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ENHANCED VRF SYSTEM

VRF + ZEPHIR³ UNIFIED CONTROL

A Group Company of Midea

Enhanced VRF System – Introduction

The heart of the System is the thermodynamic heat recovery technology for centralized **primary air** applications as an alternative to traditional direct expansion air handling units.

Main **advantages** of Zephir^3 in combination with VRF:

- **Simple**: primary air by a single **stand-alone** system
- **Quick**: **no need of piping connections** on field
- **Slim**: unit **compactness** and possible **indoor installation**
- **Flexible**: Possible both as **centralized** and **local** solution
- **Savings**: High **efficiency** thermodynamic heat recovery technology
- **Effective**: Precise **regulation** of **supply** air conditions
- **Differentiating**: Maximum **quality** of **air** supplied

Enhanced VRF System – Comfort application

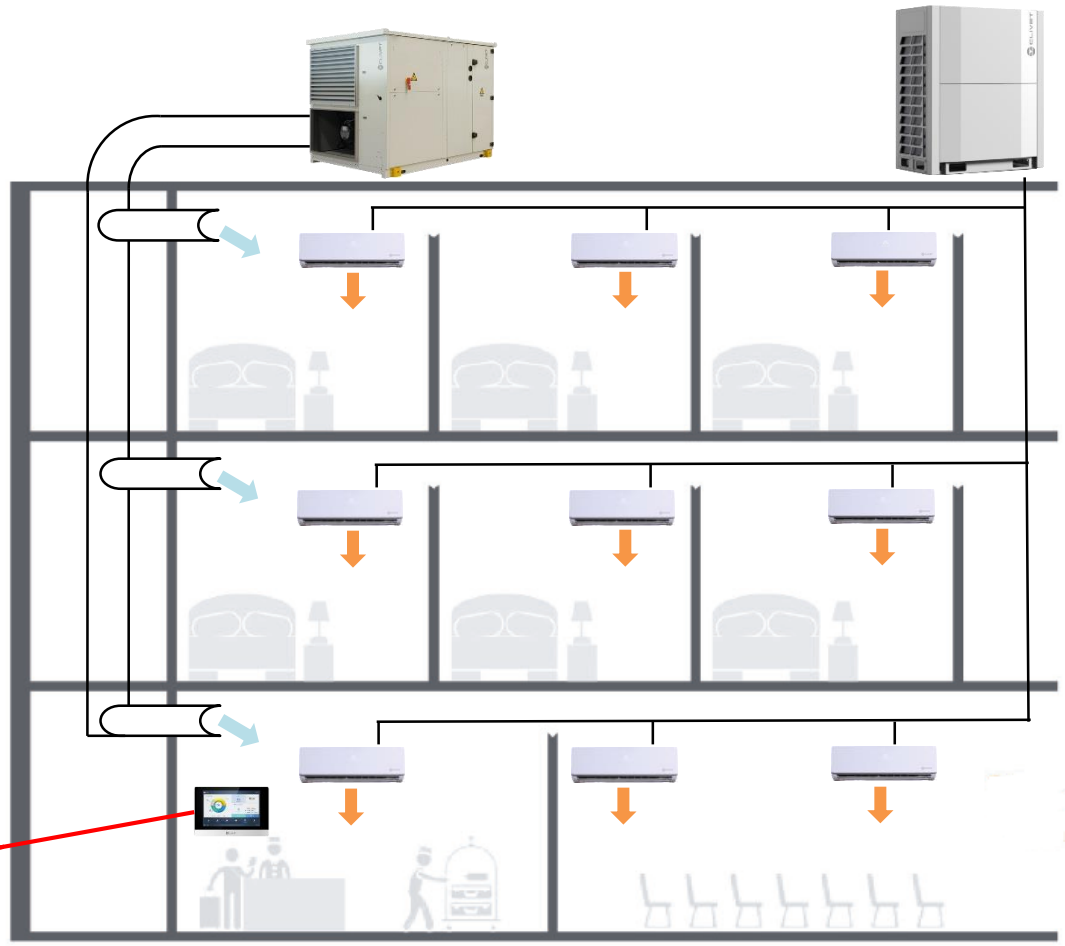
Needs:

