

edgeSV
NTEK SYSTEM

USE CASE

HVAC system health

SV500 by NTEK SYSTEM | ESA-based condition monitoring & predictive maintenance

OVERVIEW

An HVAC system is a main building system made up of fans, compressors, pumps and the motors that drive them. In this scenario SV500 analyzes the voltage and current signals of the motors and VFDs that drive HVAC equipment in real time to detect abnormalities early and supports predictive maintenance.

PROBLEM

HVAC equipment runs for long hours under varying load, so wear and abnormalities build up easily.

- **Impact of a cooling outage** - In July 2025 at Rush University Medical Center in the US, a failure in the chilled water supply line cut building cooling, the emergency department stopped accepting ambulances and many scheduled surgeries were canceled.
- **Unexpected equipment failure** - Sudden failure of fans, compressors and pumps affects building operation.
- **Limited visibility of distributed equipment** - It is hard to see in real time the condition of equipment scattered across rooftops, machine rooms and other locations.
- **Reactive maintenance** - Repair after a failure is costly and comes with equipment downtime.

EXPECTED OUTCOMES

Abnormalities in HVAC equipment can be identified early so maintenance can be planned.

- **Early detection of potential failures** - Detects potential failures early to minimize unexpected incidents and risk.
- **Optimized maintenance schedules** - Diagnostic data helps predict and optimize maintenance schedules.
- **Lower cost and downtime** - Higher operating efficiency helps reduce energy consumption, maintenance cost and downtime.

TARGET EQUIPMENT

Chiller compressors | Cooling tower fans | HVAC fans | Circulation pumps | VFD

SOLUTION

SV500 uses ESA to diagnose electrical, mechanical and operational abnormalities in HVAC motors and drive equipment.

- **Motor and drive diagnosis** - Detects mechanical unbalance, bearing problems, rotor and stator abnormalities, shaft misalignment, soft foot, fan and pump flow turbulence and cavitation, and blade and vane damage.
- **VFD operation diagnosis** - For equipment controlled by an inverter, SV500 analyzes voltage, current and frequency signals on the VFD secondary (output) side at 8 kHz to predict and diagnose potential faults.
- **Power quality monitoring** - Analyzes voltage sag/swell, total harmonic distortion (THD) and voltage and current imbalance in real time to identify equipment impact and abnormal conditions caused by poor power quality at an early stage.
- **Adaptive thresholds** - Machine learning learns the normal state of each asset and judges condition with thresholds that adapt to load. Criteria matched to each asset and load condition are applied instead of fixed thresholds.
- **Web dashboard and data integration** - The equipment web server dashboard shows status per diagnostic parameter in real time, so condition can be checked without a site visit, and data can be integrated with upper-level systems over Modbus RTU, Modbus TCP, MQTT and RESTful API.

Operational Impact of edgeSV

Continuous monitoring and early detection support availability, maintenance and energy efficiency.

20~40%	10~25%	5~15%	10~20%
Reduction in unplanned downtime	**Maintenance cost savings**	**Energy savings**	**Longer equipment life**

Illustrative ranges, not verified SV500 results. Actual outcomes depend on site conditions and corrective actions; PoC validation is required.

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