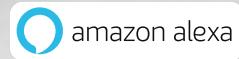




Solutions Guide

THE SMART AIR CONDITIONING



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Airzone Integrated Zoning Systems

What is an Airzone Integrated Zoning System?

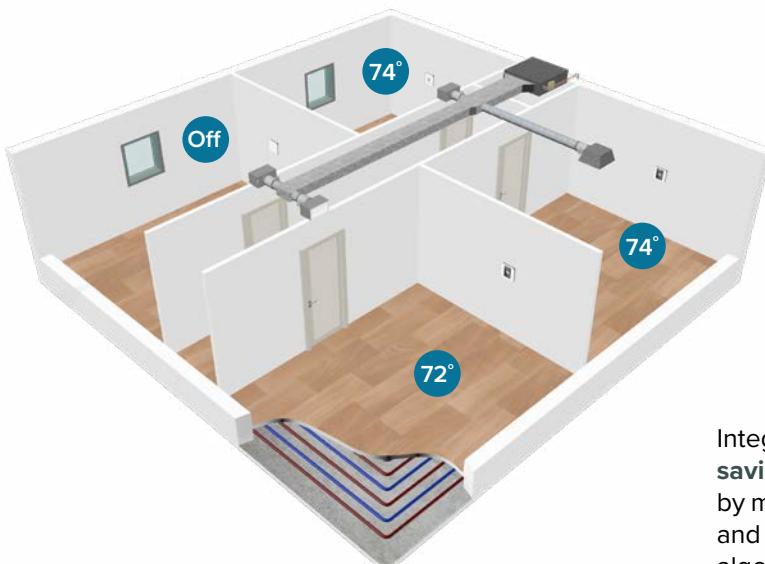
Traditional Ducted HVAC

The operation of a traditional ducted HVAC system is based on the control of several rooms as one single zone, maintaining its temperature in a comfort range.

Nevertheless, this type of system may present **several disadvantages** such as:

- It is not possible to control the energy supply for each zone individually.
- Except for the control zone (where a single thermostat is installed), the remaining zones, even when installed correctly, might not be able to maintain the proper comfort range.

Every zone in a building has specific requirements, depending on its use, schedule and occupancy, as well as its typology, orientation, insulations, etc. Because of this, it seems appropriate to be able to adapt HVAC system operation depending on the requirements of each zone in each moment.



Integrated Zoning System

An Airzone Integrated Zoning System **transforms a traditional ducted HVAC system into a multizone system**, basing its operation on two main factors:

- Optimization of the HVAC system's energy use.
- Providing the highest thermal comfort range to every zone.

Integrated zoning systems allow for **increased energy savings as well as lower initial costs**. This happens by means of the communications between Inverter units and the zoning system, as well as through efficiency algorithms.



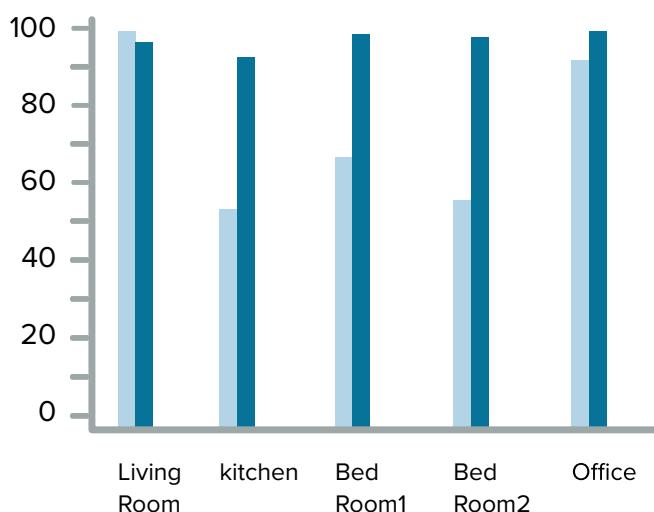
It permits to individually **control the temperature of every zone conditioned** by the same ducted indoor unit. This occurs thanks to the communications that exist between the sensors installed on each zone and the motorized elements installed on ducts. Because of this, it allows the system to cover only the thermal load of those zones where both thermal demand and occupancy exists.

