

Zehnder Carma

Installation, Service and User Manual

always the best climate



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Legal regulations

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Zehnder manufacturer's warranty

The current device terms are available online

(<https://www.caladair.com/en/espace-client/media/sales-terms-and-conditions>).

Hardcopies can be obtained via our established sales channels.

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Safety and environmental guidelines

In accordance with the regulations in force, the installation and maintenance of the equipment must only be carried out by technically qualified personnel authorised for this type of equipment and work.

Use the necessary Personal Protective Equipment to avoid injury from electrical, mechanical (injuries from contact with metal sheets, sharp edges, etc.) and acoustic hazards.

Do not use the appliance for any purpose other than that for which it is designed. This device may only be used to convey air free of hazardous compounds, construction dust, etc.

Move the device as described in the chapter on handling.

Grounding must be done in accordance with the applicable standards. Never switch on an ungrounded appliance.

Before carrying out any work, make sure that the equipment is switched off and wait for the moving parts of the ventilation unit to come to a complete stop before opening the doors, panels and access hatches.

During operation, inspection and service panels, doors and hatches must always be fitted and closed.

The appliance can only be switched on and off via the isolator switch.

The safety and control equipment must not be removed, short-circuited or disabled.

The installation must comply with fire safety regulations.

All waste produced must be handled in accordance with the regulations in force.

It is the responsibility of the installer of the equipment to ensure compliance with the regulations concerning noise emissions inside the building and to adapt the installation and location conditions if necessary.

We accept no liability for damage resulting from misuse of the equipment, unauthorised repair or modification or failure to observe these instructions.

1. Technical specifications

1.1. Common electrical performance data Zehnder Carma 90xx and Zehnder Carma 3xx

Zehnder Carma model	Output Electric motor (W)	Operating temp. (°C / °C)	Degree of protection / Class	Thermal protection	FIRST, PREMIUM BC and SEASON		INFINITE BC and SMART		PREMIUM BE			INFINITE BE		
					Supply voltage (V/Ph/Hz)	Current draw (A)	Supply voltage (V/Ph/Hz)	Current draw (A)	Supply voltage (V/Ph/Hz)	Model	Current draw (A)	Supply voltage (V/Ph/Hz)	Model	Current draw (A)
9008 308	2 x 220	-20 / 60	IP44/B	ITP	230/1/50	3.4	230/1/50	14.3	230/1/50	BE 025	14.3	230/1/50	BE 025	25.2
9010 310	2 x 480	-20 / 60	IP54/B	ITP	230/1/50	4.3	230/1/50	20.6	230/1/50	BE 025	15.2	230/1/50	BE 025	31.5
9016 316	2 x 480	-20 / 60	IP54/B	ITP	230/1/50	4.3	400/3+N/50	11.9	230/1/50 400/3+N/50	BE 037 BE 052	20.6 11.9	400/3+N/50	BE 052	19.5
9023 323	2 x 700	-20 / 40	IP54/B	ITP	230/1/50	6.0	400/3+N/50	15.7	230/1/50 400/3+N/50	BE 037 BE 067	22.3 15.7	400/3+N/50	BE 067	25.4
9035 335	2 x 2500	-20 / 40	IP54/B	ITP	400/3+N/50	7.7	400/3+N/50	19.6	400/3+N/50	BE 067 BE 137	17.4 27.2	400/3+N/50	BE 067 BE 137	29.3 39.1
9048 348	2 x 1950	-20 / 50	IP54/B	ITP	400/3+N/50	6.3	400/3+N/50	32.3	400/3+N/50	BE 067 BE 137	16.0 25.8	400/3+N/50	BE 067 BE 137	42.0 51.8
9070 370	2 x 2730	-20 / 60	IP54/F	ITP	400/3+N/50	8.4	400/3+N/50	44.1	400/3+N/50	BE 105 BE 157	23.6 31.1	400/3+N/50	BE 105 BE 157	29.3 66.9

* ITP: Integrated thermal protection

1.2. Dimensional data Zehnder Carma 90xx

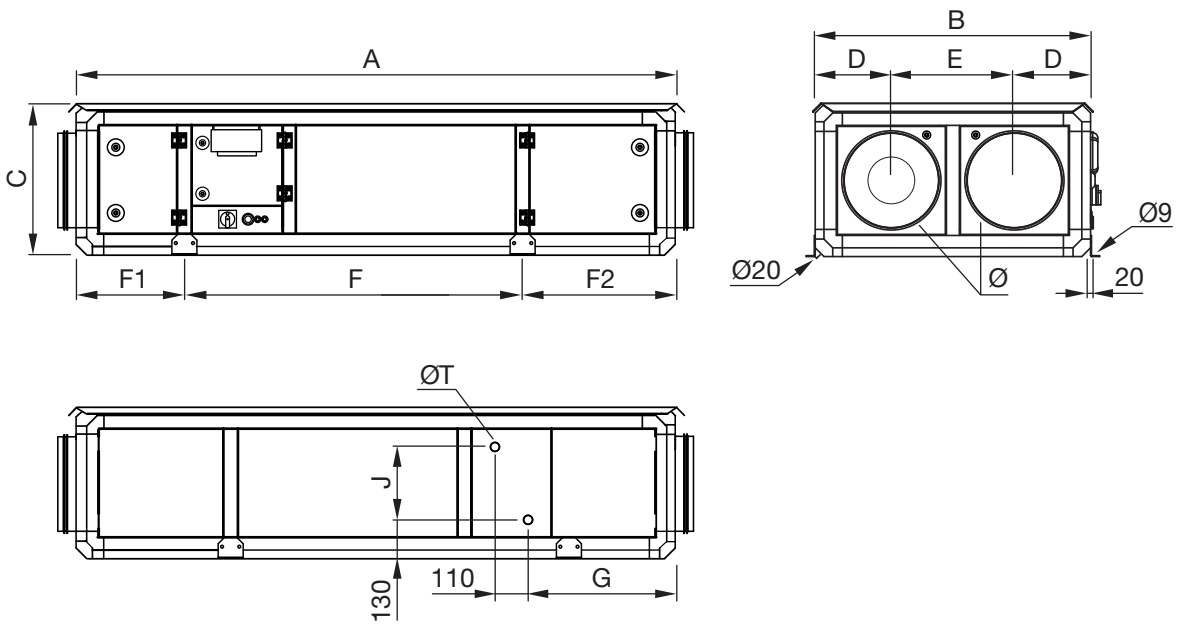
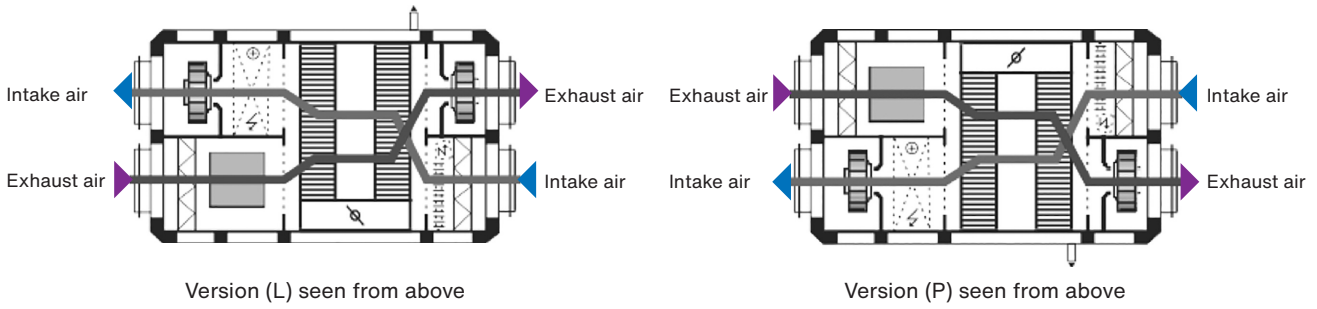
The dimensional data for each model is shown in the table below.

See the dimensional drawings for each model in the subsequent chapters.

Zehnder Carma model	Ø	A	B	C	D	E	F	F1	F2	G	J	K	T	SEASON	FIRST	SMART	PREMIUM	INFINITE
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Ø	kg	kg	kg	kg	kg
9008	315	2010	915	505	255	405	1097	362	517	500	245	540	1/2"	210	215	217	218	220
9010	315	2010	915	505	255	405	1097	362	517	500	245	540	1/2"	215	220	222	223	225
9016	400	2230	1115	605	305	505	1261	362	607	565	345	690	1/2"	295	295	298	300	303
9023	450	2345	1315	705	355	605	1376	362	607	565	445	690	3/4"	390	395	400	402	407
9035	500	2625	1515	805	405	705	1520	450	655	640	545	740	3/4"	545	550	554	560	564
9048*	630	2970	1715	1030	455	805	1677	535	758	685	645	840	1"	715	720	727	735	742
9070	see dimensions below												1"	895	900	915	930	945

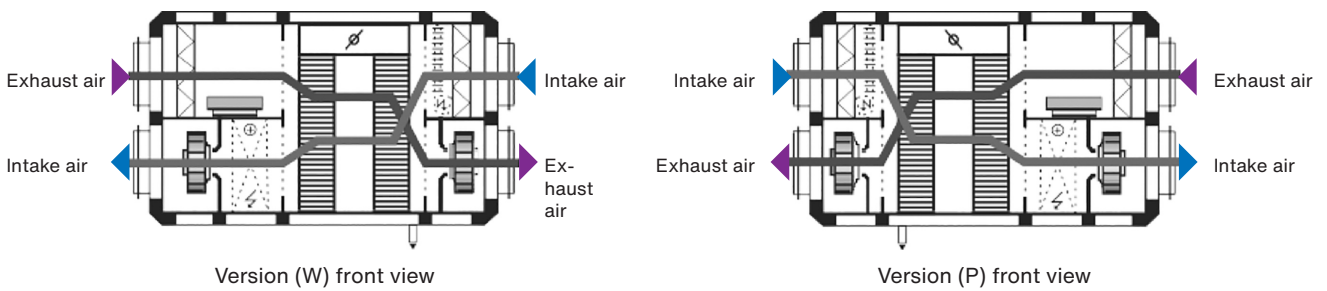
* Only available in vertical configuration

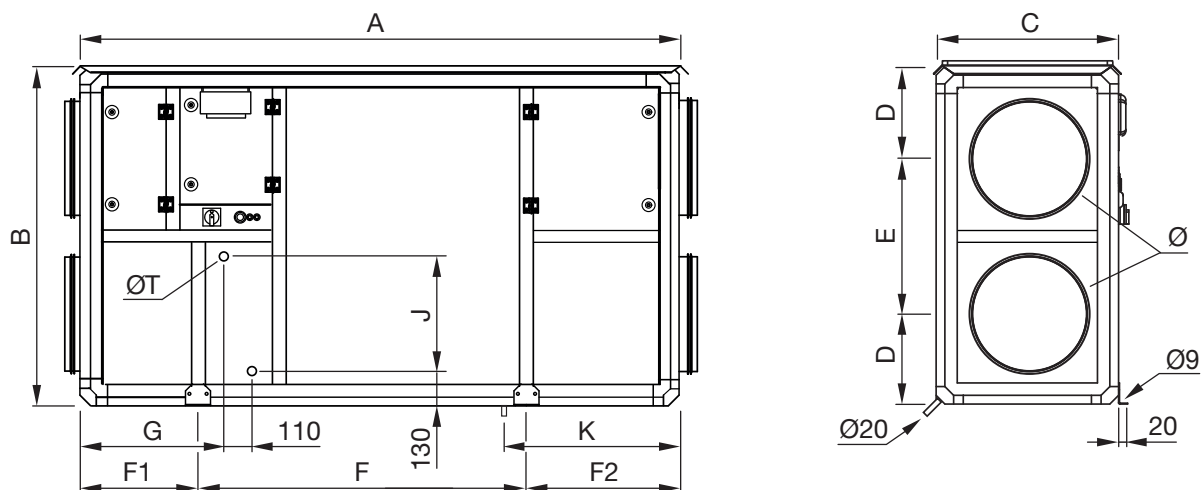
1.3. Horizontal configuration: 90xx (W) and (D) models (except 9048 and 9070)



Provide at least the equivalent of dimension (C) on each side of the machine to enable maintenance operations and access to the various removable parts.

1.4. Vertical configuration: 90xx (W) and (Y) models (except 9070)

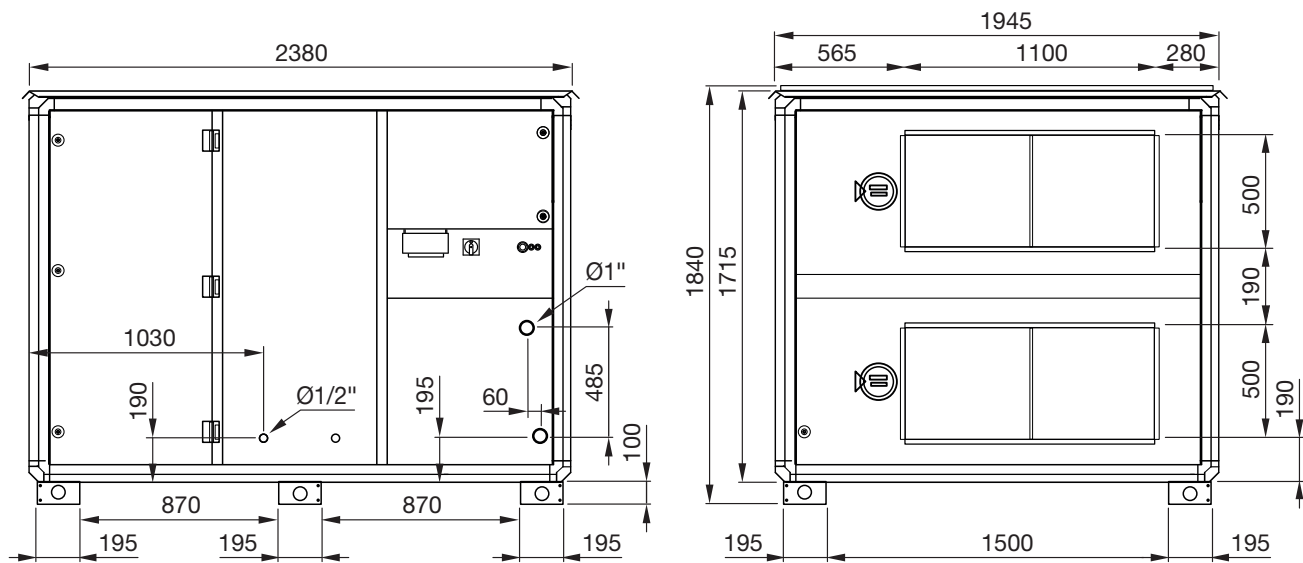
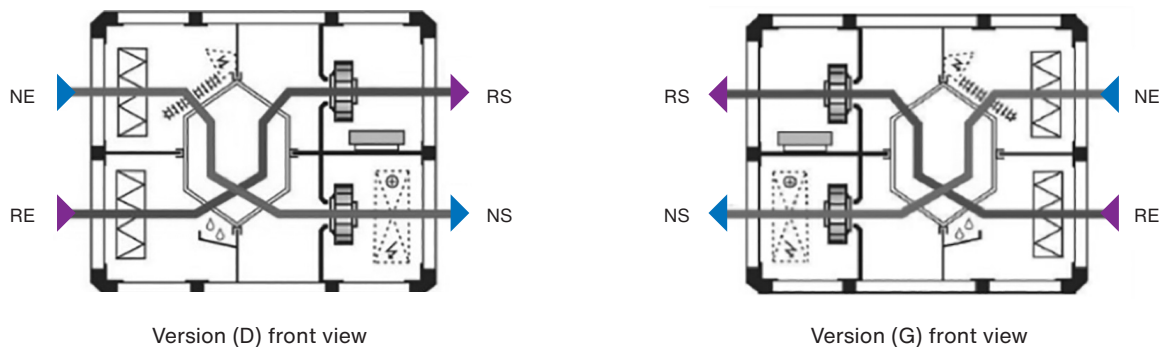




Provide at least the equivalent of dimension (C) at the front of the machine to enable maintenance operations and access to the various removable parts.
 Allow a minimum of 300mm at the rear for the condensate connection.

1.5. Vertical configuration: 9070 (D) and (G) model only

The Zehnder Carma 9070 is only available in a vertical version. It is characterised by the rectangular cross-section of the air connection.

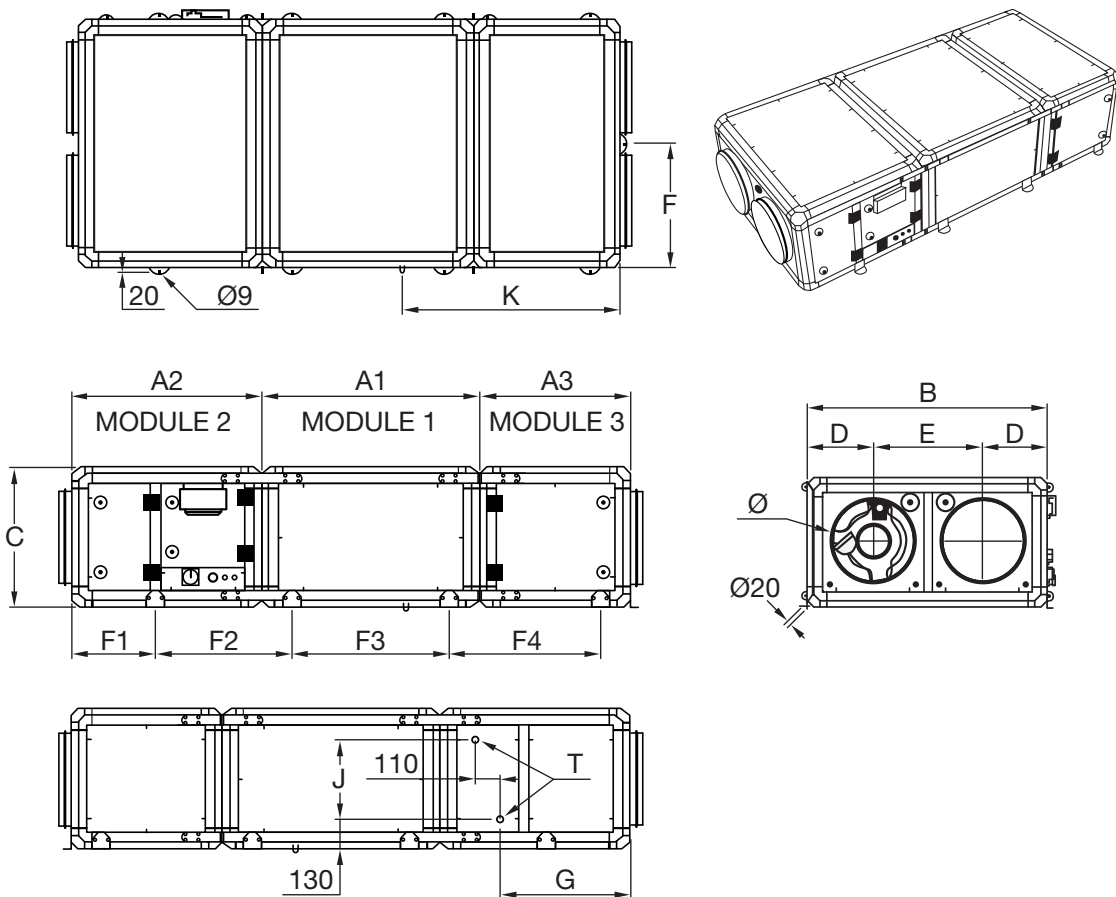


Provide ≥ 1100mm access to the front panel and to the various floor fixing brackets.

1.6. Horizontal configuration: 3xx (W) and (D) models (except 348 and 370)

Zehnder Carma model	Ø	A1	A2	A3	B	C	D	E	F	F1	F2	F3	F4	G	J	K	T	MODULE 1	MODULE 2	MODULE 3	TOTAL
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Ø	kg	kg	kg	kg
308	315	880	760	565	915	505	255	405	455	360	530	620	565	500	245	850	1/2"	93	89	66	248
310	315	880	760	565	915	505	255	405	455	360	530	620	565	500	245	850	1/2"	93	91	68	252
316	400	945	825	655	1115	605	305	505	555	360	595	685	655	565	345	975	1/2"	130	118	92	340
323	450	1060	825	655	1315	705	355	605	655	360	595	800	655	565	445	1030	3/4"	178	151	115	444
335	500	1205	910	700	1515	805	405	705	755	450	590	945	700	640	545	1150	3/4"	262	195	151	608

The weights indicated are the maximum weights.

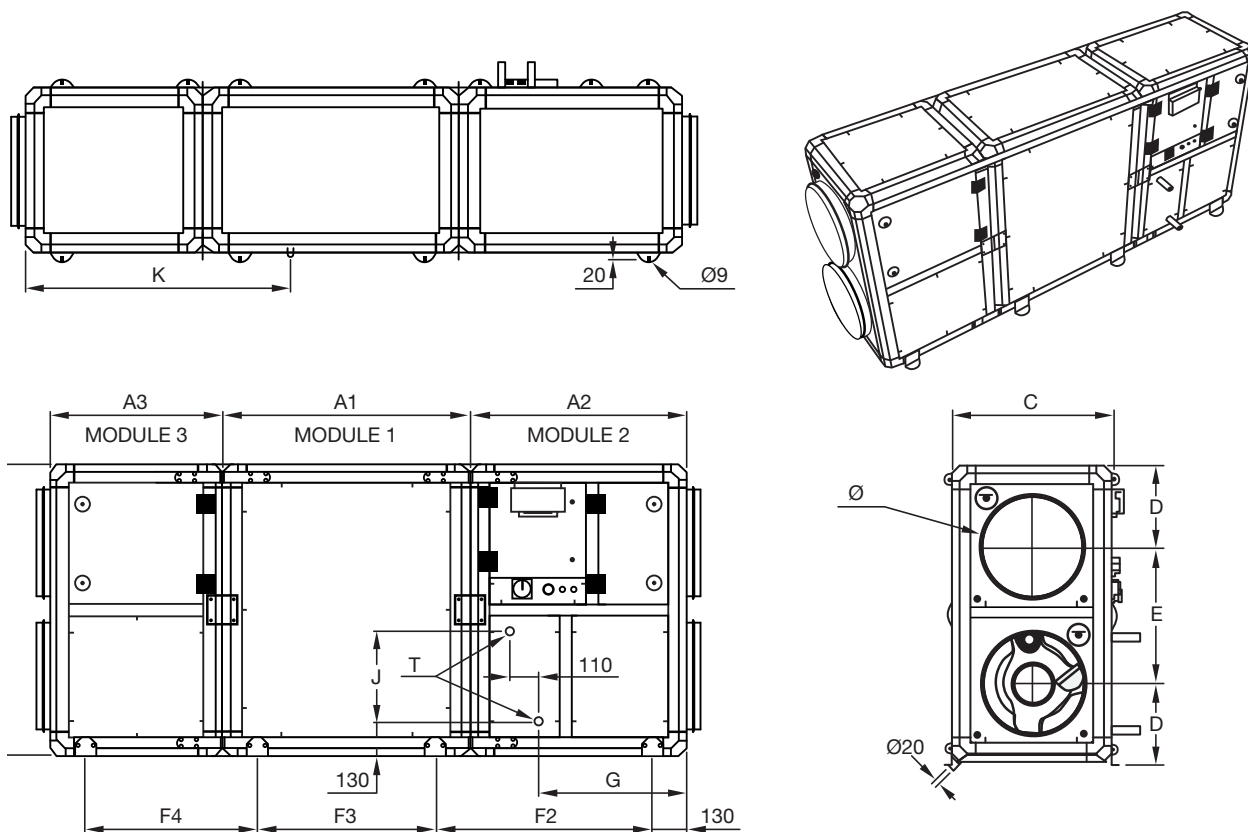


Provide at least the equivalent of dimension (C) on each side of the machine to enable maintenance operations and access to the various removable parts.

1.7. Vertical configuration: 3xx (W) and (Y) models (except 370)

Zehnder Carma model	Ø	A1	A2	A3	B	C	D	E	F2	F3	F4	G	J	K	T	MODULE 1	MODULE 2	MODULE 3	TOTAL
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Ø	kg	kg	kg	kg
308	315	880	760	565	915	505	255	405	760	620	565	500	245	850	1/2"	93	89	66	248
310	315	880	760	565	915	505	255	405	760	620	565	500	245	850	1/2"	93	91	68	252
316	400	945	825	655	1115	605	305	505	825	685	655	565	345	975	1/2"	130	118	92	340
323	450	1060	825	655	1315	705	355	605	825	800	655	565	445	1030	3/4"	178	151	115	444
335	500	1205	910	700	1515	805	405	705	910	945	700	640	545	1150	3/4"	262	195	151	608
348	630	1345	1015	805	1715	1030	455	805	1015	1085	805	685	645	1325	1"	350	255	187	792

The weights indicated are the maximum weights.

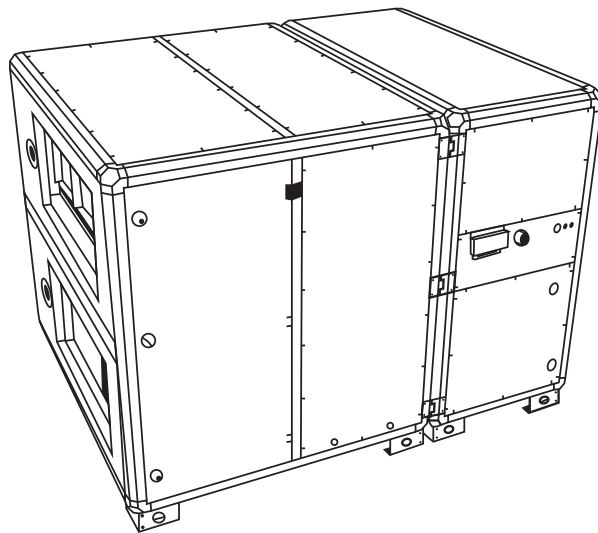
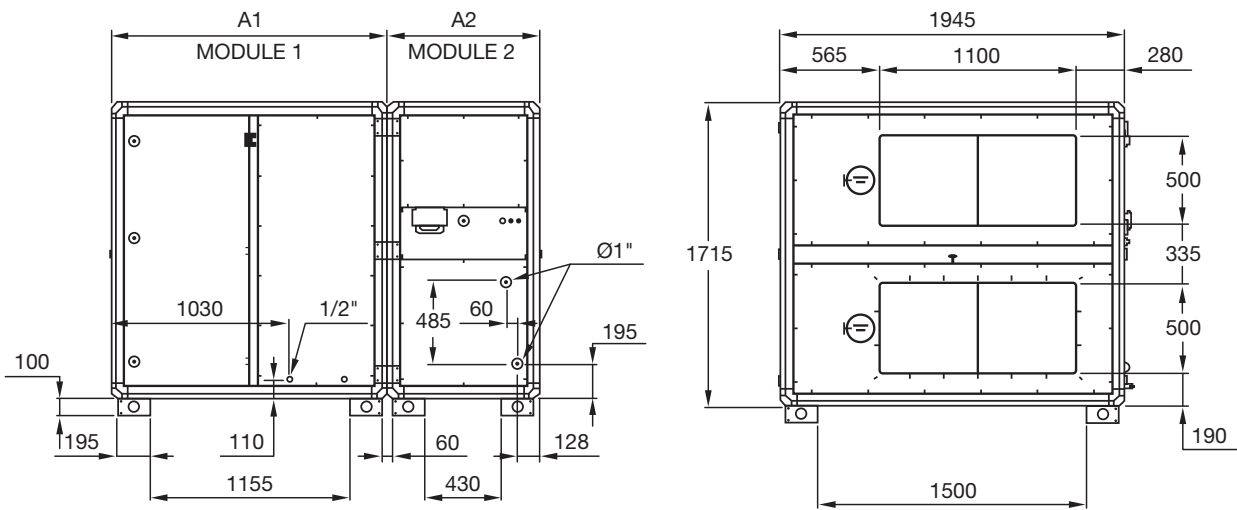


Provide at least the equivalent of dimension (C) at the front of the machine to enable maintenance operations and access to the various removable parts.
 Allow a minimum of 300 mm at the rear for the condensate connection.

1.8. Vertical configuration: only models 370 (D) and (G)

Zehnder Carma model	Ø	A1	A2	B	C	D	E	F	F1	F2	F3	G	J	K	T	MODULE 1	MODULE 2	TOTAL
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Ø	kg	kg	kg
370	-	1605	875	-	-	-	-	-	-	-	-	-	-	-	-	595	385	980

The weights indicated are the maximum weights.



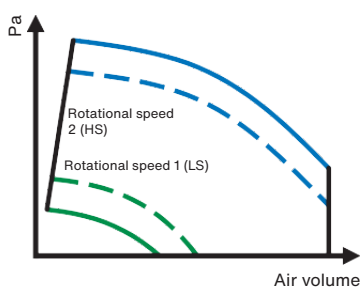
Provide ≥ 1100mm access to the front panel and to the various floor fixing brackets.

2. General

Zehnder Carma is a range of high-efficiency, plug & play, compact, single-piece indoor ventilation units. The range is available in 7 sizes to cover unit flows up to 8000 m³/h.

