DECEMBER 2020

THE Resource

CORPORATE UPDATE

APPLICATION ENGINEERING

TECHNICAL SUPPORT

RESEARCH & DEVELOPMENT

SALES & MARKETING

Our future's looking brighter at Reliable Controls headquarters

In this issue

(Click title to jump directly to article)

THE Resource

Our future's looking brighter at Reliable Controls headquarters

The terrible thing about the lighting business is it changes so rapidly. The past few decades have seen incandescent technologies replaced by fluorescent T12s, compact fluorescents, T8s, T5s, and now LEDs. The pace of technological development is so rapid, manufacturers and dealers aren't interested in stocking replacement parts or offering upgrade kits for old fixtures. Reliable Controls facilities staff were recently dismayed to discover that when expensive exterior fixtures failed after just a few years, replacement parts were not available.

The wonderful thing about the lighting business is that it changes so rapidly. The technology is transmogrified every few years, with new features and energy savings so enticing, owners and consulting engineers happily sign up to retrofit lighting fixtures and controls that were installed just a few years earlier! Building codes change constantly, requiring new fixtures, new control components, and new control strategies. What a bonanza for dealers and contractors in the lighting business.

Reliable Controls dealers are aware that we design our controls to last many years, which means it will be the next generation who does the retrofit of those devices. How many times could you renovate the lighting fixtures and lighting controls in a building during that period? Sounds like good business, right?

Recently, the good guys in our Facilities department joined the madness. Would you believe we just upgraded most of the lighting fixtures and controls in the south annex of our headquarters building—less than 8 years after construction? Here's why:

- The original installation used T5 fluorescent tubes and ballasts. Upgrading to LEDs provides significant energy savings.
- The original dimming fluorescent ballasts were failing, which required an electrician and an expensive replacement part for each individual failure. It should be noted we never lost a single T5 tube in the 8-year period; that part of the technology was flawless.
- The original EnOcean transceivers that came with the light fixtures proved to have firmware problems, and the hardware was failing at an unacceptable rate.
- The original SMART-Sensor EnOcean Accesspoint devices and fixture transceivers used 315 MHz radios, which were superseded by 902 MHz devices a few years ago. For that reason, adding more EnOcean devices, like plug-load controls, to our existing 315 MHz system became problematic.

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Fluorescent fixtures.

Well, our motivation was compelling, but the task of replacing or upgrading our beautiful, expensive fluorescent fixtures was daunting. So we hired an electrical consultant to do a study.

The consultant did a nice spreadsheet of the types of fixtures installed and recommended a suitable LED fixture replacement for each but did not include energy savings estimates. The total cost was unacceptable, so we got discouraged and shelved the idea for a few months while continuing to replace ballasts and EnOcean transceivers.

Eventually, we started looking for a way to upgrade the existing fixtures without replacing them. We learned that three types of LED tubes are available for installation in existing fluorescent fixtures.

Type A

Type A LED tubes are drop-in replacements for T5 or T8 fluorescent tubes. The LED driver is buried in the tube, and they are designed to operate with the old fluorescent ballast in place. Super easy to install, not that expensive, but…

- The old ballast uses energy, even when the light is off (5–7 watts each).
- If the old ballast fails, it has to be replaced to keep using the Type A LED.
- The location of the driver in the bulb is sensitive to heat. If the driver heats up, it can significantly reduce the life of the bulb.

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Type B

Type B LED tubes also have the LED driver mounted inside the tube, but they are designed to operate from main power directly. To use these bulbs, each fixture must be rewired to exclude the old ballast. That work requires a UL kit and an electrician, making this option much more expensive, but at least it does not reuse the nasty old ballast. On the down side, warning labels must be installed on the fixture, because main power is exposed at the tombstones holding the tube. Maintenance personnel need to be cautious when they replace tubes.

Type C

Type C tubes do not have an internal LED driver, which means a separate LED driver has to be installed in the fixture. Again, a UL kit and electrician are required, but the result is basically an LED fixture with the lowest cost for replacement tubes.

For our project, Type A was out of the question, because it would not solve the problem of constant expensive ballast failures.

Then we learned the manufacturer of our beautiful, expensive fixtures does not offer a kit for Type B or Type C LED retrofits.

We also learned that most lighting manufacturers don't make the job of selecting retrofit LED driver/LED tubes easy. Not to mention, these two components must be electrically compatible for the warranty and specified operating hours to be valid. And we discovered that many available drivers would not physically fit into our streamlined fixtures.

Eventually, we found some driver/tube pairs from Keystone Technologies, based in Pennsylvania. The drivers were small enough to fit in our fixtures, the price was good, the company has been in business for over 75 years, and the documentation is readily understandable. Aside from choosing the color temperature (we went with 3500 K), the only option to decide on was high efficiency (HE) or high output (HO). We ordered two ballasts and four tubes of each type to compare. We subsequently installed the two sets of gear in the fluorescent fixtures of two adjacent offices in the south annex.

To justify the overall project, we needed some data on the performance of the retrofitted fixtures. We hooked up a power meter to the power input of each fixture, which yielded the results in Table 1.