Zoning Systems

The Integrated Zoning System developed by **Airzone** **regulates the air flow** supplied to each air-conditioned zone, and may satisfy the thermal needs of each one of them. In addition, it includes several efficiency algorithms which by **controlling Inverter heat pumps** (operation mode, set point temperature, fan speed, etc.) **optimizes energy use**.

These features allow the Integrated Zoning System to provide an **increase in both comfort and energy savings** as substantiated by an independent study from the Energy Researching Group of the University of Malaga, Spain, entitled "Report over the Airzone integrated zoning model and its comparison to a non-zoned system".

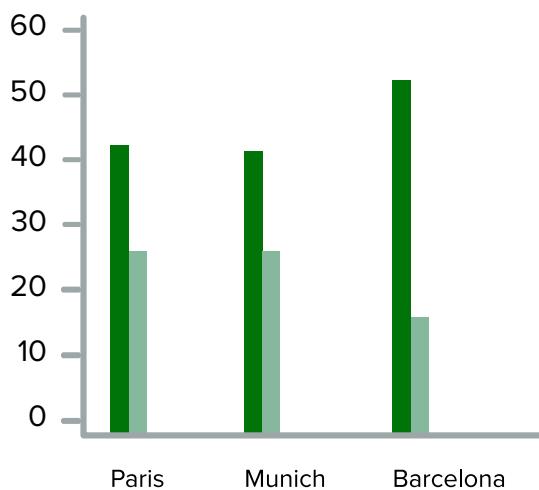
% Comfort



% of time in comfort

- With Airzone Integrated Zoning System
- Without Airzone Integrated Zoning System

% Efficiency



- Comfort-driven profile
- Efficiency-driven profile

Both compared with a ducted unit without integrated zoning system.

What is Airzone ZBS?

Airzone ZBS is an Integrated Zoning System specially designed for **Inverter and VRF systems**. Airzone ZBS system provides a seamlessly integrated zoning solution for Inverter/VRF heat pump installations. It only requires connecting two wires.

The cornerstone of this system is **the communications gateway**, a device that manages the communication between the integrated zoning system and heat pump Inverter units, **increasing both comfort and energy savings**. The heat pump and integrated zoning system will work as one thanks to the Airzone Communication Gateway.

All the zones information is gathered to determine the most efficient operation of the heat pump equipment.

It sets the following parameters according to the zones status:

- The operation mode
- The heat pump set-point temperature
- The ventilation speed

Due to these features, **Airzone ZBS does not require any bypass damper**, making it the most efficient zoning solution for HVAC installations.

Algorithms and Integration

Q-Adapt

Q-Adapt is an algorithm that automatically **selects the fan speed** of the zoned indoor units depending on the number of zones calling for demand.

This algorithm adapts the control system to the application of the installations and the air flow demand of each zone.

This adaptation is carried out by assigning a weight (percentage) to each zone of the installation, which is mainly suitable for complex ducted installations with numerous zones.

Eco User Mode

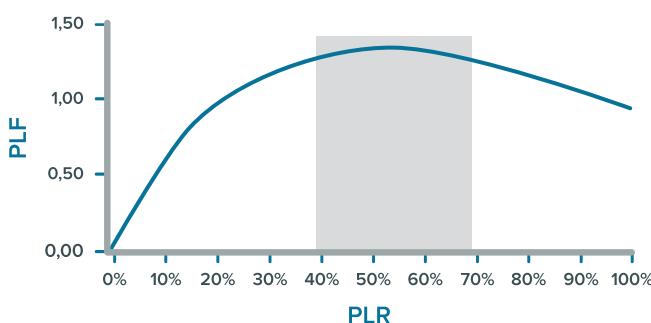
Eco User Mode utilizes several algorithms orientated to the **improvement of the HVAC systems** which offers numerous benefits both to the technician and the end user.

It improves the energy efficiency

The Airzone Blueface thermostat allows users to quickly adjust the temperature at which the HVAC system is operating and also to regulate it depending on their requirements.

Dynamic control of the set-point temperature of the Inverter/VRF indoor unit

Eco User Mode range in Inverter units



PLR: Partial Load Ratio (demanded capacity / total capacity).

PLF: Partial Load Factor (EER' = EER · PLF).



In addition, the end user will be able to, by means of the Blueface thermostat, **adjust the set point temperature** of every room in order to optimize the energy savings.