- Air conditioning
- Primary air

Enhanced VRF System – Comfort application

Solution:

- Air conditioning → VRF
- Primary air → Zephir^3

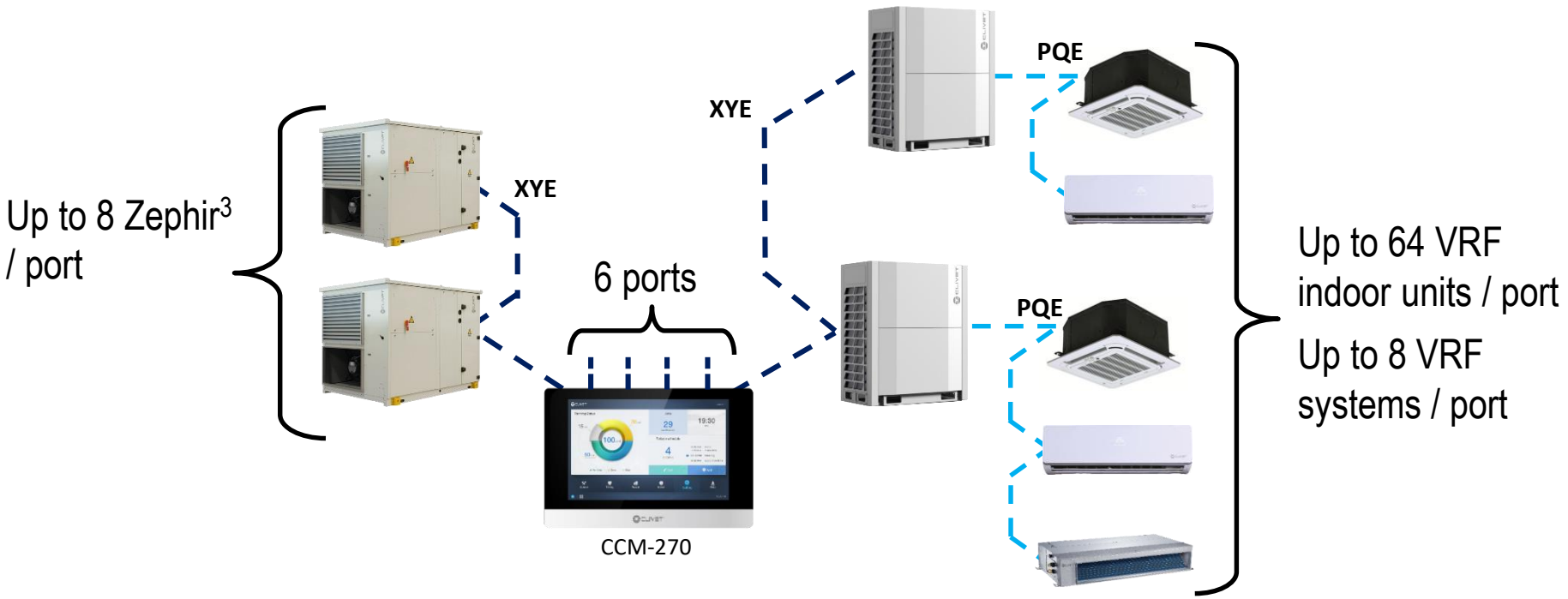


Unified system control

Enhanced VRF System – Components

- Control → **Touchscreen 10" centralized controller CCM-270**
- Air conditioning → **VRF system**
- Primary air → **Zephir^3 + «VRF gateway» option**

Enhanced VRF System – Units controllable



One CCM-270 can manage:

- VRF → Max 64 IDU or 8 systems per port / Max 384 IDU or 48 systems per CCM-270
- Zephir³ → Max 8 Zephir³ per port / Max 48 Zephir³ per CCM-270

