F459 – Driver for HVAC

HVAC indoor units management through MyHOME Temperature control system

Features & Installing details

1 – The solution

1.1 – Object

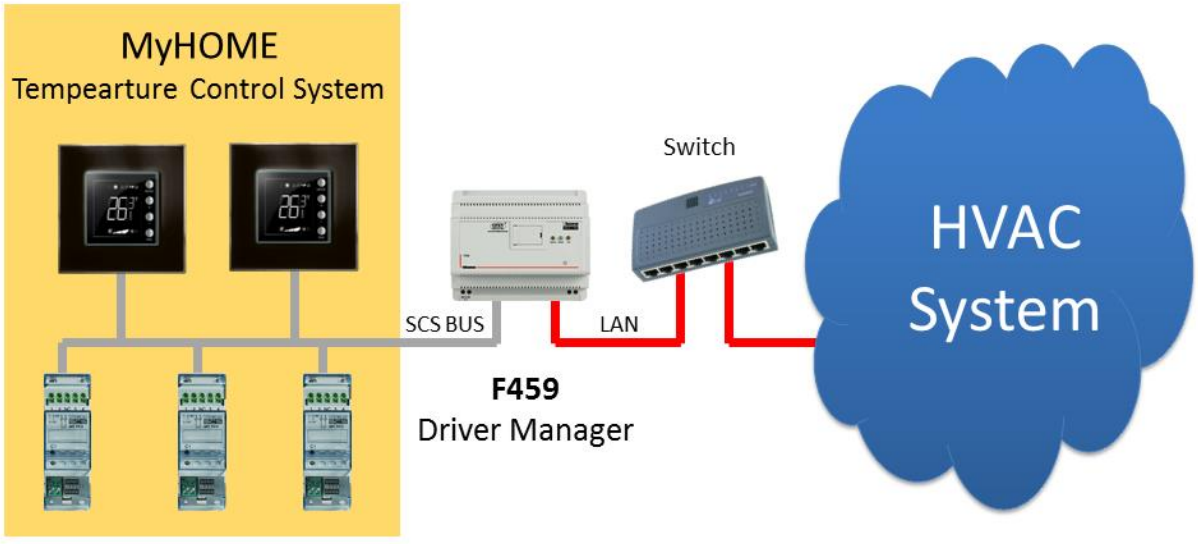
To manage **HVAC** (**H**eating **V**entilating (and) **A**ir **C**onditioning) heating and cooling indoor units through MyHOME standard Temperature control system, solution based on Legrand **MYHOMESERVER1** device (**or** MyHOME 99zones Control unit), MyHOME probes and actuators (optional).

The solution allows the association of a MyHOME temperature zone to one (or a group) HVAC indoor unit in order to transfer the following settings :

- Set-point
- Operating mode and Power-ON
- Fan speed

by activating the operating status indicator of the probe.

Moreover, it is possible to gather MyHOME actuators (i.e. used for Radiant Panels, with ON/OFF valves management) and HVAC indoor units, to be managed through a single MyHOME temperature zone, in "combined" mode.



1.2 – Prerequisites

MyHOME system

- Legrand **MYHOMESERVER1** device (**or** MyHOME 99 zones Control unit), MyHOME probes, MyHOME actuators (if present); correctly installed, configured and ready to work.
  Standard rules of installation and configuration of the MyHOME Temperature control system, configuration values according to the typology of the system.
  It is matter of the System Integrator to achieve this part, with Legrand subsidiary local support.

- SCS Driver manager device (ref. Legrand **F459**), connected to the SCS BUS and to the Ethernet network.
  Connection to the SCS BUS of the MyHOME Temperature control system (private riser) and to the LAN (settings of the own IP address). Standard rules of Ethernet network.
  It is matter of the System Integrator to achieve this part, with Legrand subsidiary local support.

- (Optional) Modbus-IP/Modbus-RTU converter (ref. BTicino **PM1AC** or Legrand **004689**), connected to the Ethernet network.
  Only if required by the solution. Connected to the LAN (settings of the own IP address) and to the Modbus-RTU line. Standard rules of Serial-RTU line (RS485).
  It is matter of the System Integrator to achieve this part.

HVAC installation

- The HVAC system has to be arranged to be managed by a BMS controller (Legrand MyHOME).
  HVAC system arrangement according to the rules of installation defined by the HVAC producer.
  The MyHOME temperature control system will be the end-user interface for zone management, therefore the HVAC thermostats are no longer needed. The operating temperature will be measured by the MyHOME probe placed on field, cause it the value may differ from the one measured by the HVAC probe (built-in the indoor unit). If the difference of the two values is over +/-4°C (i.e. in cases of ducted and/or flush-mounted HVAC indoor units), it is advisable to adopt the remote HVAC probes placed close to the MyHOME probes on field.
  It is matter of the HVAC installer to check this part and define the correct solution to adopt.

- HVAC heating and cooling indoor units, correctly installed, configured and ready to work.
  Connection to the HVAC system and configuration, according to the rules of installation defined by the HVAC producer.
  It is matter of the HVAC installer to check this part and define the correct solution to adopt.

- HVAC IP gateway or Modbus-IP gateway or Modbus interface, proper quantity to the number of units to be controlled, connected to the Ethernet network.
  Connection to the HVAC system and configuration, according to the rules of installation defined by the HVAC producer.
  Some solutions give possibility to use different references as per HVAC gateway, it is matter of the HVAC installer to check in advance the number and type of the necessary HVAC gateways and/or interfaces in relation to the topology of the system, therefore connect and configure them accordingly.

- HVAC wired thermostat and/or IR remote controllers must be disconnected or inactive.