In order to obtain **the highest energy efficiency** of Inverter indoor units, it is essential to manage them to **run at a partial load regime (peak efficiency) as long as possible**. By modifying the set-point temperature in relation to the return air temperature, it is possible to vary the Partial Load Ratio (PLR) of the compressor and, therefore, its efficiency.

Eco User Mode algorithms are dynamically adjusted in order to provide **the necessary comfort level** for users maintaining the PLR and, the highest efficiency.

BMS Integration

The Airzone Cloud HUB Webserver module provides **Cloud connectivity and BMS/IT integration to the Airzone systems**. Stay always in control of your HVAC systems anytime, anywhere.

- Controls up to 32 Airzone systems.
- Ethernet port for access to Airzone Cloud and BACnet IP.
- RS485 port for BACnet MS/TP and Modbus.
- Wi-Fi 2.4 GHz/5 GHz connectivity for Airzone Cloud access.
- Bluetooth Low Energy (BLE) connectivity for Airzone systems configuration.
- Local and Cloud API connectivity.
- Voice assistants (Google Home and Amazon Alexa) compatible.



HVAC Manufacturers



BMS Control Systems



IoT Control Systems



Commercial Applications

Case study

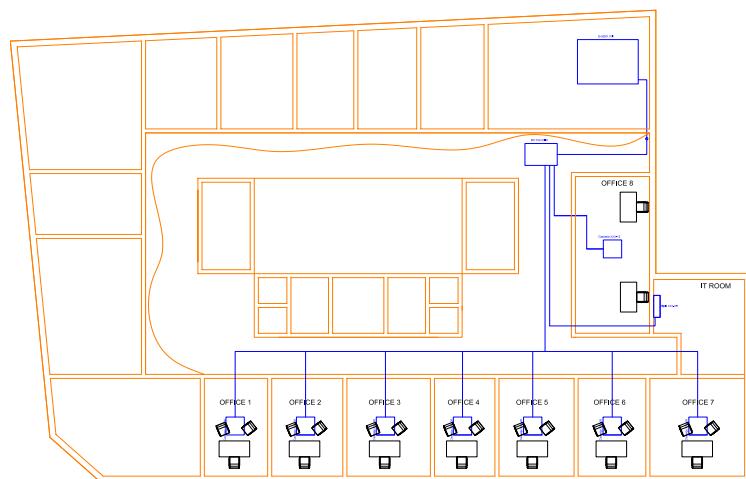
Within the commercial sector, VRF technology can provide the most efficient solution, featuring a single cassette or split as indoor unit for each zone in a building. Nevertheless, this type of installation might present several limitations such as:

Oversized
indoor units

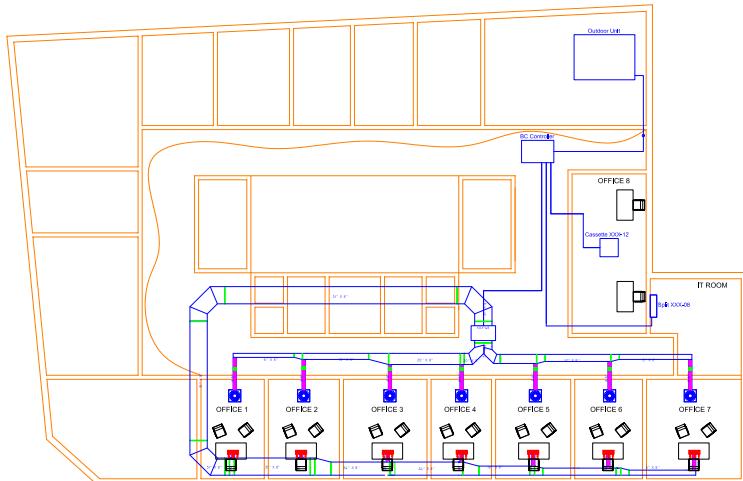
Refrigerant
pipes length and
refrigerant quantity

Noncompliance with
ASHRAE 15 & 34 /
B-52 Standards

Costly
maintenance



By implementing a combination of ducted indoor units and Airzone ZBS into a VRF Installation, all these challenges could be overcome as illustrated in this example.



The case study, consisting of eight Offices and an IT Room has been calculated using two different options (VRF Installation with individual indoor units and VRF Installation with ducted and individual indoor units).

