GB

VEX5000
RANGE
MODULES

VEX5000

Assembly, installation and maintenance instructions

Original instructions

EXHAUSTO A/S
Odensevej 76
5550 Langeskov,
Denmark

Tel.: +45 65 66 12 34
Fax: +45 65 66 11 10
exhausto@exhausto.dk
www.exhausto.dk

EXHAUSTO

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Symbols, terms and warnings

Prohibition symbol

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

Danger symbol

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

Instruction manual application

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 the safety of others, and to protect the equipment and ensure its correct operation. EXHAUSTO A/S accepts no liability for accidents caused by the product not being used in accordance with the manual's instructions and specifications.

It is recommended that the preliminary chapters about the installation, startup, operation and maintenance are read.

Supply air/extract air

These instructions use the following terms as given in DS447-2013:

- Supply air
- 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 run-on time for the fans is at least two minutes.

Information plate The sections' information plate can be read.

- VEX size and designation for the section.
- Production number and production year.
- Maximum and minimum short-circuit current.

- Supply voltage and the maximum current consumption.

- Section number and the total number of sections for the air handling unit
- Section type, see if required, the table below for an explanation of type.
- Weight of the section and assembled air handling unit.
- K factor [m^3/h]
- Filter type

- Information in connection with ECO design (only on information plate for fan sections)

Code on the information plate	The section contains
IL	Inflow
OL	Outflow
SP	Empty section, if required distribution board
FX	Filter Coarse (Type M5)
FX	Filter Fine (Type F7 and F9)
FX	Panel air filter (Type G2 and G4)
ER	Rotary heat exchanger
EX	Crossflow heat exchanger
TC	Liquid coupled heat exchanger
NR	Sound baffles
HG	Gas burner
HW	Water heating coil
HW	Water heating coil, wide
HEC	Electric heating coil
XE	Humidifier
MR/MS/MD	Mix function
CW	Cooling coil
CW	Cooling coil, wide
FAN AX	ZerAx® fan
FAN PF	Plenum fan
DC	Droplet separator

1. Introduction

1.1 Use

VEX5000 covers a wide capacity range, from 4,500 to 50,000 m³/h, with nine different unit sizes (VEX5020 - VEX5200), 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 variants can be fitted with a fully integrated control system.

1.2 Unit configurations

VEX5000 air handling units are designed as single or two-string air handling units and are divided into the following main groups:

- Heating and ventilation
- Heat recovery
- Air conditioning and cooling

If the air handling unit is supplied with an EXcon control system, it can be operated via the Web and with a handheld terminal.

All of the VEX5000 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 included with the rest of the documentation.

2. Handling and transport

2.1 Transport and delivery

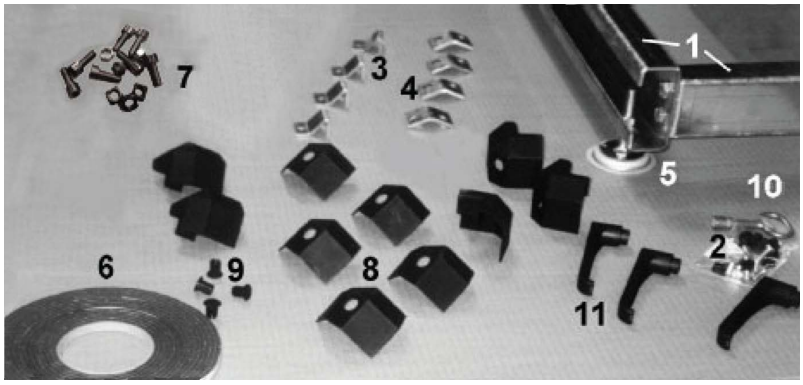
2.1.1 Once the VEX has arrived at the assembly site

- 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 Extent of the delivery

In addition to the air handling unit, a VEX5000 delivery may include several loose parts. All of the loose parts are enclosed in packaging and included in the packing list.



1. Base
2. Screws and plugs for handles
3. Fittings with hooks
4. Fittings
5. Levelling screw with foot
6. Sealing strip
7. Screws and nuts for assembling sections
8. Plastic covers for corners
9. Plugs for plastic covers
10. Square key
11. Handles for doors

For unassembled air handling units

- Base (optional for unassembled):
  The base with cross member (1) is supplied separately and includes bolts and fitting (3+4) for securing the air handling unit to the base. A number of adjustable screws (5) and fitting for alignment. The base is enclosed in packaging on a small pallet.
- Plastic covers:
  Corner covers (8) and plugs (9) for covering the corners, once the hoist eyes are removed.
- Handle and square key:
  One square key (10). Handles (11) are supplied as per the number ordered, together with screws and plugs (2).
- Sealing material:
  Self-adhesive sealing strip (6) 12 x 6.4 mm for sealing joints.
- Interior sectional joints:
  The sections are equipped with four interior corner fittings with clearance holes. The fitting are assembled using 8 x 25 mm screws, and an 8 nut (7). Sides that are longer than 1500 mm must also be equipped with fittings in the middle of the side.

Optional – can be supplied as loose parts

- Water trap
  The crossflow heat exchanger and cooling coils are supplied with a water trap for connection to an external drain.
- Flexible connections
  External connections for connection to duct system of the inlet and outlet openings are supplied with assembly rails.
- Roof - in the form of Aluzinc® plate.
- Assembly rails for connections to the duct system
- Silencers
- Baffel plates for drain
- Isolation switch
- Sensors for temperature, CO2 and pressure
- Fire thermostat
- Handheld terminal to control the control system
- CD for LonWorks

2.1.3 Weight

The air handling unit's total weight and dimensions, and weight and dimensions of the individual

sections are stated on the supplied print out from the calculation program EXselectPRO.

2.1.4 Handling the air handling unit

VEX5000 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.

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.

Single section

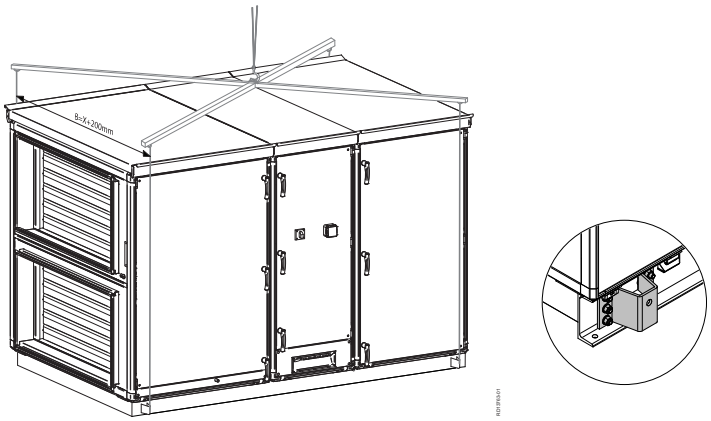
Single sections are equipped with transport feet and lifting eyes in the top corners.

The lifting eyes may only be used on sections weighing less than 1500 kg.

Assembled air handling unit

When lifting the assembled unit on a base, use 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.



2.2 Storage

VEX5000 air handling units are supplied either assembled or in sections, packaged in plastic.
If they are stored outdoor, they must be covered over, so that there is ventilation under the top cover to avoid the condensation formation. Outdoor storage must only take place for short periods.

When storing for longer periods, the plastic packaging must be removed because of condensation formation and the air handling units must be stored indoors in dry areas. When storing for more than three months, the fan impellers should be regularly turned by hand.

Assembled air handling units with roofs which are designed for outdoor installation may be stored outside but they should be stored in a covered location to prevent soiling on the construction site, and also ensure that there is ventilation under the location’s cover.

3. Mechanical assembly

The VEX5000 air handling unit must be installed on a stable surface with a strong foundation.

Setting up of the air handling unit

1. Set up the air handling unit.
2. Remove the fan unit's transport safety fitting, if this is fitted.
3. Fit any handles onto the doors.
4. Connect the ducts
5. Connect the base tray and droplet separator to the drain (drain plug)
6. Connect the cooling coil, heating coils and liquid heat exchanger.
7. Establish electrical connections.

Accessories which can be subsequently fitted

- LonWorks® module (if the air handling unit is supplied with an EXcon control system)

3.1 Setting up and assembling

The assembly and set-up contains loose parts, which are described in the section**"Extent of delivery"**. The loose parts have been placed in the first fan section.

Outdoor air handling units

It is important that the roof is fitted on the air handling unit at the same time it is set up. This is to prevent water entering the air handling unit.

3.1.1 Installation site requirements

There must be free space in front of the air handling unit along the whole length to ensure easy access for inspection, cleaning and servicing.
The doors must be able to be opened to their entire width, for inspection and cleaning, in some cases this is 1200 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

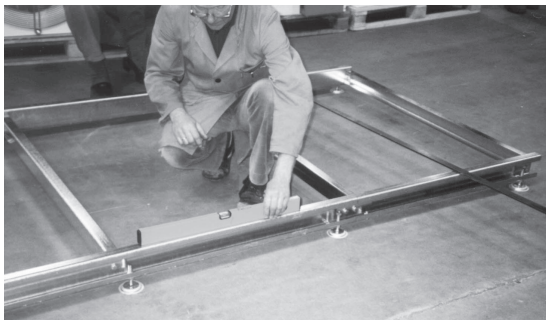
Air handling units installed on roofs may not be incorporated as part of the roof cover of the building. The air handling units must have a complete roof deck under them.

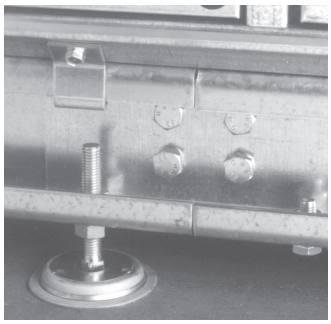
All vertical and horizontal joints between the individual sections must be carefully sealed with a suitable sealant that is weather-resistant, e.g. construction silicone. Carefully degrease all of the surfaces before applying the sealant.

Important: When installing outside, the damper motor and motor valves must be protected against penetrating water and frost.

3.1.2 Setting up the base

Place the base on a suitable installation site that has a foundation and which has been prepared. If the base is separated, assemble the cross members using mounting tabs.





1. Fit a levelling screw under each tab joint.
2. Fit and adjust the remaining levelling screws in the holes in the member so that the foundation is levelled.

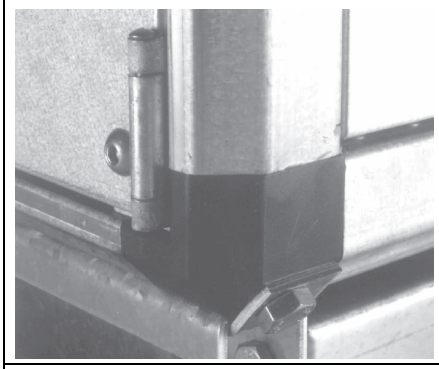
   The distance between the levelling screws may not exceed 1300 mm, this is ensured by using the pre-bored holes in the side members.

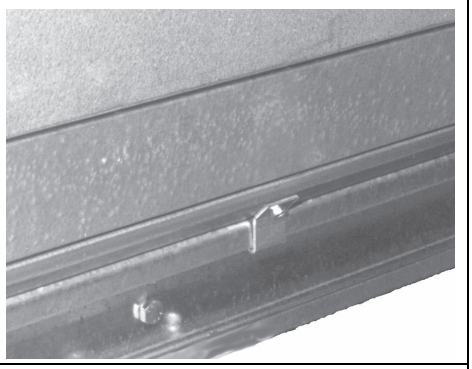
⚠ **Important:** The base must be completely level, otherwise the sections will twist when they are subsequently fitted and the doors will not seal properly when closed.

3.1.3 Positioning and assembly of sections

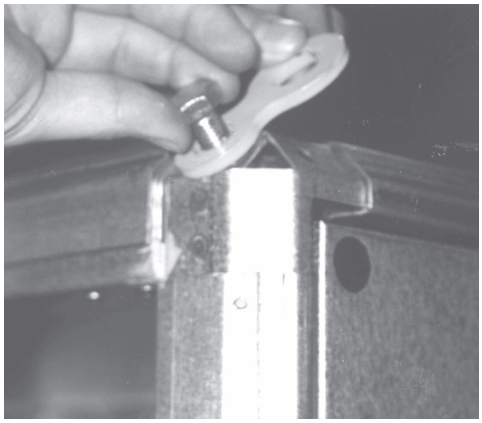
Numbers written in parenthesis is the following section, refer to loose parts that are named in the section**"Extent of delivery"**.

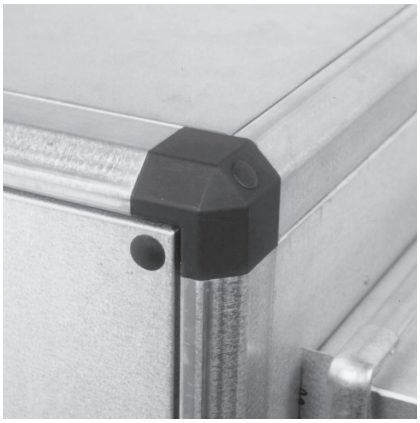
Assemble the sections on the base in numerical order, starting with no. 1, from left to right. If the system is a 2-string system, align the top sections in after the bottom sections.
The section numbers are stated on the information plates on the sections.





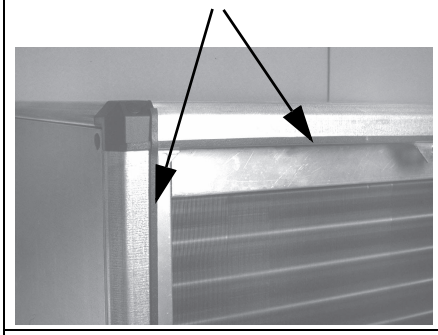
1. Remove the transport feet before the sections are placed on the base.
2. Fit the plastic covers where the feet were and secure the section to the base using the fittings (4) and bolts.
3. Secure the air handling unit on the side of the base using the fittings that have hooks in the ends (3). Use 6.3 x 1.3 mm sheet metal screws.





4. Remove the lifting eyes once the section is positioned on the base or on an underlying section.
5. Fit the plastic covers and plug the holes.

Sealing strip

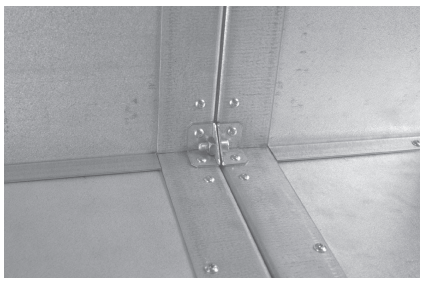


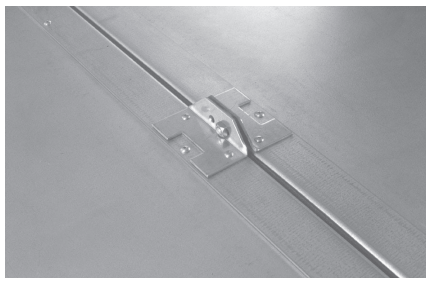
6. Stick the sealing strip onto the contact surface along the inner edge on the section before positioning the adjacent section.

7. Move the next section onto the base and push it up against the preceding section.

Important: The sections must be positioned precisely next to each other and levelled in accordance with the base or underlying section.

To access the inside of the air handling unit, do so through the inspection doors or by removing a side panel. If necessary, pull out functional parts that are in the way. Fit screws in the fitting and tighten in a cross pattern, using a 6 mm hex key until there is a gap of approx. 1 mm between the sections.

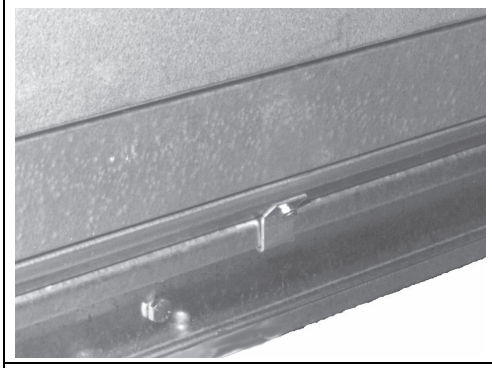




8. Fit the interior corner fittings using screws and bolts.

Important: The holes in the corner fittings may not be enlarged. Instead, fully align the base or the sections. The joins must be correct for the sake of the air handling unit's output.

9. Fit the interior fittings in the middle of the sides that are longer than 1500 mm.
10. Tighten in a cross pattern, using a 6 mm hex key until there is a gap of approx. 1 mm between the sections.



11. Fit the remaining fittings, evenly distributed along the sides.
    Use 6.3 x 13 mm sheet metal screws.

Once the bottom layer of the air handling unit with two airflows is assembled, fit the sections in the top layer in the same way, since the sections are aligned in accordance with the underlying sections.

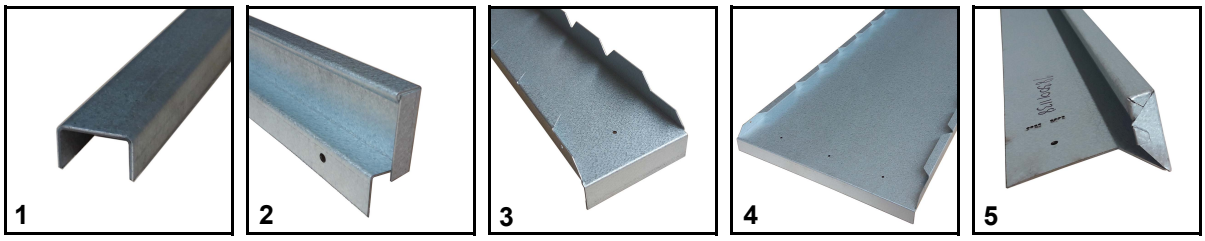
12. Finally, drill a 5.5 mm hole through the frame profiles in each door opening.
13. Screw the profiles together using a 6.3 x 13 mm sheet metal screw.
    Fit two screws to the profiles in the door opening.