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Light type	Dim % Cmd	Lux	Watts	VA	pf	Lux/ watt
Fluorescent	100	196	120.5	120	0.99	1.63
HO LED	100	300	100.8	101	0.99	2.89
HE LED	100	274	53.8	54	0.99	5.09
Fluorescent	75	192	116.4	116	0.99	1.65
HO LED	75	260	84.2	84	0.99	3.09
HE LED	75	232	44.8	45	0.99	5.18
Fluorescent	50	136	85.6	85	0.99	1.59
HO LED	50	180	54.4	54	0.99	3.31
HE LED	50	156	29.3	29	0.99	5.32
Fluorescent	33	88	63	63	0.99	1.40
HO LED	33	124	34.8	35	0.98	3.56
HE LED	33	106	19.2	19	0.98	5.52
Fluorescent	25	64	50.6	50	0.99	1.26
HO LED	25	92	25.6	26	0.97	3.59
HE LED	25	78	14.3	14	0.98	5.45
Fluorescent	10	8	23.3	23	0.99	0.34
HO LED	10	40	10.5	11	0.91	3.81
HE LED	10	30	6.1	6	0.93	4.92

Table 1

Wow! The efficacy, in lux per watt, of the fixture retrofitted with the HE components was typically three times that of the old fluorescent tube. At 100 percent command, it produced 40 percent more light while consuming 55 percent less power. We found that the HO components produce much more light than necessary for our applications.

Inspired by these results, we went on to discover that since all the lighting components are UL certified, we could hire a local UL inspector to approve the converted fixtures. Game on.

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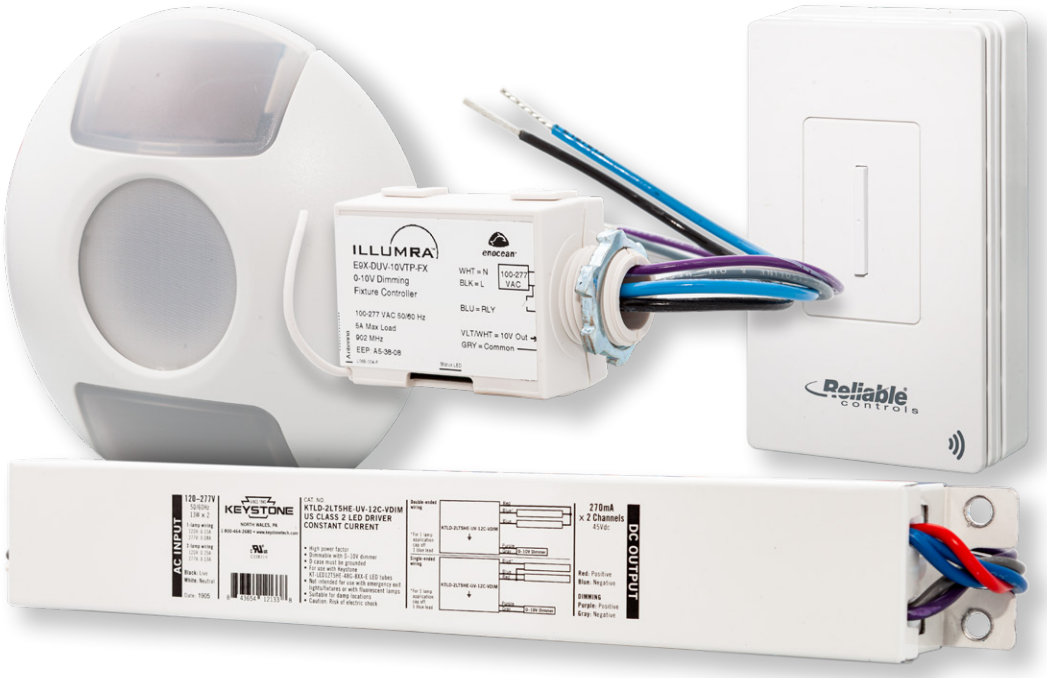
In the end, the retrofit consisted of the following components, including spares (Table 2):

Manufacturer	Item	Part number	Quantity
Illumra	EnOcean transceiver	E9X-DUV-10VTP-FX	85
Reliable Controls	SMART-Sensor EnOcean Accesspoint	SSEA3-902-O/W	60
Keystone	LED driver	KTLD-2LT5HE-UV-12C-VDIM	160
Keystone	LED tubes	KT-LED12T5HE-48G-835-E	320
Echoflex	Lux sensor	TAP-31U	50
Echoflex	Battery for lux sensor	CR1632	50
Reliable Controls	Labels		160

Table 2



Peripheral components: Illumra EnOcean transceiver, SMART-Sensor EnOcean Accesspoint, Keystone LED driver, and Echoflex lux sensor.

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We were aware that with our typically low operating hours and high rate of dimming, the energy savings of the overall retrofit would not be high. We estimated a 3 percent drop in the electrical energy consumed in the south annex, or about $672 per year. Nevertheless, the other considerations carried the day, and management approved the project.

A Reliable Controls dealer performed the electrical installation in August, which created very little disruption to staff, who had been chased out of the building by COVID-19. The other benefit of an empty building is we can honestly say we've had very few complaints. Unfortunately, it will be difficult to differentiate the actual energy savings due to the lighting retrofit, because about 60 percent of the lights have been off continuously since March.

Nevertheless, with new LED bulbs, a LEED Platinum–certified heritage, and energy use about 14 percent below design intent, the Reliable Controls south annex continues to be a shining example of the ART of Building Sustainability.

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Al McElhone promoted to Vice President, Sales—Americas

Reliable Controls is pleased to announce the promotion of Al McElhone to Vice President, Sales—Americas effective January 1, 2021.

For the past 7 years, Al has been an integral component to the sustained success of Reliable Controls in Eastern Canada. As Regional Sales Manager in a mature market that stretches from Ontario to Newfoundland, Al grew the region every year and increased market share by more than 7 percent. Al has proven himself to be a trusted advisor and advocate for Reliable Controls Authorized Dealers and customers, and he is a valued anchor of the sales team.