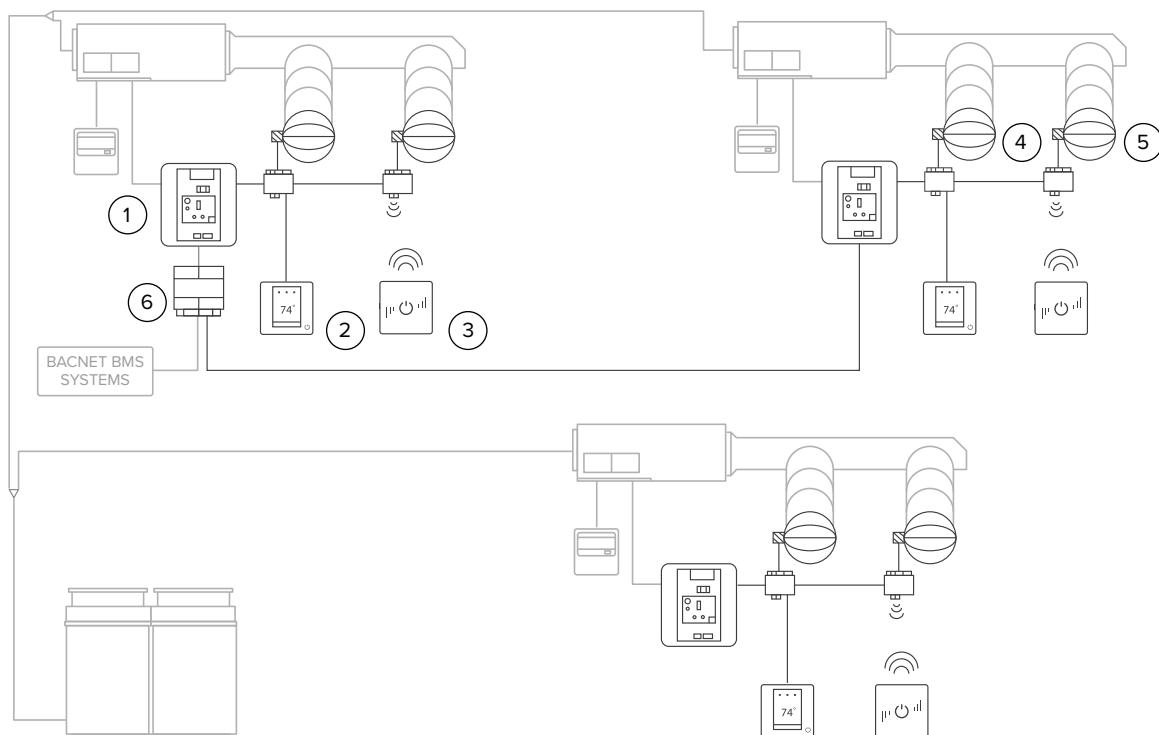
By implementing a combination of an Airzone ZBS system and ducted indoor units to a VRF system, a user creates a system that optimizes efficiency.

*According to ASHRAE 15 & 34/B-52, lowest allowed volume of a room crossed by a refrigerant pipe has been reduced from 1819.1 ft³ to 1319.8 ft³.