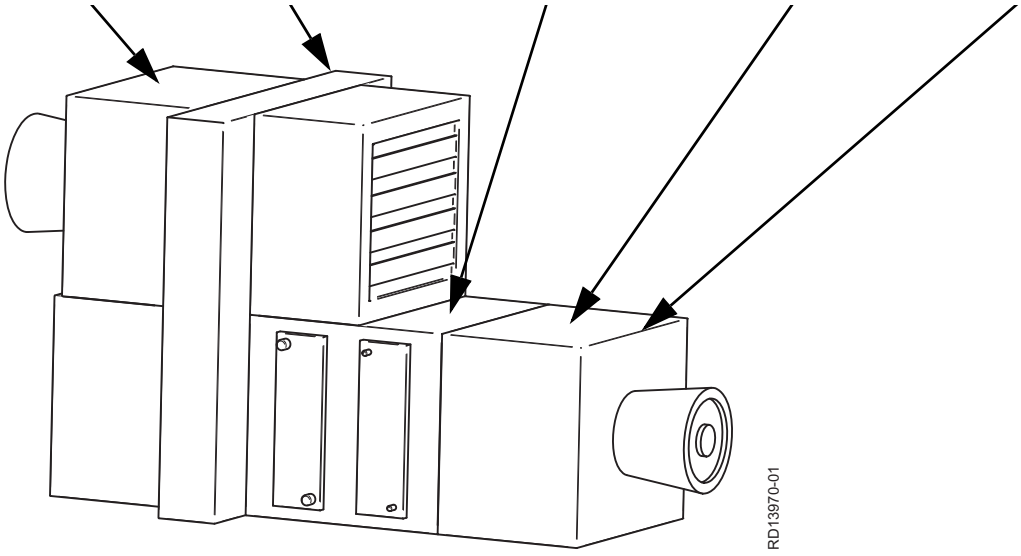
3.2 Fitting roof (outdoor air handling units)

3.2.1 Preparation

The roof is built up of a number of pre-fabricated roofing panels, of various lengths between 280-560 mm.
The roofing panels come in different sizes - but calculated to match the roof-size.

It is recommended that the roofing panels are laid loosely before they are secured, to ensure that all of the panels are positioned correctly.





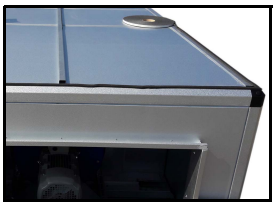
Supplied with roof

- Sealant for sealing between sections (9)
- Sealing strip for attaching to the air handling unit (9)
- U profile to form a drain on roof (1)
- End piece for overhang (5)
- If required, end piece corners for exchanger (2)
- Roofing panels in varying widths of up to 560 mm (4)
- Roofing panels facing ends, up to top section (3)
- Roof finishing facing ends (7)
- 2-part roofing panels for rotary exchanger, with mounting tab
- Assembly rails for roofing panels and plastic ends (6/10)
- Self-tapping screws with washer/pop rivets(8)

3.2.2 Fitting of roof

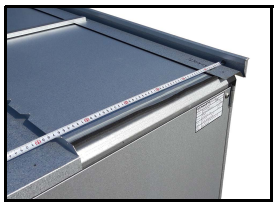
1. Seal between the sections.
2. Stick the sealing strips on the top of the air handling unit on all of the outsides (A).
3. Lay the U profile along (in the middle) the air handling unit as a roof ridge, to achieve a fall toward the sides. Trim the U profile so that it ends a couple of centimetres inside the air handling unit (B).
4. Lay the first roofing panel in against the top section.
5. Lay the next roofing panels, except the last. Pop rivet the roofing panels together (F).
6. Fit the end piece profile 560 mm from the outside of the second last roofing panel (C).
7. Turn the last roofing panel into the end piece profile and place it in position. Secure using pop rivets (D/E).
8. Push the assembly rails in over the plate joints. Close using plastic end (G/H).
9. Secure roof facing top section using the plate “Roof finish facing end”. Seal the joint.
10. Screw self tapping screws using nylon washers in all of the prepared holes.

A



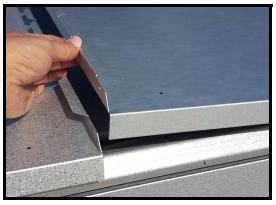
B

C



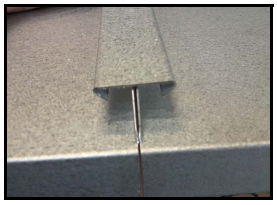
D

E

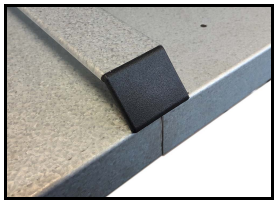


F

G



H



Air handling unit with rotor

1. Fit the end piece in one end with approx. 2 cm of overhang.
2. Lay the U profile lengthwise, so that it ends a couple of centimetres inside the air handling unit.
3. Lay the next roofing panel, except the last. Pop rivet the roofing panels together (F).
4. Fit the end piece profile 560 mm from the outside of the second last roofing panel (C).
5. Turn the last roofing panel into the end piece profile and place it in position. Secure using pop rivets (D/E).
6. Push the assembly rails in over the plate joints. Close using plastic end (G/H).
7. Screw self tapping screws using nylon washers in all of the prepared holes.

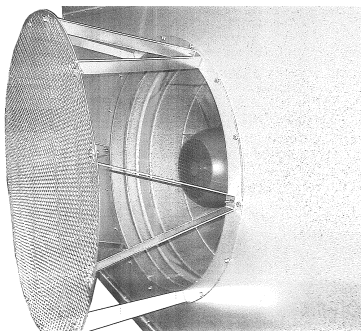
Air handling unit with wide rotor

1. Start with the 2-part roofing panel
2. Assemble the 2-part roofing panel using the mounting tab.
3. Fit the assembled plates on the rotor.
4. Seal the plate joint.
5. Fit the four end piece corners.
6. Lay the rest of the roof next to the rotor and finish as the bottom part.

3.2.3 Baffel plate

For fans with free outflow without duct connection, fit baffel plate on the outflow ends. Keep the baffel plate at the correct distance using 6 or 8 braces.

1. Bend the braces in the square holes so that they align with the holes in the baffel plate.
2. Remove the loose fitted flange.
3. Fit the braces on the flange using the supplied countersunk bolts.
4. Fit the baffel plate on the braces.
5. Fit the flange with the baffel plate on the air handling unit again.

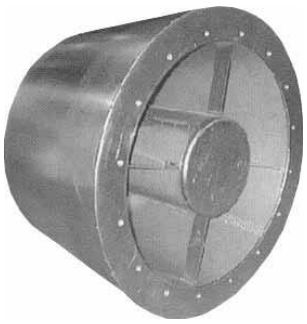


3.2.4 Air diffuser

The air diffuser must be fitted after the fan.

1. Remove the loose fitted end panel on the air handling unit.
2. Fit the air diffuser to the panel using the supplied countersunk bolts.
3. Re-fit the panel with the air diffuser to the air handling unit.

The air diffuser must be supported or suspended.



3.3 Fans

Important: If there is not a duct on the pressure side of the fan, a protective net must be fitted.

3.3.1 Transport safety fitting

The transport safety fitting is marked with a yellow label.

The fan unit can be equipped with a transport safety fitting, which locks the vibration damping for the unit. Remove the transport safety fitting when the air handling unit is installed in its final location.

ZerAx® fans

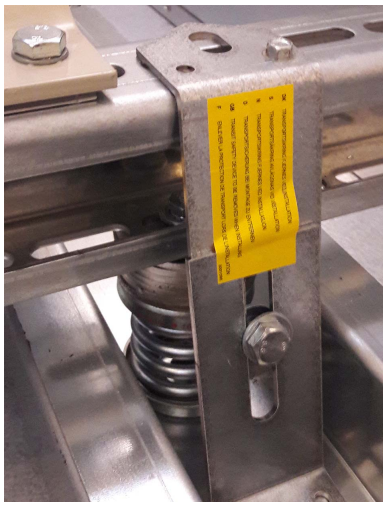
All ZerAx® fans are equipped with two points, which lock all four rubber feet during transport. Pull the two points out from the service side.

ZerAx® fan transport safety fitting

Plenum fans

Larger plenum fans fitted on springs as vibration dampers, are secured using four fittings, which must be removed.

Plenum fan transport safety fitting

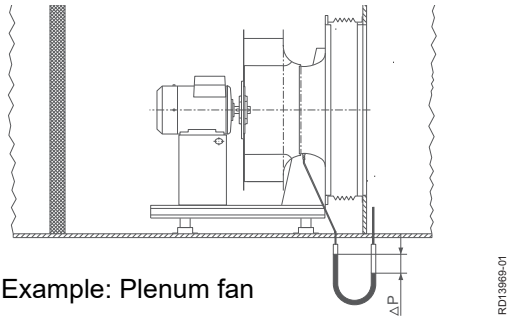


NB

Smaller plenum fans which are vibration damped using rubber feet do not have a transport safety fitting.

3.3.2 Airflow determination

The airflow can be determined on the basis of the pressure difference across the fan (∆***P***) and the fan's calculation constant (***K***).



Example: Plenum fan

Pressure difference is calculated in *Pascal*(***Pa***) and using the equation shown below, the airflow (***q***) is determined in m^3/h.

$$\sqrt{\Delta P} \times K = q$$

Example: The airflow is calculated for a fan of the type ER/RH63C.

The analogue pressure difference is read as **700 Pa** and in the table shown below, an ER/RH63C fan has a **K** value of **381**

$$\sqrt{700}\ Pa \times 381 = 10.080\ m^3/h$$

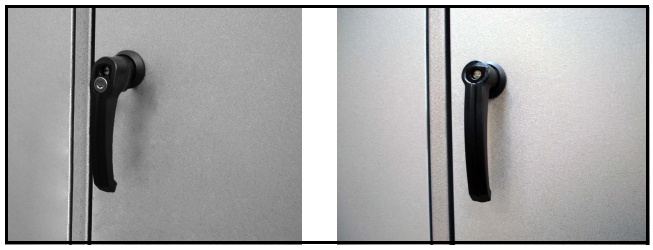
If the unit for airflow is desired to be in l/s, divide by 3.6.

Plenum fan		ZerAx® fan	
Fan type	**K value [m^3/h]**	**Fan type**	**K value [m^3/h]**
RH/ER22C	47	AZN 500/350	692
RH/ER25C	60	AZN 560/350	913
RH/ER28C	75	AZN 630/350	1197
RH/ER31C	95	AZN 710/350	1558
RH/ER35C	121	AZN 800/350	2017
RH/ER40C	154	AZN 900/350	2593
RH/ER45C	197	AZN 1000/350	3240
RH/ER50C	252		
RH/ER56C	308		
RH/ER63C	381		
RH/ER71C	490		
RH/ER80C	620		
RH/ER90C	789		
RH/ER10C	999		
RH/ER11C	1233		

3.4 Handles on doors

The handles can be supplied loose to avoid damage during transport and are supplied as loose parts in packaging. A set of handles consists of 1 handle with lock and key, and one handle without a lock. The lockable handle must be fitted at a suitable height.

Exercise caution with the handle when opening the door.



Important: If the fan is unprotected, the doors must be able to be opened using the square key or be equipped with at least one handle that is lockable.

3.5 Duct connections

Round ducts can be secured to the duct spigots using a clamp.

Rectangular ducts are connected to inlet and outlet openings on the air handling unit using LS rails or METU fittings.

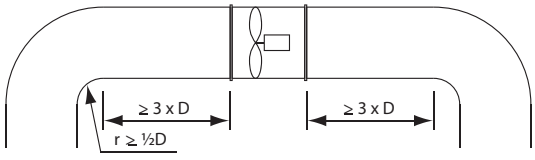
3.5.1 Flexible connections

The unit has built-in vibration dampers between the fan and frame.
If further vibration damping is desired, flexible connections at the duct connection can be supplied as accessories.

3.5.2 ZerAx® fans

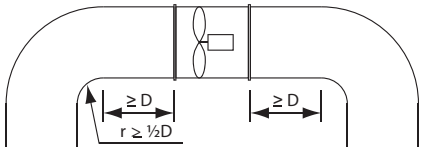
Optimal installation

It is recommended that the distance to the nearest duct bend from a ZerAx® fan is at least 3 x the fan's diameter [3 x D].



Minimum installation

It is recommended that the minimum distance to the nearest duct bend from a ZerAx® fan is the fan's diameter [D].



3.6 Filter monitor (optional)

Filter condition The condition of the filter is determined by the pressure drop measured across the filter. You may choose between two types of gauges.

U pipe manometer	Magnehelic pressure gauge
	

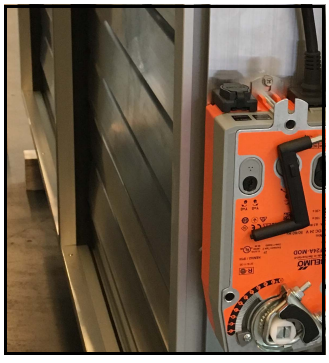
3.6.1 Filling with liquid

1. Place the scale in the bottom. 2. Fill with the supplied special liquid, up to approx. 300 Pa. 3. Connect the two plastic hoses.	

NB The special liquid has almost no evaporation and is temperature resistant in the range -20°C to +50°C. If the U profile must be used at a lower temperature, antifreeze must be added with a viscosity of 1.0.

3.7 Damper

Important: When installing outside, the damper motors must be protected against penetrating water and frost.



3.8 Rotary heat exchanger

Installation of a split rotor requires further instructions, which are found in “Instructions for split rotor VEX 5000”. The instructions are stored in the rotor section when a split rotor is supplied.

3.8.1 Check

After transportation, handling and setting up of the air handling unit, check that the rotor does not come into contact with the sides. The distance to the edge must be uniform on both sides.

3.9 LonWorks®

If the air handling unit is supplied with an EXcon control system, the LON® module can be supplied as an accessory.

The LON® module can also be retrofitted as a LonWorks® kit.
EXHAUSTO provides a LonWorks® kit, which consists of a module and visit by a technician, who will fit and configure the control system.

Contact EXHAUSTO for more information.

4. Pipe system

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

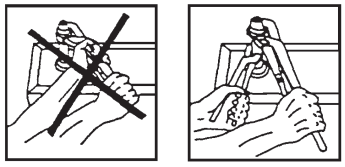
The pipe system that connects the cooling and heating coils and exchanger must be equipped with a pump, regulating and monitoring equipment.
The pipe system must be protected from frost damage via a built-in control system, which opens the valve for water flow, stops the fan and closes the damper against outdoor air if there is a risk of frost damage.
A sensor must be fitted on the return water pipes.
The pipes should be insulated in consideration of the actual temperature conditions in and around the system.

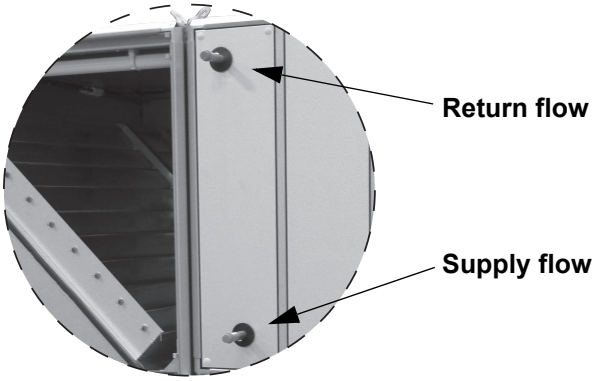
Important: When installing outside, the motor valve must be protected against penetrating water.

Liquid (water/glycol) is connected to the spigots that run out through the side of the air handling unit.
Heating, cooling and exchanger coils consist of copper pipes with aluminium fins, which are fitted in a steel plate frame. Supply and return flow occurs in collecting pipes with connection spigots that run out through the side panel.

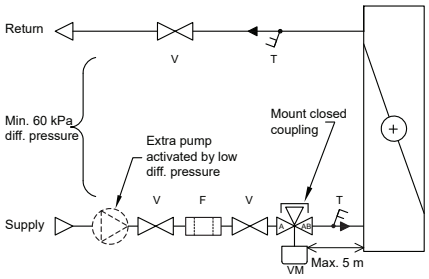
The collecting pipes are equipped with a spigot for air screw and a spigot for draining.

- Remember to hold extra counter force on the collecting pipe when connecting the coil to the pipe system.
- The thread must be packed in accordance with standard plumbing regulations.
- The supply flow should always be connected to the bottom spigot.



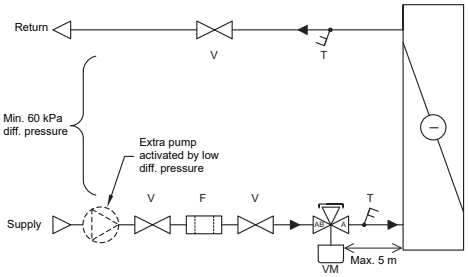


4.0.1 Circuit for heating coil



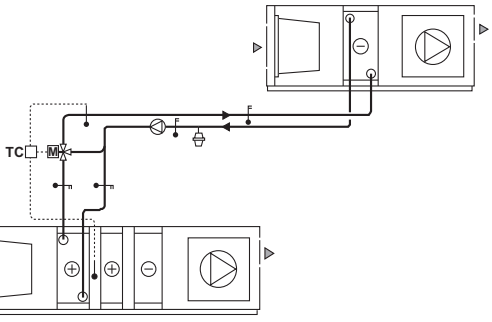
F	Filter*
V	Shut-off valve*
VM	Motor valve
VO	Non-return valve*
T	Thermometer

4.0.2 Circuit for cooling coil



F	Filter*
V	Shut-off valve*
VM	Motor valve
T	Thermometer

4.0.3 Circuit for liquid coupled heat exchanger



M	Motor valve
	Temperature sensor
	Expansion tank*

*Not supplied by EXHAUSTO.

4.1 Condensation outlet

4.1.1 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 water trap must be established from all sections with an outlet.

4.1.2 Water trap

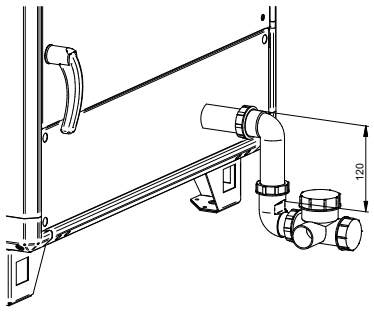
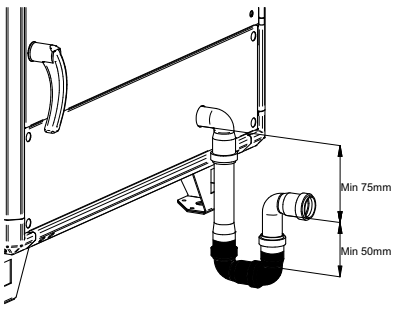
Water trap is supplied as an accessory.
Water traps are either designed for negative pressure or overpressure and are fitted a ball to preserve their water tightness even when not filled with water. The water traps are connected to the base trays drains in the sections with drains.

The drain is Ø32 mm on the exterior.

