

## Daikin's Energy Efficient Heat Pumps Satisfy Preservationists' Guidelines

**The Challenge:**  
Installing a new cooling system and upgrading the heating system in Maryland's oldest synagogue without affecting the synagogue's aesthetics.

**Daikin's Solution:**  
The design and contracting team chose an intelligent, energy-efficient VRV<sup>®</sup>III system delivering both cooling and heating while remaining virtually unnoticeable to visitors.

**Application:**

Commercial

**Location:**

Baltimore, Maryland

With the Maryland Historical Trust keeping a very sharp eye on the restoration of the nation's third oldest synagogue, the trustees, the general contractor, and the architect knew every choice they made would be under intense scrutiny. "From the footing to the roof's ridgeline, nothing was exempt from the agency's review and approval," said Jewish Museum of Maryland trustee Lee Rosenberg about big changes at the Lloyd Street Synagogue, built in 1845.

Near the top of the list of renovations that could have negatively impacted the

aesthetics of the historic structure was the installation of an air conditioning system for the first time in the synagogue's 155-year history. Choosing a system that would preserve the synagogue's character and beauty while delivering year-round comfort was of paramount concern to the project team.

In the end, the team chose an intelligent energy-efficient Variable Refrigerant Volume<sup>®</sup> (VRV) comfort system by Daikin to deliver both heating and cooling with advanced zoning capabilities. The new equipment, however, remains virtually



*A top-down view of the interior of the Lloyd Street Synagogue, the oldest synagogue in Maryland, disclosed no evidence of the new heating and cooling system installed in the house of worship.*



*Daikin RXYQ outdoor condensing units at the rear of the synagogue which supply a total of 28 tons of capacity.*

unnoticeable to synagogue visitors. “There is no evidence that any changes have been made,” said Rosenberg. “Even someone who has been there 50 times would not notice the change. But in the warmer weather, especially, they certainly will feel a lot more comfortable that they did in the past.”

The Jewish Museum of Maryland selected the Daikin VRVIII heat pump system for the two-story Greek Revival style synagogue after a very careful search of all of its options. In place, was a boiler/hot water radiator system for cold weather, and no cooling system at all for warm weather. Initially, the team looked into conventional comfort systems that would have required installing – and trying to hide –

ductwork in the historic space. “This would have involved creative placement of duct work and probably having to alter the space to accommodate it,” said John Lederer, principal owner of Frosty Refrigeration Inc., the general contractor for the entire renovation and restoration of the project.

Early in the project, the engineering firm of JMT Inc., working with HVAC equipment supplier Havtech Corp., proposed a Daikin duct-free system be considered as the best choice for

the heating and cooling system for a number of reasons, including aesthetics, space, and energy efficiency. When the museum owners decided to go with a design-build approach to the project, Frosty Refrigeration took complete responsibility for the HVAC system design and installation. Lederer and preservation architect John R. Srygley, AIA, of JRS Architects Inc. eventually decided to stay with JMT’s recommendation and worked very closely with Daikin on the final system design.

## A Rich Religious Heritage



The Greek Revival style Lloyd Street Synagogue, built in 1845, was the first synagogue erected in Maryland.

In 1861, the synagogue was expanded but kept the architect’s original classical style in the sanctuary and exterior

façade. In 1889, the structure became the home of St. John the Baptist Roman Catholic Church, one of the first Lithuanian parishes in the U.S. It changed hands once again in 1905, when it became the home for Somrei Mishmeres HaKodesh, an Orthodox congregation.

Recent archaeological discoveries include the original 1845 mikveh, or ritual bath, on the lower level of the synagogue.

The Lloyd Street Synagogue, listed on the National Register of Historic Places, is under the aegis of the Jewish Museum of Maryland. For more information, visit [www.jewishmuseummd.org](http://www.jewishmuseummd.org).



*Daikin Sales Engineer Michael Panopoulos (left), John Lederer of Frosty Refrigeration, and Lee Rosenberg (right), a trustee with the Jewish Museum of Maryland, confer on the performance of the new Daikin VRV8 heat pump system. The Daikin FXLQ floor console models are seen at left, flushed on the wall below the windows.*

**“The Daikin FXLQ floor console models fit neatly under the low historic synagogue windows... These console units rest flush against the wall and are actually less obtrusive than the radiators that had previously been there.”**

*John Lederer, Frosty Refrigeration Inc.,*

Thos. Somerville Inc., a wholesale HVAC equipment supplier, delivered the product to Frosty for the project. “After we reviewed and rejected all of our options, we came back to the Daikin solution,” noted Srygley, “because of the fact that it both heats and cools, and also provides a streamlined alternative for a historic preservation solution.”

