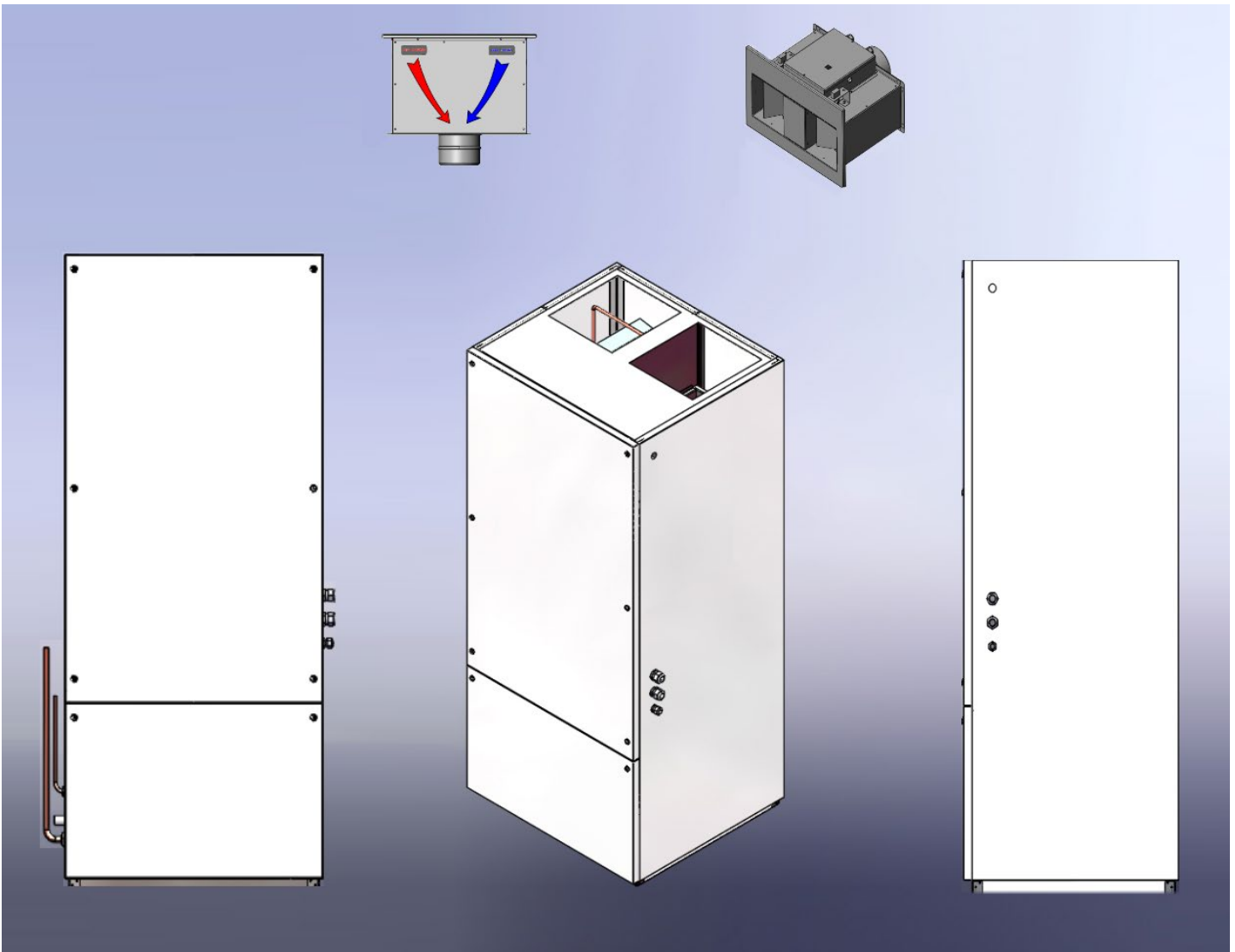


INSTALLATION MANUAL HAC

HAC SYSTEM



For more information, please visit our website: www.calorek.com

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-
- Before installing or using this product, you must read and understand these guidelines and keep them for future reference. The manufacturer will not be held responsible for anything that happens and the warranty will not be valid if the installer and/or the user does not meet these guidelines. This product must be installed by a qualified person and connected by a certified electrician in accordance with the different codes in force in your area.
 - The non-compliance of these guidelines could result in personal injury, property damage, serious injury and electric shocks potentially fatal.
 - Make sure that all screws and connections of electrical connection are tight before attempting to operate the device in the case they are released during transport.
 - Protect the device using the circuit breakers or fuses appropriate in referring to the codes in force in your area.
 - It is necessary to install an air filter in the return duct.
 - Make sure that the power supply (voltage) corresponds to that indicated on the rating plate.
 - This appliance must be grounded.
 - Turn off the power supply to the appliance at the circuit breaker/fuse before proceeding with the installation, repair and cleaning.
 - Make sure that the appliance is designed for the intended use (if necessary, consult the catalog of products or a representative).
 - Observe the distances and the positions mentioned in the installation section of this guide.
 - If the installer or user modified the device in any way, it will be held liable for any damages resulting from this change and the UL certification and warranty will be canceled.
 - This device must not come into contact with a source of water and must be protected from splashing (ex.: water mop). Do not use if any part has been submerged. In addition, do not enable or do not disable when your feet are in the water or you have wet hands.
 - When you cut a section of steel for the installation of the return duct, make sure that you do not damage the electrical wiring of the unit.
 - Do not insert foreign objects into the air inlets and outlets of the appliance, as this could damage it and cause an electric shock or a fire.
 - The machine can produce electrical arcs (sparks). It is not designed to be used or stored in damp areas or containing flammable liquids, combustible materials and corrosive products, abrasives, chemical or explosives such as, but not limited to, paint, gasoline, chlorine, and cleaning products.
 - Some places are dustier than others. It is therefore the responsibility of the user to evaluate whether it should change the filter according to the quantity of dirt accumulated on the latter.
 - There is a risk of fire if the product is not installed and cleaned in accordance with these guidelines.
 - If this device is damaged or defective, cut its electric power supply to the circuit breaker/fuse and do the repair in a repair center recognized (refer previously under the terms of the limited warranty).
 - Identify all wires before disconnecting the device to ensure you to connect correctly by the suite. A bad connection can cause a malfunction and present a danger.