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 water trap is fitted to its full length, 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 a water trap for the air handling unit is 1200 Pa. If the water trap is trimmed, the capacity falls by 10 Pa/mm.
For correct and problem free operation, it is recommended that a Siphon water trap is fitted. This also applies to outdoor versions of air handling units.

If a Siphon water trap is not used, the water trap must be executed in accordance with the dimensions shown below.

Siphon water trap	Other water trap
	

Frost protection of water trap

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.

5. Electrical installation

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

5.1 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.**

Important:

- Electrical parts such as fan motors, damper motors, control system components and similar, must be connected to the control system box.

An isolation switch must be installed immediately preceding the air handling unit in accordance with EN60204-1.

NB: The isolation switch is not supplied by EXHAUSTO.

In Denmark, the DS/HD 60364 series and DS/EN 60204-1 must be complied with. In the EU, the directive relating to machine safety – electrical equipment of machines EN 60204-1, must be complied with.

It is the responsibility of the electrician to ensure the correct earthing and protection in accordance with the above.

5.2 Supply voltage

Electrical connection

The air handling unit shall be connected to 3 x 400 VAC 50/60 Hz, neutral and PE. The sizes of the necessary fuses are stated on the labelling on the control system box.

Automatic disconnection of voltage

It is a requirement that there is automatic disconnection of the power supply when there is a fault or if there is direct contact with live cables. A residual-current-operated circuit breaker (PFI 300 mA) must be used.

NB: The PFI device is not supplied by EXHAUSTO.

In case of an earth fault, there may be a DC component in the fault current. Therefore, the residual-current device must be able to detect this, and be installed in accordance with the relevant regulations.
EXHAUSTO recommends a residual-current device for class B.

Air handling unit electrical supply

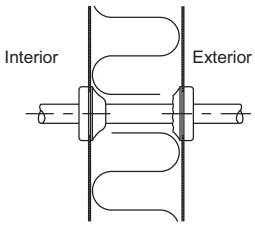
1. Run cable to the air handling unit.
2. Connect the power cable to the control system box to the terminal block - X1 (applies only to the EXcon control system).
3. Install an isolation switch ahead of the power cable.

The connection of individual components are reviewed in the following sections.

NB: The connection of the power supply is done in connection with the start-up of the air handling unit. See the section "**Start-up**".

5.3 Running of cable through panels

Cables routes running through the panels in the air handling unit housing must be airtight and made safe against damage from sharp panel edges. Cables may not be run through the inspection doors.
Cable routing in the form of pipes and cable lead-ins are prepared at the factory.

Cable lead-in	Holes in plate [mm]	Exterior cable - diameter [mm]
	19	7–10
	23	10–14
	29	14–20
	38	20–26
	48	26–35

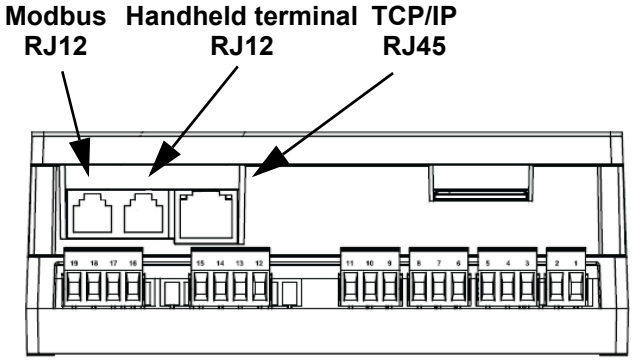
.
The airtight lead-in is on the inside of the panel, while the grommet in the outside panel protects the cable from the sharp edge of the panel.

5.4 Motor connection

Cables for motors must be connected in accordance with the instructions in the terminal boxes (if required, see the electrical diagram on the inside of the terminal box lid).
If the air handling unit is supplied with the EXcon control system, the cables are fitted and coiled in the fan section.
The cables must be run to the control system box in the prepared cable routing/lead-ins.

5.5 Connections in the control system box (EXcon control system)

The control system box controls the air handling unit and the connected devices. The box is positioned in an empty section. If the air handling unit has a crossflow heat exchanger, the box is primarily positioned in the same section as the exchanger.



Connect the box to the power supply and connect to external components, sensors and communication systems. Run the cables along the established cable routing.

Installation of the different components is carried out in accordance with **"Technical electrical connections"**.

See also the section **"Flow diagrams"** for the positioning of sensors, etc.

LAN connection

The VEX5000 air handling unit supports standard LAN communication via 10/100 Mbit Ethernet using TCP/IP. Modbus and BACnet can be used via TCP/IP.

Setting up of communication via TCP/IP is carried out after start-up and requires a log in as the Installer.

For more information about setting up communication, see EXcon instruction manual - VEX5000 Control System.

Serial connection for Modbus

VEX5000 air handling unit supports serial communication using Modbus.

Setting up of the communication via Modbus is carried out after start-up and requires a log in as the Installer.

For more information about setting up communication, see EXcon instruction manual - VEX5000 Control System.

LonWorks(R) connection

The VEX5000 air handling unit supports communication via a LonWorks® connection.

Note: The procedure assumes that a LON® module has been installed. Contact EXHAUSTO for more information retrofitting.

Setting up of LON®communication is carried out after start-up and requires a log in as the Installer.

For more information about setting up communication, see EXcon instruction manual - VEX5000 Control System.

Handheld terminal

To connect the handheld terminal, see EXcon instructions - VEX5000

Sensors

Connection of sensors

1. Open the doors in the air handling unit.
2. Run the cables from the sensors to the control system box.
3. Connect the cables in the connector in accordance with the connection diagram in the section “**Technical electrical connections”**
4. Close and lock the air handling unit.

6. Startup

The VEX5000 air handling unit must be started up in accordance with a fixed procedure.

6.1 Start-up procedure

Connect the supply voltage last.

1. Check that the air handling unit is set-up correctly.

2. Check that all of the internal connections are correctly made.
3. Fit and connect the external connections, including heating coil, cooling coil and air duct system.

The duct system must be fitted and connected to the air handling unit before the fans are started.

4. Check that the external components and sensors are fitted and connected correctly.

6.1.1 Fans start-up

1. Remove any transport safety fittings. They are marked with yellow sleeving.
2. Check that the fan impeller can turn freely without touching any of the sides.
3. Check that all of the airways are free of foreign bodies (paper, tools or similar).
4. Check that the motors are tightened securely.
5. 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.
6. Connect the supply voltage.
7. Switch on the fans for a short period and long enough to check the direction of rotation is in accordance with the arrows on the fans.
8. Switch off the fans and if required, re-connect the supply voltage, depending on whether the direction of rotation was correct during the brief start.
9. Check again that the damper shuts out the air.
10. Switch on the fans.

Note

Air handling units with control systems from EXHAUSTO use approx. three minutes to start up:

- Approx. 30 seconds after the voltage is switched on, logging can take place using a browser or the handheld terminal.
- The dampers open, extract air and then supply air starts. After 2½ minutes, recovery 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.

11. Check that the level of vibration is normal.
    The level should not exceed 7 mm/s, measured at two points with 90° offset externally on the fan pipe (ZerAx® fans) or inlet funnel (plenum fans) and the free ends of the motor.
    If the vibration level exceeds 11 mm/s, re-balancing must be executed.

If necessary, the vibrations may be checked with the door open, but when doing so exercise extreme caution to avoid touching any moving parts.

12. Check the fans and level of vibration again after 30 minutes of operation.
13. Close the air handling unit.

For safety reasons, the doors in the air handling unit must always be closed.

7. After commissioning

7.1 After 2–3 weeks of operation

Check the rotor's belt and remove any shavings which have blown out from the fins. It is quite normal to find shavings after start-up.

Trin	Handling
1	Check for shavings in the bottom of the rotor section. Shavings can come from the belt or from the manufacture of the rotor. 
2	Check that the motor has sufficient distance to the base to keep the belt tight. If there is too little distance, shorten the belt.
3	• Loosen the fixture using a screwdriver and shorten the belt.  **NB: Shorten one hole at a time, because it is important that the belt does not become too short.**

8. Maintenance

The VEX5000 series has been designed to not require any maintenance. The air handling unit shall be cleaned and the filters replaced when they are worn out. This is important because it ensures the air handling unit retains its efficiency and that there is a good hygienic indoor climate.

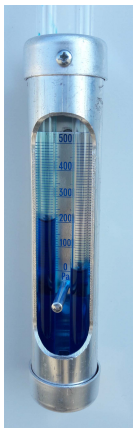
The air handling unit's operation conditions and its surrounding environment determine how often inspection must be carried out and its cleaning requirements.

EXHAUSTO recommends that a ventilation unit inspection procedure is established, so that the frequency of cleaning and filter replacement can be set and carried out promptly.

8.1 Replacement of filters

The air handling unit is equipped with one or more filters. The filters are marked to show type, and are inserted in holders where they are retained using locking rails. The rails push the filter frames against the rubber seal and are released by pushing out the handle on the rails.
The lifetime of the filters depends on the operating rhythm and the concentration of dust in the air.

Regular inspections of the pressure drop should be carried out. Avoid exceeding the recommended pressure drop, since the airflow is thus reduced and the efficiency of the unit is degraded.

Once the unit is operating, set the filter monitor by moving the 0-point to the lowest liquid height. Read the pressure difference on the highest liquid column.	

The filters are disposable filters and must be replaced when they are worn out and when the terminal pressure drop has been reached.

Filter type	Terminal pressure
G2 - G4	150 Pa
F7	200 Pa
M5	200 Pa
F9	300 Pa

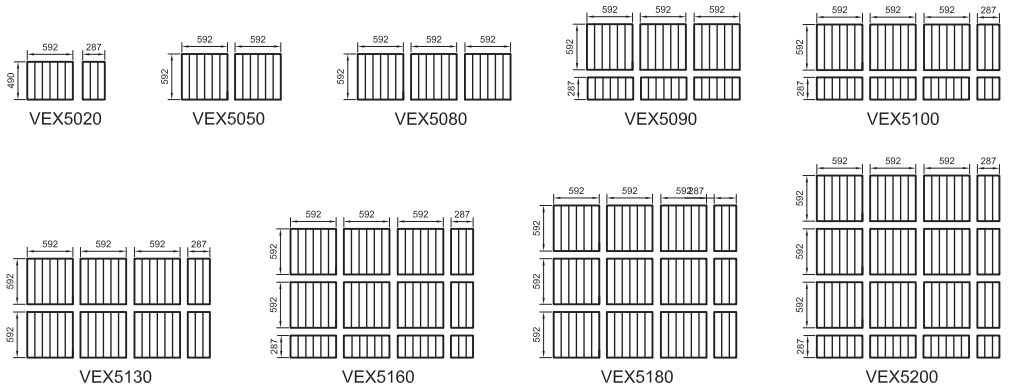
Once the display or filter monitor shows a filter alarm, the filter should be changed.
It is recommended that all filters are replaced at the same time.

8.2 Filter design

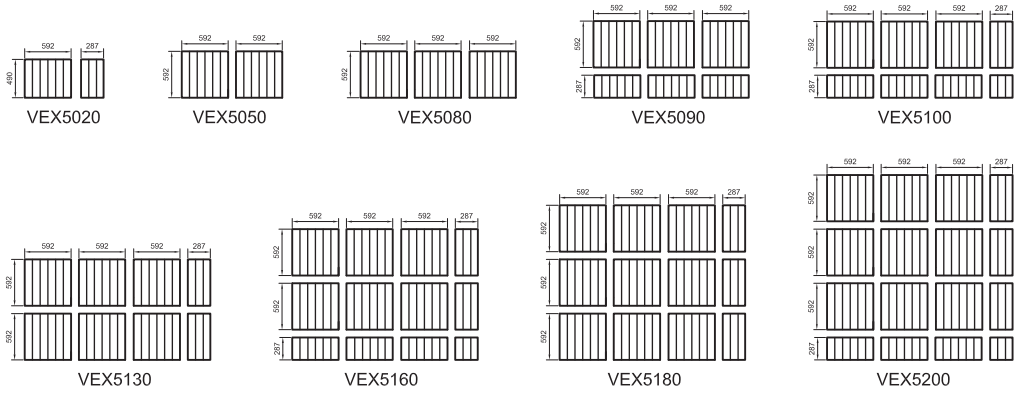
See below for an overview of the filter design and filter size that apply to VEX sizes.

To order filters, contact EXHAUSTO.

Filter without base tray



Filter with base tray



8.3 Cleaning

Disconnect power via the isolation switch before cleaning. The doors may only be opened after the air handling unit has stopped. The run-on time for the fans is at least two minutes.

Even though the air handling unit is equipped with air filters, sometimes there can be dust or a covering of dust in the air handling unit housing. The air handling unit can be cleaned by normal cleaning, using a vacuum cleaner and then wiping off.
For industrial installations that are more affected, more thorough cleaning may be necessary. If pressurised air and the dampers must be used, exercise caution.

Use ordinary cleaning agents. Strong acids or bases will destroy the surface finishing.

9. Technical specifications

		5020	5050	5080	5090	5100	5130	5160	5180	5200
Air handling unit data										
Max. airflows	m^3/h	4500	10,800	16,200	21,500	20,000	32,000	40,000	45,000	50,000
Damper		Protection class DS/EN 1751, class 2, 3 or 4								
Filter types		G2, G4, M5, F7 or F9								
Crossflow heat exchanger with bypass		N/A		N/A		N/A		N/A	N/A	N/A
Crossflow heat exchanger: Torque for bypass damper [a]	Nm	-	5	-	10	-	10	-	-	-
Crossflow heat exchanger: Torque for heat exchanger damper	Nm	-	5	-	10	-	10	-	-	-
Rotary heat exchanger: Rotor diameter	mm	570	1250	1525	1780	2020	2420	2900	3200	3200
Plate type and insulation		0.7 mm AluZink — 50 mm mineral wool 70 kg/m^3								
Duct connections Duct connections with SB	mm	300 x 600 200 x 600	500 x 1000 300 x 1000 Ø500 Ø560	500 x 1500 300 x 1500 Ø500 Ø560	700 x 1500 400 x 1500 Ø500 Ø560 Ø630 Ø710	700 x 1800 400 x 1800 Ø560 Ø630 Ø710	900 x 1800 500 x 1800 Ø560 Ø630 Ø710	1200 x 1800 700 x 1800 Ø710 Ø800	1500 x 1800 900 x 1800 Ø710 Ø800 Ø900 Ø1000	1800 x 1800 900 x 1800 Ø710 Ø800 Ø900 Ø1000
Service space min. from front	mm	At least 1200 or enough so that the doors can be opened all the way								
Specific data for power consumption (A), dimensioning and performance		Calculated using EXselectPRO								
Motor technical electrical data										
Electrical power supply (50/60 Hz)		3 x 400 V, 50/60 Hz								
Absorbed power	kW	Dependent on the equipping, and calculated using EXselectPRO								
Fan data										
Types		Plenum fan or ZerAx® fan								
Water heating coil (optional)										
Pipe end 2 / 4 pipes	“	¾ / 1	1 / 2	1¼ / 2	1¼ / 2	1½ / 2	2 / 3	2½ / 4	2½ / 4	2½ / 4
Cooling coil (optional)										
Pipe end 4 / 6 / 8 pipes		2 x 1” / 2 x 2” / 2 x 1½”	2 x 1½” / 2 x 2” / 2 x 2½”	2 x 1 1/4” / 2 x 2½” / 2 x 2½”	2 x 2” / 2 x 2½” / 2 x 3”	2 x 2½” / 2 x 3” / 2 x 3”	2 x 2½” / 2 x 2½” / 2 x 3”	2 x 3” / 2 x 4” / 2 x 4”	2 x 3” / 2 x 4” / 2 x 4”	2 x 3” / 2 x 4” / 2 x 4”
Other options										
Protocols		TCP/IP, Modbus, BACnet, LonWorks®								
Servers		Web server, Portal server								

a. On air handling units with double bypass, the regulating torque us double that stated here.

10.Technical electrical connections (EXcon control system)

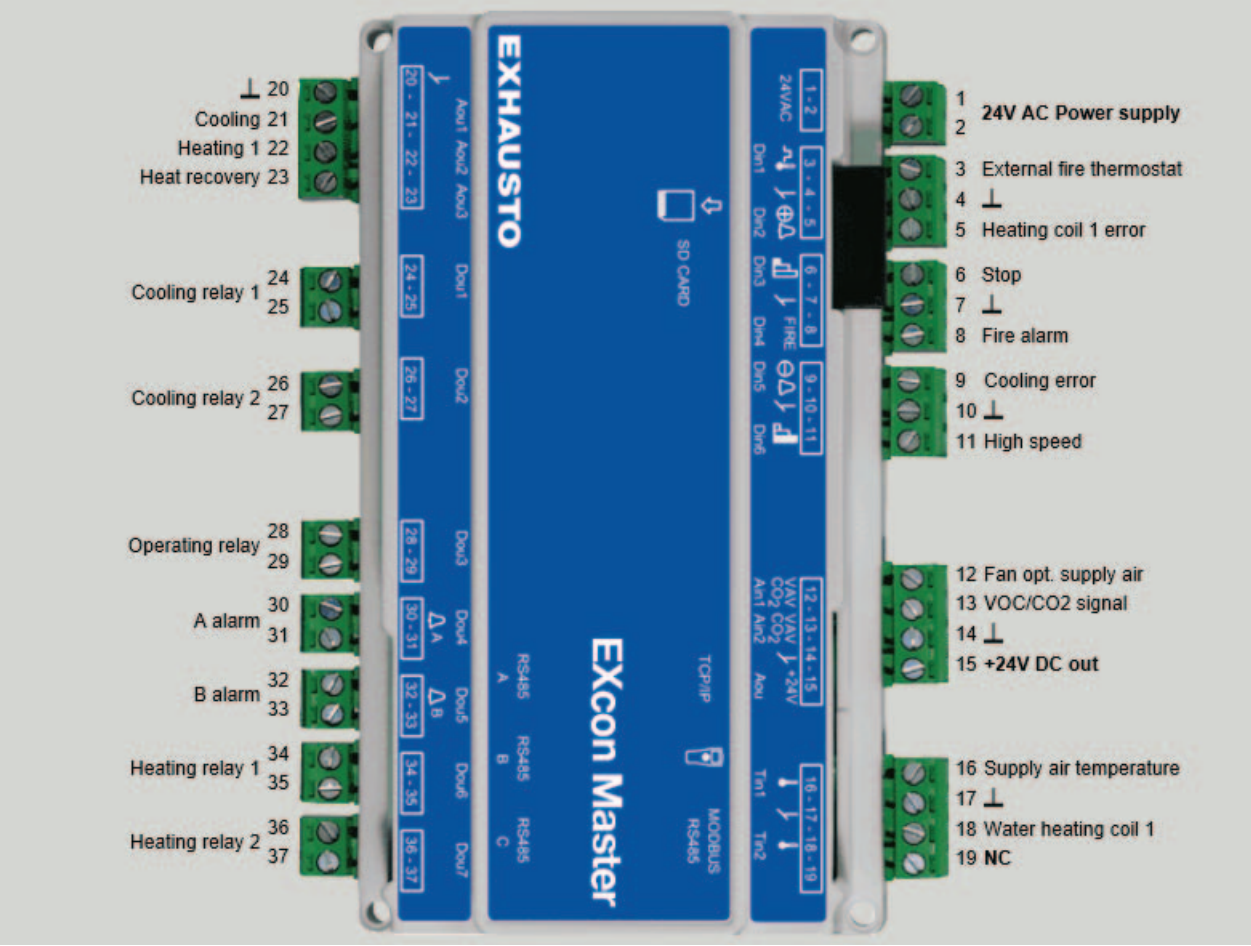
10.1Control system component names

The figures below are found in the web user interface under **Service > Master > Connection EXconMaster.**

NB **The subsequent installation of components requires a reconfiguration of the control system and requires another pin allocation than that shown.**

Contact EXHAUSTO for more information.