Enhanced VRF System – Functions

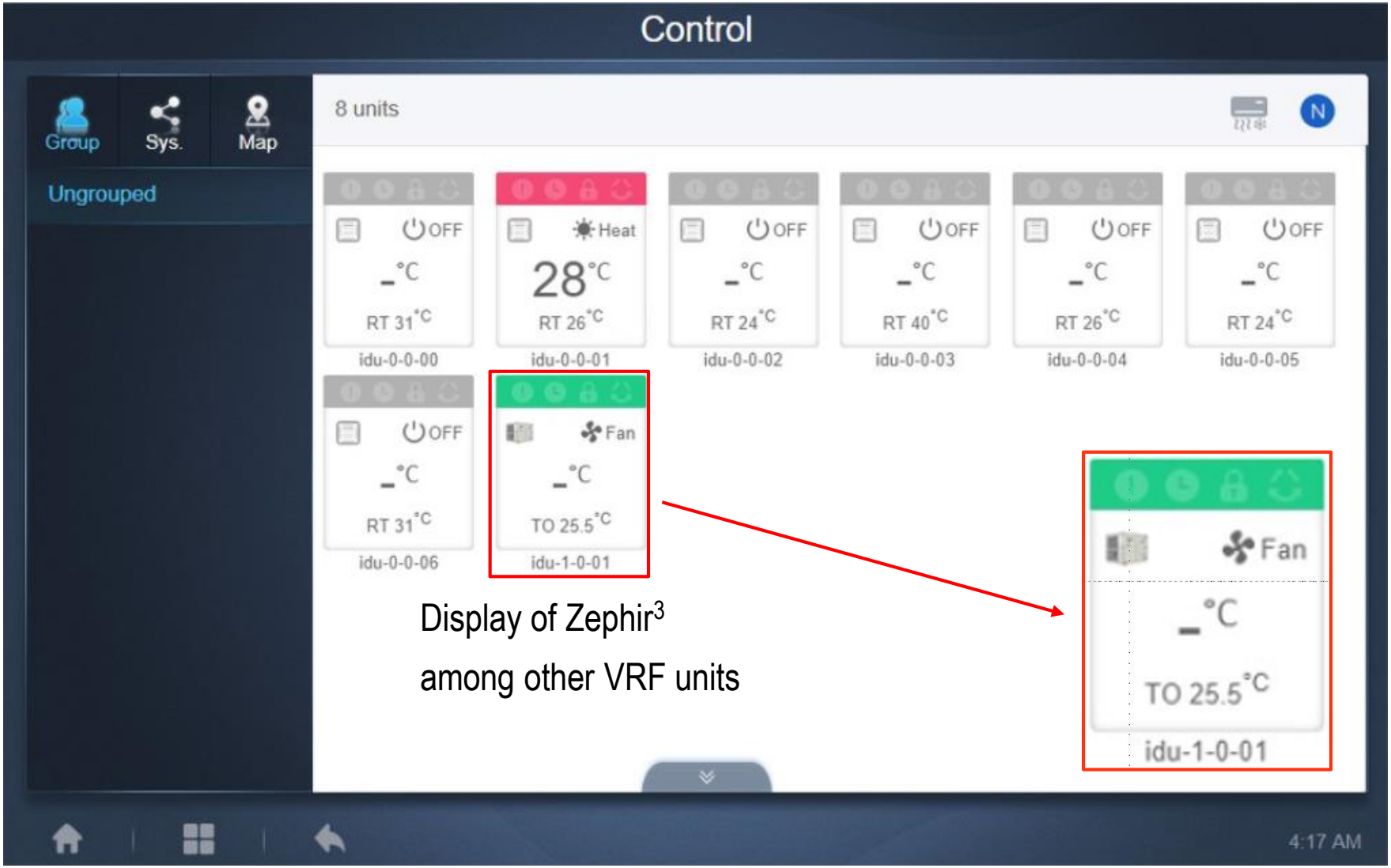
Zephir[3] functions available on CCM-270:

- **ON/OFF**
- Change **±4°C** on supply air temperature target
- **Hour and weekly schedule**
- Set **auto/fan mode**
- **Alarm** monitoring

Other parameters of Zephir[3] can be set by display on unit

In addition to VRF management with all functions available by CCM-270: indoor units commands, weekly schedule, lock of remote controls functions, errors and parameters monitoring, etc.