1 SPECIFICATIONS

Heat pump air handling unit HAC36

MODEL	RATED CAPACITY	VOLT	AMP 208/240Vac	COMPRESSOR	H (in)	W (in)	L (in)	Weight (lb)
HAC36	36 000 btu/hr	208 /240Vac	14/14	Rotary, Inverter	66	29	26	380
Liquid LS		Vapor LS						
3/8 OD		5/8 OD						

Heat pump outdoor unit UEE36

MODEL	RATED CAPACITY	VOLT	AMP 208/240Vac	FAN	H (in)	W(in)	L (in)	Weight (lb)
UEE36	36 000 btu/hr	208 /240Vac	2/2	BLDC Variable speed	31	15- 1/4	39- 1/2	92

Air handling unit electric heater

MODEL	WATT	VOLT	AMP 208/240Vac	H (in)	W (in)	L (in)	Weight (lb)
CSE10	10 000	208/240Vac	36/42	9-1/2	12-1/2	23-1/8	15.5
CSE15	15 000	208/240Vac	54/63	9-1/2	12-1/2	23-1/8	15.5
CSE18	18 000	208/240Vac	65/75	9-1/2	12-1/2	23-1/8	15.5
CSE20	20 000	208/240Vac	72.5/83	9-1/2	12-1/2	23-1/8	15.6
CSE23	23 000	208/240Vac	83/96	9-1/2	12-1/2	23-1/8	15.7

Air handling unit modulating ventilator

PART #	CFM MAX	VOLT	AMP 208/240Vac	HP
ECM MOTOR				
123-00001-000-00	1400@0.5" H ₂ O	120/208/240ac	4.2/3.9	1/2
MOTOR BRACKET				
125-00005-000-00				
HOUSING				
125-00004-000-00				

Air distribution modules ZoneMax HAC

MODEL	NUMBER OF DAMPERS	VOLT	AMP	ACTUATOR	H (in)	W (in)	L (in)	Weight (lb)
ZM-HAC1-4-B	2	24ac	1	24Vac, 3 positions	13	15	9	9

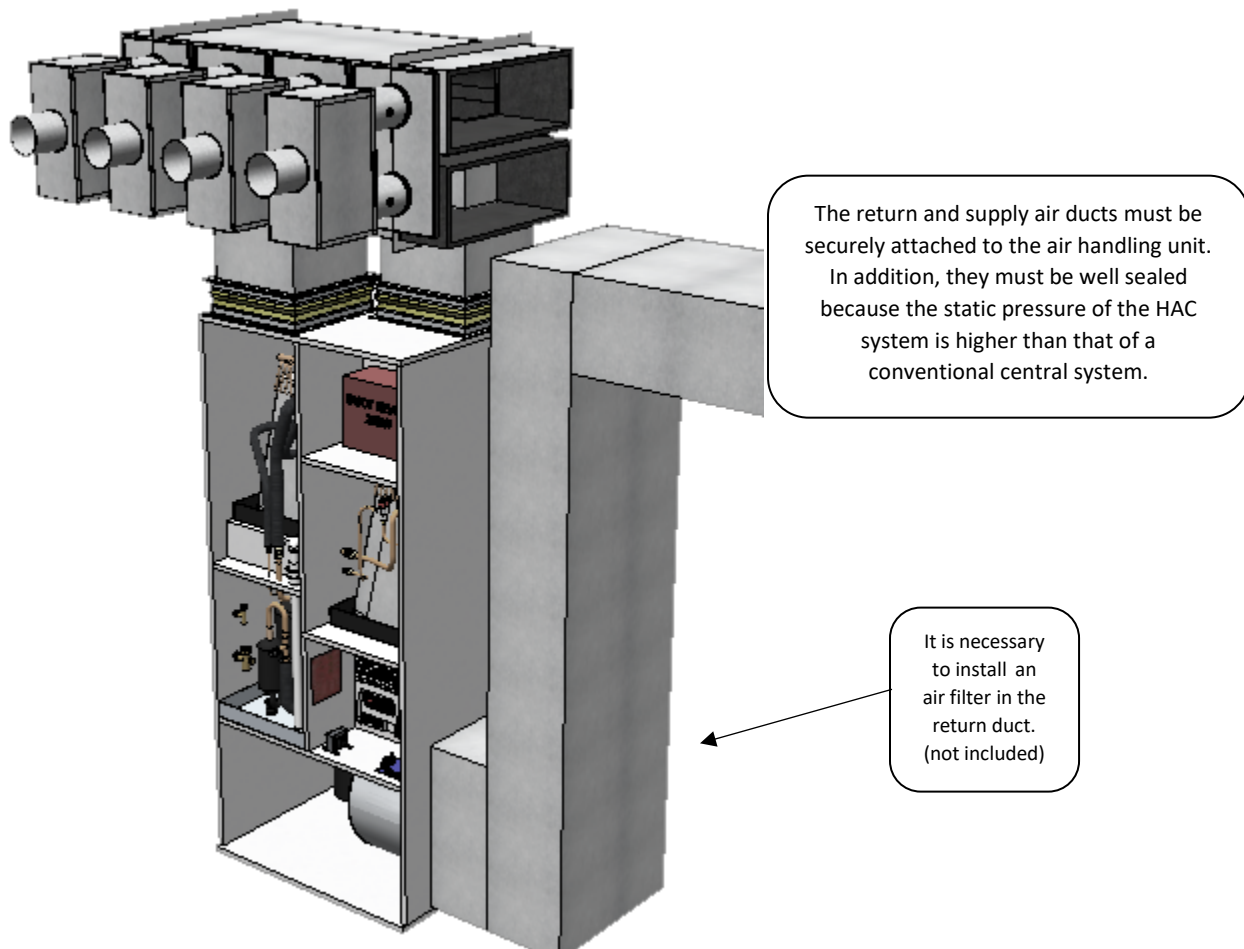
2 EQUIPEMENT INSTALLATION

2.1. Installation of the air handling unit

The HAC system consists of three parts

- Air handling unit
- Heat pump outdoor unit
- Zone air distribution modules

The air handling unit consists of a variable speed fan, the unique heat pump that makes air conditioning and heating simultaneously, and an optional electric or hot water heater.



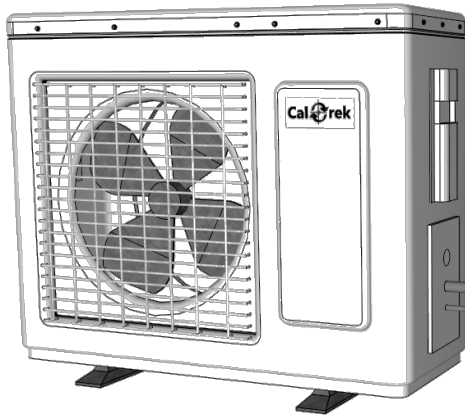
IMPORTANT: THE LOCATION AT WHICH THE CENTRAL AIR WILL BE INSTALLED MUST BE CHOSEN TO LEAVE A CLEARANCE OF AT LEAST 24IN ALL AROUND. THIS CLEARANCE WILL ALLOW THE ACCESS TO THE COMPONENTS OF THE EQUIPMENT AND THEIR MAINTENANCE.

IMPORTANT: THE HEAT PUMP CABINET MUST BE POSITIONED VERTICALLY.



ATTENTION: The connections of the refrigeration circuit must be carried out by a qualified refrigeration engineer and according to the rules of the profession.