Al has spent 30 years as a built-environment professional with extensive experience in energy management and performance contracting. He was an account executive with Ontario Hydro, Ameresco, Honeywell, and Siemens before he joined the Reliable Controls team.

As Vice President, Sales—Americas, Al will provide valuable advocacy and leadership for our regional sales managers throughout North, Central, and South America. Al's vision will be instrumental to the strategic and sustained growth of Reliable Controls and our Authorized Dealers.

"I'm very excited for this opportunity to get to know our amazing dealers and customers. Their success is key to us realizing our mission, and I can't wait to be part of it all," says McElhone.

Please join us in congratulating Al and wishing him the best in this new and exciting challenge.

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With warm appreciation, Reliable Controls extends our best wishes for a safe and happy holiday season!

Season's Greetings

Thank you for your business. We look forward to working together in 2021.

Open application engineering positions in Asia Pacific, Latin America, and North America

Reliable Controls is looking for three experienced, motivated application engineers in the Asia Pacific, Latin America, and North America regions. Each position offers a high degree of challenge, flexibility, and autonomy as well as the opportunity to work for a great company whose pioneering technologies improve comfort and sustainability in buildings around the world.

The job of an application engineer is to provide service and support to independent Authorized Dealers. The Asia Pacific application engineer will serve Southeast Asia, China, and Australasia. The Latin America application engineer will serve Latin America, and the North America application engineer will serve North America. The main goal is to develop a trusting relationship that fosters collaboration and mentorship with our Authorized Dealer network.

Successful candidates will work remotely from home with occasional business travel, approximately 20 percent per year. Applicants must hold a valid passport for entry into Canada.

Applicants for the North America and Latin America positions must be US citizens. These applicants must already reside in the United States; relocation is not offered. Applicants for the Latin America region must be fluent in Spanish.

Qualifications

- Minimum 5 years of experience in an application engineering role in the building automation industry, particularly in system design, deployment, and support
- Bachelor's degree in mechanical engineering or controls and instrumentation engineering or equivalent
- Excellent written and verbal communication skills in the language of the region you are applying for with proficiency in English
- Advanced, in-depth working knowledge of industry hardware and software
- Proficiency in Microsoft Visio or AutoCAD and experience or accreditation in green-building concepts, BACnet, Modbus, and multivendor integration. Experience with the Reliable Controls system is an asset.
- Ability and eagerness to gain new skills and learn about Reliable Controls products
- Strong time- and project-management skills with the ability to stay focused
- Strong ability to consistently demonstrate high performance with independent work
- Ability to see the "big picture" and drive for continuous improvement
- Demonstrated people skills

To learn about this role and the perks and benefits we offer, please visit reliablecontrols.com/careers/#openings

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insight

Standard High-Performance Sequences of Operation

Many ascribe to the adage "consistency is key." Consistency can be defined as steadfast adherence to a principle, course of action, pattern of behavior, or unchanging performance. There is undeniable power in habit, which, when performed with regularity, often translates into reliable, repeatable action and even results. However, consistency alone is not always laudable. What if an action is performed consistently but achieves dependably poor results? Is the outcome of that consistency desirable?

Preceding insight installments have provided reminders of the benefits and value of operational standardization for business sustainability. Standard applications and engineering templates produce consistent results, but to realize the greatest return on investment, they must be developed, implemented, and executed to deliver consistently effective results. Recall that effective standardization is a process of developing and implementing technical, consensus-based standards that maximize repeatability, efficiency, and quality over custom processes. It is not enough to conserve effort and resources while punching out consistent results; the goal is consistent *quality* results.

Diversity in the built environment represents a fundamental challenge to effective standardization. Facilities have dramatically different uses. Portfolio executives have varied expectations and requirements; a wide diversity of mechanical processes and equipment are commonly used; and comfort and energy conservation seem to be constantly at odds and often poorly balanced.

In traditional facility automation, though, the stakeholders most commonly accountable for sustainable success have presented a consistent challenge to effective standardization. Mechanical system and automation designs can be inconsistent, from boilerplate models with dubious application to finely tuned custom-engineered solutions. Design firms are accountable for a range of knowledge in many complex disciplines, which often makes deep understanding difficult in highly technical specialties like automation. In execution, the quality of controls contractors and automation vendors varies dramatically, from highly trained and experienced specialists to generalized contractors dabbling in automation as a peripheral business. Some automation firms

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are expert stewards of the sustainable built environment and its occupants, whereas others churn and burn controls as a transaction. All too often, these two critical stakeholders are at odds. To further exacerbate these variabilities, they are often selected based not on qualification or expertise but rather on who can provide services at the lowest initial cost. The characteristics of this model certainly present a challenge to standardization, but it is a challenge that can be overcome.

Rear Admiral Grace Murray Hopper, computer scientist and cocreator of the high-level programming language COBOL, said, "The most dangerous phrase is: *we've always done it that way*" (Surden 1976). A more sustainable and effective paradigm requires not consistent iteration of the way the built environment has always been automated but instead, change. Many Reliable Controls Authorized Dealers have changed internal processes to successfully implement standardization and quickly realized benefits to their operational sustainability, coupled with reduced effort and improved return on investment. The Reliable Controls Application Engineering team continues to champion a shift to increased standardization to improve efficacy and efficiency. We are not alone. The engineering community has recognized and actioned this need for change as well.