Enhanced VRF System – Functions



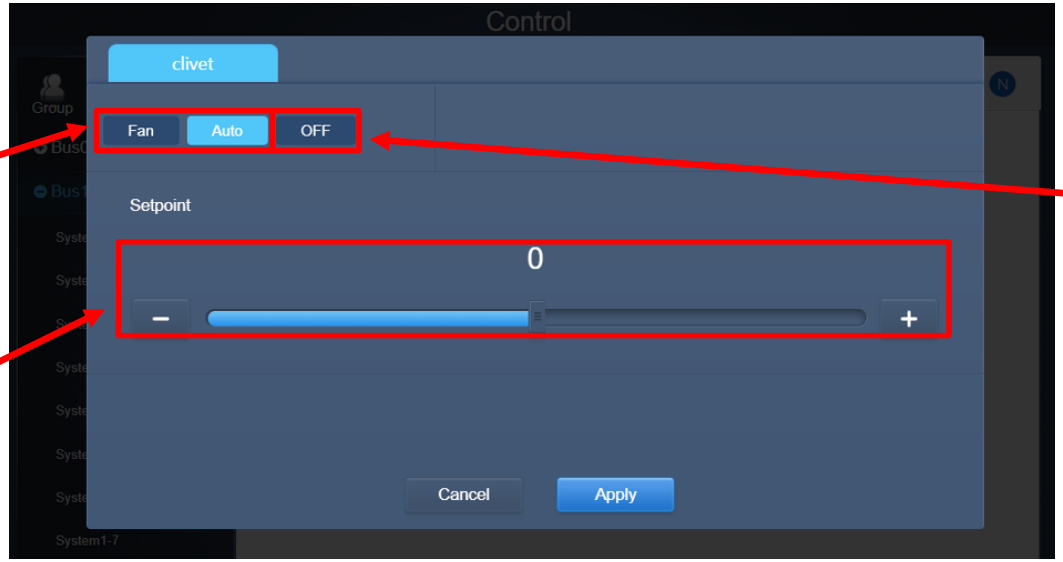
Display of Zephir[3]