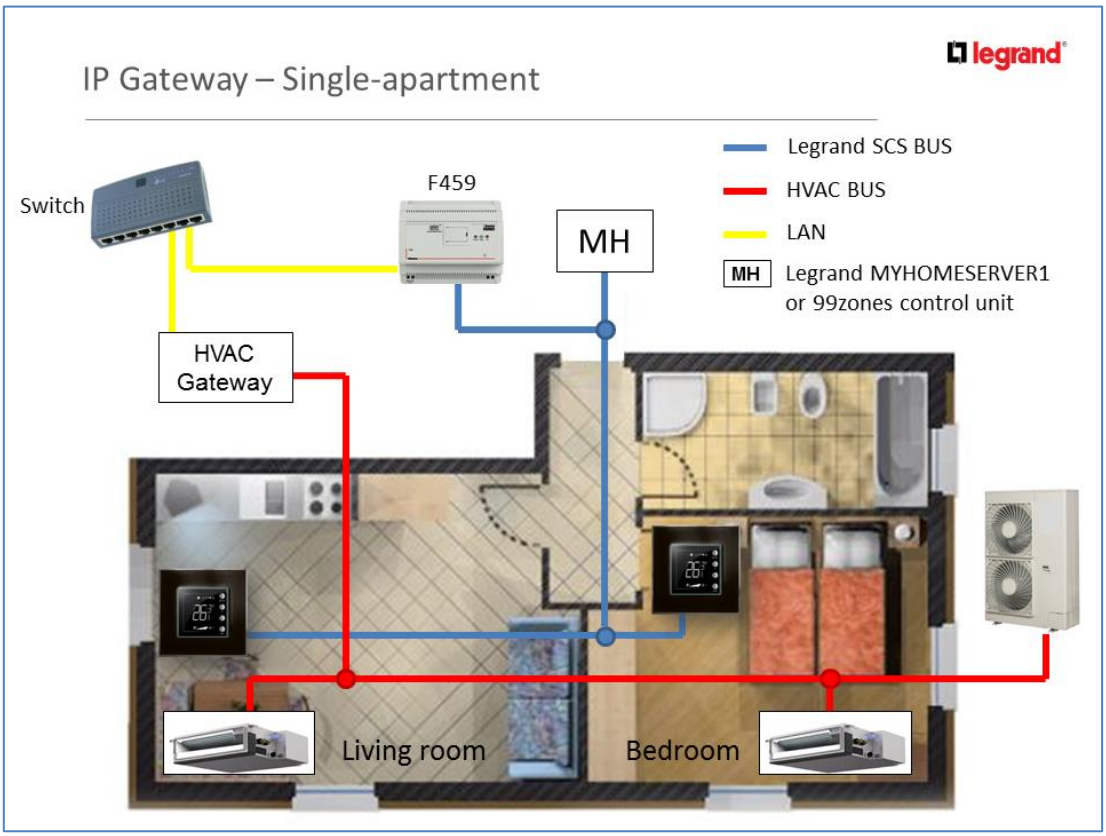
Infrastructure

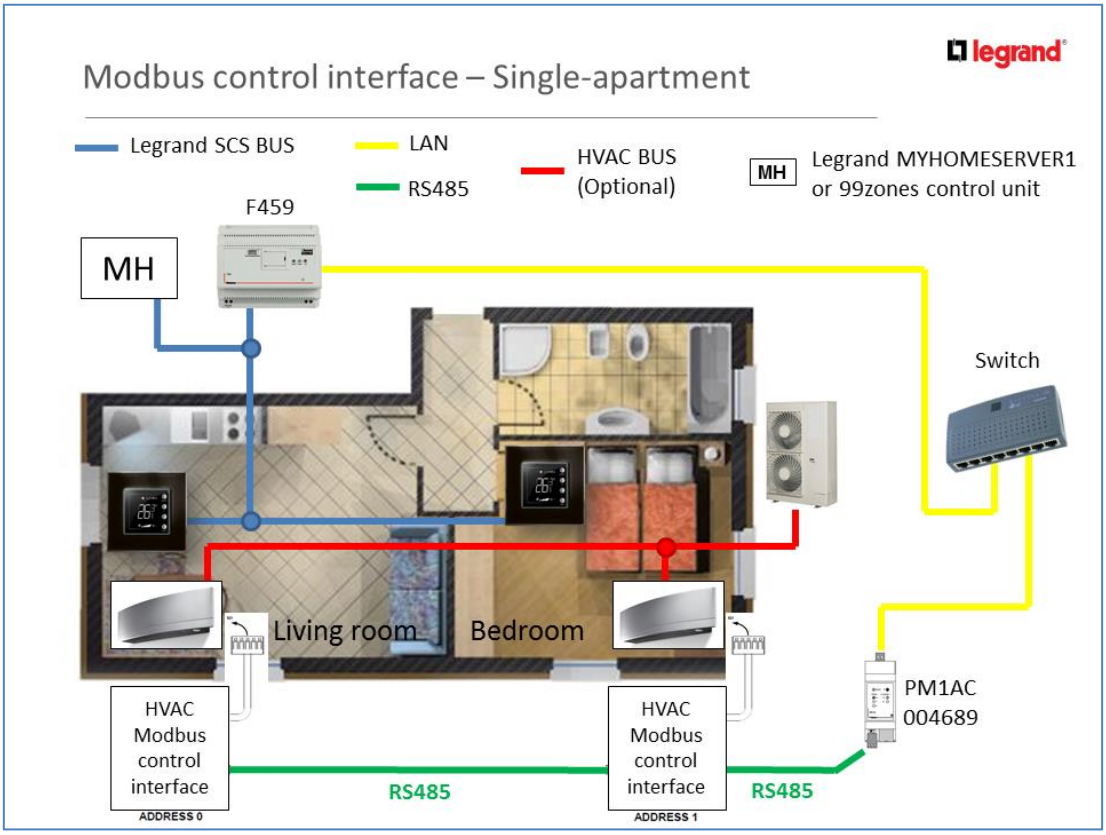
- Ethernet network configured to connect the SCS Driver manager device and the HVAC IP gateway or Modbus-IP gateway or Modbus interface, with univocal IP addresses (static IP function, or pre-defined values inside DHCP router function.
  Standard rules of Ethernet network.
  It is matter of the System Integrator (and/or Network manager) to achieve this part.

- (Commissioning service) (Optional) Active and powerful Internet connection, configured to allow the remote connection with the plant and/or a PC connected to the same LAN of the system integrated.
  Standard rules of Ethernet network.
  It is matter of the System Integrator (and/or Network manager) to achieve this part.

1.3 – Installation scheme

Examples of a single-apartment application with 2 controlled zones :





1.4 – Features

The proposed implementation is based on Driver Framework for SCS Driver manager device (ref. Legrand **F459**) and it consists in the release of a Driver that communicate with the MyHOME Temperature control system and allows, through a web pages interface, to define for every controlled zone :

- Address of the associated HVAC indoor unit.
- Type of probe available (with or without FAN adjustment).
- Configuration of the supported operating modes (Heating, Cooling or both).
- Management of the operating status indicator of the probe.
- Air flow direction adjustment: Automatic (no Driver intervention) or Pre-defined (different position for Heating and Cooling operating modes).

In addition, general options of :

- Temperature range within which modulate the fan speed, of the available ones on HVAC, when the probe is set to the “Automatic speed” mode.
- Operating mode when the MyHOME probe is set to the “Thermal protection” mode (Switch-OFF the unit or activation of the automatic mode with thermal protection as a set-point value).
- Operating mode when the set-point is reached (turn OFF the unit, set AUTO mode, set LOW fan speed, no action).

The Driver will communicate through the network, in standard protocols (preferential Modbus), with one HVAC gateway or “Modbus-IP/Modbus-RTU converter”.

The MyHOME Temperature control system will be the end-user interface for zone management and so HVAC controllers (wired thermostats or IR controllers) are no longer needed.

The proposed management works in the way that all the settings/commands (mode, set-point, fan speed) of the MyHOME Temperature control system are periodically sent to the HVAC system, therefore any setting/command sent from the local HVAC controllers (if still present) will be over-written in the next MyHOME sending.

The operating temperature will be measured by the MyHOME probe placed on field and so the value may differ from the one measured by the HVAC probe (built-in the HVAC indoor unit). If the difference of the two values is over +/-4°C (i.e. in cases of ducted and/or flush-mounted HVAC indoor units), it is advisable to adopt the remote HVAC probes placed close to the MyHOME probes on field. The Driver will compare the two measurements in order to compensate the set-point value.

The operating status indicator (colored LED or graphic icon) of the MyHOME probe is managed by the Driver through configuration of the zone operating mode as “gateway”. The operating status indicator will be aligned to the achievement of the set-point and not to real indoor unit working condition.

Two working modes available, also different for Heating and Cooling functions if required:

- “Only Driver”: Heating and/or Cooling functions only through HVAC indoor units.
- “Driver & MyHOME”: HVAC indoor units used to support another system, in example Radiant Panels (ON/OFF Valves) (Refer to the chapter 2.4 – Example 4).

In “Driver & MyHOME” mode the Driver manages automatically the two systems involved, with functional features as follow :

1. If required a new set-point: both systems (HVAC and Radiant Panels) start immediately.
2. Close to the reaching of the set-point: the HVAC decreases its support (decreasing the fan-speed), meanwhile the Radiant Panels continues to work.
3. Reaching the set-point: the HVAC turns off, to leave at the Radiant Panels the maintenance of the required temperature level.

Advantages of this combined mode, in terms of Comfort :

- Quick reaction of the system to speed up the reaching of the set-point.
- Noiseless system in maintenance condition.

And, in terms of Saving :

- The HVAC is more performance in transitory condition.
- The Radiant Panels are more performance in static condition.

1.5 – Solution components

The proposed solution consists of the following items, all included in a package to install on the SCS Driver manager device (ref. Legrand **F459**) :

- XML system file containing all the parameters mentioned in the proposal.
- Web pages interface for XML configuration.

1.6 – Additional details

This solution **DOES NOT MANAGE** anything not specifically mentioned in the previous chapters, in detail :

- The local commands sent by HVAC wired or IR controllers (if present).
- The HVAC operating modes VENTILATION, DRY, AUTO (if available).

Moreover, as regards the HVAC system :

- According to HVAC system operating features, in some cases the HVAC indoor unit needs to work (fan only) after the set-point achievement also. Through variable settings of the “set-point reached” operating mode, it is possible to manage all the HVAC system conditions.