EXcon Master The figure shown below is found in the web user interface under **Service > Master > Connection EXconMaster.**

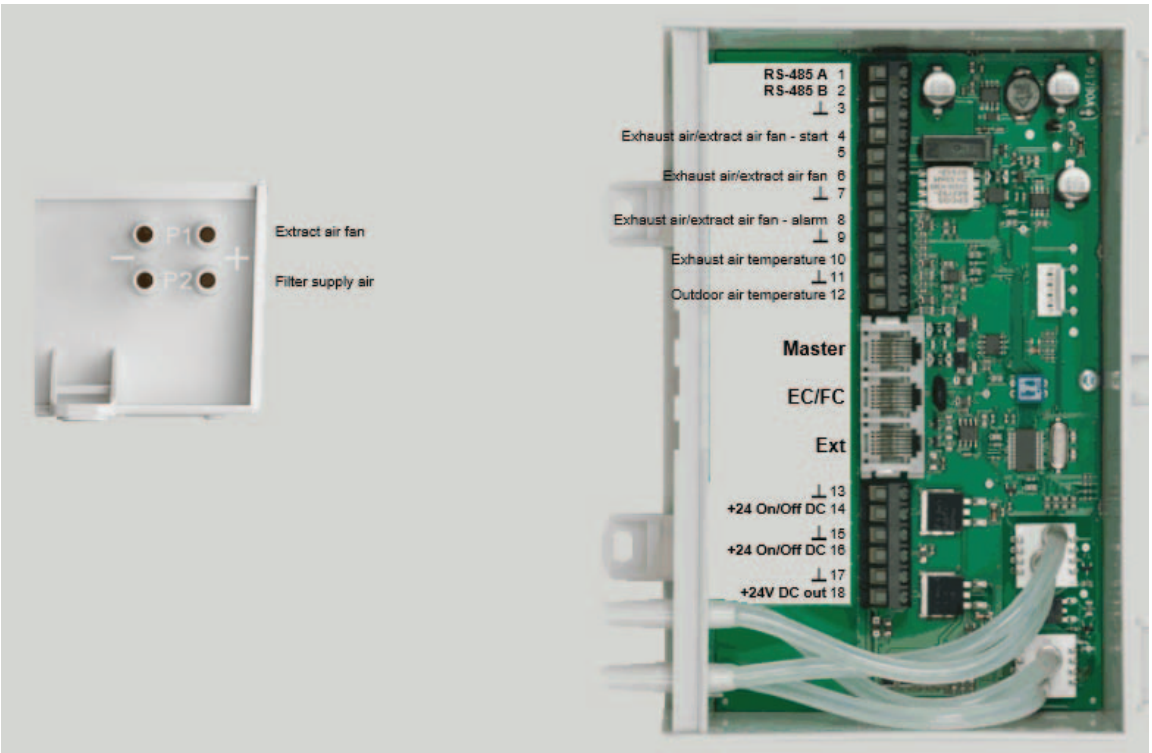


Fan IO 1 (supply air)

The figure shown below is found in the web user interface under **Service > Fan IO> Fan-IO 1 >Connection EXcon Fan-IO 1.**

Fan IO 2 (extract air)

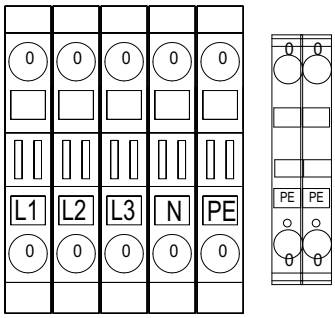
The figure shown below is found in the web user interface under **Service > Fan IO> Fan-IO 2 >Connection EXcon Fan-IO 2.**



10.2Connection diagrams

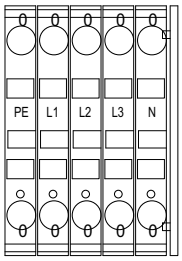
10.2.1 Terminal block

-X1 (50A & 100A)



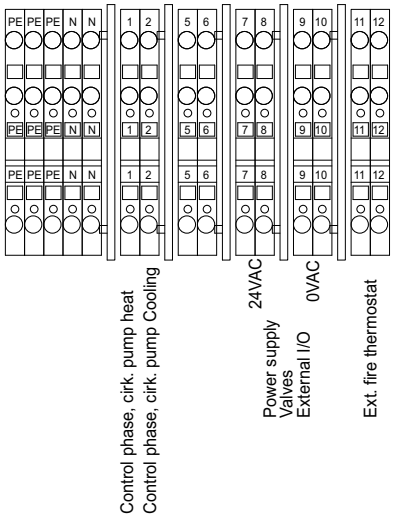
3x400VAC +Neutral
PE,L1,L2,L3,N

(32A)