among other VRF units

Enhanced VRF System – Functions

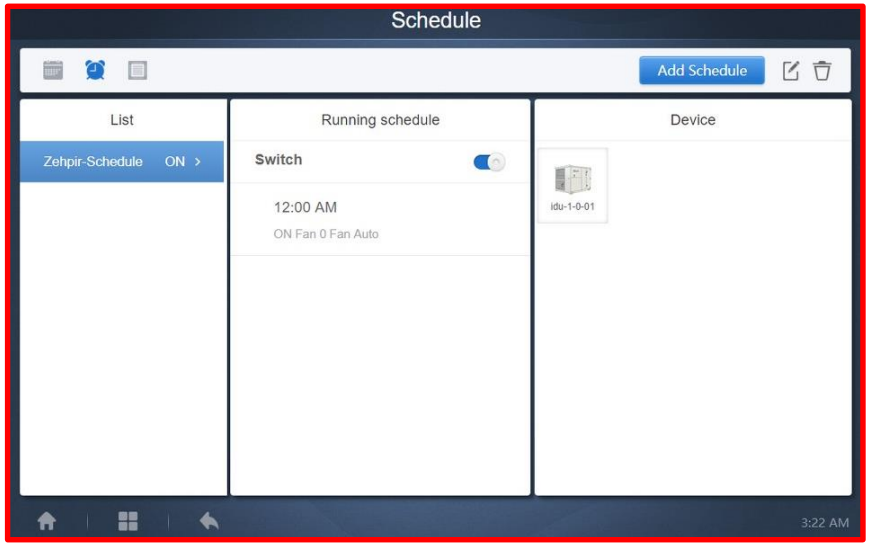
Set **auto/fan mode**

Change **±4°C** on supply air temperature target



ON/OFF

Hour and weekly schedule

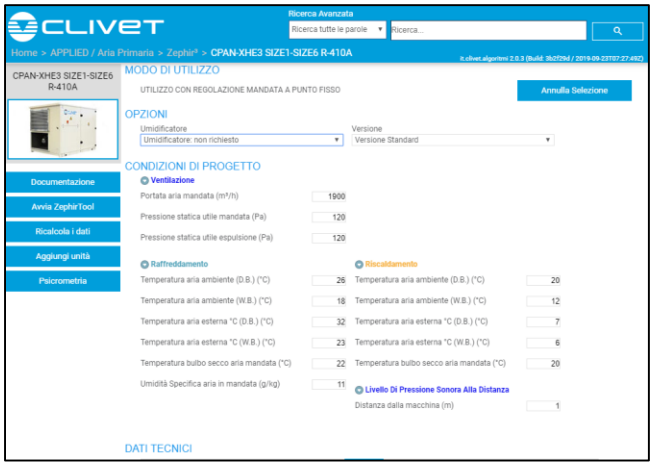


Alarm monitoring

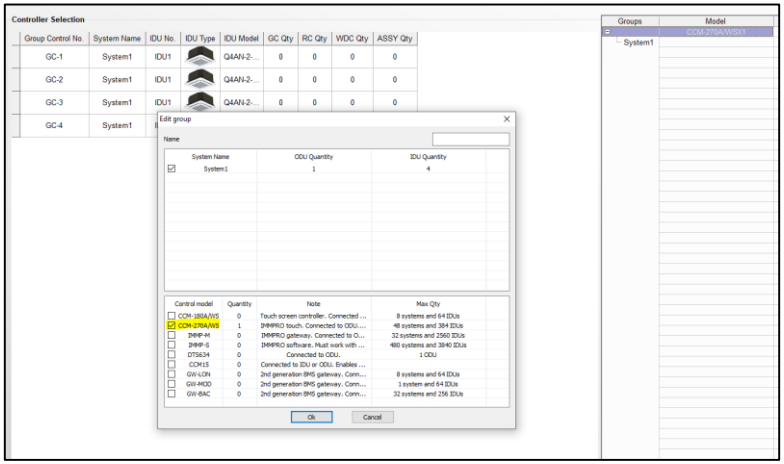
Other parameters of Zephir3 can be set by display on unit

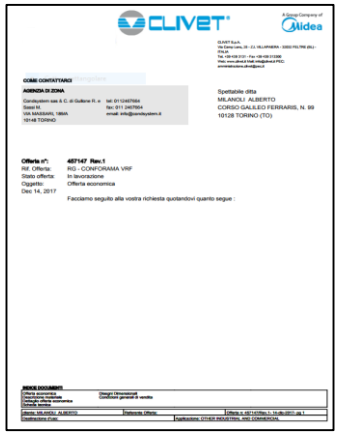
Enhanced VRF System – How to Offer it?