2.2. Connecting the refrigeration circuit of the outdoor unit (UEE)

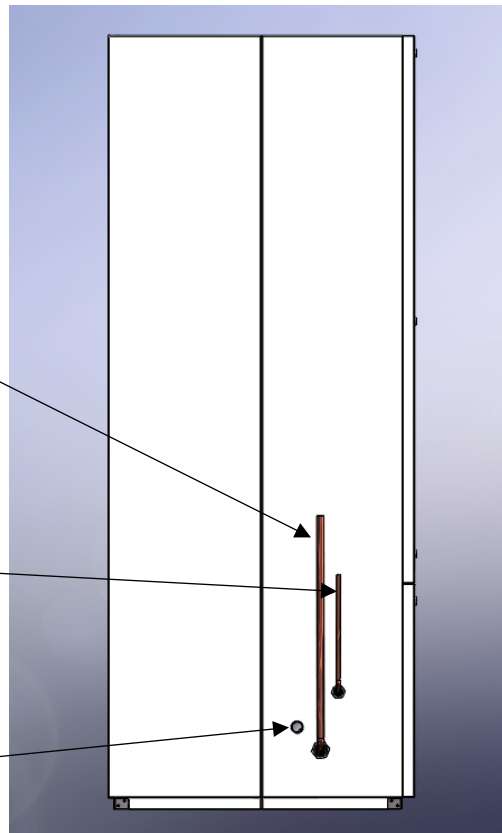


The outdoor unit must be installed on a suitable wall support or floor support.

Service valves are installed, and the tubing is connected with a "Flare" connection.

Screw the flare connections of the outdoor unit firmly and proceed to the connections of HAC unit.

2.3. Connecting the refrigeration circuit of the HAC unit



5/8 tube (vapor side) to be connected with a brazed coupling

3/8 tube (liquid side) to be connected with a brazed coupling

3/4 PVC drain pipe

The HAC unit contains the R410a refrigerant needed for proper operation up to 25 feet of line.

*** Add 0.38 ounces for each additional foot or remove 0.38 ounce every less feet.

The service valves, ball valve type with built-in access port for recovery and / or charging are installed. When brazing to connect the tubing to the HAC unit liquid and vapor lines, the use of nitrogen is recommended. To do this, insert the nitrogen supply pipe into the liquid access valve located on the ball valve of the HAC unit, make sure to firmly screw the two-flare connection at the outdoor unit and leave the access valve open on the outdoor unit. Thus, the nitrogen can circulate freely in the outdoor unit and in the 5/8 line (vapor) and will ensure the cleanliness of the inner face of your brazed joints.

To evacuate, connect the vacuum pump to the liquid (3/8 line) service valve on the HAC unit, same as to charge with new refrigerant.

2.4. Installation of air distribution modules ZoneMax

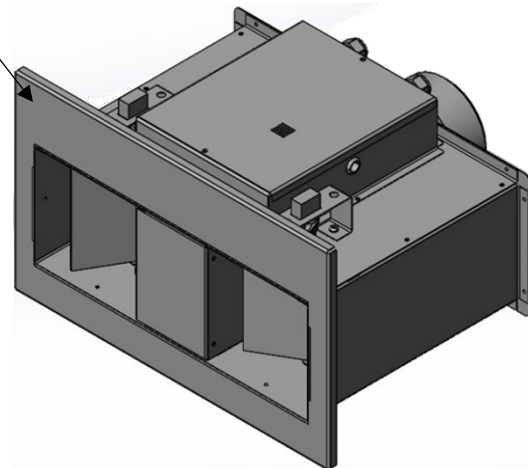
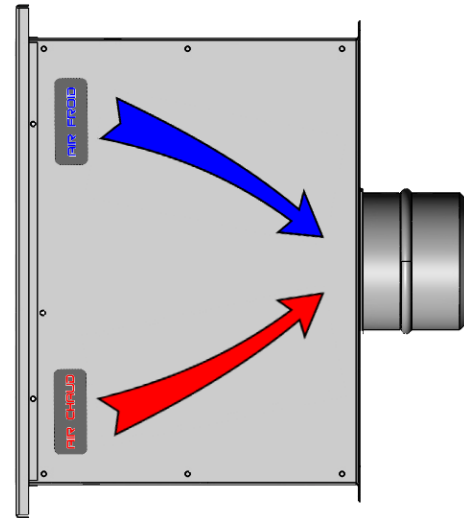
Air distribution module ZoneMax HAC

The air distribution module must first be attached to a dual duct system. The warm side port on the air distribution module must be placed on the warm side of the dual duct system. As well as the cold side port on the air distribution module must be placed on the cold side of the double duct system.

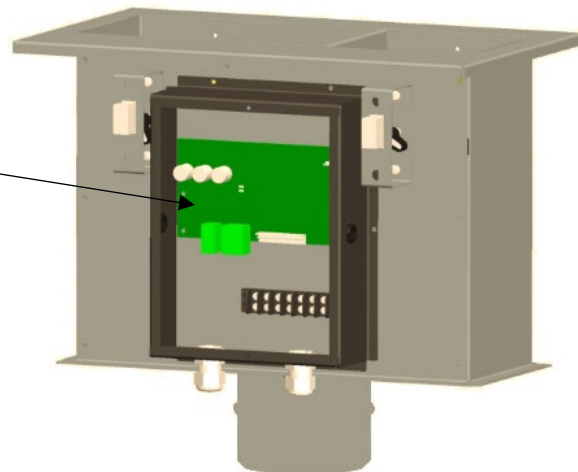
The module must be fixed to the double duct system with the help of self-drilling screws or rivet on the flanges of the air distribution module.

It is highly recommended to use insulated ducts for the entire supply circuit from the air handling unit to all terminations. There are two advantages to applying this practice:

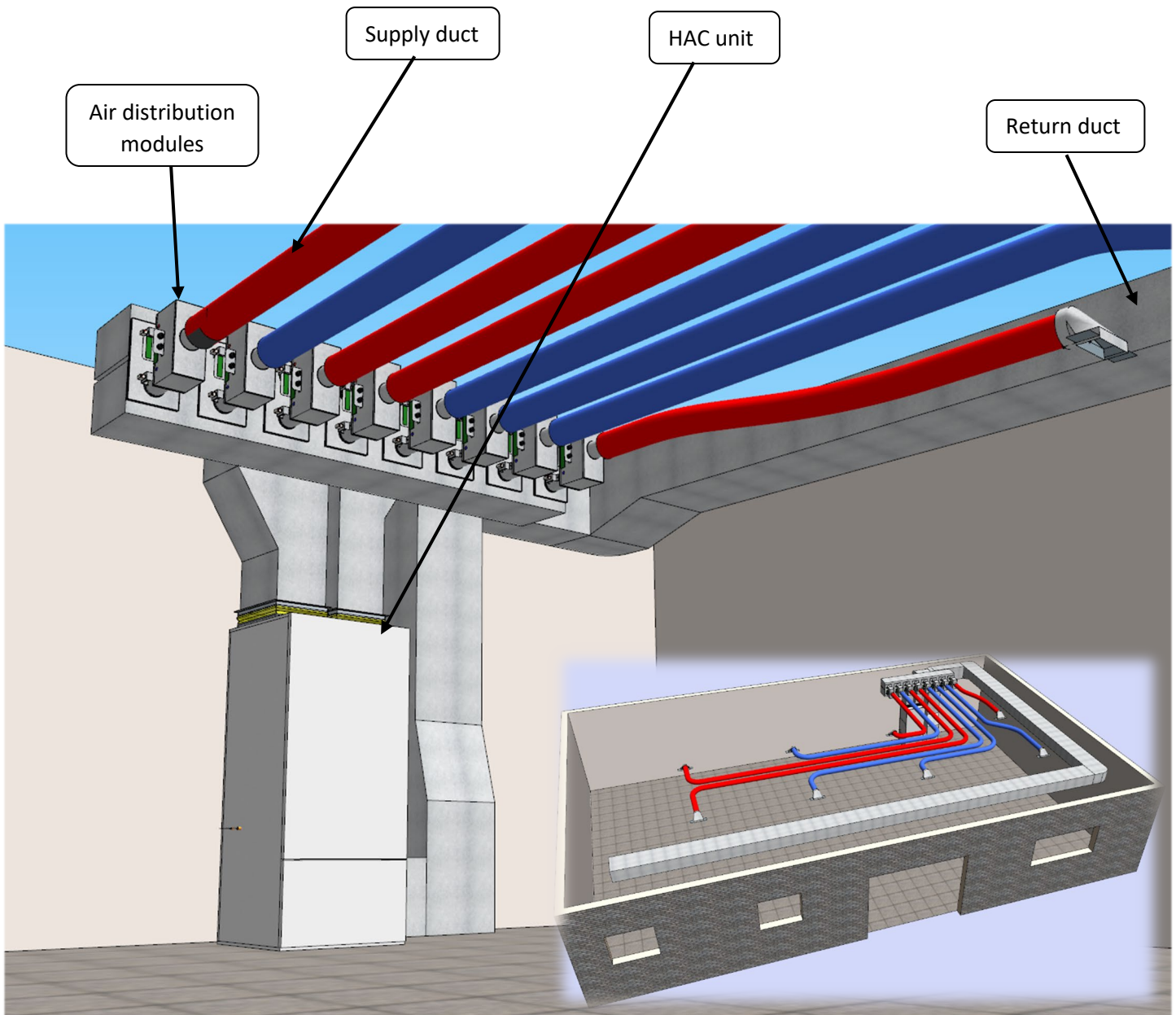
- 1- Avoid condensing ducts during air conditioning.
- 2- Limit thermal losses to serve areas in demand with more efficient heating or cooling.



Each air distribution module is controlled by an electronic card that receives the commands from the thermostats. The thermostats inputs can be integrated with your own choice of thermostat "with wire", or a wireless thermostat which is provided by Calorek (in option). More detail is provided in section *****



2.5. Example of an 8-zones installation

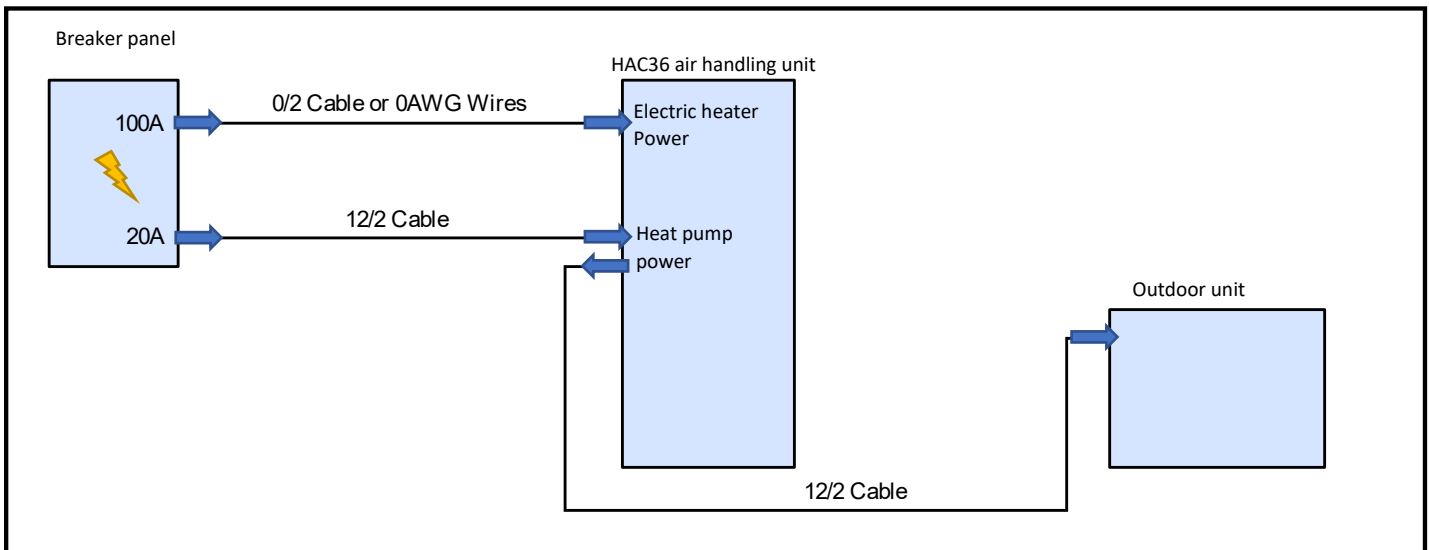


Each distribution module is connected to its own thermostat and can supply warm air or cool air at anytime. A single thermostat can be connected to multiple distribution modules in order to have more air flowing to a large room.