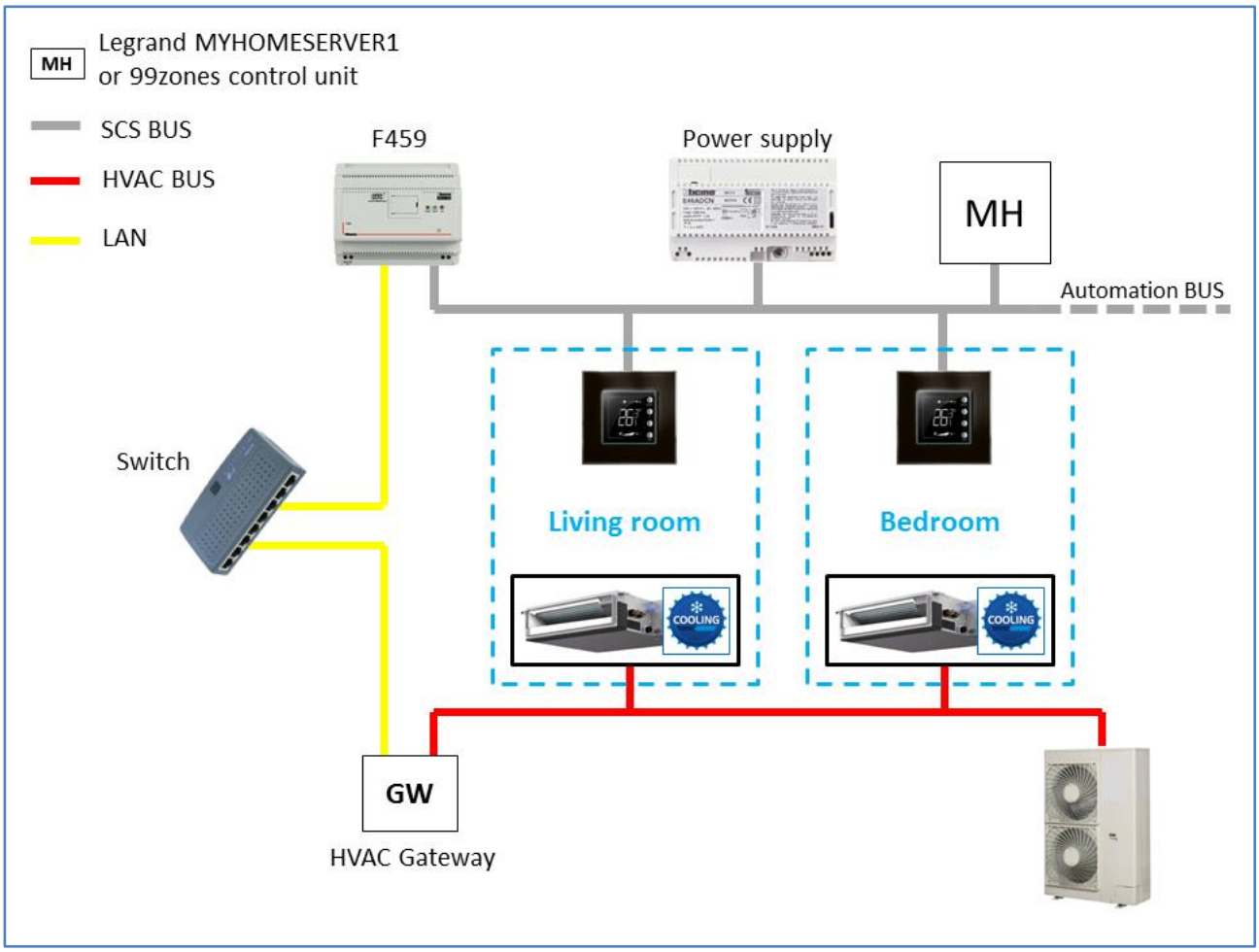
2 – MyHOME configuration settings

2.1 – EXAMPLE 1 - Single apartment, two controlled zones

2.1.1) Required management functions

Heating function : Not required

Cooling function : HVAC indoor units



2.1.2) Summing up table

Zone	Probe	Actuators						
	Za - Zb	Item code	Status	Za - Zb	N°	Type of load	Function	Description
Living room	0-1	None	Virtual	0-1	1	Gateway	Cooling	Actuator emulated by the Driver on F459
Bedroom	0-2	None	Virtual	0-2	1	Gateway	Cooling	Actuator emulated by the Driver on F459

2.1.3) Probes

If present MyHOMEServer1

Configure probes by MyHOME_Up App.

- Add into the desired room a “Thermostat object”
- Start the procedure “Wizard Thermo”
- Select the type of system → Cooling
- Associate the thermostat → *Live procedure*
- Cooling / Select the type of load to control → Gateway
- Pump Cooling → *NO selection*

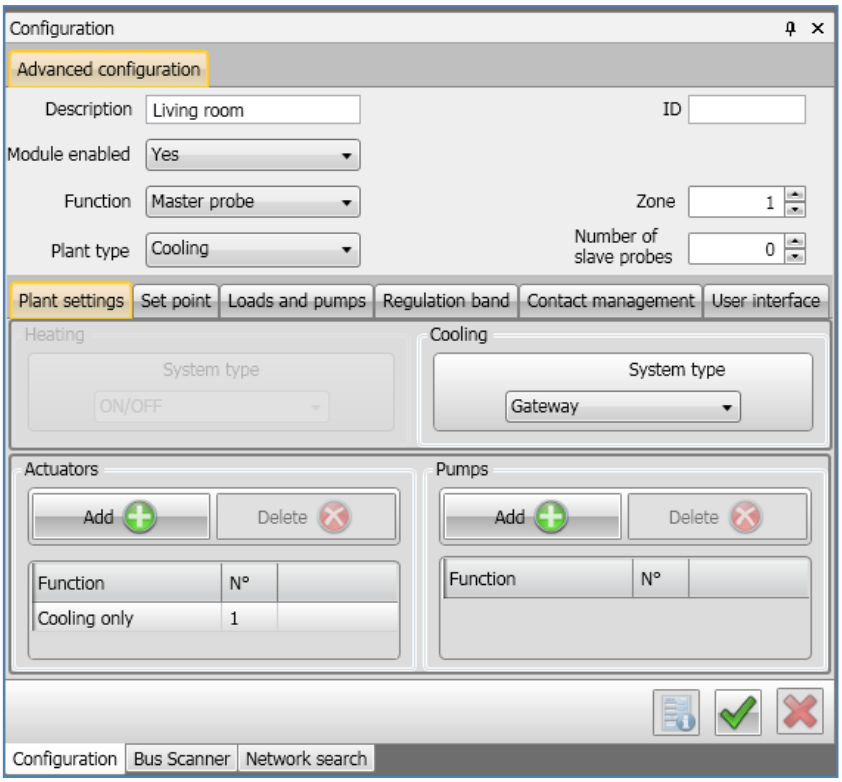
Za-Zb values (SCS addressing of the Temperature zone) has been automatically defined by the MyHOME Server. To know them it is mandatory to connect a PC to the network where is present the MYHOMESERVER1 device, using a browser type the MyHOMEServer1 IP address and indicate the 3443 connection port (e.g. 192.168.0.158:3443). In alternative, use MyHOME_Suite software, “BUS scanner” function.

If present 99zones Control unit

Configure the probes by MyHOME_Suite or with physical configurators.

- Probe in the Living room → 0-1 (Za-Zb)
- Probe in the Kitchen → 0-2 (Za-Zb)

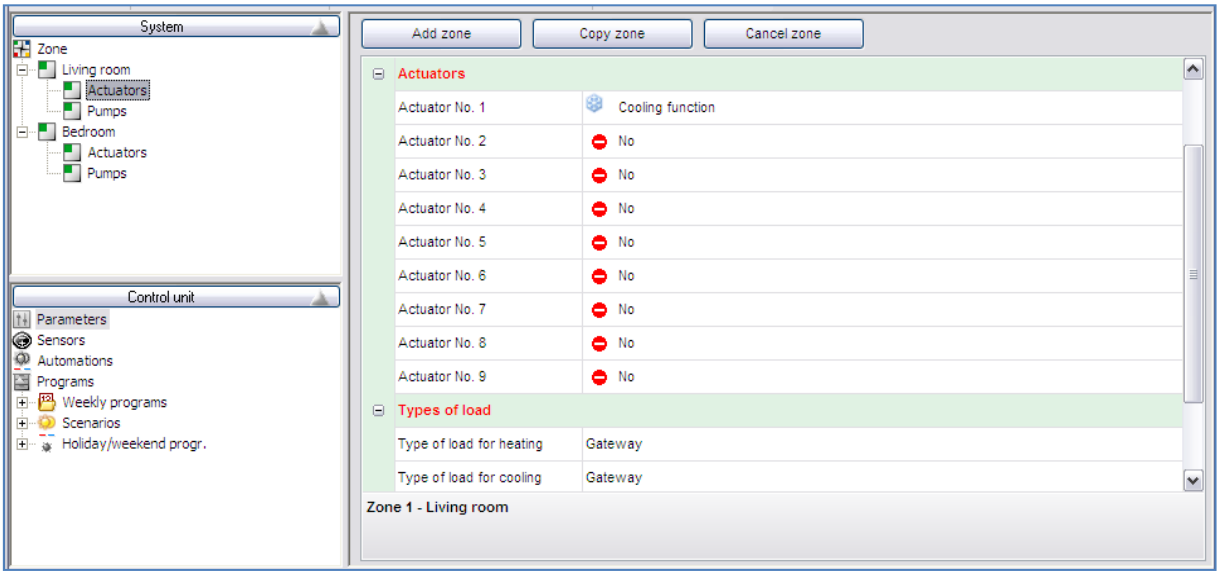
In the picture a MyHOME_Suite example of a “Thermostat with display” probe configuration.



2.1.4) 99zones Control unit

Configure the zones in the 99zones Control unit using MyHOME_Suite or its own menu.