3x400VAC +Neutral
PE,L1,L2,L3,N

-X2



10.2.2 Rotary heat exchangers

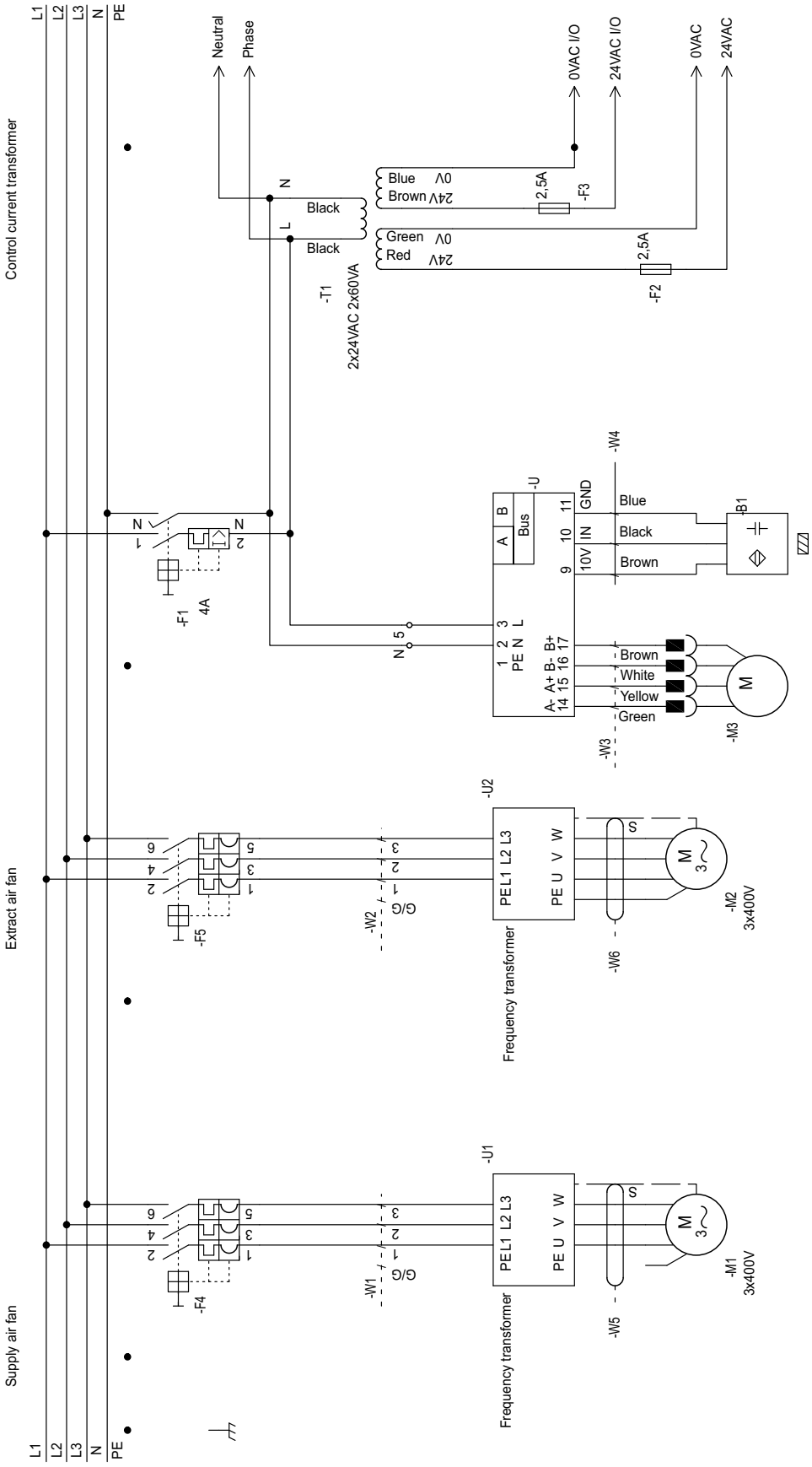


Fig 10.2.2.1 Main supply – rotary heat exchangers

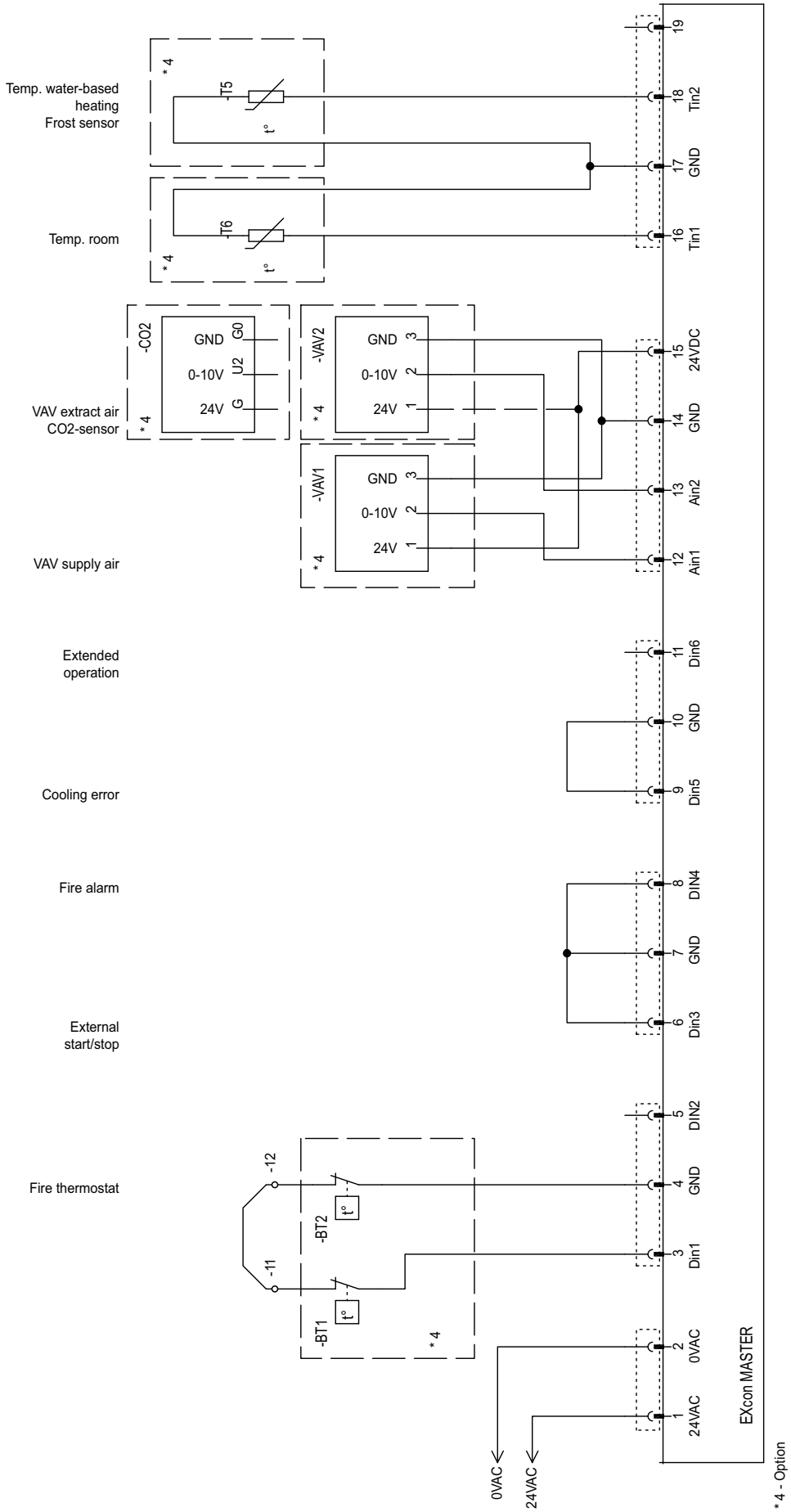


Fig 10.2.2.2 Master input – rotary heat exchangers

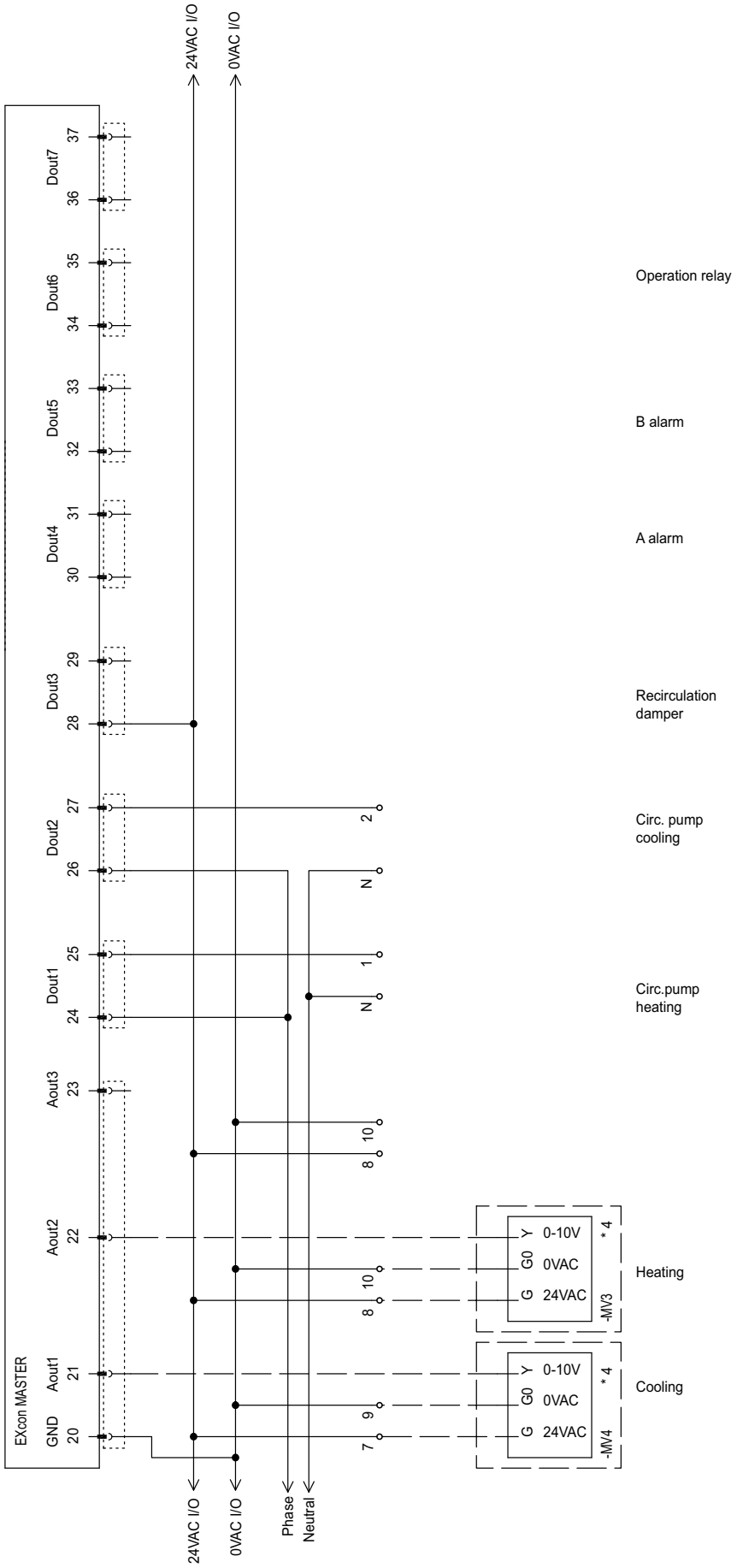


Fig 10.2.2.3Master output – rotary heat exchangers

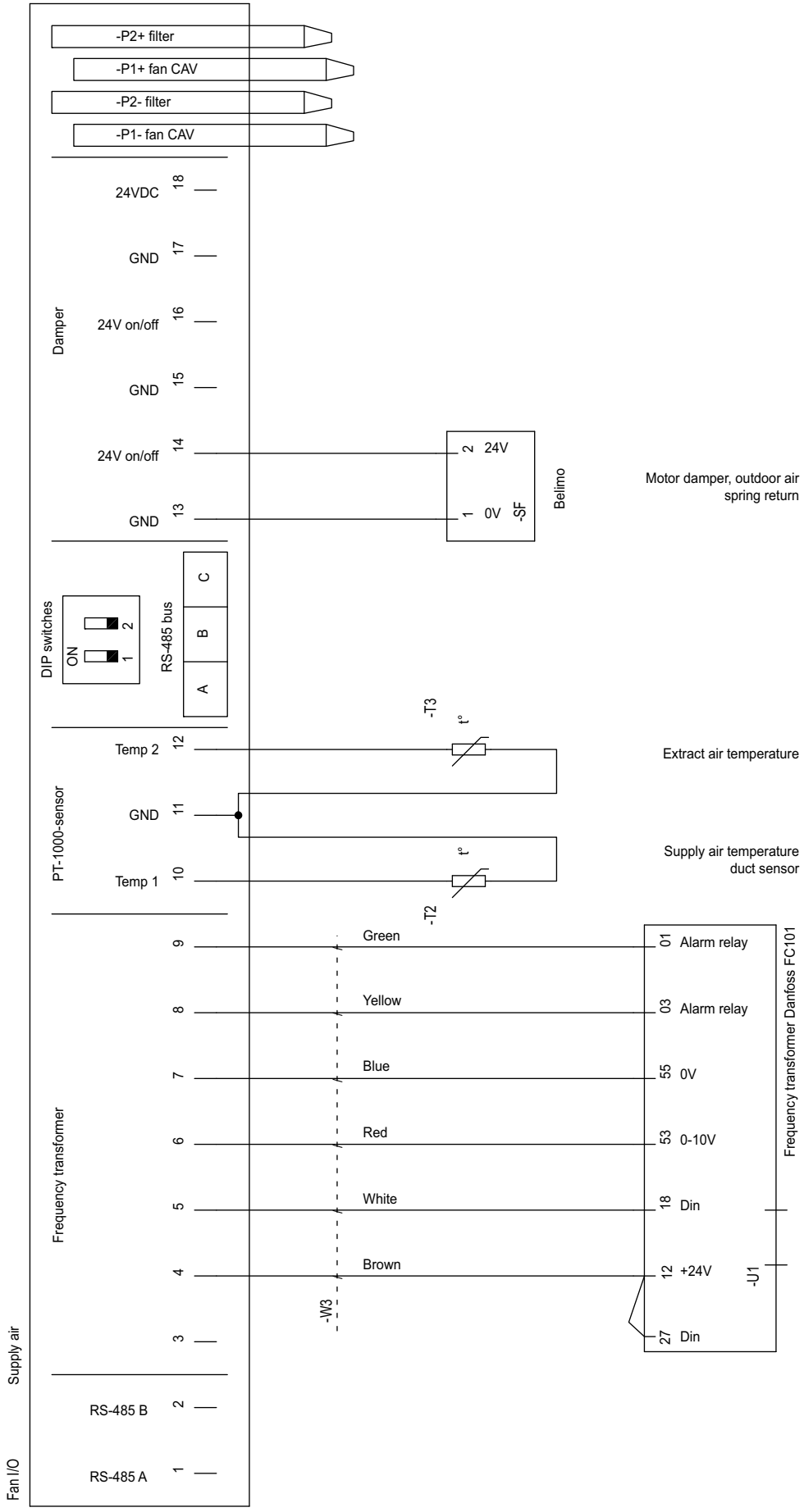


Fig 10.2.2.4 Fan I/O supply air – rotary heat exchangers

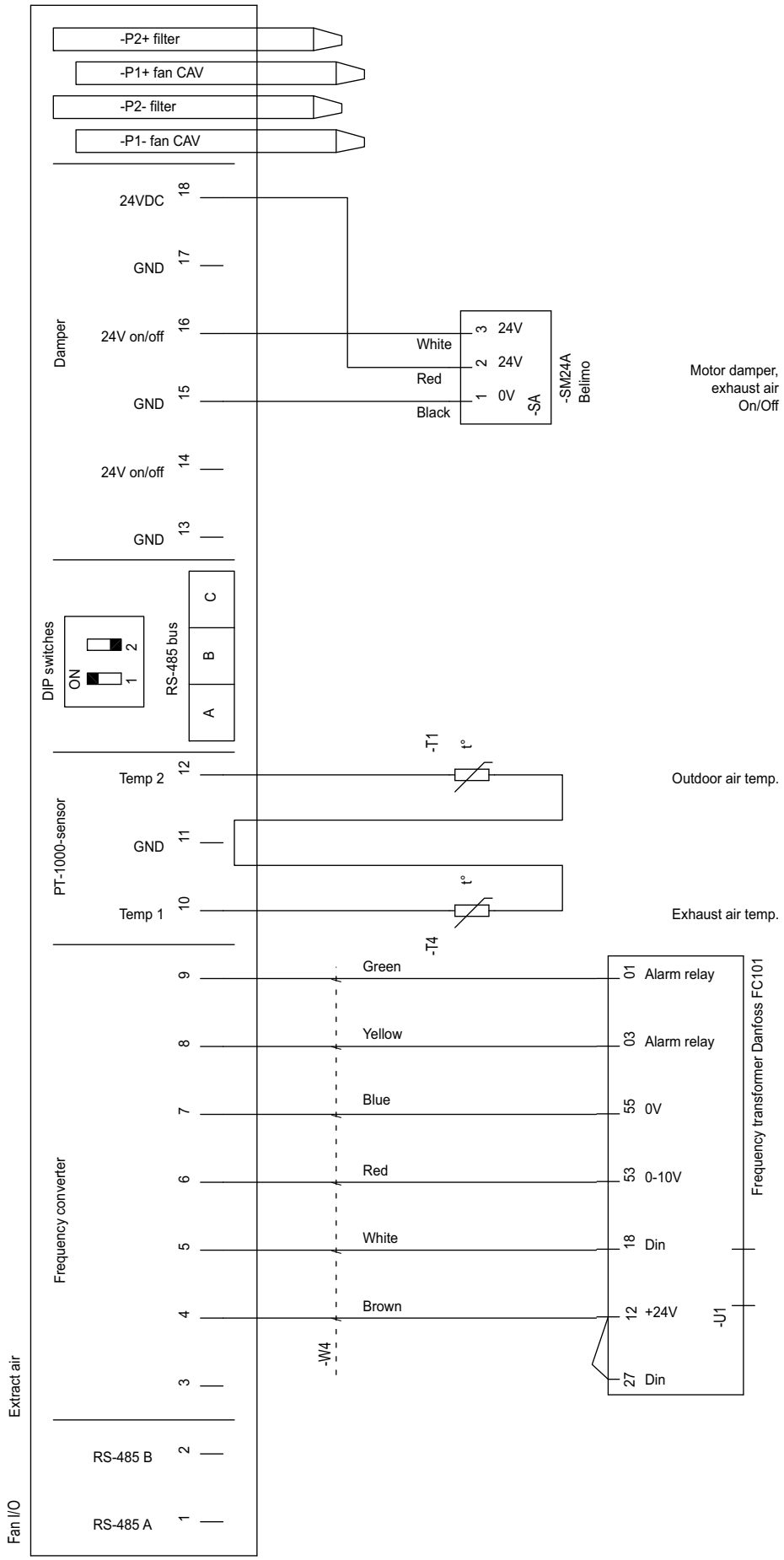


Fig 10.2.2.5 Fan I/O extract air – rotary heat exchangers

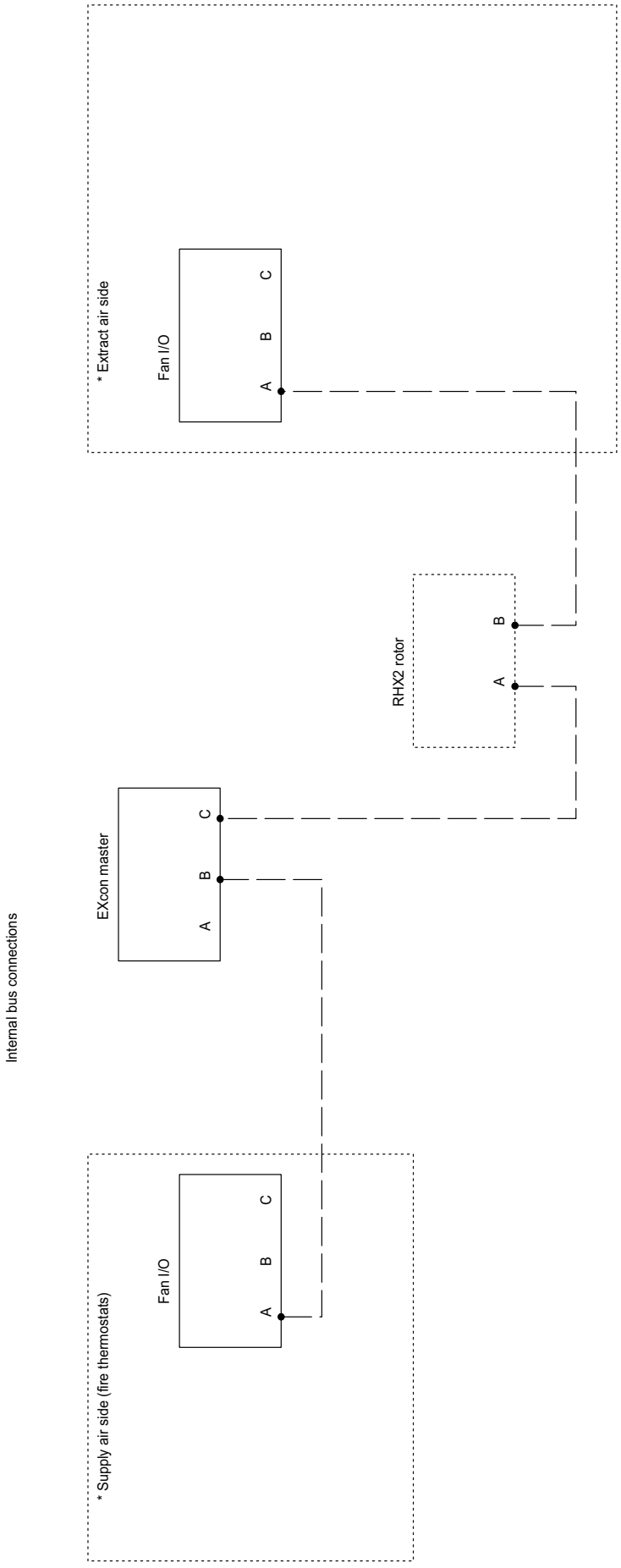


Fig 10.2.2.6 Internal connections – rotary heat exchangers

10.2.3 Crossflow heat exchangers

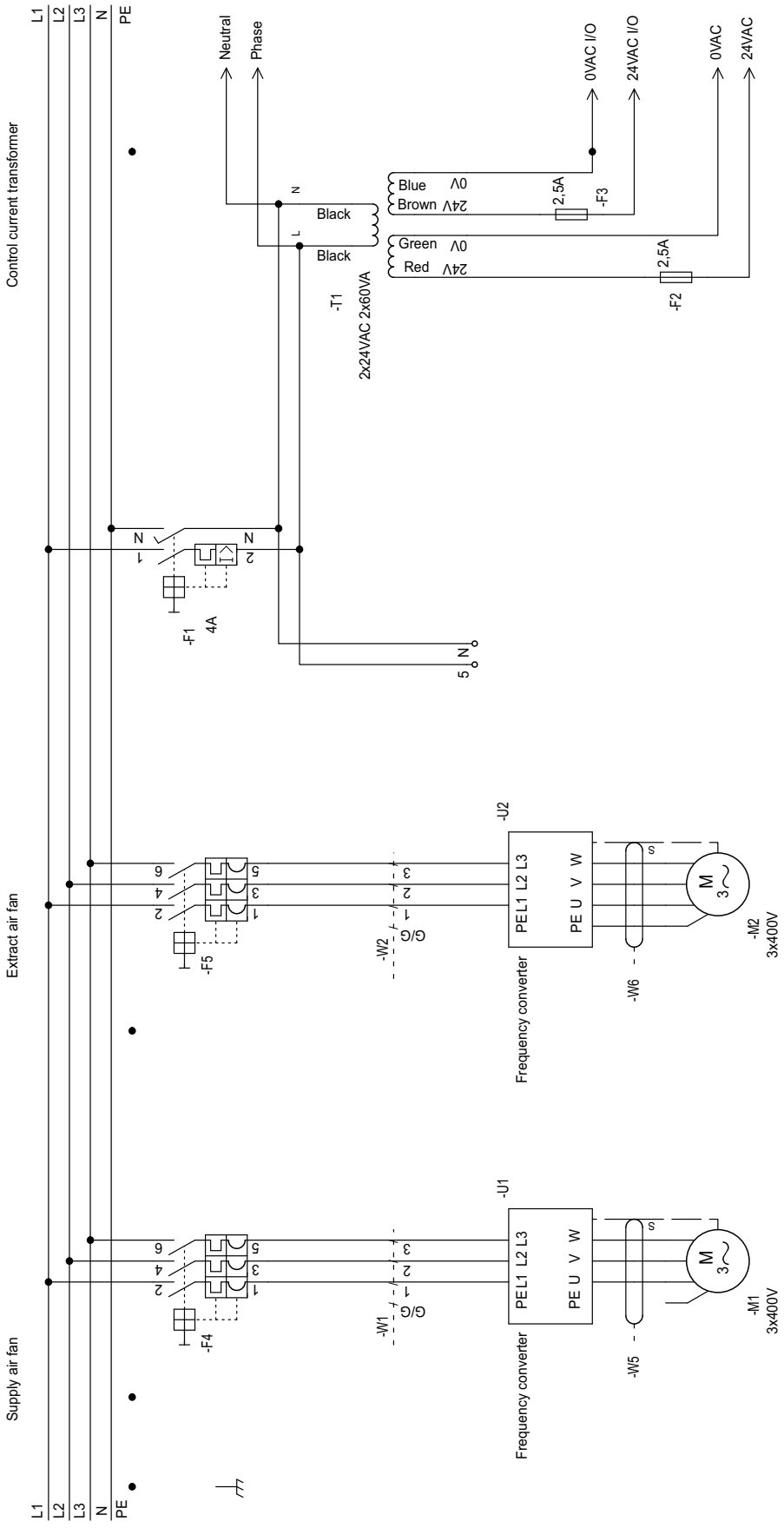


Fig 10.2.3.1 Main supply – Crossflow heat exchangers

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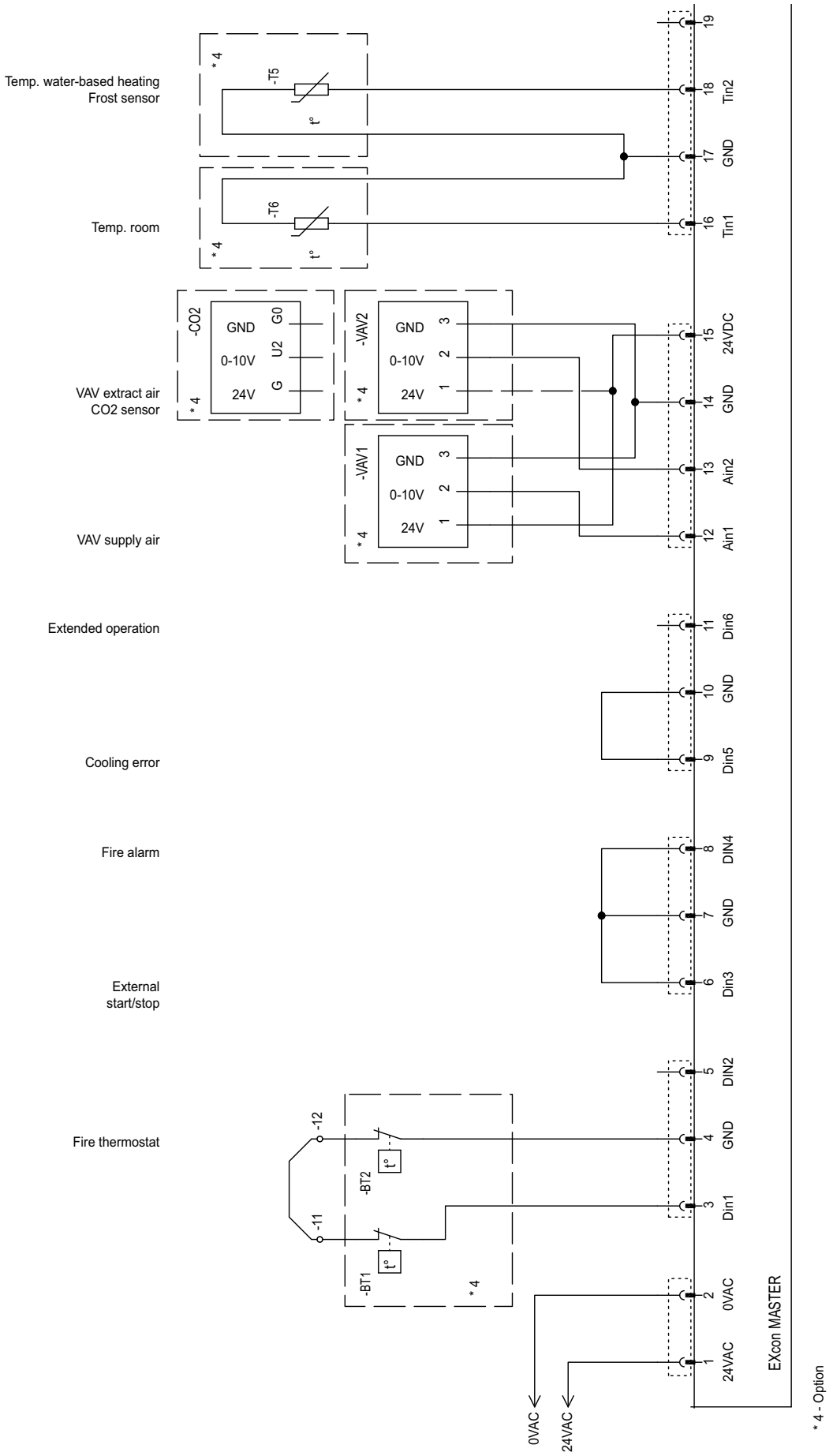


