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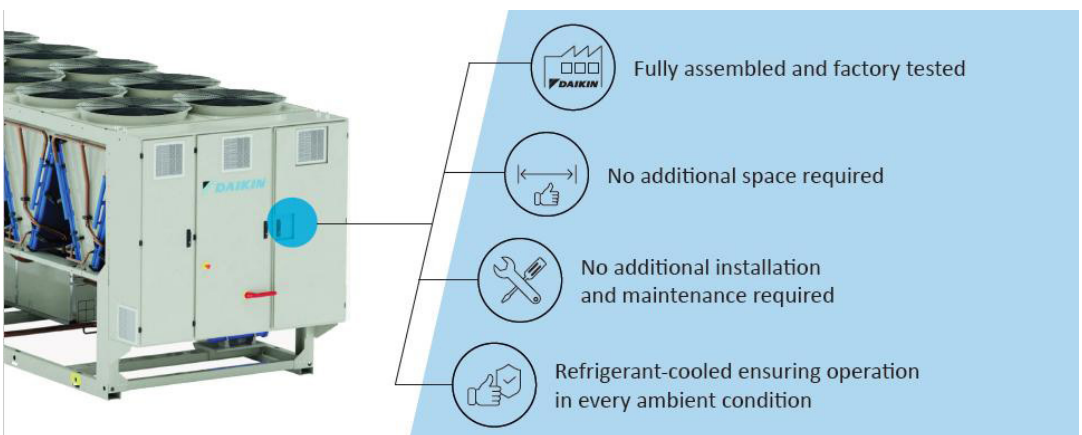
Daikin Active Harmonic Filter

Advanced power quality solution for Inverter-driven chillers

Harmonic distortions are a common issue in electrical systems with nonlinear loads, such as inverterdriven compressors. In standard Variable Frequency Drive (VFD) screw chillers, the Total Harmonic Distortion of Current (THDi) can reach levels around 35%, which may lead to overheating, equipment malfunction, and noncompliance with power quality standards. To solve this challenge, Daikin integrates an advanced Active Harmonic Filter (AHF) into its TZ chiller series. This filter is based on Active Front End (AFE) technology, which actively monitors and reshapes the input current waveform using IGBT control, thereby reducing Total Harmonic Distortion (THDi) to below 5% at full load. Unlike conventional aircooled filters, Daikin's AHF is refrigerantcooled and installed inside the chiller's electrical panel. It is designed and manufactured inhouse by Daikin, specifically for compressor applications in chillers, sharing the same technology platform as Daikin's integrated VFDs.



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Application and Use Cases

The Daikin Active Harmonic Filter is particularly beneficial in installations where electrical power quality is critical. Without harmonic filtration, excessive THDi can lead to electrical noise, interference with sensitive electronic equipment, overheating of cables and transformers, tripping of protective devices, and potential noncompliance with utility standards. These issues can result in operational disruptions, increased maintenance costs, and even system failures.

Key applications

- Data Centers: Harmonic distortions can damage servers and networking hardware, leading to downtime and data integrity issues.
- Hospitals: Imaging systems, monitoring equipment, and other sensitive devices are vulnerable to harmonic noise, which can affect performance and patient safety.
- Industrial Facilities: Harmonic distortions can interfere with automation systems, sensors, and PLCs, causing production delays and quality issues.
- Commercial Buildings: Distorted power can cause nuisance tripping, increased energy losses, and difficulty in meeting green building certifications.

Competitive advantages

Daikin's Active Harmonic Filter stands out in the HVAC market due to three fundamental differentiators:

1. It is refrigerantcooled, ensuring optimal performance in all environmental conditions.
2. It uses active filtering technology, delivering consistent THDi reduction under all load conditions.
3. It is fully integrated (unitmounted), eliminating the need for external space, cabling, or thirdparty installations.

These three pillars form the foundation of Daikin’s superior harmonic mitigation solution.

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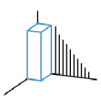
Refrigerantcooled vs. Aircooled harmonic filters

Daikin's AHF is cooled by the refrigerant of the unit itself, offering a stable and controlled thermal environment. This provides clear benefits over aircooled filters used by competitors:

Reliable performance

Cooling effectiveness



Compact & enclosed design

Extended lifespan and reduced failure risk

In contrast, aircooled filters are prone to overheating and performance degradation, especially in harsh or polluted environments.

