GB

VEX4000

Assembly and installation

Original instructions

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EXHAUSTO

1. Introduction

2. Handling and transport

3. Mechanical assembly

4. Electrical installation

5. Startup

6. Technical data

Symbols, terms and warnings

Prohibition symbol

Failure to observe instructions marked with a prohibition symbol may result in serious or fatal injury.

Danger symbol

Failure to observe instructions marked with a danger symbol may result in personal injury and/or damage to the unit.

Scope

This instruction manual is for use with EXHAUSTO VEX-type air handling units. Please refer to the product instructions regarding accessories and extra equipment.

The instructions must be fully observed to ensure personal safety and to protect the equipment and ensure its correct operation. EXHAUSTO A/S accepts no liability for accidents caused by equipment not used in accordance with the manual's instructions and recommendations.

Supply air/extract air

This instruction manual uses the terms described in DS447-2013:

- Supply air (inlet aur)
- Extract air
- Outdoor air
- Exhaust air

Opening the air handling unit

Do not open the service doors until power has been disconnected at the isolation switch and the fans have stopped. The isolation switch is located on the door of the heat exchanger section. When the isolation switch is in the OFF position, the light inside the VEX unit can still be switched on and the service socket in the panel can be used. Everything else on the VEX is de-energised.

There is an extra and separate built-in isolation switch on the door to the electric heating coil. Units with electric heating coils thus have two isolation switches, both of which must be in the OFF position to ensure the unit is de-energised.

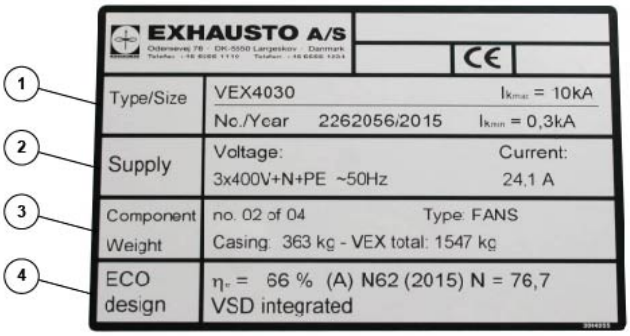
Lock the air handling unit during operation

Use an NV8 Allen key to lock the doors.

NB: All door locks on the air handling unit must be locked during operation.

Information plate

The sections' information plate shows:



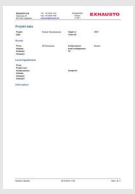
Lorem ipsum

1	• VEX size and designation for the section. • Production number and production year. • Maximum and minimum short-circuit current.
2	• Supply voltage and the maximum current consumption.
3	• The section numbers and the total number of sections for the air handling unit (the sections are installed in numerical order from left to right). • The section type, if required see the table explaining the type under the sections "Terms in the instructions - simplified diagrams". • Weight of the section. • Weight of the assembled air handling unit.
4	• Information in connection with ECO design (only on information plate for fan sections) • For sections with cooling machine: - Coolant - Amount - PS HT (limit for disconnection because of high pressure) - PS HT (limit for disconnection because of low pressure)

NB: Always have the production number ready when contacting EXHAUSTO A/S about the product.

Choose the correct documentation for the task.

Find your information.

VEX4000	Assembly and installations instructions	Operation and maintenance instructions	EXcon hand-held terminal Menu and alarm list	EXcon instructions	Print out from EX SELECT PRO calculation program	Electrical documentation for the order (electrical diagrams)
Supplied documentation »						

VEX4000	Assembly and installations instructions	Operation and maintenance instructions	EXcon hand-held terminal Menu and alarm list	EXcon instructions	Print out from EXSELECTPRO calculation program	Electrical documentation for the order (electrical diagrams)
Mechanical assembly »	✓				✓	
Electrical installation »	✓				✓	✓
Start-up - operation »			✓	✓	✓	
Maintenance - Service »	✓	✓	✓	✓	✓	✓

1. Introduction

1.1 Application

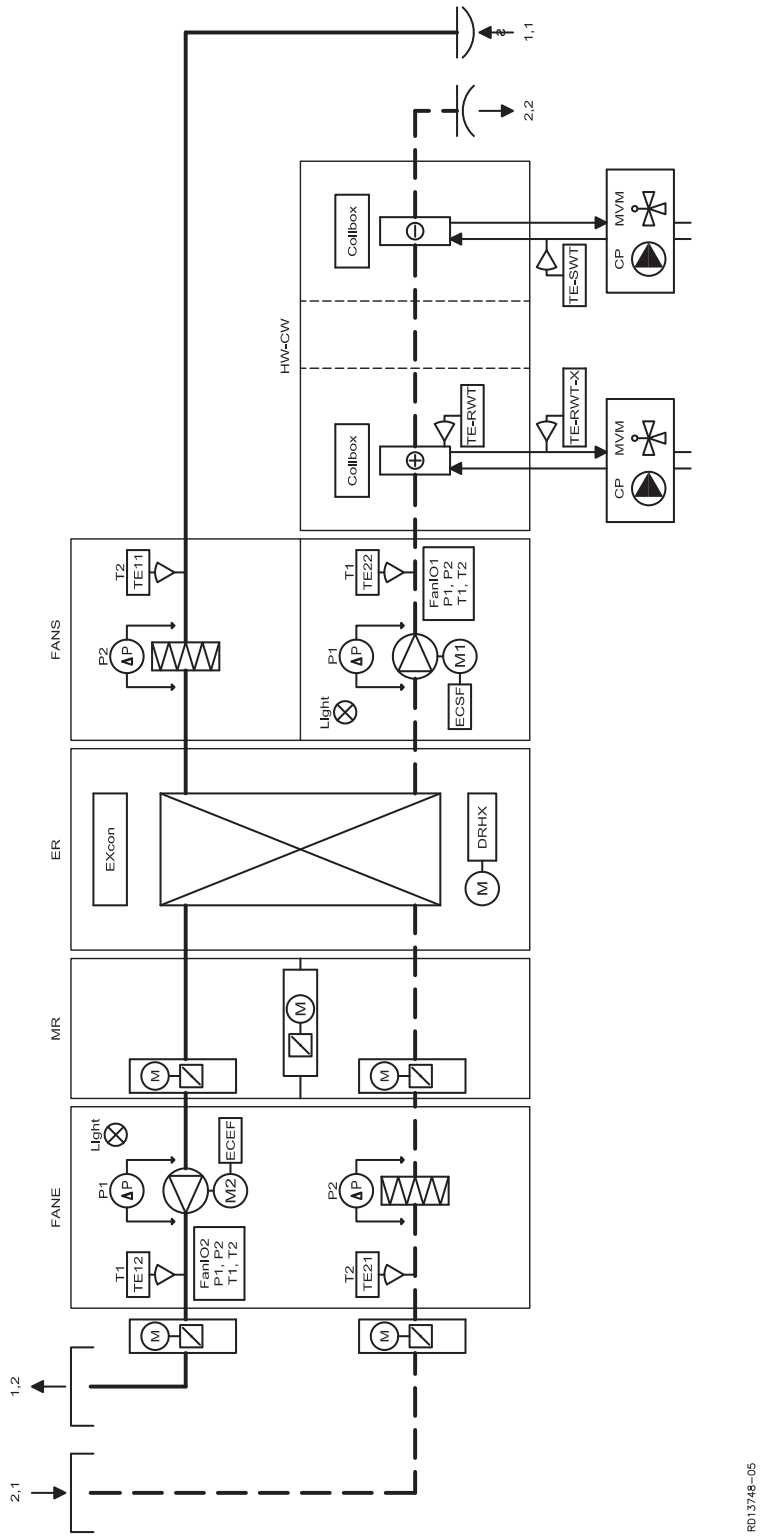
VEX4000 covers a wide capacity range, from 800 to 40,000 m³/h, with 10 different unit sizes (VEX4010 - VEX4100), which means it is ideal for comfort ventilation in many types of buildings - from schools, institutions and offices, to hotels, hospitals and industrial premises. All of the variants have heat recovery either via a crossflow heat exchanger or rotary heat exchanger, and they can be fitted with a fully integrated control system.

1.2 Unit configurations

All of the VEX4000 air handling units are configured in the calculation program EXselect Pro. A print out from the program containing all of the specific data and dimensions for the air handling unit is attached with the other documentation; instructions and electrical documentation (specific electrical diagrams, etc.)

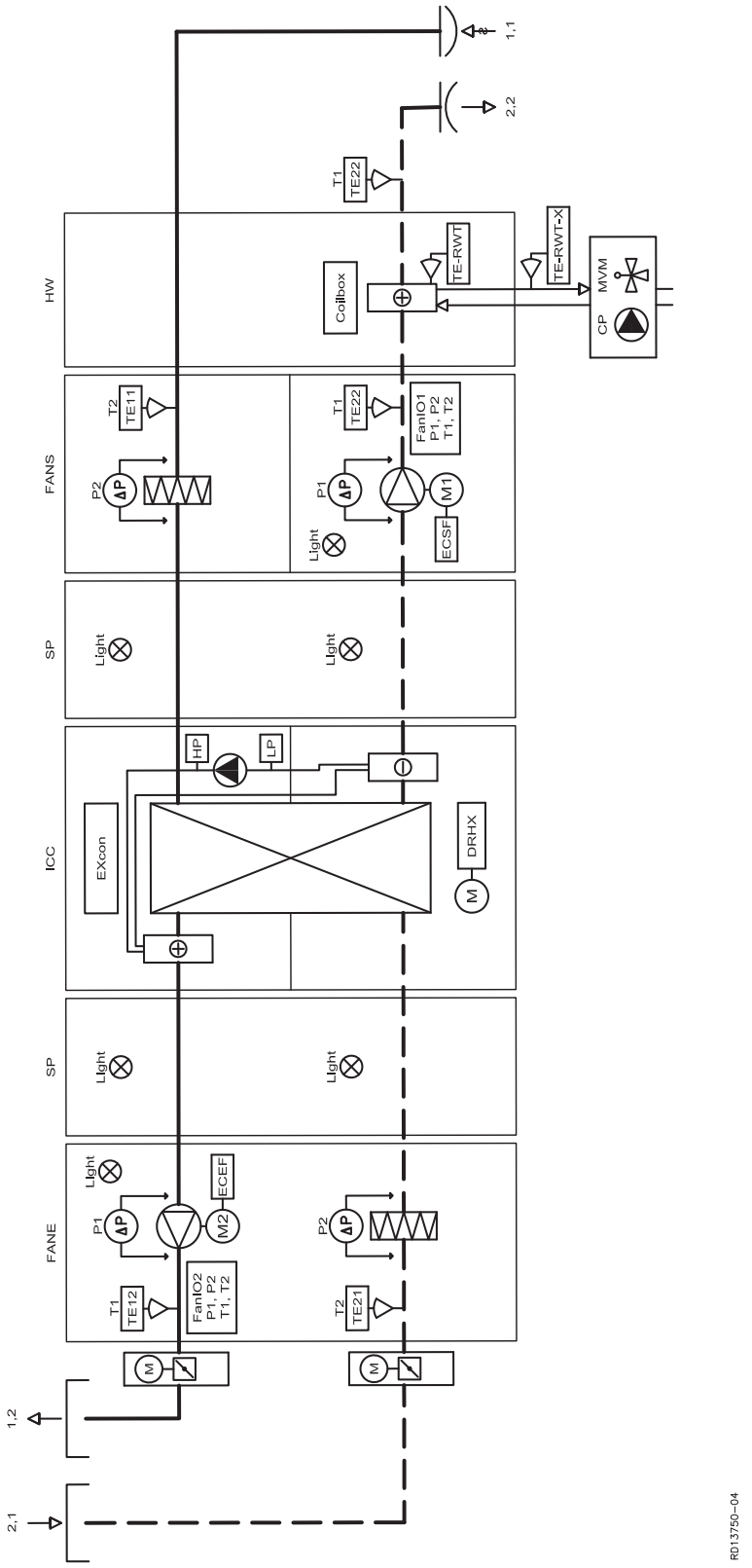
1.3 Terms used in the instructions - simplified diagrams

