



SERV-ALL MILESTONE
Celebrates 40 Years In Business

DEPARTMENT PROFILE
R&D: Firmware Department



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RUNtime

The Official Quarterly Newsletter of Reliable Controls® Corporation

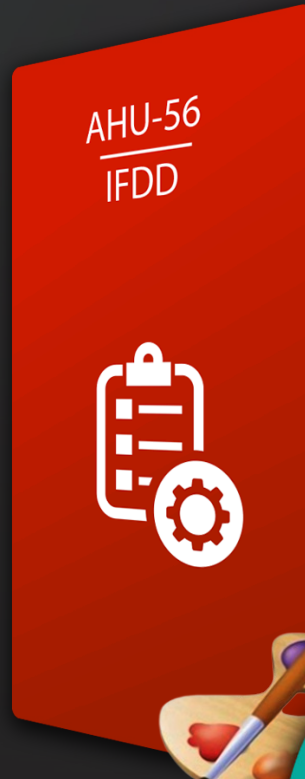
Q2 - 2018

INTRODUCING RC-GRAFSet®

IFDD

INTEGRATED FAULT
DETECTION & DIAGNOSTICS

FLEXILES



INTRODUCING RC-GRafxSet® 3.4

New Release Features IFDD FlexTiles™



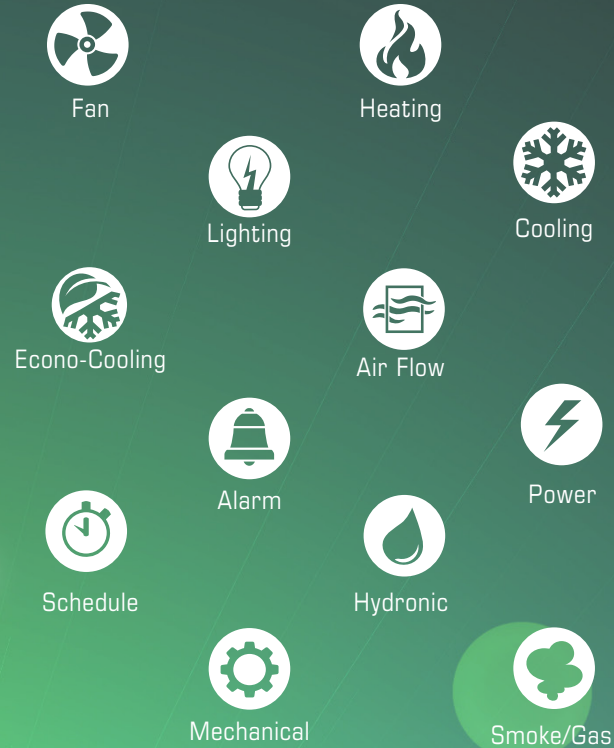
Reliable Controls is pleased to announce the release of RC-GrafXSet® 3.4. With this release, RC-GrafXSet now supports Integrated Fault Detection and Diagnostic (IFDD) FlexTiles™.

RC-GrafXSet is a full-featured, easy to use, non-proprietary, online graphical images and software service. It allows users to quickly generate professional 2D and 3D System Group graphics. IFDD FlexTiles are a new addition to RC-GrafXSet, allowing for the creation of simple, intuitive, and flexible interfaces for Fault Detection and Diagnostic (FDD) applications. IFDD FlexTiles must be used with Reliable Controls controllers that must use enhanced System Groups, with RC-Studio® version 3.4.2 or higher.

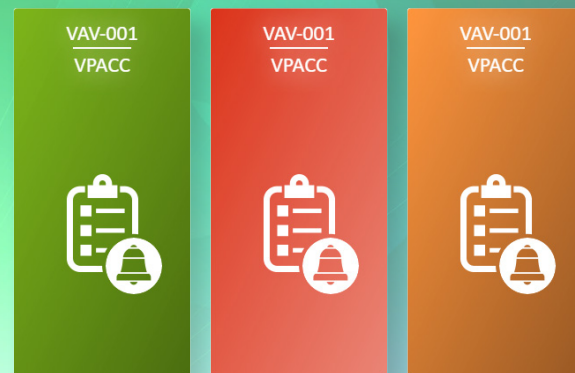
FDD strategies are comprised of two complementary components: detection and diagnostics. Fault detection methods are intended to automatically detect common mechanical faults and control errors that can result in sub-optimal performance and be predictive of occupant discomfort and equipment failures. Fault detection is often performed using one, or a combination, of techniques, including rules-based fault detection, performance-based fault detection, system-based fault detection, and value-based fault detection.