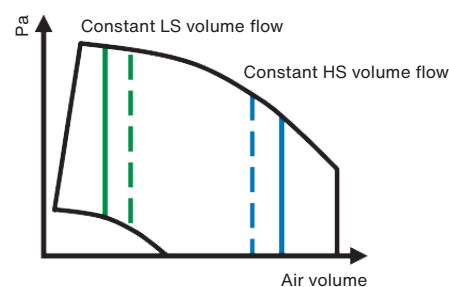
It is equipped as standard with the Zehnder Easy 5.0 controller, which provides intelligent ventilation and thermal management (except for the SEASON version, see chapter 20 Season controller). The Zehnder Easy 5.0 controller is a communicative device (Modbus RTU/TCP or Bacnet MSTP/IP) and has an integrated web server that is compatible with any HTML5 browser. The Zehnder Easy 5.0 controller is described in a separate manual.

ECO / Constant speed



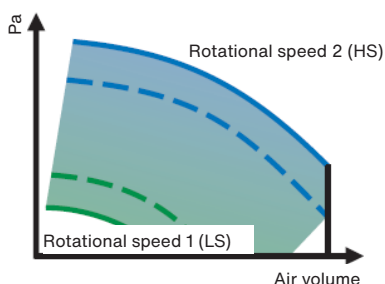
2 adjustable independent fan speeds
2 independent time periods for each speed can be set.

MAC2 / Constant air volume



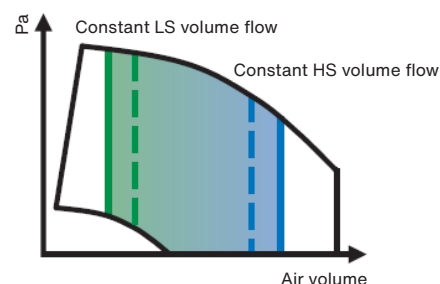
2 adjustable independent fan air volumes.
2 adjustable independent time periods for each air volume.

DIVA / CO₂ control via fan speed



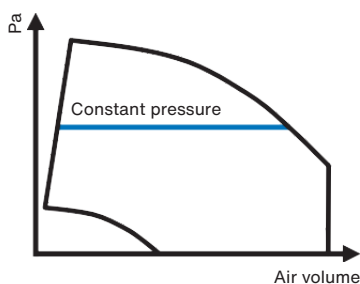
The fan speed varies continuously and proportionally between 2 fan speeds depending on the CO₂ concentration measured at the extract.

QUATTRO / CO₂ control via fan air volume



The fan air volume varies continuously and proportionally between 2 fan speeds depending on the CO₂ concentration measured at the extract.

LOBBY / Constant pressure



2 adjustable independent fan pressures
2 independent time periods for each speed can be set.

SEASON

Constant speed
(without controller)

Fan speed can be adjusted manually by means of an individual potentiometer located on the front of the fan unit.

Zehnder Carma	Integrated thermal control and equipment		
	Electric defrosting coil EDC	Hot water coil BC	Electric coil BE
FIRST	-	-	-
SMART	■	-	-
PREMIUM BC	-	■	-
PREMIUM BE	-	-	■
INFINITE BC	■	■	-
INFINITE BE	■	-	■

The Zehnder Carma range is supplied as standard with a modulating bypass that provides the following functions:

- Protection against icing of the plate heat exchanger
- Management of the thermal recovery rate
- Free cooling
- Night cooling
- Free heating

If you wish to extend the functional capabilities, the Zehnder Carma range of ventilation units can be coupled with the optional Combi Box modules, which allow the following coils to be installed in the duct:

- Cold water coil
- Direct expansion coil (hot and/or cold)
- Changeover coil
- Hot water coil (to replace the coil integrated in the unit).

The Zehnder Easy 5.0 controller can only accommodate:

- A heating coil + a cooling coil
- A changeover coil alone.

The Zehnder Easy 5.0 controller cannot accommodate:

- A heating and cooling coil for dehumidification
- A heating coil and a changeover coil.

3. Upon receipt of the material

3.1. Quality checks

On receipt of the material, check the condition of the packaging and the material, as well as the number of packages. In case of damage, make detailed comments on the carrier's delivery note and inform your supplier immediately.

3.2. Unpacking

When unpacking the equipment, check the following points:

- Presence of total number of packages
- Presence of the expected accessories (electrical equipment, sleeves, (external) controls, etc.)

Remove the protective film from the sheets.

After unpacking the material, the waste must be disposed of according to local regulations and standards. No packaging should be released into the environment.

3.3. Storage

As long as the unit is not installed and connected to the air distribution network, it must be stored in a sheltered, dry place at a temperature between -20 °C and +40 °C as the packaging is not suitable for storage in bad weather.

4. End of service life

Through its membership of the eco-organisation ECOLOGIC, CALADAIR meets the financing obligations for the collection, removal and treatment of waste electrical and electronic equipment.

When installing or uninstalling this equipment, the user or installer can contact the Ecologic company, which will offer a collection solution to dispose of the obsolete product in a suitable way.

Telephone: +33 (0)1 30 57 79 09

Internet: www.e-dechet.com

5. Packaging and packages

The Zehnder Carma ventilation unit is delivered mounted on wooden palletes or PCB feet and wrapped in a protective plastic film. The fragile parts are protected by cardboard pieces.

6. Identification and labelling

The ventilation unit can be identified by its identification label:

The identification label for the Zehnder Carma ventilation unit is structured as follows:

1 CARMA **2** 9048 **3** W **4** INFINITE **5** BE135 QU

HIGH EFFICIENCY RECOVERY UNIT / CENTRALE DOUBLE FLUX HAUTE EFF

400 V	3~ + N	50 Hz
HEATING / CHAUFFAGE	ELECTRIC / ELECTRIQUE	13,5kW
DEFROST / DEGIVRAGE	ELECTRIC / ELECTRIQUE	18kW
0	Max : 51,8 A	
NOMINAL AIRFLOW / DEBIT NOMINAL : 4392 m³/h		VDI 6022 CERT. N° No .../.../...
FRESH AIR - AIR NEUF	FILTER / FILTRE : 2 X F7 (ePM1 55%) - 720x458x48 mm MAX REPLACEMENT PRESSURE DROP / PERTE DE CHARGE MAX DE REMPLACEMENT : 163 Pa NOMINAL FILTER PRESSURE DROP / PERTE DE CHARGE NOMINALE DU FILTRE : 63 Pa	
EXTRACT AIR - AIR REPRIS	FILTER / FILTRE : 2 X M5 (ePM10 50%) - 720x458x48 mm MAX REPLACEMENT PRESSURE DROP / PERTE DE CHARGE MAX DE REMPLACEMENT : 115 Pa NOMINAL FILTER PRESSURE DROP / PERTE DE CHARGE NOMINALE DU FILTRE : 38 Pa	

CDF026856

 N° 21.03.072

Manufactured by ZEHNDER CALADAIR INTERNATIONAL 61 rue de Saint Veran - 71000 MACON LOCHE - FRANCE

1	Unit size	
	9008 / 308	<p>See air performance curves Chapter 21 AIR PERFORMANCE CURVES</p> <p>90xx: single-piece unit 3xx: 3-part modular unit except 370 which is in 2 parts</p>
	9010 / 310	
	9016 / 316	
	9023 / 323	
	9035 / 335	
	9048 / 348	
	9070 / 370	

2	Configuration	
	D	<p>See configurations in chapter 1 TECHNICAL SPECIFICATIONS</p>
	G	
	L	
	P	
	W	
	Y	

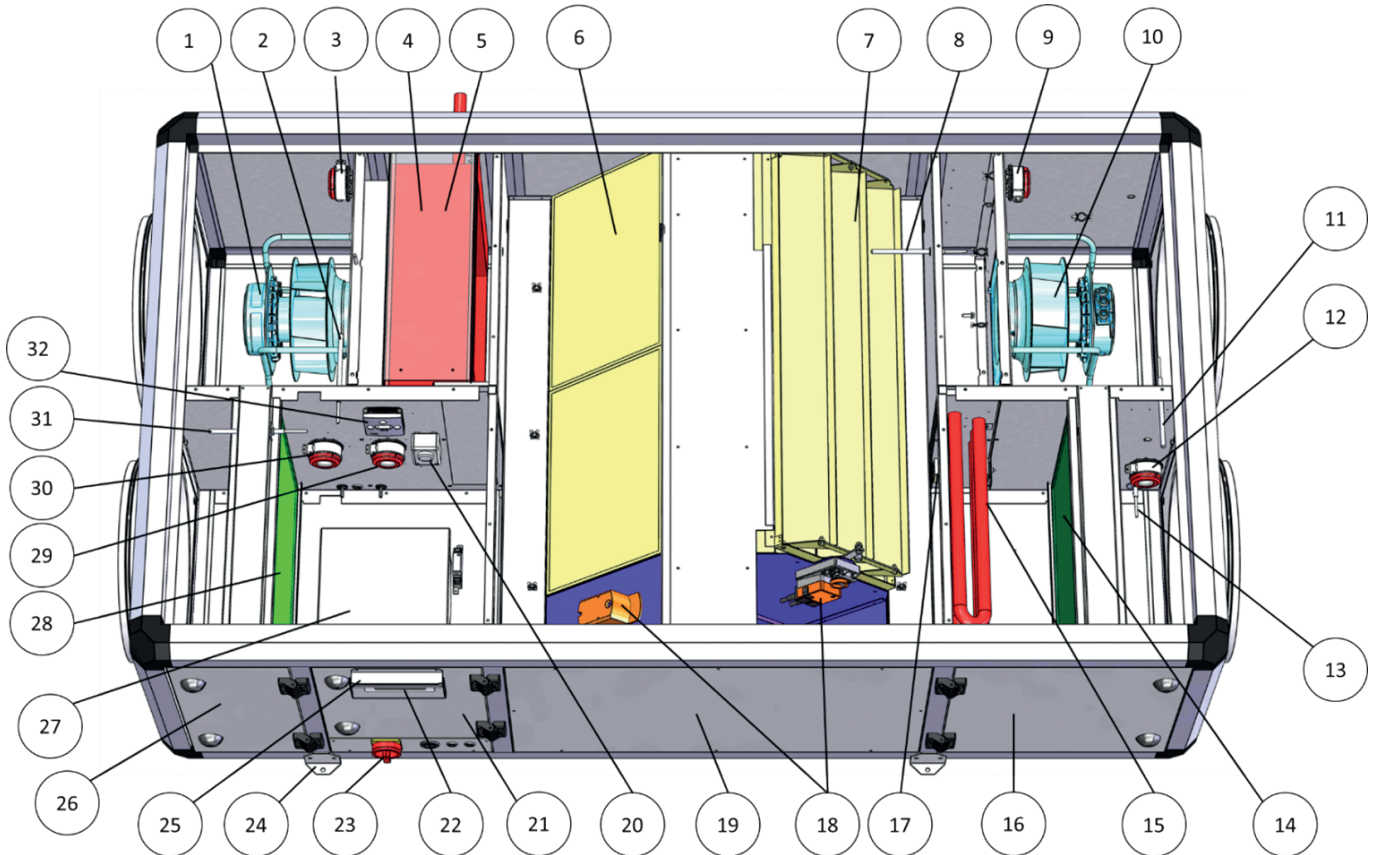
3	Type of control and integrated thermal equipment	
	SEASON	Fan control via potentiometer and heat recovery control via thermostats (no Zehnder Easy 5.0 control).
	FIRST	Zehnder Easy 5.0 controller without integrated coil
	SMART	Zehnder Easy 5.0 controller with integrated electric defrost coil control (EDC)
	PREMIUM BE	Zehnder Easy 5.0 controller with integrated electric heating coil control (EHC)
	PREMIUM BC	Zehnder Easy 5.0 controller with integrated hot water heating coil control (BC)
	INFINITE BE	Zehnder Easy 5.0 controller with control of the integrated electric defrosting coil (EDC) and the integrated electric heating coil (EHC)
	INFINITE BC	Zehnder Easy 5.0 controller with control of the integrated electric defrosting coil (EDC) and the integrated hot water heating coil (BC)

4	Integrated electric coil model (if present)	
	025	2.5 kW
	037	3.7 kW
	052	5.2 kW
	067	6.75 kW
	105	10.5 kW
	135	13.5 kW
	157	15.7 kW

5	Fan control type	
	ECO	Constant speed
	LOBBY	Constant pressure
	MAC2	Constant air volume
	DIVA	CO ₂ in variable speed
	QUATTRO	CO ₂ in variable discharge capacity
6	Type of power supply	
	400 V - 3~ + N - 50 Hz	Three-phase + Neutral
	230 V - 1~ - 50 Hz	Single-phase
7	BE: Effective capacity of the electric heating coil in (kW) BC: Maximum temperature/pressure of the hot water coil	
8	Characteristics of the electric defrost coil (intake air preheating)	
9	Maximum absorbed current in (A)	
10	Production number to be mentioned in all communication with the supplier	

7. Overview and construction

7.1. General overview of the unit

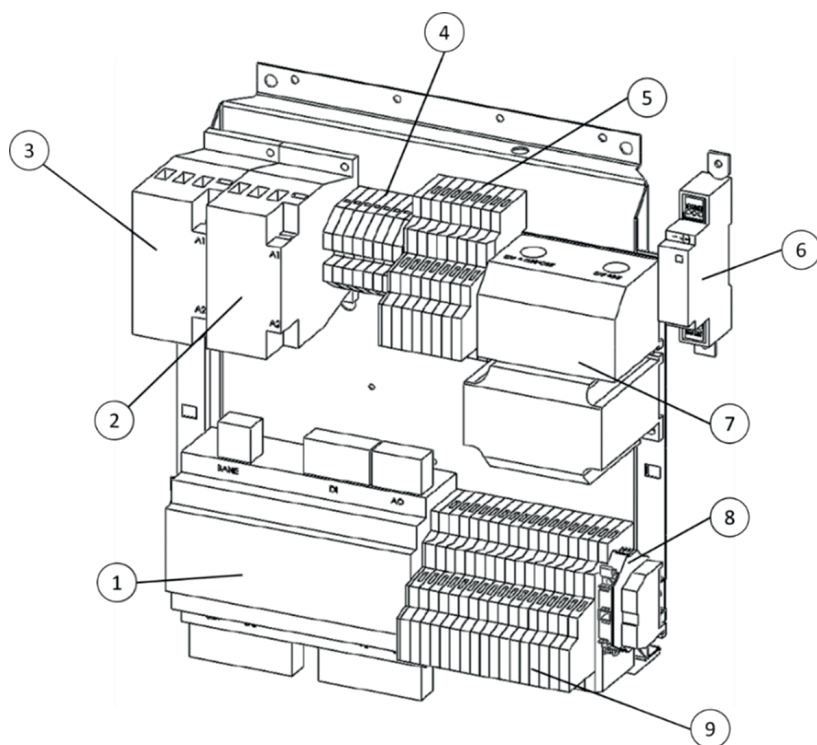


The image may differ from the actual model but the principle of how to position the components remains valid.

Number	Description	Description
1	SAF	Supply air fan
2	SSG	Supply temperature sensor
3	TRP S	Supply pressure transducer (LOBBY)
4	BE/BC	Electric heating coil (PREMIUM BE / INFINITE BE) or hot water heating coil (PREMIUM BC / INFINITE BC)
5	THS	Overheating safety thermostat for electric heating coil (PREMIUM BE / INFINITE BE)
6	REC	Plate heat exchanger
7	BIM	Bypass register
8	SBD	Defrost coil temperature sensor (SMART / INFINITE)
9	DEP R	Pressure switch for extract fan operation (ECO / DIVA)
	TRP R	Pressure transducer for extract air volume measurement (MAC2 / QUATTRO)
10	EAF	Extract air fan
11	SEG	Outdoor temperature sensor (intake air)
12	DEP SF	Pressure switch to control the clogging of the supply filter (intake air)
13	SDG	Defrost temperature sensor (exhaust air for bypass management)
14	SF	Supply filter (intake air)
15	EDC	Electric defrost coil (intake air preheating) (SMART / INFINITE)

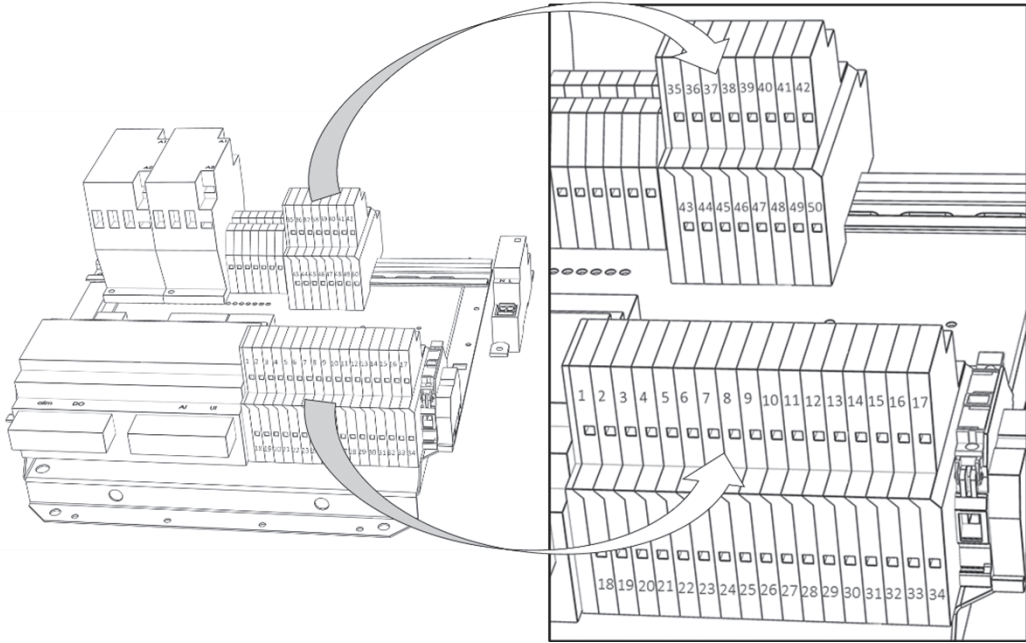
Number	Description	Description
16		Access door for supply air filter (intake air)
17	THSD	Overheating safety thermostat for electric defrosting coil (intake air preheating for protection against icing) (SMART / INFINITE)
18	SM	Bypass register actuators (2 for Zehnder Carma 9008...9035, 1 for Zehnder Carma 9048-9070)
19		Removable panel for access to actuators
20	THA	Frost protection thermostat (PREMIUM BC / INFINITE BC)
21		Access door with electric control board
22	PG 5.0	Local touchscreen control
23		Main power cut-off switch
24		Clamping brackets
25		Protective cap
26		Access door for extract air filter
27	REG	Electrical board (control)
28	RF	Extract filter
29	DEP S	Pressure control switch for supply air fan (ECO / DIVA)
	TRP R	Extract air pressure transducer (LOBBY)
	TRP S	Pressure transducer for supply air volume measurement (MAC2 / QUATTRO)
30	DEP RF	Pressure switch to control the clogging of the extract filter (optional)
31	CO ₂	CO ₂ sensor (DIVA or QUATTRO)
32	SRG	Extract temperature sensor

7.2. Electrical board



Number	Description	Description
1	CLD-283	Controller
2	K1	Electric heating coil (EHC) contact transmitter
3	KD	Electric defrost coil contact transmitter (intake air preheating) (EDC)
4		Supply and extract air fan terminals (SAF and EAF)
5		Upper control and user terminals (optional), see chapter 7.3 Control terminals and user connections
6		Power supply transformer 230V AC / 24V DC for local touch control PG 5.0
7	TRAFO	Control transducer 230V AC / 24V AC
8		Fuse holder terminal 3.15A T
9		Lower control and user terminals (optional), see chapter 7.3 Control terminals and user connections

7.3. Control terminals and user connections



Designation	Definition	Terminals	Connection
RFS	Remote fire stop	1-2	To be connected to the terminals of an NC contact of the remote fire stop. (Shunt between terminals (1)-(2) at the factory)
ATD	Autonomous trigger detector	3-4	To be connected to the ATD fault contact. (Shunt between terminals (3)-(4) at the factory)
THA	Frost protection thermostat	5-6	To be connected to terminals (C) and (2) of the THA frost protection thermostat (PREMIUM BC/CO and INFINITE BC/CO equipped with a heating or changeover coil) Shunt between terminals (5)-(6) at the factory (FIRST/SMART)
THS	Safety thermostat	5-6	To be connected to terminals (C) and (2) of the THS safety thermostat (PREMIUM BE and INFINITE BE equipped with an electric heating coil) Shunt between terminals (5)-(6) at the factory (FIRST/SMART)
Zehnder EDT2	Power supply +24V DC Zehnder EDT2 room touch control	7-8	To be connected to the (N) and (+24 V) terminals of the Zehnder EDT2 room touch control respectively (observe polarity).

Designation	Definition	Terminals	Connection
LS RO	Low-speed remote order	9-10	To be connected to an external NO (Normally Open) contact
HS RO	Low-speed remote order	11-12	To be connected to an external NO (Normally Open) contact
ARR EXT	External stop	13-14	To be connected to an external NO (Normally Open) contact
V3V BC	3-way valve Hot water heating coil	15-16-17	To be connected to the modulating 3-way valve of the hot water coil (see chapter 11.1 Remote hot water coil)
COOLING NEED	Hot water heating coil pump	18 + DO3 of the controller	To be connected to the ON/OFF switch of the hot water circulator (Attention: 24V AC output to be relayed) see chapter 11.1 Remote hot water coil
COOLING NEED	Cold water cooling coil pump	19 + DO4 of the controller	To be connected to the ON/OFF switch of the cold water circulator (Attention 24V AC output to be relayed) (see chapter 11.2 Remote cold water coil)
AL	Alarm reporting	20 + DO5 of the controller	24V output available if the unit is faulty (Attention 24V AC output to be relayed)
NC	Night cooling	22 + DO7 of the controller	24V output available if the unit is combined with the LOBBY EC option for opening the terminal registers during the night cooling period. (Attention 24V AC output to be relayed)
V3V BF	3-way valve Cooling coil	28-29-30	To be connected to the 3-way valve of the cold water coil (see chapter 11.2 Remote cold water coil)
MSR	Motorised supply register	35 + DO1 of the controller	To be connected to terminals (1) and (2) of the supply register
MER	Motorised exhaust register	36 + DO2 of the controller	To be connected to terminals (1) and (2) of the motorised extract register
THSD	Defrosting coil safety thermostat EDC (intake air preheating)	44-45	To be connected to terminals (C) and (2) of the THSD safety thermostat (SMART AND INFINITE) equipped with an electric defrosting coil (intake air preheating) Shunt between terminals (44)-(45) at the factory (FIRST/ PREMIUM)

8. Installation

8.1. Handling

The ventilation unit may only be transported in its installation position.

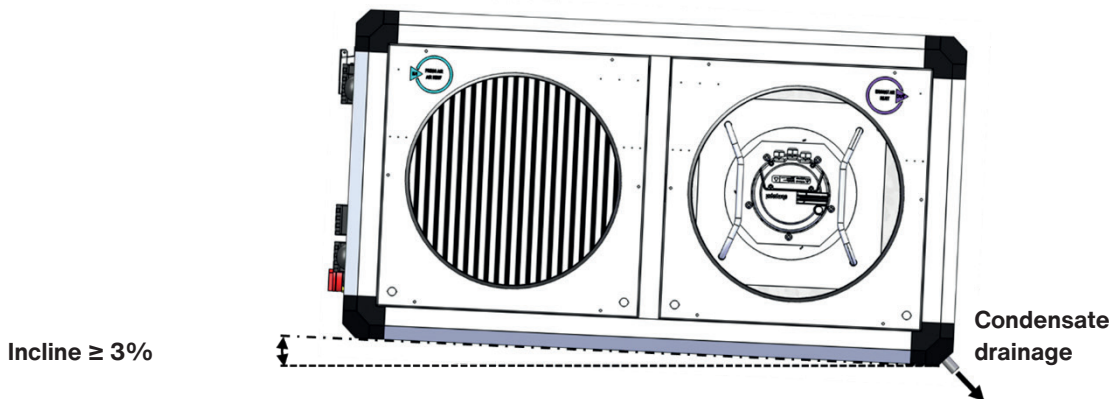
If the product is handled by a forklift truck, ensure that the truck supports the load-bearing structure. Adapt the choice of handling equipment to the weight of the equipment received (refer to the weight given at the beginning of the document).

If the unit is transported by crane, use a lifting beam and strap the product to keep it in the transport position (horizontal airflow).

Pay particular attention to the lifting and lowering of the product to the ground in order to avoid any impact that could damage the structure and integrity of the product.

8.2. Setting up

The unit must be placed on a sufficiently rigid surface, if necessary using anti-vibration and adjustable pads to adjust the evenness and prevent the ventilation unit structure from deforming. Observe the necessary height for the installation of the syphon and an inclination of at least 3 % towards the rear to ensure correct drainage of the condensate from the recovery unit.



For ceiling installation (Zehnder Carma versions L and P), the ventilation unit can be suspended by threaded rods according to the weight. It can also be installed on a frame suspended from the building structure itself, taking care to ensure that the permissible loads are respected (the frame is the responsibility of the installer).

The Zehnder Carma 90xx ventilation unit is equipped as standard with a roof for outdoor installation. For this type of installation, it must be raised above the ground (waterproofing). If required, the ventilation unit can be fitted with a set of elevation feet (option PCB), inclined mesh nozzles (option BBG) or rain canopies (option AGC). In the modular version (Zehnder Carma 3xx), the unit has no roof and can only be installed indoors.

In general, install the unit in such a way that weather or ambient temperature cannot damage the internal components of the unit during setup and operation.

8.3. Module disassembly/reassembly (Zehnder Carma 3xx)

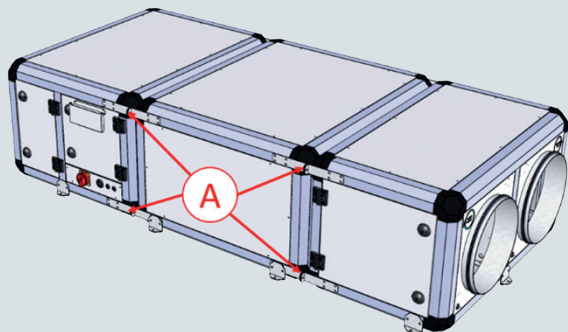
Zehnder Carma 3xx modular units are delivered assembled and can be disassembled on site if necessary to facilitate logistics during the installation phase.



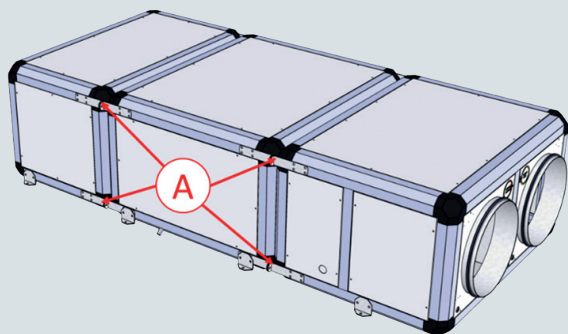
When disassembling, the separation distance of the modules should not exceed 300mm so as not to damage the electrical harness.

Zehnder Carma 308...348

3 modules (Configurations L / P / W / Y)



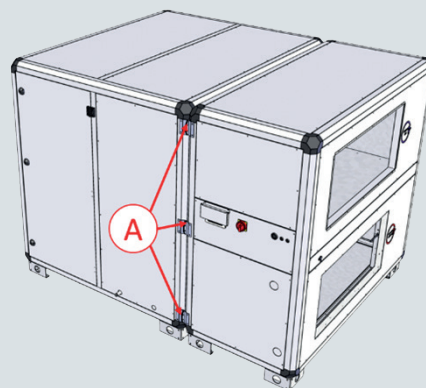
Front panel



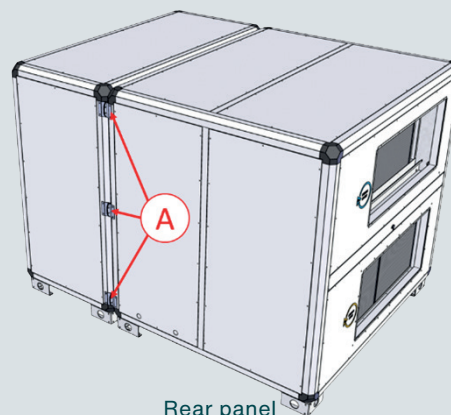
Rear panel

Zehnder Carma 370

2 modules (Configurations D / G)



Front panel



Rear panel

Disassembly:

Unscrew and remove the connecting screws (A) so that the modules can be separated from each other. Keep screws, washers and nuts in a safe place. The electrical harness is equipped with plug-in connectors fixed at the junction between each module. Care must be taken when separating the modules so as not to damage the electrical harness. A maximum separation distance of 300 mm must be maintained between the modules. This distance allows access to the plugs so that they can be disconnected and so that modules can be completely detached from each other.

Reassembly:

Bring the modules as close together as possible to allow the electrical connectors to be plugged in (observe the order of the plugs), taking into account the direction and indexing of the plugs (the plugs are equipped with terminal numbers). Take care not to damage the inter-module seal. After plugging in the connectors, bring the modules into contact with each other, observing the alignment. Insert the connecting screws (A) into the brackets and tighten them moderately. Check the air tightness between the modules when the unit is started up.

8.4. Installation of the plate heat exchanger syphon



Non-compliance with the installation rules for condensate syphons can lead to the condensate tray overflowing and to internal flooding of the ventilation unit, which can result in damage to the equipment, malfunctions and danger to personnel.