3 ELECTRICAL CONNECTIONS

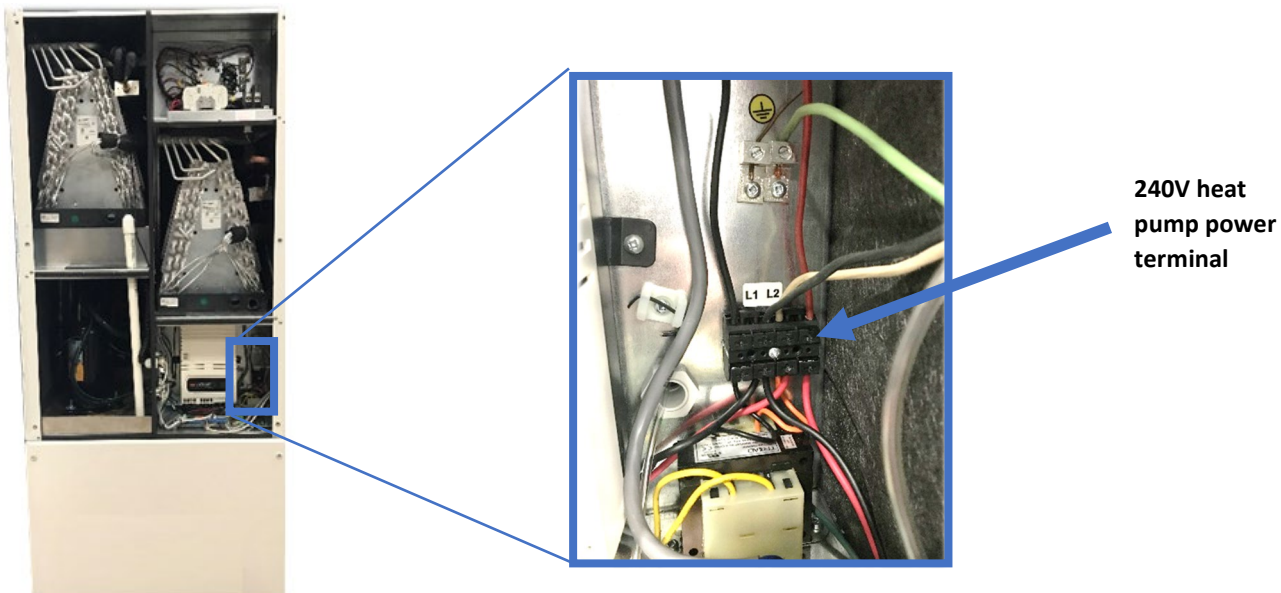
3.1. 240Vac Electrical connections

The HAC system operates at a supply voltage of 208-240Vac. Two power sources are required if an electric coil is installed in the heat pump. See the diagram below.



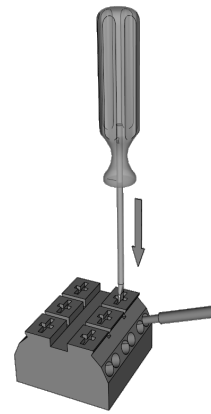
3.1.1. Heat pump 240Vac electrical connections

The HAC heat pump must be powered by a 208-240Vac power source. The power source for the heat pump must be protected by a 20A circuit breaker located in the building breaker panel. It is necessary to use a copper 12AWG cable to connect the power to the heat pump. The outdoor unit is powered by the same source as the air handling unit. A power terminal block in the air handling unit connects the power source of the outdoor unit.



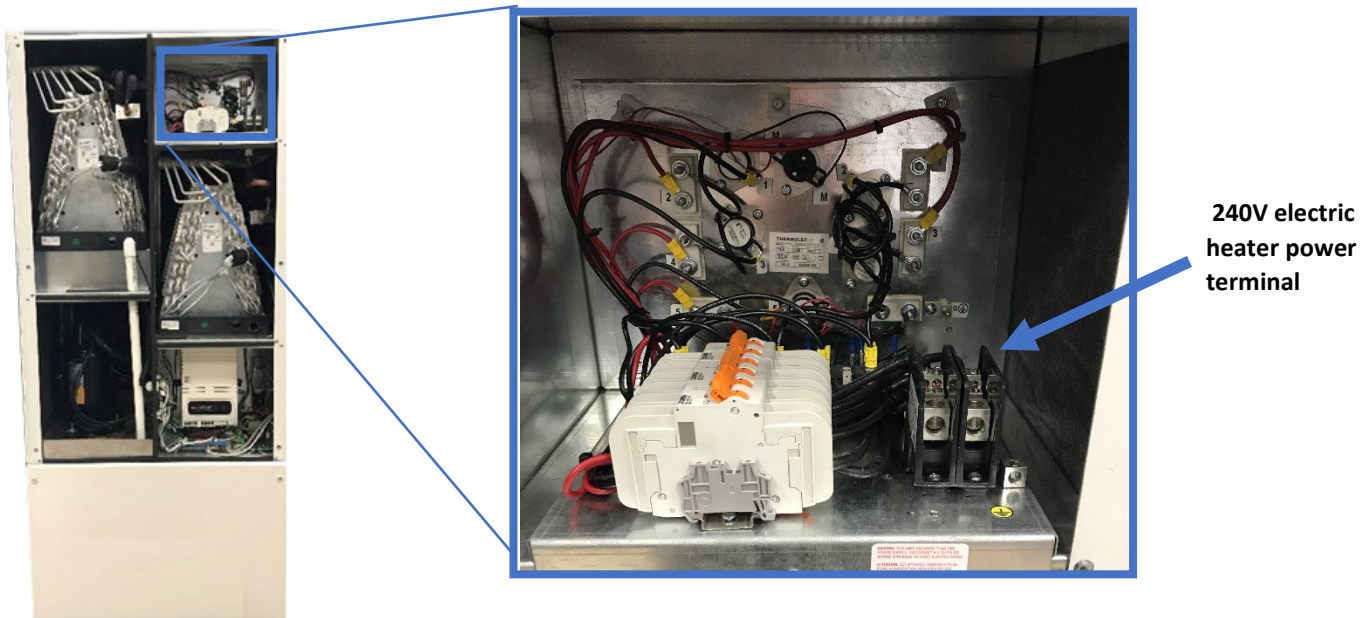
To connect the wires to the terminal block, push the buttons on each terminal with a flat screwdriver and insert the wires. Push the wires to the bottom of the terminals to ensure a reliable connection. The proper strip length is mark on the side of the terminal (11mm)

See the image on the right.