Monitoring the system in real time, as an inherent component of the sequence of operation, provides a solution that is both scalable and that provides the operator with immediate notification of poor performance, improving the likelihood of proactively identifying the root cause and resolving the fault.

IFDD FlexTiles can be used to quickly develop a fault detection and diagnostic solution within the MACH-System™ without the need for third-party software or third-party services.



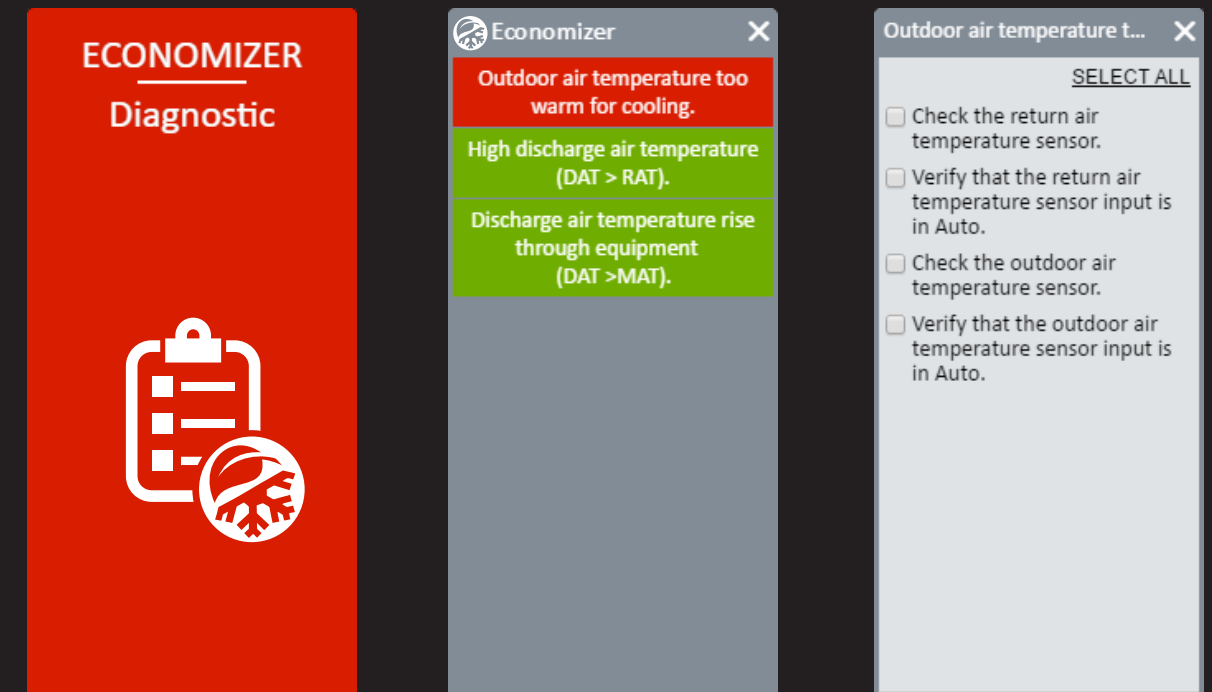
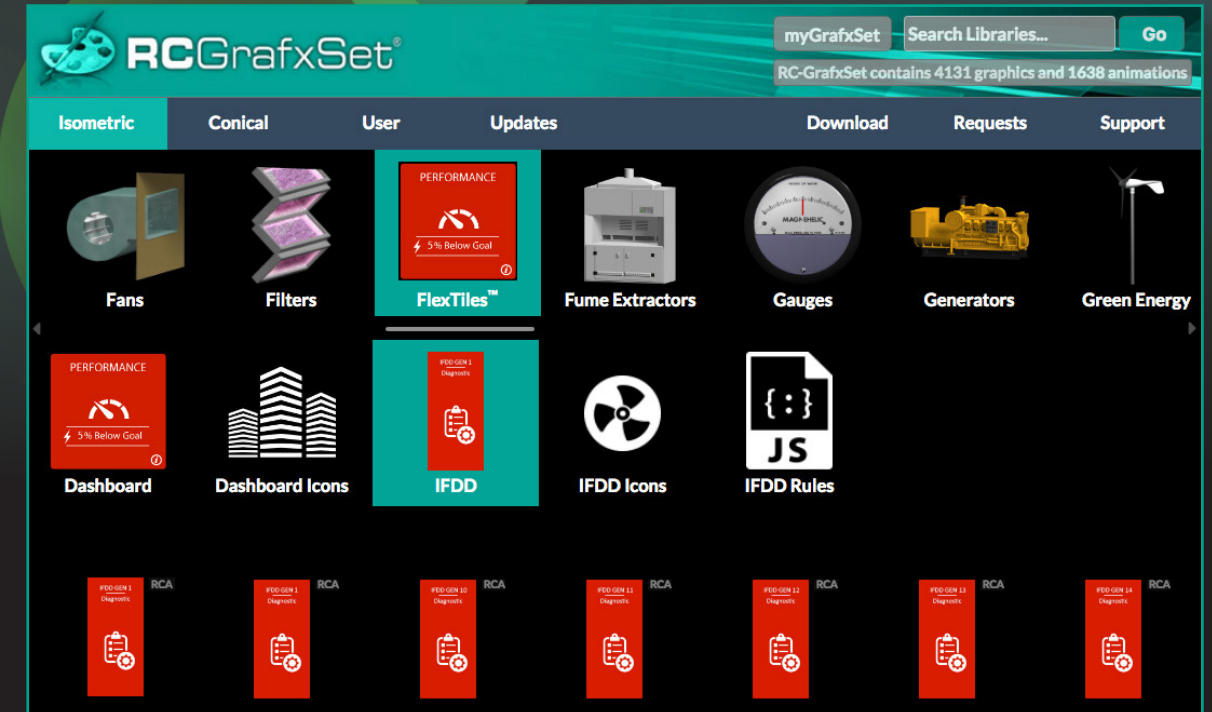
The many choices of IFDD configuration