The dimensions of the condensate drain connection tapping point provided in the unit are:

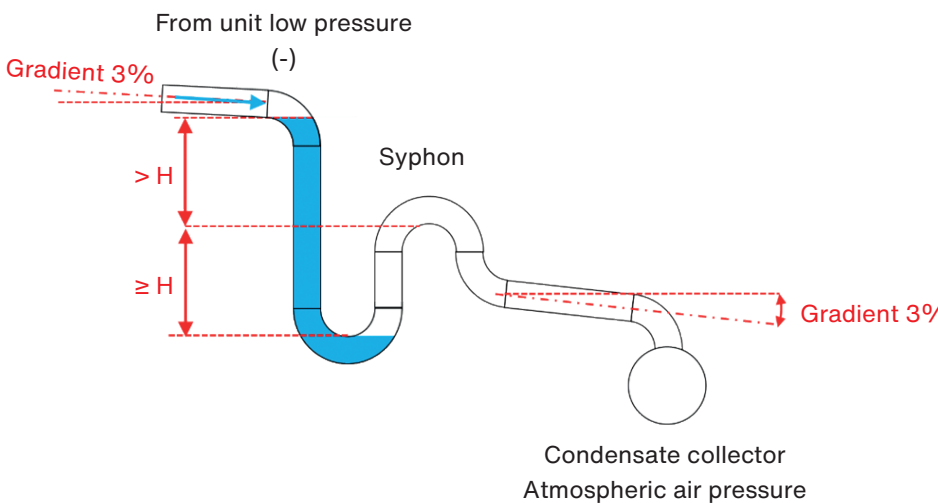
- All models except 9070: smooth PVC tapping with external diameter of 20mm
- 9070: male tap G 1/2"

Provide a syphon connection for the condensate from the exchanger and for the condensate from the remote cooling coil (water coil or DX direct expansion coil if present).

The syphon must always be filled with water in order for it to work. The syphon must be filled when the central ventilation unit is started up for the first time, and it may be necessary to manually fill the syphon from inside the central ventilation unit after a long period without condensation.

Provide a separate syphon on each condensate drain hose. The same syphon cannot be used for several drains.

Make sure that the syphon device is perfectly sealed with the connection tap provided in the central ventilation unit in order to prevent any external air from being drawn in.



Vacuum (Pa)	H (mm)
100	10
200	20
300	30
400	40
500	50
600	60
700	70
800	80
900	90
1000	100
1100	110
1200	120
1300	130
1400	140
1500	150

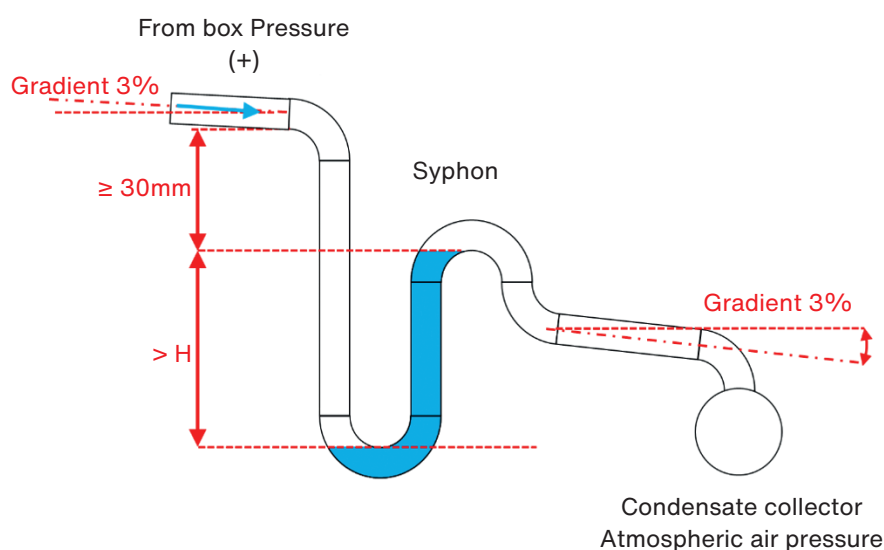
The height H depends on the maximum vacuum. If there are no space constraints, a height of H = 120mm can be used for all applications. The installation of a syphon with an integrated non-return device (ball, spout, damper, etc.) means that this minimum height constraint is not necessary.

Ensure that there is a 2-3% gradient towards the condensate drain to drain off the condensate and that the collector is neither under- nor over-pressurised.

8.5. Installation of the remote coil syphon

The requirements of chapter 8.4 “Installation of the plate heat exchanger syphon” apply.

Unlike the condensate drain of the plate heat exchanger, which is under low pressure relative to atmospheric pressure, the drain of the remote coil is under overpressure relative to atmospheric pressure, which requires a different syphon height.



Vacuum (Pa)	H (mm)
100	10
200	20
300	30
400	40
500	50
600	60
700	70
800	80
900	90
1000	100
1100	110
1200	120
1300	130
1400	140
1500	150

The height H depends on the maximum downstream pressure of the remote coil. If there are no space constraints, a height of H = 120mm can be used for all applications.

Ensure that there is a 2-3% gradient towards the condensate drain to drain off the condensate. Make sure that the collector is neither under- nor over-pressurised.

8.6. Connection to the air network

For the air connection, select the duct sections according to the dimensions of the flexible sleeves, which must be correctly tensioned. The ducts must be insulated and the first accessories (elbows, tees, etc.) must be located at a distance of at least 2.5 times the diameter in order to avoid any disturbance (turbulence) of the airflow that could affect the proper functioning of the ventilation unit.

8.7. Connection of power supply

It is necessary to provide protection devices (circuit breaker, differential) upstream of the ventilation unit's power supply cable.

The power supply cable is connected directly to the back of the isolating switch on the front of the ventilation unit.

Drill a hole in the rubber grommet on the front and pass the power cable through it.

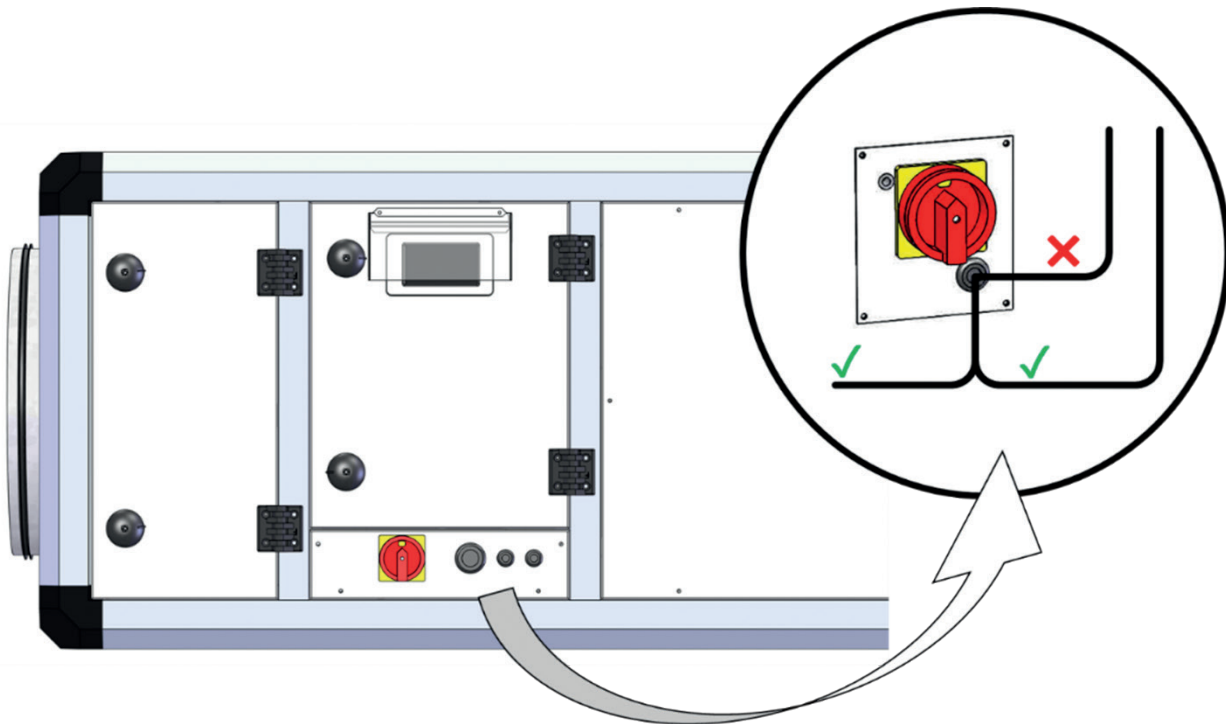
Connect the power supply wires directly to the terminal block of the isolator switch (use crimped cable ends).

Connect the ground wire (PE) to the crimped nut clamp provided for this purpose (use a lug terminal for M6 screws). The ground wire (PE) should be slightly longer than the phase and neutral wires.

Securely attach and clamp the power cable to a fixed part (frame, cable tray, etc.).



The power cable must enter the grommet from below.

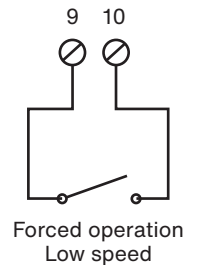


The image may differ from the actual model but the principle remains the same.

9. Electrical connection of external devices

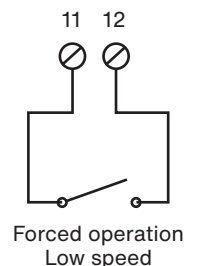
9.1. External control of low-speed forced operation (reduced operation)

The external low speed forced operation command allows the unit to be forced to operate at low speed, regardless of the current operating mode requested by the time schedule. The external control has priority over the time schedule. If the central ventilation unit is switched off by the time schedule, the activation of the external forced low-speed control (reduced operation) will force the central unit to start up at low speed.



9.2. External control of high-speed forced operation (normal operation)

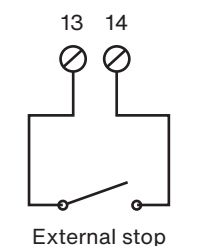
The external high-speed forced operation command (normal operation) forces the ventilation speed of the central ventilation unit to high speed, regardless of the operating speed requested by the time schedule and regardless of the status of the external low-speed forced operation command. The external high-speed forced operation command (normal operation) has priority over the time schedule and the external low-speed forced operation command (reduced operation). If the central ventilation unit is switched off by the time schedule, the activation of the external forced high-speed command (normal operation) will force the unit to start up at high speed.



9.3. External shutdown control

The external shutdown control forces the central ventilation unit to shut down, regardless of the operating mode requested by the time schedule and regardless of the status of the external forced operation commands for reduced or normal operation.

The use of isolation registers on the supply and extract air circuits is highly recommended in case of repeated starting and stopping of the ventilation unit.

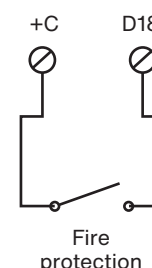


9.4. External fire protection control

When the external fire protection control is activated, the central ventilation unit operates in fire protection mode, regardless of the operating mode requested by the time schedule and regardless of the status of the external forced operation controls for reduced or normal operation. The fire protection mode has priority over all other operating modes.

The operation of the machine depends on the function settings made by the user. By default, the function is inactive when the equipment leaves the factory.

The potential of terminal (+C) is available on terminals (9), (11) and (13) of the customer's terminal block.



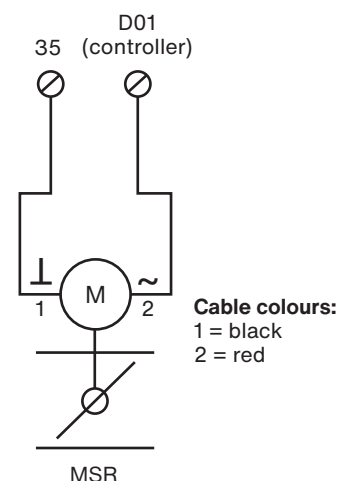
9.5. Motorised supply air register control (MSR)

The motorised supply air register can be supplied as an option. It is powered directly from the controller's DO1 output (24V AC). It has a safety return spring that ensures the register closes in the event of a power failure or machine shutdown.

Installation and electrical connection are the responsibility of the installer.

The use of isolation registers on the supply and extract air circuits is highly recommended if the ventilation unit is repeatedly switched on and off.

When the ventilation unit is in operation, there is a voltage of 24 V AC between terminals (35) and (DO1). When idle, there is no voltage.



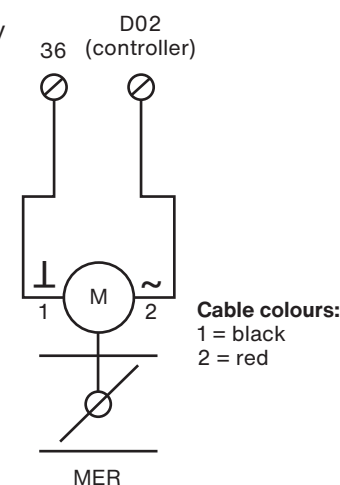
9.6. Motorised exhaust air register control (MER)

The motorised exhaust air register can be supplied as an option. It is powered directly from the controller's DO2 output (24V AC). It has a safety return spring that ensures the register closes in the event of a power failure or machine shutdown.

Installation and electrical connection are the responsibility of the installer.

The use of isolation registers on the supply and extract air circuits is highly recommended if the ventilation unit is repeatedly switched on and off.

When the ventilation unit is in operation, there is a voltage of 24 V AC between terminals (36) and (DO2). When idle, there is no voltage.

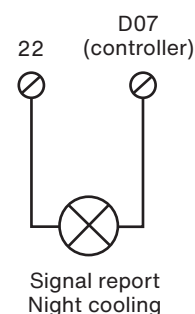


9.7. Night cooling (LOBBY) signal

The night cooling function takes advantage of the cooler outside temperatures at night to lower the internal temperature of the building and thus improve daytime comfort while limiting the energy consumption of any cooling systems. When the function is active, the aim is to maximise the airflow to make the most of the free cooling energy available outside.

For this function to be fully functional when the fans are regulated at constant pressure (LOBBY), it is necessary to be able to force the opening of the registers in the network, otherwise the air volume will be limited to an average value.

A 24V AC output (to be relayed) is provided between the terminals (22) of the customer terminal block and DO7 of the controller to force the opening of the zone registers during the night cooling period. When the function is active, there is a voltage of 24V AC between terminal (22) of the terminal block and (DO7) of the controller. When idle, there is no voltage.

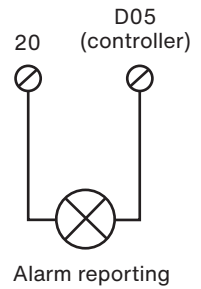


9.8. Alarm signal

The output contact is polarised at 24V AC and is programmed as NO at the factory:

No alarm or class C alarm (warning) (See alarm table)	Class A or B alarm is active (See alarm table)
No voltage between terminal block (20) and (DO5) of the controller	24V AC voltage between terminal terminal block (20) and (DO5) of the controller

The alarm signal is limited to 100mA. It must not be used to power a component directly and must be relayed.



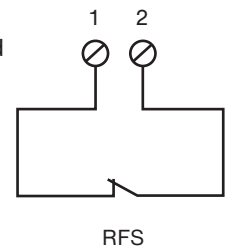
9.9. Remote fire stop - RFS

The dry NC (normally closed) contact of the RFS (or CMSI) must be connected by the installer between terminals (1) and (2) of the customer terminal block after having removed the shunt installed at the factory on these 2 terminals.

Opening the circuit cuts off the general 24V AC power supply to the entire control unit.

The ventilation unit is immediately switched off and the MSR/MER isolation registers are closed by their automatic return spring.

The control unit restarts automatically as soon as the circuit is closed (closing of the RFS or CMSI contact).



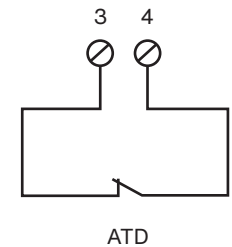
9.10. Autonomous trigger detector - ATD

The dry NC (normally closed) contact of the ATD must be connected by the installer between the terminals (3) and (4) of the customer terminal block after having removed the shunt installed at the factory on these 2 terminals.

Opening the circuit cuts off the general 24V AC power supply to the entire control unit.

The ventilation unit is immediately switched off and the MSR/MER isolation registers are closed by their automatic return spring.

The control unit restarts automatically as soon as the circuit is closed (closing of the ATD). If an ATD is installed, provide a motorised register with a safety return spring positioned downstream of the intake air filters.



10. 3-way valve connection

The Zehnder Carma PREMIUM BC and INFINITE BC are equipped with an integrated hot water coil. The installation of the 3-way valve is the responsibility of the installer and must follow the same guidelines as for a remote hot water coil (see chapter 11.1 Remote hot water coil).

11. Connection of remote coils in ducts

The entire Zehnder Carma range can be combined with the Combi Box range in order to extend the basic functionality, particularly in cases where remote cooling coils are to be added to the duct system.

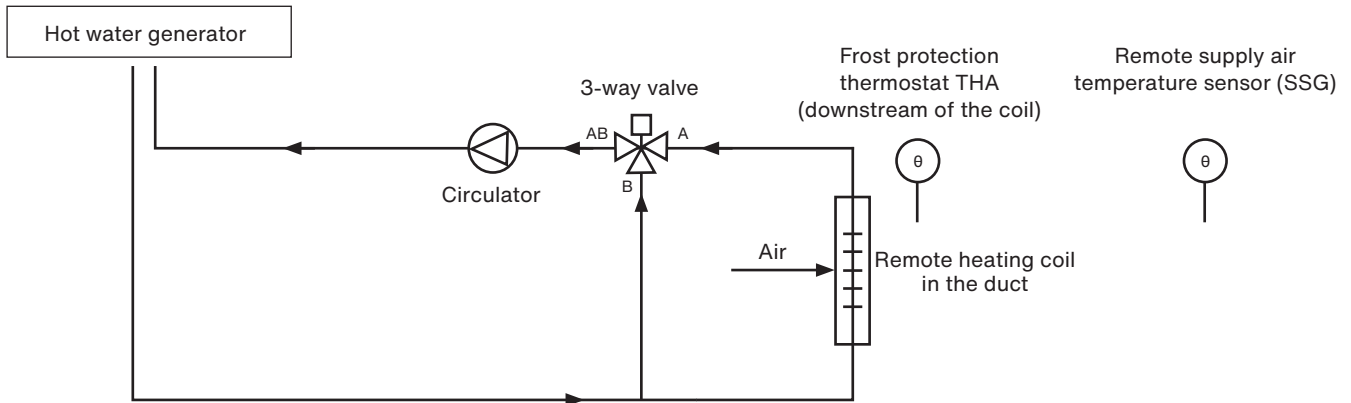
11.1. Remote hot water coil

When a remote hot water coil is used (available as an option in the Combi Box), the following accessories must be connected:

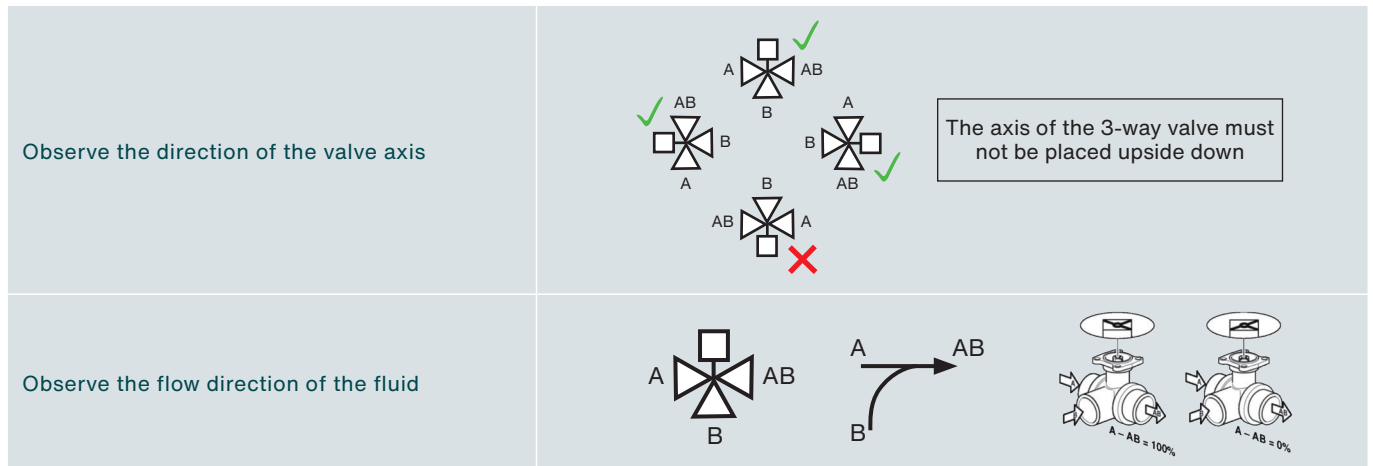
- 3-way valve (available as an option)
- The THA frost protection thermostat (available as an option)
- The pump (circulator) for the irrigation of the coil (selection and supply done by the installer).

It is also necessary to move the ventilation supply air temperature sensor (SSG) downstream of the remote hot water coil.

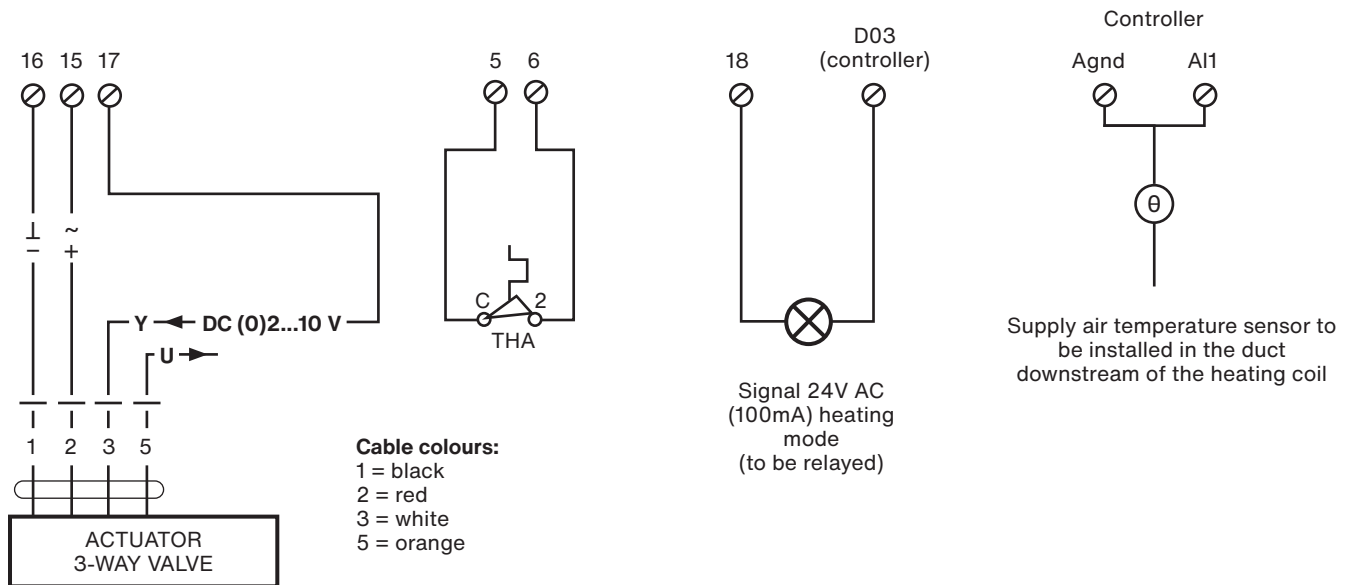
The installation must comply with the following hydraulic connection principle:



The hydraulic connection and installation of the hot 3-way valve must meet the following requirements:



The electrical connection must meet the following requirements:



The THA frost protection thermostat is of the NC (normally closed) type. It should be set to +5 °C. It is closed when the bulb temperature is above +5 °C and opens when the temperature drops below +5 °C. Its function is to protect the coil from freezing. When the contact opens, the controller stops the ventilation. When the temperature rises, the controller restarts the fans. As long as the contact is open, the controller displays the alarm (56). This alarm is stored in the alarm history and is automatically acknowledged when the contact closes.

Please note that the “heating mode” signal is a control signal and not a power signal. Therefore, it must not be used as a power supply and must be relayed. The signal sent by the controller is 24V AC (100 mA max).

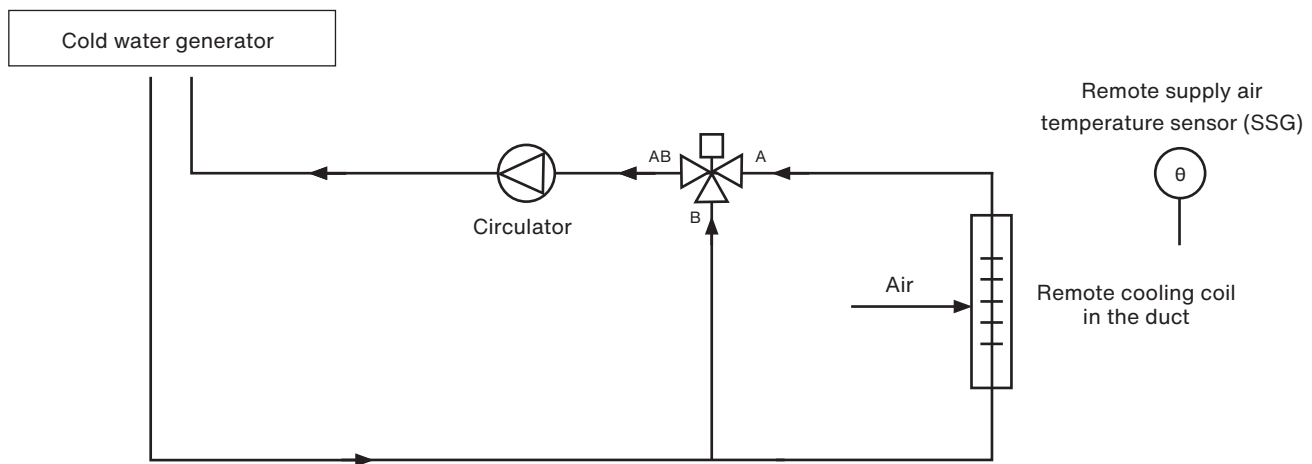
11.2. Remote cold water coil

When a remote cold water coil is used (available as an option in Combi Box), it is necessary to connect the 3-way valve (available as an option) to the controller of the ventilation unit.

The coil circulator is the responsibility of the installer.

It is also necessary to move the ventilation supply air temperature sensor (SSG) downstream of the remote cold water coil.

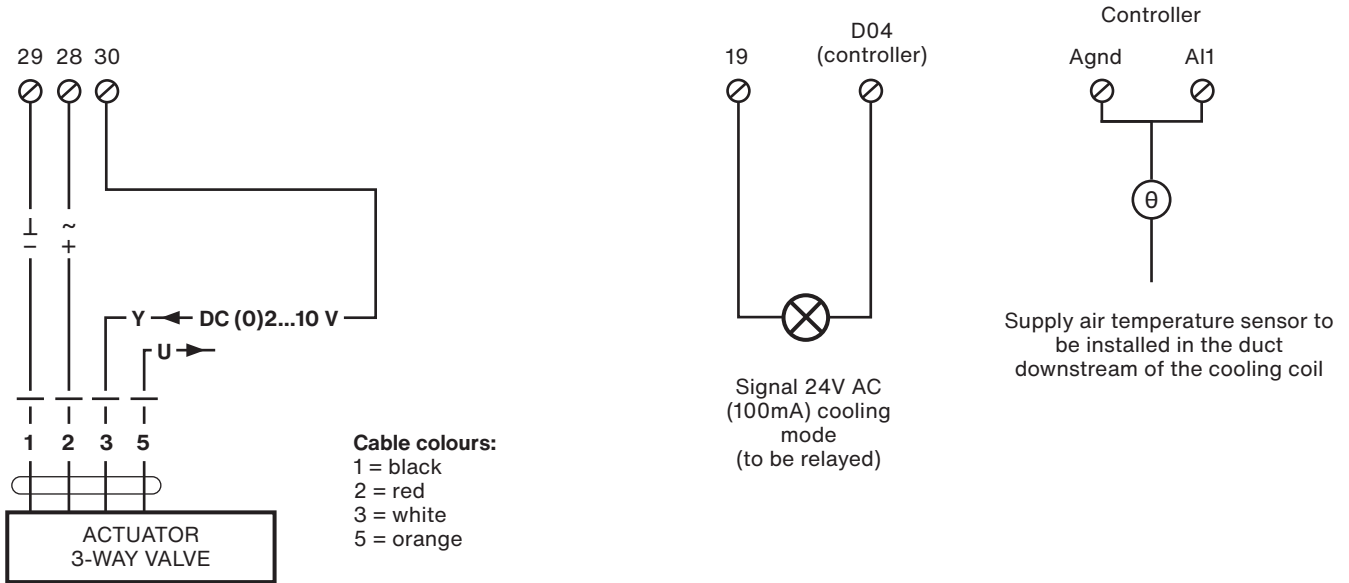
The installation must comply with the following hydraulic connection:



The hydraulic connection and installation of the 3-way valve must meet the following requirements:

<p>Observe the direction of the valve axis</p>	
<p>Observe the flow direction of the fluid</p>	

The electrical connection must meet the following requirements:



Please note that the “cooling mode” signal is a control signal and not a power signal. Therefore, it must not be used as a power supply and must be relayed. The signal sent by the controller is 24V AC (100 mA max).