Active vs. Passive Harmonic Filters

Daikin's AHF is based on Active Front End (AFE) technology, which dynamically adjusts and corrects harmonic distortion in real time.

Active filters	Passive filters
Consistent THDi < 5 %	Optimal performance only at nearfull load
Rapid response to operating condition changes	Effectiveness decreases under variable conditions
No negative impact on power factor	May cause voltage distortion reducing power quality
Reduced risk of resonance effects	Need tuning and are spaceconsuming

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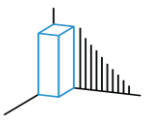
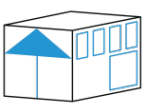
UnitMounted vs. FreeStanding Harmonic Filters

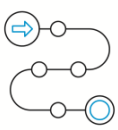
Daikin's AHF is fully integrated within the chiller's electrical panel, making installation seamless and reducing the need for additional resources.



No need for additional floor space or structural supports



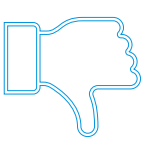
No external cabling or additional protections



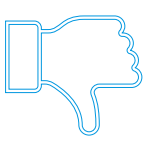
Faster commissioning and simplified logistics

Harmonised design ensuring integration with unit controls

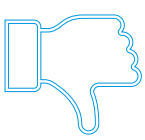
Freestanding harmonic filters



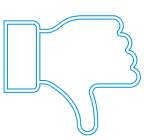
Require separate installation, coordination, and protection



Increase project complexity and onsite installation time



Often fall outside the main unit's warranty or service agreements



Are more vulnerable to incorrect installation or environmental exposure

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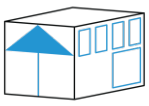
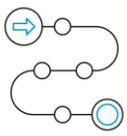
Benefits by Stakeholders

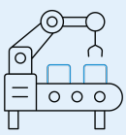
For installers



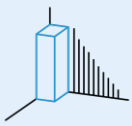
Fully integrated into the chiller and no external wiring needed



Fewer components, faster commissioning



Factory tested



Compact footprint

For end users

- Bestinclass power quality
- Reduces the risk of electrical disturbances
- Zero maintenance
- Ensures compatibility and longterm reliability
- Reduced energy losses and extended equipment life

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Specification Guidelines

The chiller unit shall be equipped with a factoryintegrated Active Harmonic Filter (AHF) designed to reduce input current distortion and ensure compliance with stringent power quality requirements. To ensure uniform performance and simplify installation, the following technical criteria must be included in the project specifications:

Harmonic Mitigation Performance

The AHF shall maintain Total Harmonic Distortion of Current (THDi) ≤ 5% at full load, measured in compliance with IEEE 519 or equivalent standard.
Harmonic mitigation shall be effective across a broad load range, including partial load operation down to 25% of nominal capacity.

Filtering Technology

The filter shall be based on Active Front End (AFE) architecture using IGBT technology, providing realtime waveform correction and dynamic response to load variations.
Passive or tuned filters shall not be accepted as equivalent due to their limited range of effectiveness and risk of resonance.

Integration and installation

The harmonic filtering system shall be fully integrated within the chiller electrical cabinet.
Freestanding filters or external cabinets requiring additional floor space, wiring, or separate commissioning shall not be accepted.
The filter shall be preinstalled, prewired, and factorytested as part of the chiller assembly, ensuring compatibility and reducing onsite commissioning risks.

Cooling method

The filter must be refrigerantcooled, utilising the chiller's refrigerant circuit to maintain stable thermal conditions.
Aircooled solutions shall not be considered equivalent due to their reduced reliability in dusty, hot, or polluted environments.

Environmental and reliability considerations

The filter shall operate without dependence on ambient air flow, ensuring consistent performance across the full range of external temperature and humidity conditions. The system shall be sealed and maintenancefree, with no requirement for cleaning, fan replacement, or filter tuning.