Fig 10.2.3.2Master input – Crossflow heat exchangers

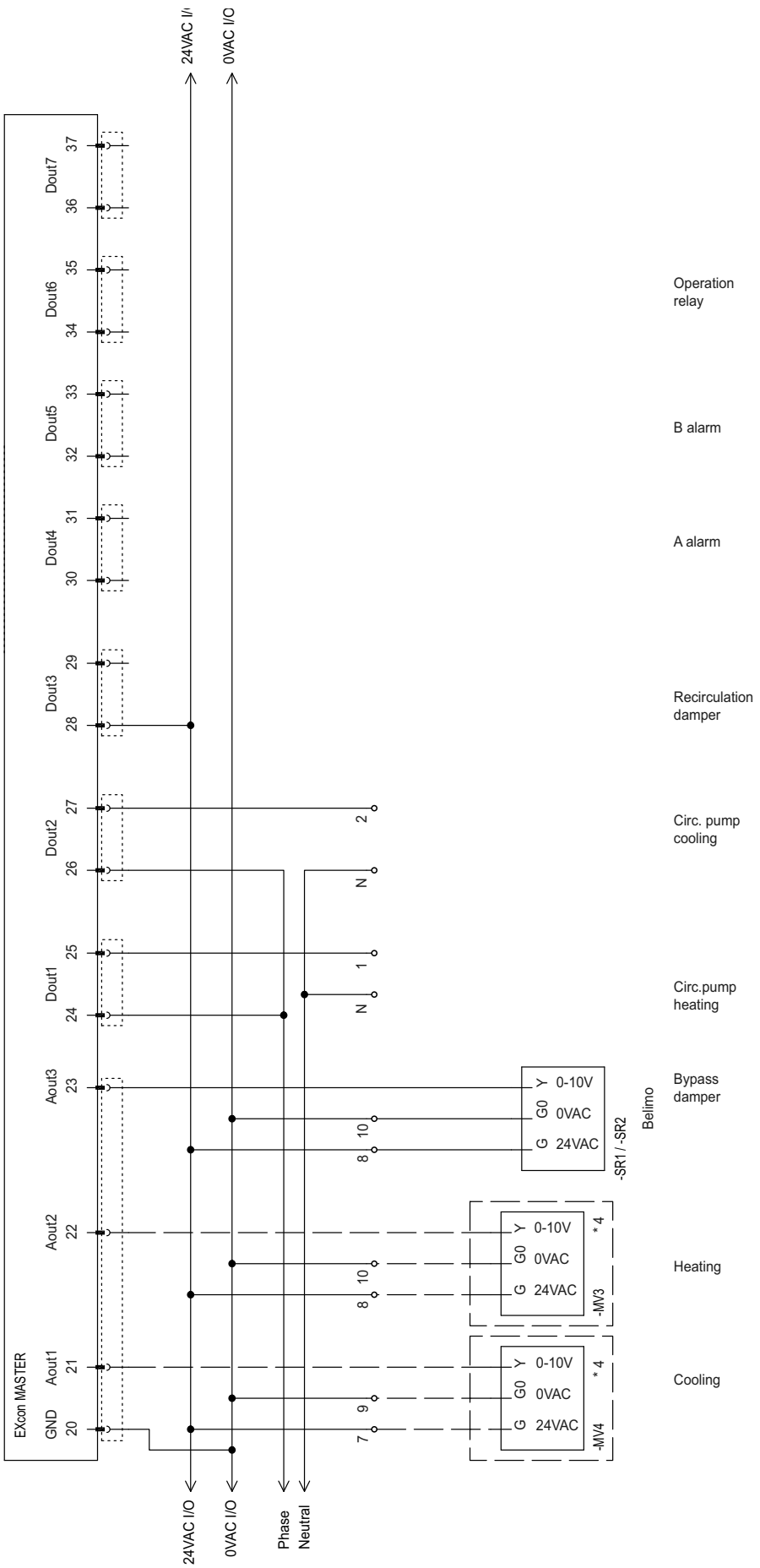


Fig 10.2.3.3Master output – crossflow heat exchangers

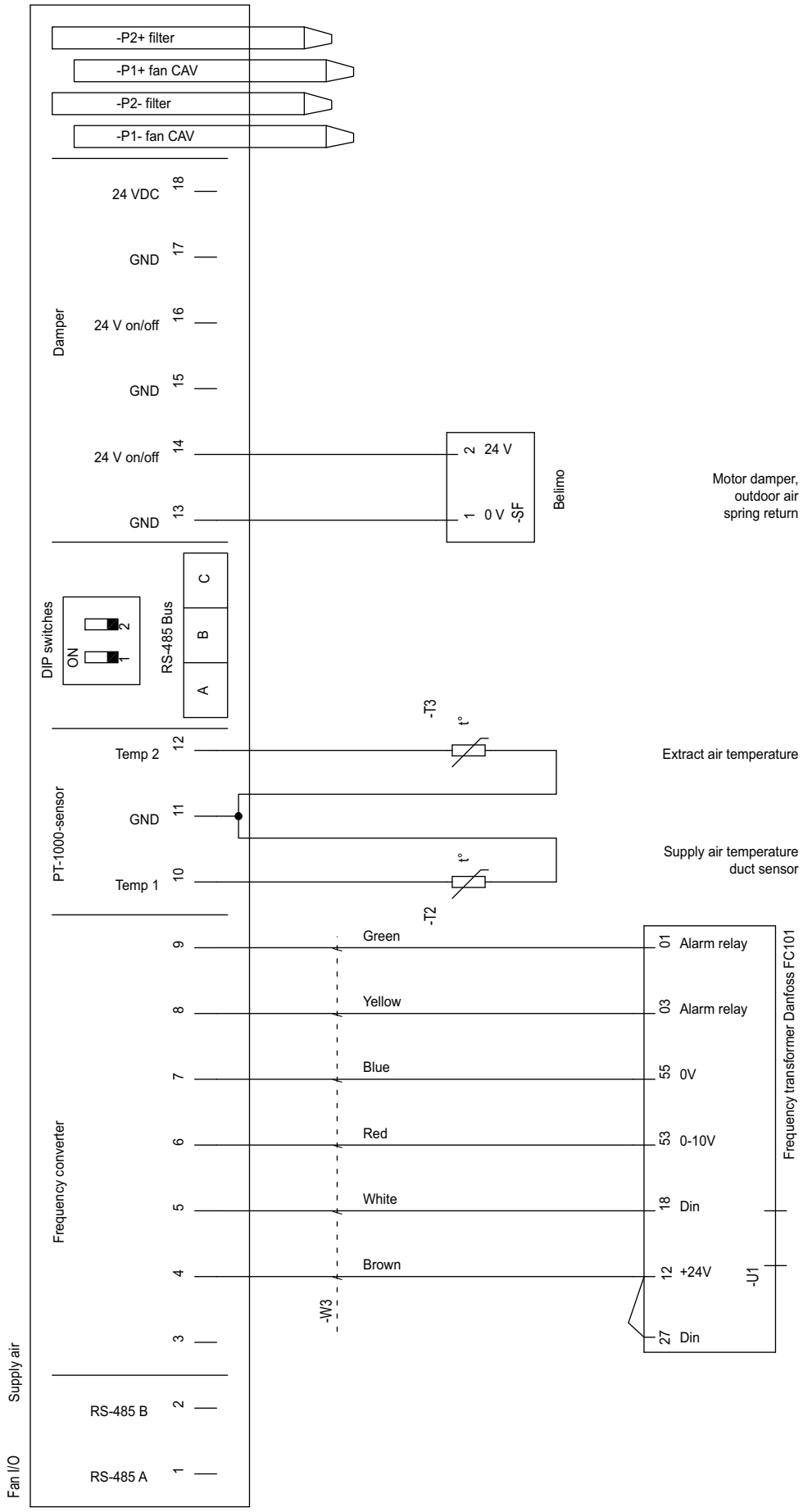


Fig 10.2.3.4 Fan I/O supply air – crossflow heat exchangers

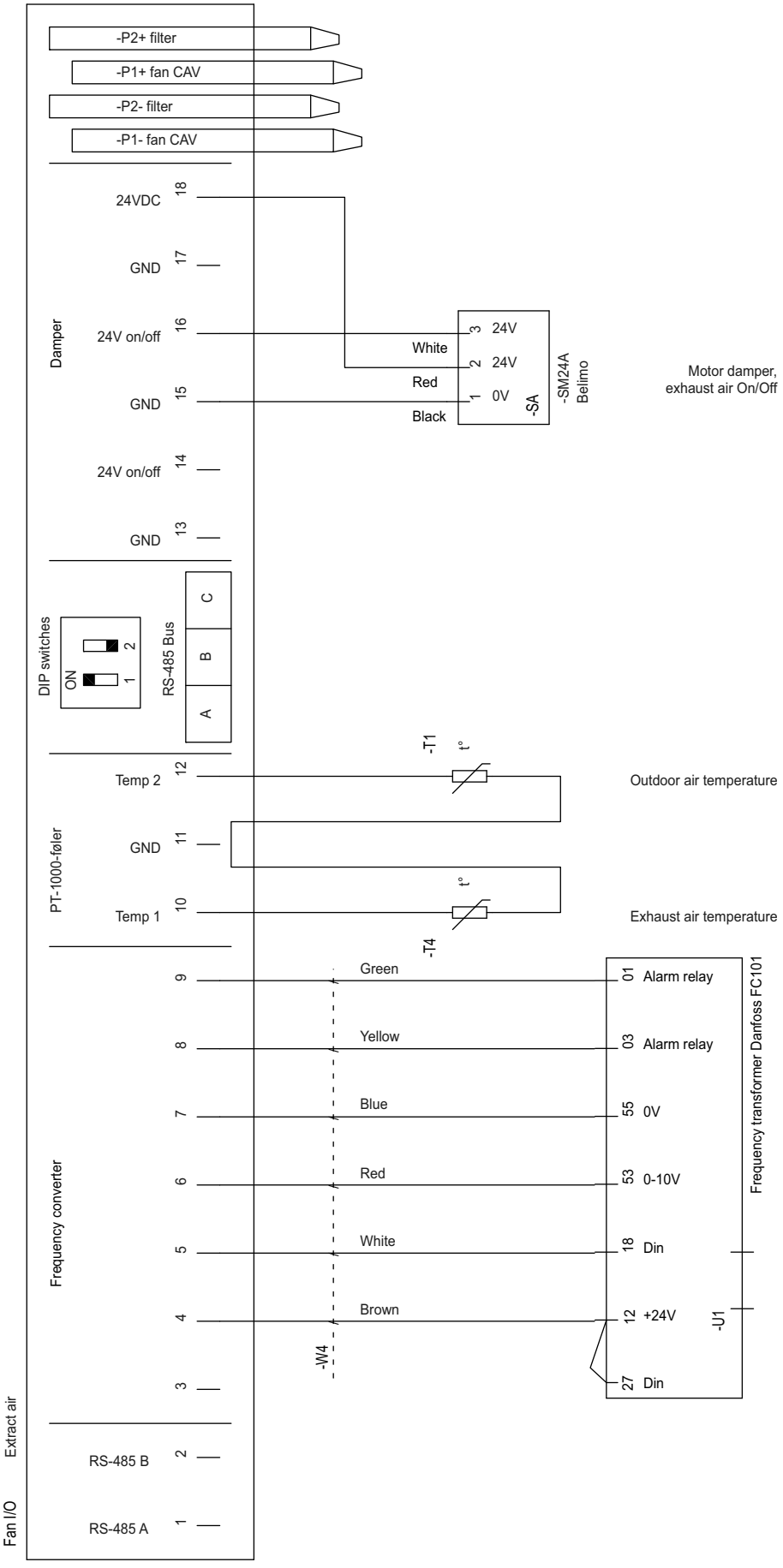


Fig 10.2.3.5 Fan I/O extract air – crossflow heat exchangers

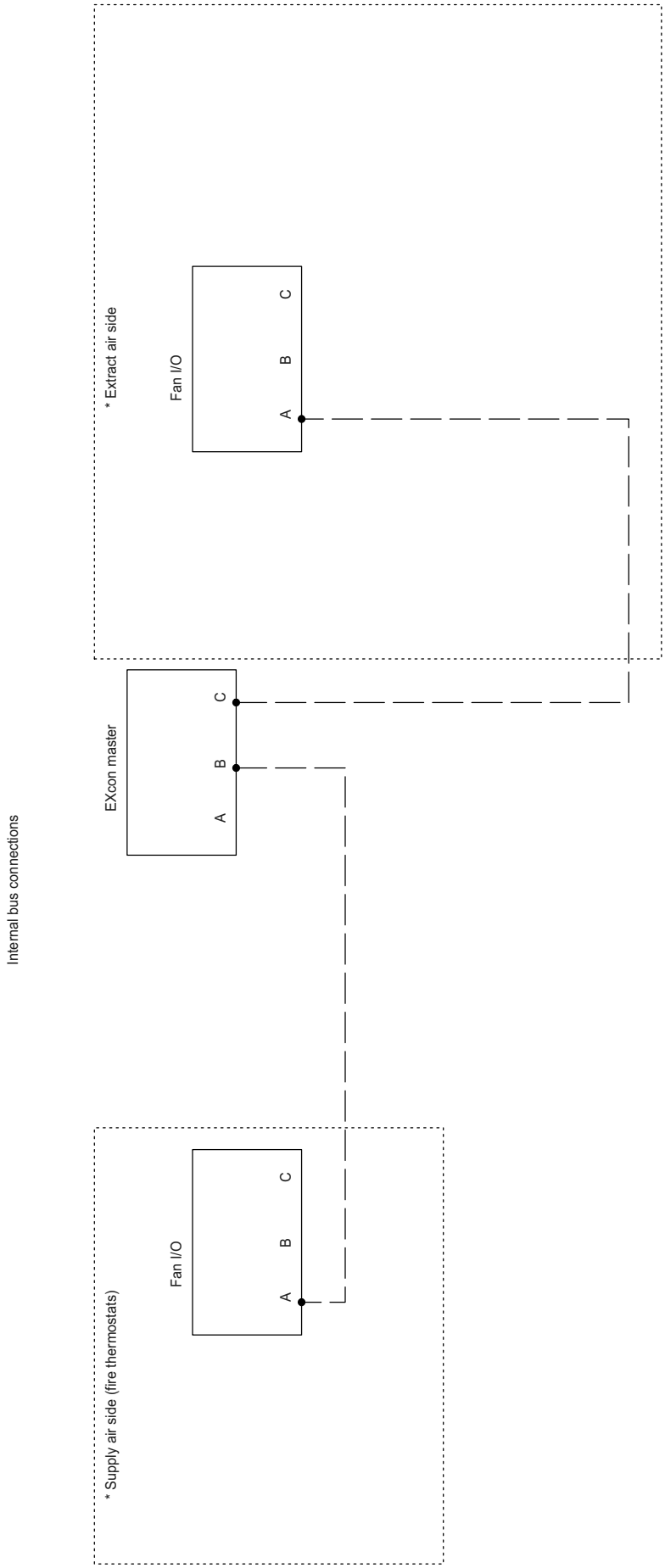


Fig 10.2.3.6 Internal connections – crossflow heat exchangers

10.2.4 Liquid coupled single string

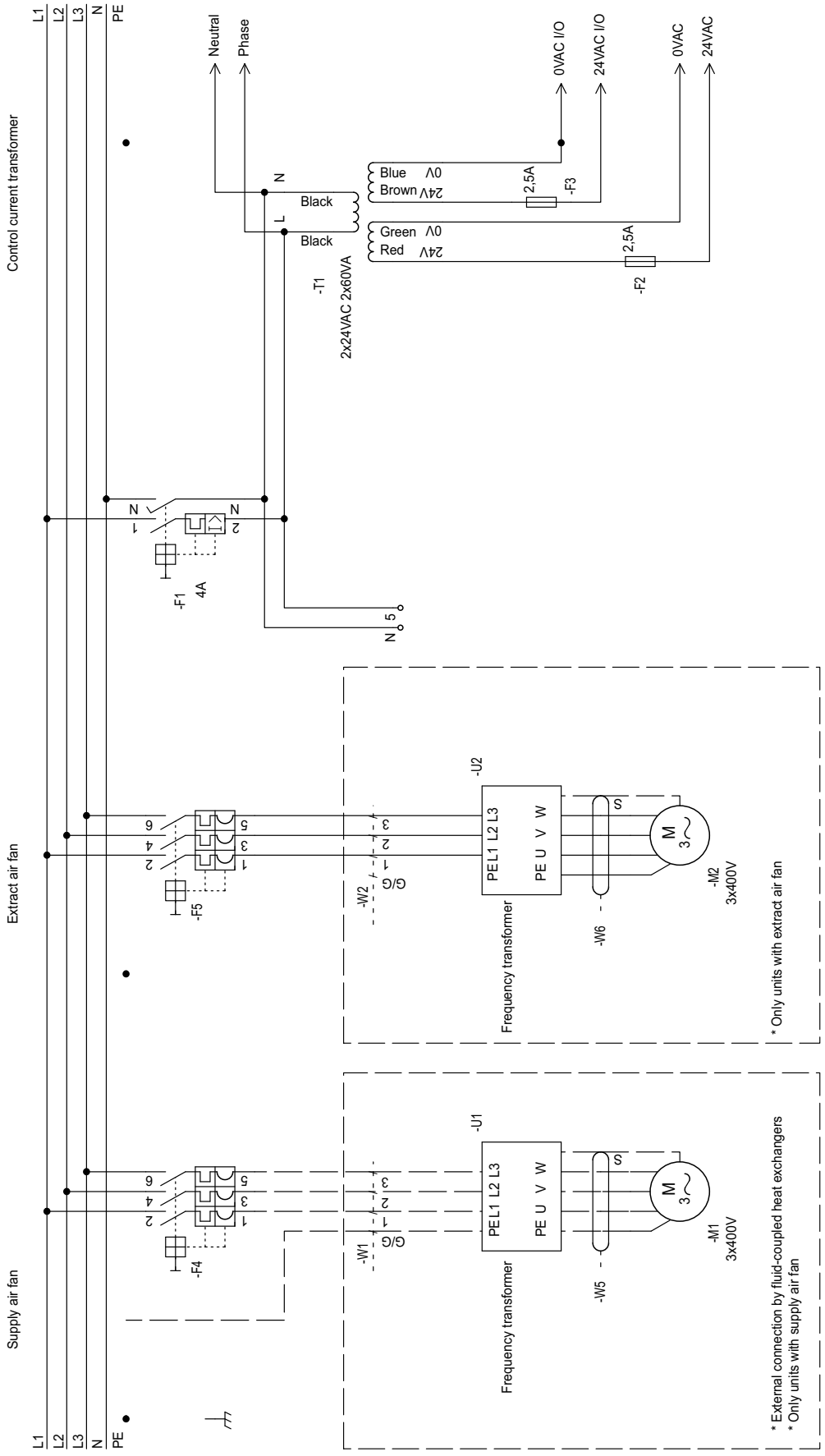


Fig 10.2.4.1 Main supply – liquid coupled single string

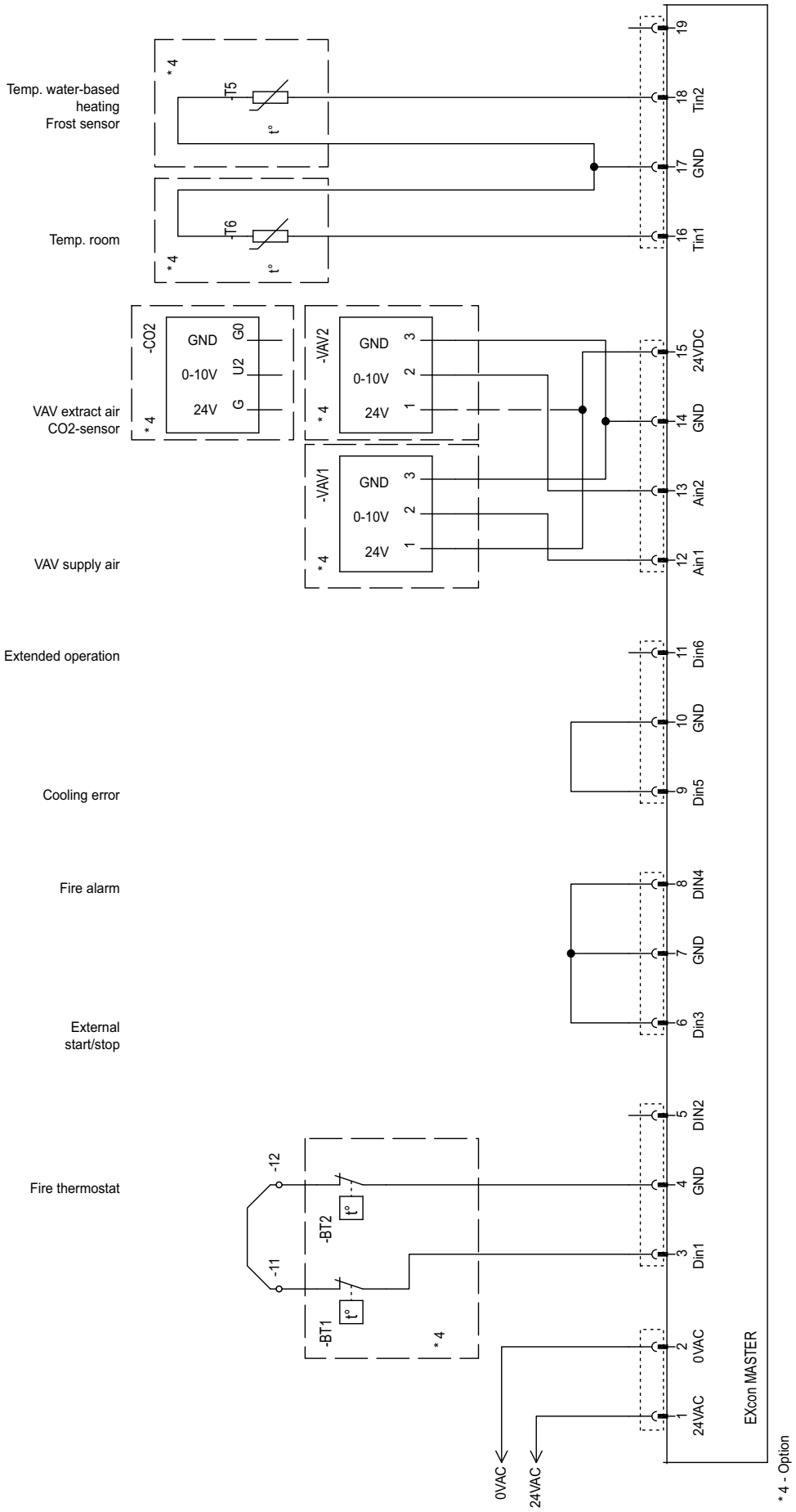


Fig 10.2.4.2 Master input – liquid coupled single string

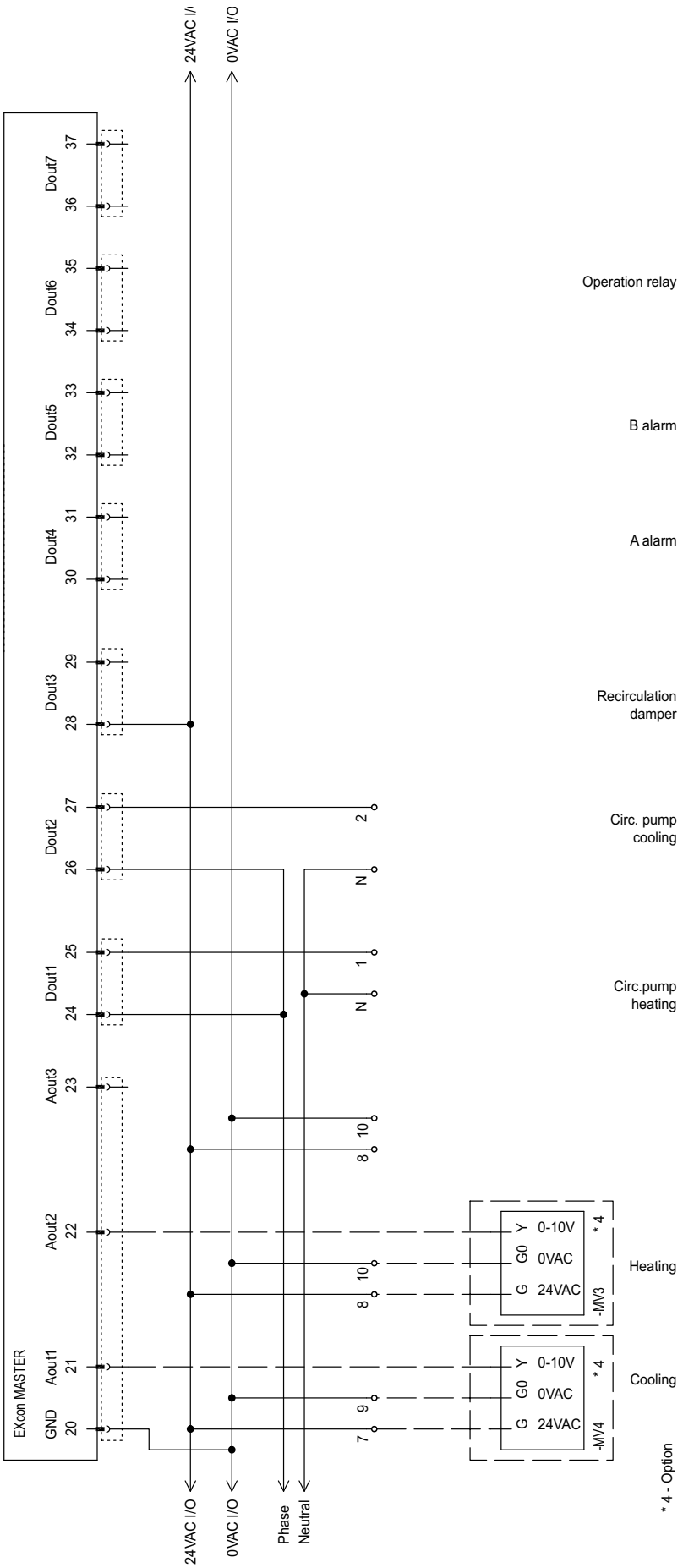


Fig 10.2.4.3 Master output – liquid coupled single string

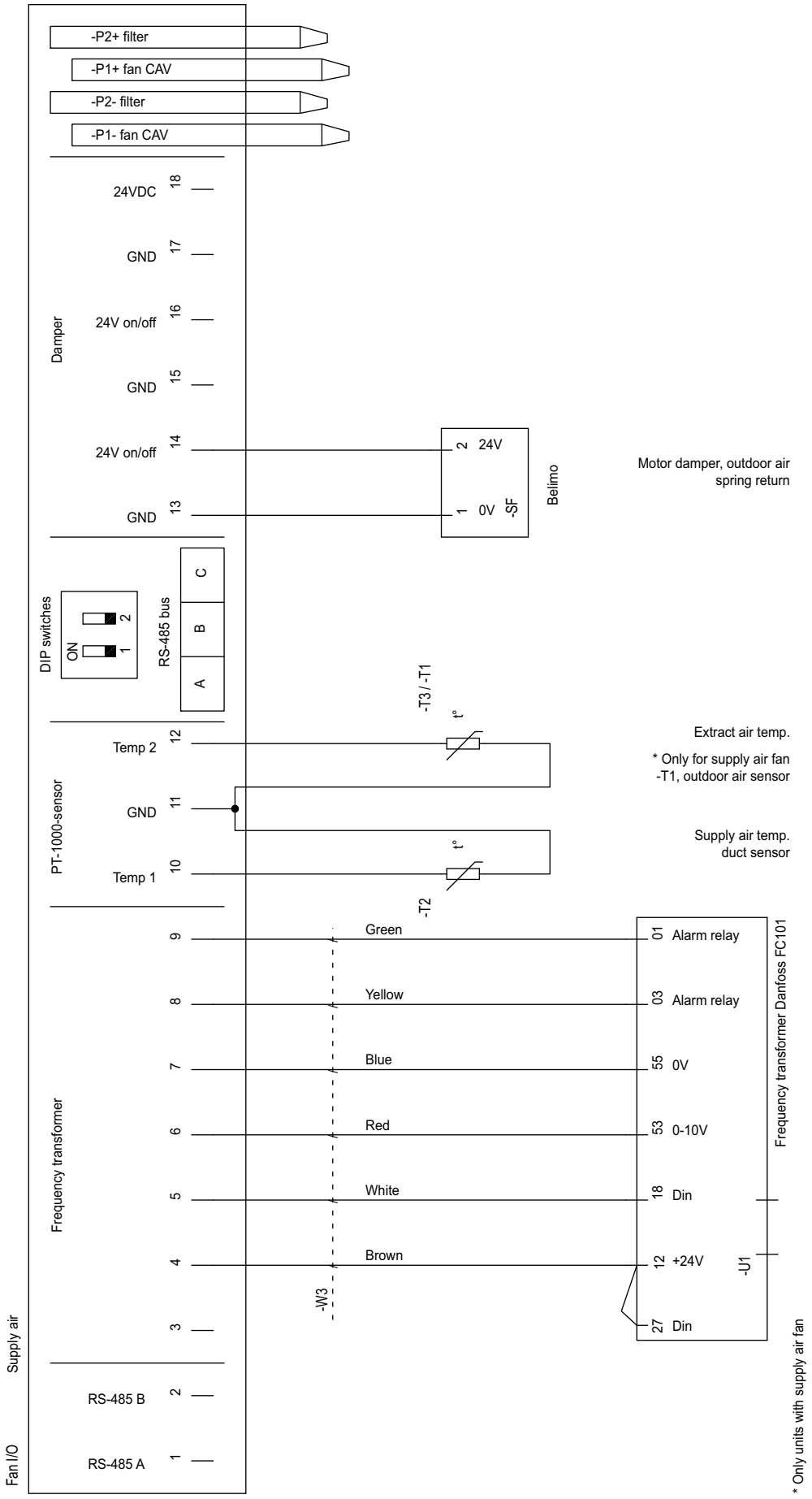


Fig 10.2.4.4 Fan I/O supply air – liquid coupled single string

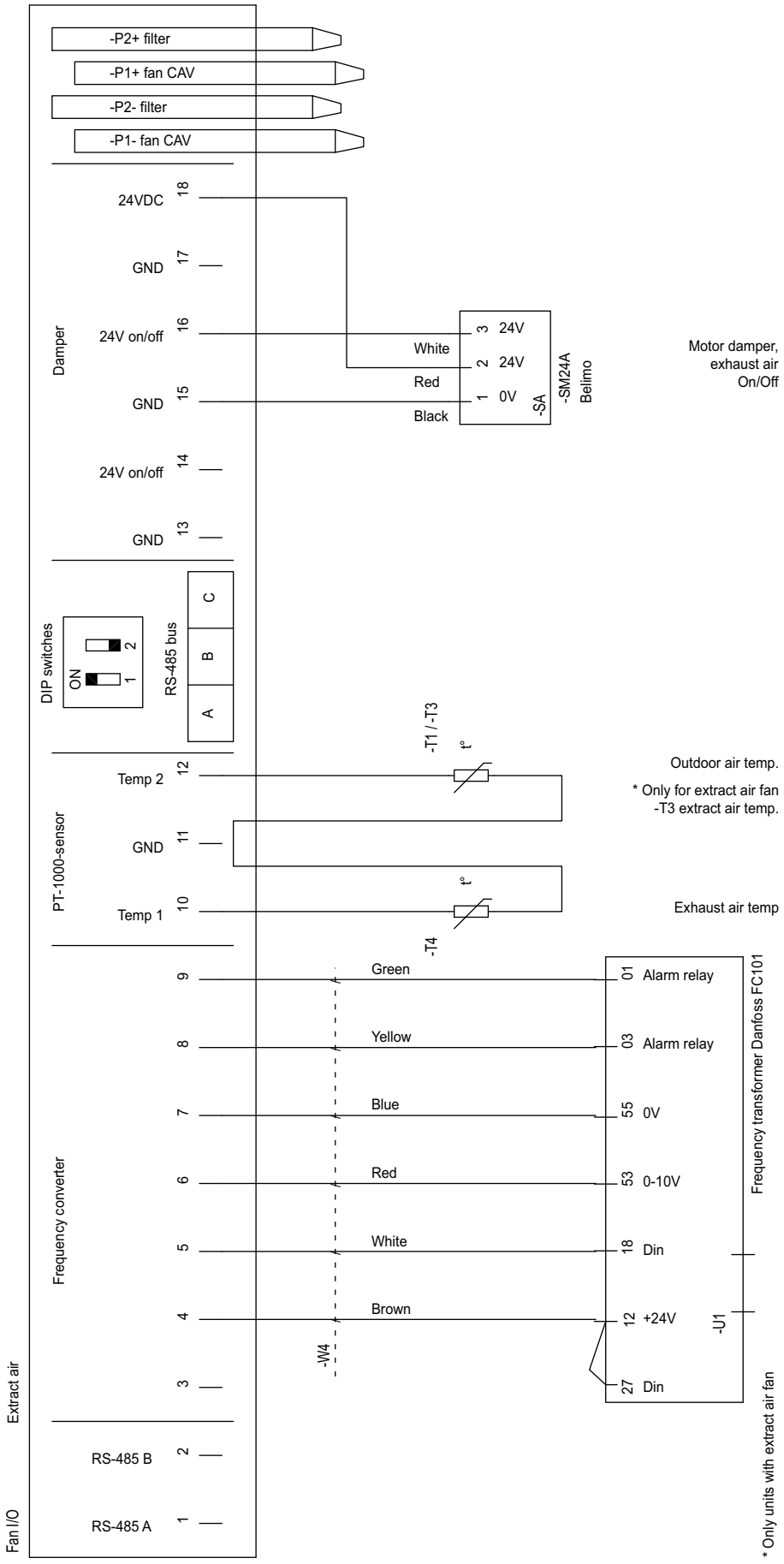


Fig 10.2.4.5 Fan I/O extract air – liquid coupled single string

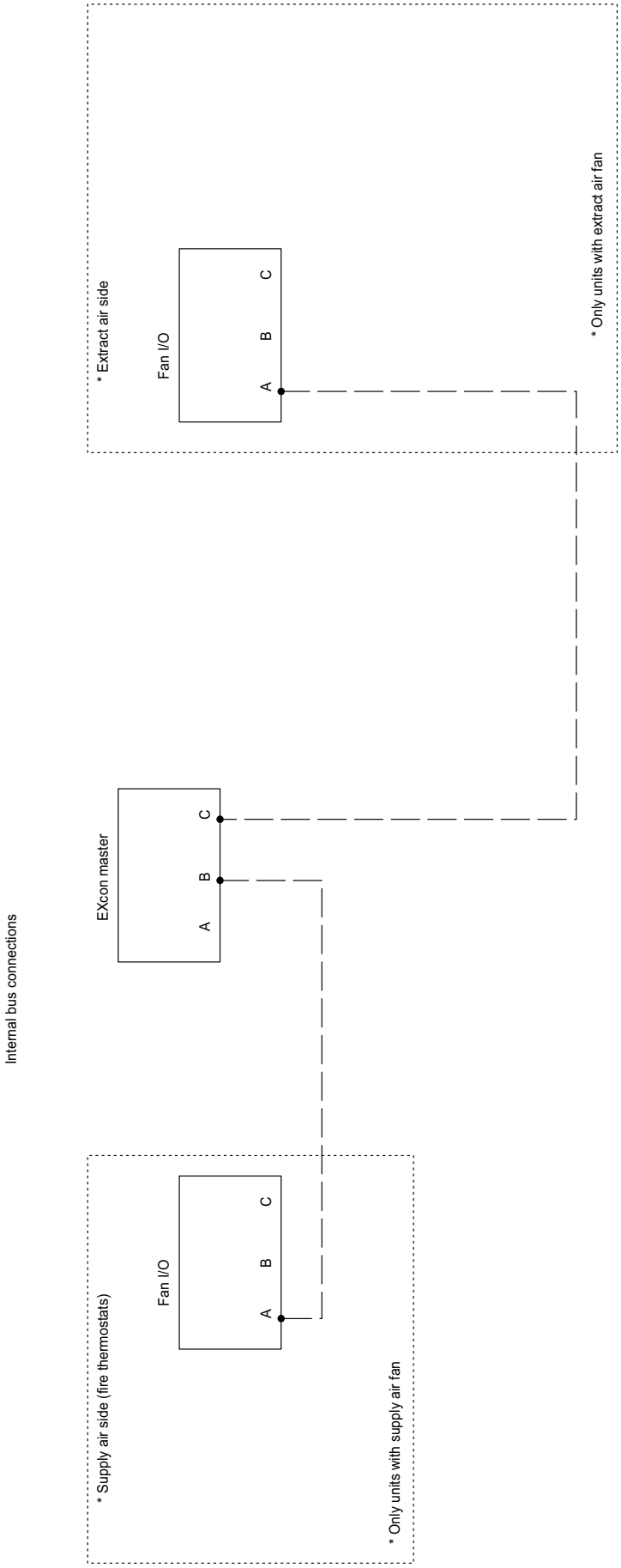
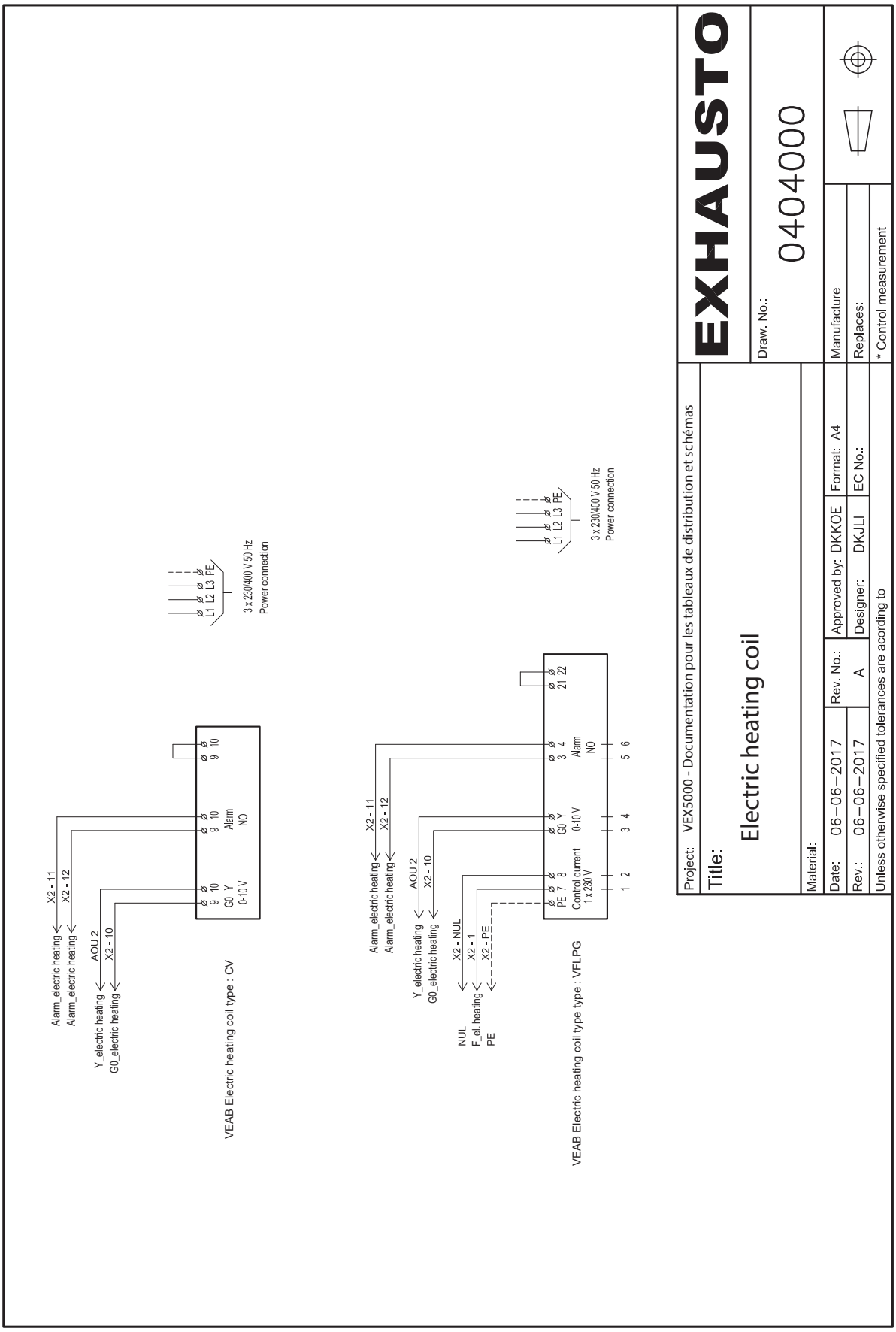
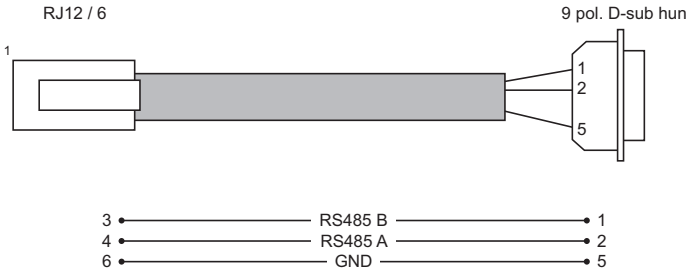


Fig 10.2.4.6 Internal connections – liquid coupled single string

10.2.5 Electric heating coil



10.2.6 Serial Modbus cable



10.2.7 Rotor control

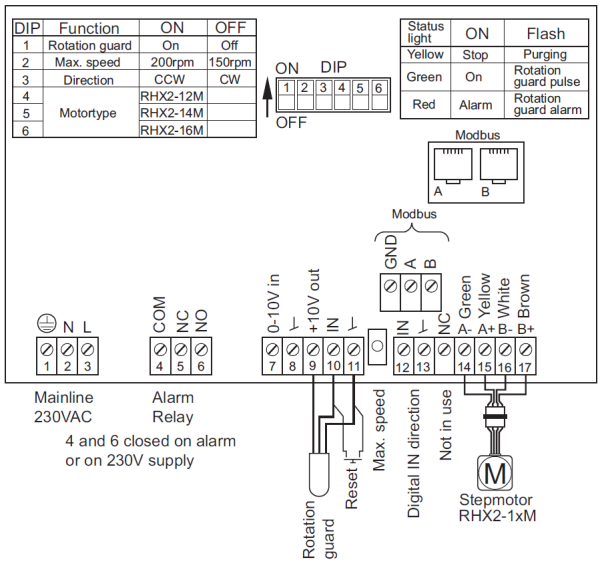


Fig 10.2.7.1 VEX5010-5100

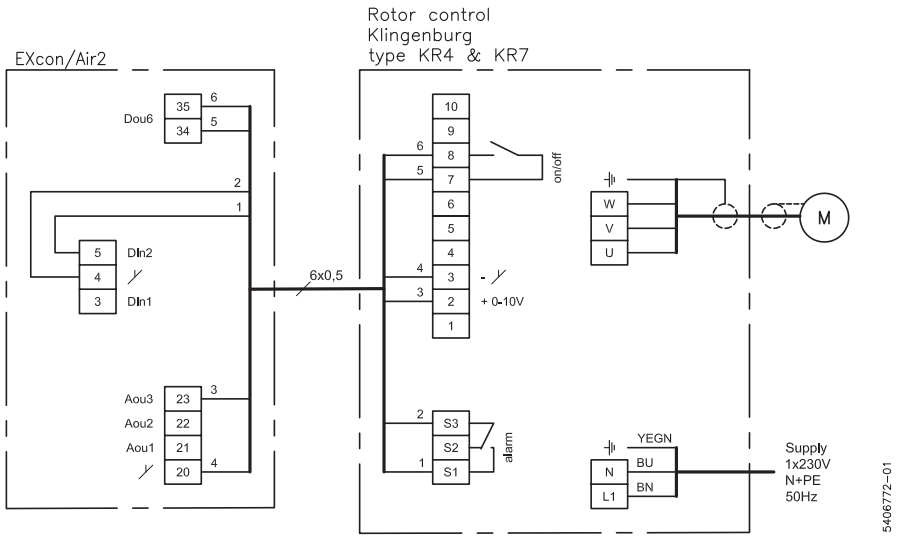


Fig 10.2.7.2 VEX5130-5200

10.3External connections

10.3.1 Digital inputs

Master Din1 (fire thermostat)

- Potential free contact, which trips in case of fire.
- Fire thermostat
- Smoke detector
- Fire thermostat

Master Din3 (external start/stop)

- Potential free contact, which trips in case of stop.
- BMS unit
- PIR sensor

Master Din4 (fire warning unit)

- Potential free contact, which trips in case of fire.

Master Din5 (cooling fault)

- Potential free contact, which trips in case of fault.
- Cooling pump fault
- Cooling unit fault

Master Din6 (external high speed)

- Potential free contact, which closes at high speed
- Contact timer
- PIR sensor
- BMS unit
- Extended operation pressure

10.3.2 Analogue inputs

Master Ain1 (common supply air)

- Pressure transducer, VAV sensor, 0–10 V

Master Ain2 (common extract air)

- Pressure transducer, VAV sensor, 0–10 V
- CO2

Master Tin1 (room temperature)

- PT1000 room sensor

Master Tin2 (water coil temperature)

- PT1000 sensor for built-in return water from water heating coil.

10.3.3 Analogue outputs

Master Aou1 (cooling)

- 0–10 V

Master Aou2 (heating)

- 0–10 V

Master Aou3 (heat recovery)