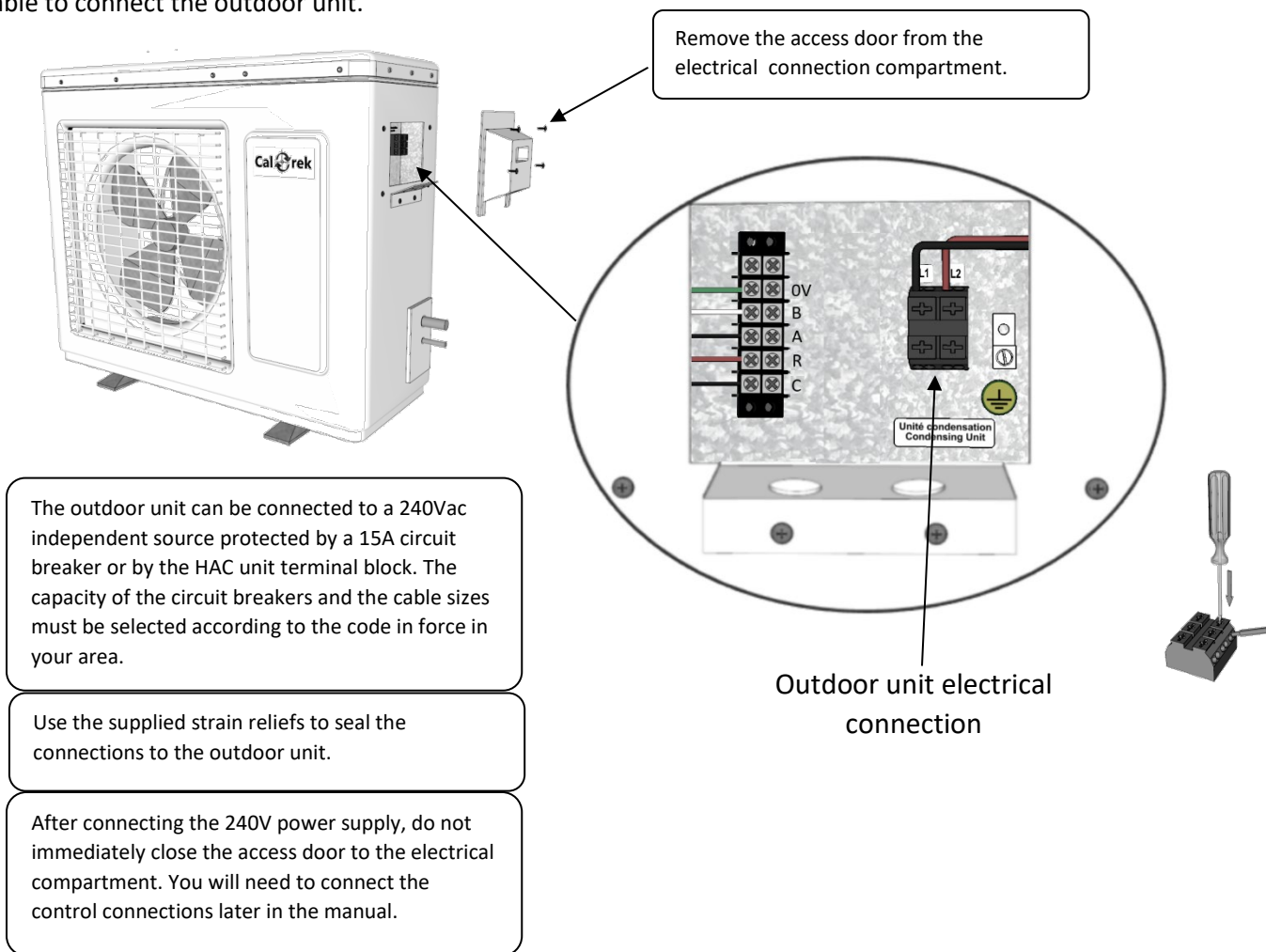
3.1.2. Electric heater 240Vac electrical connections

If the heat pump is equipped with an electric heater, it must be connected separately with a cable or wire of sufficient size and protected by a circuit breaker of sufficient capacity for the consumption of the heater.



3.1.3. Outdoor unit 240Vac electrical connections

As explained above, the outdoor unit is powered from the power supply terminal block of the air handling unit. Use a 12/2 cable to connect the outdoor unit.



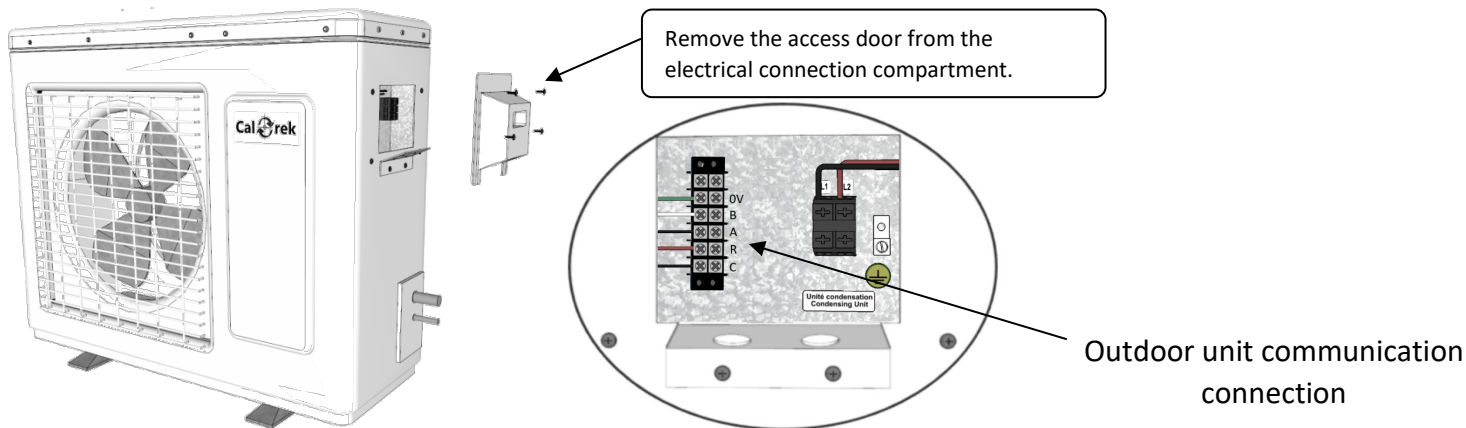
3.2. Connections of the communication network RS485 Modbus

The elements composing the HAC system communicate with each other via a RS485 Modbus communication network. They are therefore connected by 5-conductor cables; the first two wires conduct the 24Vac power supply and the other three conduct the RS485 Modbus communication. The elements connected to the communication network are the HAC air handling unit, the outdoor unit as well as the ZoneMax air distribution modules.

Rs485 Modbus Network is fairly simple. It consists in 3 wires; A, B and 0V that must be connected respectively from and to each network connected component in the HAC System. Also, each of the Modbus network connected component must be powered with 24Vac from the HAC air handling unit.

3.2.1. Outdoor unit communication connection

The outdoor unit (UEE36) must be connected to the RS485 Modbus network to receive the fan speed commands and to transmit the temperatures read in this unit. It must also receive a 24Vac power supply that goes through the same cable as the Modbus communication. A 5-conductor 18-22AWG thermostat cable is suggested for connection. The image below shows the terminal block of the 24Vac and Modbus power supply of the outdoor unit.