IFDD FlexTile front displaying color-coded status feedback

1. **NO WARNING:** Green (default) indicates that there are no active faults.
2. **WARNING:** Red (default) indicates that there are active faults.
3. **IN PROGRESS:** Orange (default) indicates that diagnosis of a fault is underway.

RCGrafXSet®



IFDD FlexTiles will empower building operators to identify and resolve faults and sub-optimal performance in their own facility, while improving the life-cycle cost of the building systems as well as controlling occupant safety and comfort.

Better by design™

AUTHORIZED DEALER ACHIEVES MILESTONE

Serv-All Celebrates 40th Anniversary



Serv-All Mechanical Services, Ltd., began forty years ago. Much like the humble beginnings of Reliable Controls, Serv-All was started in a small, one-room office within the basement of one of the founder's homes. Combining industry experience and a drive for success, the founding partners, Vic Bogdanski, Dan Piche, Gerry Woods, and Blake Stewart, set out to make their mark on the HVAC service industry, where they discovered a calling in building automation systems (BAS).

At the time, there was an apparent gap in the market for controls installations. In order to be able to effectively fill this gap, Serv-All chose to join forces with a larger controls company in order to have a seat at the table as a competitor - effectively becoming a pawn for the company. However, in 1986, a new player emerged in the controls industry: Reliable Controls. This was a crucial turning point for Serv-All, as Reliable Controls was able to provide an opportunity for Serv-All to retain their independence and strong core values, while also offering full building controls and mechanical HVAC system services.

Over the next 30 years, Serv-All flourished. The success of Serv-All can be attributed to both the hard work and dedication of many talented team members, but also the core values that are strongly ingrained within Serv-All today. The genuine, honest approach to business has allowed Serv-All to operate successfully through both upturns and downturns in the economy. Three core values: RELIABLE, RESPECTFUL, and RESPONSIBLE have been the pillars on which the company has developed and grown.

A quick adoption of technology also played a vital role in Serv-All's progress throughout the years. Technological developments have been both momentous and rapid since the founding day. To put things in perspective, as an early adapter, Serv-All purchased the company's first computer in 1979, which was only one year after the first computer was installed in the White House! It was the size of an office desk, with its storage capacity measured in MB and limited to only 10 MB. Serv-All has continued to adapt the newest technologies and has been

fortunate to have Reliable Controls as a partner to help contribute to the company's success forty years.

The value of technology within the company is more prevalent today than ever before. The growing need for greener solutions is creating both challenges and opportunities within building automation, and Serv-All is eager to play its part in achieving greater sustainability. In conjunction with its 40th anniversary in business, the company released a new logo, featuring a bold green maple leaf to identify the additional focus on creating efficient systems for clients.