ASHRAE Guideline 36

The American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE) picked up the mantle to change the built-environment paradigm in 2014 when it created a guideline project committee to "provide uniform sequences of operation for heating, ventilating, and air-conditioning (HVAC) systems that maximize HVAC system energy efficiency and performance, provide control stability, and allow for real-time fault detection and diagnostics" (ASHRAE Standing Guideline Project Committee 36 2018). This committee, comprised of researchers, designers, vendors, users, commissioning agents, and other interested parties, is tasked with the publication and maintenance of ASHRAE Guideline 36, *High-Performance Sequences of Operation for HVAC Systems*. Initially published in 2018, Guideline 36 establishes consensus- and research-based, standardized advanced sequences of operation for common HVAC systems that deliver several benefits to the built environment, including the following (ASHRAE Standing Guideline Project Committee 36 2018):

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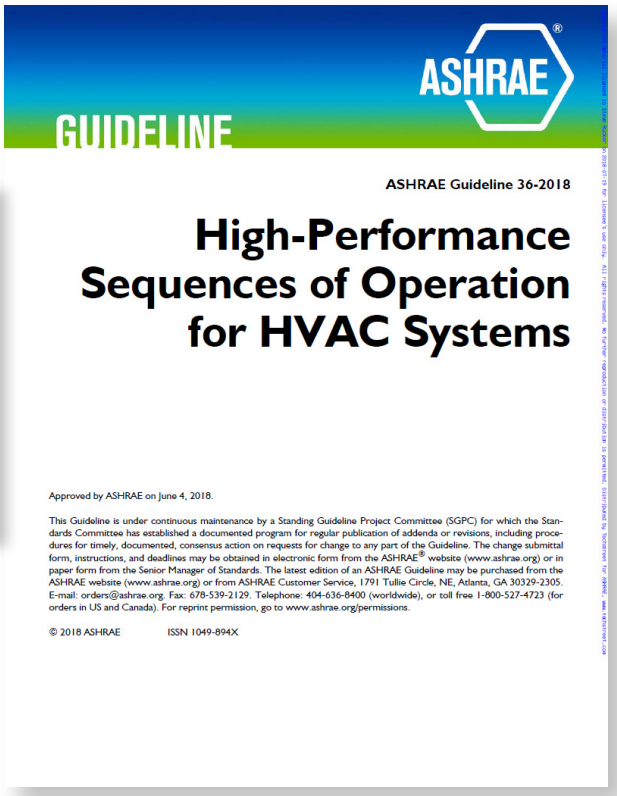

• Reduced design time for engineers, who can use standard sequences of operation.

• Reduced time to program and commission, as standard applications provide consistent sequences of operation.

• Reduced dependence on proper controls implementation and commissioning to achieve design performance and energy conservation, as the sequences of operation and programming are standardized.

• Reduced energy consumption by consistently using proven, cost-effective strategies that leverage fully implemented energy and building codes.

• Reduced energy consumption and system downtime through automated fault detection and diagnostics (FDD) to proactively prevent poor performance.

• Improved indoor-air quality by ensuring sequences comply with current standards and legislation.

- Consistent functional performance and expectations between designers, contractors, and operators.

The intended audience for the guideline includes designers, vendors, contractors, commissioning agents, and high-level facility operators responsible for the deployment and operation of facility automation systems. The guideline is comprised of standard components that may be combined into a complete sequence of operation. Informative notes describe how designers can properly implement the sequences of operation, and background information and descriptions of the intent facilitate a common understanding among stakeholders.

Guideline 36 empowers consistent, high-quality designs that can be customized for the needs of each application with an effort analogous to copy and paste. The sequences of operation leverage current technology, science, and broad industry experience to balance the apparent conflict between tight control and energy conservation. Saving energy while improving the comfort and health of occupants means working harder and using automation systems smarter. Consider a few ways that ASHRAE Guideline 36 is a clear departure from the past.

Solid foundation

A multiyear research project[1] that focused on dry-side applications served as the foundation for the initial publication of Guideline 36. To ensure that designers and controls specialists can build a consistent and sustainable application, the guideline provides detailed guidance, including control schematics, hardware point lists, and visualizations of the sequence. Default setpoints for temperature, airflow, ventilation, economizer, and timing are clearly defined by application and space to ensure sequences fully comply with standards and legislation like ANSI/ASHRAE/IES 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*; ANSI/ASHRAE 62.1, *Ventilation for Acceptable Indoor Air Quality*; and California Energy Commission Title 24, *Building Energy Efficiency Standards*.

4.1 VAV Terminal Unit—Cooling Only

Required?	Description	Type	Device
R	VAV box damper position	AO **OR** two DOs	Modulating actuator **OR** Floating actuator
R	Discharge airflow	AI	Differential pressure (DP) transducer connected to flow sensor
R	Zone temperature	AI	Room temperature sensor
A	Local override (if applicable)	DI	Zone thermostat override switch
A	Occupancy sensor (if applicable)	DI	Occupancy sensor
A	Window switch (if		
A	Zone temperature (if applicable)		
A	Zone CO_2 level (if		

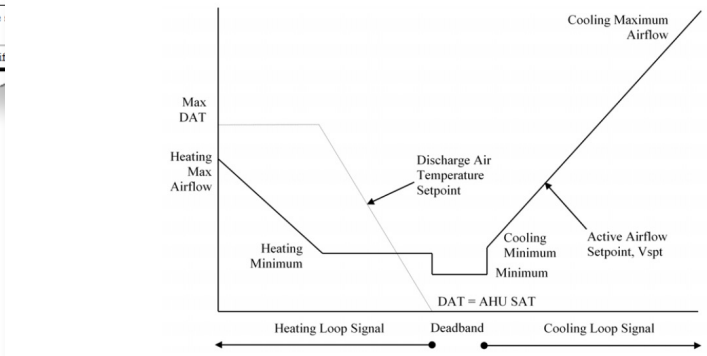

Figure 5.6.5 Control logic for VAV reheat zone.