Control monitoring

The harmonic filter shall be natively integrated into the chiller's main controller, allowing unified monitoring, diagnostics, and alarm management.
External supervisory software or separate control interfaces for harmonic filtering will not be accepted.

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Daikin reference for data centers

OSLHamar Green Mountain hyperscale Data Center, Norway.

Daikin has the knowledge, experience and technology to support complex hyperscale and colocation data center projects. Our largest data centers supplies per region are detailed below.

Region	Highest cooling capacity per project
Europe	115 MW
Middle East & Africa	61 MW
Latin America	40 MW

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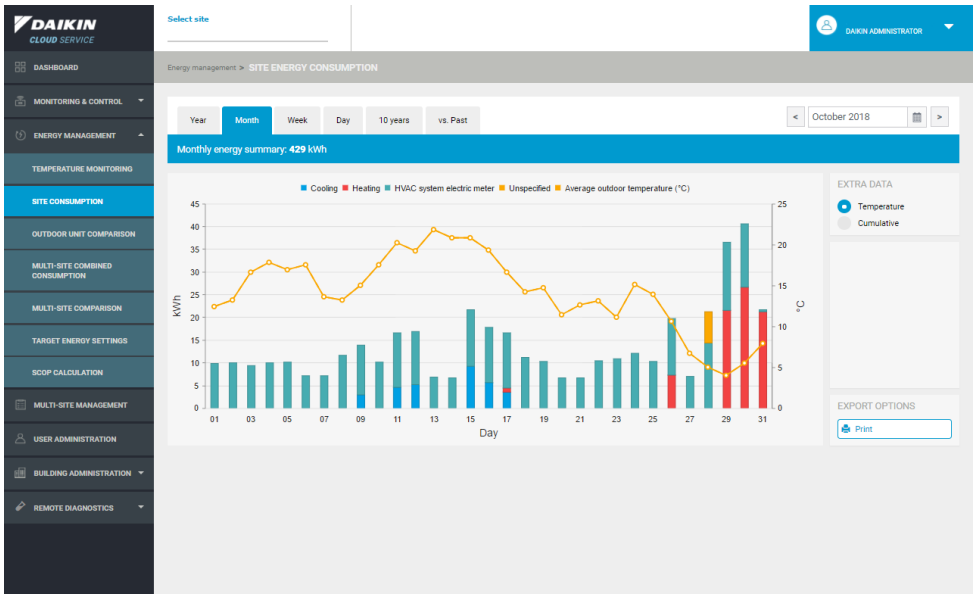
Daikin on Site

Remote Monitoring That Works as Hard as You Do

Daikin on Site (DoS) is Daikin's advanced remote monitoring platform, giving you complete visibility, control, and insight into your HVAC rental equipment — anytime, anywhere.

Available as standard on all Daikin Rental chillers, heat pumps, and air handling units, DoS provides a secure, cloud-based interface that keeps your system operating at peak performance.

Whether you're managing a temporary site or maintaining a critical production line, Daikin on Site ensures you're not just hiring equipment — you're hiring performance, reliability, and peace of mind.



Real-Time Monitoring
See system performance in real time, wherever you are.

Performance Insights
Turn data into energy savings and peak performance.

Remote Control
Take full control remotely, from start/stop to setpoints.

Predictive Maintenance
Stay ahead of failures with proactive diagnostics.

Smart Alerts
Get notified instantly with clear, actionable fault info.

Custom Dashboard
Build your own view with live, interactive system data.

For Product, Service & Maintenance, Rental and Spares enquiries:

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www.daikinapplied.uk

www.daikinrentalsolutions.uk

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Daikin Europe N.V. participates in the Eurovent Certified Performance programme for Fan Coil Units and Variable Refrigerant Flow systems. Daikin Applied Europe S.p.A participates in the Eurovent Certified performance programme for Liquid Chilling Packages, Hydronic Heat Pumps and Air handling Units. Check ongoing validity of certificate: www.eurovent-certification.com

Daikin Applied (UK) Ltd is certified to ISO 9001 Quality Management System (QMS), ISO 14001 Environmental Management System (EMS), and ISO 45001 Occupational Health and Safety (OH&S) management systems.
For the latest certificates, visit:www.daikinapplied.uk/documents-download