Ultimately, the heart of this organization is the people who have kept Serv-All moving forward every day. The company credits a number of long serving individuals whose dedication and commitment are the reasons the company is still running strong.

Today, Serv-All operates from three offices in Alberta, Canada. Edmonton has been home to the head office since 1978, the second office in Grande Prairie opened in 2007, and in 2016, a Calgary office was opened. With new challenges ahead in the HVAC industry, Serv-All will continue to be a leader in both reliable and sustainable building automation systems for years to come. The company looks forward to helping customers and building operators push the envelope in efficiency and comfort, knowing that they continue to move forward in a Reliable, Respectful, and Responsible manner.



With three offices in Alberta Serv-All has over 50 employees who keep Serv-All moving forward. Pictured are a handful from the Edmonton office staff.



Kaye Edmonton Clinic

This nine-story, 670,000 square foot clinic provides a range of 80 outpatient healthcare services and streamlined access to a diverse range of services and specialists. The building, completed in 2012, has over 5,000 points and is LEED® silver certified.



Grande Prairie Regional College

Grande Prairie Regional College is a comprehensive community college with two campuses. The project's two-year scope called for the removal of the facility's pneumatic controls in favor of the MACH-System™ with the least impact on day-to-day facility operations. Completed in 2009, the system includes over 3,000 points.



Edmonton Remand Centre

The Edmonton Remand Centre covers the size of ten football fields and is the most technologically advanced prison facility in Canada. The building aims to achieve significant environmental savings and provide a safer environment for both inmates & correctional workers. The building achieved a LEED® Silver rating for new construction.



Phillip J Currie Dinosaur Museum

Resting on the ancient Pipestone Creek, the world's richest dinosaur bone bed near Grande Prairie, this LEED® silver certified building features a stunning geometrically unique roof designed to reference the dinosaur bones that reside within the museum. This is one of the most aesthetically unique projects Serv-All has completed.



Walter C. MacKenzie Medical Centre

In 1997, an aging 1,500 point smoke control system was replaced with an Ethernet-based MACH-System™. Subsequently, other control systems and functionality were added. In 2003, the 650-bed, 351,000 square metre facility expanded with the addition of a four-story research center. The current system includes over 9,000 points.



Northern Alberta Institute of Technology CAT

NAIT's largest building, Centre for Applied Technology, opened in 2016. It covers 51,600 square meters, and hosts around 5,000 full-time students. The building was fitted with the MACH-System™, which was instrumental in helping the building to reach LEED® Gold certification. The facility contains over 3,500 points.

WELCOME TO NEW DEALERS

New Reliable Controls Authorized Dealers



Automated Building Concepts Inc. - Owensboro

Owensboro, KY, USA

Evolution Energy Solutions Gh Ltd.

Evolution Energy Solutions Gh Ltd.
Accra, Ghana



Integration & Control Solutions
Summerville, SC, USA

East Coast Controls

East Coast Controls
Charlottetown, PE, Canada



Tecno Ingenieria HVAC S.A.
Olivos, Buenos Aires, Argentina

TRADE SHOWS

Visit Reliable Controls at these Upcoming Trade Shows

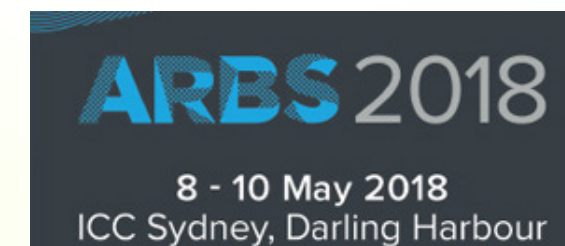
MEET

May 2-3, 2018
Moncton Coliseum
Moncton, NB, Canada
Booth #628



ARBS - Australasia's Largest HVAC Trade Show

May 8-10, 2018
International Convention Centre
ICC Sydney Darling Harbour, Australia
Booth #2055/2077



AIRAH - CANBERRA

June 6-7, 2018
Exhibition Park, Coorong Pavilion
Mitchell, ACT, Australia



RealComm/IBcon

June 6-7, 2018
The Cosmopolitan
Las Vegas, NV, USA
Booth #1915



AIRAH - PERTH

June 20, 2018
HBF Stadium
Mount Claremont, WA, Australia



PEOPLE YOU CAN RELY ON

Research & Development: Firmware Department

Firmware is software embedded in a device.

