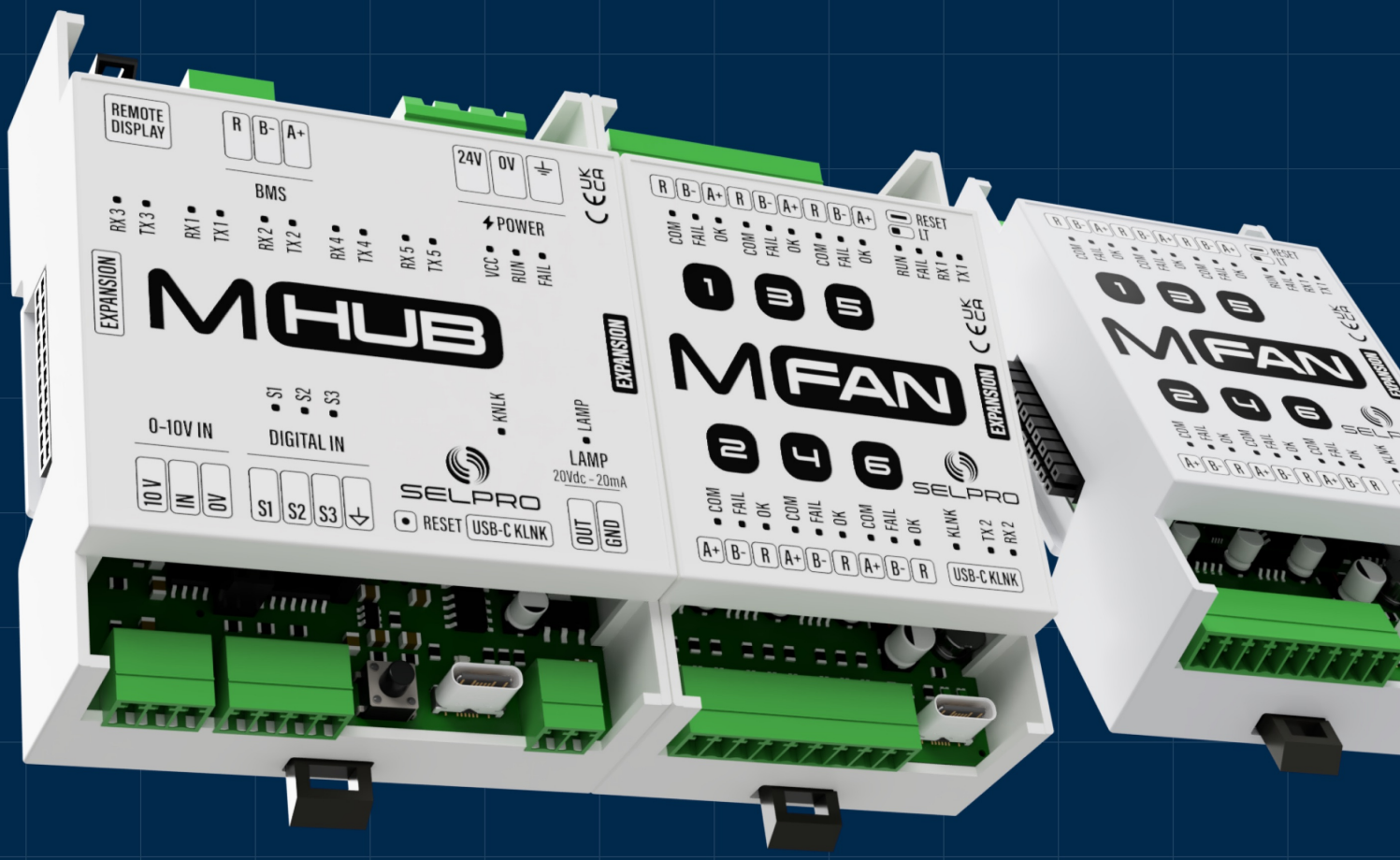
MHUB + MFAN

Plug-and-play Modbus hub for **EC ventilation systems**



Digital management of EC motors

Without the complexity of Modbus

Modulo automatically converts your control signal into Modbus communication with the EC fans — including addressing, configuration and data collection.

SELPRO

THE PROBLEM

Four situations you recognise.
One system that solves them all

In systems with multiple EC fans, the benefits of digital control come together with concrete operational issues that every machine or panel builder knows well.