Zephir^3 → from **navigator** by selecting «**VRF gateway**» option



VRF → from selection software by selecting **CCM-270** centralized controller



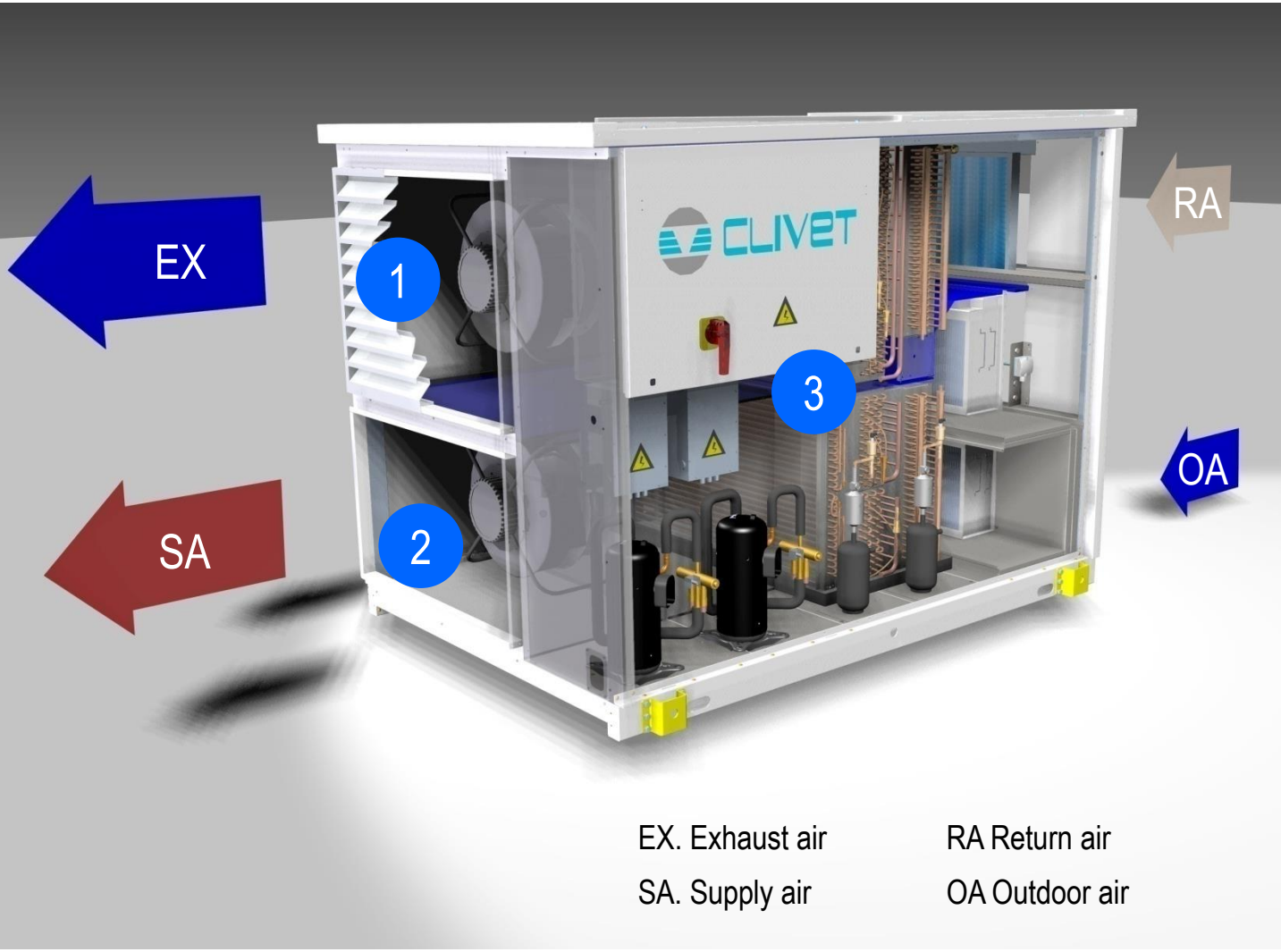


Zephir^3 – The whole Primary air plant in a single stand-alone System

1. Air return and **exhaust** section with **energy recovery**

2. Fresh air handling and **supply** section

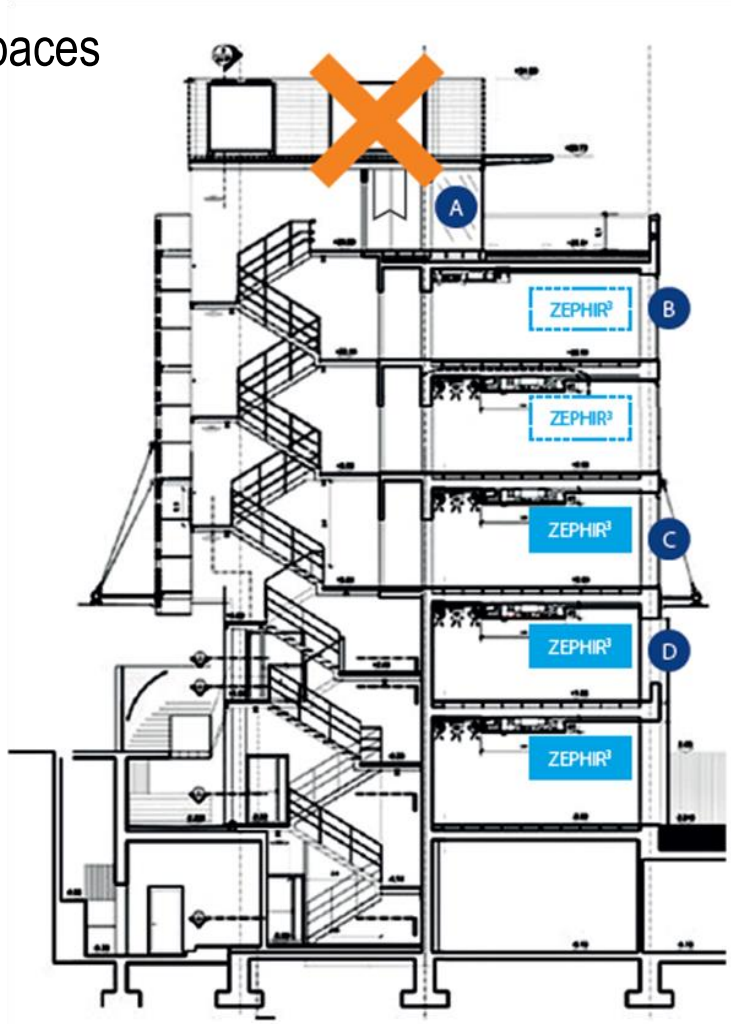