Firmware in a controller gives it a heartbeat, converts a raw input into a human readable value, displays that value, and gives the controller a voice so it can talk to other devices and the system.

The Reliable Controls firmware team writes the code for all microprocessor-based devices that the company manufactures. This includes SMART-Sensor™ devices, MACH-ProPoint™ controllers, and even the USB key that is included with software licenses (RC-Key).



Michael Osborne, Firmware Manager

The team has grown from three developers in 2004 to a full dozen this year. Since 2004, the firmware team has added many features and capabilities to the MACH-System™ and has given a voice to many new devices including the MACH-ProCom™, MACH-ProWeb, MACH-ProPoint, MACH-ProZone™, MACH-ProAir™, MACH-Pro1™, MACH-Pro2™, and most recently, the SMART-Sensor™ EPD (SS3-E). While doing that, many new features and capabilities have been added to all products and a few bugs were fixed along the way.

There are three groups within the firmware team, each with a specific task. The Support Group is made up of two developers that deal with any technical issues that cannot be handled by Technical Support. The members of this group cycle out every three months so every developer gets an opportunity see the real issues dealers experience.

The next group is Firmware DevOps. This group is tasked with maintaining and enhancing the tools that the firmware team uses, the firmware

build process, and all the other tools the Research and Development team uses. At this point, Peter Ostrom is the only full-time member of this group. The final group is the Development group that designs and implements all the firmware features.

As the team grows, so must grow the methods used to design and develop new products. When there were only a few developers, design decisions were made after a quick conversation over the cubicle wall. Today, with a much larger team, “Agile methods” are used to help ensure the best quality firmware is produced, on time.

What are Agile Methods?

Agile defines the players and processes required to develop quality commercial code, firmware or software. The players include a Product Owner (PO), Scrum Master (SM), and a Scrum Team.

A PO is the key stakeholder which represents the customer. The PO sets the priority of work and writes the high-level objectives for a new feature. The Scrum Master is often the technical expert and helps the PO determine the order of work that needs to be completed. The Scrum Team itself is the most important part of the Agile method. It is the team that gets the work done and is made up of developers, quality assurance testers, and technical writers.

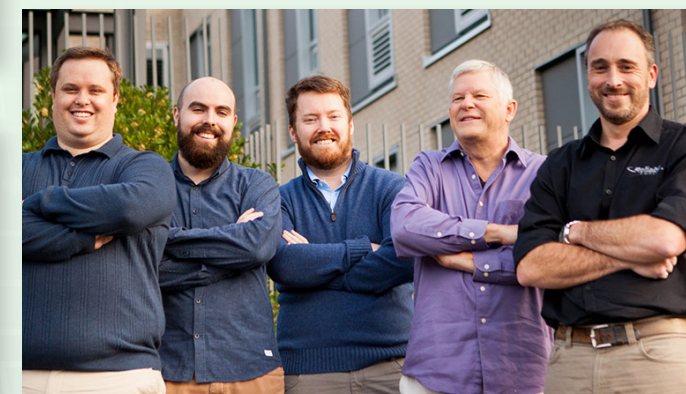
Since Reliable Controls started writing firmware, there has always been one individual responsible for dealing with firmware issues in production, handling firmware releases, dealing with feature requests, and being the advocate for the controller. This individual is called the “Firmware PO”, and since the Scrum Teams are often small, this person often takes on the Scrum Master role as well.



Peter Ostrom, DevOps



Matthew Clarkson, Harley Sims, Christian Leclerc, and Kyle Hendry



Firmware Product Owners: David Findlay, Harley Sims, Matthew Clarkson, Keith Fowler, and Matthew Osborne

The Agile method for firmware development includes; stakeholder design reviews, testing, code complexity analysis, code peer reviews, and adherence to strict coding standard.



MACH-ProCom™ and MACH-ProView™ LCD



MACH-ProAir and MACH-ProZone

Department Profile

Request to Release

The Firmware Product Owner manages all new features from request to release. New features are first reviewed by the PO for fit and viability, and then placed to the backlog for consideration for a future release. A feature may need further research or “proof of concept” prototyping to determine its viability.

Before a line of firmware code is written, a new feature must be fully designed. This requires one or more developers to document how the feature should be implemented. If the feature has a user interface, the UI/UX Team is asked to design a wireframe for it. Both the feature design and the interface go through a review before implementation can begin.