- Both zones have only Actuator “N° 1”
- Cooling Function
- Type of Load for Heating and Cooling is “Gateway”



2.1.5) Notes

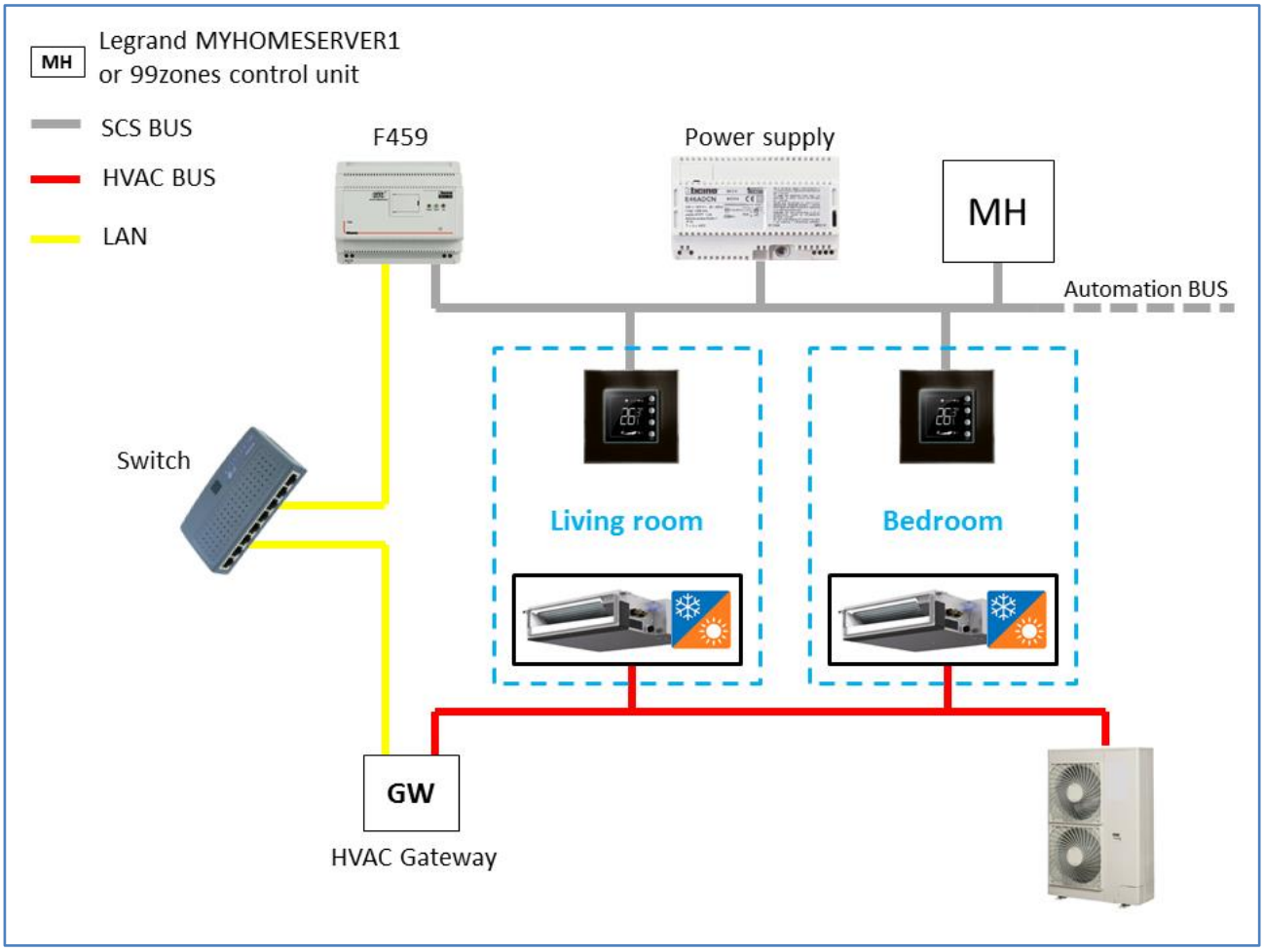
- The HVAC addressing of the unit/zone has to be defined by the HVAC designer/installer.
- A virtual actuator must be always the first, so actuator “N° 1”.
- The Driver manages **Cooling** functions.

2.2 – EXAMPLE 2 - Single apartment, two controlled zones

2.2.1) Required management functions

Heating function : HVAC indoor units

Cooling function : HVAC indoor units



2.2.2) Summing up table

Zone	Probe	Actuators						
	Za - Zb	Item code	Status	Za - Zb	N°	Type of load	Function	Description
Living room	0-1	None	Virtual	0-1	1	Gateway	Heating Cooling	Actuator emulated by the Driver on F459
Bedroom	0-2	None	Virtual	0-2	1	Gateway	Heating Cooling	Actuator emulated by the Driver on F459

2.2.3) Probes

If present MyHOMEServer1

Configure probes by MyHOME_Up App.

- Add into the desired room a “Thermostat object”
- Start the procedure “Wizard Thermo”
- Select the type of system → Heating and cooling
- Associate the thermostat → *Live procedure*
- Heating and cooling / Select operating mode of the actuator (...) → Heating and cooling load
- Heating and cooling / Select the type of load to control → Gateway
- Pump Heating and cooling → *NO selection*

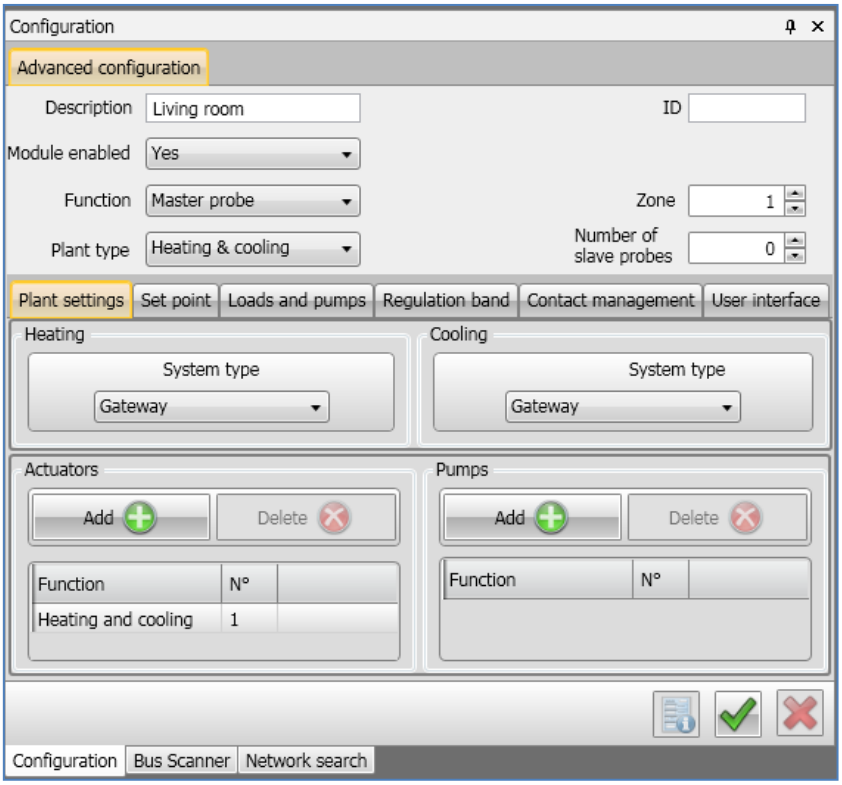
Za-Zb values (SCS addressing of the Temperature zone) has been automatically defined by the MyHOME Server. To know them it is mandatory to connect a PC to the network where is present the MYHOMESERVER1 device, using a browser type the MyHOMEServer1 IP address and indicate the 3443 connection port (e.g. 192.168.0.158:3443). In alternative, use MyHOME_Suite software, “BUS scanner” function.

If present 99zones Control unit

Configure the probes by MyHOME_Suite or with physical configurators.