### **LESS OBTRUSIVE THAN OLD RADIATORS**

The new comfort system consists of two twinned 10-ton outdoor VRV8 condensing units supplying 20 tons of capacity to the upper level of the space, plus another unit supplying 8 tons of capacity to the lower level, and 21 one-ton and two-ton floor console models lining the interior walls of both floors to serve as supply and return air units. The configuration of both inside and outside units was the optimum

solution for the space limitations of the mid-19<sup>th</sup> century building, according to Lederer. “The Daikin FXLQ floor console models fit neatly under the low historic synagogue windows,” he said. “They enabled us to maintain the aesthetics of the structure with minimal disruption. These console units rest flush against the wall and are actually less obtrusive than the radiators that had previously been there,” Lederer said.

The three outdoor condensing units that provide a total of 28 tons of capacity also provided a preservation solution to the team. They are “tucked away” in a narrow alley right behind the building -- another plus for the renovation and restoration goal of the synagogue. “Several of the HVAC alternatives we were looking at would have required

placing the outdoor equipment on our roof, which really would have been contrary to what the historic preservationists would have been willing to accept,” noted Lederer.

Since the system was commissioned in the fall of 2009, the operation of the Daikin system has been impressive, according to Lederer. “It’s been above our expectations, there’s no doubt about it. The heat production, even in freezing weather, as well as the acoustical performance, have been just tremendous,” he said. “The balance of air conditioning in the summer in every corner of the

synagogue has been remarkable, as well.”

Lederer pointed out that each individual Daikin console has a built-in intelligent return air sensor helping vary the flow of refrigerant to provide increased comfort exactly where and when it’s needed. “It acts independently in its own little zone,” he said. For example, when the sun streams in south-facing windows, the units can run at higher capacity than those on the opposite side, where the space is cooler. In addition, multiple consoles on each floor are controlled by a centralized intelligent seven-day programmable controller, which gives the synagogue overall control of the comfort of the space.

One other feature of the Daikin

system helped the Lloyd Street Synagogue design/build team make its choice. “Because of the location of our synagogue, which is very close to Baltimore’s Inner Harbor and very close to sea level, we had to contend with moisture concerns. After doing a thorough study, we knew that the Daikin system control logic would help manage the discomfort due to high humidity levels better than standard on/off systems. We are very sure we are meeting the very stringent requirements for moisture, humidity, and temperature that are always a concern in a museum setting,” museum trustee Rosenberg observed.

“We are pleased we made the best possible choice for our historic synagogue, the oldest in the state of Maryland.”

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*John Lederer, Frosty Refrigeration Inc.*

*“From the footing to the roof’s ridgeline, nothing was exempt from the agency’s review and approval,” said Jewish Museum of Maryland trustee Lee Rosenberg (pictured).*



## Location

Jewish Museum of Maryland  
Lloyd Street Synagogue  
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## Additional Information

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### Daikin Equipment

1	RXYQ240PTJU	Heat Pump VRV III R410A – twinned RXYQ120PTJU
1	RXYQ96PTJU	Heat Pump VRV III R410A
11	FXLQ12MVJU	Floor Standing Indoor Unit
10	FXLQ24MVJU	Floor Standing Indoor Unit
1	FXSQ18MVJU	Concealed Indoor Unit
10	KHRP26A22T	REFNET™ Branch Piping Kit
7	KHRP26A33T	REFNET Branch Piping Kit
2	KHRP26M72TU	REFNET Branch Piping Kit
1	KHRP26M73TU	REFNET Branch Piping Kit
1	DCS601C71+DCS004A7	Intelligent-Touch Controller (with web option) (64 groups)
1	DMS502B71	BACnet Gateway (128 groups)
9	BRC1D71	7-Day Programmable Controller
11	KRCS01-1B	Remote Sensor Kit, All VRV Indoor Units
1	BHFP22P100U	Outdoor Multi-Connection Pipe Kit, VRV Series HP

### About Daikin AC

Daikin AC offers North America intelligent heating and cooling solutions with superior energy performance and sophisticated design. These advanced systems fall under the Daikin Altherma, 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](http://www.daikinac.com).