Analogue control

The 20% wall

With 0–10 V control, below 2 V the fans do not receive the signal. Minimum speed is limited to around 20%.

At low load or in winter: oscillations, unstable condensation, inefficient defrosting.

OPERATING LIMIT

No speed below 20%. No data. No configurable emergency mode.

Modbus daisy-chain

The network that slows down

With 20+ devices at 19,200 bps, the PLC polls each fan sequentially.

In documented configurations, the polling cycle exceeds 15 seconds — unacceptable for critical control logic.

OPERATING LIMIT

Fault on a single node: risk of locking the entire chain. Fragmented diagnostics: each device must be scanned individually.

Commissioning

Manual addressing

On a machine with 16 EC fans, Modbus commissioning requires each motor to be configured individually: addresses, parameters, chain testing.

A technician who knows the protocol is required.

OPERATING LIMIT

Hours lost. Risk of errors. Dependence on specialists and higher costs.

Maintenance

Specialised service

A fan fails. Physical replacement, re-addressing, firmware compatibility check, configuration upload. In the field, often without up-to-date documentation and without an available Modbus expert.

OPERATING LIMIT

Each intervention requires a specialised technician. Risk of configuration errors appearing later.

SYSTEM ARCHITECTURE

Three levels.
A single integration point.

Your regulator or controller manages the system logic: it decides when to enable cooling, which setpoint to follow, and which operating mode to use.

Modulo works **one level below**. It takes the controller's decisions and brings them to each individual EC fan. It automatically translates the control signal into the **native Modbus protocol** of each motor, collects diagnostic data and aggregates it in a **standard format**, and manages emergency logic when the controller is not available.

Your PLC does not change. Its operating capabilities change.

Your **PLC/BMS**

Decides the logic: when to cool, how much, and in which mode. It does not change.

Modbus RS485 or **0–10 V signal**

↓ ↓ ↓ ↓ ↓

MHUB + MFAN

Receives the command, translates it into the native Modbus protocol of each motor, distributes the instructions, collects 40 parameters per fan, and manages emergency logic. A simple initial configuration: only the fan type and the number of outputs to enable.

Addressing, configuration, commands and **data management**

↓ ↓ ↓ ↑ ↑ ↑

The **EC** fans

The EC fans receive commands in native Modbus. ebm-papst, Ziehl-Abegg, Hidria, Nicotra, Dunli and others... — Modulo speaks their language.

Your supervision system sees one device with one register map — regardless of how many fans there are and what brand they are.

SYSTEM COMPARISON

0–10V · Daisy-chain · Modulo

Not all control architectures deliver the same results.
Between 0–10 V control, Modbus daisy-chain and Modulo, the way the system is **installed**, **configured**, **maintained** and **managed over time** changes.

This table puts three approaches side by side on the parameters that matter in the field: **start-up simplicity**, access to EC fan functions, operational continuity, data availability and maintenance costs.

Parameter	0–10 V analogue	Modbus **daisy-chain**	Modulo
Minimum achievable speed	>20%	4–5%	**4–5%, even with 0–10 V signal**
Access to advanced EC functions	Not available	Complete	**Complete, automatic**
Initial system setup	None	⚠ Manual motor-by-motor addressing	**Fan type + number of outputs only**
Ease of installation	Simple	⚠ Complex (terminations, interference)	**Plug & play, 3 wires/motor**
Configurable emergency modes	⚠ Manual workarounds only	⚠ Configurable, but complex	**Automatic, 2 levels**
Fan maintenance and replacement	Simple, mechanical part only	⚠ Specialised Modbus technician, long times	**Any HVAC technician, no reconfiguration**
Maintenance cost over time	Low, but no diagnostics	⚠Specialised technician at every intervention	**Standard technician, intervention only on the physical part**
Data available for BMS/PLC	Not available	⚠ Polling on each device	**40 registers per fan, aggregated, fixed latency**
Advanced functions	None	⚠ Possible, advanced configuration	**Simple and automatic**
Operational continuity	No automatic management	⚠ Possible, advanced configuration	**Automatic isolation of failed fan**
Retrofit on existing systems	Minimal improvement, only compared with AC	⚠ Very complex, only with high expertise	**High: turns analogue into digital**