1.3.1 Diagram 1 - Air handling unit with rotor, mixer section (MR) and dual-coil (HW-CW).



EXHAUSTO

1.3.2 Diagram 2 - Air handling unit with rotor and integrated cooling (ICC) and water heating coil (HW).



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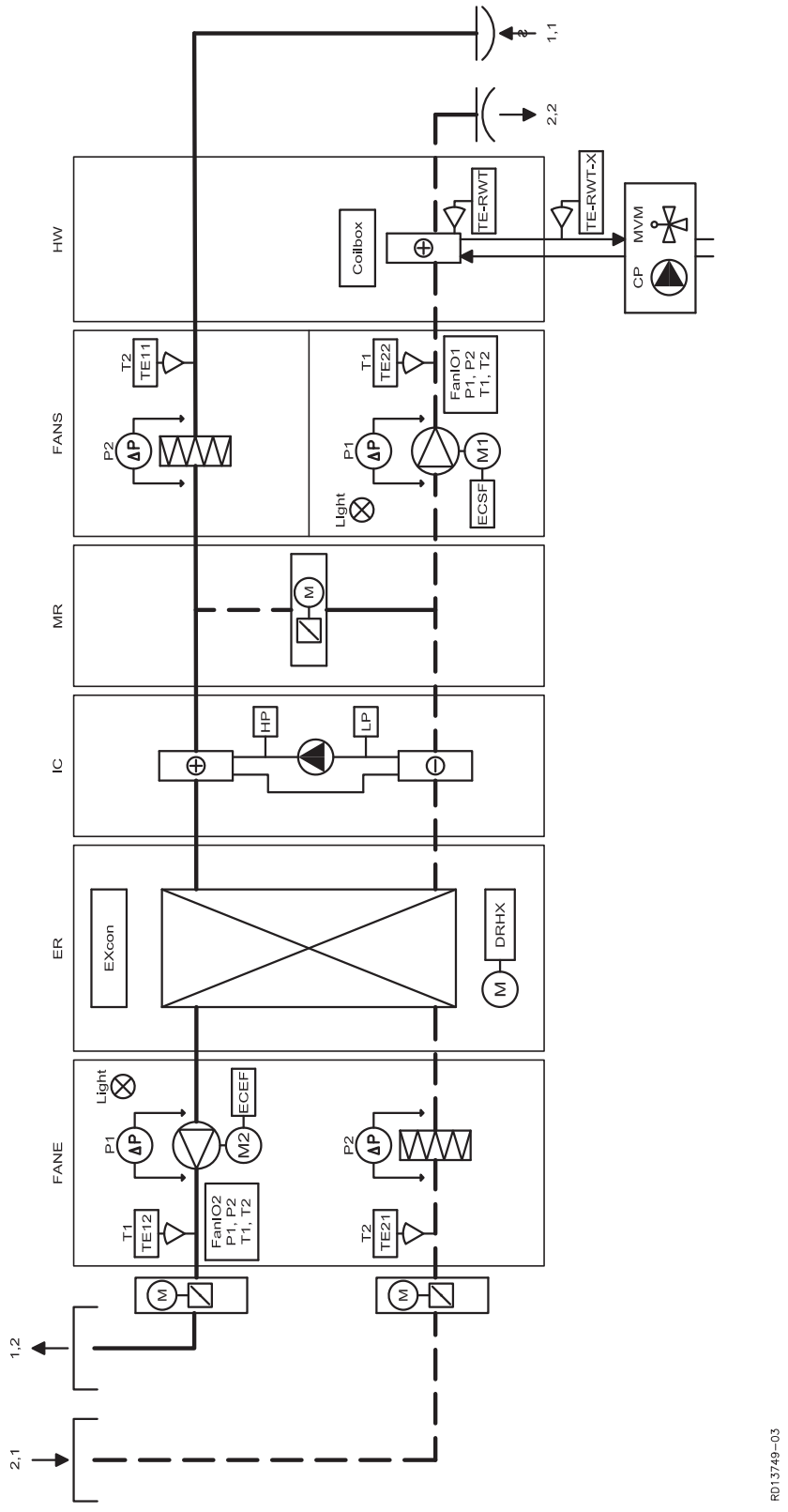
1.3.3 Diagram 3 - Air handling unit with rotor and integrated cooling without cold recovery (IC).



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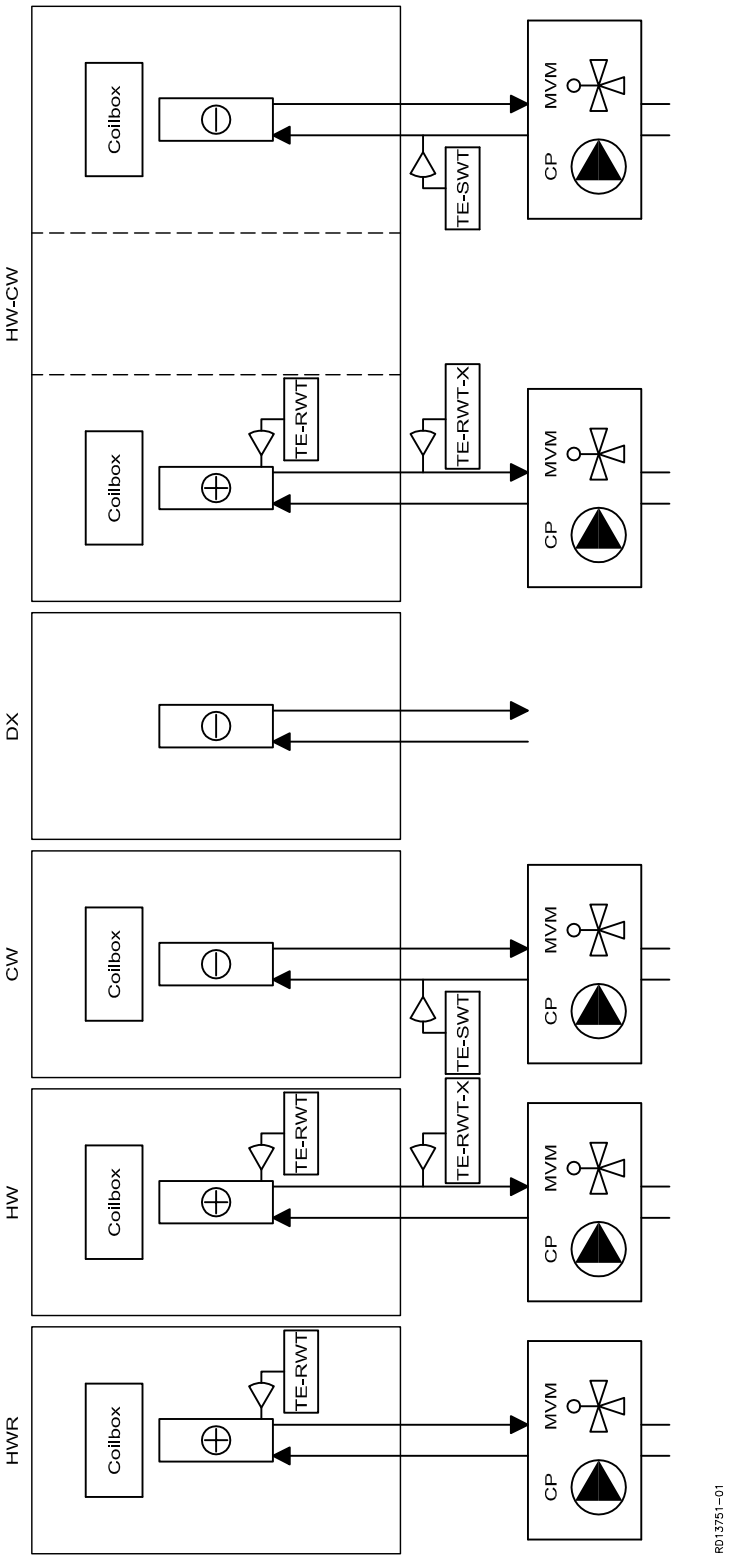
1.3.4 Diagram 4 - Various coils



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Designation	Function
1.1	Extract air
1.2	Exhaust air
2.1	Outdoor air
2.2	Supply air
Coil box	Control box coil
CP	Circulation pump
CW	Cooling coil (water cooled)
DX	Cooling coil (coolant)
ECEF	EC control for extract air motor
ECSF	EC control for supply air motor
ER	Rotor section
EXcon	EXcon control system panel
FANIO 1, P1	Airflow measurement, supply air
FANIO 2, P1	Airflow measurement, exhaust air
FANE/FANS	FAN sections (FAN**E** = EXHAUST), (FAN**S** = SUPPLY)
HP	High pressure transducer
HW	Water heating coil
HW-CW	Water heating coil - cooling coil
HWR	Heat recovery coil (store solution)
IC	Integrated cooling machine
ICC	Rotary heat exchanger with integrated cooling machine
Light	Light in the section
LP	Low pressure transducer
MVM	Motor valve
MR	Mixer section
DRHX	Control unit for the rotary heat exchanger
SP	Empty section
TE11	Temperature sensor, extract air
TE12	Temperature sensor, exhaust air
TE21	Temperature sensor, outdoor air
TE22	Temperature sensor, supply air
TE-RWT	Return water temperature sensor
TS-RWT-X	External return water temperature sensor
TE-SWT	Supply temperature sensor

1.4 Location requirements

1.4.1 Installation site requirements

Space requirements There must be free space in front of the air handling unit along the whole length to ensure easy access for inspection and servicing. The doors must be able to be opened to their entire width, i.e. for inspection this is at least 950 mm.

In connection with servicing, it is recommended that the service area is as wide as the air handling unit, since all of the components can thus be easily taken out.

Outdoor

Air handling units installed on roofs may not be incorporated as part of the roof cover of the building. The air handling units must have a complete roof deck under them.

1.4.2 Requirements for underlying surface

When installing the sections, the surface must be:

- flat
- level (+/- 3 mm per metre)
- hard
- resistant to vibration

1.4.3 Requirements for duct system

Silencers

The duct system must be fitted with silencers specified by the Project Manager, in accordance with the requirements of the operating area.

Bends (only for plenum fans)

A duct bend may be fitted immediately after the unit, because the airflow in the spigot has a uniformly moderate speed profile, which results in negligible system pressure loss.

Bends (only for axial fans, ZerAx®)

It is recommended that a straight length of pipe is fitted after the axial fan with a length that is 3 x the fan's diameter, before any bend is added.

Insulation

The duct system must be insulated against:

- **Condensation**
- **Sound emission**
- **Thermal loss**

Condensation

Condensation in the ducts may occur when the exhaust/outdoor air has high humidity. EXHAUSTO recommends a condensation outlet is also fitted at the lowest point in the ducts.

No duct connection

If one or more of the spigots is not connected to a duct: Fit a protective net to the spigots with a maximum mesh width of 20 mm.

2. Handling and transport

2.1 Transport and delivery

2.1.1 Once the VEX has arrived at the assembly site

- Check the air handling unit and any supplied accessories for any transport damage immediately on arrival at the assembly site.
- Check that the delivery is complete.

If there is damage or something is missing, point this out immediately to the haulier.

2.1.2 Delivery

Overall the delivery consists of:

- VEX unit, assembled or in sections and designed for indoor or outdoor assembly, see the subsequent table.
- Supplied loose parts and accessories.

2.1.3 VEX delivered assembled or in sections

Assembly site	Delivery	VEX size	Set-up method	NB:
Indoor	Sectional VEX	4010-4100	Feet	If required, fit adjustment screws on the feet.
		4010-4070	100 mm base for manual assembly.	If required, fit adjustment screws on the base.
		4080-4100	Fit on site on 200 mm trestle/UPE base	If required, fit adjustment screws on the base.
Outdoor	Sectional VEX	4010-4100	Fit on site on 200 mm trestle base 0-4000 mm.	If required, fit adjustment screws on the base.
			Fit on site on 200 mm UPE base 4000-8000 mm.	If required, fit adjustment screws on the base.
	Assembled VEX	4010-4100	Fitted on 200 mm trestle base 0-4000 mm.	If required, fit adjustment screws on the base.
			Fitted on 200 mm UPE base 4000-8000 mm.	If required, fit adjustment screws on the base.

Supplied loose for assembled or sectional VEX

- Base - Base is supplied separately incl. bolts and fitting for securing the air handling unit to the base.
- Any screws (accessories) for alignment are also enclosed in the packaging with loose parts.

Supplied loose only for sectional VEX

- 4 x simple exterior assembly fittings (EBS4000).