Commercial Applications

VRF Ducted Units

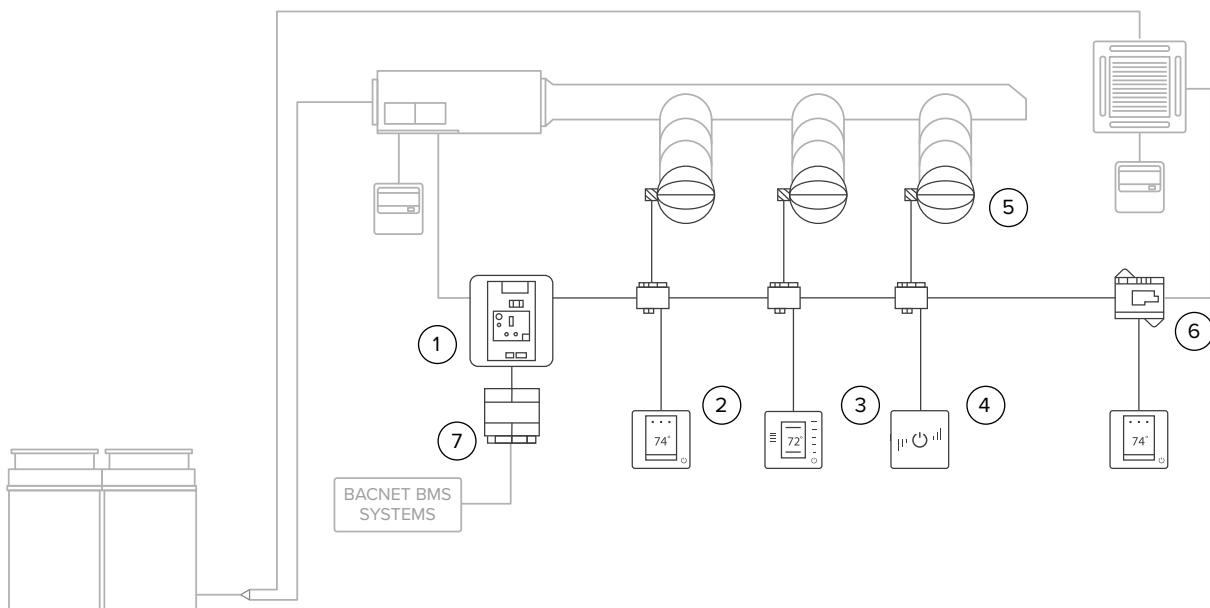
ZONE	AREA (FT ²)	REQUIRED CAPACITY (BTUH)	I.U. MODEL ST. SOLUTION	REQUIRED CAPACITY (BTUH)	I.U. MODEL AZ SOLUTION	INSTALLED CAPACITY (BTUH)
Office 1	164.2	6,252.1	XXX-08	8,000.0	XXX-48	48000
Office 2	184.6	7,025.9	XXX-08	8,000.0		
Office 3	216.7	8,250.2	XXX-08	8,000.0		
Office 4	156.9	5,973.7	XXX-08	8,000.0		
Office 5	194.9	7,419.0	XXX-08	8,000.0		
Office 6	175.7	6,690.2	XXX-08	8,000.0		
Office 7	246.0	9,363.9	XXX-12	12,000.0		
IT Room	199.4	7,591.0	XXX-08	8,000.0	XXX-08	8,000
Office 8	308.5	11,742.7	XXX-12	12,000.0	XXX-12	12,000
TOTAL		70,308.7		80,000.0		68,000.0



	Part number	Description	Units
1	AZZBSCB2MEL	Airzone ZBS Control board with Mitsubishi Electric communication region 2	3
2	AZZBSBLUEFACECB	Airzone ZBS wired Blueface principal controller white	3
3	AZZBSLITERB	Airzone ZBS wireless Lite controller white	3
4	AZZBSDAMPER[XX]C	Airzone ZBS [XX] wired intelligent round damper	3
5	AZZBSDAMPER[XX]R	Airzone ZBS [XX] wireless intelligent round damper	3
6	AZX6WSPBAC	Webserver HUB Airzone - BACnet	1

VRF Ducted and Ductless Units

ZONE	AREA (FT ²)	REQUIRE CAPACITY (BTUH)	I.U. MODEL ST. SOLUTION	REQUIRED CAPACITY (BTUH)	I.U. MODEL AZ SOLUTION	INSTALLED CAPACITY (BTUH)
Office 1	164.2	6,252.1	XXX-08	8,000.0	XXX-48	48000
Office 2	184.6	7,025.9	XXX-08	8,000.0		
Office 3	216.7	8,250.2	XXX-08	8,000.0		
Office 4	156.9	5,973.7	XXX-08	8,000.0		
Office 5	194.9	7,419.0	XXX-08	8,000.0		
Office 6	175.7	6,690.2	XXX-08	8,000.0		
Office 7	246.0	9,363.9	XXX-12	12,000.0		
IT Room	199.4	7,591.0	XXX-08	8,000.0	XXX-08	8,000
Office 8	308.5	11,742.7	XXX-12	12,000.0	XXX-12	12,000
TOTAL		70,308.7		80,000.0		68,000.0



	Part number	Description	Units
1	AZZBSCB2MEL	Airzone ZBS Control board with Mitsubishi Electric communication region 2	1
2	AZZBSBLUEFACECB	Airzone ZBS wired Blueface principal controller white	2
3	AZZBTHINKCB	Airzone ZBS wired Think controller white	1
4	AZZBSLITECB	Airzone ZBS wired Lite controller white	1
5	AZZBSDAMPER[XX]C	Airzone ZBS [XX] wired intelligent round damper	3
6	AZZBSZMOMELC	Airzone ZBS wired zone module with Mitsubishi Electric communication	1
7	AZX6WSPBAC	Webserver HUB Airzone - BACnet	1