3. **Thermodynamic** inverter section and control panel



EX. Exhaust air
SA. Supply air
RA Return air
OA Outdoor air

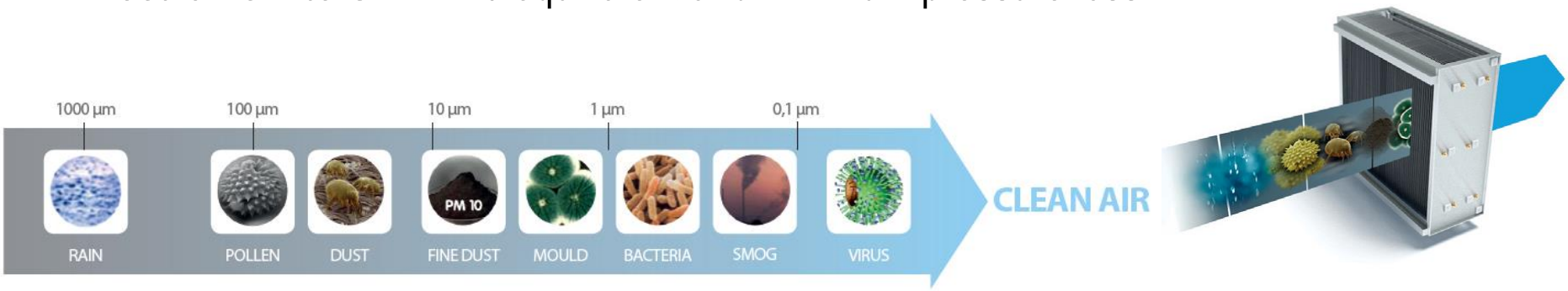
Zephir^3 – Advantages in combination with VRF

- **Stand-alone** unit → no need of piping connections
- **Compactness** → perfect for installation in narrow spaces
- **Supply air temperature and HUMIDITY control** → maximum comfort
- Possible **indoor installation** → modular design with single zone control