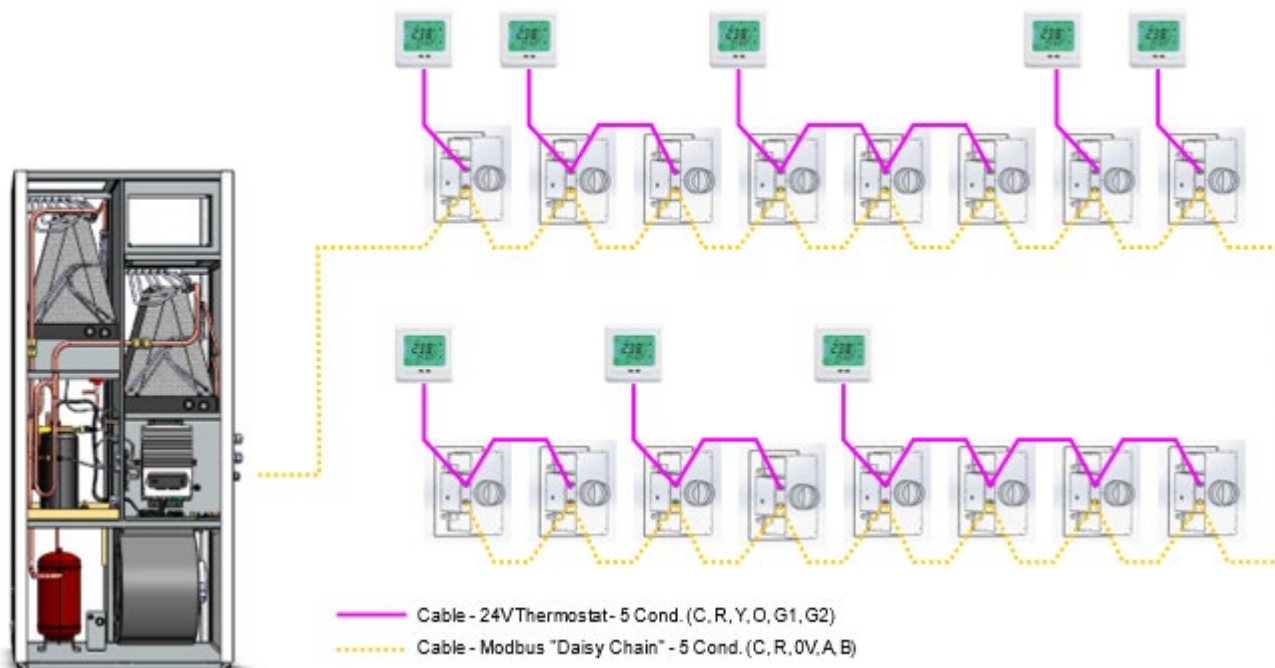


3.2.2. Communication and thermostat connections of the air distribution modules ZoneMax

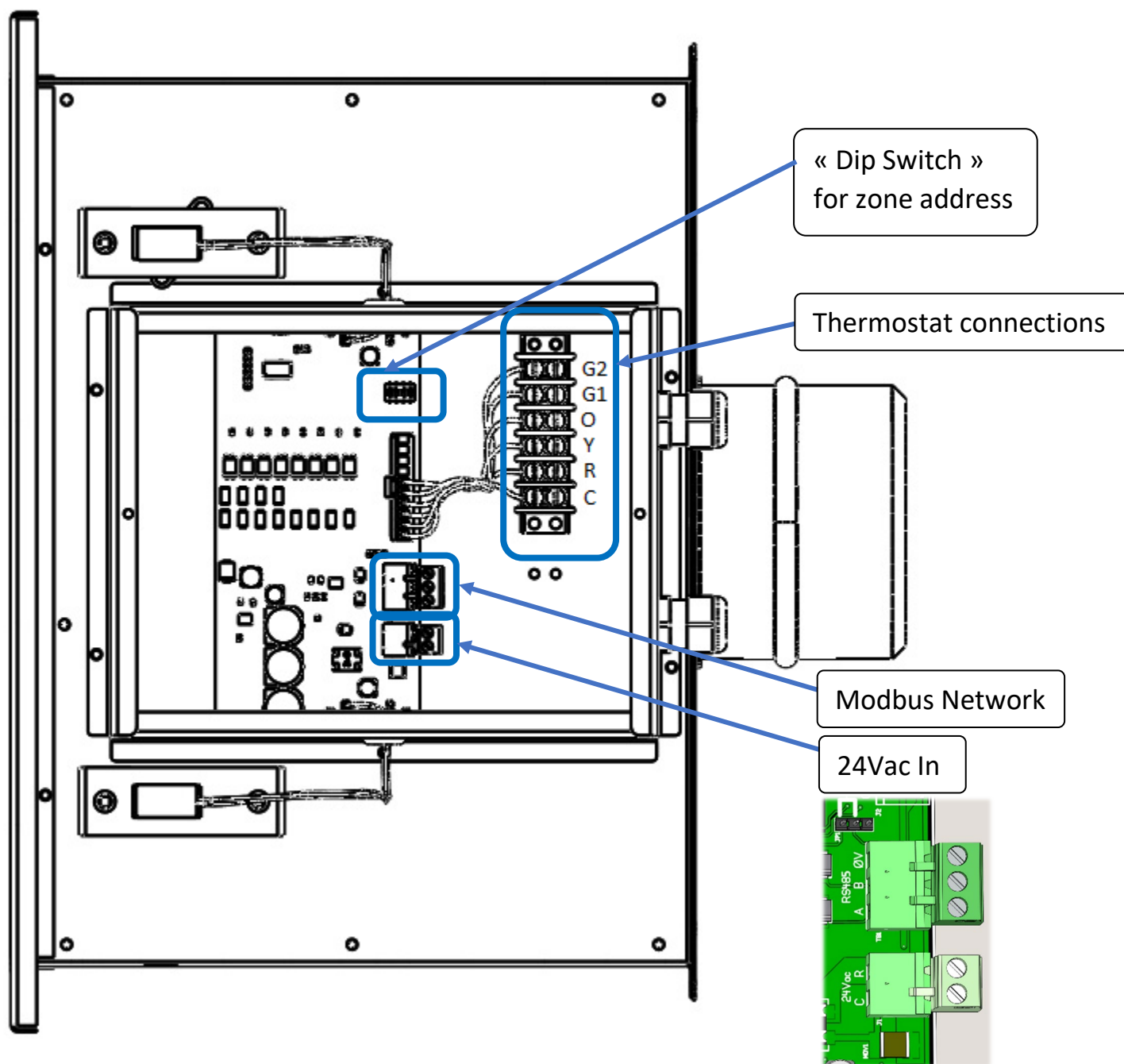
ZoneMax air distribution modules must be connected to the RS485 Modbus network to transmit requests from the thermostats to the air handling unit and to receive some commands from the air handling unit; like defrost cycle that asks for all dampers open regardless of the thermostats demands.

The HAC36 system can receive up to 16 air distribution modules and each of the modules is connected in a chain Modbus wise, the first link in the chain being the air handling unit.

See the image below showing the connection topology of the zone modules



As per the above schematic, each HAC Zonemax module must be connected to the Modbus network in a daisy chain manner but multiple modules can be connected to a single thermostat. For example, a large room asks for more airflow than a single module can deliver even with 6" duct. Then, more than one HAC Zonemax module can be connected to a single thermostat. See the following picture for detailed view of the connections on a single HAC Zonemax module.