2.1.4 Weight

EXSELECTPRO

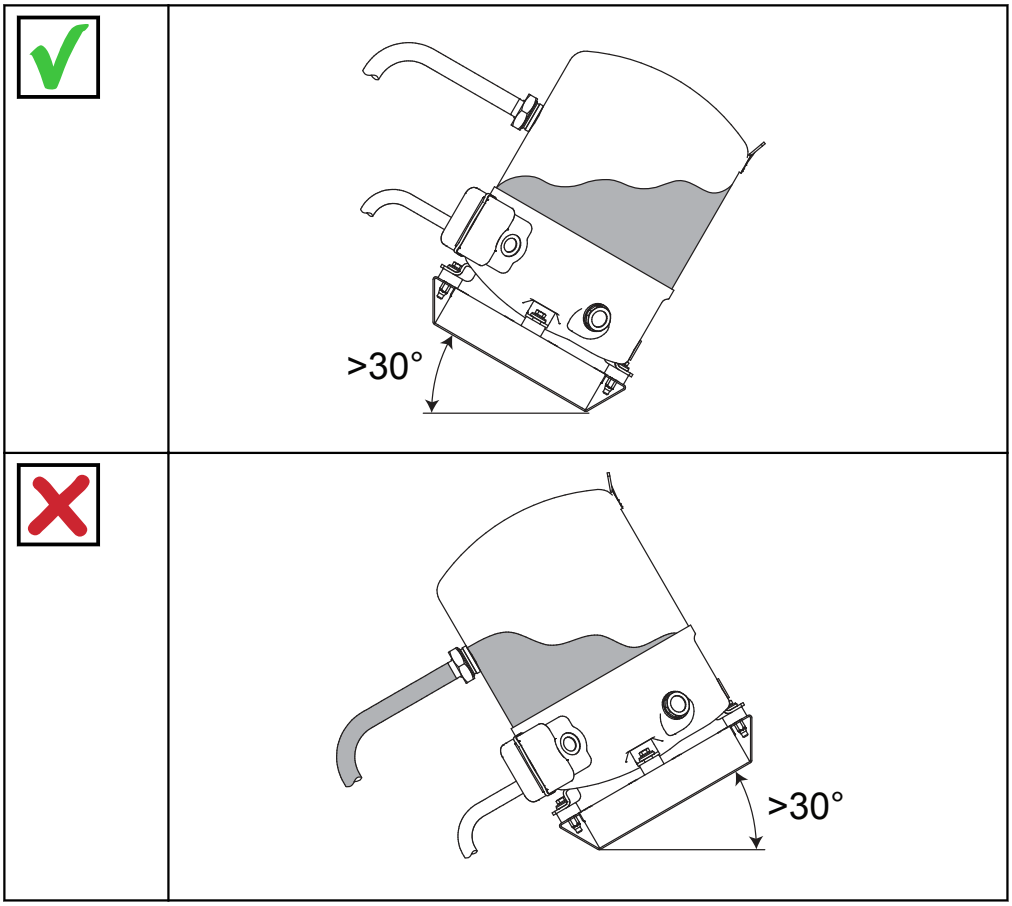
The air handling unit's assembled weight and dimensions, and the weight and dimensions of the individual sections are stated on the supplied print out from the calculation program EXselectPRO.

2.1.5 Handling the air handling unit

VEX4000 is supplied either as an assembled or sectional unit. In both cases, the remaining transport is executed using a forklift truck or crane, depending on the conditions at the assembly site.

Specially for cooling machine, integrated cooling IC/ICC

If the air handling unit is supplied with a section with a cooling machine: Always transport this section on a max. incline of 30°, to avoid oil running from the compressor. If the incline exceeds 30°, the suction spigot on the compressor must face upwards.

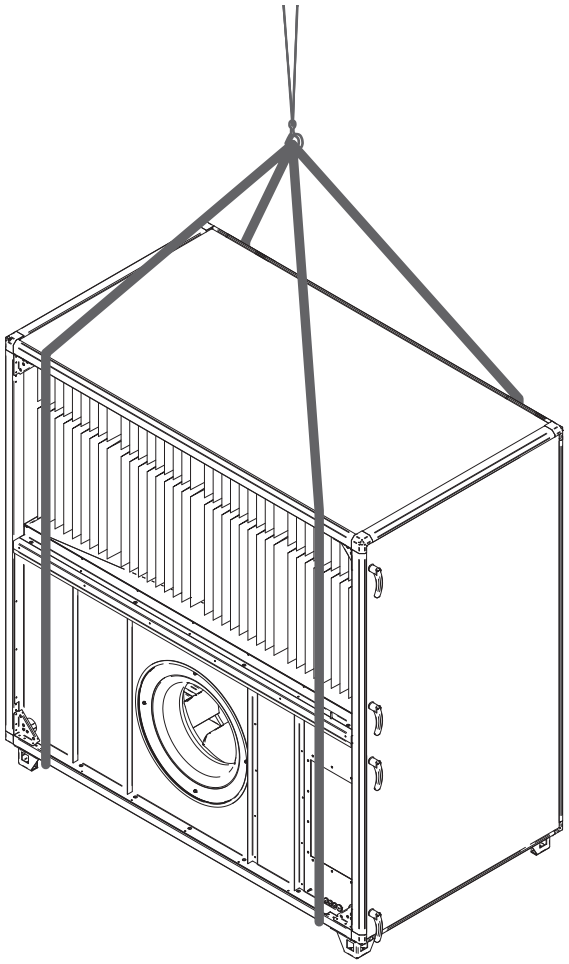


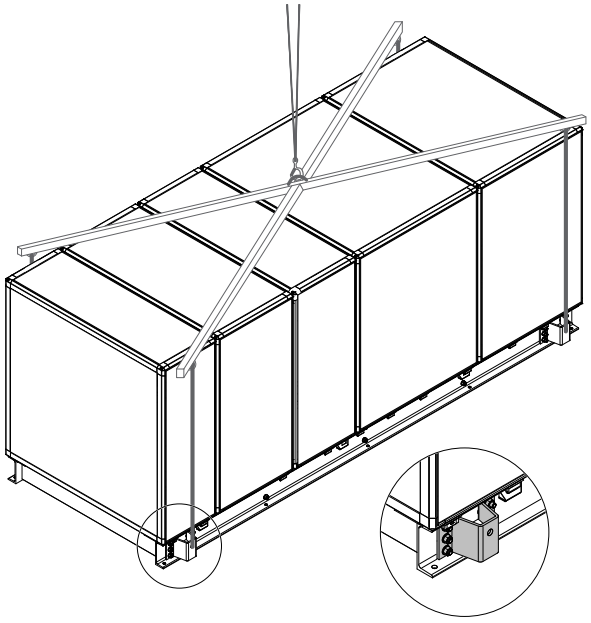
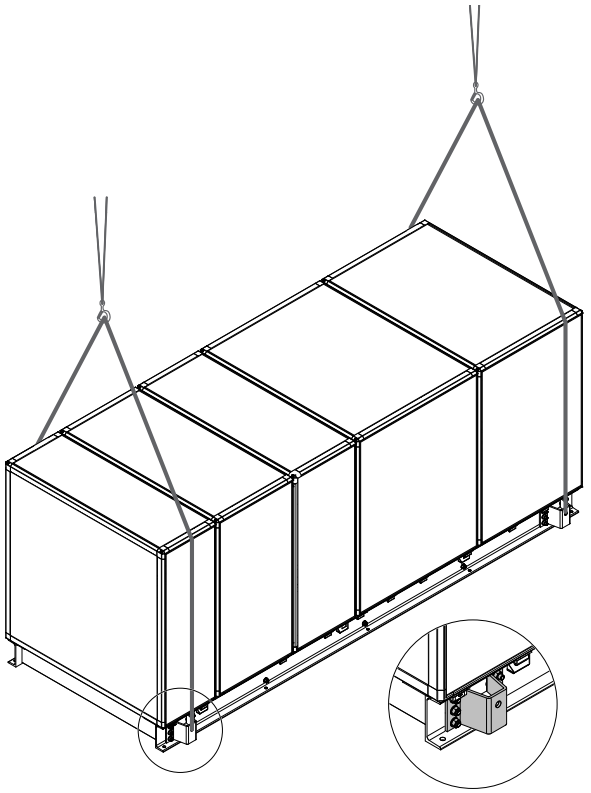
Lifting with forklift truck

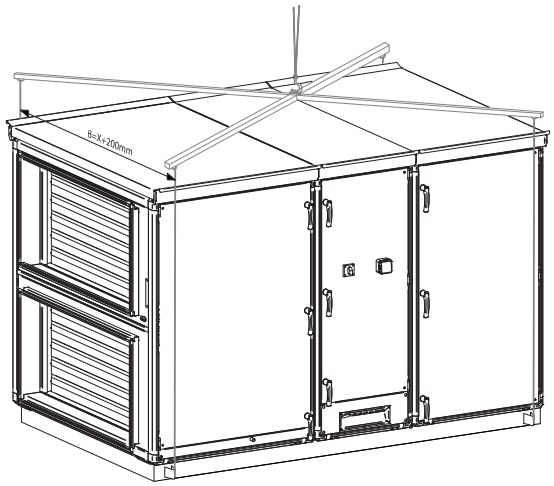
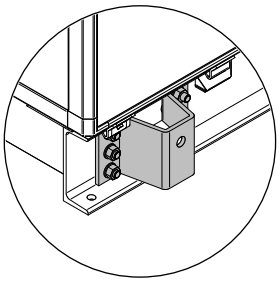
Transport with forklift truck: The truck forks must extend all the way under the section and lift on the frame on both sides of the section. Nothing should be moved/stored on the top of the sections.

Lifting by crane

For safety reasons, a shackle must be used when lifting by crane.

Lifting the sections	Lifting
• Check the weight on the information plate on the specific section. • Use a minimum of two straps.	

Lifting the assembled air handling unit on base (indoors)	**Lifting**
Check the weight of the whole air handling unit against the type plate on the heat exchanger section.	
When lifting with a lifting beam: ● Check the weight of the whole air handling unit against the type plate on the heat exchanger section. ● Use the rigging fixtures which are fitted on the base. ● The lifting beam must have a width that is +200 mm wider than the assembled air handling unit.	 Rigging fixture
When lifting with straps: ● Check the weight of the whole air handling unit against the type plate on the heat exchanger section. ● Use the rigging fixtures which are fitted on the base.	 Rigging fixture

Lifting the assembled air handling unit on base (outdoors)	Lifting
Check the weight of the whole air handling unit against the type plate on the heat exchanger section.	
When lifting with a lifting beam: ● Use the rigging fixtures which are fitted on the base. ● The lifting beam must have a width that is +200 mm wider than the assembled air handling unit incl. gutters.	  Rigging fixture

2.2 Storage and unpacking

2.2.1 Before unpacking

Unpacking

In general, the product should be protected from dust before it is started – this is due to dust and hygiene considerations.

2.2.2 Storage and unpacking

Indoor/outdoor storage

VEX4000 air handling units are supplied either assembled or in sections, packaged in plastic.

Indoor storage	Outdoor storage
● In the case of long-term storage, the plastic packaging may be required be opened at the bottom, so that there is ventilation under the cover, while still preventing soiling. ● VEX air handling units or sections must be stored indoors in premises where the air is dry. ● When storing for more than three months, the fan impellers should be regularly turned by hand.	● Sections must be covered in a way that ensures there is ventilation under the cover to avoid condensation. ● Assembled air handling units with roofs, which are designed for outdoor assembly may be stored outside but they should be covered over to prevent soiling on the construction site. If required, open at the bottom, so that there is ventilation under the cover, while still preventing soiling.

3. Mechanical assembly

3.1 Installing the air handling unit - procedure

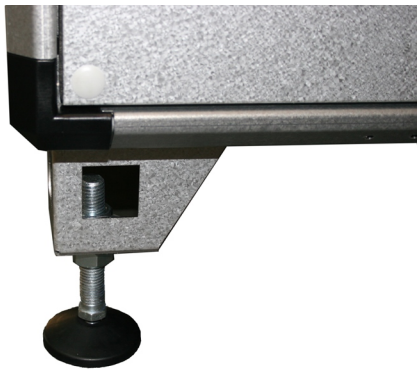
3.1.1 Procedure for assembly

The following chapter describes the mechanical assembly of the VEX unit. The main points for assembly are:

1. Set the air handling unit on feet or on a base - level out.
2. Tighten the air handling unit together with the supplied fittings.
3. Connect plugs and sockets
4. Connect the condensation tray(s) to the condensation outlet.
5. Fit any handles onto the doors.
6. Connect the ducts.
7. Connect cooling coil to cooling machine (optional)
8. Ready the heat exchanger (rotary or crossflow heat exchanger).

3.2 Preparation for installation

3.2.1 Fitting of adjustment screws

• Slightly raise the section so that the feet are free. • Fit the adjustment screws below the feet.	