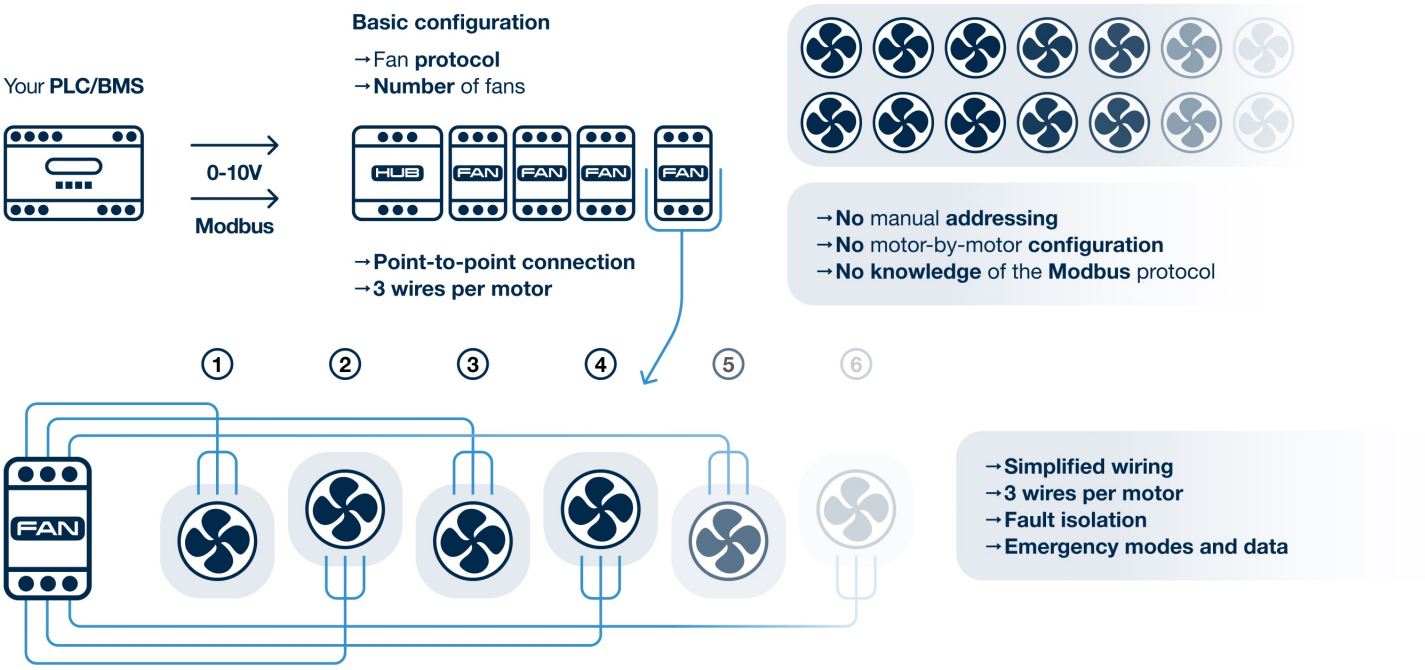
FOUR PROBLEMS SOLVED

From specialised operation to standard procedure.

01 Automatic commissioning

Initial configuration requires two parameters: the type of connected fans and the number of MFan outputs to enable. From that moment, the system **identifies each motor autonomously**, establishes communication and checks that each fan is correctly connected

No Modbus address mapping is required. No motor-by-motor configuration is required. A technician with specific protocol skills is not required for **standard commissioning**.



Traditional system	Modulo
Manual motor-by-motor addressing	Initial configuration: **fan protocol + number of fans**
Specialised Modbus technician	**Any HVAC technician** or installer
Risk of duplicate or incorrect addresses	**Automatic connection verification** included
System documentation required	The **system identifies** the **motors** autonomously
Reprogramming at each replacement	**No post-replacement reconfiguration**