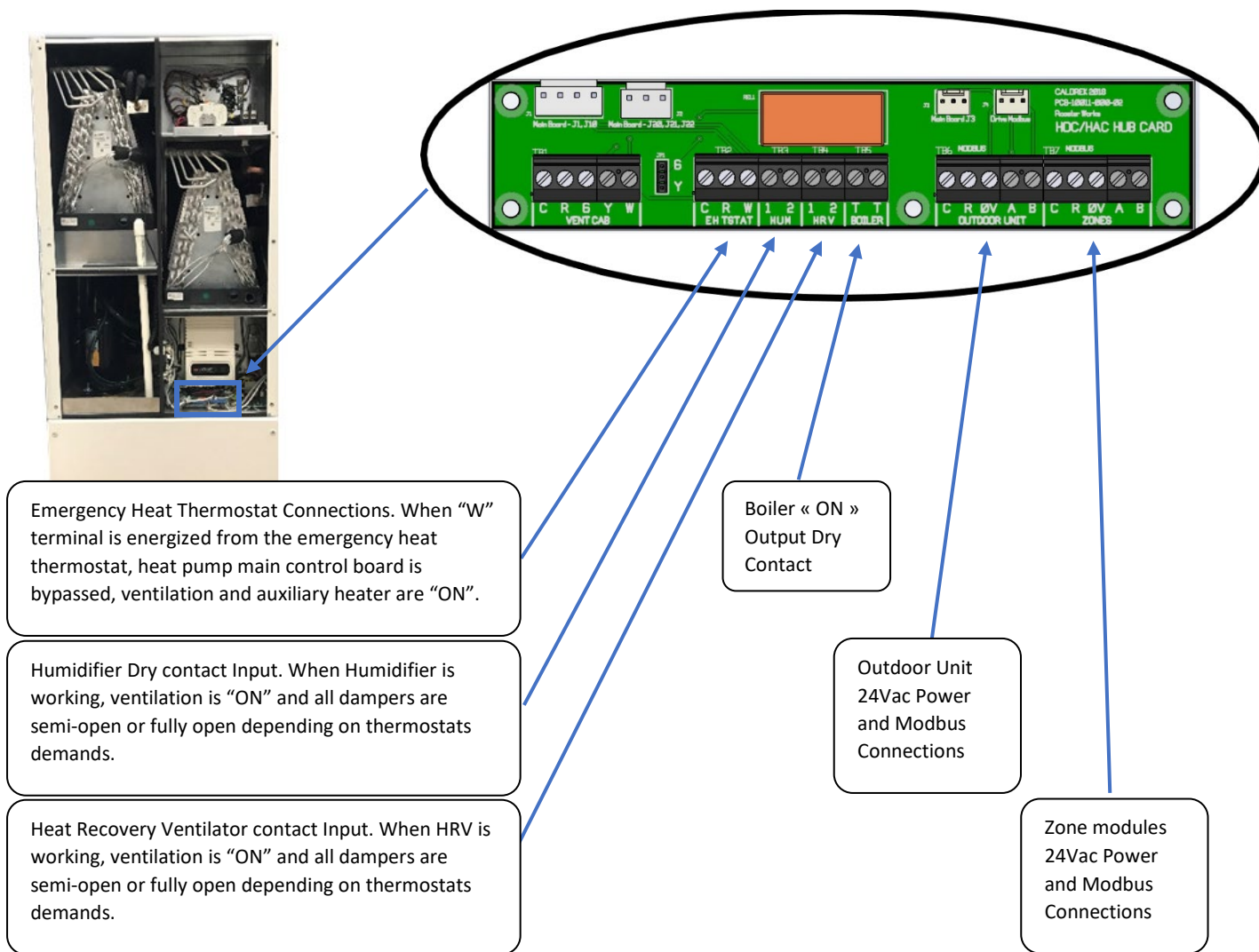


In addition, each zone module must have a different Modbus address that is located on the electronic board. This address is programmed using a "Dip Switch" of 4 circuits. See the following table for the "Dip Switch" position according to the addresses to be programmed

Codes DIP switches sur modules de distribution d'air ZoneMax		DIP switches codes on ZoneMax air distribution modules	
Adresse 0 Address 0		Adresse 8 Address 8	
Adresse 1 Address 1		Adresse 9 Address 9	
Adresse 2 Address 2		Adresse 10 Address 10	
Adresse 3 Address 3		Adresse 11 Address 11	
Adresse 4 Address 4		Adresse 12 Address 12	
Adresse 5 Address 5		Adresse 13 Address 13	
Adresse 6 Address 6		Adresse 14 Address 14	
Adresse 7 Address 7		Adresse 15 Address 15	

3.2.3. Control terminal Board – HAC unit

The air handling unit has connection points for various auxiliary equipment/controls as well as Outdoor unit and zones Modbus connections.



4 DUCT DESIGN CHART

(flexible duct)

Diameter: 3"	Length	Number of 90degree elbow	Stat. P. In. ("H2O)	Nbr. of damper open	(cfm)
	10'	1	0.4	1	92
	10'	1	0.8	1	115
	10'	1	0.8	4	115
	10'	1	1.2	4	134
	35'	3	0.4	1	50
	35'	3	0.4	4	46
	35'	3	0.8	1	60
	35'	3	0.8	4	55
	35'	3	1.2	1	76
	35'	3	1.2	4	76
Diameter: 4"	Length	Number of 90degree elbow	Stat. P. In. ("H2O)	Nbr. of damper open	(cfm)
	10'	1	0.4	1	115
	10'	1	0.4	4	110
	10'	1	0.8	4	146
	10'	1	1.2	4	166
	25'	3	0.4	1	110
	25'	3	0.4	4	108
	25'	3	0.8	1	150
	25'	3	1.2	1	170
	25'	3	1.2	4	170
	50'	3	0.4	1	87
	50'	3	0.4	4	87
	50'	3	0.8	1	92
	50'	3	0.8	4	115
	50'	3	1.2	4	136
	50'	3	1.75	1	160

Diameter: 6 "	Length	Number of 90degree elbow	Stat. Press. In. ("H2O)	Nbr. of damper open	(cfm)
	25'	3	0.4	1	140
	25'	3	0.4	4	130
	25'	3	0.8	4	173
	25'	3	1.2	4	206
	50'	3	0.4	1	123
	50'	3	0.4	4	118
	50'	3	0.6	1	135
	50'	3	0.6	4	132
	50'	3	0.8	1	166
	50'	3	0.8	4	153
	50'	3	1.2	1	185
	50'	3	1.2	4	178
	75'	5	0.4	1	102
	75'	5	0.4	4	92
	75'	5	0.6	1	122
	75'	5	0.6	4	110
	75'	5	0.8	1	134
	75'	5	0.8	4	123
	75'	5	1.2	1	158
	75'	5	1.2	4	145

5 AIRFLOW EXAMPLE - 8 ZONES INSTALLATION

Flexible Ducts – 4 in. diameter – All 8 dampers open – 0.8 in W.C.

2 x 50 feet, 3 x 90 degrees elbows	: 85 pcm / ch	TOTAL 170 pcm
4 x 25 feet, 3 x 90 degrees elbows	: 150 pcm / ch	TOTAL 600 pcm
2 x 10 feet, 1 x 90 degrees elbow	: 140 pcm / ch	TOTAL 280 pcm
		TOTAL 1050 pcm

Note: The small variation in airflow per single damper as per the total amount of open dampers will not affect final temperature in each room. Only the operating cycle time may be affected.

6 ZONES TABLE

ZoneMax Module	Name of the room related
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	