3.2.2 Units with cross-flow heat exchanger

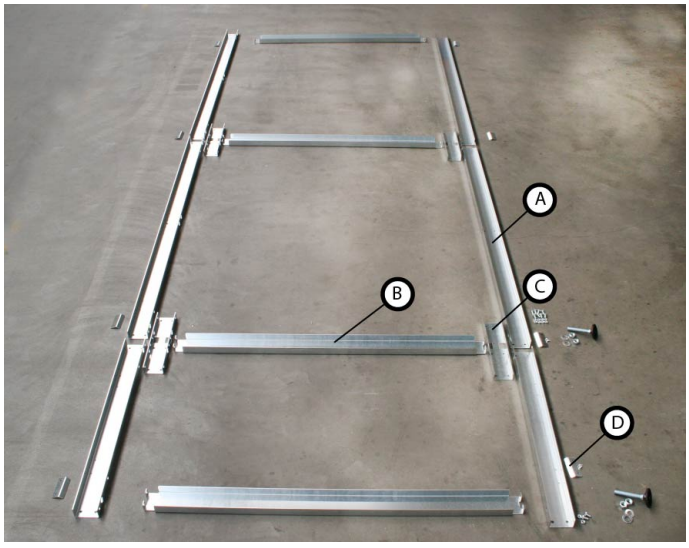
Description	Photo
• Mount the fan section guide panels with the accompanying screws. ⚠ **Guide panels must be mounted before the sections are assembled.**	

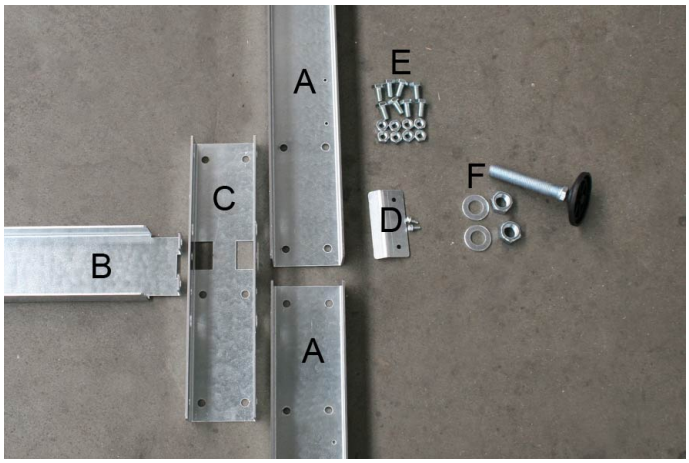
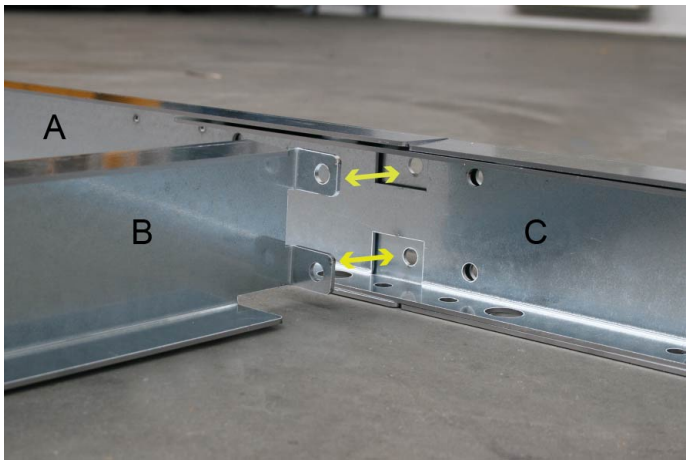
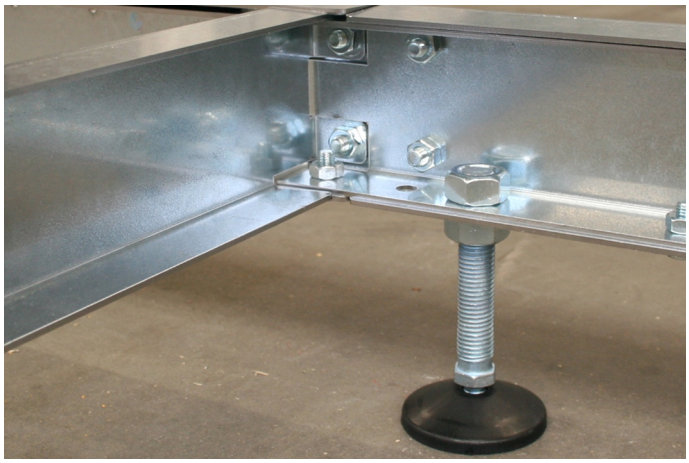
NB: Applies only to VEX sizes 4080, 4090 and 4100.

3.3 Installing a sectional VEX

3.3.1 Assembly of manual-assembly base

⚠ **The base must be completely level, otherwise the sections will twist and the doors will not seal properly when closed.**

Step (1-6)	Action	Photo
1	• Lay out the side members (A), crossbars (B) and mounting tabs (C) on the ground to get an overview of the assembly. ⚠ **NB: The cross members are of varying length and must be set so they match two and two opposite each other**	

Step (1-6)	Action	Photo
2	In addition, the parts to the base are: - Side guide for base (D) - Bolts and nuts for assembly of base (E) - Adjustment screws for base (F)	
3	• Assemble the cross members (A) using the brackets (C) and fit the crossbars (B).	
4	• Fit the adjustment screws (F) last. The distance between the adjustment screws or other support may not exceed 1210 mm, this is ensured by using the assembly holes in the side members.	

Step (1-6)	Action	Photo
5		
6	• Fit the side brackets (D) once the air handling units is placed on the base.	

3.3.2 Positioning of sections

The individual sections' section number + the total number of sections which the VEX consists of (e.g. 3/5) is stated on the information plate. The numbers are always from left to right (1,2,3,4...).

Fitting tightened by degrees

⚠ **The sections must be tightened together over time as they are set up, because of the access conditions.**

The next section is moved onto the base and pushed up against the previous section. The sections must be positioned precisely against each other and adjusted in respect to the base. Internally, the fitting is secured with screws and bolts, or the exterior assembly fittings are used if the access conditions, especially for the rear fitting, are too restricted. See the section "Fitting" for additional information about the different assembly methods.

⚠ **Important - The holes in the fittings may not be enlarged. Instead correct the base or the sections. The joins must be tight for the sake of the unit's output.**

3.4 Fittings

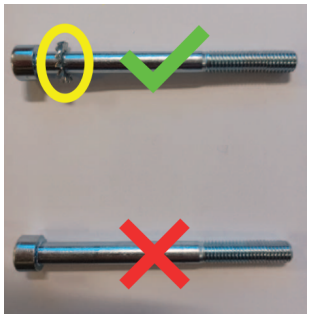
3.4.1 Section assembly fitting

The VEX4000 sections can be tightened together in several different ways, depending on what is appropriate for the assembly site, and the order of the sections.

There are four types of fittings:	
- Bolt for interior fittings in sections	
- Simple exterior assembly fitting ⚠ **Only with fixed panels**	
- Exterior threaded fitting for assembly of the unit in the feet	
- Bolt for assembly in feet	

3.4.2 Interior fitting

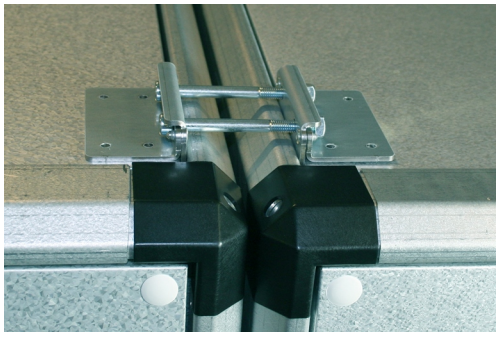
Important Remember to use the supplied toothed discs for correct clamping and potential equalisation

Assembly	
	 

3.4.3 Simple exterior assembly fitting (EBS4000) - rear or top

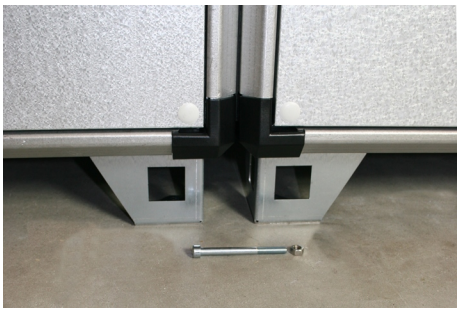
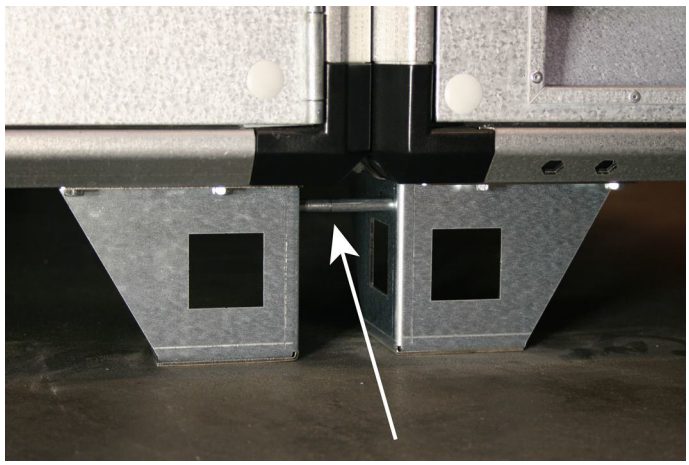
In those cases where it is difficult to get to the rear interior fittings and tighten the sections together, the exterior assembly fitting can be used both on the rear and on the top.

Description	Photo
Supplied fitting	
Secure fitting on the sections	
Top of sections Example: Fitting fitted on top rear of sections	
Bottom of sections Example: Fitting fitted on bottom rear of sections	

Description	Photo
On the top of sections Example: Fitting fitted on the top of sections	

3.4.4 Fitting for feet

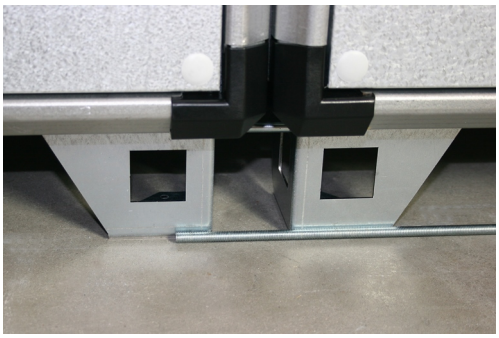
Fitting used for assembly of the air handling unit, when the available space makes it difficult to use the interior assembly fitting.

Assembly	
	
	

3.4.5 Threaded bar fitting, assembly via feet on rear of the VEX

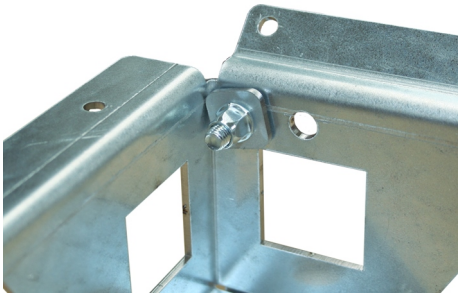
The fitting is used when the interior and exterior assembly fitting cannot be used. It is typically used when the air handling unit is installed next to a wall and because of problems with space, an exterior assembly fitting cannot be positioned on the rear.

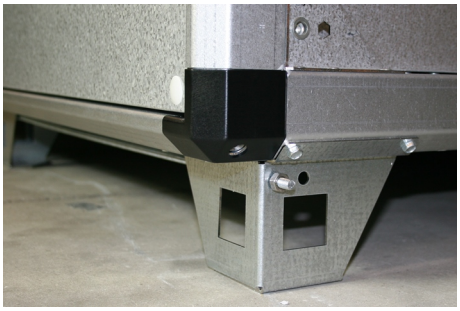
Mark up the threaded bar once the sections have been correctly set up.



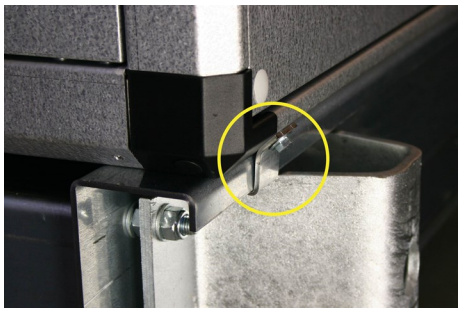
Shorten the threaded bar to the measured length.

NB: use the hole closet to the corner in the foot. The square nut will "lock" against the foot, so the nut can be tightened in the other end of the threaded bar. See details below.