- 0–10 V
- Bypass damper motor 24 VAC (at 0 V the bypass is fully open)

10.3.4 Digital outputs

Master Dout1 (heating relay)

- Potential free relay. 230 VAC / 5A
- Circulation pump for heating

Master Dout2 (cooling relay)

- Potential free relay. 230 VAC / 5A
- Circulation pump for cooling
- Cooling unit

Master Dout3 (re-circulation relay)

- Damper control

Master Dout4 (A alarm relay output)

- Potential free relay max. 30 V / 3 A
- With A alarms, the air handling unit stops completely. Relay closes in case of an alarm.
- Signal light
- BMS unit

Master Dout5 (B alarm relay output)

- Potential free relay max. 30 V / 3 A
- With B alarms, the air handling unit operates but there is a fault on some of the functions. Relay closes in case of an alarm.
- Signal light
- BMS unit

Master Dout6 (operating relay)

- Potential free relay max. 30 V / 3 A

11.Flow diagrams

Depending on the installed equipment level, there will be a difference between the actual and shown flow for the different air handling unit variants.

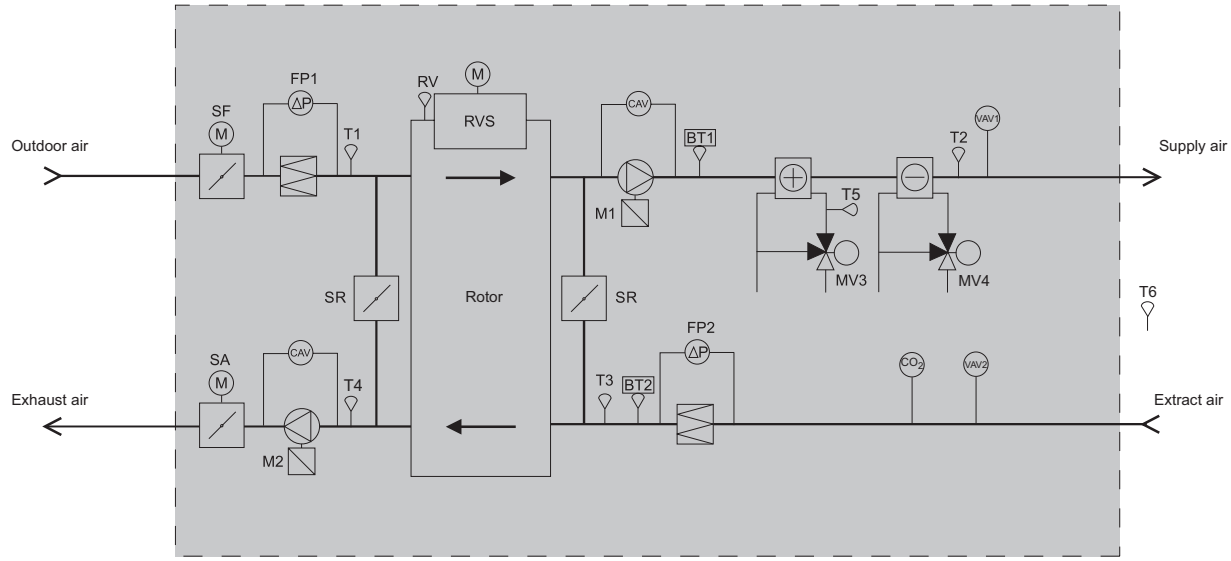


Fig 11.1 Example of an air handling unit with rotary heat exchanger, water heating and cooling

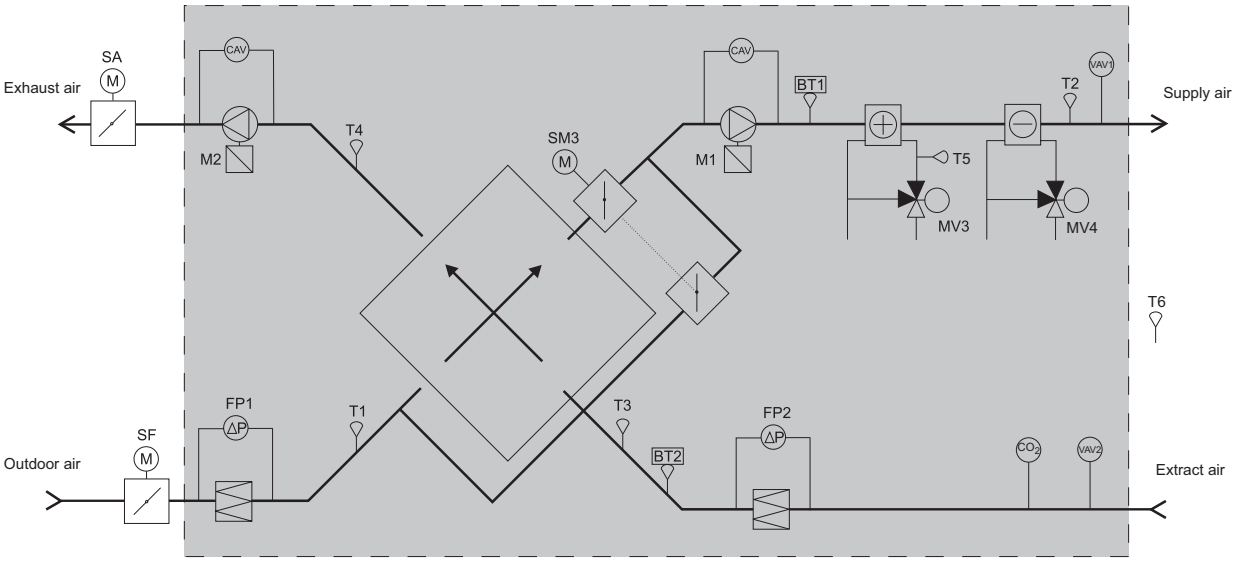


Fig 11.2 Example of an air handling unit with crossflow heat exchanger, water heating and cooling

Abbreviations	Component	Description
BT1	**Water:** Fire thermostat BT70	Fire thermostat for supply air max. 70°C, positioned in the air handling unit
BT2	Fire thermostat BT40	Fire thermostat for extract air max. 40°C, positioned in the air handling unit
CAV	Constant airflow	Pressure transducer for constant airflow regulation fitted internally
CO_2	CO_2 sensor in room or duct	Optional, supplied loose
FP1	Outdoor air filter monitor	Monitors the pressure drop across the filter and generates a replace filter alarm
FP2	Extract air filter monitor	Monitors the pressure drop across the filter and generates a replace filter alarm
M	Motor drive for rotary heat exchanger	Fitted internally in the air handling unit
M1	Supply air fan	B fan impeller and motor with frequency converter
M2	Exhaust air fan	B fan impeller and motor with frequency converter
MV3	Motor valve, heating	Supplied loose, motor controlled 3-way valve – modulated
MV4	Motor valve, cooling	Optional, supplied loose, motor controlled 3-way valve – modulated
OHT	Overheating thermostat	Thermostat for overheating
RV	Rotor monitor	Monitors rotor rpm and interval motioning
RVS	Control for rotary heat exchanger	Variable speed of rotor