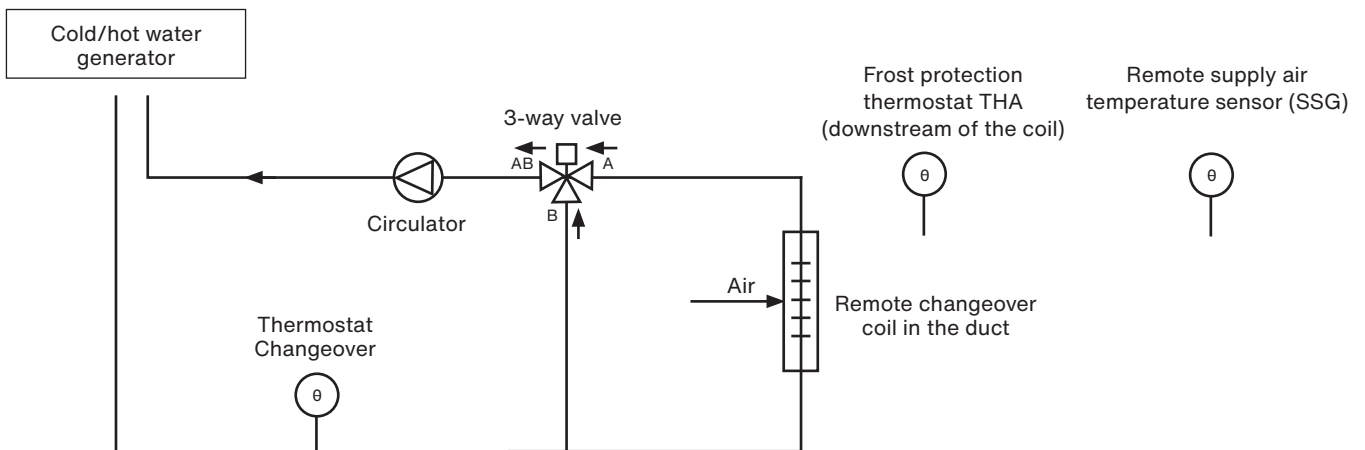
11.3. Remote changeover coil (CO coil)

When a remote changeover coil is used (available as an option in Combi Box), it is necessary to connect the 3-way valve (available as an option) and the changeover thermostat to the controller of the central ventilation unit.

The changeover coil circulator is the responsibility of the installer.

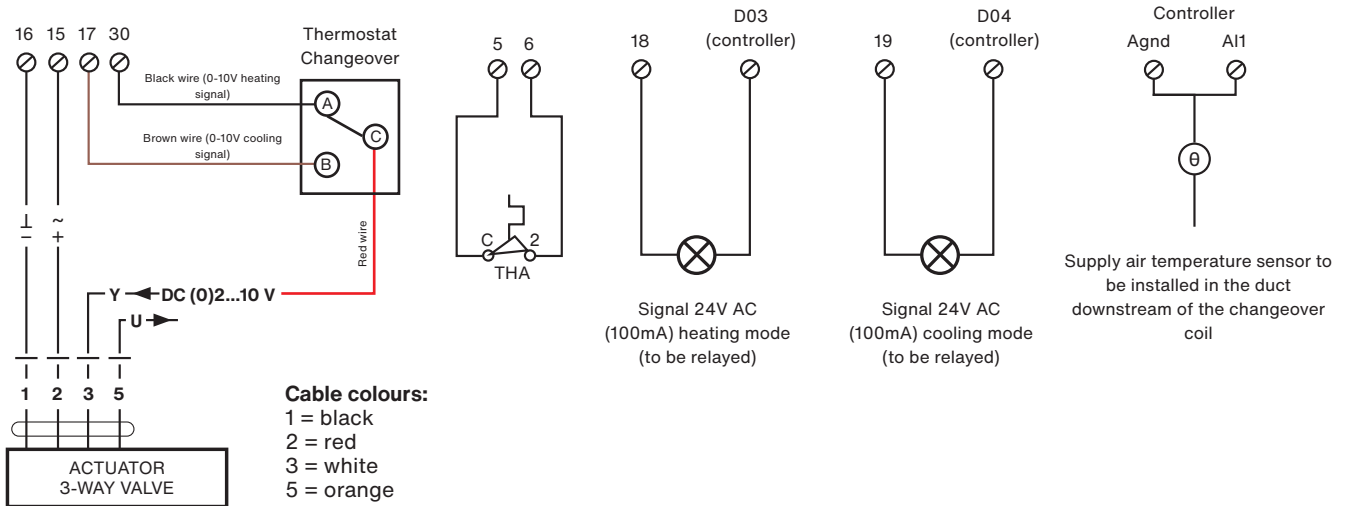
It is also necessary to move the supply air temperature sensor (SSG) downstream of the remote changeover coil.

The changeover thermostat allows the control of the mixing valve to be reversed depending on the temperature of the fluid measured at the mixing valve inlet. It should be installed in the water supply line of the CO coil, upstream of the 3-way valve.



Electrical connection of the 3-way valve actuator to the changeover thermostat

Changeover thermostat side		Terminal block and actuator side	
	RED (common) BROWN (hot) BLACK (cold)	Red wire	Y (control signal) of the actuator
		Brown wire	17 (heating signal)
		Black wire	30 (cooling signal)



The behaviour of the changeover thermostat is defined in the table below:

$T \geq 30\text{ }^{\circ}\text{C} \pm 4\text{ }^{\circ}\text{C}$	$T \leq 15\text{ }^{\circ}\text{C} \pm 4\text{ }^{\circ}\text{C}$
Contact C-A open (C-B closed)	Contact C-A closed (C-B open)

Please note that the “cooling mode” and “heating mode” signals are control signals and not power signals. Therefore, they must not be used as a power supply and must be relayed. The signal sent by the controller is 24V AC (100 mA max).

11.4. Remote direct expansion (DX) cooling/heating/reversible coil

The control of a direct expansion (DX) coil is described in a separate document and is independent of this manual. Please contact your supplier.

12. General functions

12.1. Installation of the thermal sequence

Initialisation at start-up allows the unit to be started at an operating point that is as close as possible to the one that will be recalculated during operation in order to avoid any source of discomfort and unnecessary energy consumption.

The initialisation of the thermal sequence at start-up depends on the outdoor temperature measured at the time the machine is started:

Outdoor temperature < +3 °C	Outdoor temperature ≥ +3 °C
<p>The unit starts when 100% heat is required*.</p> <p>As long as the supply fan feedback signal is off**, the electric heating coil (EHC) is not activated.</p>	<p>The unit starts with maximum energy recovery.</p>

* The control output of the 3-way valve or the control output of the electric heating coil is at 100% (10V).

** ECO/DIVA: the DEP S pressure switch contact is open; LOBBY: the pressure signal is below the minimum threshold; MAC2/QUATTRO: the volume signal is below the minimum threshold.

12.2. Start-up sequence

The start-up sequence is activated when the following conditions are met:

- The unit is ON
- There are no active class A alarms (alarms that shut down the unit) or the external control is not active
- At least one time programme (reduced operation or normal operation) is active, or a forced operation (normal operation or reduced operation) is active, or the fire protection function set to start the unit is active, or there is a request for operation from the BMS.

The start-up sequence takes a total of 120 seconds. During this time, the alarms are disabled (except for the THS electric coil overheating alarm (63), which is monitored during this period) and the AHU starts up at the operating point defined at the initialisation of the thermal sequences at start-up. The minimum fan control signal does not apply.

The openings of the intake air and exhaust air registers open as soon as the start sequence is activated. The control signal for the extract fan is enabled 15 seconds after the start sequence is activated. 15 seconds later, the control signal for the extract air fan is enabled and the extract air fan starts. The outputs for controlling the 3-way valves and the heating or cooling pumps are activated.

Once the 120 seconds have elapsed, the fan unit switches to normal mode at the end of the start-up sequence. The minimum and maximum fan control signal is then taken into account and the alarm monitoring function is activated.

In the event of a power failure, the unit will automatically restart as soon as the power supply is restored.

12.3. Shutdown sequence (post-ventilation)

The shutdown sequence occurs when at least one of the following conditions is met:

- Appearance of an alarm whose action requires the normal shutdown of the unit (note that some alarms are programmed for rapid shutdown, in which case the shutdown sequence is ignored and the unit shuts down immediately);
- The unit is switched to OFF;
- No active time range;
- The fire protection function is set to stop the unit;
- Stop request from the BMS.

The shutdown sequence lasts for a time related to the setting of the fan shutdown time limits (post-ventilation) and the intake air and exhaust air register closing time limits. When the shutdown sequence is activated, the alarm management function and the electric coil output are immediately deactivated (the hot/cold water and recovery coil outputs remain active). The supply fan is switched off after 180 seconds. The extract fan is switched off 30 seconds later. The intake air and extract air registers are closed 5 seconds after the extract air fan has stopped and all actuator control signals are deactivated.

13. Starting up

The Zehnder Carma ventilation unit is delivered pre-set and ready to use.

However, if the factory settings do not meet the requirements, the specific actions to be taken are:

- Installation and electrical wiring of optional extras
- Controller date and time setting
- Setting the summer/winter time changeover (automatic changeover by default)
- Time schedule settings
- Fan setpoint setting
- Temperature setpoint setting
- Communication protocol setting (if communication used)
- Setting of specific functions (according to version and need):
- Night cooling: activation time and fan setpoint offset
- Fire protection
- Protection against icing by reducing the supply air volume.

By using the save user settings function at the end of the commissioning process, a normally functional configuration can be restored at any time.

14. Maintenance

14.1. Annual general quality check

Check the ducts, flexible sleeves and anti-vibration pads and replace them if necessary.

Check that all the components connected to the control unit are in place so that no vibrations can be transferred to external items.

Check the electrical connections and the tightness of the terminals.

14.2. Filter quality check

Classification		Reference	Cleaning* (Water + gentle detergent)	Extraction* Supply*
Filtration efficiency ISO 16890				
ePM10 - 50%		M5	Restricted (1 to 4 times)	YES
ePM10 - 55%		F7	NO	

*Filter cleaning must be carried out with care to avoid damaging the filter media.

Only M5 filters can be blown out and cleaned with care.

Frequency (in months of operation)	
Every 3 months (to be adapted according to local conditions)	Every 12 months
Verification (Cleaning if necessary for M5 filters)	Filter replacement

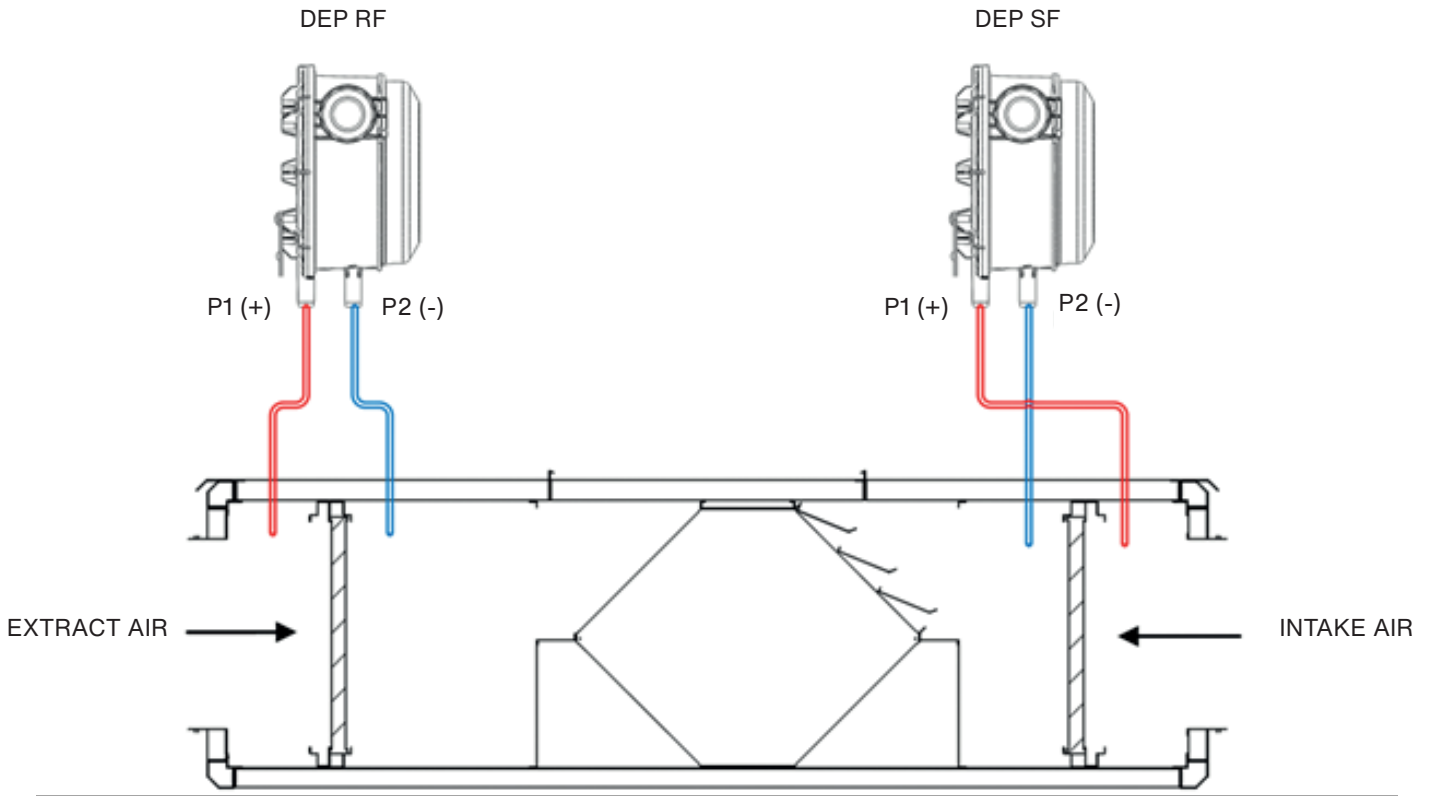
15. Troubleshooting - maintenance

When the ventilation unit is malfunctioning, it is recommended that you first:

- Check the tightness and connection of the terminal blocks and electrical plugs
- Check the setting and consistency of the control parameters and setpoints.

15.1. Connection and adjustment of the filter control pressure switch

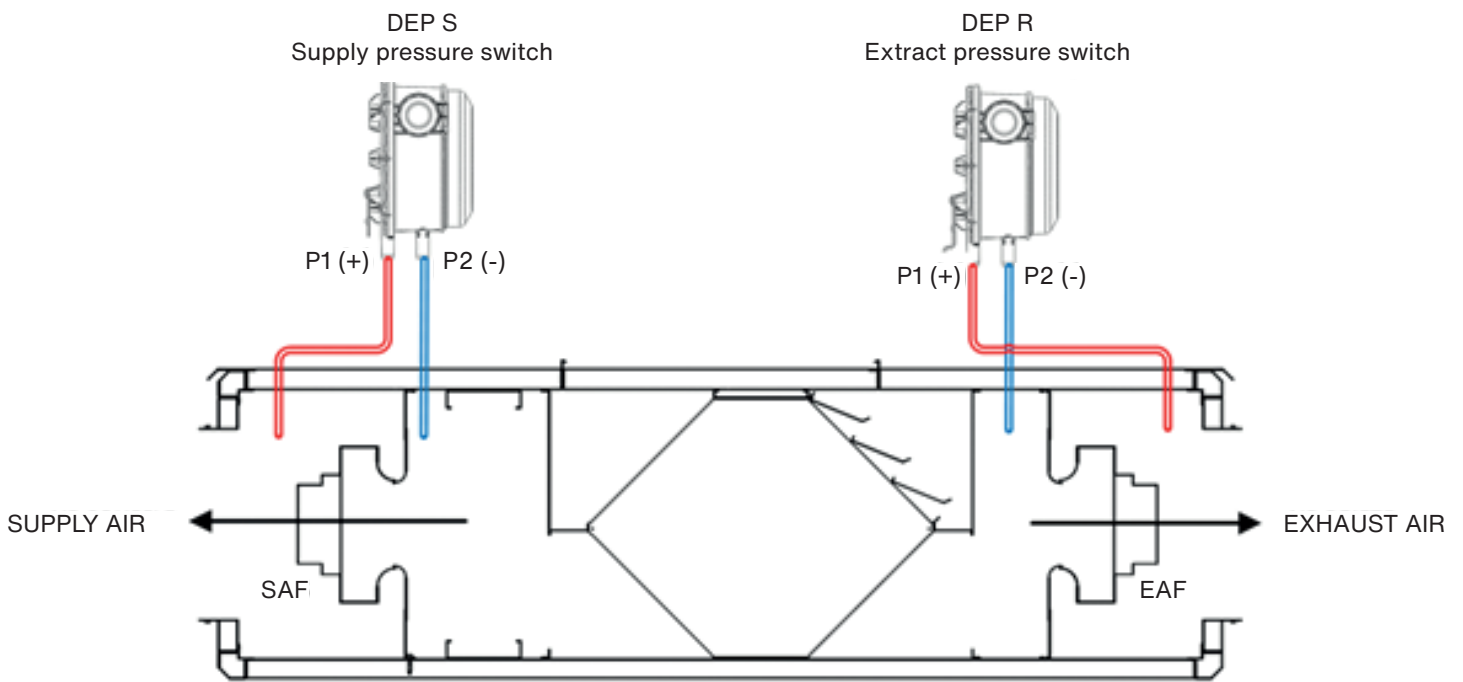
Pressure switches for monitoring the clogging of filters allow the degree of clogging in filters to be checked by measuring the pressure drop between the inlet (upstream) and the outlet (downstream) of the filter. When the pressure drop (pressure difference) of the filter element exceeds the setting of the pressure switch, the NO contact of the pressure switch closes. The factory setting of the filter pressure switch is 150 Pa for M5 filters and 200 Pa for F7 filters. If an additional filter is installed for the intake air (double filter stage) in addition to the standard filter, the pressure switch must be set to 300 Pa.



Refer to the wiring diagram for details on the electrical connection of the pressure switches.

15.2. Connection and setting of the fan feedback pressure switches (ECO and DIVA)

The fan operation control pressure switches allow the pressure difference between the fan inlet and outlet to be monitored at any time, thus indicating whether the fan is operating correctly or not.

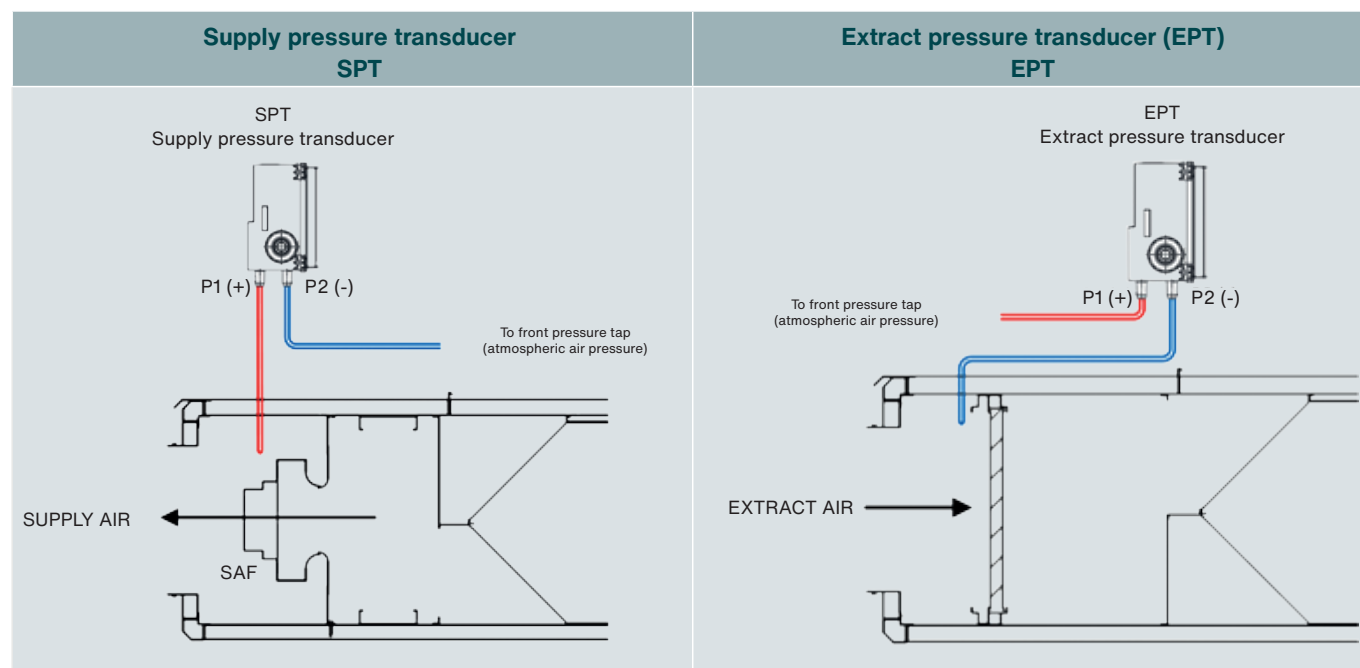


The factory setting for the pressure switches is 25 Pa.

Refer to the wiring diagram for details on the electrical connection of the pressure switches.

15.3. Connection and setting of pressure transducers (LOBBY)

The pressure transducers convert the relative air pressure measured at the air extract and supply of the unit into an analogue 0-10 V signal which is transmitted to the controller.



The pressure signal is also used by the controller to check that the fans are working properly (run monitoring). The threshold is 25 Pa.

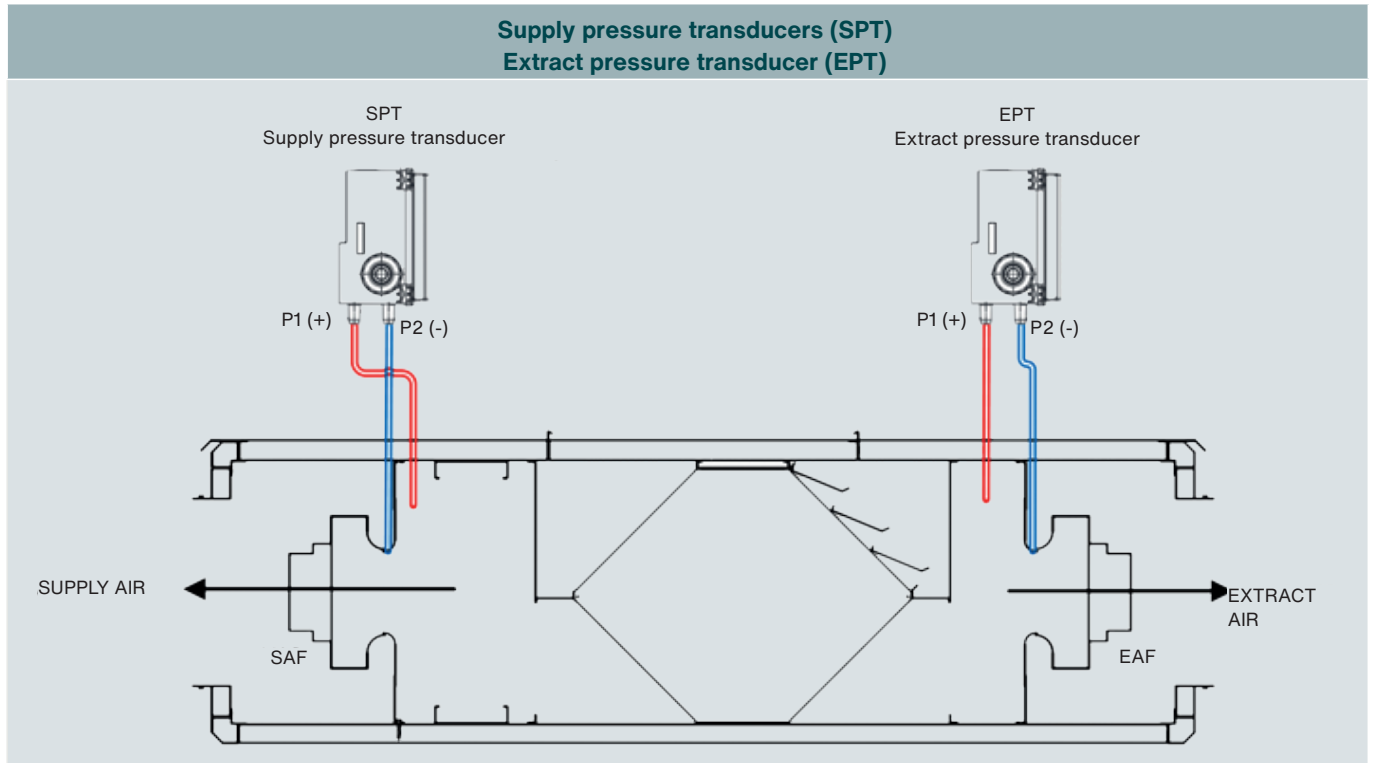
The factory setting is 130 Pa.

Refer to the electrical diagram (see chapter 16 Electrical control wiring diagram) for details of the electrical connection of the pressure transducers.

		Zehnder Carma LOBBY	Setting the position of the pressure transducer jumpers
Gauge	9008...9070		
SPT	0-1600Pa / 0-10V		
EPT			<p>The jumpers are in the OFF position (position 0)</p>

15.4. Connection and setting of pressure transducers (MAC2 and QUATTRO)

The pressure transducers convert the differential air pressure measured into an analogue 0-10V signal, which is transmitted to the controller. This signal is then converted by the controller into a volume signal.



For the MAC2 and QUATTRO versions, the P1(+) pressure switch pressure tap must be connected upstream of the fan bell, and P2(-) must be connected directly to the inlet ring.

		Zehnder Carma MAC2 / QUATTRO		Setting the jumper gauge position of the pressure transducers
Gauge	9008	9010...9070		
SPT	—	0-1600 Pa / 0-10 V		<p>The jumpers are in the OFF position (position 0)</p>
EPT				

The signal is also used by the controller to check that the fans are working properly (run and deviation monitoring). The threshold is different for each machine model:

Zehnder Carma (MAC2 or QUATTRO)	Reduced operation volume	Normal operation volume	S + R fan difference threshold	S + R fan difference threshold
Zehnder Carma 9010	400 m ³ /h	800 m ³ /h	300 m ³ /h	240 m ³ /h
Zehnder Carma 9016	800 m ³ /h	1200 m ³ /h	300 m ³ /h	360 m ³ /h
Zehnder Carma 9023	1000 m ³ /h	1800 m ³ /h	350 m ³ /h	540 m ³ /h
Zehnder Carma 9035	1700 m ³ /h	3000 m ³ /h	610 m ³ /h	900 m ³ /h
Zehnder Carma 9048	2000 m ³ /h	3500 m ³ /h	770 m ³ /h	1050 m ³ /h
Zehnder Carma 9070	3000 m ³ /h	5800 m ³ /h	1200 m ³ /h	1740 m ³ /h

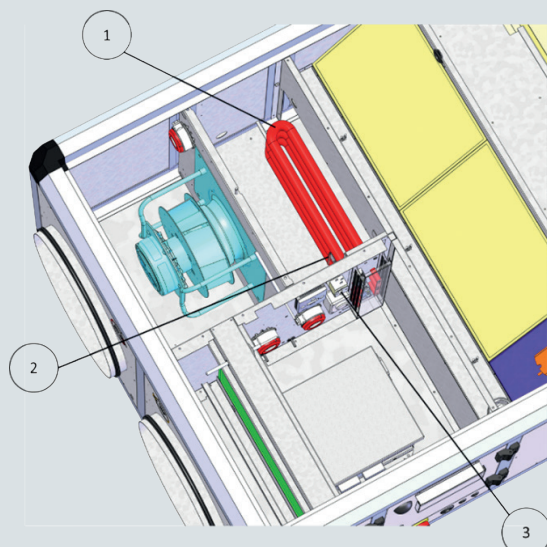
Refer to the electrical diagram (see chapter 16 Electrical control wiring diagram) for details of the electrical connection of the pressure transducers.