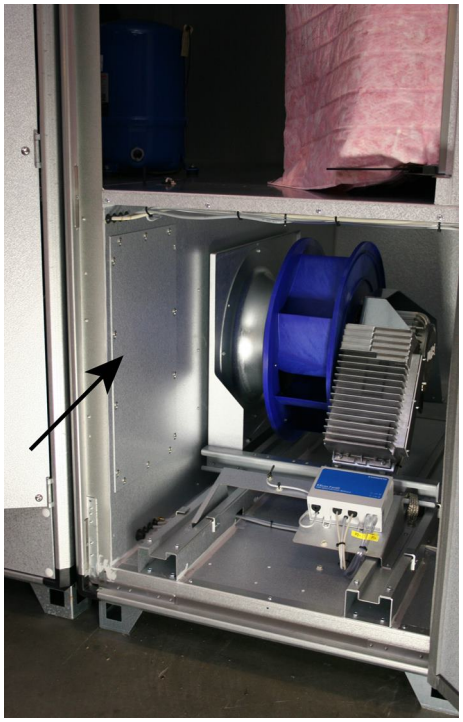
3.4.6 Base fitting

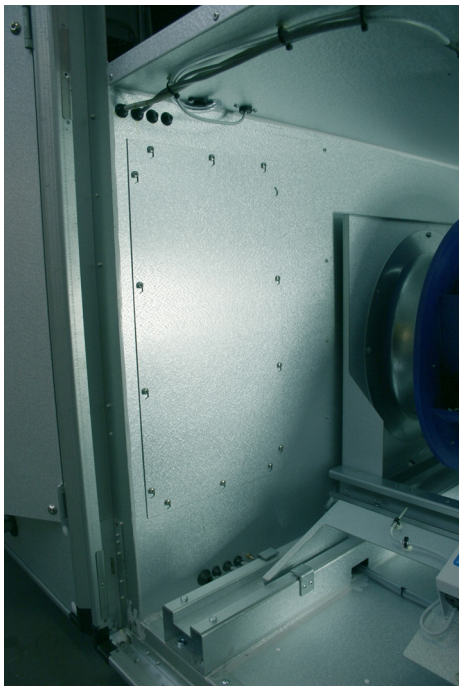
Description	Photo
• Fitting for base behind VEX	
⚠ **The base fitting must always be used when the base has been supplied loose.**	

3.5 Special assembly factors

3.5.1 Inspection hatch(es) in different sections

Fan section

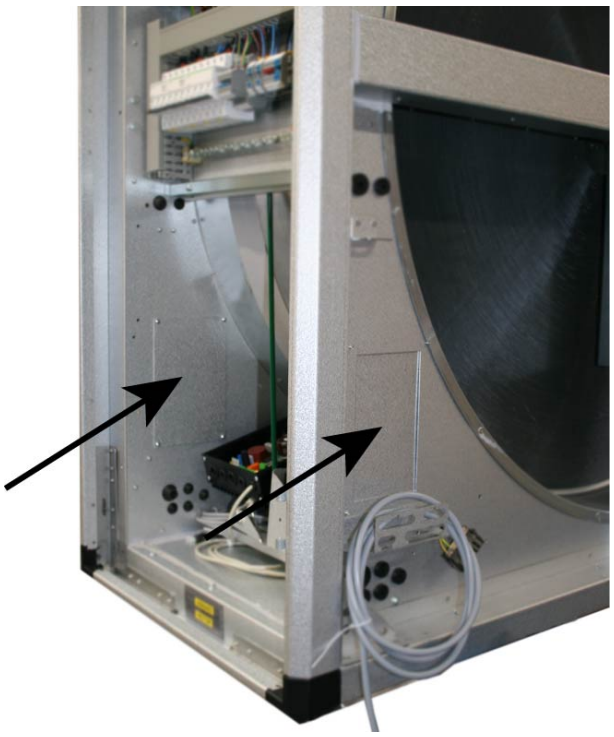
Description	Photo
If the access conditions are restricting, access from the fan section to the adjacent section takes place via the inspection hatch in the fan section.	

• Loosen the screws, push the hatch up and put it to the side. ⚠ **REMEMBER to re-fit the hatch before staring up the VEX.**	

Access to assembly fitting via the membrane sleeve

Description	Photo
• Remove the rubber membrane to access the section assembly fitting (fan section).	

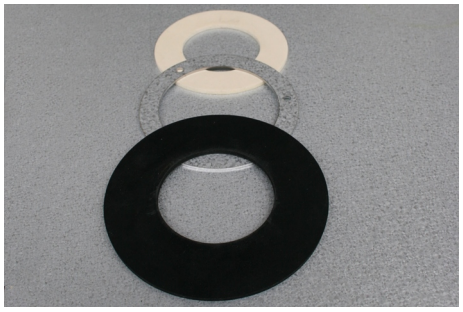
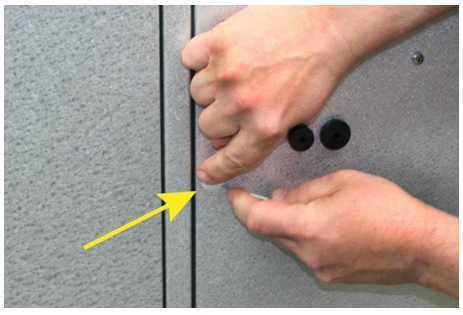
Rotor section

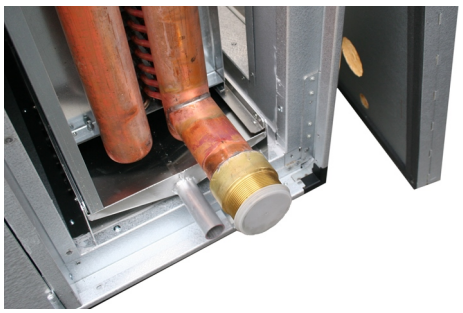
Description	Photo
Use the inspection hatches in the rotor section, if the access conditions for assembly or servicing on the adjacent sections is restricted.	

3.5.2 Removing cooling/heating coil (CW, HW, HWR)

If the access conditions in the VEX make it difficult to tighten the interior rear fitting, it may be helpful to take the coil out of the section.

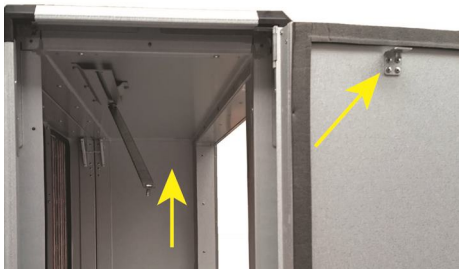
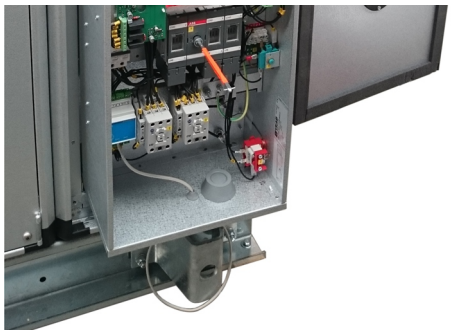
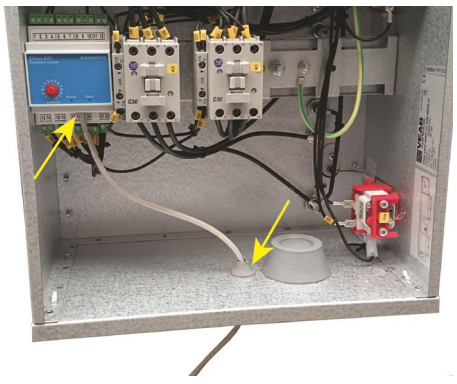
Step	Action	Picture:
1a	There is a rubber adapter on the spigots on smaller coils. ● Loose any adapters from the panel (only necessary if the panel must be completely removed, otherwise the coil can be lifted out with the panel in place) and go to point 6 on the table.	
1b	There is a rubber flange on the spigots on large coils. ● Follow point 2b-5b to remove the flanges.	

Step	Action	Picture:
2b	Remove the exterior flange and two interior flanges on the spigots.	
3b.	• Remove the exterior black rubber flange.	
4b	• Unscrew the screws that hold the interior flanges.	
5b	• Remove the interior flanges.	
6a	• Remove all of the plugs on the panel.	

Step	Action	Picture:
7a+b	• Unscrew all of the screws that hold the panel.	
8a+b	• The panel can now be removed.	
9a+b	• The coil is positioned loosely on a rail above the condensation tray.	
10a+b	• Pull the coil out. • On large sized VEX units: To lift the last part out of the section requires two people.	
11a+b	Now there is access to the rear of the VEX and the condensation tray.	

3.5.3 Removal of electric heating coil (HE)

If the access conditions in the VEX make it difficult to tighten the interior rear fitting, it may be helpful to take the coil out of the section.

Step	Action	Picture:
1	Lift off the door hinge at the top so the section door can be fully opened.	
2	Remove all plugs from the panel and unscrew the screws. The panel can now be removed.	
3	Position the coil loosely on a rail in the section.	
4	Draw out the heating coil slightly to free the cable bushing at the bottom from the section.	
5	Remove the plug from the Extension module and pull out the cable and bushing through the base of the heating coil.	

Step	Action	Picture:
6	Pull out the coil and place it on an even substrate. On large sized VEX units: To lift the last part out of the section requires two people.	
7	There is now access to the rear of the VEX.	

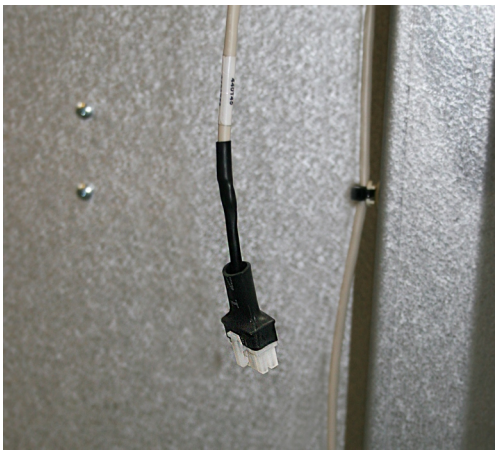
Fitting half sections (single height)

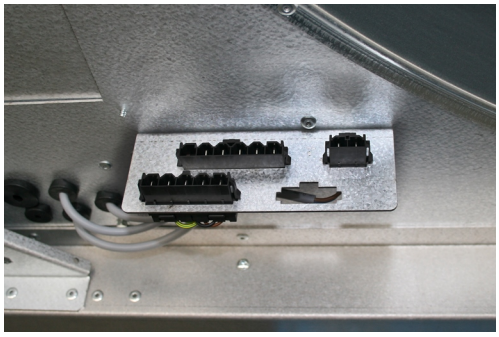
Half sections that shall be fitted on the top of the air stream must always be supported – including during assembly. The fixture for this is not part of the EXHAUSTO delivery.

3.6 Connection of plugs and sockets

3.6.1 Connection of plugs and sockets

⚠ **Ensure that neither connectors or conductors are crushed or damaged in any way when two sections are placed against each other and tightened.**

Description	
Connectors are coded, which makes assembly easier as a connector cannot be connected to the wrong connection.	

Description	
The plug outlets carry live voltage, while the contact plugs from the adjacent sections are dead.	

3.7 Setting up an assembled outdoor VEX

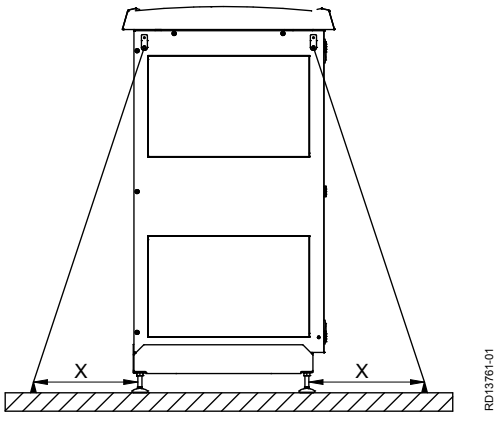
3.7.1 Assembled Outdoor VEX on base

Recommendation

EXHAUSTO recommends that the VEX unit is secured to the building to prevent it from becoming dislodged during a storm. The mounting tabs that are fitted in the end sections can be used for this purpose, see drawing in table below.

Securing the VEX unit to the building structure must be carried out in accordance with the specification from the project manager, who also calculates the value X (shown on the drawing in the table).