SA	Motor damper, exhaust air on/off	Optional, supplied loose, fitted in exhaust air duct and closes on standby.
SF	Motor damper, outdoor air	Supplied loose, fitted in outdoor air inlet and closes on air handling unit stop
SM3	Motor damper, crossflow heat exchanger	Modulated damper motor on interconnected damper
SR	Motor damper, recirculation	Fitted between the supply air and extract air, and between the outdoor air and exhaust air
T1	Temperature sensor, outdoor air	Positioned in outdoor air section after filter
T2	Temperature sensor, supply air	Fitted with 5 m cable and enclosed in the air handling unit, must be fitted in the supply air duct, min. 1 m from the heating coil
T3	Temperature sensor, extract air	Fitted in the extract air spigot for measuring and controlling extract air temperature
T4	Temperature sensor, exhaust air	Positioned in the exhaust air duct from the crossflow heat exchanger for de-icing protection
T5	Temperature sensor, return water	Positioned on the discharge pipe from the heating coil for frost protection
T6	Temperature sensor, room	Positioned in the servicing room in connection with recirculation
VAV1	External pressure transducer, supply air	Optional, supplied loose
VAV2	External pressure transducer, extract air	Optional, supplied loose

Tabel 11.1 Abbreviations used in flow diagrams

12.Spare parts

Contact EXHAUSTO to order spare parts.

Component	Type	Comments
Spare V-belts for rotors		
Recovery valve, 3-way, KVS 2.5, 1/2" incl. 1 set ALG143	VXP459.15-2,5	
Recovery valve, 3-way, KVS 4.00, 1/2" incl. qty. 3 ALG15. ALG153	VXP459.20-4	
Recovery valve, 3-way, KVS 6,3 3/4" incl. qty. 3 ALG20. (ALG203)	VXP459.25-6,3	
Recovery valve, 3-way, KVS 10 - 1" incl. qty. 3 ALG25. (ALG253)	VXP459.25-10	
Valve motor, IP40 (1–50 degrees) AC 24 V, 0–10 V, 200 N, 5.5 mm, 1.5 m	SSB619	
Valve motor, IP54 (-5 to +50 degrees) AC 24 V, 0–10 V, 400 N, 5.5 mm	SQS65	
Water heating coil sensor, IP54 incl. all tightened return flow	ETF-1698	
Damper motor inlet, 15 Nm, spring-return (cable 1 m) max. Ø10–20 mm	AF24	
Damper motor crossflow heat exchanger, 1 m^2, 5 Nm, 2–10 V modulated (cable 1 m)	LM24A-SR-F	
Damper motor, exhaust air, 20 Nm, On/Off, Ø10–20 mm	SM24A	
Damper motor, recirculation, 1 m^2, 5 Nm, On/Off for 8 x 8 mm	LM24A-F	
Fuse, 4 A time delay (control power supply 230 V)	5725553471	
Fuse, 2.5 A quickblow (control power supply 24 V)	5725553219	
Duct sensors, PT1000 100 mm x 4 m PVC cable	ETF-1098L1-4	
Cable sensors PT1000 1.5 m		

Tabel 12.1 Spare parts list

Scan code and go to addresses at
www.exhausto.com

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