15.5. Overheating safety thermostats THS and THSD

The overheating safety thermostats are placed directly:

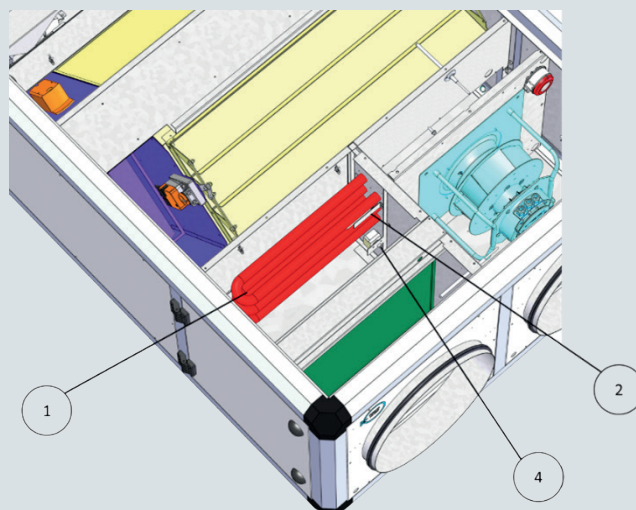
- On the electric heating coil (EHC) for the THS
-

THS overheating safety thermostat for electric heating coil (EHC)

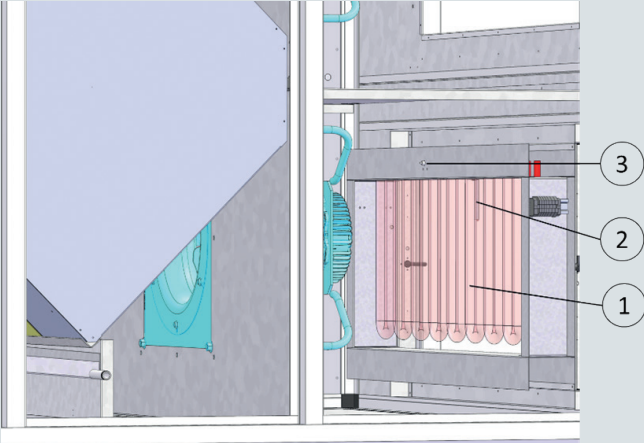
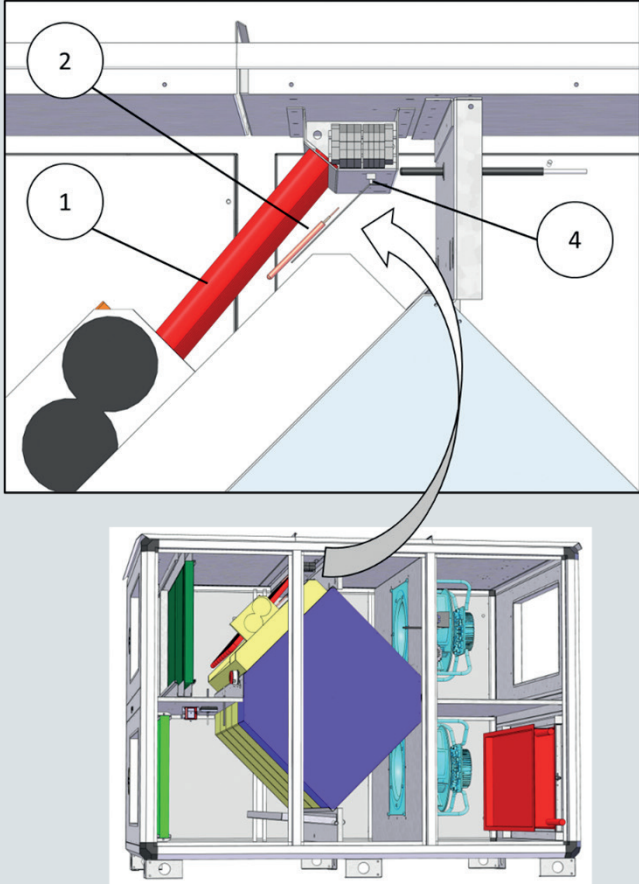


All Zehnder Carma models except 9070

THSD overheating safety thermostat for electric intake air preheating coil (EDC)



All Zehnder Carma models except 9070

THS overheating safety thermostat for electric heating coil (EHC)	THSD overheating safety thermostat for electric intake air preheating coil (EDC)
 <p data-bbox="316 965 596 992">Only Zehnder Carma 9070</p>	
<p data-bbox="129 1245 319 1272">Reference points:</p> <ul data-bbox="129 1272 957 1400" style="list-style-type: none"> <li data-bbox="129 1272 300 1299">▪ 1-Electric coil <li data-bbox="129 1301 357 1328">▪ 2-Thermostat bulb <li data-bbox="129 1330 836 1357">▪ 3-THS overheating safety thermostat for electric heating coil <li data-bbox="129 1359 957 1400">▪ 4- Intake air preheating electric coil safety thermostat (frost protection) 	

When overheating has been detected by the THS or THSD overheating safety thermostats, it is necessary to reset them by pressing the white reset button after removing the protective cap screwed on the thermostat body itself.

Before resetting the thermostat, it is necessary to know the cause of the overheating and to remedy it in order to avoid any damage to the equipment. There may be overheating of the electric coil, for example, due to a faulty solid state relay and/or fan, or due to a power failure when the coil was at full power (check for alarms).

15.6. Replacing the internal memory battery

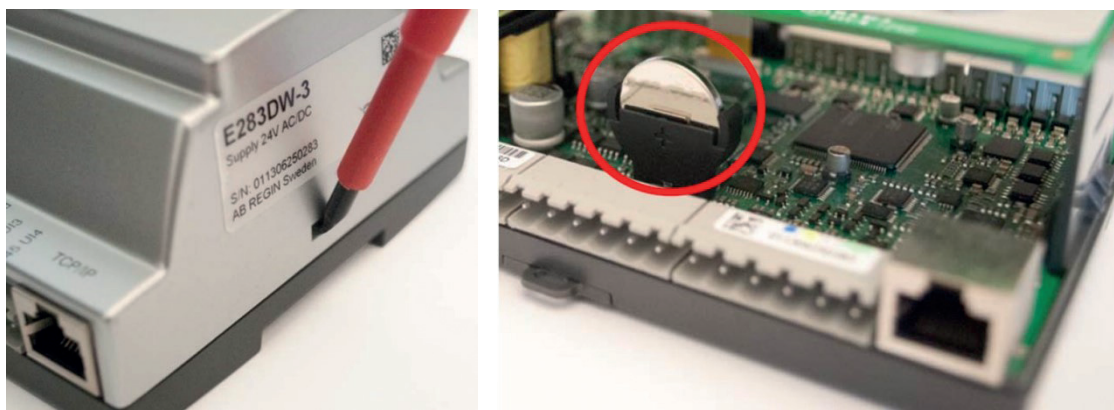
The appearance of the low battery alarm (alarm #78) indicates that the battery powering the internal memory and Real Time Clock (RTC) is too low and may fail to operate in the event of a power failure.

The procedure for replacing the battery is described below. A condenser takes over when the battery is removed. The battery should be replaced within approximately 10 minutes after the power supply is cut off.

If the battery replacement takes less than 10 minutes, it will not be necessary to reload the programme and the clock will continue to operate normally. If necessary, the controller must be reprogrammed.

It is a CR2032 battery.

Press the clips on either side of the housing with a small screwdriver to release the cover from the base. Hold the base and remove the cover.



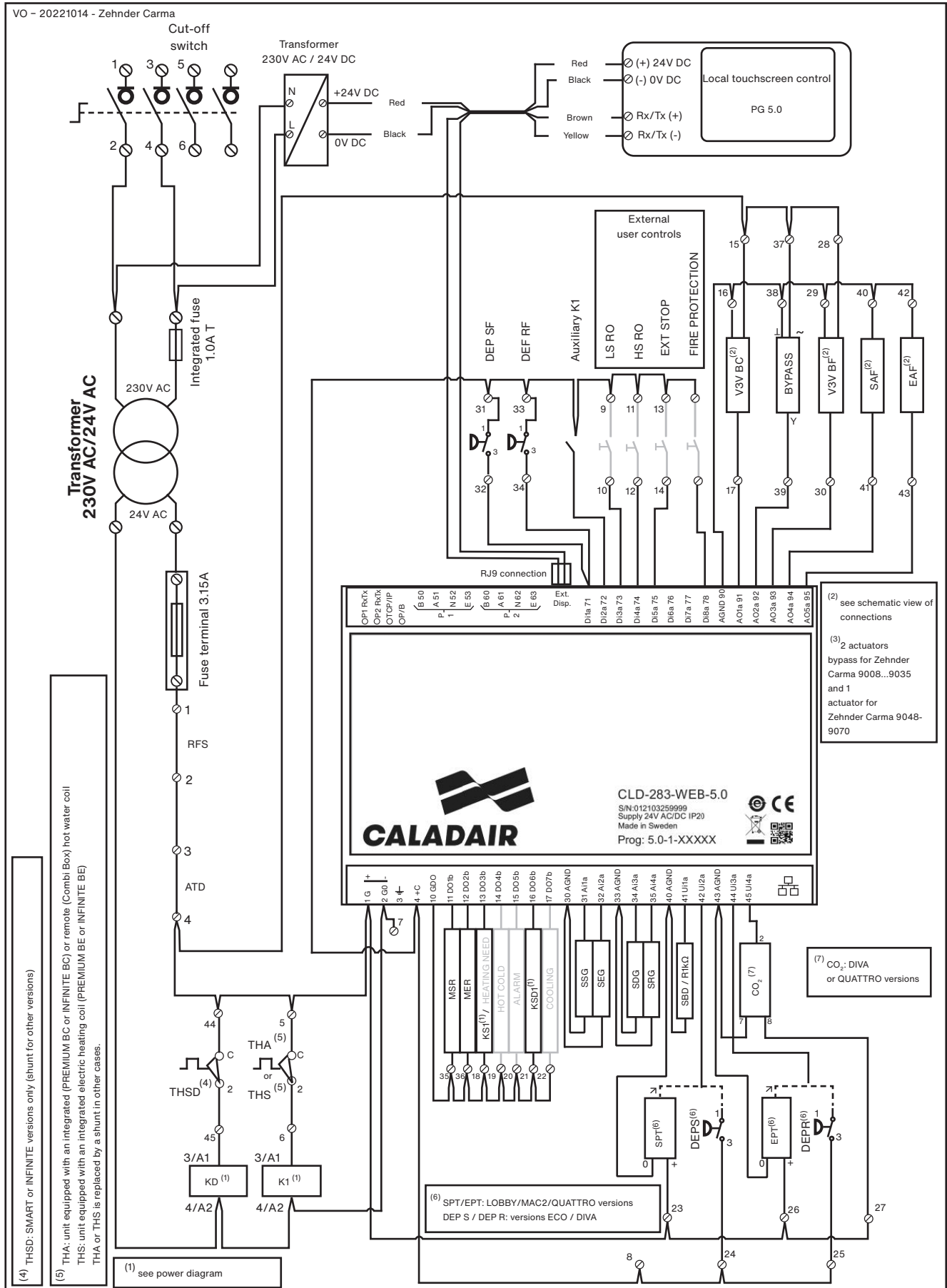
Hold the battery and gently pull it upwards until it comes out of the battery holder.

Replace the new battery by pressing firmly on it to slide it into its holder.

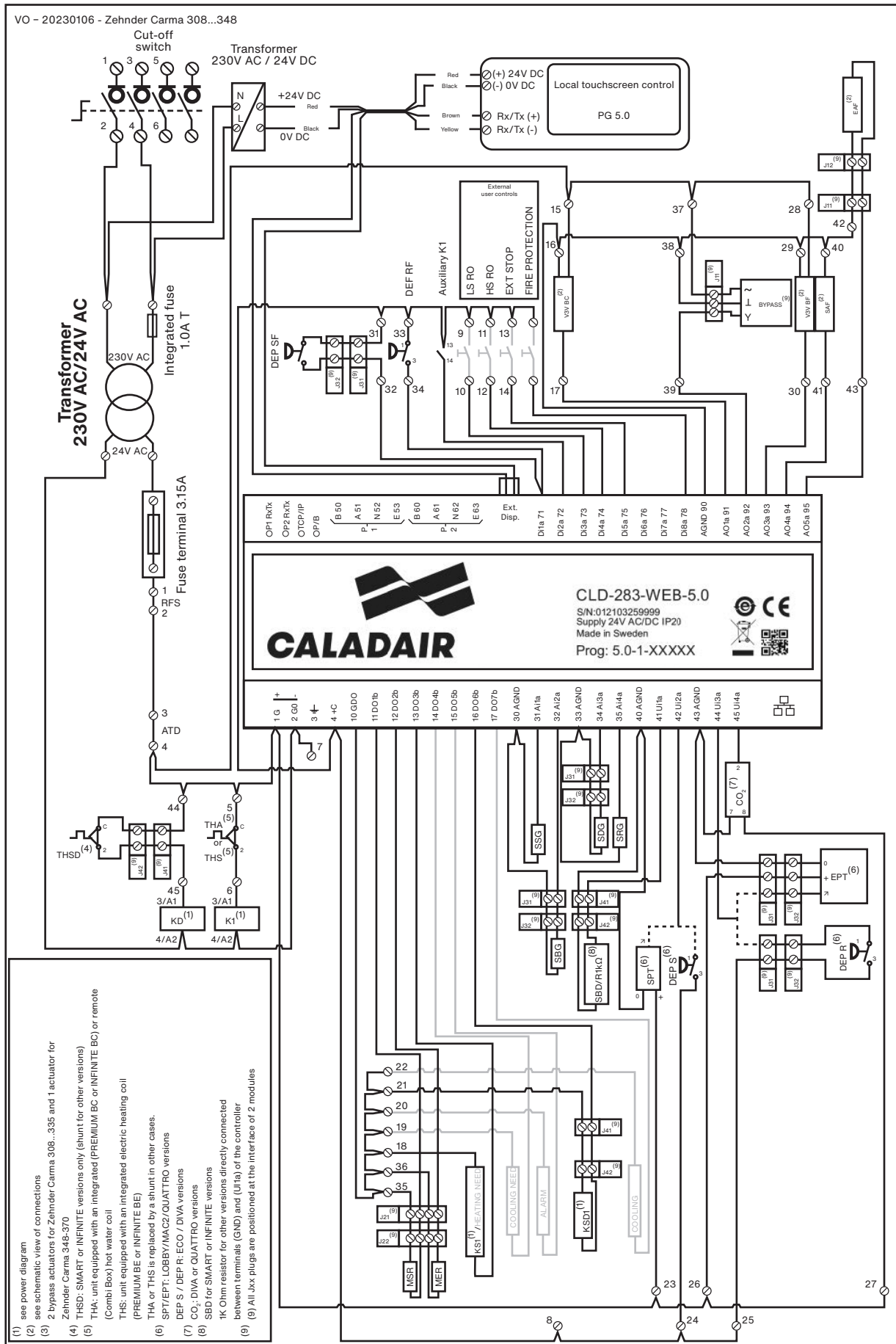
Note: Pay attention to the direction of the battery to ensure correct polarity.

16. Electrical control diagram

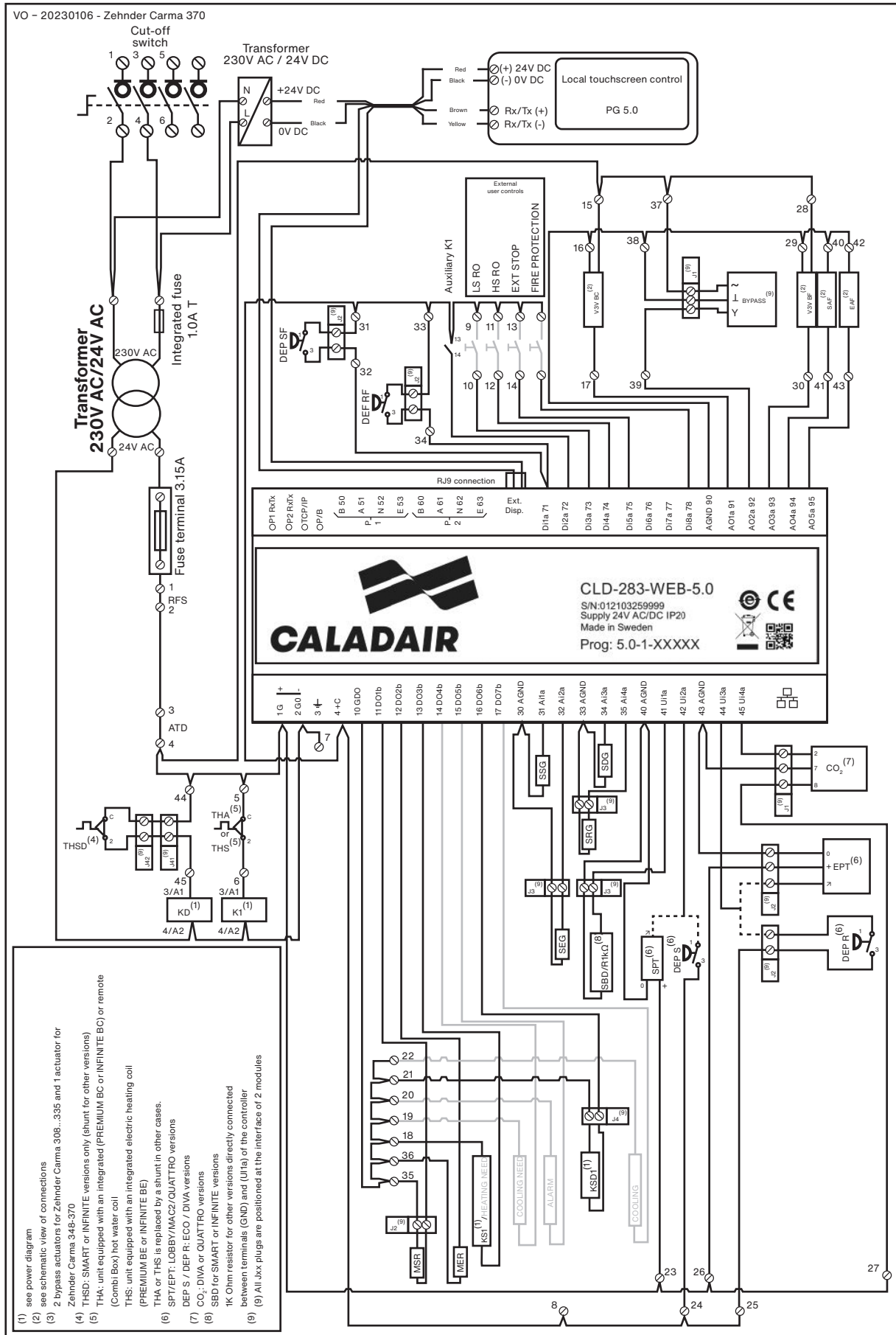
16.1. Zehnder Carma series 9008...9070



16.2. Zehnder Carma 308...348



16.3. Zehnder Carma 370



STANDARD EQUIPMENT (depending on unit version)		
BYPASS	Control signal for bypass recovery actuator	All versions
DEP SF	Supply filter pressure switch	All versions
DEP RF	Extract filter pressure switch	Optional, factory-wired
Auxiliary K1	Auxiliary contact of contact transmitter K1	All versions
SAF	Control signal for supply fan	All versions
EAF	Control signal for extract fan	All versions
THA	Frost protection thermostat	If equipped with a hot water coil (PREMIUM BC / INFINITE BC), or control of a remote water coil in the Combi Box duct
THS	Overheating safety thermostat for electric heating coil	If equipped with an electric heating coil (PREMIUM BE / INFINITE BE)
THSD	Overheating safety thermostat for electric defrosting coil	If equipped with an electric defrosting coil (SMART / INFINITE)
KD	Electric defrosting coil contact transmitter (EDC)	
KSD1	Defrosting coil static relay (EDC)	If equipped with an electric defrosting coil (SMART / INFINITE) single-phase 230V AC or three-phase 400V AC
KSD2	Defrosting coil static relay (EDC)	If equipped with a three-phase 400V AC electric defrosting coil (SMART / INFINITE)
K1	Electric heating coil (EHC) contact transmitter	
KS1	Static relay for electric heating coil (EHC)	If equipped with an electric heating coil (PREMIUM BE / INFINITE BE) single-phase 230V AC or three-phase 400V AC
KS2	Static relay for electric heating coil (EHC)	If equipped with an electric heating coil (PREMIUM BE / INFINITE BE) three-phase 400V AC
BE	Electric heating coil	If equipped with an electric heating coil (PREMIUM BE / INFINITE BE)
EDC	Electric defrosting coil	If equipped with an electric defrosting coil (SMART / INFINITE)
SSG	Supply temperature sensor	All versions Equipped with a yellow sleeve
SEG	Outdoor temperature sensor	All versions Equipped with a blue sleeve
SDG	Defrosting temperature sensor (exhaust air)	All versions Equipped with a colour sleeve
SRG	Extract temperature sensor	All versions Equipped with a black sleeve
SBD	Defrost coil temperature sensor (preheated intake air)	If equipped with a defrosting coil (SMART / INFINITE) Equipped with a red sleeve

STANDARD EQUIPMENT (depending on unit version)

R1kΩ	1k Ohm resistance	If not equipped with a defrosting coil (FIRST/ PREMIUM versions)
CO₂	CO ₂ sensor	DIVA / QUATTRO
DEP S	Pressure switch for supply fan operation	ECO / DIVA
DEP R	Pressure switch for extract fan operation	ECO / DIVA
TRP S	Supply air pressure transducer	LOBBY / MAC2 / QUATTRO
TRP R	Extract air pressure transducer	LOBBY / MAC2 / QUATTRO

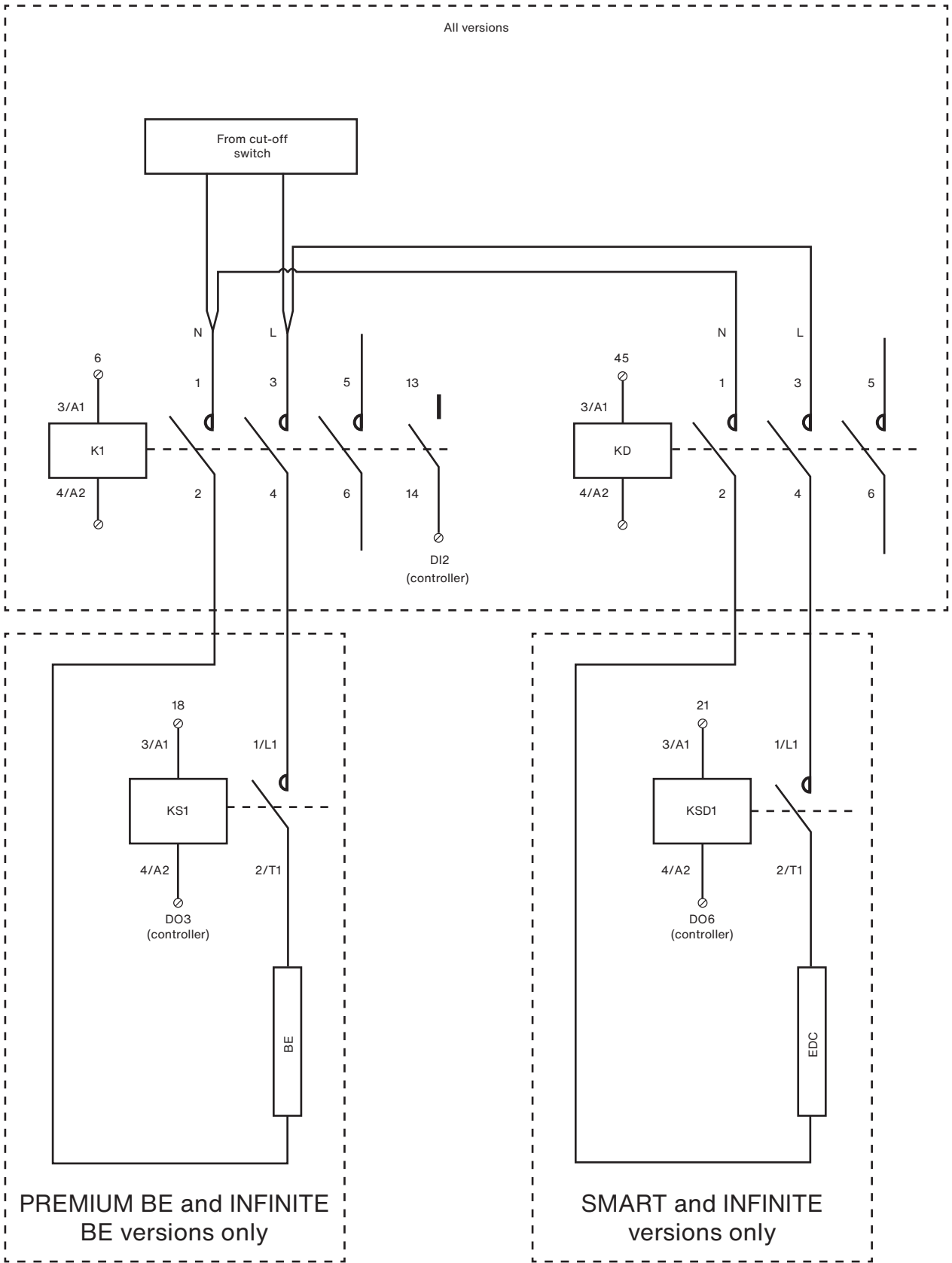
OPTIONAL EQUIPMENT (to be wired on site according to user requirements)

LS RO	External control of low-speed forced operation (reduced operation) by NO dry contact
HS RO	External control of high-speed forced operation (normal operation) by NO dry contact
EXT STOP	External control of unit shutdown via NO dry contact
RFS	Remote fire stop by NC dry contact
ATD	Autonomous trigger detector by NC dry contact
ALARM	Polarised 24V AC digital on/off output for alarm signal
NIGHT COOLING	Polarised 24V AC digital on/off output for active night cooling signal
HEATING NEED	Polarised 24V AC digital on/off output for active heat demand
COOLING NEED	Polarised 24V AC digital on/off output for active cooling demand
MSR	Output for controlling the opening of the motorised supply register polarised at 24V AC
MER	Output for controlling the opening of the motorised extract register polarised at 24V AC
V3V BC	0-10V control signal for the 3-way valve of the hot water heating coil
V3V BF	0-10V control signal for the 3-way valve of cold water cooling coil

17. Electrical control diagram**17.1. Single-phase 230V AC electric heating and defrosting coils****17.1.1. Zehnder Carma 9008...9023**

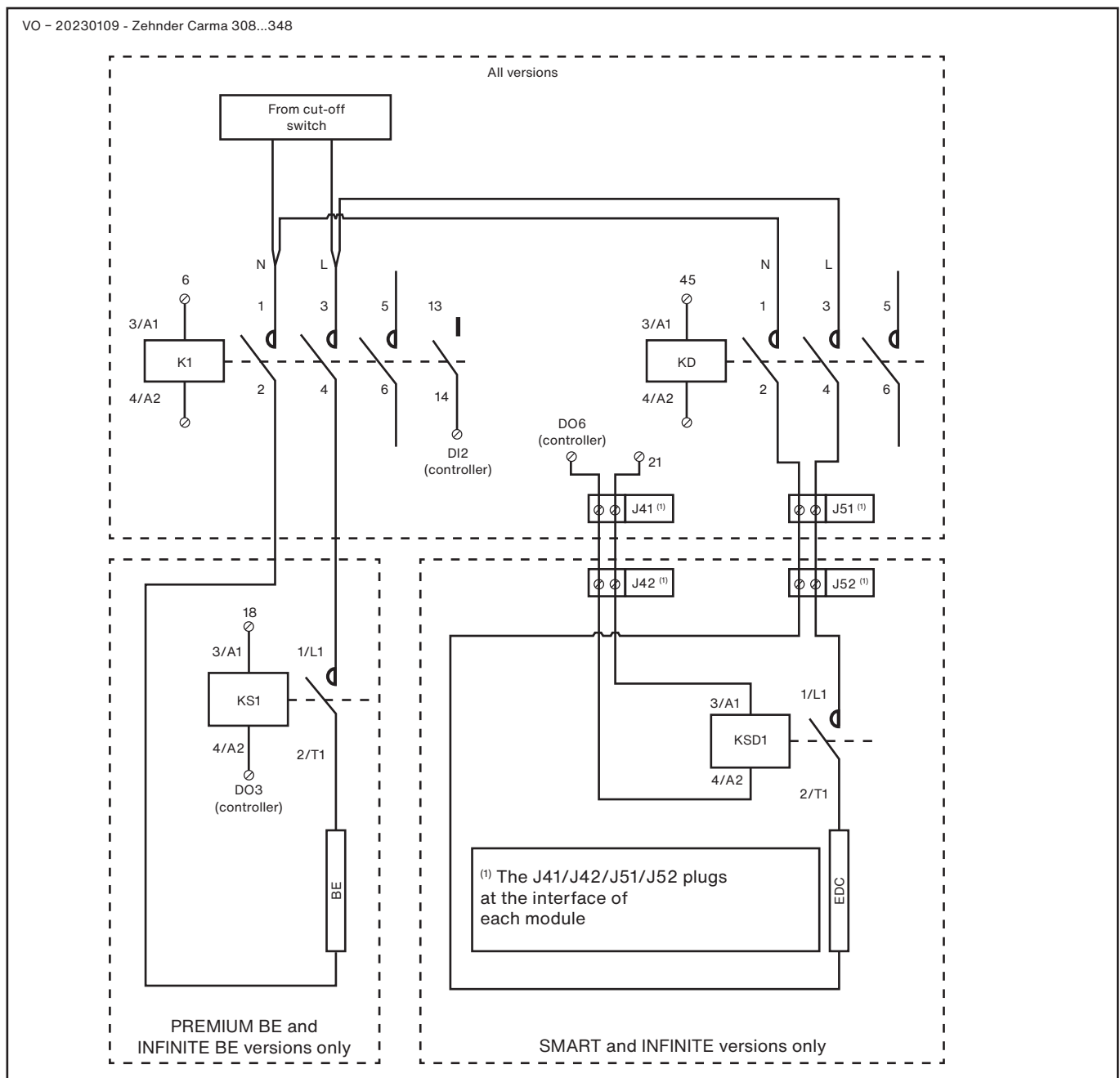
Zehnder Zehnder Carma	Versions included				
	SMART	PREMIUM BC	PREMIUM BE	PREMIUM BE 037	INFINITE
9008	✓	✓	✓		✓
9010	✓	✓	✓		✓
9016		✓		✓	
9023		✓		✓	