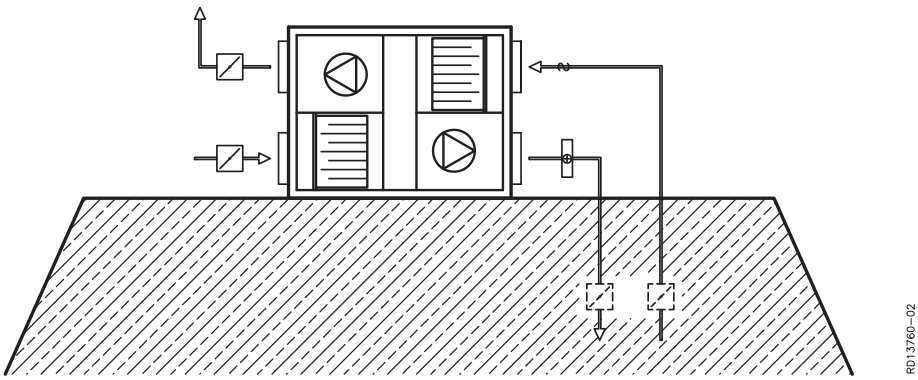
Assembly

Description	Photo/drawing
Four mounting tabs are supplied.	
• Secure wire to the mounting tab and to the building with at least X mm distance from the air handling unit's front and rear. This is done via cable eye stiffener, wire lock, catch or similar.	
• Fit the mounting tabs in the top side posts on the end sections. Fit two wires and secure to the building's terrace. **The mounting tab may be loaded by 5000 N parallel with the end gables of the air handling unit.**	

The project manager must ensure that the parts used and connection to the building can tolerate the specified pull.

Avoid condensation forming

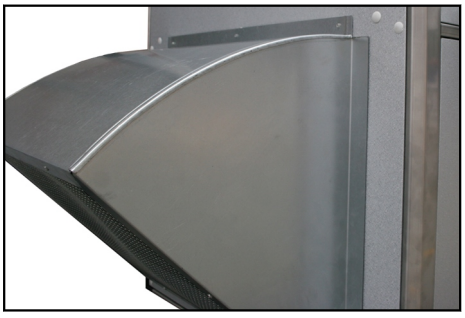
Condensation can occur in an outdoor air handling unit that is not operating if air from the building flows inside the air handling unit. The following is therefore recommended:



If the outdoor air handling unit	Then
is not immediately commissioned, or where there are periods where it is not operating,	depending on the ventilation ducts' set-up (positioning of damper etc.), it may be necessary to fit a supply air damper and an extract air damper, see the simplified diagram above. In case of doubt, contact EXHAUSTO for advice.

3.8 Exhaust air caps (accessories) Outdoor

3.8.1 Fitting of exhaust air/inlet cap

Step	Action
0	1. Exhaust air cap 2. Inlet cap 
1	**1. Exhaust air cap:** ● Fit the exhaust air cap on the spigot using screws all the way around.  

Step	Action
2	**2. Inlet cap:** ● The set consists of inlet cap, cover rails and sealing strip (not shown in photo). 
3	● Set the sealing strip on the spigot, exercise care to ensure the strip is fitted correctly. 
4	● Hold the inlet cap up against the spigot and slide the cover rail in across the spigot and inlet cap all the way around to lock the cap in place. 

3.9 Condensation outlet

3.9.1 Establishment of condensation outlet

The connection must be made by an authorised plumber.

The execution of the condensation outlet must take into consideration that the doors must be able to be opened, and that inspection, servicing and operation of the air handling unit should be unhindered.

A condensation outlet with water trap must be established from the following sections:

- Sections where cooling is included
- Crossflow heat exchanger
- Fan section with condensation tray

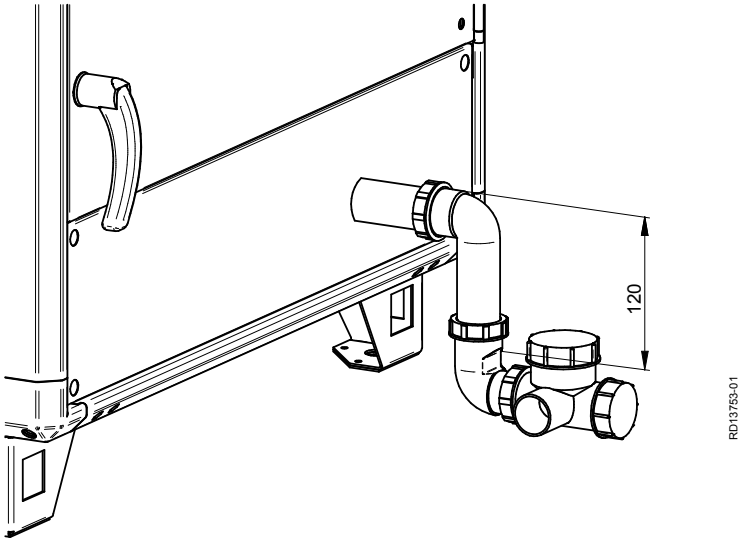
Location

The next drawing shows an example of how the drain for the condensate from the condensation outlet can be established, and the correct dimensions for the water trap. To achieve sufficient height, it may be necessary to fit the air handling unit on levelling screws, or where possible, make space down in the surface/floor. It is recommended that the H dimension is as large as possible, however, the pipe can be shortened if required, if the water trap is too high.

The outlet from the water trap is led to the drain with a gentle incline. The drain pipe must end above an open drain. There must be a water trap for each base tray in the air handling unit. Several water traps can be connected on the drain, with a gentle incline on all of the drain pipes. Max. negative pressure for water trap for the air handling unit is 1200 Pa. For correct, problem free operation, it is recommended that a siphon is fitted. This also applies to outdoor versions of air handling units.

Solution with Siphon water trap (accessory)

The Siphon water trap is easy to install and service.

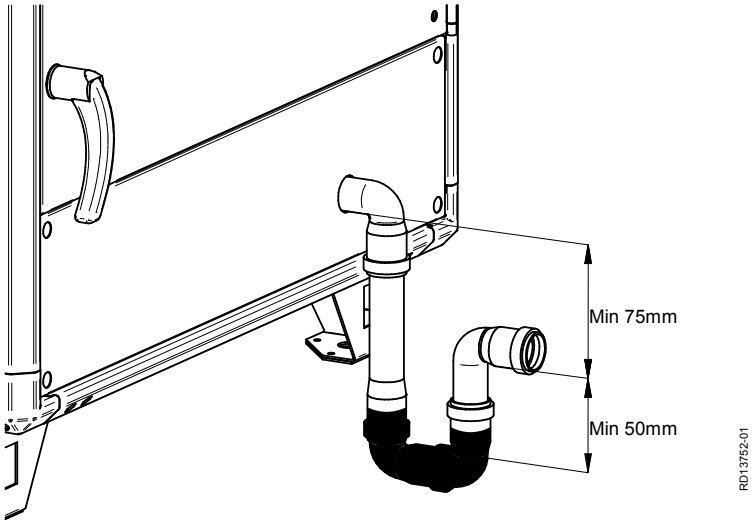


3.9.2 SIPHONE electrical heat tracing

It is recommended to protect the condensation outlet against frost damage by fitting a SIPHONE electrical heat tracing device on the outlet before the pipes are insulated. For fitting, see the device's fitting instructions.

3.9.3 Requirements for water trap

If a siphon water trap is not used, the water trap must be executed in accordance with the following dimensions:



If the air handling unit has been in operation with closed damper, the water trap must be checked and, if required, topped up with water.

3.10 Door locks

Adjustment of door lock

The door locks on the air handling unit can be adjusted in a horizontal or vertical direction.

Step	Action	
1	Open the door on which the lock needs to be adjusted	
2	Vertical adjustment: Loosen the two screws and adjust the part of the door lock that is located on the unit's frame. Adjustment range +/- 1.5 mm	
3	Horizontal adjustment: Loosen the three screws and adjust the part of the door lock located on the unit's door. Adjustment range +/- 1.5 mm	

Remember to tighten all screws after adjustment.

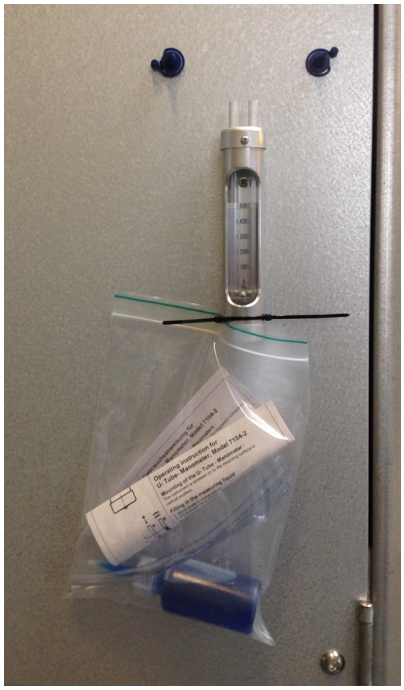
3.11 Filter monitor

3.11.1 Measuring pressure drop across filters (VDI6022)

According to VDI6022, the pressure drop across filter must always be readable during operation. Therefore, a pressure gauge (optional) must be fitted on each filter on the outside of the VEX. From two measuring points, on each side of the filter, hoses are laid inside the air handling unit to the hose spigots on the door. Two types of pressure gauge are available:

- U pipe manometer
- Magnehelic® pressure gauge

3.11.2 Commissioning the U pipe manometer



Step	Action
1	Fill the supplied manometer liquid, as stated on the included note.
2	Fit the hoses from each side of the hose spigot and down to the manometer's spigots.

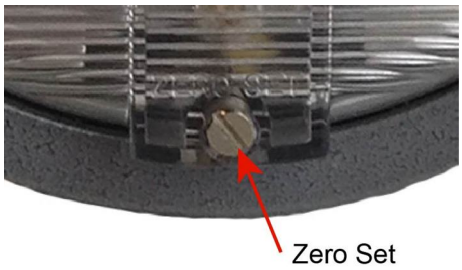
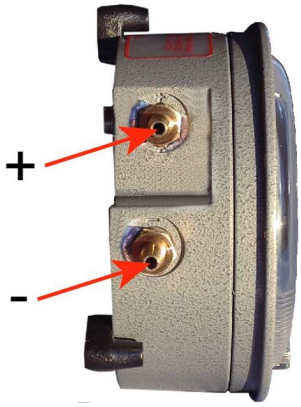
Note the temperature range.

The supplied liquid (with a density of 1.00) can tolerate temperatures in the range -20°C to +50°C. If the manometer has to operate in ambient temperatures that are less than -20°C, coolant must be added (with the same density) to the manometer liquid.

The filter pressure drop curves can be seen in the section "Technical data".

3.11.3 Commissioning the Magnehelic® pressure gauge

Step	Action

1	Before the hoses are fitted: ● If required, adjust the indicator so that it is on 0 by using the screw in the bottom of the gauge. 
2	● Fit the hoses from each side of the hose spigot and down to the pressure gauge's spigots. 

The filter pressure drop curves can be seen in the section "Technical data".

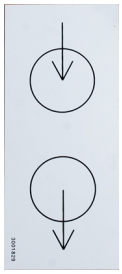
3.12 Connection of water heating coil

3.12.1 Connection of water heating coil

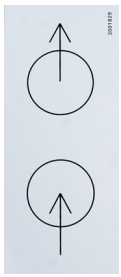
Supply and return flow occurs in pipes with connection spigots that run out through the front panel. The pipes are equipped with a spigot for air screws and a spigot for draining.

The supply and return flow on the heating coil can be seen via the label on the door.

Supply flow on the top spigot and return flow on the bottom spigot:



Return flow on the top spigot and supply flow on the bottom spigot:



The plumbing work must be carried out by an authorised plumber.

Hold extra counter force on the manifolds when connecting the heating coil to the pipe system.

Prevention against frost damage

The heating coil is protected from frost damage via a built-in control system, which opens the valve for water flow, stops the fan and closes the damper against outdoor air if there is a risk of frost damage. An inserted temperature sensor in the coil measures the liquid temperature in the return water header. An extra temperature sensor (optional) may be fitted on the return water pipe from the heating coil.

Insertion temperature sensor for return flow temperature

If water is connected to the air handling unit before the control system is connect, the coil must be protected against frost damage by forcing the valve open.

3.12.2 Ventilation requirements

Bleeding

#It is the responsibility of the contractor/customer to ensure that the bleeding option is correctly installed and that the building owner is informed of the risk of insufficient bleeding, regardless of whether the coil(s) in question are built into a ventilation system or mounted separately in the duct system. The following must be observed when bleeding liquid-coupled coils/heating and cooling batteries:

- The heating/cooling system must be arranged in accordance with DS469 so that they can be bled.
- Ventilation systems installed above suspended ceilings or outside on roofs are often the top point of the pipe system and therefore air is often collected in the system here.
- Bleeding points must be easily accessible.
- Bleeding points must be selected so that all air in the system can be bled.
- Air pots and automatic air vents should be considered so that air is collected before it enters the coils, despite the fact that many coils are equipped with a bleeding option.
- A lack of bleeding can lead to a lack of water flow and, ultimately, frost damage to the coils and subsequent water damage to the building.