- Probe in the Living room → 0-1 (Za-Zb)
- Probe in the Kitchen → 0-2 (Za-Zb)

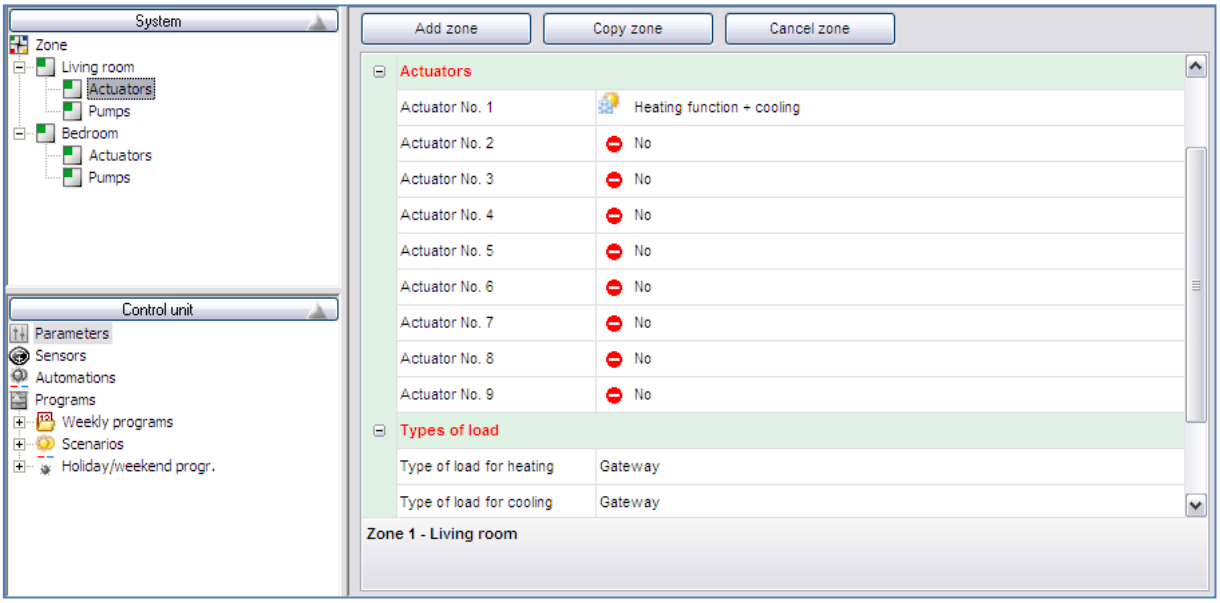
In the picture a MyHOME_Suite example of a “Thermostat with display” probe configuration.



2.2.4) 99zones Control unit

Configure the zones in the 99zones Control unit using MyHOME_Suite or its own menu.

- Both zones have only Actuator “N° 1”
- Heating and Cooling Function
- Type of Load for Heating and Cooling is “Gateway”



2.2.5) Notes

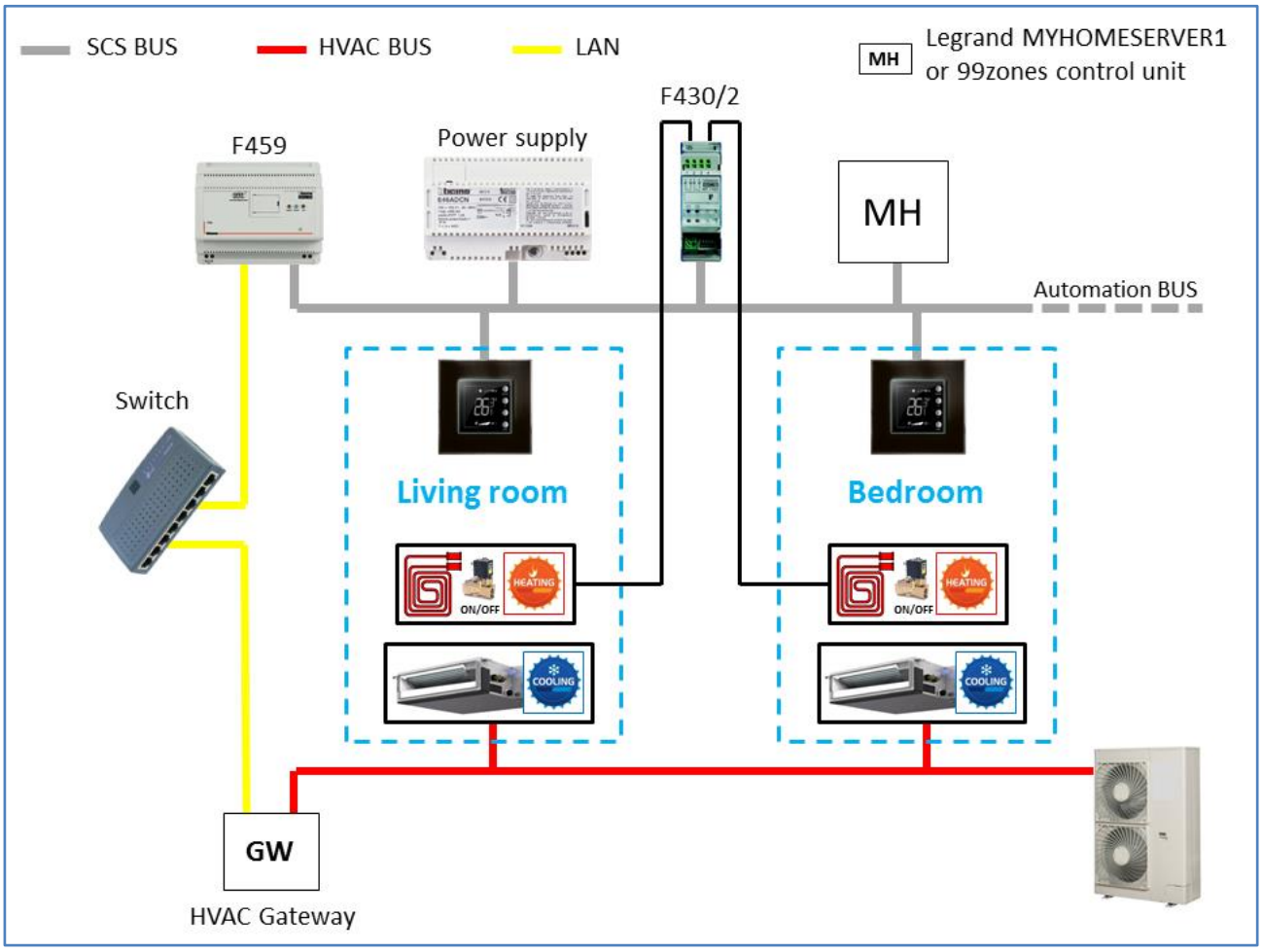
- The HVAC addressing of the unit/zone has to be defined by the HVAC designer/installer.
- A virtual actuator must be always the first, so actuator “N° 1”.
- The Driver manages **Cooling** and **Heating** functions.

2.3 – EXAMPLE 3 - Single apartment, two controlled zones

2.3.1) Required management functions

Heating function : Floor Heating (ON/OFF valves)

Cooling function : HVAC indoor units



2.3.2) Summing up table

Zone	Probe	Actuators						
	Za - Zb	Item code	Status	Za - Zb	N°	Type of load	Function	Description
Living room	0-1	None	Virtual	0-1	1	Gateway	Cooling	Actuator emulated by the Driver on F459
		F430/x	Physical	0-1	2	ON/OFF	Heating	ON/OFF valve management
Bedroom	0-2	None	Virtual	0-2	1	Gateway	Cooling	Actuator emulated by the Driver on F459
		F430/x	Physical	0-2	2	ON/OFF	Heating	ON/OFF valve management

2.3.3) Probes & Actuators

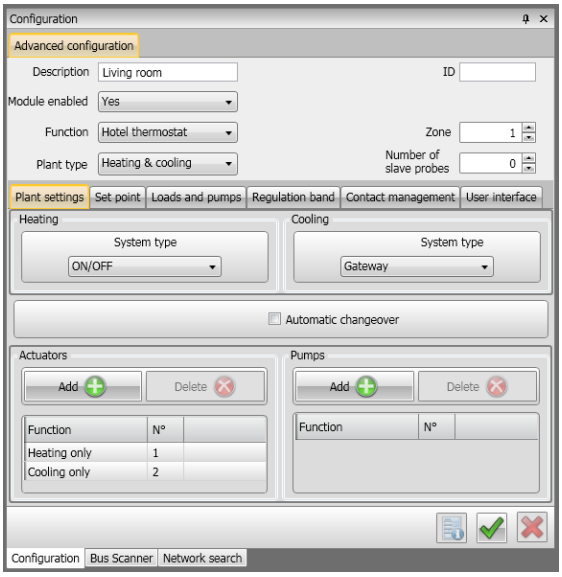
If present MyHOMEServer1

Configure probes by MyHOME_Up App.