Single-family Application

Single-family · DX+Zone-supplemental heat

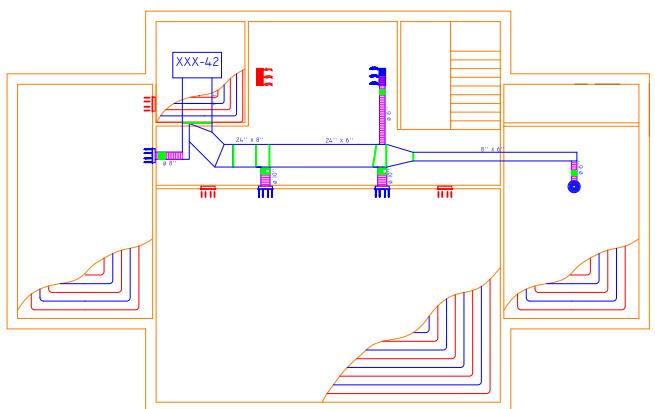
HVAC systems in single-family buildings are usually a combination of air conditioning and zone-supplemental heat elements.

Airzone ZBS applies zone and integrated control to both of these systems providing the fastest and highest level of comfort.

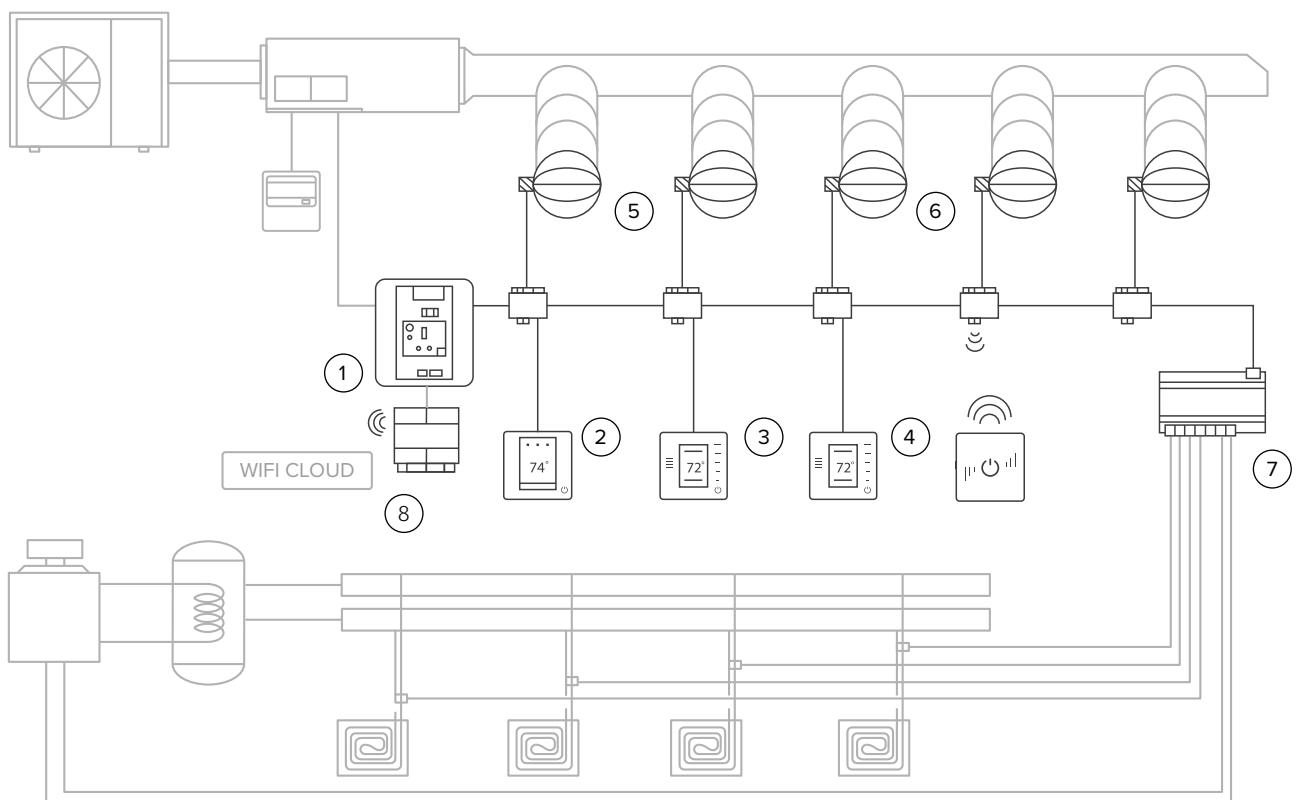


The following system is composed of an Inverter air conditioning ducted indoor unit (with a capacity of 45,000 BTUh) and floor radiant elements produced by a boiler. Four rooms will be equipped with air conditioning and radiant heating and one room (Restroom) only with radiant heating.

Airzone ZBS allows for integrated zoning control of the entire installation: Inverter Air Conditioning Unit using **motorized dampers** and supplemental heating elements **controlled by the solenoid valves** of the heating installation.



ZONE	AREA (FT2)	THERMAL LOAD (BTUH)	INDOOR UNIT MODEL	AIRFLOW (CFM)	AZ MOTORIZED DAMPER MODEL
Living Room	645.9	24,546.4	XXX-42	797.9	2x10"