Following connection of water supply to the unit:

- bleed the system thoroughly using the upper bleed screw on the water heating coil

Air screw	

Insufficient bleeding

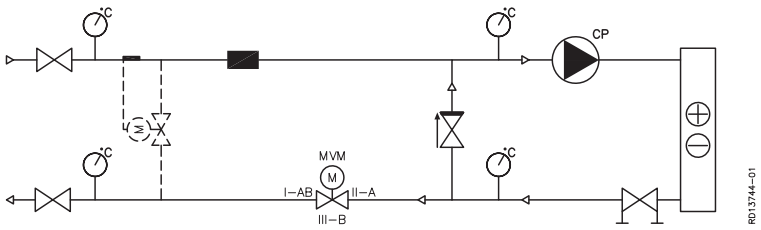
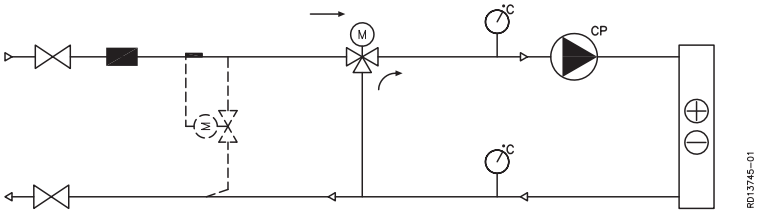
⚠ **Insufficient bleeding can result in still water forming in the system, which may result in frost-induced leaks during the winter.**

Insulate the supply pipe and heating coil

⚠ **Only for duct fitted coils: The pipes and heating coil must be insulated according to valid regulations.**

3.12.3 Principle diagram

Pipe penetrations in panels are equipped with seals on the innermost panel plates. The seals are fitted in the panels.

Type	Water heating circuit principle	Simplified diagram
Mixing loop 1	Variable flow in the primary circuit (supply) and constant flow in secondary circuit (VEX unit)	
Mixing loop 2	Variable flow in the primary circuit (supply) and in the secondary circuit (VEX unit)	

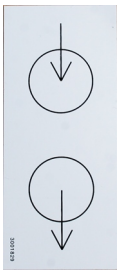
3.13 Connecting the cooling coil

3.13.1 Connecting the cooling coil

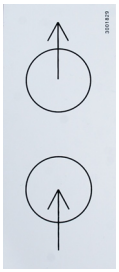
The coil is designed in the same way as the heating coil. The circulation coolant is connected to the spigots from the cooling coil that goes out through the front panel on the section.

The supply and return flow on the cooling coil can be seen via the label on the door.

Supply flow on the top spigot and return flow on the bottom spigot:



Return flow on the top spigot and supply flow on the bottom spigot:



EXHAUSTO

Supply air temperature sensor	

The plumbing work must be carried out by an authorised plumber.

Hold extra counter force on the manifolds when connecting the cooling coil to the pipe system.

3.13.2 Ventilation requirements

Bleeding

#It is the responsibility of the contractor/customer to ensure that the bleeding option is correctly installed and that the building owner is informed of the risk of insufficient bleeding, regardless of whether the coil(s) in question are built into a ventilation system or mounted separately in the duct system. The following must be observed when bleeding liquid-coupled coils/heating and cooling batteries:

- The heating/cooling system must be arranged in accordance with DS469 so that they can be bled.
- Ventilation systems installed above suspended ceilings or outside on roofs are often the top point of the pipe system and therefore air is often collected in the system here.
- Bleeding points must be easily accessible.
- Bleeding points must be selected so that all air in the system can be bled.
- Air pots and automatic air vents should be considered so that air is collected before it enters the coils, despite the fact that many coils are equipped with a bleeding option.
- A lack of bleeding can lead to a lack of water flow and, ultimately, frost damage to the coils and subsequent water damage to the building.

Following connection of water supply to the unit:

- bleed the system thoroughly using the upper bleed screw on the water heating coil

Air screw	

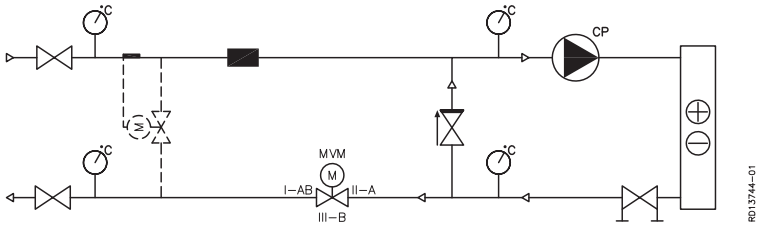
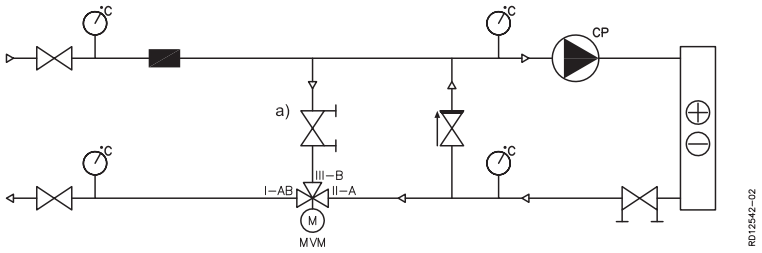
Insufficient bleeding

Insufficient bleeding can result in still water forming in the system, which may result in frost-induced leaks during cold spells.

Insulate the supply pipe and heating coil

Only for duct fitted coils: The pipes and heating coil must be insulated according to applicable regulations

3.13.3 Simplified diagram coolant

Type	Coolant circuit principle	Simplified diagram
Mixing loop 1	Variable flow in the primary circuit (supply) and constant flow in secondary circuit (VEX unit)	
Mixing loop 2	Variable flow in the primary circuit (supply) and constant flow in secondary circuit (VEX unit) a) The valve must be adjusted on the basis of the volume of liquid required in the primary circuit.	

3.14 DX Cooling

3.14.1 General warnings for a unit with DX cooling

Note that the coolant from the evaporator must be collected and disposed of in accordance with national regulations concerning the disposal of coolants.

Note that if the door is opened in the cooling section, there is a risk of frostbite from touching cold components.

If coolant has escaped into the room, personnel may only be present in the room if they are wearing respiratory protection. Coolant is odourless, but displaces oxygen in the room and thus can lead to suffocation.

3.14.2 Connection

Connection of the DX section must be performed by an authorised cooling company.

The pipe layout must be carried out by an authorised cooling technician

The permitted pressure, which is stated for the cooling coil, must be maintained. (Max pressure is 42 bar)

Avoid contact with coolant and use personal protective equipment in accordance with national regulations.

3.14.3 Technical data

EXselectPRO

Technical data regarding the connection of the DX cooling coil is given on the accompanying print-out from the EXselectPRO calculation program.

3.15 Integrated cooling IC/ICC

3.15.1 General warnings for a unit with integrated cooling

Note that the coolant from the condenser and evaporator must be collected and disposed of in accordance with national regulations concerning the disposal of coolants.

Note that if the door is opened in the cooling section, there is a risk of frostbite from touching cold components.

Condenser and pipe can be warm.

If coolant has escaped into the room, personnel may only be present in the room if they are wearing respiratory protection. Coolant is odourless, but displaces oxygen in the room and thus can lead to suffocation.

3.15.2 Connection

The cooling machine must be fitted and inspected by an authorised fitter. See Maintenance logbook for cooling unit.

NB: Set the compressor's frequency converter after installing the display shown here. The display can be ordered as an accessory.

The permitted pressure, which is stated for the cooling/condenser coil, must be maintained. (Max pressure is 42 bar)

Avoid contact with coolant and use personal protective equipment in accordance with national regulations.

3.16 Motor valve

3.16.1 Motor valve, MV2W/MV3W

2-way or 3-way valve

Together with the water heating coil, a modulating 2-way or 3-way 2-10 V motor valve for the control of water flow is supplied. The valve is fitted on or just after the return flow spigot from the heating coil.

Fitting motor valve

The valve must not be fitted with the motor facing down

Screening

Screen the valve motor from direct sunlight. Due to heat emissions, the valve motor must not be encapsulated (max. ambient temperature: 50°C).

Isolation of valve and valve motor

To ensure normal operation at ambient temperatures below 0°C, it is very important that the valve section is insulated according to current standards/procedures.

Regulation properties

The control of the motorised control valve is best when the differential pressure is below 200 kPa. See EXselect Pro print out for value of Kvs.

Heat supply

The heat supply **must** be constant.

Outdoor unit

When installing outside, the motor valve must be protected against penetrating water and frost.

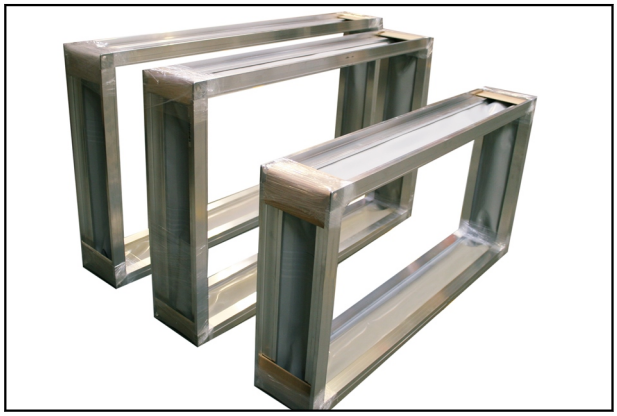
3.17 Duct connections

3.17.1 Duct connection

The air handling unit can be supplied with LS/Metu duct connection/flanges

3.17.2 Flexible duct system connections (optional), only for METU connections.

The VEX4000 series of air handling units can be ordered with flexible duct system connections. Flexible duct system connections are used to attenuate any vibrations out in the duct system.



Potential equalisation: If the air handling unit is fitted in accordance with EN3803, then potential equalisation must be fitted between the air handling unit and the duct system at the flexible duct system connections.

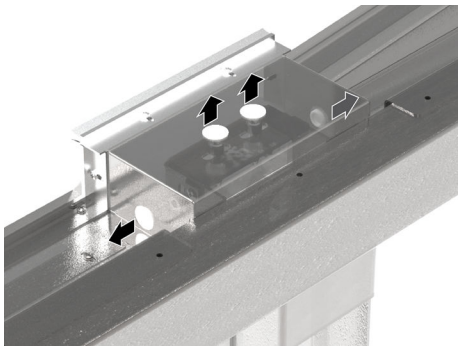
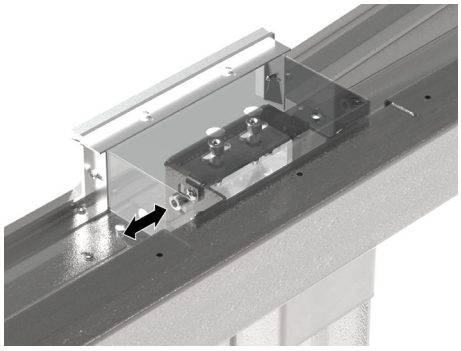
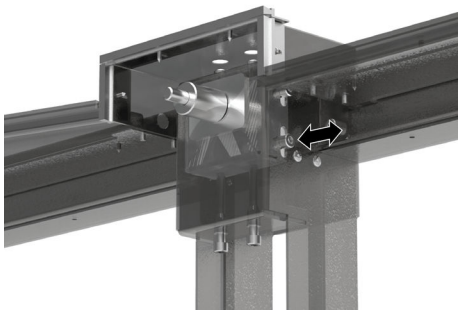
3.18 Air handling units with rotary heat exchangers

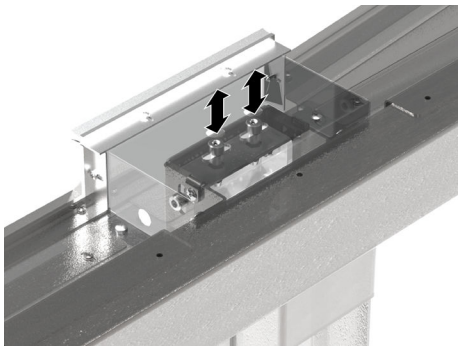
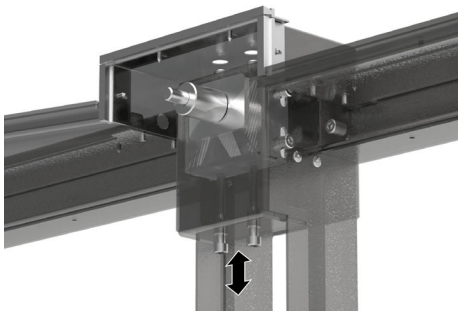
3.18.1 Rotor section

The rotor is factory adjusted, so that the gap distance between the rotor and housing is uniform around the circumference of the rotor. The brush seal forms a seal between the air streams.

3.18.2 Readjustment

After transport and installation of the sections, it may be necessary to readjust the rotor. Adjustments may be made on both sides of the rotor.