VO - 20211118 - Zehnder Carma



17.1.2. Zehnder Carma 308...323

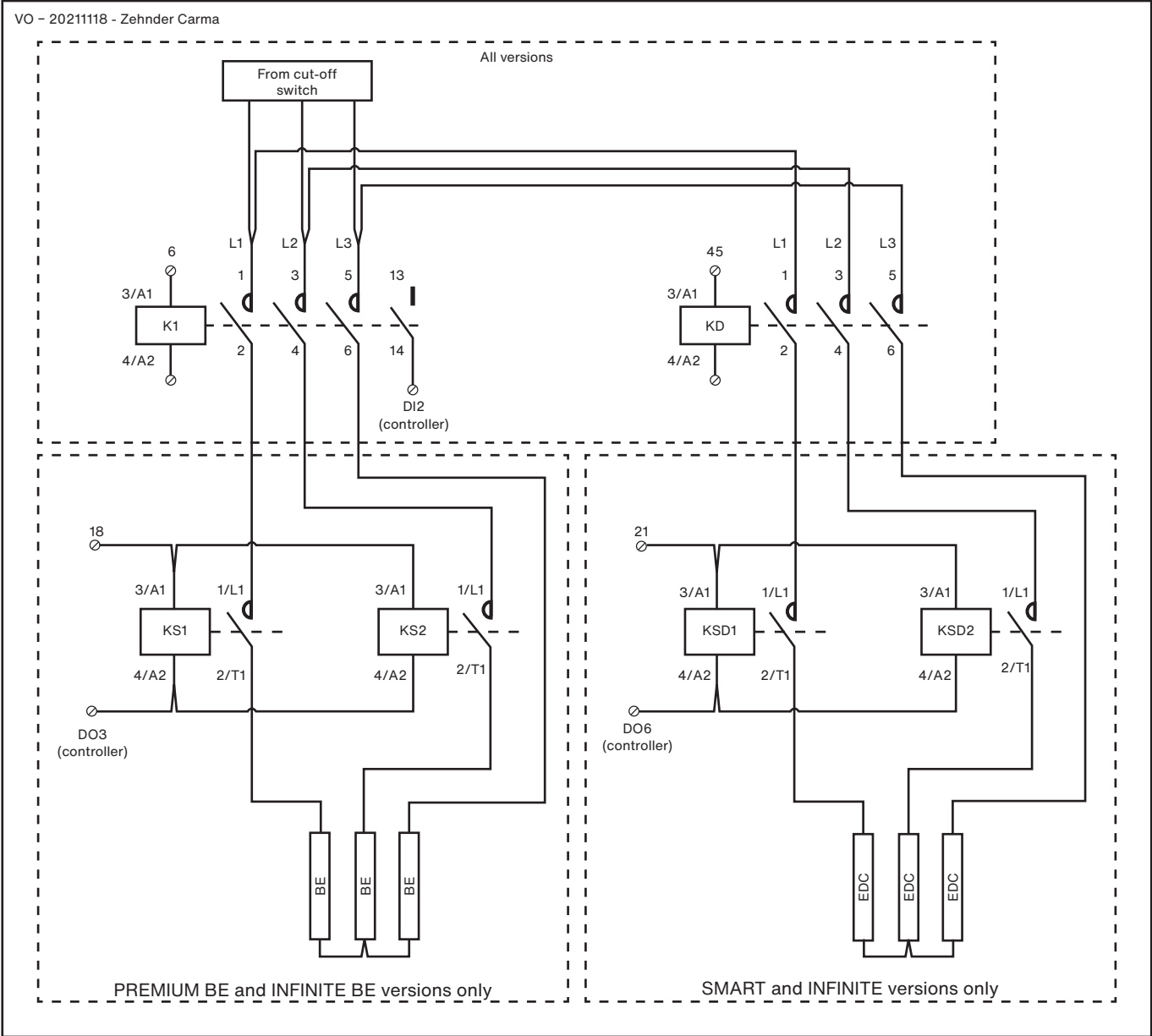
Zehnder Carma	Versions included				
	SMART	PREMIUM BC	PREMIUM BE	PREMIUM BE 037	INFINITE
308	✓	✓	✓		✓
310	✓	✓	✓		✓
316		✓		✓	
323		✓		✓	



17.2. Three-phase 400V AC electric heating and defrosting coils

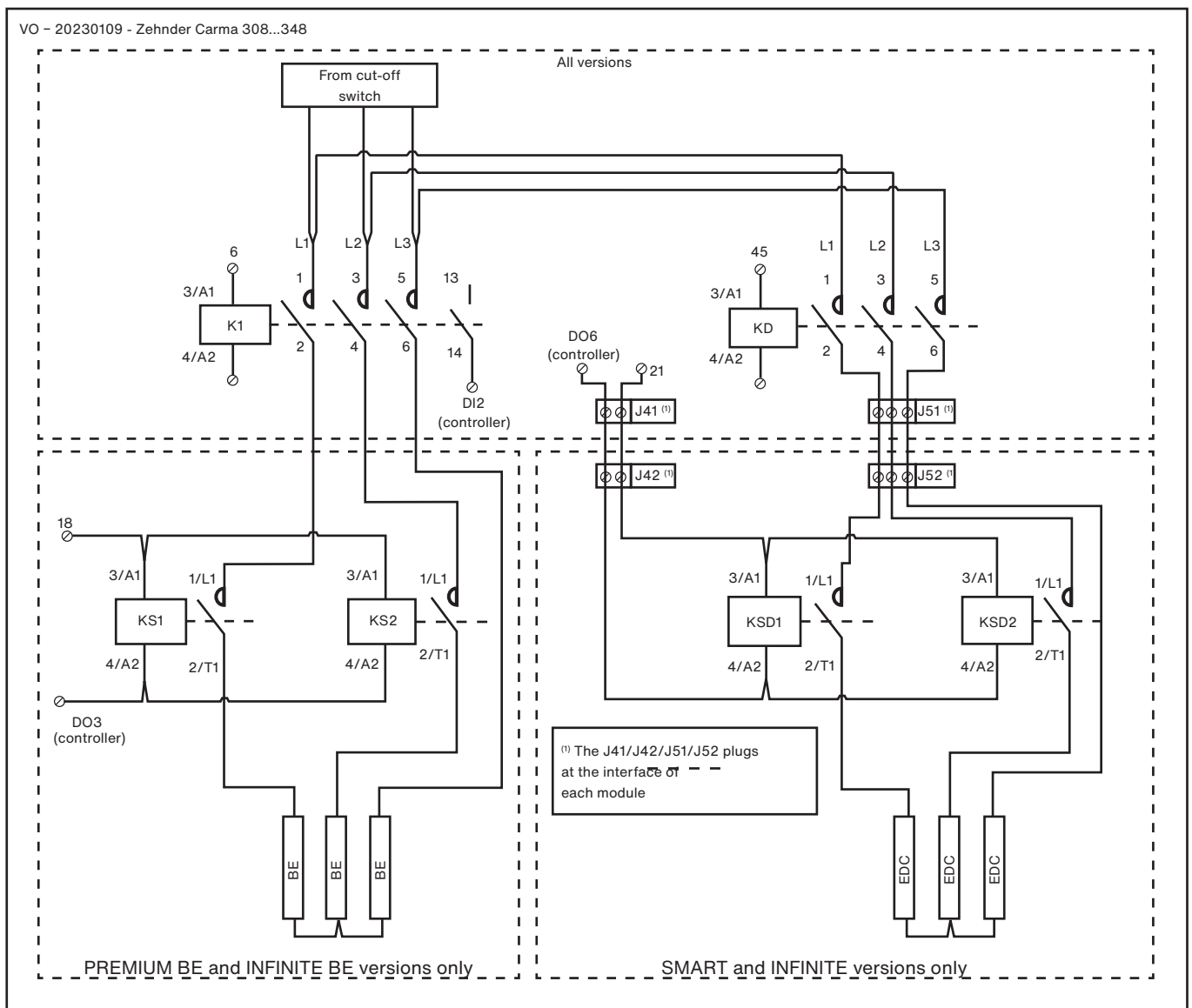
17.2.1. Zehnder Carma 9016...9070

Zehnder Zehnder Carma	Versions included			
	SMART	PREMIUM BE 052	PREMIUM BE 067	INFINITE
9016	✓	✓		✓
9023	✓		✓	✓
9035...9070	✓	✓	✓	✓

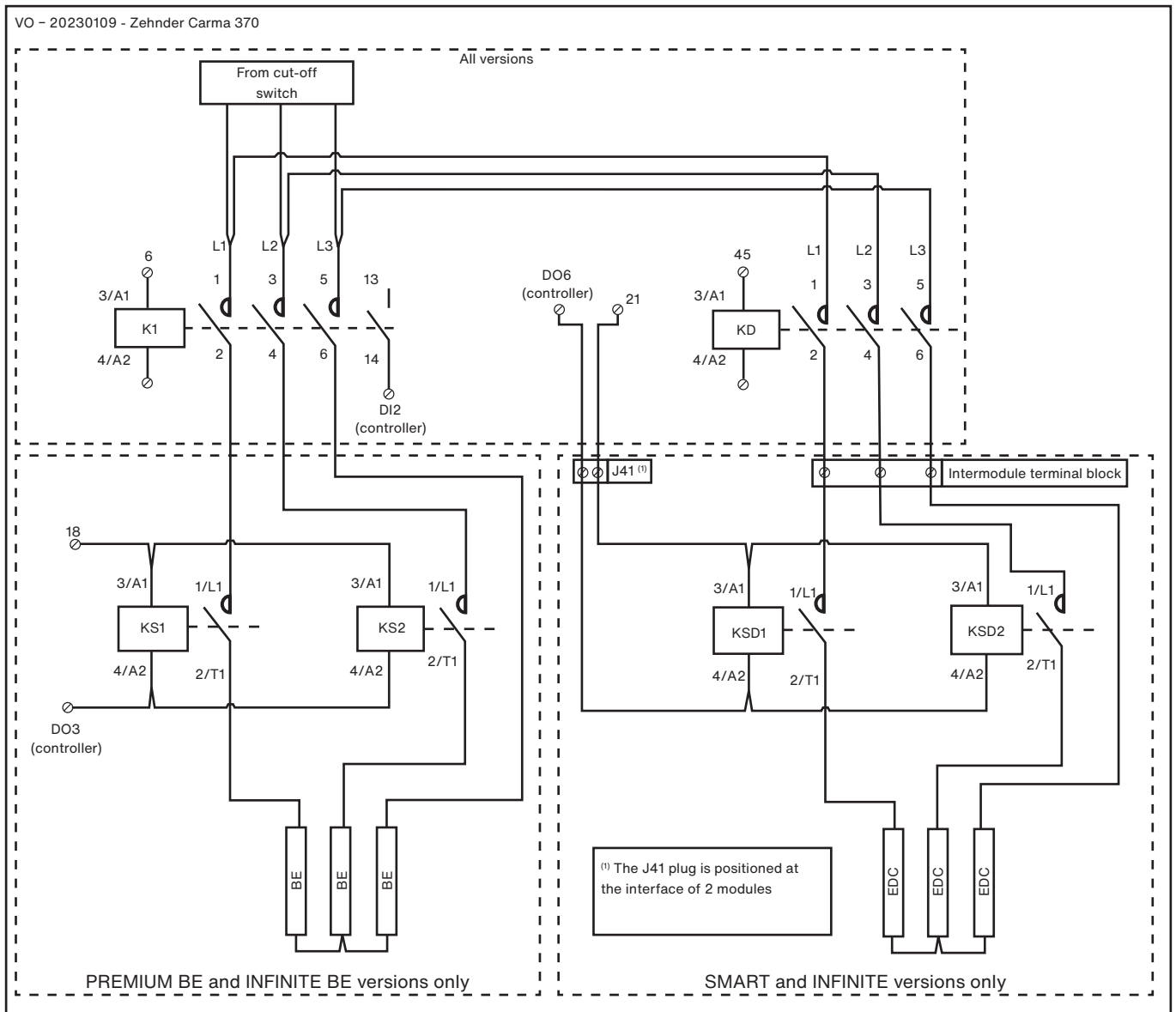


17.2.2. Zehnder Carma 316...348

Zehnder Carma	Versions included			
	SMART	PREMIUM BE 052	PREMIUM BE 067	INFINITE
316	✓	✓		✓
323	✓		✓	✓
335...348	✓	✓	✓	✓



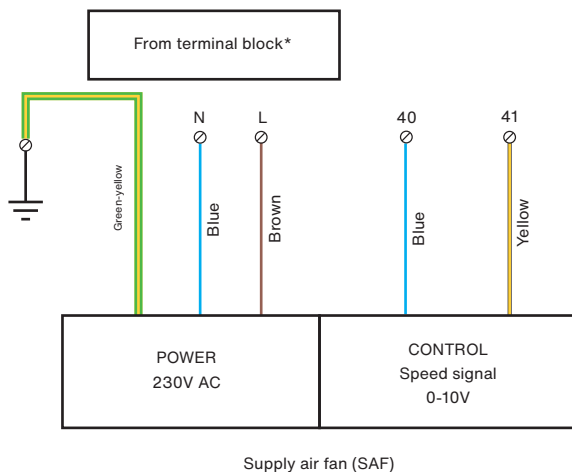
17.2.3. Zehnder Carma 370



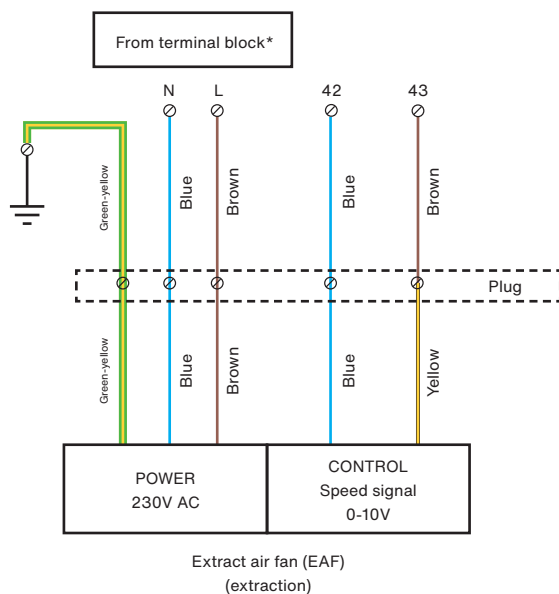
17.3. Zehnder Carma 90xx motorised fans

Zehnder Carma 9008 motors

Supply



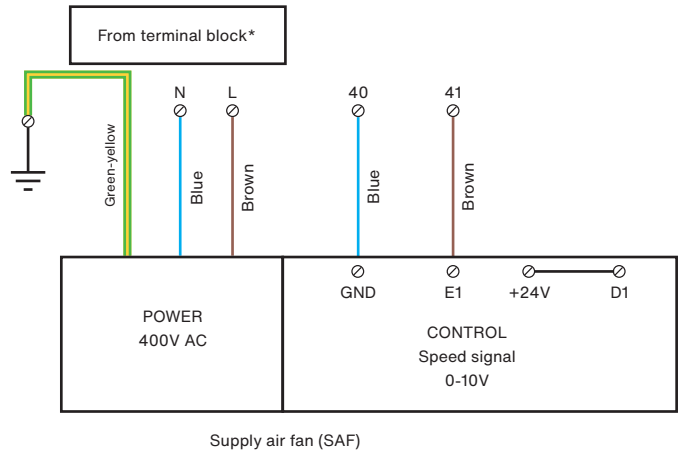
Extract



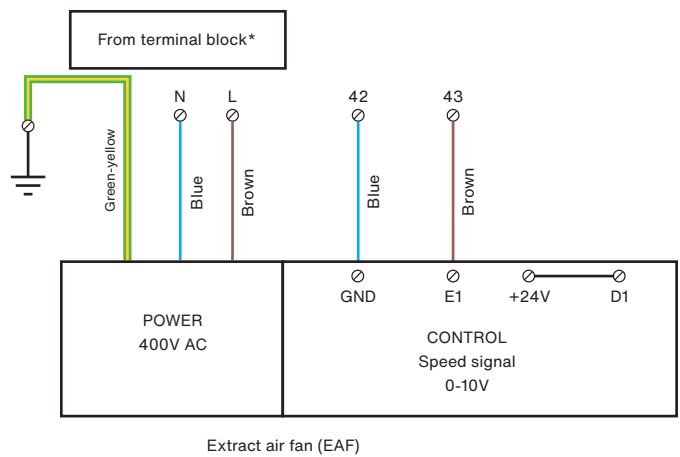
*Fan power supply terminal block see 7.2 Electrical board.

Zehnder Carma 9010-9016 motors

Supply



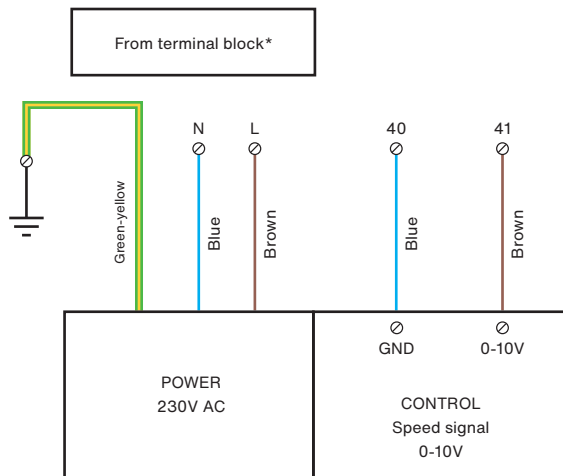
Extract



*Fan power supply terminal block see 7.2 Electrical board.

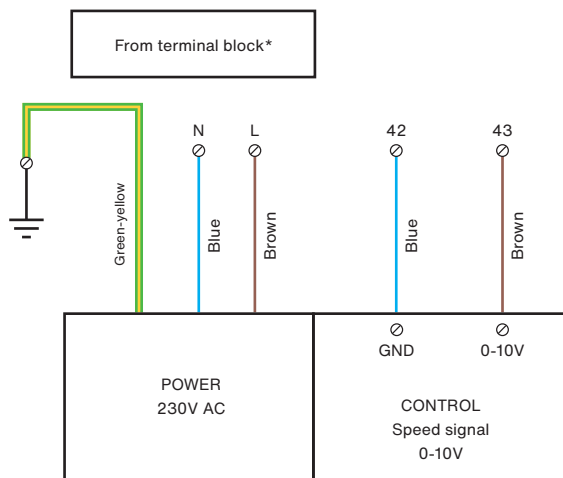
Zehnder Carma 9023 motors

Supply



Supply air fan (SAF)

Extract

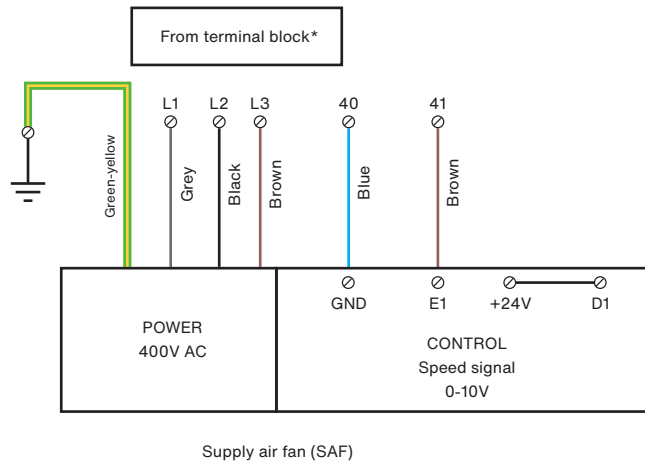


Extract air fan (EAF)

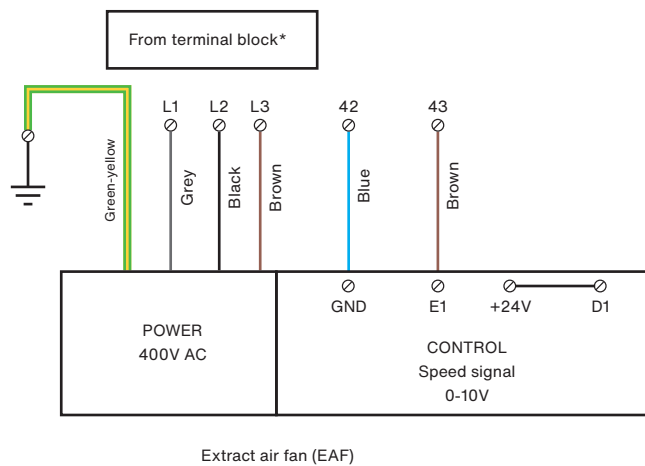
*Fan power supply terminal block see 7.2 Electrical board.

Zehnder Carma 9035-9048 motors

Supply



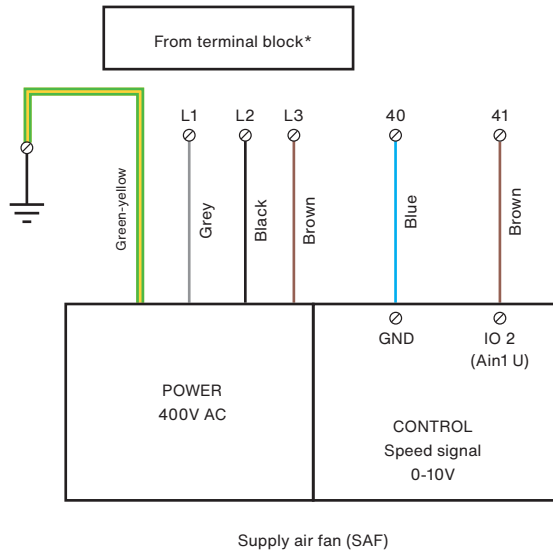
Extract



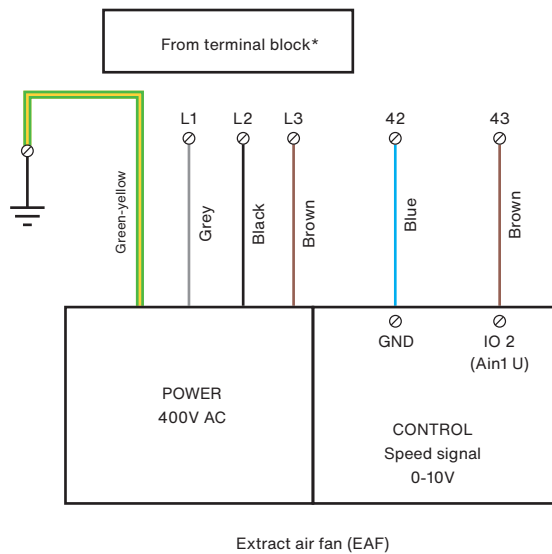
*Fan power supply terminal block see 7.2 Electrical board.

Zehnder Carma 9070 motors

Supply



Extract

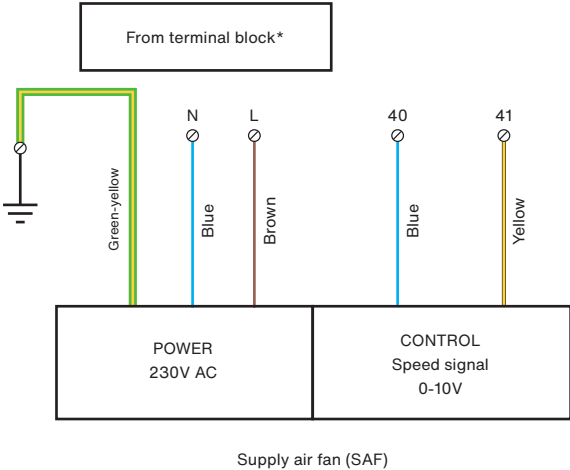


*Fan power supply terminal block see 7.2 Electrical board.

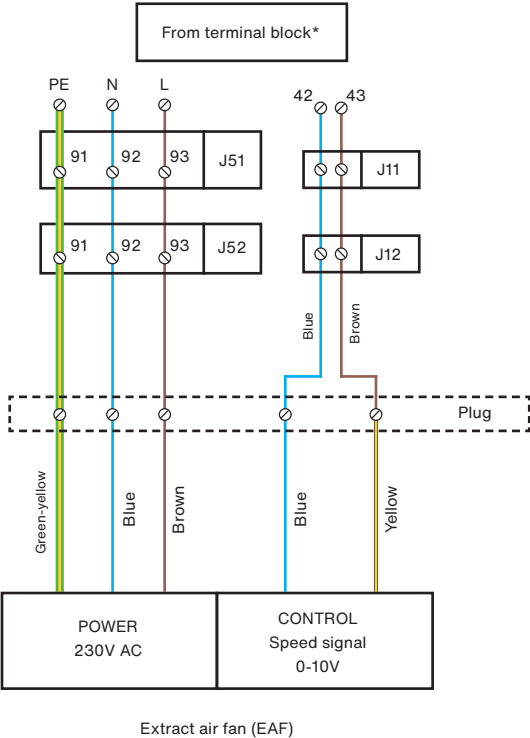
17.4. Zehnder Carma 3xx motorised fans

Zehnder Carma 308 motors

Supply



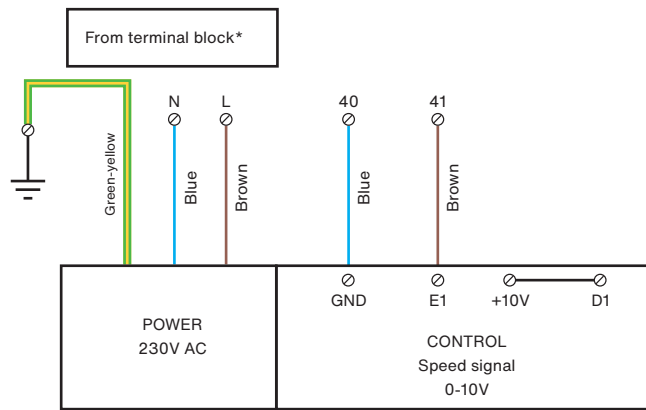
Extract



*Fan power supply terminal block see 7.2 Electrical board.

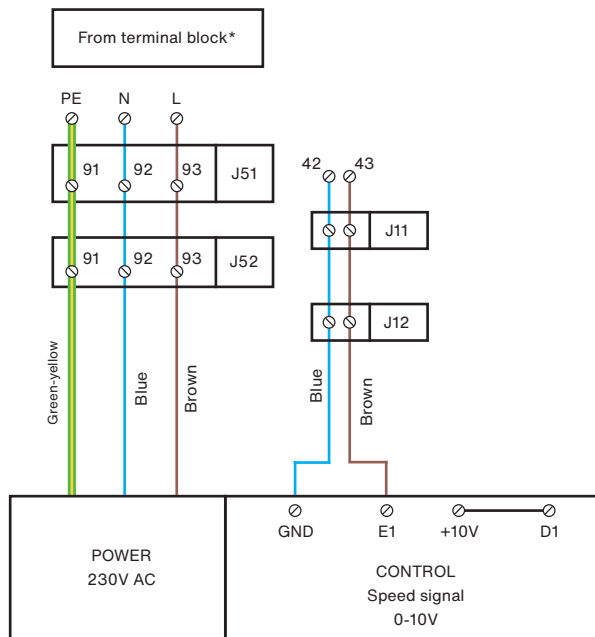
Zehnder Carma 310-316 motors

Supply



Supply air fan (SAF)

Extract

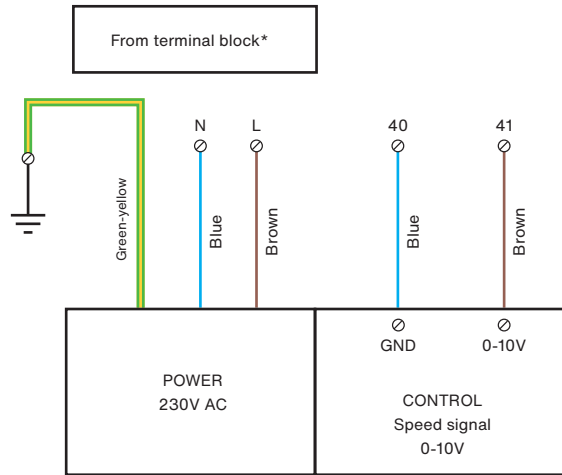


Extract air fan (EAF)

*Fan power supply terminal block see 7.2 Electrical board.

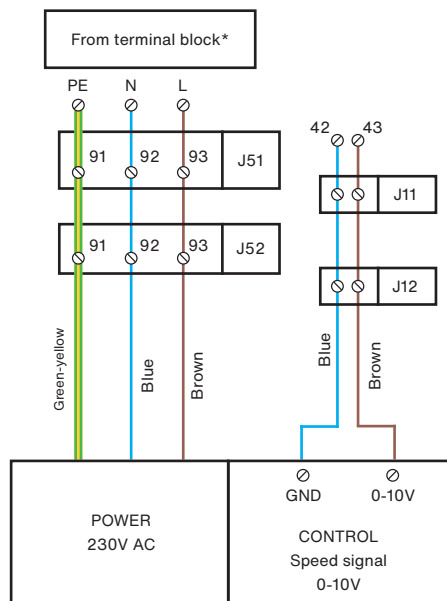
Zehnder Carma 323 motors

Supply



Supply air fan (SAF)

Extract

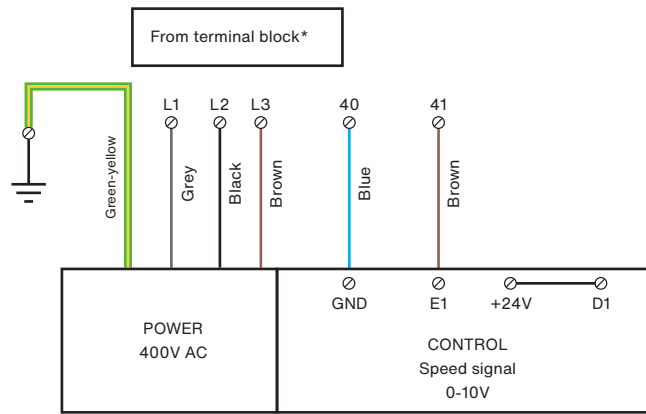


Extract air fan (EAF)

*Fan power supply terminal block see 7.2 Electrical board.

