

Daikin's Intelligent Manager III and VRV[®] Meets University's High-Rise Challenges

The Challenge

Specify an environmentally friendly HVAC system to monitor and regulates students' consumption and contribute to the goal of LEED[™] certification.

Daikin's Solution

Daikin's Intelligent Manager III and Daikin's VRV provided the high level of efficiency, control and flexibility needed to easily clear the high rise challenge with ease.

Application:

New Construction
University Housing

Location:

Manoa, Hawaii

Founded in 1907, the University of Hawaii at Manoa (UH-M) is the flagship campus of the University of Hawaii. Students and faculty come from around the world to take advantage of UH-M's research opportunities, diverse community, Division I athletics program, and beautiful landscape. However, the university's student housing had become a bit dated – since none had been built since the 1970s.

When officials at the UH-M sought an image change to improve on-campus student housing and the campus

community itself, they determined massive upgrades were necessary. For years, students complained about the on-campus housing conditions, and one of the worst offenders was Frear Hall. Thus, a new version was planned as part of a \$132 million dormitory renovation and construction project.

University administrators decided to construct a new 12-story facility including 810 beds. The original structure was demolished in 2006 to make room for the new \$71 million Frear Hall. From the outset, offering air



The size and number of rooms in the University of Hawaii at Manoa's Frear Hall presented plenty of hurdles, but Daikin cleared them all so easily the building is now LEED[™] Silver certified.

conditioning was a high priority. Yet at the same time, environmental friendliness was a key objective – and LEED certification was also vital.

A University First

Frear would be the first new dormitory in 30-plus years, and it would also be one of the only ones with air conditioning. Notkin Hawaii Inc. served as the project's mechanical engineer, and according to the firm's Keith M. Chan, P.E., the university sought an air conditioning system to provide climate comfort at an economical cost, with the ability to maintain proper cooling and dehumidification.

The university also wanted the ability to submeter (thus monitor) each fan-coil unit's air conditioning usage for educational purposes and/or to charge the students appropriately. "Having each bedroom's A/C consumption monitored was required and was a challenge, and the A/C system chosen had the capability to do this," Chan said.

The project developer, American Campus Communities (ACC) sought an air conditioning system to provide a central point of control and a remotely accessible control system. This

Daikin's compact equipment cools over 600 rooms without the large amount of ductwork required by traditional HVAC systems.



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*Keith M. Chan, P.E.,
University of Hawaii, Manoa*



was required to facilitate future system troubleshooting and diagnostics as well as for overall HVAC control with the goal of increasing operational efficiencies and lowering energy consumption.

Xavier Garcia, vice president of project management for ACC, explained Notkin and CTG Energetics (the project's LEED consultant) were collectively tasked with investigating systems compatible with this plan while also adhering to the LEED criteria. Swinerton Builders – Hawaii also teamed with ACC to select the designer consultants and present

the winning proposal to the university.

After exhaustive research, the Daikin two-pipe VRV heat pump systems were selected. What made the Daikin system so well suited for the project, according to Swinerton's senior project manager Silas Collier, was not only its high level of efficiency and control, but also its small footprint. "To provide the same amount of cooling to over 600 rooms with a conventional system, would have required a large amount of ductwork running both horizontally and vertically throughout the building," Collier said.

“In a structure where every square inch was optimized, the routing within walls of small-diameter refrigerant lines greatly simplified construction,” he added. The low-profile, wall-mounted fan-coil unit in each room and compact air-cooled condensing units on the roof were also easy to transport and install.

“Other types of A/C systems were considered, including chilled water and window units, but the variable refrigerant flow allowed the most flexibility and value for the high-rise dormitory situation. Daikin offered the best value and we had the most confidence in their product,” added Chan.

Quite Simply, Intelligent Energy Management

Another integral part of the project’s energy efficiency equation was Daikin’s Intelligent Manager III, which, like all of Daikin’s multi-zone control products, offers independent operational aspects. “All space temperature control demand and requirements are managed at the local level between the students’ air

conditioning unit and the outdoor condensing unit supplying it with refrigerant,” said Daikin project manager, Robert Giba.

“The Intelligent Manager control system is aware of these demands and requirements; however, it only reacts to enforce other changes or adjustments when specific parameters or boundaries are exceeded,” added Giba.

The UH-M staff also has access to the Intelligent Manager III system through both their intranet and internet connections as well as a detailed e-mail

reporting function.

The Intelligent Manager III was an essential part of the Frear Hall project’s energy efficiency. In conjunction with the control system, the owner selected the Power Proportional Distribution (PPD) option, which apportions total outdoor unit power consumption back into the respective indoor units served by those outdoor units.

PPD mathematically calculates each indoor unit’s portion of the outdoor unit’s total power consumption based upon its return air temperature, electronic expansion valve position, and baseline values determined by the factory.



The Intelligent Manager III gives the staff the ability to restrict, turn off or setback individual dorm room air conditioners from their offices prior to leasing and occupancy.

“The temperature setpoint limitation feature prevents the individual wall-mounted air conditioners from accepting any cooling temperature setpoint value below 73°F.

This feature provides enormous energy savings and reduced equipment wear.”