Bureau	280.8	10,671.7		346.9	8"
Kitchen	140.3	5,331.7		173.3	6"
Hall	133.4	5,070.1		164.8	6"
Restroom	78.7	2,994.0		-	-



Part number	Description	Units
1 AZZBSCB2MEL	Airzone ZBS Control board with Mitsubishi Electric communication region 2	1
2 AZZBSBLUEFACECB	Airzone ZBS wired Blueface principal controller white	2
3 AZZBSTHINKCB	Airzone ZBS wired Think controller white	1
4 AZZBSLITERB	Airzone ZBS wireless Lite controller white	1
5 AZZBSDAMPER[XX]C	Airzone ZBS [XX] wired intelligent round damper	4
6 AZZBSDAMPER[XX]R	Airzone ZBS [XX] wireless intelligent round damper	1
7 AZZBS5OUTPUTS	Airzone ZBS relay radiant heat control module	1
8 AZX6WSPHUB	Webserver HUB Airzone Cloud Ethernet - Wi-Fi	1

Single-family Application

Single-family · DX+Zone-supplemental heat+Auxiliary heat

Oftentimes, the combination of Inverter air conditioning and zone-supplemental heat does not provide enough coverage to meet the thermal load.

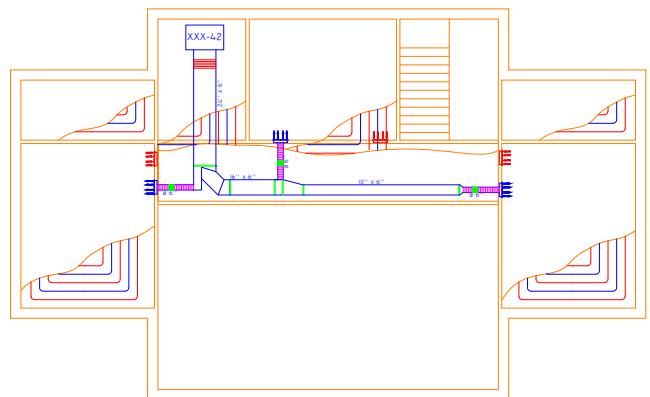
In these cases, HVAC installations are complemented by auxiliary heating elements such as a electrical furnaces.