OPERATING RESULT

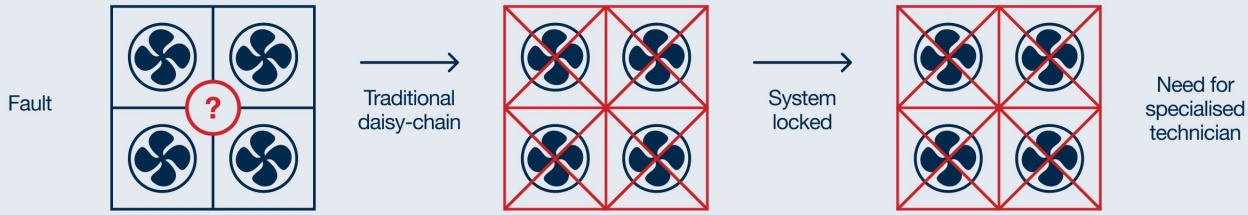
Connect the 3 wires, indicate the fan type and the number of outputs. The system does the rest.

02 Replacement without reconfiguration

When an EC fan fails, MFan detects the problem, **isolates that single output** and keeps all other motors operating. The fault is immediately visible: which port, which fan.

When the new motor is connected — even with a different firmware version — Modulo establishes communication automatically and loads the correct configuration for the new fan: **speed, emergency mode, limits**. No manual operation on software configuration or addressing.

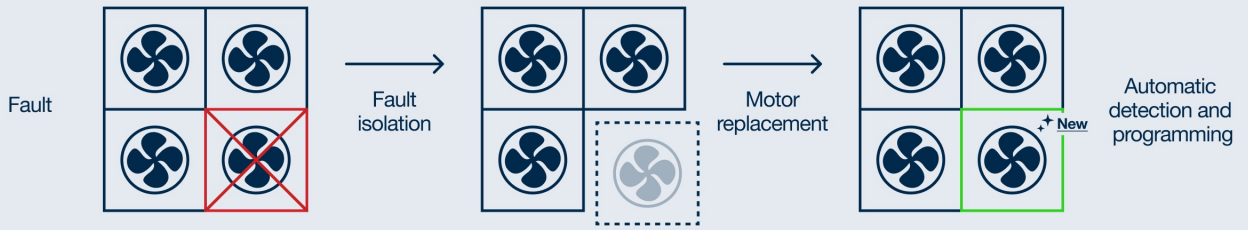
Traditional system



OPERATING LIMIT

Failed fan → network diagnosis → node localisation → physical replacement → re-addressing → firmware check → chain test → ~2–4 hours of specialised technician time

With Modulo



OPERATING RESULT

Failed fan → MFan automatically isolates the fault → physical replacement → 3-wire connection → automatic recognition → ~20–30 minutes, any technician

The technician replacing the fan only needs basic mechanical and electrical operations; Modulo takes care of the rest.

03 Fixed-latency polling

The PLC polls **a single point: MHub**. Internally, MHub continuously collects data from all fans and aggregates it in a single normalised memory. The response time to the supervisor is **constant** — regardless of the number of connected fans.

In traditional Modbus networks, the supervision system polls each device sequentially. With 10 or more fans on an already busy network, the cycle time grows proportionally with the number of devices.

With Modulo, this logic changes structurally. The PLC or BMS polls **one endpoint only** — regardless of how many fans are in the system.

40 registers per fan by default, accessible in real time

Operating states | **Speed** | **Power consumption**

Temperatures | **Operating hours** | **Alarms** | All Modbus data

OPERATING RESULT

Response time to the supervisor is fixed. Adding fans does not increase the load on the supervisory network.

04 A single protocol, all devices integrated.

Your PLC integrates the Selpro protocol once. Any EC motor manufacturer supported by Modulo can be reached without modifying the controller firmware. Modulo also handles different firmware versions from the same manufacturer on the same system.

PROTOCOL ARCHITECTURE

MHUB

Single integration point for your PLC

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Internally managed Modbus protocols

ebm-papst | **Ziehl-Abegg** | **Nicotra** | **Hidria** | **Dunli**

+ more coming soon

EXPANDING ECOSYSTEM

Modulo's architecture is designed to progressively integrate RS-485 field devices beyond motors.

Two components.
MHub and MFan

MHUB - CENTRAL MODULE

The system brain

Receives the existing control signal, manages all communication logic with the fans, aggregates data in a single normalised memory and appears to the supervisory system as a single Modbus address.

