



Lighting control system slashes installation and commissioning time at hyperscale data center

Highlights

- Today's data centers and distribution centers require efficient and easy-to-operate lighting controls, but traditional systems use antiquated technology and could take months to commission.
- NICOR developed the Illumination Management System (IMS), a low-voltage control system, for normal and emergency luminaires within a facility.
- The combination of NICOR's custom coding and Phoenix Contact's PLC hardware and DALI lighting control solution ensure simple user management for easy commissioning and control.

Customer profile

NICOR, created in the 1980s under the name National Industries, has grown from an affordable ceiling fan company into a leading supplier of solid-state LED lighting. NICOR believes in building lasting relationships based on integrity, respect, and accountability. NICOR strives to provide affordable, high-performance lighting solutions that customers can rely on.

"We want to provide our customers with products that perform beyond today's standards and provide significant energy savings," said David Brown, Senior Electrical Engineer at NICOR, "Every product we design is made to exceed

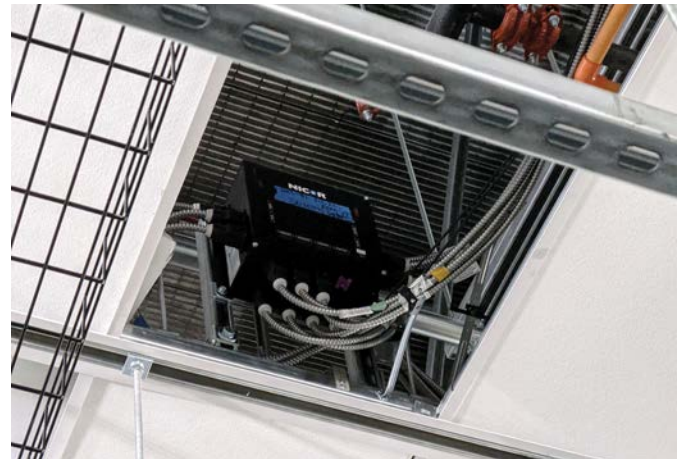


Figure 1: Distribution boxes have color-coded, uniquely keyed components for error-free connectivity.

industry standards and undergo extensive reliability testing for lifetime and efficiency. We also invest our research into products that meet the needs of more than a single project and ensure the solution can be the right fit for anyone."

Challenge: Outdated technology took months to commission and troubleshoot

NICOR has a customer who needed a highly efficient, fully-controllable lighting system for a large data center facility. The system needed to be user-friendly and capable of on-site adjustments and maintenance without requiring a manufacturer

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Figure 2: The IMS makes it possible to commission a facility's lighting system in hours instead of days. The easy installation and simple User Interface (UI) save time and money.

technician. In addition to this, the system needed to be fully secured to prevent outside access to the facility's systems.

David explained, "The majority of the competitors in largescale control systems haven't changed anything in years. The main competition is similar to a DOS-based system—very old and antiquated. Therefore,

trying to commission a system with such technology is very tedious and time-consuming; the customer is forced to rely on the system's technicians to come out to implement the network."

David said it typically takes three weeks before a technician can arrive, and the commissioning process itself usually takes a week. "On top of that, there tend to be a lot of failures and issues that follow the commissioning process. This requires the technician to come back, sometimes weeks later, to try to fix ensuing issues. When it's all said and done, the customer has lost two to three months before the commissioning process is complete," he added. Energy efficiency is also an important issue for data centers and distribution centers. The facility would see high levels of heat that regular lighting systems are unable to handle due to driver and LED failures.

Previous systems that the customer used could not handle the high heat of the data center's environment. The systems could only control groups of lighting and not individual fixtures, so the customer would see consistent failures. They also were unable to find a system that had full-system controllability down to the individual fixture.

Solution: Commissioning in just hours

To meet these demands, NICOR developed the Illumination Management System (IMS) Lighting Control System. The IMS takes hours, not days or weeks, to commission.

The IMS provides a simpler installation with an easy-to-use User Interface (UI) that anyone can navigate. "With this system, the customer can do all the commissioning themselves and have their system up and running within a day," David assured.

It operates on the Digital Addressable Lighting Interface (DALI) protocol, and provides control on all levels from individual fixture control to multi-site empowerment with NICOR's Master Control Unit (MCU).

The IMS system is comprised of three main components:

- IMS control box, luminaires, and control devices.
- IMS User Interface for control and commissioning on a tablet or laptop.
- Master Control Unit (MCU) that provides global control for multiple networks.



Figure 3: The IMS is certified to UL 2108 as a Low Voltage Lighting System.

The IMS system and fixtures have been certified for temperatures of up to 50°C (122°F) and have been specifically designed to withstand the high temperatures of data center isles. With temperature-sensing cooling fans installed in the IMS, customers no longer need to be concerned about overheating and loss of lighting. NICOR continues to test their system and fixtures for several years at temperatures exceeding 65°C (149°F) with no failures. Additionally, the IMS system was designed to have a closed-network system to maximize security. It is certified to UL 2108 as a Low Voltage Lighting System.

