of vacuum.

### NOTE!

- Some values depend on installation and application.
- For temperatures below zero: pneumatic components require dry air.
- Sound level is measured at front operator position with a distance of 1 m (39.4"), at height 1.6 m (63.0") running at 15 kPa.

## 3.7 Meaning of symbols

Symbols on the Vacuum and Control unit					
	Fixed light		Flashing light		Normal operation / standby
	Warning, read User Manual for more information		Manual filter cleaning		Reset
	Ground symbol. Fastener used for grounding/bonding.		Electrical hazard warning		Power on/off

## 4 Using PAK-M

PAK-M has two operating modes:

- 1 Manual operation:
  - All operation is controlled by the user
- 2 Remote operation from pilot signals:

- No active pilot signal means that PAK-M is in standby mode, waiting for a pilot signal.
- An active pilot signal means that PAK-M is running.
- Functionality of the start (standby) / stop button changes. See [Section 4.1 Controls](#).

**WARNING! Risk of personal injury**

- PAK-M is intended to be used by experienced adult operators who are properly trained and understand how to use it.
- Use ear protection when appropriate.
- Use proper protective equipment where there is a risk of exposure to dust.
- The motor, fan and air duct may become very hot during operation. Never expose a body part to the hot air produced by the fan.
- Do not use PAK-M outside the conditions specified in [Section 3.6 Technical data](#).
- Do not disconnect any cables/hoses when PAK-M is in operation.
- Do not direct outlet towards operator.

**NOTE!**

- Never run the Vacuum and Control unit without compressed air. Before starting, test the manual cleaning function and observe if the cleaning valve is operating.
- Avoid using PAK-M with no or minimal air flow.
- Do not block the cooling intakes.

## 4.1 Controls

See [Figure 4](#).

### 4.1.1 Start (standby) / stop button

Item A in [Figure 4](#).

Manual operation:

- Press to start/stop.

Remote operation from pilot signals:

- Press to on/off

When PAK-M is on it will be in standby mode waiting for a pilot signal or running if there is an active pilot signal.

### 4.1.2 Manual filter cleaning / reset button

Item B in [Figure 4](#) has two functions:

- PAK-M is in normal operation: press to start manual filter cleaning.
- PAK-M has a triggered alarm: press to reset when fault is corrected.

### 4.1.3 Emergency stop button

Item C in [Figure 4](#).

- Press to stop in case of an emergency.  
An alarm is triggered.

**NOTE!**

- After an emergency stop the Vacuum and Control unit needs to be reset.
- Do not use the emergency stop as a normal stop.
- Test the emergency stop and confirm the alarm function periodically.

## 4.2 Signals

Warnings and alarms are indicated by the lamp on the start (standby) / stop button:

- A constant light indicates running/in standby.
- No light indicates it's not running/in standby.
- A flashing light indicates a warning or an alarm.

**NOTE!**

- Controls and signals should be checked regularly.
- If the signals are not visible, an alternative alarm signal must be used.
- If PAK-M is placed in a remote location, an accessory with Nederman Insight capabilities is recommended, see [www.nederman.com](http://www.nederman.com).
- For specific signals, you can check the display on the VFD or refer to the VFD display extension if this is installed.
- The VFD display and the Program Manual provides more information about warnings and alarms.

### 4.2.1 Warnings

The Vacuum and Control unit is operational during a warning and may be used. A warning will go away when the condition that caused it is gone.

**CAUTION! Risk of equipment damage**

The Vacuum and Control unit should be inspected by a service technician. Running it with a warning may lead to an alarm and/or equipment damage.

### 4.2.2 Alarms

The Vacuum and Control unit is not operational during an alarm. An alarm requires a reset, but this cannot be done until the faulty conditions are corrected.

**WARNING! Risk of personal injury**

- Do not reset until the Vacuum and Control unit has been inspected by a service technician and the cause of the alarm is known.

## 5 Maintenance



### **WARNING! Risk of personal injury**

Only qualified service technicians - electrical, local regulations, product knowledge and so on - using the relevant PAK-M manuals, may perform service and maintenance on the Vacuum and Control unit. This includes disconnecting cables, hoses or other components and/or changing settings not specifically mentioned as allowed by user.

Users that are not service technicians may only perform the following maintenance:

- Checking the functionality of buttons.
- Removing top cover or the top rear cover. See the Installation and Service Manual.
- External inspections.
- Cleaning
- Tilting of a connected Dust Separator.
- Maintenance described in other PAK-M User Manuals.

### 5.1 Maintenance schedule

Type of maintenance	Frequency
Regular inspection	Regularly and after changed operating conditions
Yearly inspection	One month after installation and every year

### 5.2 Inspections

#### 5.2.1 Regular inspection

- 1 Verify the functionality of controls and signals.
- 2 Inspect all parts of Vacuum and Control unit and pay special attention to the seals. Replace damaged parts.
- 3 Check all parts of all attachments. Tighten bolts if necessary.
- 4 Make sure the outside are free from dust layers.
- 5 Avoid dust build-ups around the Vacuum and Control unit and keep the specified areas around it clear for cleaning, service and maintenance. See [Figure 3](#).
- 6 Inspect and clean the motor compartment.

#### 5.2.2 Yearly inspection

- 1 Complete the steps in the regular inspection schedule.
- 2 Check all power, protective conductors and earth connections. Tighten, if required, to ensure good contact.

- 3 Ensure that the inside and the connection ducts are free from deposits. A build-up of deposits inside the duct system may cause a discharge of static electricity.
- 4 Check that all signs/markings regarding safe operation are in place and that the personnel know them.
- 5 Verify the function of all emergency stop buttons, alarms and signalling devices.

### 5.3 VFD

The VFD controls the motor so that it operates efficiently and maintains vacuum level to prevent dangerous negative pressure and the Vacuum and Control unit from overheating.



### **WARNING! Risk of electric shock**

Contact Nederman if the VFD needs service.



### **CAUTION! Risk of equipment damage**

Do not adjust any parameters in the VFD without written authorization from the person responsible for this product. See the Program Manual. Unauthorized adjustments may void the warranty and cause a severe risk.

### 5.4 Accessing internal parts

See the Installation and Service Manual.

### 5.5 The motor and the fan unit

The motor and the fan shares one shaft with one bearing in the motor and one in the fan. These bearings should be replaced according to the fan maintenance manual. Generally every 40,000 hours or every five years.



### **NOTE!**

Time is reduced for higher temperatures. Both bearings must be replaced by a specialized operator and require special tools and new sealing.

- Contact Nederman or an authorized Nederman distributor when bearings need to be replaced.

## 6 Spare Parts



### **CAUTION! Risk of equipment damage**

Use only Nederman original spare parts and accessories.

Contact your nearest authorized distributor or Nederman for advice on technical service or if you require help with spare parts. See also [www.nederman.com](http://www.nederman.com).

### 6.1 Ordering spare parts

When ordering spare parts always state the following:

- The part number and control number (see the product identification plate).

- Detail number and name of the spare part (see [www.nederman.com/en/service/spare-part-search](http://www.nederman.com/en/service/spare-part-search)).
- Quantity of the parts required.

## 7 Recycling

The product has been designed for component materials to be recycled. Different material types must be handled according to relevant local regulations. Contact the distributor or Nederman if uncertainties arise when scrapping the product at the end of its service life.

***Nederman***

[www.nederman.com](http://www.nederman.com)