RS485 Modbus RTU | 0-10V input | USB-C KLNK | 3 On/Off contacts

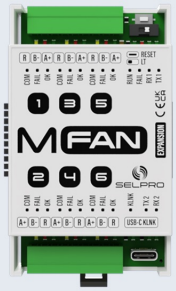
- **1 Modbus** RTU RS-485 **input** to BMS/PLC
- **1 analogue 0–10 V** signal input
- **3 configurable On/Off** contacts (digital inputs)
- **1 output** for signal **lamp**
- **USB-C** port for configuration and updates
- 8-pin port for **remote display**
- Size **4M → 71.1 x 90 mm**

MFAN - DISTRIBUTION MODULE

Interface to the motors

Each MFan manages up to 6 EC fans in point-to-point topology. Up to 5 MFans can be connected to one MHub (30 fans). They are added without reprogramming. They speak natively with the Modbus protocols of each supported manufacturer.

6 motor outputs | 3 wires per motor | Auto-addressing | Auto-configuration



- **6** dedicated **motor outputs** (A+, B-, Ref per motor)
- **3 wires per motor** — no additional cable for alarms or signals
- **40 registers per fan** accessible in real time (expandable on request)
- **USB-C** port for firmware update
- Size **3M → 53.3 x 90 mm**

ECPRO SELPRO

Native integration

With ECpro, Modulo connects via internal bus — zero gateways, zero additional cables. Parameters, configuration and diagnostics managed directly from the ECpro interface.

DISPLAY MXC + KLNK

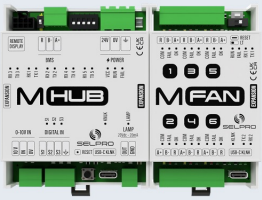
Field configuration

MXC remote display for local parameter setting. KLNK key (USB-C) for Wi-Fi access from smartphone or laptop — quick commissioning and service without PLC access.

THIRD-PARTY CONTROLLERS

With any existing system

MHub accepts 0–10 V or Modbus RTU. The existing controller does not change. Modulo manages all complexity toward the fans internally.



ADVANCED OPERATING FUNCTIONS

What analogue control cannot give you.

Many functions are already in EC motors. Modulo enables them because it knows how to speak to them.

Low capacity

Progressive activation at low load: a few fans active at their maximum efficiency point instead of all at 20% minimum. Configurable thresholds and sequences.

Chiller low load · heat pumps · winter

Reverse rotation

Reverse-rotation command for controlled defrosting or automatic cleaning of heat exchanger coils. Configurable speed and duration.

Defrost · heat exchanger cleaning

Silent Mode

Programmed limitation of maximum RPM in configurable time bands. Noise reduction without manual intervention.

Hospitals · accommodation facilities · residential

Energy Meter

Power consumption monitoring by individual fan, bank or system. Meets the measurability requirements of Ecodesign Regulation (EU) 2024/1834.

Energy supervision · regulatory compliance

Individual RPM

Speed control for each EC motor. Customisable maximum limits. Flow optimisation in asymmetrical configurations.

Fan wall · fan grid · multi-zone AHU

Integrated protections

Anti-icing fan release, condensate drying, fail-safe per individual motor, alarm log, two independent configurable emergency-speed levels.

Critical environments · data centres · cold storage

What happens
when something goes wrong

In an industrial system, the question is not “will it always work?” but “what happens when something stops working?”. Modulo has a configurable response for each scenario.

Scenario	What happens	Modulo response
Loss of BMS signal → MHub 01	The master loses the connection. MHub is still operating. 	After a **configurable timeout**, typically between 10 and 30 seconds, the fans **automatically switch** to the programmed **emergency speed**.
MHub hardware fault 02	MHub no longer generates commands or emergency functions. 	The fail-safe logic pre-loaded in each individual EC fan activates autonomously — **2nd independent safety level**. The physical manual contact allows override from the panel.
Single MFan fault 03	A distribution module stops. 	The other **MFans continue to operate normally**. The fans on the failed module are isolated, signalled and, depending on the configuration, may retain the last recorded speed or switch to emergency speed. The **fault does not propagate** to the network. (Not possible with daisy-chain.)
Fan replacement 04	Fan replacement 	Modulo **automatically recognises the new motor**, **addresses** it and **loads** the correct **configuration** — even with firmware different from the previous one. No manual intervention.