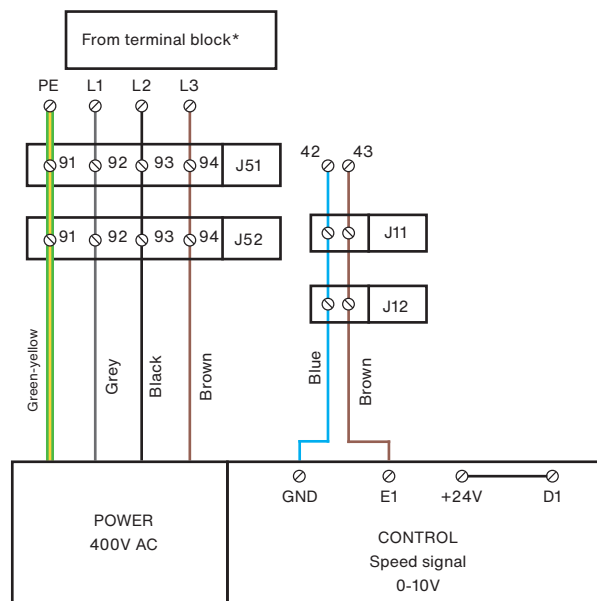
Zehnder Carma 335-348 motors

Supply



Supply air fan (SAF)

Extract

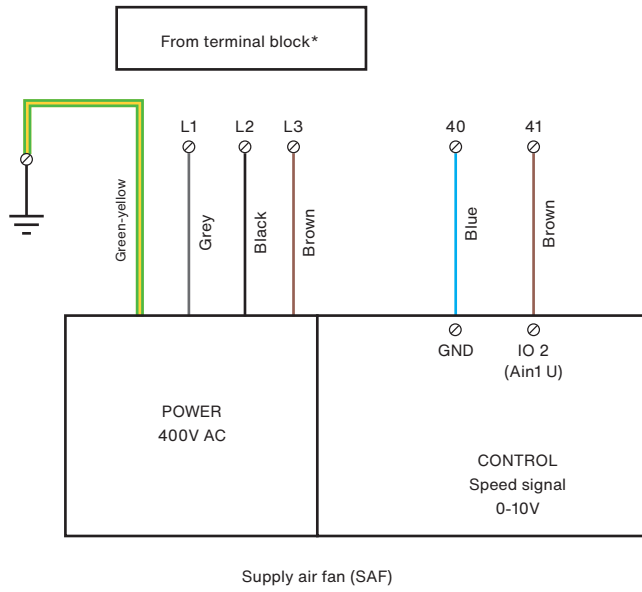


Extract air fan (EAF)

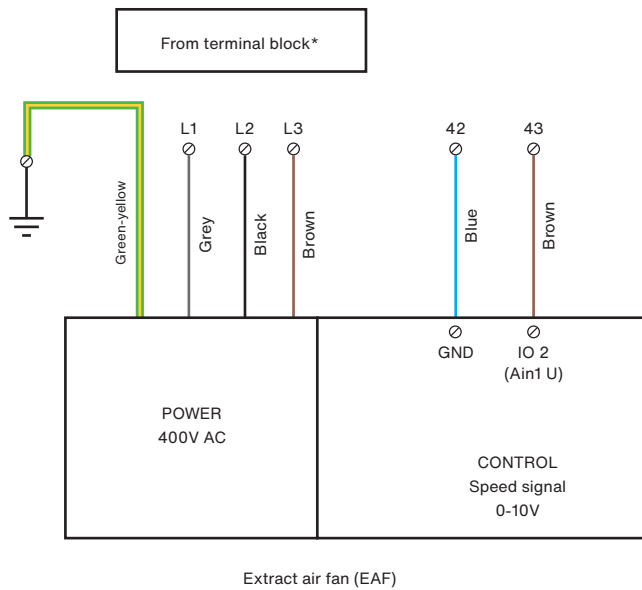
*Fan power supply terminal block see 7.2 Electrical board.

Zehnder Carma 370 motors

Supply

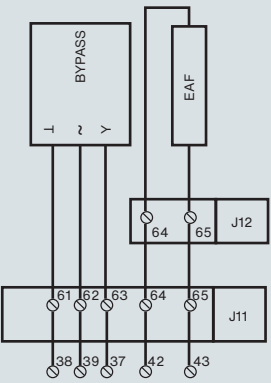
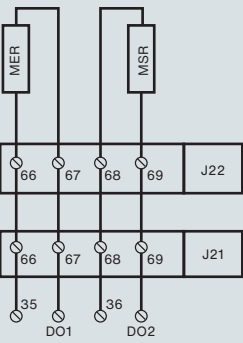
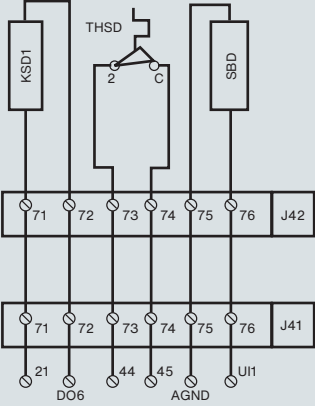
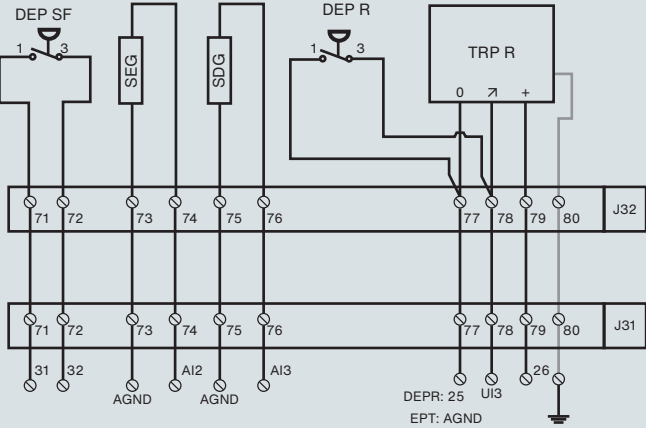


Extract



*Fan power supply terminal block see 7.2 Electrical board.

18. Terminal number details for J plugs (Zehnder Carma 3xx only)

Zehnder Carma 370					
Plugs	Type	Diagram	Plugs	Type	Diagram
J11/J12	J11: 5 Poles J12: 2 Poles		J21/J22	4 Poles	
J41/J42	7 Poles		J51/J52	8 Poles	See: 17.1.2. Zehnder Carma 308...323 17.2.2. Zehnder Carma 316...348
J31/J32	10 Poles				DEP R: ECO / DIVA versions EPT: LOBBY/MAC2/QUATTRO versions

Zehnder Carma 370

Plugs	Type	Diagram	Plugs	Type	Diagram
J1	7 Poles		J4	4 Poles	
J3	8 Poles				
J2	10 Poles	<p>DEP R: ECO / DIVA versions EPT: LOBBY/MAC2/QUATTRO versions</p>			

19. Zehnder Easy 5.0 controller

See specific manual MS-CDF-020 - Zehnder Easy 5.0 controller.

20. SEASON controller

20.1. General

The SEASON controller is a simplified and streamlined solution for controlling the ventilation unit. In contrast to the Zehnder Easy 5.0 controller, it does not have an intelligent electronic controller, a local touch control PG 5.0 or a remote Zehnder EDT2 room touch control. The SEASON controller is not available for Zehnder Carma 3xx (only available for 90xx models).

The SEASON controller includes as standard:

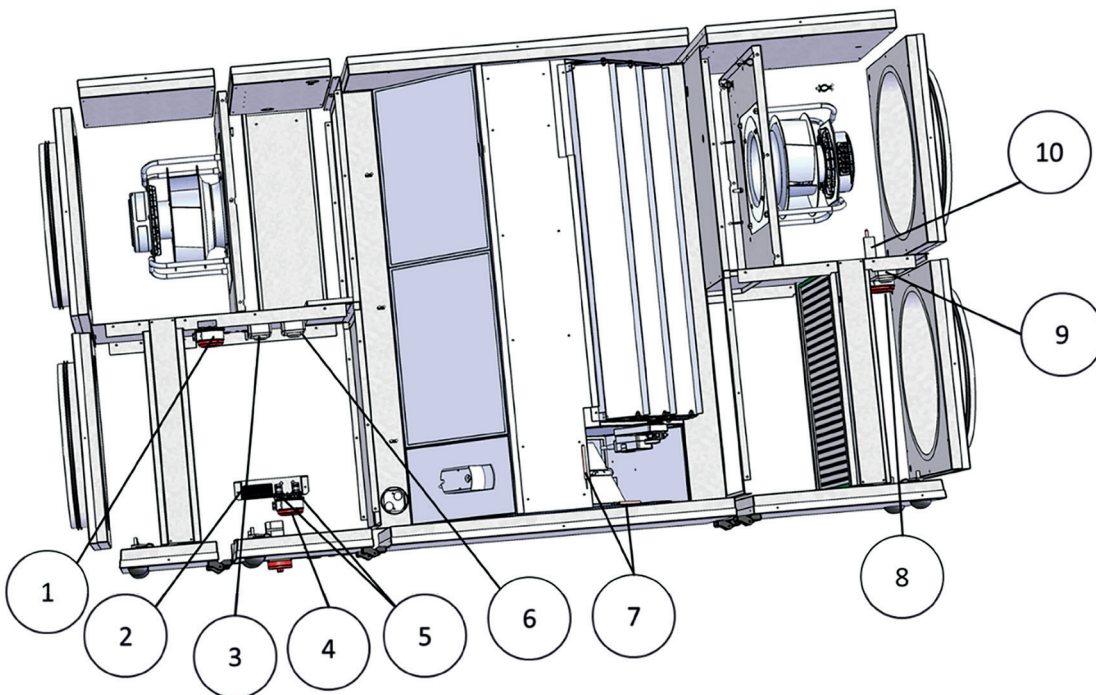
- Individual fan speed setting via adjustable potentiometer
- Heat recovery management by adjustable thermostats, including the functions:
 - Frost protection of the heat exchanger by bypassing the intake air flow in on/off mode
 - Cold recovery, heat recovery
- Fan operation report via pressure switch (NO or NC dry contact)
- Reporting the state of clogging in intake air filters (NO or NC dry contact).

The SEASON controller does not allow the control of heating or cooling coils.

The bypass flap operates in on/off mode (on/off and open/closed, respectively).

20.2. Overview and construction

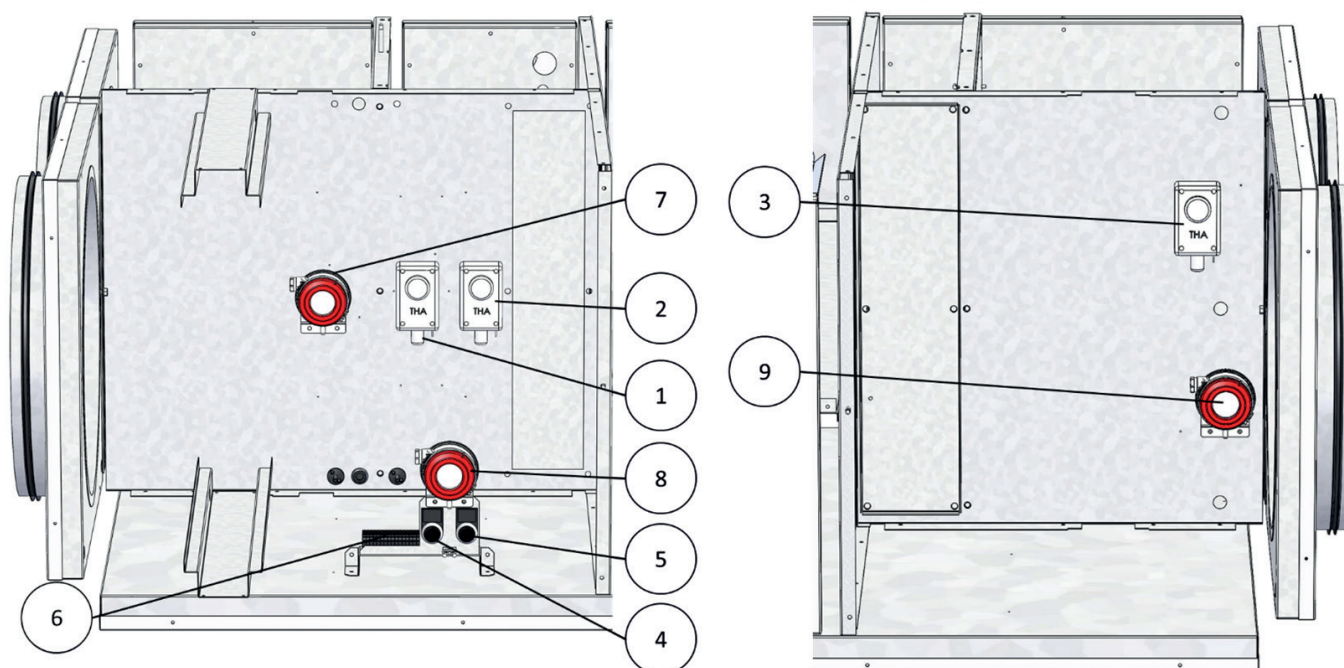
The overview and construction of the SEASON version is very similar to the basic ECO version. The differences are mainly in the electrical board and the control components (temperature sensors, controller).



Reference point	Name	Component
1	DEP S	Pressure switch for supply air fan operation
2		Electrical board including electrical terminal block, SAF potentiometer, EAF potentiometer as well as pressure switch to control the extract fan operation DEP R
3	TH1	Control thermostat TH1
4	DEP R	Pressure switch for extract fan operation (EAF)
5	POT SAF POT EAF	Speed setpoint potentiometers for supply air fan (SAF) and extract air fan (EAF)
6	TH2	Control thermostat TH2
7		Thermostat bulbs TH1 and TH2 (outside air temperature)
8	DEP SF	Pressure switch to control the clogging of the intake air filter
9	TH3	Control thermostat TH3
10		Control thermostat bulb TH3 (exhaust air temperature)

The other components common to the standard range equipped with the Zehnder Easy 5.0 controller are presented in chapter 7.1 General overview of the unit.

20.3. Electrical compartments and user controls



Reference point	Name	Component
1	TH1	Control thermostat TH1 (heat recovery)
2	TH2	Control thermostat TH2 (cold recovery)
3	TH3	Control thermostat TH3 (frost protection)
4	POT SAF	Potentiometer for air supply speed setting (SAF)
5	POT EAF	Potentiometer for air extract speed setting (EAF)
6		Electric terminal block

Reference point	Name	Component
7	DEP S	Pressure switch to control the operation of the supply fan (SAF)
8	DEP R	Pressure switch for extract fan operation (EAF)
9	DEP SF	Pressure switch to control the clogging of the intake air filter

20.4. General operating principle

When the power is switched on (isolating switch in ON position), the supply air fan and the extract air fan start after a few seconds to reach the set speed requested by the potentiometer position.

The bypass flap is activated when the power is switched on depending on the outside air temperature, the exhaust temperature and the setting of the (adjustable) control thermostats.

	Exhaust temperature**	Outdoor air temperature**		
	< 5 °C	< 18 °C	18 °C...24 °C	> 24 °C
Bypass flap position*	Open	Closed (heat recovery)	Open	Closed (cold recovery)

exchanger

**Values for the factory settings of the thermostats to be adapted as required. Maintain a temperature difference of at least 6°C between the 2 thermostats.

***The thermostat placed at the exhaust (TH3) must be set at a temperature ≥ 5°C.

20.5. User settings

20.5.1. Thermostat TH1 (heat recovery)

The TH1 thermostat bulb is placed in the intake air flow (= outdoor temperature). The factory setting of the thermostat is +18 °C:

Outdoor temperature < 18 °C	Outdoor temperature > 18 °C
Contact closed between terminals (C) and (1)	Contact open between terminals (C) and (1)

20.5.2. Thermostat TH2 (cold recovery)

The TH2 thermostat bulb is placed in the intake air flow (= outdoor temperature). The factory setting of the thermostat is +24 °C:

Outdoor temperature < 24 °C	Outdoor temperature > 24 °C
Contact open between terminals (C) and (2)	Contact closed between terminals (C) and (2)


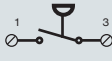
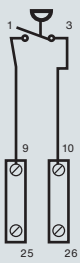
20.5.3. Thermostat TH3 for frost protection

This thermostat ensures the frost protection function of the plate heat exchanger. The bulb is placed in the exhaust air flow. The factory setting of the thermostat is +5 °C:

Outdoor temperature < 5°C	Outdoor temperature > 5°C
Contact open between terminals (C) and (2)	Contact closed between terminals (C) and (2)

20.6. Connecting and setting external user devices

At any time, the user can check the operating status of the fans and the state of clogging of the supply air filter through the use of 3 pressure switches:

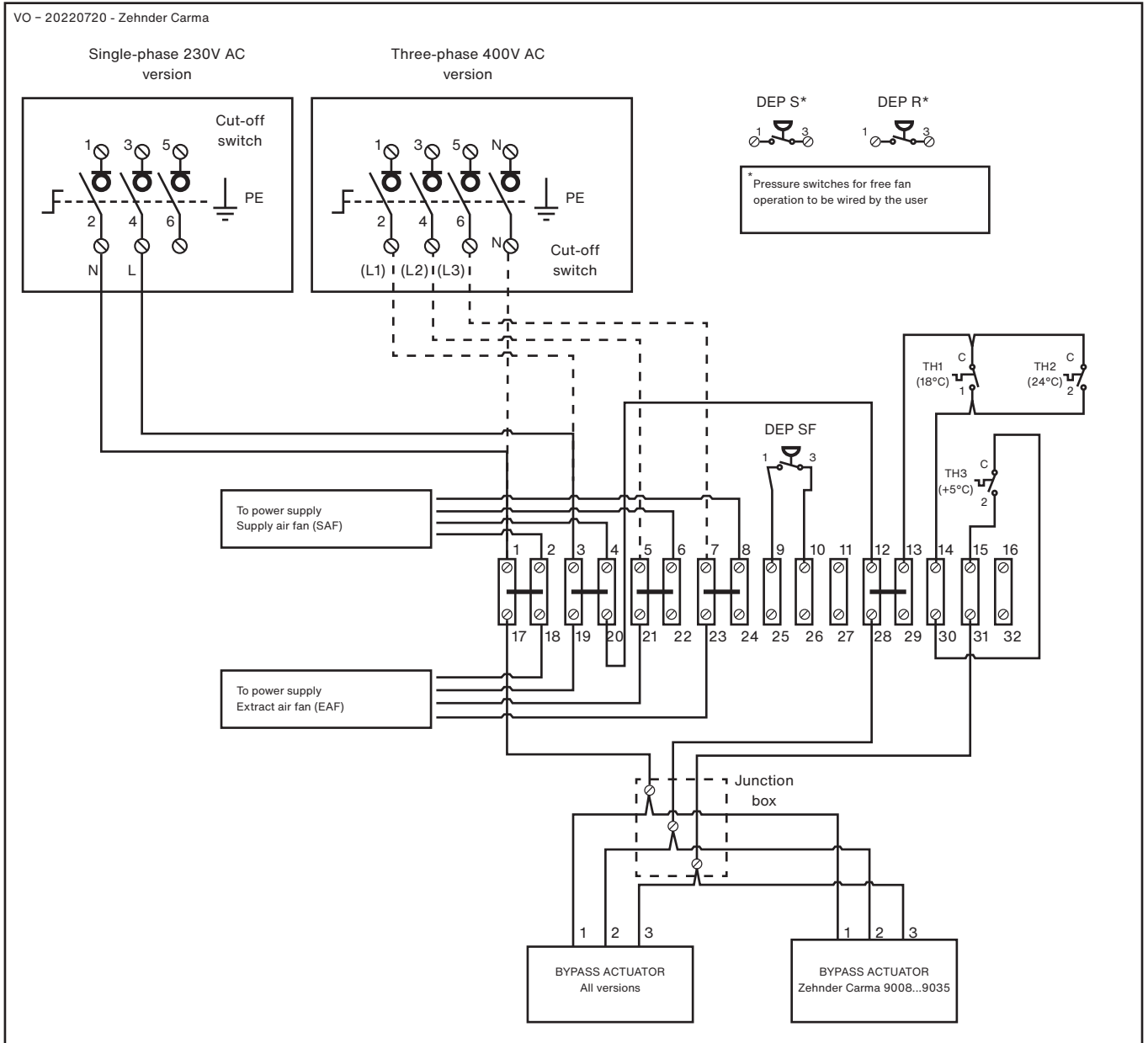
Device	Factory setting	Electrical connection responsibility of the user
Pressure switch to control the operation of the supply fan (SAF)	25 Pa	<p>DEP S</p>  <p>The connection is to be made directly to the device.</p>
Pressure switch to control the operation of the extract fan	25 Pa	<p>DEP R</p>  <p>The connection is to be made directly to the device.</p>
Pressure switch for clogging of the intake air filter	150 Pa M5 filters 200 Pa F7 filters	<p>DEP SF</p>  <p>The connection must be made between terminals (25) and (26).</p>

20.7. Troubleshooting and maintenance

As the SEASON control system is very simple, the risk of breakdowns is relatively limited and confined to the main components.

Fault	Possible causes
Supply air fan is not working	<p>The 0-10V control signal potentiometer is in position 0 or is defective (control signal at the motor input below 1V).</p> <p>The 0-10V control signal wire is defective or the signal polarity is reversed.</p> <p>The power supply wiring is defective.</p> <p>The motor is defective.</p>
The extract air fan is not working	<p>The 0-10V control signal potentiometer is in position 0 or is defective (control signal at the motor input below 1V).</p> <p>The 0-10V control signal wire is defective or the signal polarity is reversed.</p> <p>The power supply wiring is defective.</p> <p>The motor is defective.</p>
The bypass flap does not work (the unit blows air at a temperature close to the outdoor temperature at low/high outdoor temperatures).	<p>The outdoor temperature is in the range where the bypass is inactive (normal case).</p> <p>Control thermostats TH1, TH2, TH3 are incorrectly set or defective.</p> <p>The actuator wiring is defective, the actuator is not powered.</p> <p>The actuator is defective.</p>

20.8. General SEASON wiring diagram



Note:

The power supply for the bypass actuator is provided between terminals (1) and (2) of the actuator.

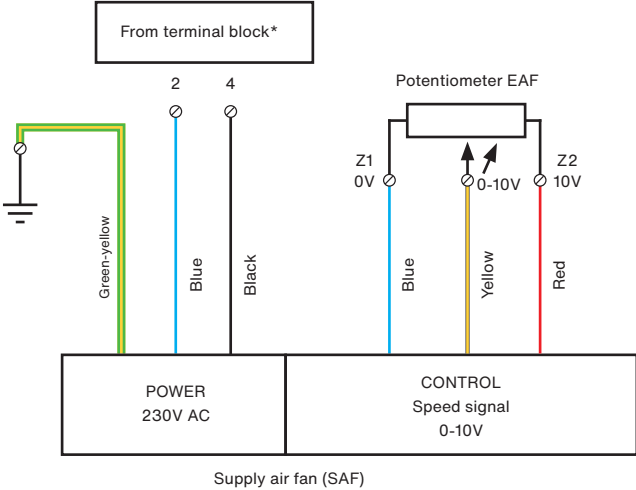
When the power is supplied:

- The potential is absent in terminal (3) of the actuator, the actuator is open, the air is diverted from the exchanger and there is no energy recovery
- The potential is present at terminal (3) of the actuator, the actuator is closed, the air flows through the exchanger and energy recovery is active (100%).

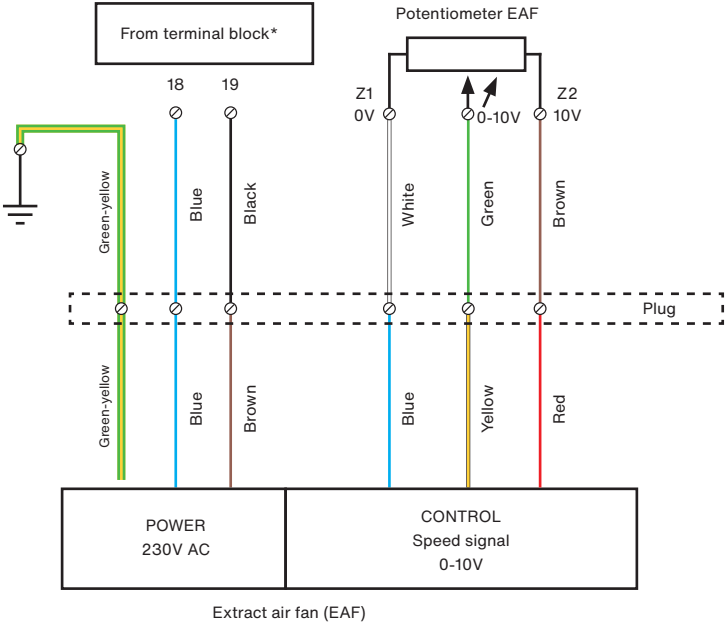
20.9. Electrical wiring diagram for SEASON motorised fans

Zehnder Carma 9008 motors

Supply

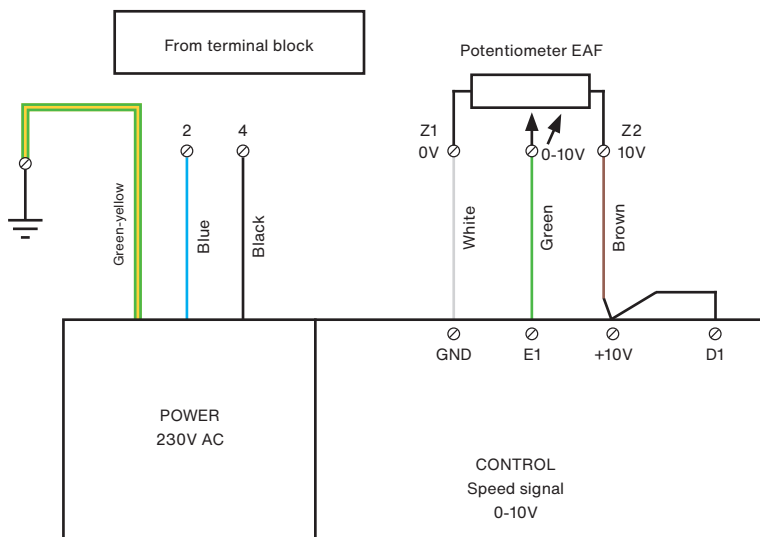


Extract



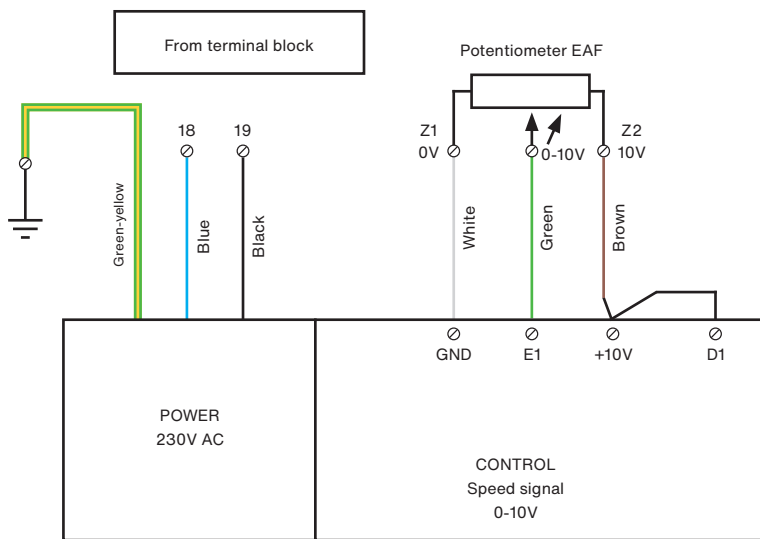
Zehnder Carma 9010-9016 motors

Supply



Supply air fan (SAF)