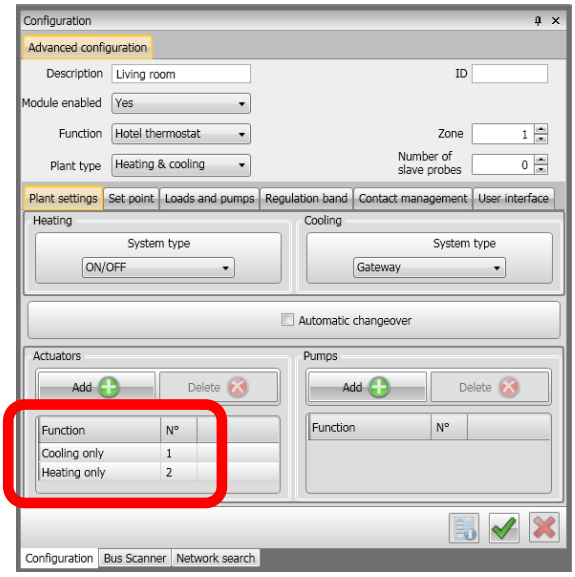
- Add into the desired room a “Thermostat object”
- Start the procedure “Wizard Thermo”
- Select the type of system → Heating and cooling
- Associate the thermostat → *Live procedure*
- Heating / Select the type of load to control → ON/OFF valve
- Heating / Associate the actuator (…) → *Live procedure*
- Pump Heating → *Follow the procedure to configure the Pump, if required*
- Cooling / Select the type of load to control → Gateway
- Pump Cooling → *NO selection*

ATTENTION: It is now required to modify some actuator parameters, procedure feasible with use of MyHOME_Suite software only, in detail :

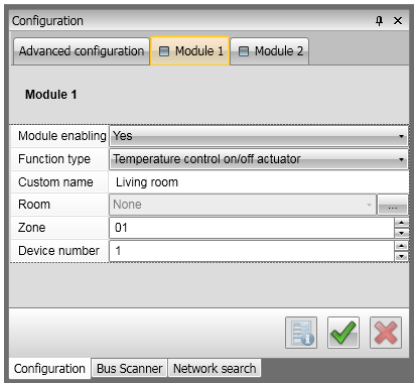
- Use the “BUS scanner” to upload configuration of the probe (Picture 1)
- Modify actuators parameters “**N°**” only (Cooling = 1 – Heating = 2) (Picture 2)
- Send the new configuration to the probe
- Use the “BUS scanner” to upload configuration of the actuator (Picture 3)
- Modify actuator parameter “**Device number**” only (Device number = 2) (Picture 4)
- Send the new configuration to the actuator



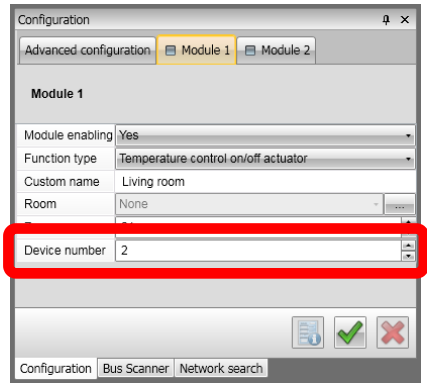
Pic.**1**



Pic.**2**



Pic.**3**



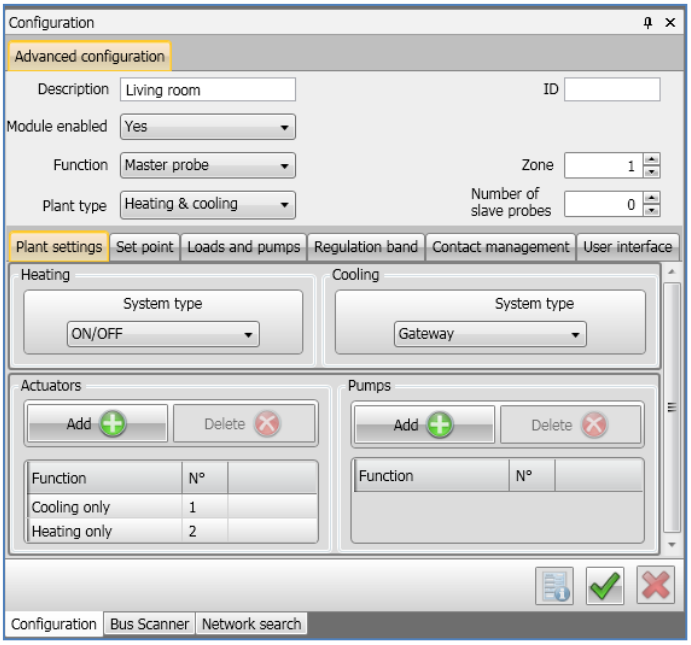
Pic.**4**

If present 99zones Control unit

Configure the probes by MyHOME_Suite or with physical configurators.

- Probe in the Living room → 0-1 (Za-Zb)
- Probe in the Kitchen → 0-2 (Za-Zb)

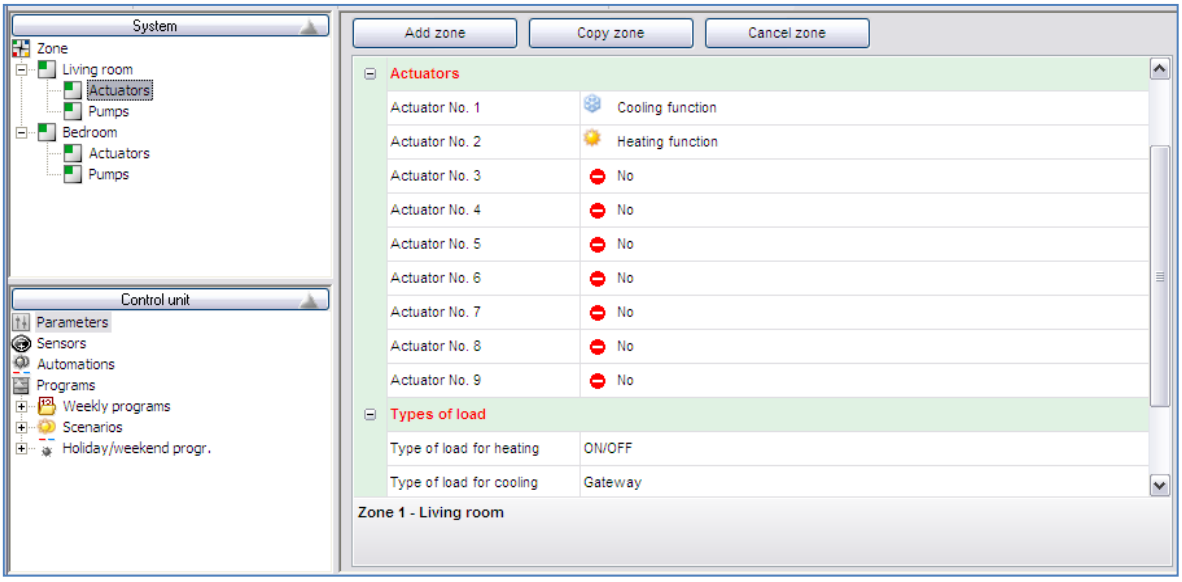
In the picture a MyHOME_Suite example of a “Thermostat with display” probe configuration.



2.3.4) 99zones Control unit

Configure the zones in the 99zones Control units using MyHOME_Suite or its menu.

- Both zones have
  - Actuator “N° 1” for Cooling
  - Actuator “N° 2” for Heating
- Type of Load for Cooling is “Gateway”
- Typo of Load for Heating is “ON/OFF”



