



HUMAN-CENTRIC AUTONOMOUS BUILDINGS

Designed for people. **Built for autonomous equipment optimization.**

From static defrost rules to self-optimizing AHUs, with no additional sensors. Siemens embeds machine learning directly into the Climatix controller platform.

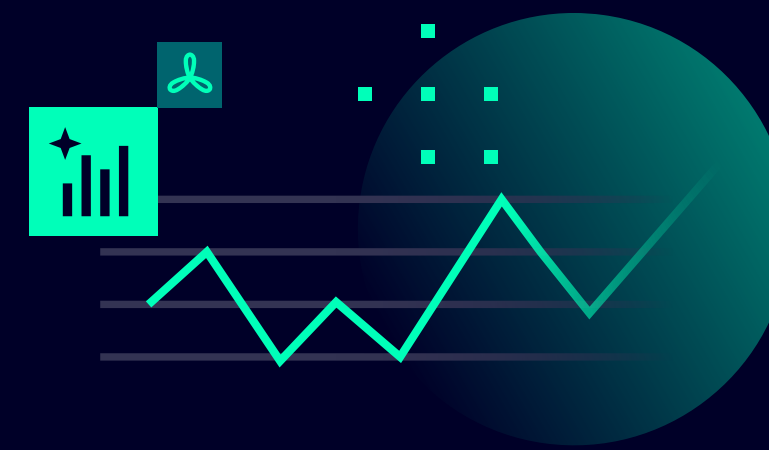
As AHU heat recovery efficiency increases, frost formation is unavoidable whenever outside air temperature drops below freezing. Conventional defrost strategies force a trade-off: preventive defrost wastes energy, reactive defrost needs extra sensors and tuning. Both rely on static rules that can't adapt to real operating conditions.

The journey to autonomous equipment starts with the controller learning the AHU's normal, frost-free behavior, then continuously monitoring it in real time, detecting frost formation without added sensors, and triggering defrost only when it's actually needed.



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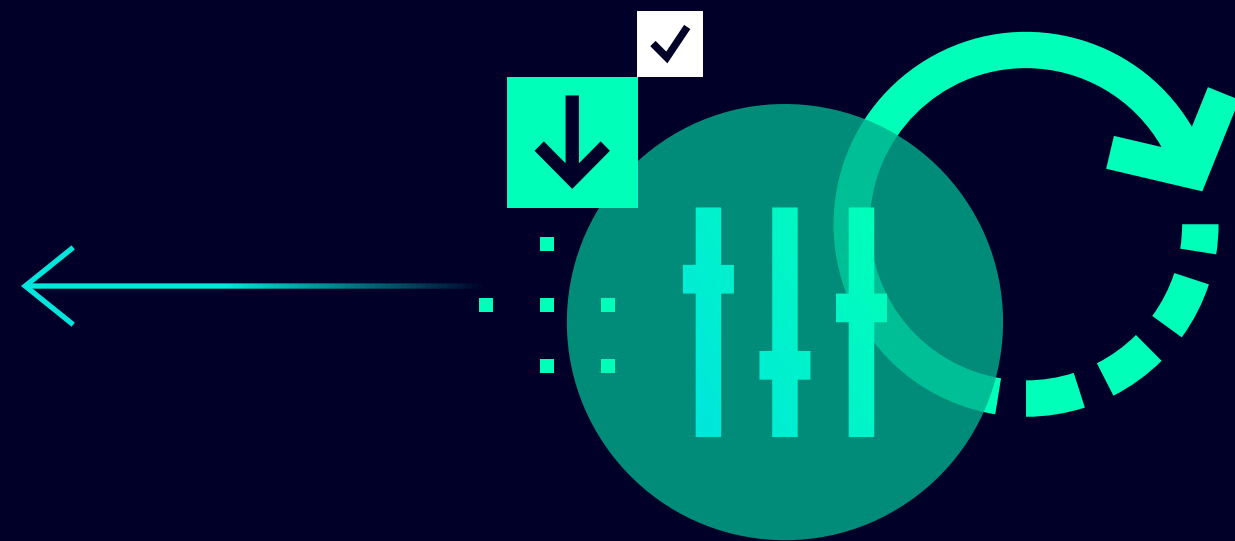
01 Learn

The controller learns the AHU's frost-free fan power pattern as a virtual reference, no dedicated frost sensor required.



02 Monitor

It continuously compares predicted, frost-free fan power with actual measured fan power in real time.



05 Outcome

Equipment that continuously adapts to real operating conditions, triggering defrost only on demand through self-adaptive optimization directly on the controller, reliably preventing ice blockage while minimizing energy costs.



04 Defrost & Adapt

Defrost is triggered only when needed. The model keeps learning and refining with every cycle.



03 Detect

A growing deviation signals frost formation, validated in simulation, lab, and field down to -30°C .

From static rules to measurable savings

From static defrost rules to self-optimizing AHUs, with no additional sensors. Siemens embeds machine learning directly into the Climatix controller platform to detect frost and optimize defrost timing automatically.



Autonomy that pays off

20 - 30%

Energy reduction in winter ¹
For AHUs without frost sensors, compared to preventive defrost, achieved by learning frost-free fan power patterns and triggering defrost only when needed.



Optimize Directly at the Equipment
Advanced incremental machine learning is embedded on the controller, enabling self-adaptive optimization without cloud connectivity or parameter tuning.

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No additional commissioning or set-up effort
No parameter tuning required: the embedded model adapts automatically from day one, without added hardware or specialist commissioning support.



Extend Equipment Lifetime
Ice blockage is reliably prevented, reducing mechanical stress, lowering maintenance effort, and decreasing overall operating costs.

¹ Compared to preventive defrost, for AHUs without frost sensors. Actual savings depend on climate and system configuration.