With 0–10 V control alone, emergency logic is not managed as a system function, but requires ad hoc solutions — such as physical bypasses.
They are neither automatic nor configurable for multiple scenarios, and they do not allow a partial fault to be distinguished from a total one. In addition, an interruption or short circuit on the command cable propagates in cascade, affecting all motors connected in series.

OPERATING RESULT
With **Modulo**, **whatever happens**, your **system** always has a programmed **response**.

ECONOMIC VALUE

Why the cost of Modulo is easily justified

The question machine builders get from their customers is direct: “why does the machine cost more?”.
Here is the structured answer — for the builder and for the end customer.

FOR THE MACHINE BUILDER / OEM

Lower production and service costs

01 Faster commissioning in production

Commissioning the fan control system does not require manual motor-by-motor addressing. Time is significantly reduced with the same personnel and no specialised operators are required.

02 Fewer after-sales service calls

Replacing a fan no longer requires a technician who knows the Modbus system. Less escalation, fewer specialised interventions.

03 One firmware for all suppliers

If you change fan manufacturer, your PLC firmware does not change. The cost of every new software integration is eliminated.

FOR THE END CUSTOMER (END USER)

Lower operating costs over time

01 Maintenance without Modbus specialists

Each intervention on a traditional Modbus system requires a technician who knows the protocol — typically 1–2 hours more than a purely mechanical replacement. With Modulo, any HVAC technician can intervene. On a system active for 10–15 years, this value accumulates at every intervention.

02 Guaranteed operational continuity

A failed fan does not stop the system. It is automatically isolated, and the rest continues. For applications where downtime has a cost (continuous production, refrigeration), this value exceeds the cost of the component.

03 Ready for Ecodesign 2024/1834

The EU regulation introduces measurability requirements for consumption. Modulo meets them today — without future system modifications.

OPERATING RESULT

Modulo is not an extra component. It simplifies installation and every future maintenance intervention, throughout the system’s service life.

Your system can do much more

Perfect for retrofit.

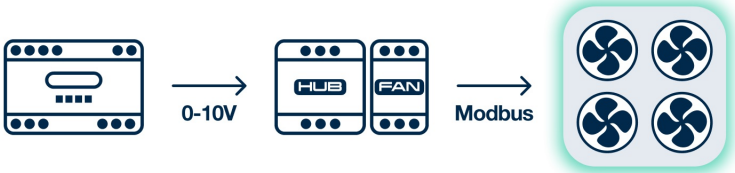
Upgrade your system without changing its structure.

Keep the simplicity of **0–10 V analogue control**, but add everything analogue alone cannot offer: **real data** from fans, **diagnostics**, advanced management of emergency modes and digital functions.

With MHub + MFan, the existing system evolves into a **complete digital system**, with the benefits of Modbus and **without disrupting** the machine architecture.

The controller sends only a speed reference, with no direct access to the fans' data.

The following remain excluded: detailed **monitoring**, **diagnostics**, advanced protection management, **advanced control** of **EC** fan functions and **energy optimisation** based on the actual system status.

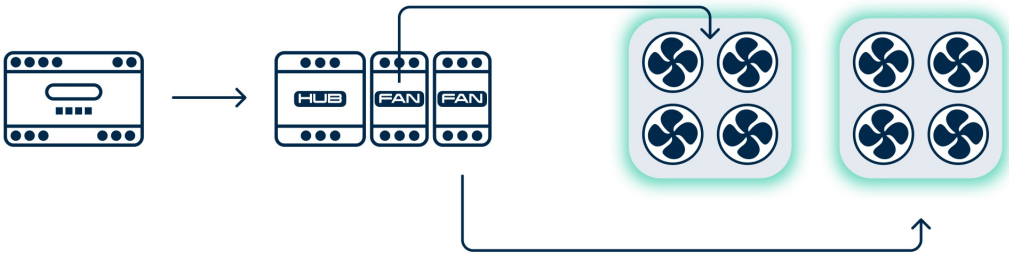


The same command signal becomes a **complete digital system**.

Multi-bank control for AHUs

Independent banks, even with different protocols

Modulo can manage up to **4 independent banks**, adapting flexibly to the architecture of air handling units. Each bank can be associated with a single MFan module, or distributed across modules depending on the number of fans and the system configuration. This makes it possible to control, for example, supply and return separately, even with EC fans from different manufacturers, while maintaining a **single integration and supervision system**.