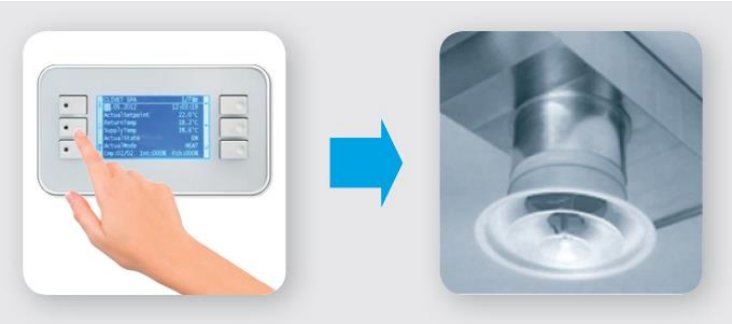


Zephir^3 – Advantages in combination with VRF

- **Electronic filters** → **H10** equivalent and minimum pressure loss

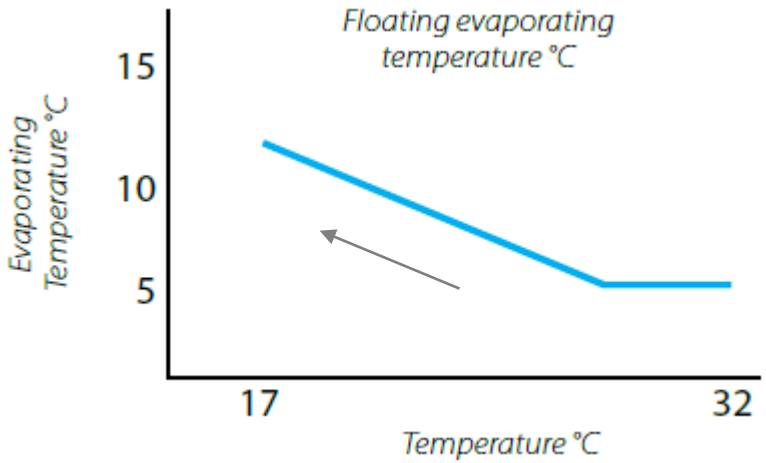


- **Thermodynamic heat recovery** → no pressure loss typical of passive heat recovery and no and air flows contamination
- **Constant** or **variable air flow** depending on actual crowding detected by the **CO_2** probe



Zephir^3 – Advantages in combination with VRF

- Particularly convenient **in combination with VRF MV6 series** having variable evaporating/condensing temperature (**EMS**) control.



By activating EMS function and using Zephir^3 for primary air control, VRF system modulate evaporating and condensing temperature depending on ambient conditions, ensuring the maximum **comfort** and **energy savings**.

Enhanced VRF System – Case study

Application: Office building (8-20, 5/7), 4 floors

Primary air: 12000 m^3/h

Total load, primary air + air conditioning: 260 kW

Air conditioning system: VRF with indoor units

Centralized primary air ventilation - solutions:

No.	Aspect	System	Regulation	Humidity control	Air filtration
1		**VRF AHU (supply + exhaust flows, enthalpic heat recovery with 77% efficiency) connected to VRF outdoor unit**	Return T control	No	F7
2			Supply T control (electric post-heat)	Yes	F7
3		**Zephir^3**	Supply T control	Yes	Electronic (H10 eq.)

> comfort

> Air quality

Capacity installed for each solution:

No.	Air conditioning VRF	Primary air
1	4 systems x 50 kW	AHU VRF standard 12000 m^3/h VRF outdoor unit dedicated: 61 kW
2	4 systems x 40 kW	AHU VRF with electric post-heat 12000 m^3/h VRF outdoor unit dedicated: 106 kW
3	4 systems x 40 kW	Zephir^3 Size 6 12000 m^3/h (117 kW) VRF outdoor unit dedicated: NO

Technical/economical comparison – centralized systems:

No.	System	First investment (€)	Annual consumption (kWh)	Annual consumption (€)	Energy saving	Payback (year)
1	VRF + AHU VRF standard	145.000	69.500	10.400	**Ref.**	**Ref.**
2	VRF + AHU VRF with electric post-heat	154.000	74.200	11.100	**+6%**	**NEVER**
3	VRF + Zephir[3]	147.000	63.600	9.500	**-9%**	**2,2**

*Total cost of units for air conditioning and primary air, installation included. Consumptions for outdoor units and primary air, cost for electric energy 0,15 €/kWh

Conclusions

- Zephir^3 represents an **excellent alternative** to primary air systems based on **direct expansion AHU connected to VRF**

Strengths:

- Stand-alone system ensuring a high level of comfort throughout the year
- Superior air quality and constant supply air temperature
- Payback in about 2 years compared to the alternative with standard AHU
- Lower first investment compared to AHU with electric post-heat, and lower consumptions thanks to high energy efficiency of the system

Thank you

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