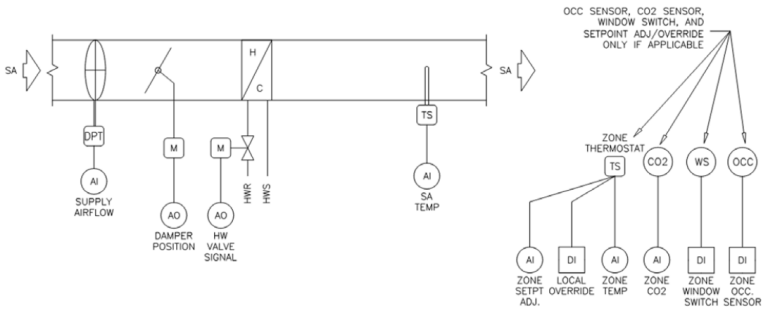

Figure A-2 VAV terminal unit with reheat.

[1] ASHRAE RP-1455, *Advanced Control Sequences for HVAC Systems: Phase I Air Distribution and Terminal Systems.*

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Doing the right thing, not the easy thing

In her advocacy for change, Grace Murray Hopper once complemented her earlier quote with: "People are allergic to change" (Schieber 1987). Like water, people often follow the path of least resistance. The adage "if it ain't broke, don't fix it" is often laudable and effective. However, it begs the question: How can you tell if something is broken and needs to be fixed? In engineering, deviation from conventional norms can be anathema. However, many of the sequences do just that, at least in part.

One of the orthodox principles of facility automation, particularly at the terminal unit, is to pare down a sequence to its bare minimum. Complex sequences of operation can of course be more difficult to design, program, commission, and operate, so simple strategies are preferred. As a change agent, Guideline 36 is cut from a different cloth; it says complexity should not prevent a strategy that consistently works well and reduces energy conservation. This kind of innovation is old hat to Reliable Controls Authorized Dealers.

Multiple dedicated control loops

The first deviation from tradition is a requirement for one control loop dedicated to each analog control application. This means a reheat VAV application requires at least three control loops: one each for space cooling, space heating, and discharge-air-temperature control. Guideline 36 prescribes the techniques required to prevent integral windup, prevent control-loop overlap, and facilitate effective cascade control to complement this requirement.

Reliable Controls has long promoted the benefits of control loops that can be individually tuned to provide tight control for applications with potentially different proportional response. Reliable Controls devices inherently support multiple freely programmable control loops that are stable and easy to tune. For more information about control loops, please refer to the August, September, and October 2018 installments of insight.

Discharge-air-temperature control

To improve energy performance[2] and occupant comfort, control of VAV reheat based simply on space-temperature deviation is prohibited by the guideline. Instead, reheat must be controlled to maintain a discharge-air-temperature setpoint that is dynamically reset based on the space-heating control loop and a maximum allowable temperature deviation from the present space temperature. The requirements of the application make discharge-air-temperature sensors mandatory.

[2] In compliance with ANSI/ASHRAE/IES 90.1 and related standards.

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Airflow control

To further improve energy performance, occupant health, and control performance, Guideline 36 provides extensive direction on terminal-unit airflow control that deviates from the tradition. Replacing simple minimum and maximum airflow setpoints in conventional strategies, the prescribed ventilation zone strategies facilitate significantly lower minimum airflow with demand-control ventilation and a dynamic absolute minimum airflow setpoint in addition to minimum and maximum airflow setpoints for heating and cooling.

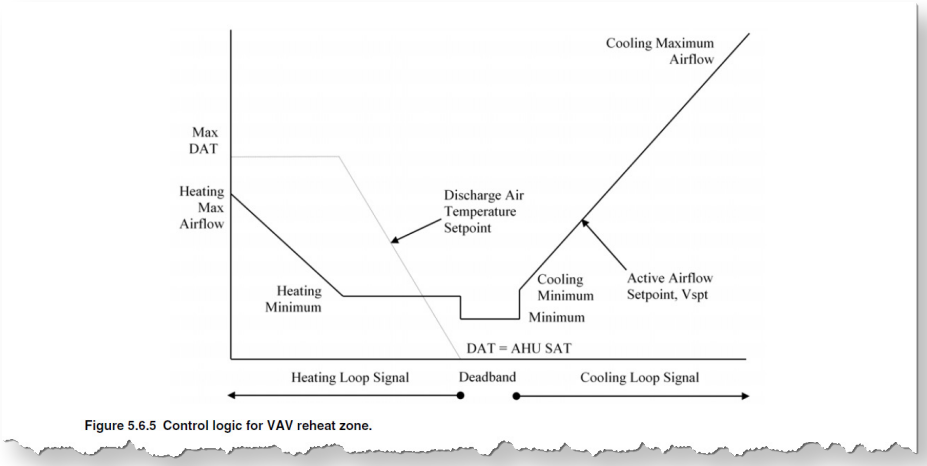

Figure 5.6.5 Control logic for VAV reheat zone.

Maintaining the lower minimum airflow setpoints requires airflow-sensor accuracy and resolution that presents a challenge for some low-cost terminal unit devices but is inherent in the MACH-ProAir™.

Efficient alarm management

Alarm and event notifications could be one of the most valuable attributes of a facility automation system, yet alarms are often implemented with inadequate design criteria and poor execution.

Guideline 36 attacks this inadequacy to reduce nuisance alarms and improve actionable insight. Alarms are categorized into at least four levels. Each prescribed event is provided with a dynamic alarm threshold and entry delay. Before an alarm condition can return to normal, an exit hysteresis and delay must be satisfied. To reduce alarm chatter, after an alarm has returned to normal, a variable suppression period prevents the alarm condition from being broadcast again.