NICOR selected Phoenix Contact for approximately 80% of the products in the control cabinet—terminal blocks, PCB terminal blocks, wire duct, I/O, and the controller itself, which is currently the ILC 191.

David stated, "Phoenix Contact helped significantly throughout the development. They supported us in any way we needed such as supplying unlocked function blocks to speed up development. They were always willing to take our calls to answer questions

we had. They also helped with developing part of the firmware for our system.”

Peter Mannon, the Automation Sales Engineer–Control at Phoenix Contact, stated that when Phoenix Contact was first involved with the project, one of NICOR’s biggest challenges was trying to implement multiple software packages. “With some custom function blocks, Phoenix Contact was able to do it with one program system,” Mannon said.



Figure 4: The IMS works with several NICOR lighting products, including the VT2 LED lighting strip.

David explained, “We started looking at the ILC 151 controller originally. Once we installed everything, there just wasn’t enough horsepower with that controller, so we had to advance to the 191 controller.”

Peter attributes the faster commissioning time to the combination of Phoenix Contact’s hardware and the PC code that David wrote. He explained, “David wrote an application on a PC that interfaces with our controllers, so the time savings comes from a two-pronged process. Part of it is related to our equipment and the way he utilized it; the other part is the custom software interface that he wrote, which is very unique.”

In the U.S., fewer people use DALI compared to traditional standards, but it offers many advantages with one being faster commissioning. Unlike many of the proprietary lighting protocols, DALI ensures interoperability for equipment from different manufacturers. It is specified in IEC 62386.

Results: Faster assembly and secure, remote commissioning

NICOR first installed these systems at its own headquarters and its sister company. Each system has been in place for about a year

and has had no issues. These installs were used during development to evaluate the system’s installation process and its overall functionality.

In Q4 2020, NICOR began the first installation in a Hyperscale Data Center. Over the next few months, a total of 140 of these systems will be installed for this data center customer. The deployment and performance of IMS has been so successful that NICOR is in discussion with this customer to deploy these systems globally.

David said the new system has cut NICOR’s own assembly a manufacturing labor time by about seven hours. “It was around eight hours, and it takes about an hour now,” David commented.

He credits reduced wiring compared to their legacy control system, the LCU, for the time savings. “On the next generation, we’re aiming to reduce manufacturing time even more by designing a custom PCB that will contain all of the wiring,” David explained.

The IMS will offer customers many benefits in how they manage their facilities, including:

- High-temperature tested and rated for industrial environments.
- Simple user management for easy commissioning and control.
- Security through a closed network that eliminates the threat of unwanted intruders.

Rocky Lawrence, President/CEO at NICOR, stated, “We know there are cost savings in installation and commissioning when the customer can install the system themselves using their own facility operations personnel. By having that control, customers can ultimately be more productive.”

He continued, “If they are concerned about power consumption, there could definitely be a payback. We all know that is a priority for these data centers since they consume massive amounts of energy LED lighting is much more efficient overall than traditional lighting. In terms of functionality and monitoring, there are significant benefits in the ability to be notified of errors from a fixture in the system or if there are other productivity issues. That information is valuable but is typically hard to measure.”

Phase II on the Horizon

Although the IMS is still brand new, NICOR is already working on the next generation, which will incorporate DALI 2. David said, “We are already pushing the limits of the 191 controller as it is. That’s part of the reason why we’re moving over to the 1152.”

The AXC F 1152 is a Linux-based controller built on Phoenix Contact’s PLCnext Technology. The team is currently working on expanding the system to the DALI 2 protocol and future-proofing. David commented, “It allows for a lot more freedom in development,

like the possibility of adding wireless controls or other features.” The DALI 2 version will cost NICOR approximately 20% less and will be more powerful than the original.

Future plans for the controls system are already in motion. John Lane, Engineering Manager at NICOR, stated, “We’re trying to be quick and nimble, so we can approach the market with a new product as quickly as possible. A lot of the changes we are implementing for the second-generation product are centered around the power distribution methods; for now, it’s all lowvoltage DC, but we’re exploring an AC distribution model as well, so we can expand the market and meet immediate needs. As soon as we get the second-generation product released, our plan is to begin engineering a third-generation product. We will start to look at some of the more advanced features like being able to commission the occupancy sensors via the software UI and adding BACnet capability.”

Peter added, “The only way to reduce costs is to increase technology. There’s only so much you can accomplish with production. Technology gets you there. We’re excited about our latest offering with the new DALI 2 and some of the technology we’re implementing, so we hope that’s going to propel NICOR to another level.”



Figure 5: The current IMS operates on Phoenix Contact’s ILC 191 programmable logic controller (PLC), but the next generation will move to the AXC F 1152, a Linux-based controller built on Phoenix Contact’s PLCnext Technology.