*Marites Calad
Norman S. Wright*



Dormitory Receives the Silver

Ultimately, UH-M will use this calculated power consumption data to help students understand their individual consumption of the air conditioning resources. But the main Intelligent Manager III energy management function employed on this project is the temperature setpoint limitation feature. Maritas Calad, the vice president of Norman S. Wright explains, "This feature prevents the individual wall-mounted air conditioners from accepting any

cooling temperature setpoint value below 73°F. This feature alone provides enormous energy savings and reduced equipment wear."

Additional energy management functions include the ability for administration staff to turn off or setback individual dorm room air conditioners from their offices prior to leasing and occupancy. Further, if desired, they can completely restrict operation of those systems until the space becomes leased and occupied.

The integrated Daikin system, an energy efficient building orientation conducive to natural ventilation, as well as other energy and water saving strategies boosted the overall energy efficiency. A combination which provides a perfect solution for this application. So perfect, the building, which opened in August 2008 to full occupancy, received LEED Silver Certification.

Additional Information

Location

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Product Profile Daikin Equipment

Model	Qty	Description
RXYQ96MTJU	53	Heat pump VRV M R410A - 36,000 Btu/h
RXYMQ48MVJU	1	Heat pump VRV S R410A - 48,000 Btu/h
FXAQ07MVJU	472	A - Wall Mounted Unit - 7,000 Btu/h
FXAQ09MVJU	206	A - Wall Mounted Unit - 9,000 Btu/h
FXAQ12MVJU	1	A - Wall Mounted Unit - 12,000 Btu/h
FXMQ36MVJU	2	M - Concealed Ducted (Medium Static) - 56,000 Btu/h
DACA- IMP -1024	1	Intelligent Manager III
KHRP26A22T	160	REFNET branch piping kit
KHRP26A33T	23	REFNET branch piping kit
BRC1D71	8	7 Day Programmable Controller
BRC7E818	679	Wireless R/C Controller
DCS601C71+ITC PPD	3	Intelligent -Touch Controller (with PPD option)
KDDFP37A160	2	Filter chamber - FXMQ36, 48

About Daikin AC

Daikin AC offers North America intelligent air conditioning solutions with superior energy performance and sophisticated design. These advanced systems fall under the Quaternity™, VRV®, VRV-S and SkyAir product names. The company located in Carrollton, Texas, is owned by the Japanese-based Daikin Industries, Ltd. For more information, call 866-4DAIKIN or visit www.daikinac.com.



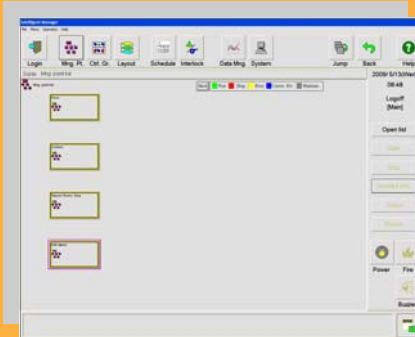
Intelligent Manager III



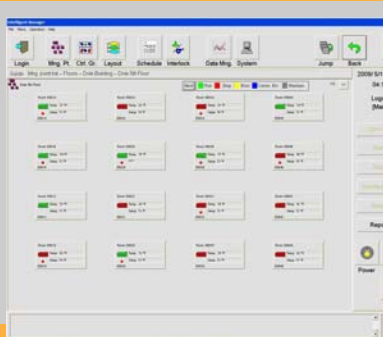
Intelligent Manager III title screen.



Frear Hall's first floor HVAC layout.



The Management Point list screen efficiently categorizes equipment for quick access and selection.



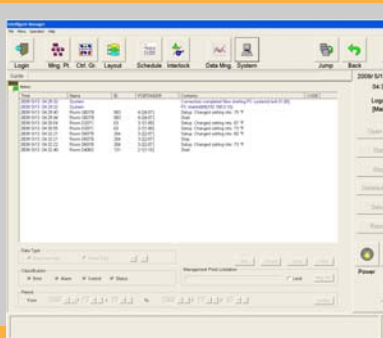
Air conditioning indoor units and ancillary building systems are displayed for monitoring and control.



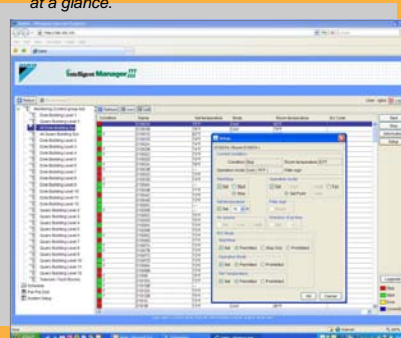
The Control Group further categorizes equipment into partitions like individual buildings, floors or specific areas. Operational status can be determined at a glance.



The Control Group list further categorizes equipment into partitions including individual buildings, entire floors or specific areas. Operational status can be determined at a glance.



The Intelligent Manager III history feature gathers data on critical system function like configuration changes, alarms, user logon activities etc.



Optional web access provides offsite access to the control system through a standard Internet browser.

Simple Operation and Management

A user-friendly interface allows even non-experts to perform building systems management easily.

Data Management

Stores operation data on multiple systems and displays it in graphical format for more effective management.

Total Building Management

Possible to build a system to manage various types of building equipment.

Automated Operation Management

Frees the operator from the troubles of daily operation management.

Web Access Function

Allows easy management of systems in remote facilities via the Internet using a Web browser.