2.3.5) Notes

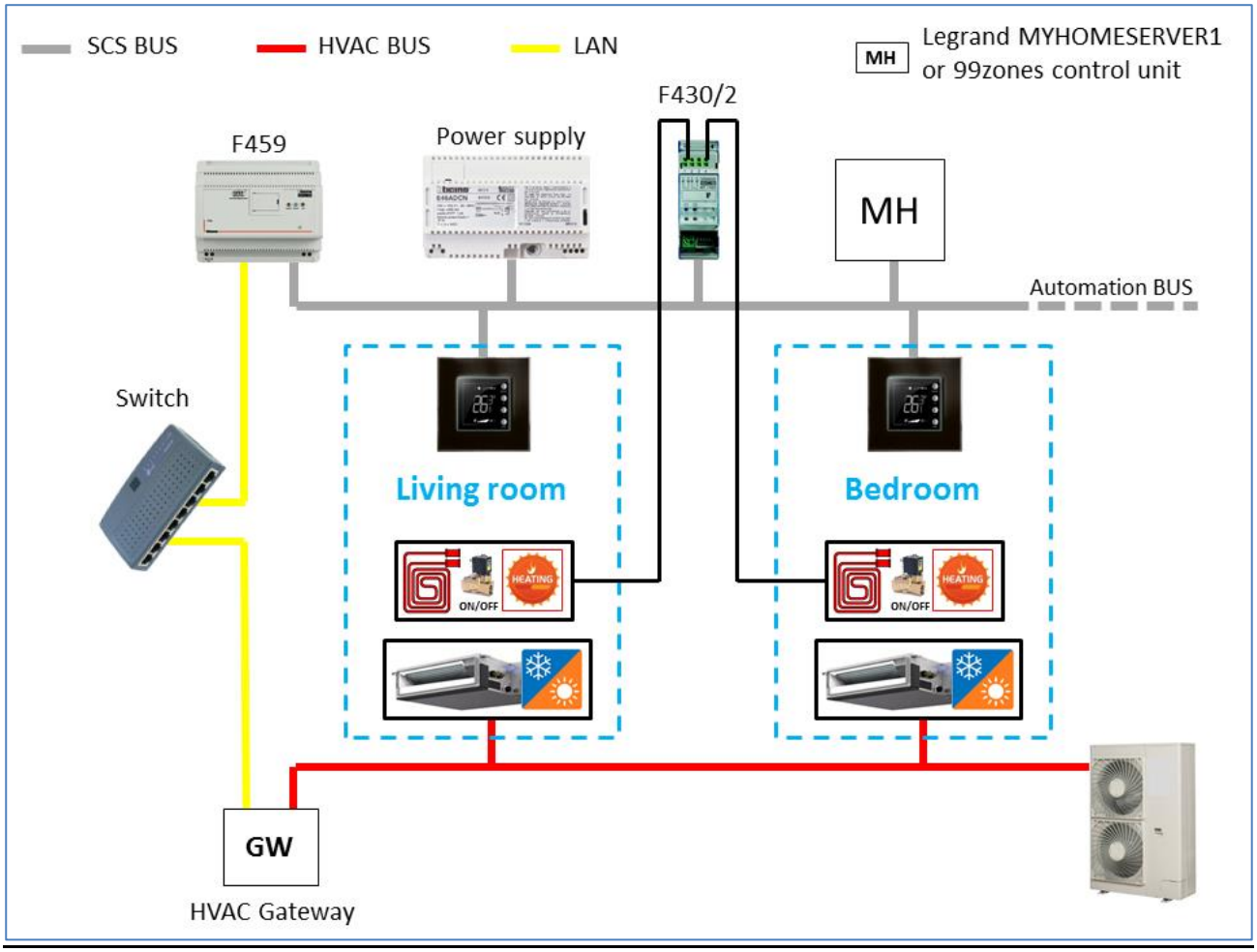
- The HVAC addressing of the unit/zone has to be defined by the HVAC designer/installer.
- A virtual actuator must be always the first, so actuator “N° 1”.
- The Driver manages **Cooling** function.

2.4 – EXAMPLE 4 - Single apartment, two controlled zones

2.4.1) Required management functions

Heating function : Floor Heating (ON/OFF valves) & HVAC indoor units

Cooling function : HVAC indoor units



2.4.2) Summing up

Zone	Probe	Actuators						
	Za - Zb	Item code	Status	Za - Zb	N°	Type of load	Function	Description
Living room	0-1	None	Virtual	0-1	1	Gateway	Cooling	Actuator emulated by the Driver on F459
		F430/x	Physical	0-1	2	ON/OFF	Heating	ON/OFF valve management
Bedroom	0-2	None	Virtual	0-2	1	Gateway	Cooling	Actuator emulated by the Driver on F459
		F430/x	Physical	0-2	2	ON/OFF	Heating	ON/OFF valve management

2.4.3) Probes & Actuators

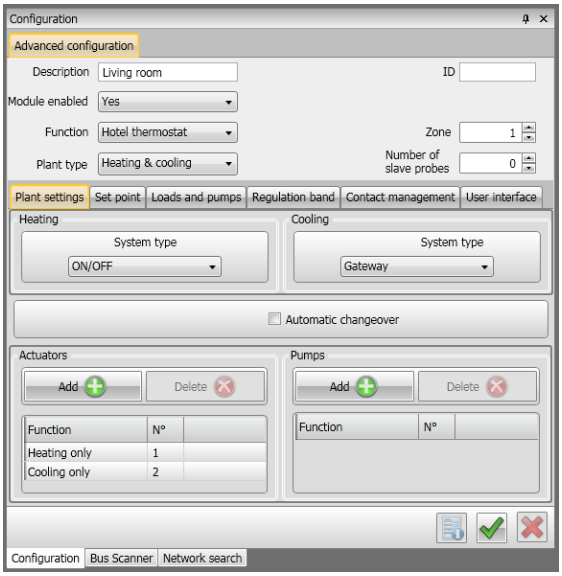
If present MyHOMEServer1

Configure probes by MyHOME_Up App.

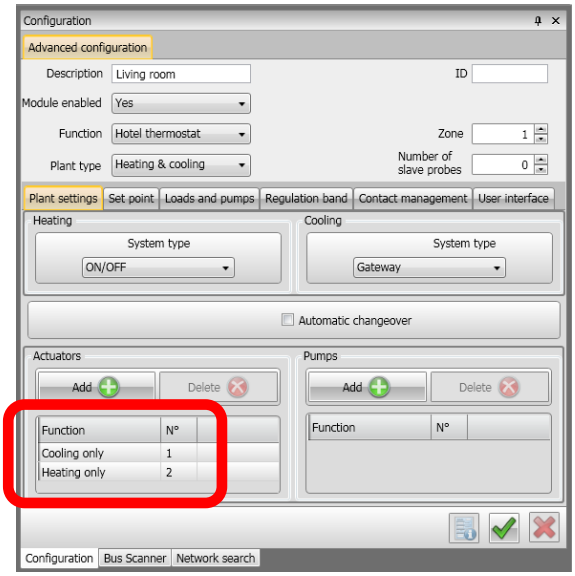
- Add into the desired room a “Thermostat object”
- Start the procedure “Wizard Thermo”
- Select the type of system → Heating and cooling
- Associate the thermostat → *Live procedure*
- Heating / Select the type of load to control → ON/OFF valve
- Heating / Associate the actuator (…) → *Live procedure*
- Pump Heating → *Follow the procedure to configure the Pump, if required*
- Cooling / Select the type of load to control → Gateway
- Pump Cooling → *NO selection*

ATTENTION: It is now required to modify some actuator parameters, procedure feasible with use of MyHOME_Suite software only, in detail :

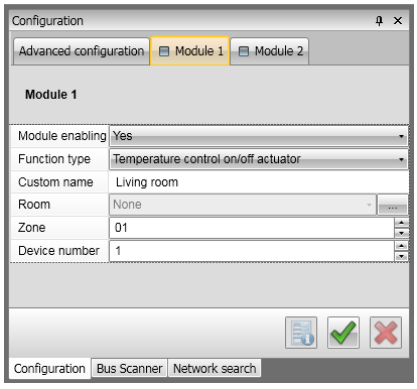
- Use the “BUS scanner” to upload configuration of the probe (Picture 1)
- Modify actuators parameters “**N°**” only (Cooling = 1 – Heating = 2) (Picture 2)
- Send the new configuration to the probe
- Use the “BUS scanner” to upload configuration of the actuator (Picture 3)
- Modify actuator parameter “**Device number**” only (Device number = 2) (Picture 4)
- Send the new configuration to the actuator



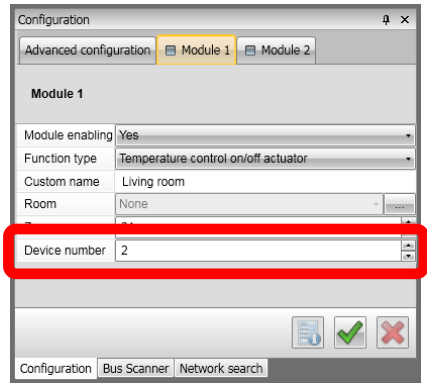
Pic.**1**



Pic.**2**



Pic.**3**



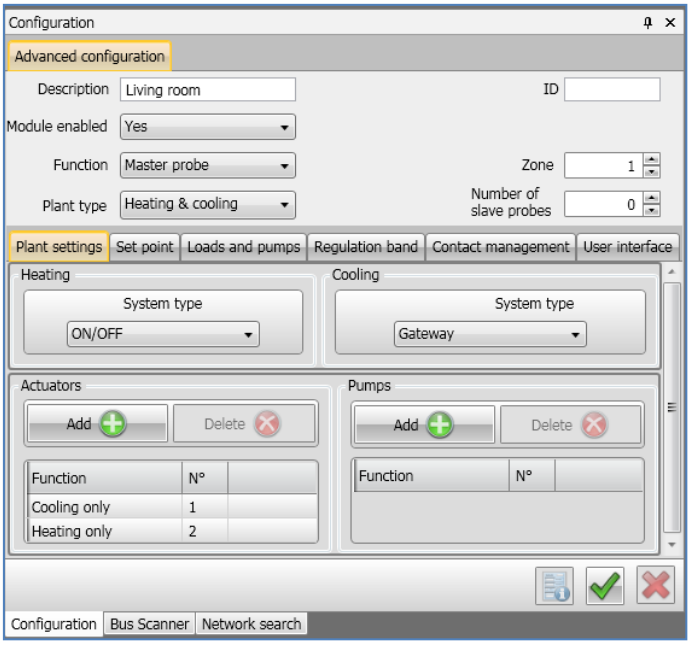
Pic.**4**

If present 99zones Control unit

Configure the probes by MyHOME_Suite or with physical configurators.