The guideline further reduces nuisance alarms by ensuring that an operator receives only actionable event notifications. Alarms for any application can be suppressed by an operator-initiated maintenance mode during maintenance or when a device is known to be nonfunctional. Alarms are automatically suppressed for a dynamic period when setpoints are changed to prevent the immediate temporary deviation that results from operator intervention. Finally, all alarms are dynamically suppressed according to a hierarchical scheme. For example, if the chilled-water plant is known to be nonfunctional, warm-space alarms are suppressed; if the heating-water plant is known to be broken, cool-space alarms are suppressed. These schemes allow the operator to focus on causes of problems rather than symptoms.

Reliable Controls has long recommended these strategies for efficient alarm management. For a more detailed discussion of alarming, please refer to the April and May 2015 installments of insight.

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Fault detection and diagnostics

FDD is an increasingly common strategy to identify suboptimal performance of mechanical and electrical systems in the built environment and then provide guidance to operations teams about how to resolve faults. The underlying principle is that by identifying and resolving poor performance as soon as possible, negative impacts to tenant comfort, facility operations, and energy waste can be avoided. Many FDD solutions implement retroactive analysis of data to identify faults based on historical performance.

Guideline 36 mandates this strategy and defines mandatory FDD rules for dry-side plant equipment like air-handling units as a part of the control sequence in the controller. This is the same strategy that has been proposed by Reliable Controls and implemented in integrated fault detection and diagnostic (IFDD) strategies and the intuitive FlexTile™ user interface. For more information about FDD and IFDD, please refer to the June and July 2015 and January, February, and March 2018 installments of insight as well as the IFDD standard application.

Closed-loop control

In one more significant deviation from traditional sequences of operation, Guideline 36 uses closed-loop dynamic reset of control setpoints. It is common practice to reset setpoints such as primary discharge-air temperature based on an open-loop input such as outdoor-air temperature. Instead, the guideline prescribes a closed-loop reset strategy that uses real-time load to reset active setpoints and use the minimal amount of energy required to satisfy the present demand. This strategy is known as trim and respond, in reference to the two iterative setpoint reset steps.

To conserve energy, during a trim iteration, the setpoint is adjusted to decrease control response[3] at a fixed rate until dependent processes are no longer satisfied. For example, a duct static pressure setpoint is regularly reduced until downstream VAVs struggle to maintain their airflow setpoints with open dampers.

When a sufficient number of processes signal their inability to maintain control, the reset strategy enters the respond iteration, during which the setpoint is adjusted to increase control response[4] at a fixed rate until dependent processes are satisfied. In the preceding example, a duct static pressure setpoint is regularly increased until downstream VAVs can maintain their airflow setpoints and modulate their dampers closed.

The net result of trim and respond is a low-frequency oscillation in process response, but when implemented as required by the guideline, this hunt is acceptable as it conserves energy while maintaining tight control and occupancy comfort.

[3] In a reverse-acting control loop like heating or static pressure, trim reduces the setpoint. In a direct-acting control loop like cooling, trim increases the setpoint.
[4] In a reverse-acting control loop like heating or static pressure, trim increases the setpoint. In a direct-acting control loop like cooling, trim decreases the setpoint.

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Lead the way

In field studies and early adoptions, the standard sequences defined by ASHRAE Guideline 36 consistently balance energy conservation and control accuracy. This reveals that many tried-and-true conventional sequences of operation are indeed broken in some way. Many additional requirements of the guideline more fully leverage the power of facility automation to create a better built environment. There is no question that in this case, the fix requires change, and the change brings complexity. But the changes brought by ASHRAE Guideline 36 are well aligned with the capabilities of Reliable Controls and our Authorized Dealers.

The guideline mandates that every object in the database be operator adjustable; the dynamic controller database and intuitive user interfaces inherently support this requirement. A dramatic change to control strategy presents a challenge to configurable terminal unit controllers; every Reliable Controls device is freely programmable and can deploy advanced, dynamic, changing strategies without difficulty. The strategies tightly integrate terminal units with central plant equipment, which increases demands on network bandwidth at the controller level, a challenge for many application-specific devices; Reliable Controls terminal unit controllers are BACnet building controllers designed to efficiently facilitate significant network interaction. The air terminal unit applications demand airflow accuracy that many low-cost controllers struggle to deliver; the MACH-ProAir features an industry-leading airflow sensor.

We are not alone. The engineering community is not the only influence in our sphere to standardize. Many peers also use operational standardization and even application-specific devices to improve their operational efficacy and efficiency. ASHRAE Guideline 36 represents an important synergy between standard high-performance designs and standard control applications. Its complexity is a compelling argument for the development and deployment of standard applications. Subsequent installments of insight will describe Reliable Controls standard applications for ASHRAE Guideline 36 sequences of operation. Properly implemented, Guideline 36 provides an excellent foundation for quality consistency.

ASHRAE Standing Guideline Project Committee 36. 2018. ASHRAE Guideline 36-2018 *High-Performance Sequences of Operation for HVAC Systems*. Atlanta: ASHRAE.

ASHRAE Standing Guideline Project Committee 36. 2018. ASHRAE Guideline 36-2018 *High-Performance Sequences of Operation for HVAC Systems*. Atlanta: ASHRAE.

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Did you know?

Internet Data Services (IDS) uses TCP port 443

The IDS tool in RC-Toolkit allows you to configure controllers to regularly request weather data updates from an internet data service and write the data to mapped BACnet objects.