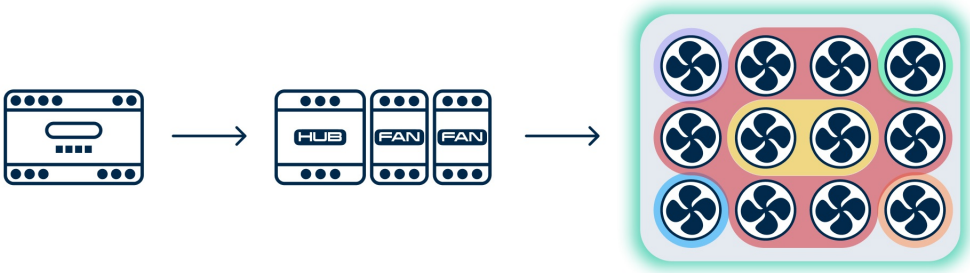


Separate management of outdoor air intake, supply, return and exhaust, with the possibility of using different fan protocols within the same AHU.

Differentiated control for fan walls

In more advanced fan walls, Modulo can autonomously **manage** the **speed** of **individual fans** or **groups** of fans, adapting operation to the actual distribution of airflow within the machine.

This logic is particularly useful when compensating for differences between the central area and side areas of the fan wall, improving **air uniformity**, **system stability** and overall unit efficiency.



Optimal airflow distribution over the entire fan wall surface, with **independent speeds by zone**.

A FEW MORE DETAILS

FAQ
Manufacturers, installers and system integrators

Manufacturers

Do I need to rewrite my PLC firmware?

A single integration: the Selpro protocol. From that point, you can change fan manufacturer without touching the controller firmware. We support ebm-papst, Ziehl-Abegg, Hidria, Nicotra, Dunli — other protocols can be integrated on request. Modulo also manages different firmware versions from the same manufacturer.

Manufacturers

Does Modulo reduce production and testing times?

Yes. Commissioning does not require manual motor-by-motor addressing. You configure the fan type and the number of outputs — the system establishes communication autonomously and checks the connections. Testing time is significantly reduced compared with a traditional Modbus system.

Manufacturers

Can I manage several independent circuits?

Yes. An MHub + MFan system manages up to 4 independent ventilation circuits with separate command signals. Useful for multi-zone machines, multi-circuit chillers and fan walls with sections or different logic.

Installers

Do I need to know Modbus to install Modulo?

No. You configure the fan type and the number of outputs to enable — the rest is automatic. No knowledge of the Modbus protocol is required for standard commissioning.

Installers

How do I manage the replacement of a failed fan?

Modulo isolates the fan in fault without stopping the others. When the new motor is connected, it establishes communication automatically and loads the group configuration — even with different firmware. The intervention is reduced to the mechanical and electrical part.

Installers

Can I use Modulo on an existing 0–10 V system?

Yes. Modulo is also designed for retrofit. The existing 0–10 V signal enters MHub as a command signal and is converted internally. Replacing the main controller is not required.

Installers

How many cables per fan?

3 wires per motor (A+, B–, Ref). The additional relay alarm cable used in 0–10 V wiring is not required. Wiring is simpler, tidier and less prone to errors.

System integrators Manufacturers

How is the polling issue reduced on already busy networks?

The PLC polls a single point: MHub. Internally, MHub continuously collects data from all fans and aggregates it in a normalised shared memory. The response time is fixed — regardless of the number of fans. You can scale from 16 to 30 fans without your system polling cycle changing.

System integrators

Are the data available in a standard format?

Yes. Modulo exposes 40 registers per fan in a normalised Modbus format — the same format regardless of the motor manufacturer. Data aggregated in a single memory area. Expandable on request for specific needs.

System integrators

What happens if I lose communication between PLC and MHub?

After configurable timeouts, the fans automatically switch to the programmed emergency speed. The system remains operational. MHub's configurable contacts also allow activation via an external digital signal, independent of digital communication.

MHUB + MFAN

SELPRO

↗ selpro.it

↗ info@selpro.it

↗ +39 030 6821611

Selpro SRL

Via Padre Giovanni Piamarta, 5/11
25021 Bagnolo Mella (BS) - Italy

| V 2.0.2