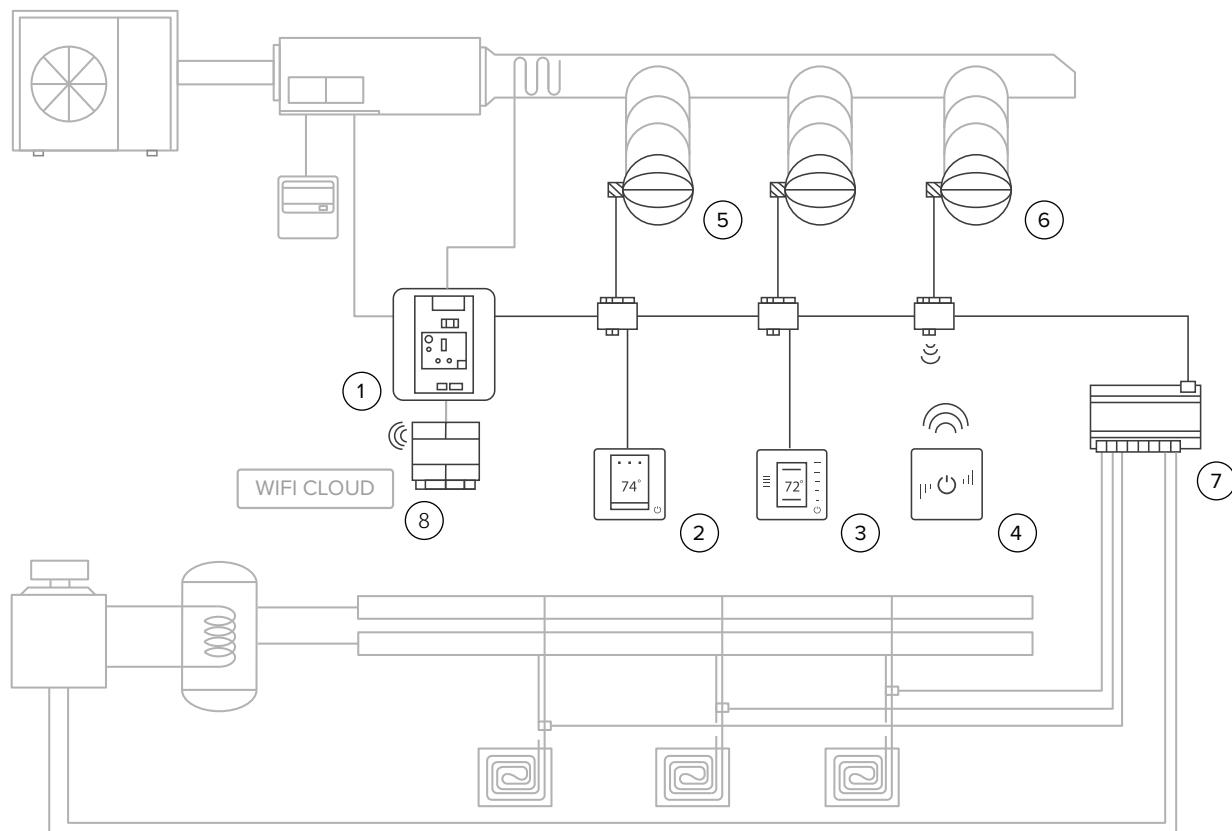
Airzone ZBS allows for control of the On/Off operation of these auxiliary elements via dedicated relays placed on the ZBS main controller.

The following installation, consisting of an Inverter ducted indoor units (with a capacity of 42,000 BTUh) and zone-supplemental heat elements, is complemented by an electrical furnace in order to cover the thermal load for three rooms. The three bedrooms will be provided with air conditioning, supplemental and auxiliary heating, and the two bathrooms with zone-supplemental heat only.

By using the Airzone ZBS solution, it is possible control the whole installation: Air Conditioning, Radiant Heating elements and the Electrical Auxiliary Heating.



ZONE	AREA (FT2)	THERMAL LOAD (BTUH)	INDOOR UNIT MODEL	AIRFLOW (CFM)	AZ MOTORIZED DAMPER MODEL
Bedroom 1	202.6	7,699.1	XXX-42	264.1	6"
Bedroom 2	202.5	7,695.0		264.0	6"
Bedroom 3	163.9	6,231.2		213.8	6"
Restroom 1	166.7	6,335.3		-	-
Restroom 2	166.7	6,335.3		-	-



Part number	Description	Units
1 AZZBSCB2MEL	Airzone ZBS Control board with Mitsubishi Electric communication region 2	1
2 AZZBSBLUEFACECB	Airzone ZBS wired Blueface principal controller white	1
3 AZZBSTHINKCB	Airzone ZBS wired Think controller white	1
4 AZZBSLITERB	Airzone ZBS wireless Lite controller white	1
5 AZZBSDAMPER[XX]C	Airzone ZBS [XX] wired intelligent round damper	2
6 AZZBSDAMPER[XX]R	Airzone ZBS [XX] wireless intelligent round damper	1
7 AZZBS5OUTPUTS	Airzone ZBS relay radiant heat controle module	1
8 AZX6WSPHUB	Webserver HUB Airzone Cloud Ethernet - Wi-Fi	1



Designed &
Manufactured in EU

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