You can easily trend weather data stored as an object, and it can be:

- Used by any BACnet device
- Employed in Control-BASIC sequences
- Displayed in System Groups and dashboards

Configuration

To configure IDS on MACH-ProView and MACH-Pro(Web)Com/Sys controllers, they must have version 8.10 or later firmware. Ensure both the controller and RC-Toolkit have access to the internet. The controller communicates with IDS on TCP port 443, and RC-Toolkit opens an outgoing connection on TCP port 80.

Follow these steps to set up IDS in RC-Toolkit:

1. Select a router-model controller from the System Tree.
2. Click the IDS icon in the toolbar to open the IDS configuration tool.
3. Using the drop-down arrows to select from lists, populate the columns with the criteria of each point to be requested. Each row represents one requested point. In the Weather Type column, click the down arrow to select between Current Observations and Forecast (Figure 1). Forecast returns data at 1-hour intervals. In the BACnet Object column (Figure 2), enter the mnemonic of the BACnet value object you want to map the retrieved point to; for example, AV2. Use the syntax AY1[n] to map an IDS value to an array, where “1” is the array number, and “n” is the index in the array. For example, AY1[2] maps a value to the second element in the first array.

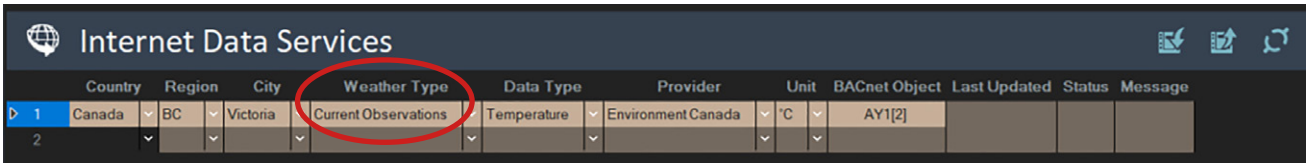

Figure 1: Weather Type column in the Internet Data Services worksheet.

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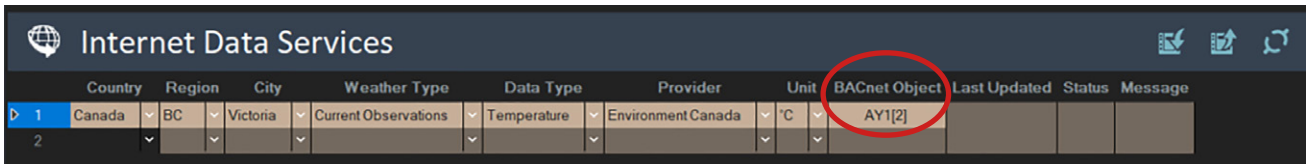

Figure 2: BACnet Object column in the Internet Data Services worksheet.

4. Click the next row in the worksheet to create the next weather data point. Subsequent rows autopopulate with information from the previous row.
5. Click **Send** to commit the IDS configuration to the controller. The controller contacts IDS, and its BACnet value objects automatically update.

Note: The firmware automatically creates BACnet objects if they do not already exist in the controller. Ideally, you should create and name the necessary value objects using RC-Studio prior to mapping with the RC-Toolkit IDS tool.

Once configured, controllers automatically request weather data every hour.

Each internet weather service has its own metadata that describes the contents and how the information is formatted. The Reliable Controls IDS tool in RC-Toolkit understands the metadata of numerous internet weather services.

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Recent website updates

Our Web Development team works hard to enhance the Reliable Controls website user experience and regularly engineers new features for the Authorized Dealer network. In the third quarter of 2020, we implemented the following updates.

1. New Standard Naming Convention Builder tool (Figure 1): This engineering tool helps you create effective object names. Refer to the *Reliable Controls Standard Naming Convention* guide or the August 2020 insight article for information about our standard naming conventions.

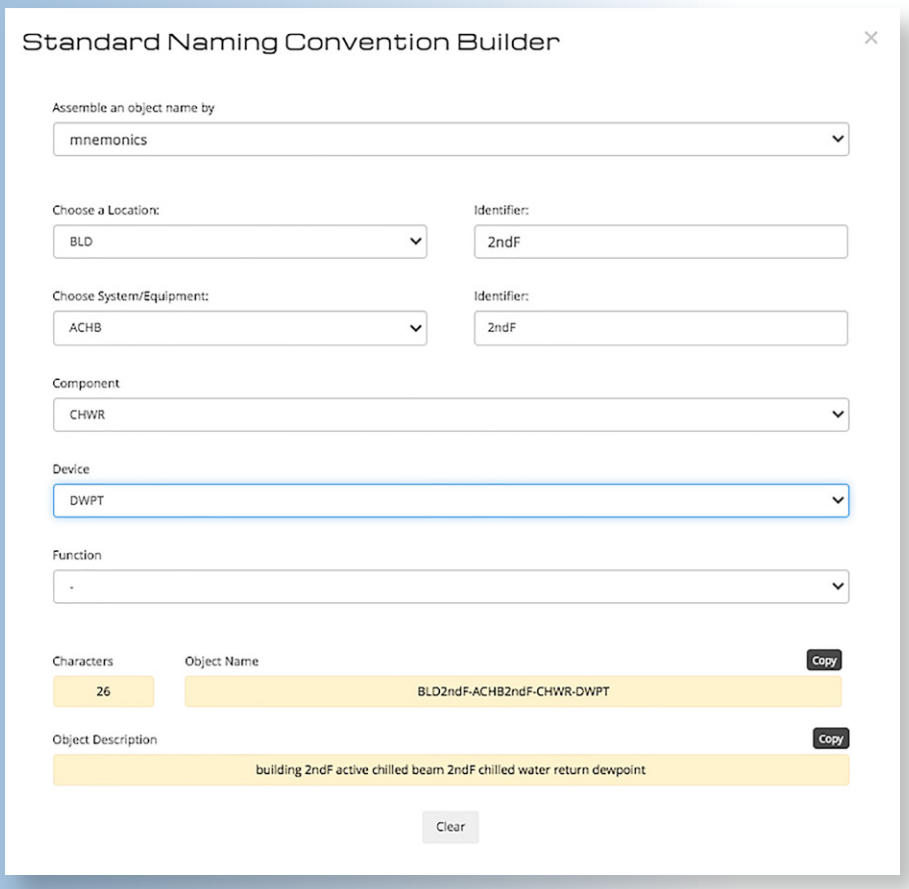

Figure 1: Standard Naming Convention Builder tool.