- Probe in the Living room → 0-1 (Za-Zb)
- Probe in the Kitchen → 0-2 (Za-Zb)

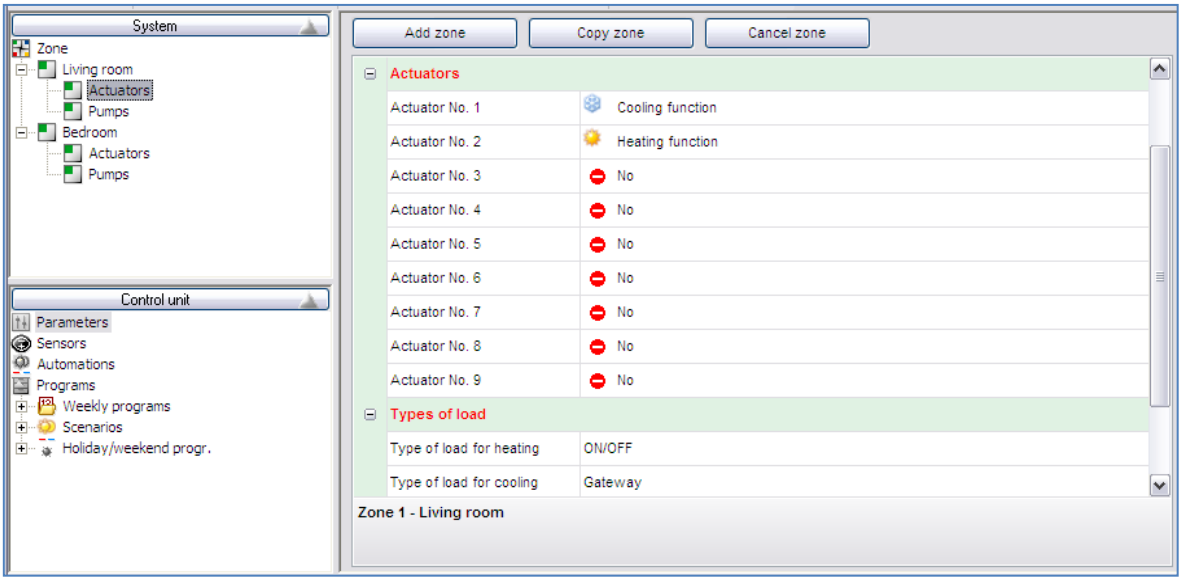
In the picture a MyHOME_Suite example of a “Thermostat with display” probe configuration.



2.4.4) 99zones Control unit

Configure the zones in the 99zones Control units using MyHOME_Suite or its menu.

- Both zones have
  - Actuator “N° 1” for Cooling
  - Actuator “N° 2” for Heating
- Type of Load for Cooling is “Gateway”
- Typo of Load for Heating is “ON/OFF”



2.4.5) Notes

- The HVAC addressing of the unit/zone has to be defined by the HVAC designer/installer.
- A virtual actuator must be always the first, so actuator “N° 1”.
- The Driver manages **Cooling**.
- The Driver manages also a part of **Heating** :
    - Probes manage ON/OFF actuator
    - The Driver manages the HVAC Units just to speed up the room heating following the parameters configured in Preferences Page.
      The main system for heating is the Floor Heating system, HVAC is a sort of slave system that speed up the warming up of the room and stops before that the set point in the room is reached.
    - Because of this “combined” management, the zone must be considered as ON/OFF with automatic management of the HVAC indoor unit (Fan-Speed included).

3 – HOW TO SET UP THE MYHOME PART

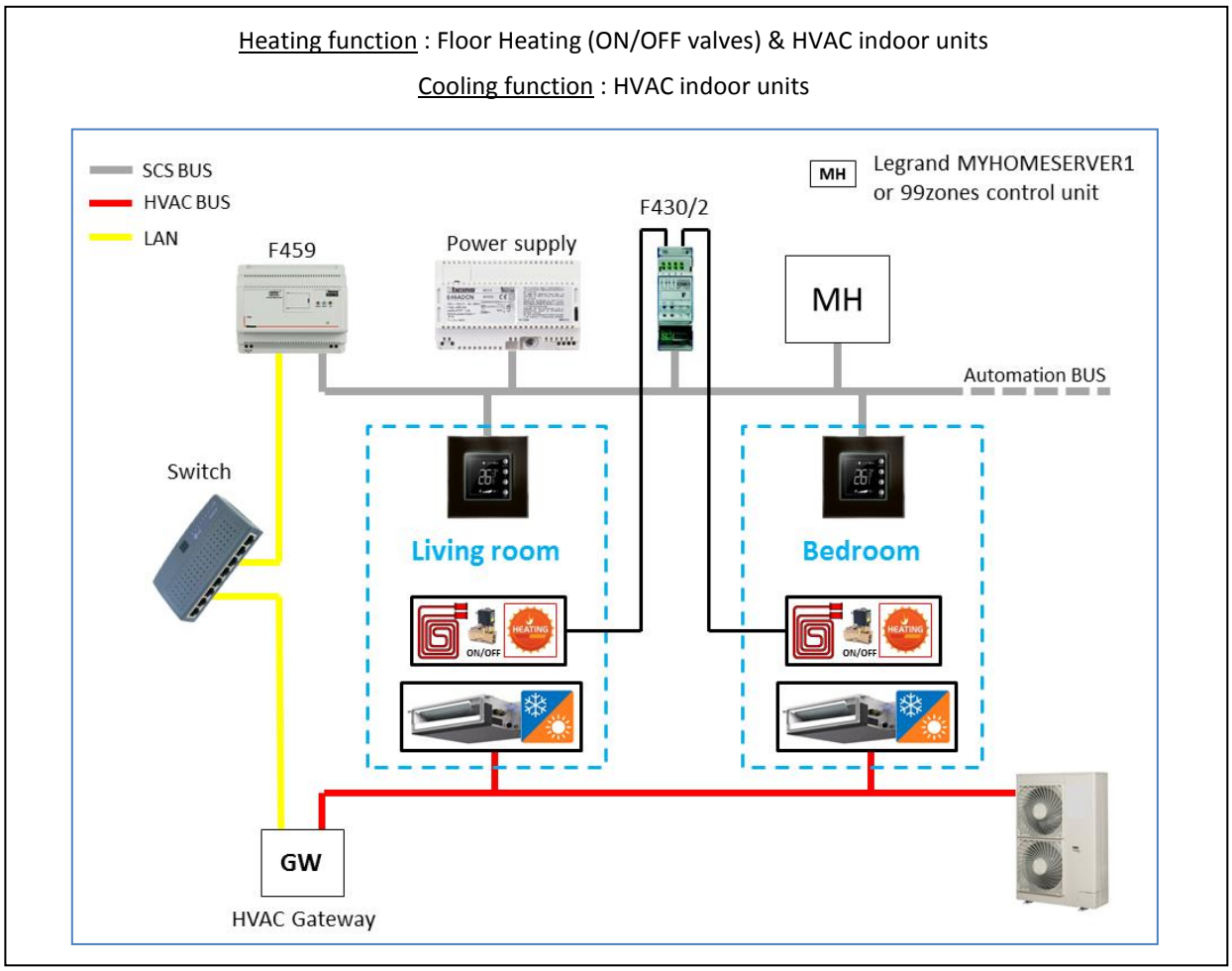
To quote the Legrand part of the integrated system, it must be considered :

- n°1 Legrand MYHOMESERVER1 device **or** 99zones Temperature Control Unit
- n°1 SCS temperature probe each temperature zone to manage through MyHOME
- SCS temperature control actuators (*)
- n°1 Legrand F459 (**) Driver manager device
- SCS BUS Power supply (use the MyHOME Automation BUS, if already present and correctly dimensioned in terms of consumption)
- "Driver License" + "Commissioning" costs (***)

(*) Only if required the combined management of other temperature systems (i.e. Floor Heating or Radiant Panels, etc…) (Picture 1). If required only management of the HVAC system (for heating and/or cooling function), NO actuators are needed.

(**) In case of huge systems could be necessary to use more than one F459 Driver manager device. One F459 for every 50 controlled zones. One F459 is able "to talk" with only one "third party" gateway.

(***) To quote as independent price.



Picture1