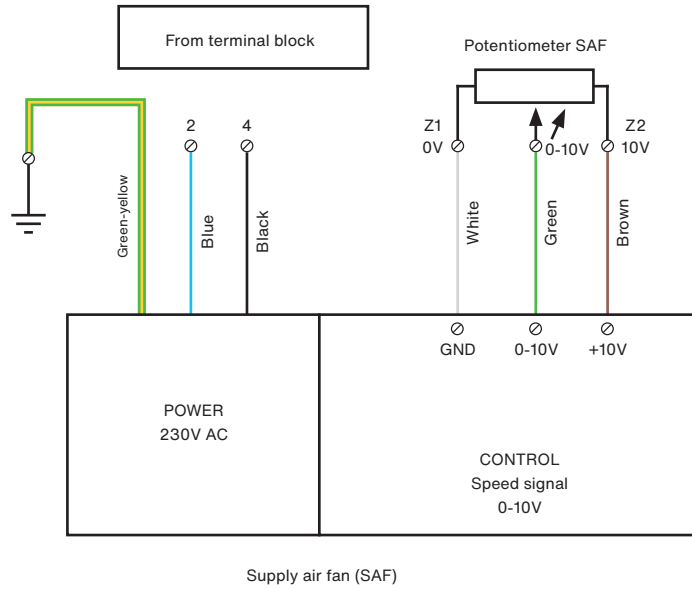
Extract



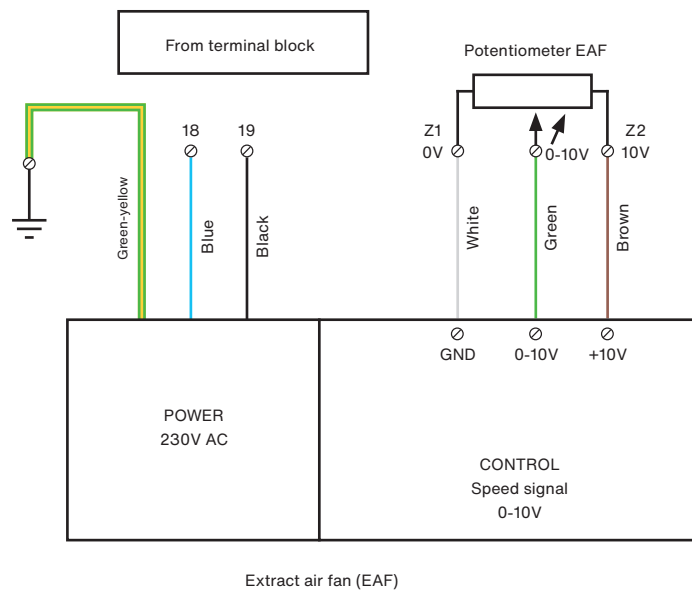
Extract air fan (EAF)

Zehnder Carma 9023 motors

Supply

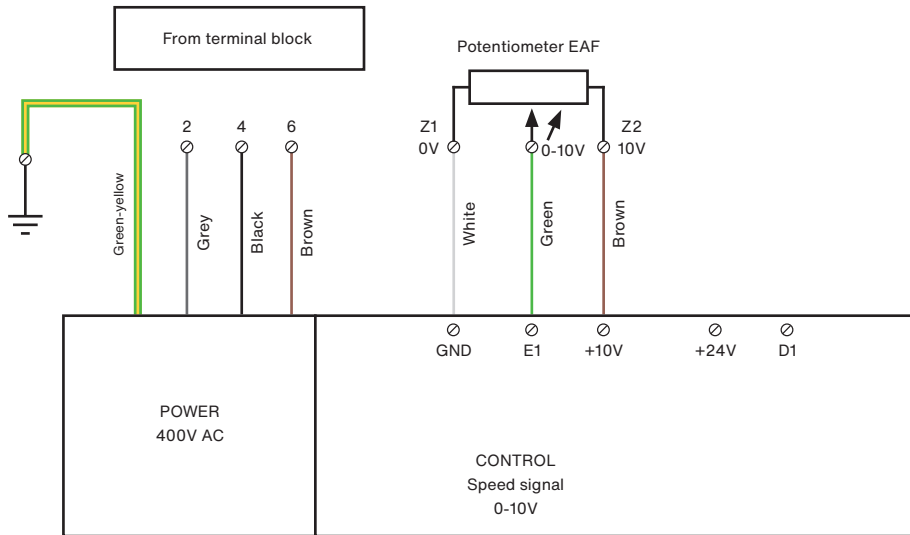


Extract



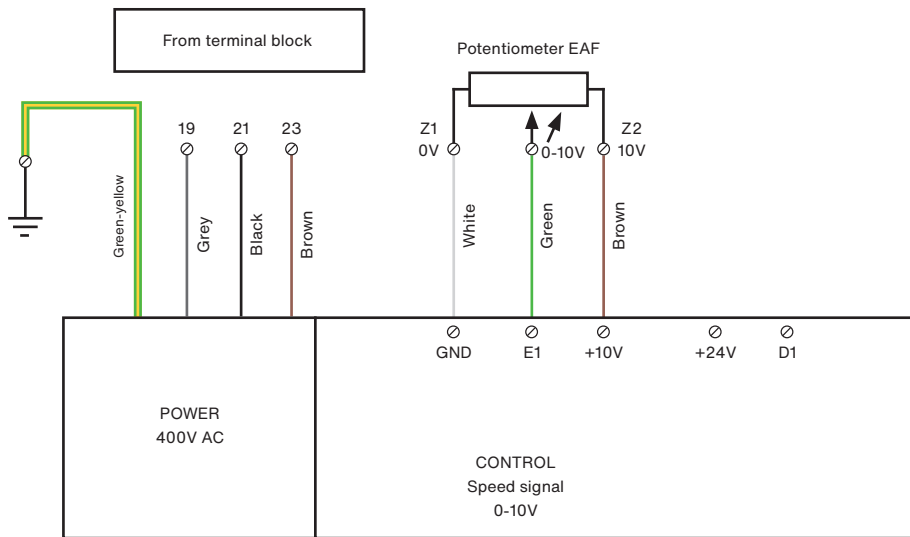
Zehnder Carma 9035-9048 motors

Supply



Supply air fan (SAF)

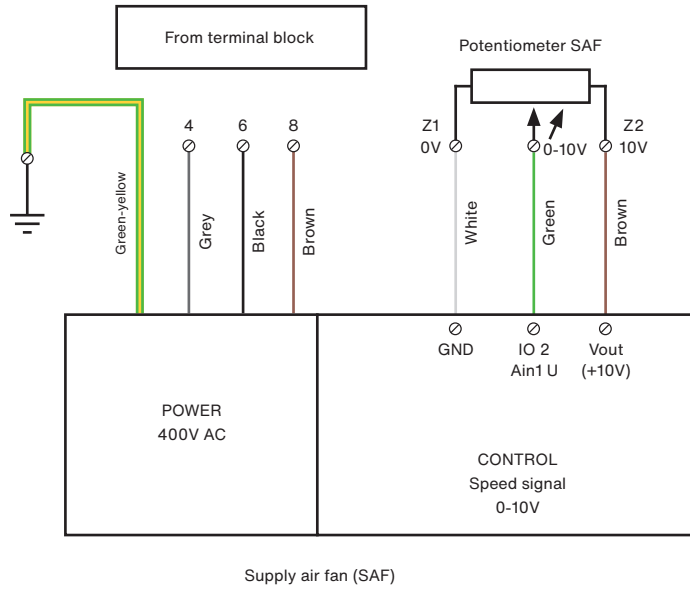
Extract



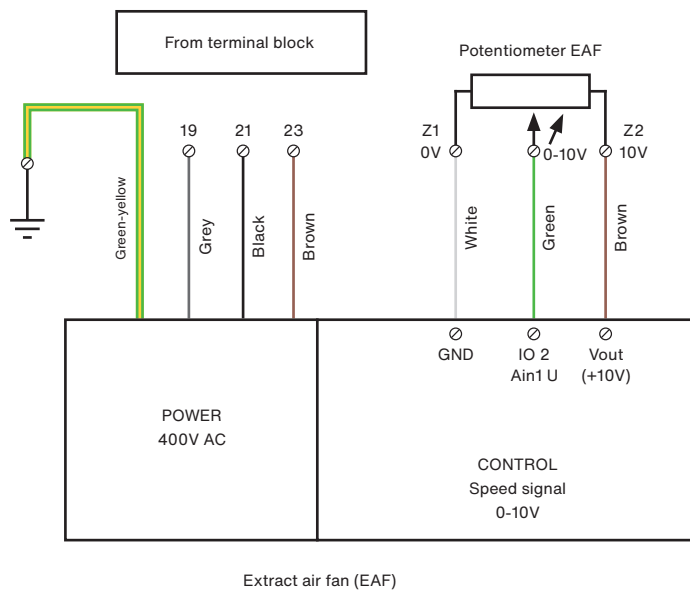
Extract air fan (EAF)

Zehnder Carma 9070 motors

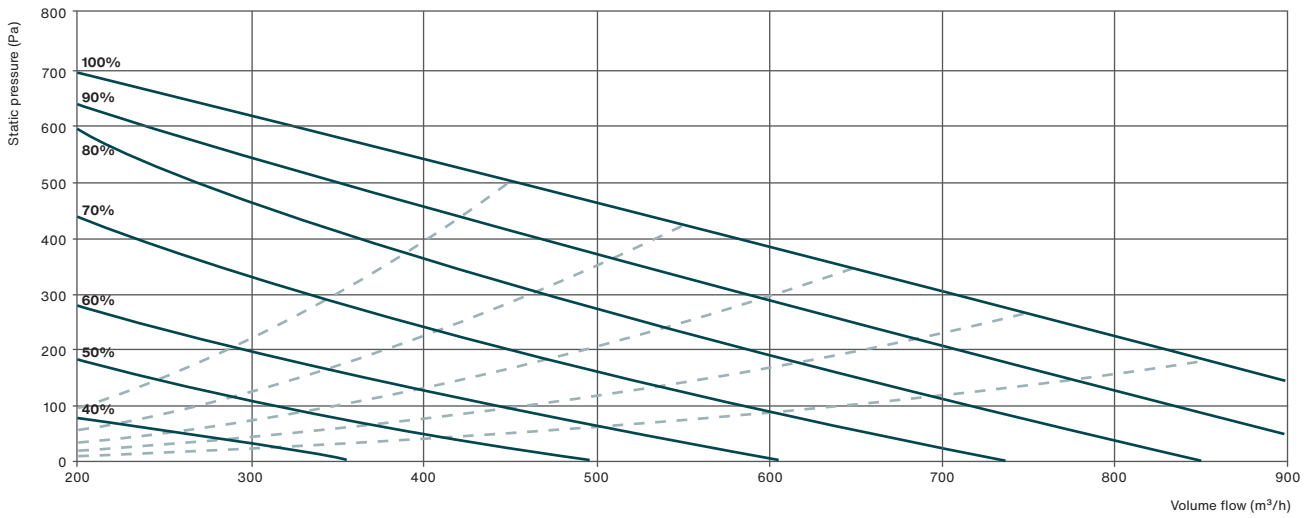
Supply



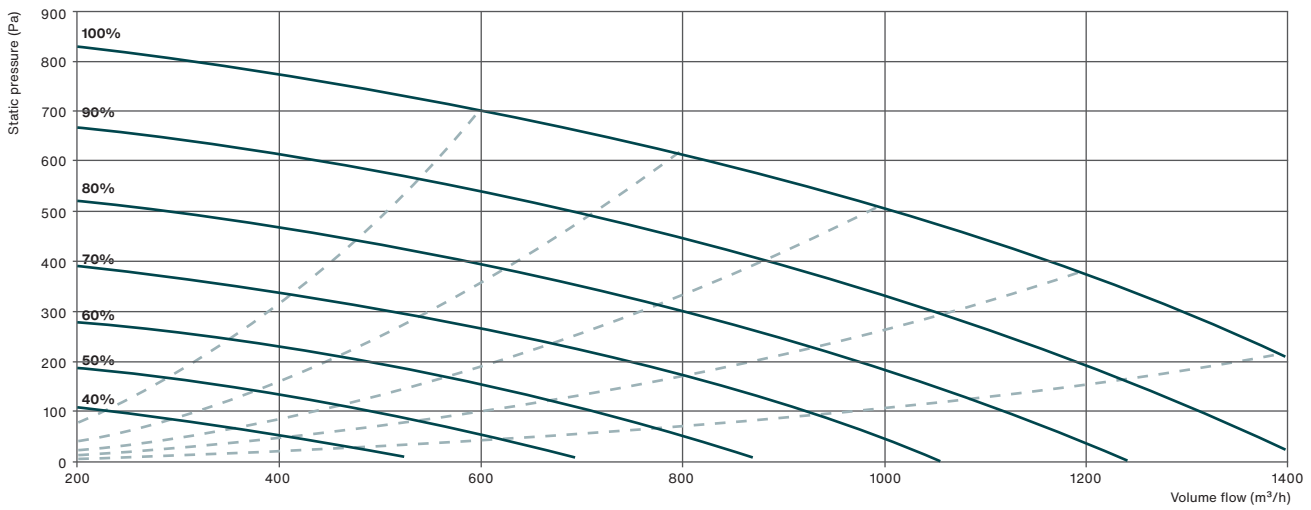
Extract



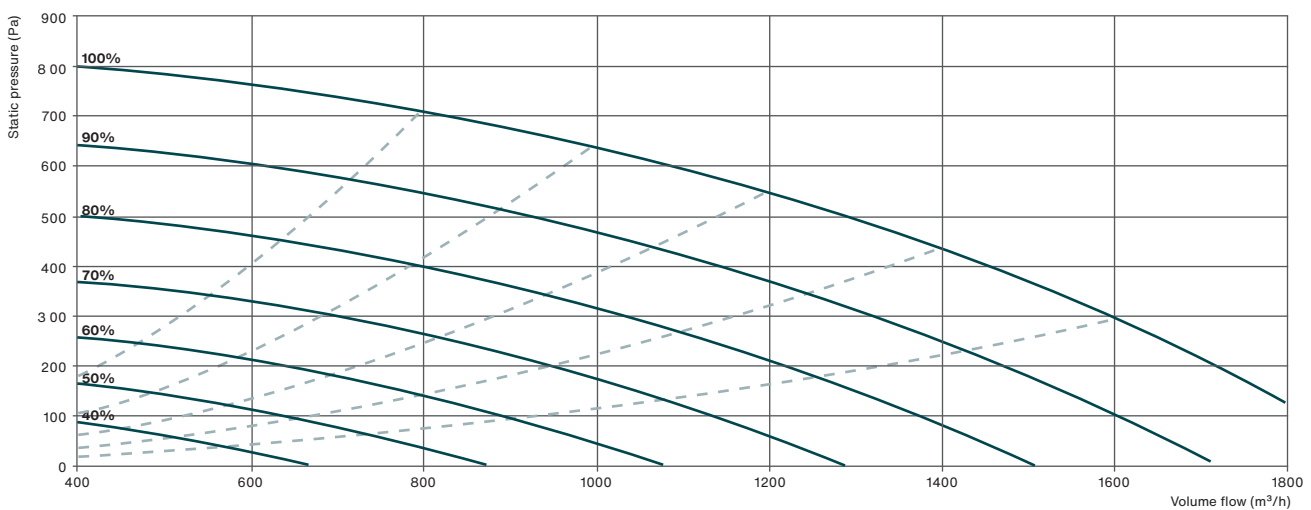
21. Air performance curves Zehnder Carma 9008 / 308



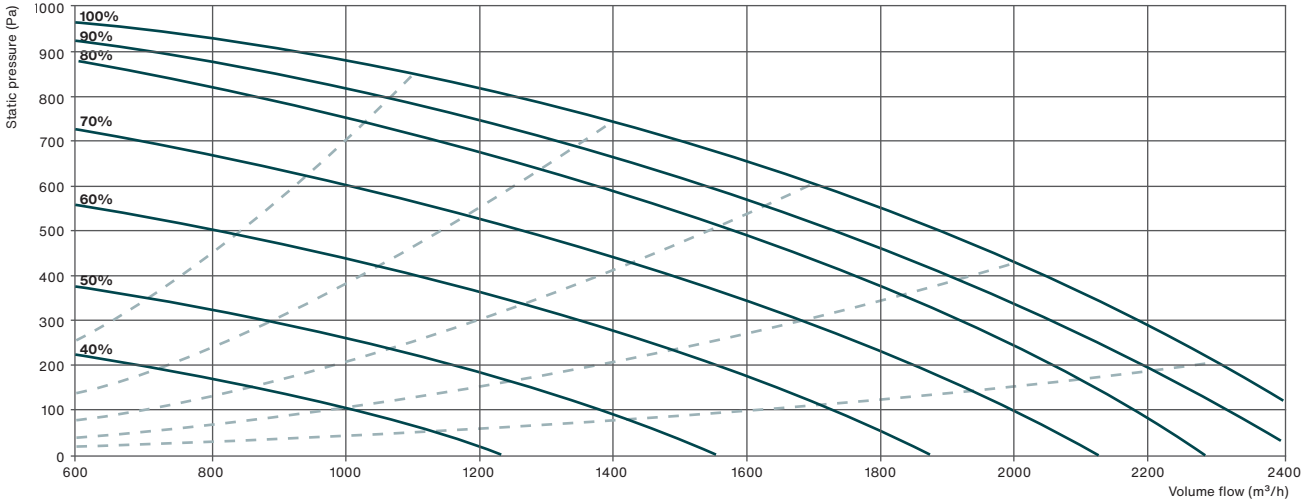
Zehnder Carma 9010 / 310



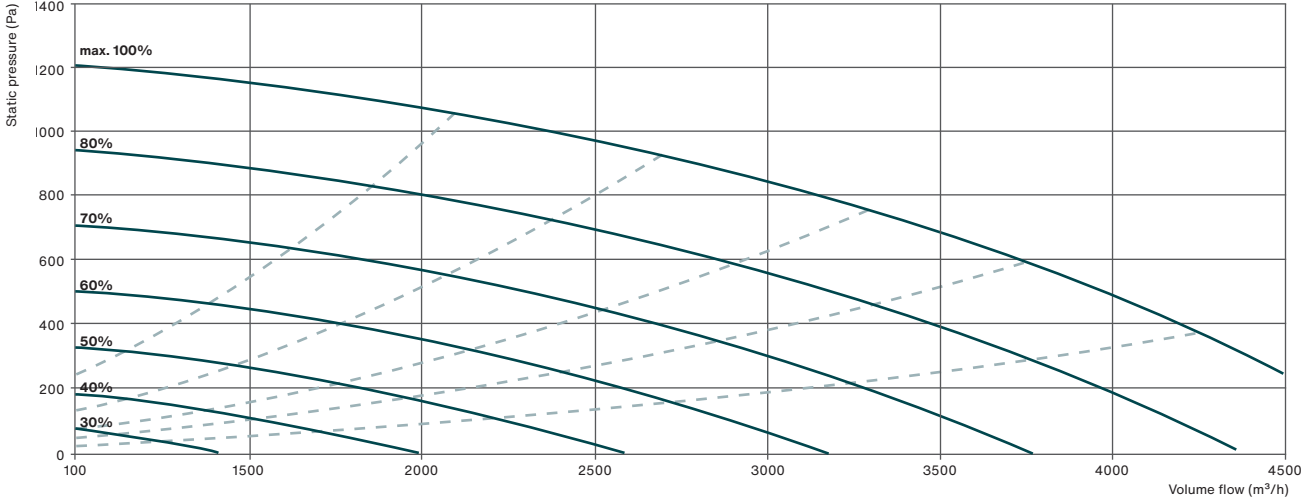
Zehnder Carma 9016 / 316



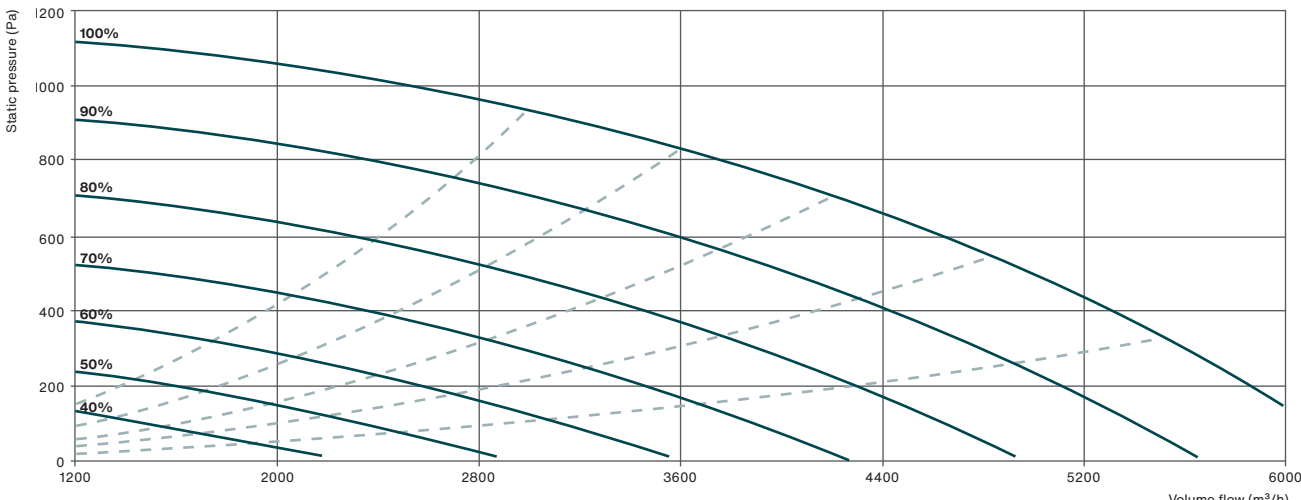
Zehnder Carma 9023 / 323



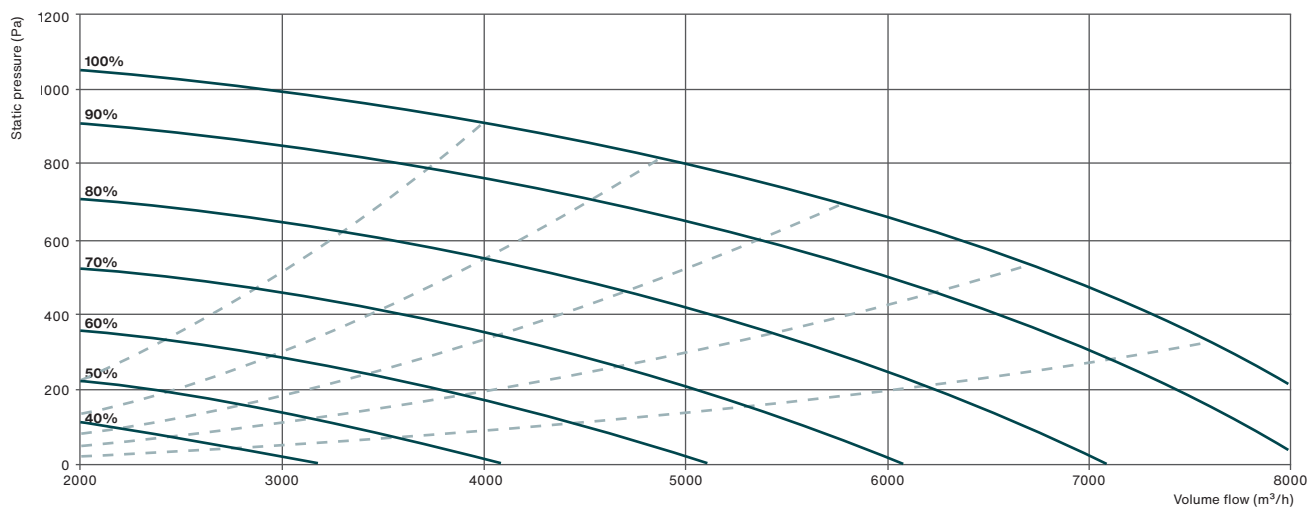
Zehnder Carma 9035 / 335



Zehnder Carma 9048 / 348



Zehnder Neotime 9070 / 370

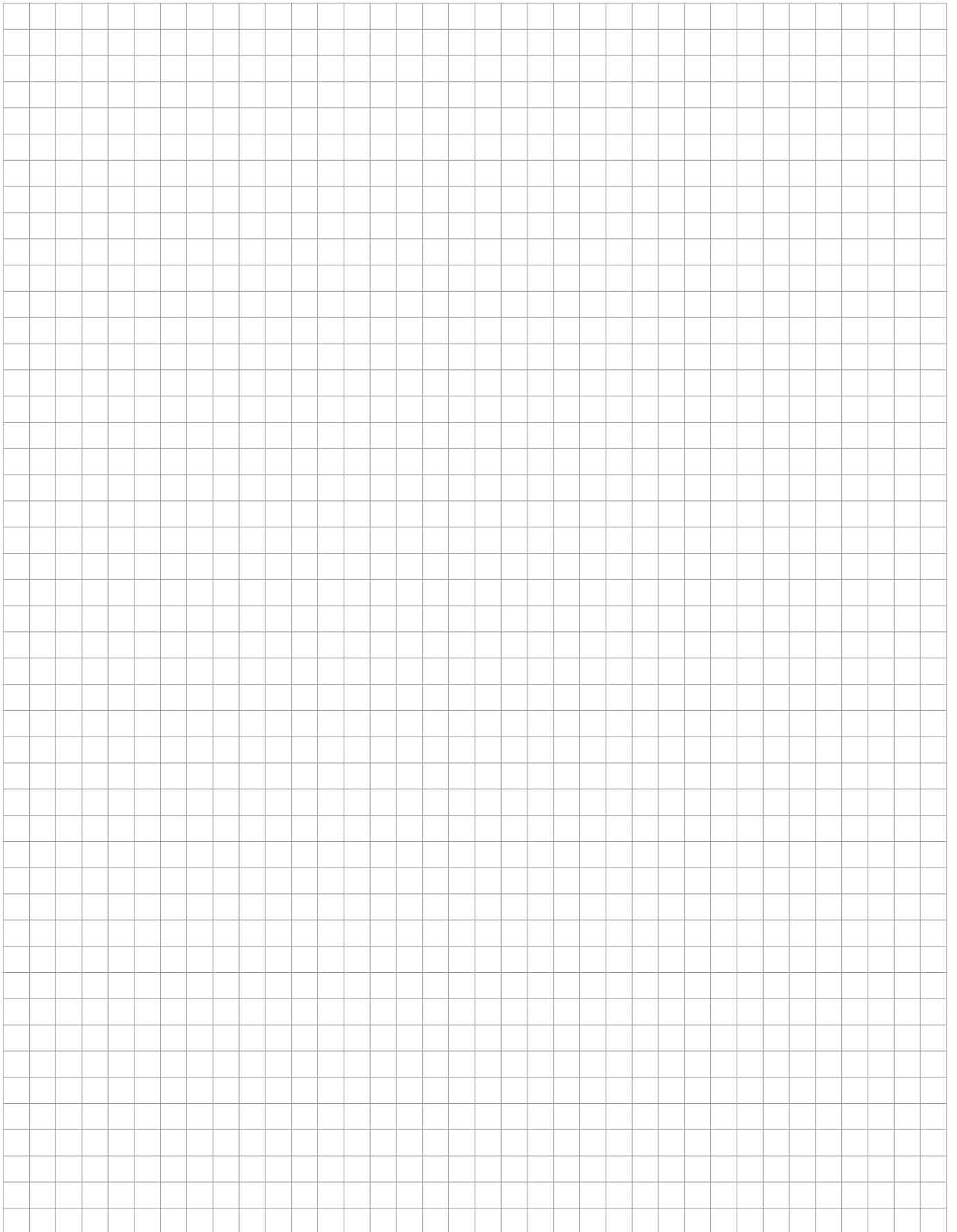


22. Commissioning report

Site			
Address			
Date/...../.....	Technician / company	
Installation	Exterior (roof)		
	Interior (equipment room)		
Material reference			
Manufacturing number			
Version	FIRST / SMART / PREMIUM BE / BREMIUM BC / INFINITE BE / INFINITE BC		
	ECO / LOBBY / MAC2 / DIVA / QUATTRO		
Supply voltage V AC		
Temperature control mode	Constant supply temperature		
	Constant extract temperature		
	Supply air temperature law		
	Extract air temperature law		
Temperature setpoint			
Ventilation setpoints	Supply	Reduced operation: % / Pa / m ³ /h	Reduced operation: % / Pa / m ³ /h
	Extract	Reduced operation: % / Pa / m ³ /h	Reduced operation: % / Pa / m ³ /h
CO₂ setpoints (DIVA / QUATTRO)	Reduced operation: ppm		Reduced operation: ppm

Date	Person involved	Observations

Notes



Notes



Mâcon Loché, on 29 August 2022

Ref: EU

EU-Declaration of conformity

We declare under our sole responsibility that the products

- ECOVOR™ - ECOBLUE™ - ECONIZER™- NOE™ - NOE LOBBY™
- MINIMAX™ - MINIBLUE™ - MINIBLUE LOBBY™ - MAXIPLUS™ - CITYCOOL™
- COMBIBOX CONCEPT™ - CMH - EVENTYS™
- Zehnder Carma™ - NEOTIME™ - FREETIME™ - EXAECO™- HEXAMOTION™- SILVERTOP™ - EVERSKEY™
- ELECTROPACK™ - AQUAPACK™ - LOBBY™ - SYSTEM TOP™ - SYSTEM DIV™ - WONDEROOM™
- CVFMI - CVFTI - CVFM - CVFT
- REFLEX™ - DIABLO™ - PYROSTAR™ - CDF
- EVERKIT™
- THERMOVER™

satisfy the provisions of the following applicable Directives and harmonised standards:

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2014/35/EU
- EMC Directive - Electromagnetic Compatibility Directive 2014/30/EU
- RoHS II Directive - Directives on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2011/65/EU and 2015/863/EU
- ErP Directive 2009/125/EC

Furthermore, for the products

COMBIBOX CONCEPT™ - CMH - Zehnder Carma™ - EXAECO™ - EVENTYS™ - FREETIME™ - NEOTIME™
- HEXAMOTION™ - SILVERTOP™ - THERMOVER™ - EVERKIT™ (Dual flow unit section)

the following standards and specifications were applied:

- EN 1886: 2008 - Ventilation for buildings. Air handling units.
Mechanical performance
- EN 13053+A1: 2011 - Ventilation for buildings. Air handling units.
Rating and performance for units, components and sections.
This declaration is valid only for products installed according to the supplied instructions and
having undergone no modification.

A handwritten signature in black ink, appearing to read "Hervé Nuzzo", with a large, sweeping initial stroke.

Hervé Nuzzo,
President

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