Sarah Sorensen, UI/UX Designer

As part of the Agile method, the Firmware Team implements a Test Driven Development on newer products and features. This means the developers must write automated test code before implementation can begin. The automated test code helps the developer to be cognizant of the design impact before implementation.

Once the implementation has been completed and tested by the developer, a few hurdles still remain before the feature is ready for primetime.

The first post implementation check is a code complexity analysis. The implementation is reviewed to ensure the code is not overly complex. Complex code is hard to read, hard to maintain, and often has hidden issues.

The next step is to perform an automated test coverage review. These tests are reviewed to ensure that at least 80% of the implementation has automated tests in place. The final step is code peer reviews. At least two other developers must review the implementation to ensure the it matches the design and does not affect other systems within the device and follows the company’s strict coding standard.

At this point, the new firmware feature is ready to be tested by the Quality Assurance Team and documented by the Technical Documentation Team.

As the Firmware Team grows, the team will continue to improve their development processes, delivering the highest quality features and products in a timely manner and, as always, will have fun giving controllers a voice.



The Firmware Team: Allen Change, Harley Sims, Brody Holden, Michael Osborne, Keith Fowler, Tony Nordstrom, Peter Ostrom, David Findlay, Matthew Osborne, Kyle Hendry, Christian Leclerc, and Matthew Clarkson

people & technology
you can rely on™

Worldwide network



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info@reliablecontrols.com

www.reliablecontrols.com/sales

CONRAD HOTEL

CHICAGO, IL, USA

HOSPITALITY

OVERVIEW

This project started out as a plan and specification project, then changed to a design build project. The building is an older 21-story office building, with over half converted into a 5-star hotel. The focus was customer comfort.

PROJECT DETAILS

Reliable Controls Authorized Dealer Intelli-Building Control and Solutions completed this fast-paced retrofit project, which required an accurate schedule critical to achieving occupancy by the deadline.

Networked hardware includes all HVAC equipment, kitchen exhaust systems, guest thermostats, and VFDs. Reliable Controls equipment includes MACH-ProAir VAV controllers for common area comfort, MACH-ProZone controllers servicing common area head pumps, MACH-ProSys controllers to manage the boiler plant, cooling tower, and pumps, and MACH-Pro2 controllers to provide smoke control and floor pressurization.

BACnet integration includes six variable frequency drives (VFDs) for pumps and cooling towers, six sensors for parking garage ventilation, two boilers, eight routers, four kitchen hood exhaust systems, and 325 thermostats serving guest rooms. Mechanical equipment includes heat pumps, air handlers, make-up air units, VFDs, and boilers.

The integration into the guest suite's INNCOM system, which controls all lights, curtains, heat pumps, and entertainment, provided Intelli-Building Control and Solutions with the ability to "sense" when a bathroom light is turned on. The light is interlocked with the bathroom's exhaust damper, providing a total count of how many exhaust dampers are open per floor. Knowing the cubic feet per minute (CFM) of each damper allowed for the calculation of the CFMs per floor being exhausted; if the count falls below the amount required to be open, INNCOM sends a BACnet command back to the MACH-System to energize the additional dampers to meet the required minimum fresh air requirements.

Floor pressurization and smoke removal for the safety of the guests was another requirement of this project. Each level was divided into two zones with magnetically latched fire doors in the center of the floor hallway. The doors act as a safety zone for proper control of smoke removal, allowing pressurization above and below the detected fire floor. A total of 66 dampers hardwired into the fire alarm system are controlled, with status and monitoring of every damper.

Intelli-Building Control and Solutions minimized the install cost through integration of the INNCOM system. Utilizing it as a gateway to perform minimum fresh air control eliminated thousands of feet of wire and hardware.

To learn more about projects using Reliable Controls® visit
www.reliablecontrols.com/projects/overview



PROJECT TYPE:

Retrofit

INSTALLATION TYPE:

Boiler, CO₂ Monitoring, Heatpump Hotel, HVAC, Smoke Control, VAV

TOTAL AREA:

13,935 m² (150,000 ft²)

NETWORK:

BACnet, EIA-485, Ethernet, WAN, Wireless

POINTS:

3,000

EQUIPMENT INSTALLED:

44 MACH-ProAir™
 10 MACH-ProZone™
 2 MACH-ProSys™
 10 MACH-Pro2

RELIABLE CONTROLS® DEALER:

Intelli-Building Control and Solutions LLC