• Remove the plugs from the deck housing on both sides of the rotor over the rotor suspension to gain access to the bolts.	
Adjustment: • Tighten or loosen two bolts to the right and left of the rotor suspension. **NB! Note that the top and bottom bolt is placed on either side of the brush strip.**	 

• Tighten or loosen two bolts at the top and bottom of the rotor suspension. **NB! There may be limited access to the bolts at either the top or bottom if a cooling/heating coil has been installed in the adjacent section.**	 

The production and installation of the rotor may lead to metal shavings lying in the bottom of the air handling unit at start-up. These metal shavings must be removed (vacuum cleaning) after a short period of operation.

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3.18.3 Purging zone (optional)

Leakage between the outdoor air and exhaust air streams cannot be fully eliminated. To help with this, a purging zone can be selected, which minimises leakage from the exhaust air to the outdoor air.

3.19 Fans

3.19.1 In general

The fan units are fitted in each section. All sizes in the VEX4000 series are supplied with plenum fans, however VEX4080 - 4100 can be ordered with an alternative axial fan, type ZerAx®. Whether it is plenum fans or ZerAx®. fans, the EC motor on the individual fan is fitted with integrated EC control. Each fan unit is equipment with vibration dampers and fitted in two transverse rails that are secured to the air handling unit.

The fan sections cannot be opened without the use of a key.

3.19.2 Plenum fans

Plenum fans are directly driven single-suction centrifugal fans, with backward curved blades, fitted without a cabinet. The fan unit consists of a fan impeller mounted directly on an EC motor's gudgeon. The inlet funnel is on the suction side, fitted up against the suction chamber. A flexible rubber seal insulates the fan from the rest of the air handling unit, so that vibrations are not transferred.

3.20 Establishment of smoke evacuation damper

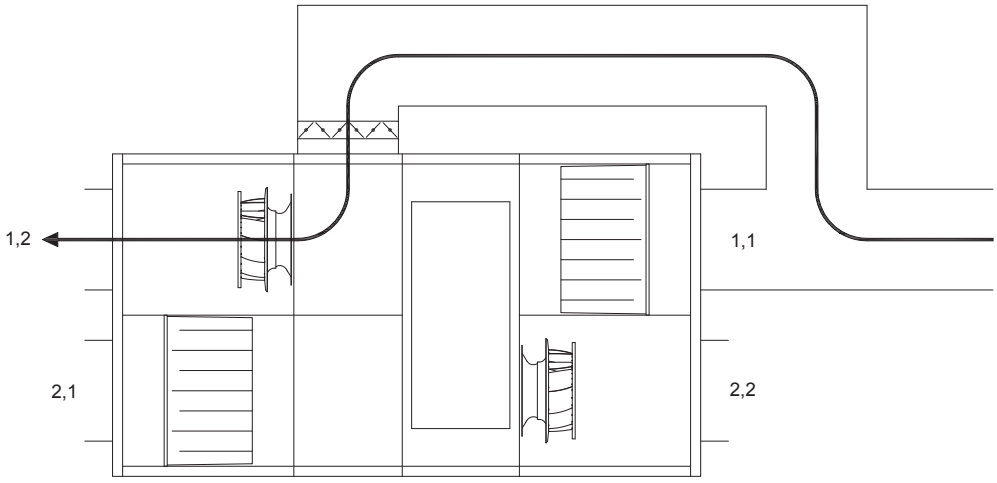
For VEX4000 ordered with smoke evacuation damper

⚠ **Note: The VEX can tolerate operation at max. 70°C for 60 minutes.**

Smoke evacuation principle

In case of fire, the external smoke evacuation damper opens, allowing smoke to bypass the filter and move directly to the exhaust air fan.

Simplified diagram - Right air handling unit



RD13766-01

4. Electrical installation

4.1 Scope of installation

The work must be performed by an authorised electrician, in accordance with locally applicable regulations and legislation.

4.2 Dimensioning and electrical installation

- **The supply cable must be dimensioned and installed in accordance with applicable regulations and legislation.**
- **The earth terminal (PE) must always be connected.**
- **The conditions at the installation location, including temperature and the path of the cable must be taken into consideration.**

The voltage supply is connected to the isolation switch in accordance with the supplied electrical documentation.

4.2.1 Electrical connection/data

The unit's power consumption is shown on the supplied printout from the calculation programme Exselect-Pro, see unit data.

4.2.2 Installation requirements and recommendations

Isolation switch and control fuses

An isolation switch (-S6.0)*)and control fuses have been built into the unit to provide overload and short-circuit protection.
When the isolation switch is in the OFF position, the light (-F6.8) inside the VEX can still be switched on and the service switch (-X6.3), (-F6.5) in the panel can be used. Everything else on the VEX unit is de-energised.

Should you want to be able to make the entire air handling unit completely de-energised , EXHAUSTO recommends that a repair switch is installed, designed like the isolation switch, immediately in front of the connection terminal for the air handling units in the fixed installation. The repair switch is not supplied by EXHAUSTO.

* Terms in brackets refer to component terms on the supplied electrical diagrams.

Extra isolation switch for VEX with electric heating coil

A separate isolation switch is integrated in the electric heating coil.

The unit with the electric heating coil has therefore two isolation switches, both of which must be in the OFF position to ensure the unit is de-energised!

Fuse

The fuse must be suitable for:
- Short-circuit protection of the unit
- Short-circuit protection of supply cable
- Overload protection of supply cable

Max. rating

The maximum fuse rating is stated in the supplied electrical documentation for the unit.

Power cable

When dimensioning the supply cable, the conditions at the installation location, including temperature and cable duct layout, must be taken into consideration.

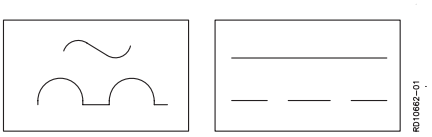
RCCB

- **The unit must have protection against indirect contact.**

If circuit breakers are fitted in the installation, they must be of a type that meets the following requirements:

VEX4010 - VEX4100

PFI type B switch that breaks the circuit on registering a fault current with DC content (pulsating DC) or smooth vagrant current in accordance with EN 61008. The fault current switches must be marked with the following symbol:



- **Disconnection time must be max. 0.3 s.**

Current leakage

RCD protection of 300 mA is recommended, as leakage currents of more than 30 mA can occur.

4.2.3 Short-circuit current

The minimum and maximum short-circuit current IKmin and IKmax is stated in the supplied electrical documentation from EXselect Pro, and on the information plate on the individual sections.

5. Startup

The VEX4000 air handling unit must be started up in accordance with a fixed procedure. When starting up, it is important to first ensure there is air circulation to prevent damage to the heating coil or cooling coil. Therefore, the fans must be started before the heating coil and any cooling coil. The start-up procedure is described below.

5.1 Start-up procedure

Connect the supply voltage last.

Step	Action
1	Check that the air handling unit is set-up correctly.
2	Fit and connect the external connections, including heating coil,cooling coil, damper and air ducts. **Ensure that the heat exchanger is operating before air is fed into the unit.**
3	Check that the external components, control system devices and sensors are fitted and connected correctly.
4	Check that the air ducts are fitted on the pressure side of the fans. If there is direct access to a fan, i.e. no duct is fitted, fit a protection net.
5	Any active alarms in the alarm list must be removed.
6	Start up the fans, as described in the next section.

5.2 Fans start-up

5.2.1 Start-up table

Step	Action
1	Check that all of the sections are cleaned free of any foreign bodies (metal shavings, paper or similar).
2	Connect the supply voltage.
3	Check again that the damper shuts out the air.
4	Switch on the fans. ⚠ **Air handling units with control systems use approx. three minutes to start up:** ● Recovery (rotor) starts immediately and the damper opens. ● **Approx. 30 seconds after the voltage is switched on, logging can take place using a browser or the handheld terminal.** ● After one minute, the extract air fan starts, after another minute, the supply fan starts. ● In the case of warm water, the circulation pump starts and the valve opens 50% in a set start-up time of two minutes.
5	Check that the level of vibration is normal. ⚠ **The vibrations may be checked with the door open, if so exercise extreme caution to avoid touching any moving parts.**
6	Closing all of the sections ⚠ **For safety reasons, the doors in the sections must always be closed.**

5.3 Determination of airflow, pressure drop across the filter.

5.3.1 Determination of airflow (plenum fan)

The airflow can be calculated using the following formula:

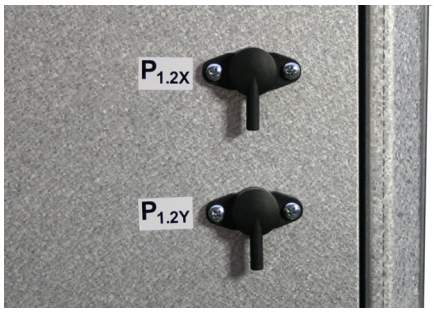
$$q_V = \sqrt{\frac{\rho_{20}}{\rho_{op}}} * k_{20} * \sqrt{\Delta p_M}$$

ρ_{op} = Air density at operation temperature

VEX size	Total number fans	Fan size	k-factor, k_{20} [l/s]	k-factor, k_{20} [m3/h]
4010	1	315	26.6	95
4020	1	355	33.6	121
4030	1	450	54.7	197
4040	1	500	70.0	252
4050	1	500	70.0	252
4060	1	560	85.6	308
4070	1	630	105.8	381
4080	2*)	2 x 500	2 x 70	2 x 252
4090	2*)	2 x 560	2 x 85.6	2 x 308
4100	2*)	2 x 630	2 x 105.8	2 x 381

* There are two parallel plenum fans in sizes VEX4080-4090-4100. Therefore, the volume flow from a fan must be multiplied by two.

5.3.2 Measurement of airflow and pressure drop across the filters



Use the formulae in the table to calculate airflow and pressure drop over the filters.

Airflow:	**Differential pressure Δp_M [Pa]**
Extract air	$\Delta p_{M1.2} = P_{1.2X} - P_{1.2Y}$ [Pa]
Supply air	$\Delta p_{M2.2} = P_{2.2X} - P_{2.2Y}$ [Pa]

Pressure drop across:	
Extract air filter	$\Delta p_{1.1} = P_{1.1X} - P_{1.1Y}$ [Pa]
Supply air filter	$\Delta p_{2.1} = P_{2.1X} - P_{2.1Y}$ [Pa]

6. Technical data

6.1 MVM valves, data

6.1.1 MVM motor valve

Valve	**2-way – K_{VS} 0.4 – 40** **3-way – K_{VS} 0.4 – 58**
Test pressure	1600 kPa
Max. differential pressure	350 kPa
Permissible media temperature	-10°C to 120°C
The valve will remain permanently open if the differential pressure	is above 1400 kPa

Motor	**2-way – K_{VS} 0.4 – 40** **3-way – K_{VS} 0.4 – 58**
Permitted ambient temperature with insulated motor	-30℃ - 50℃
Ingress protection, in accordance with IEC	IP54
Time taken to open/close	90 s
Power supply (50/60 Hz, AC/DC)	24 VAC ±20% 24 VDC ±20%
Regulation	0–10 VDC

*) 200 kPa for silent operation

6.2 Environmental declaration

Environmental documentation

The unit can be disassembled into individual product parts when worn out and in need of disposal.

Product parts	Material	
Sheet parts	Aluzinc	Recycle after disassembly
Bypass dampers, heat exchangers, condensation trays, and profiles	Aluminium	Recycled
Insulation	Mineral wool	Recycle after disassembly
Door gasket	CFC and HCFC-free cellular rubber	For landfill waste or incineration
Fan motors, bypass motors	Aluminium, steel, copper and plastic	Recycle after disassembly
Control unit	Electronic components	Recycle via an authorised enterprise
Bag filter	Fibreglass and plastic (VEX4050: steel frame)	For landfill waste or incineration (VEX4050: recycle after disassembly)
The air handling unit is supplied on disposable pallets	Wood	For landfill waste or incineration
Drive agent (integrated cooling unit)*	Coolant	Remove and recycle, or treat as waste in accordance with national regulations.
Oil in compressor (integrated cooling unit).	Oil	Remove and recycle, or treat as waste in accordance with national regulations.
Roof (only for outdoor air handling units)	Polyester reinforced PVC	Remove and recycle, or treat as waste in accordance with national regulations.

*Emptying of coolant must be carried out by a certified cooling engineer.

Percentage weight

Handling	Percentage weight of materials per unit
Recycled	11% (mineral wool)
Recycled	85% (63% Aluzinc, 16% aluminium, 3.5% steel/iron, 2% stainless steel and 1% copper)
For landfill waste or incineration	2% (Wood, filter paper, cellular rubber)
Other	1.5% (electronic components)
Total	100%

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