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2. Updated RC-Panel Configuration tool (Figure 2): With the release of the General Control Panel, we updated our panel configuration tool to help you create custom panel orders.

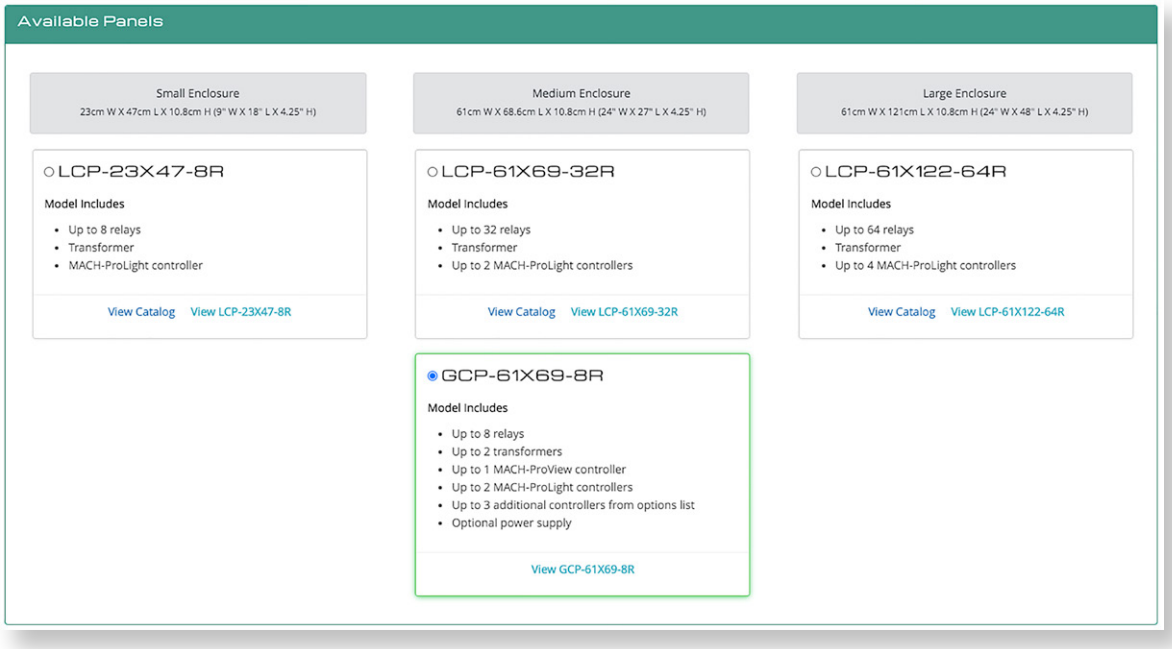

Figure 2: Create custom panels with the RC-Panel Configuration tool.

3. Improved Support Center logon: A new password reset mechanism means increased security (Figure 3).

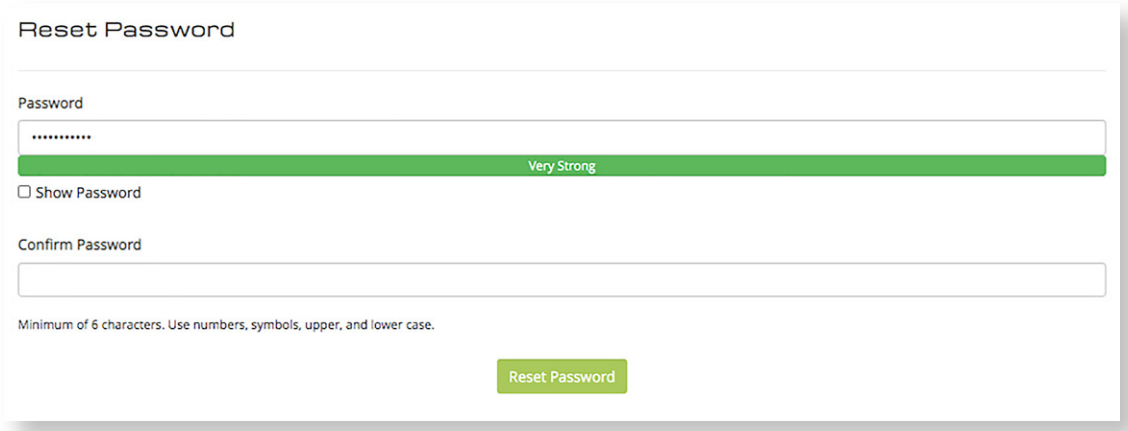

Figure 3: Reset Password dialog box.

4. Learning Center Improvements: Distance learning courses are now listed in local times, and you can join a wait list for the next available class (Figure 4). You can also manually alter your time zone in myAccount (Figure 5). Under the External Resources tab, view and register for free webinars hosted by our peripheral partners.

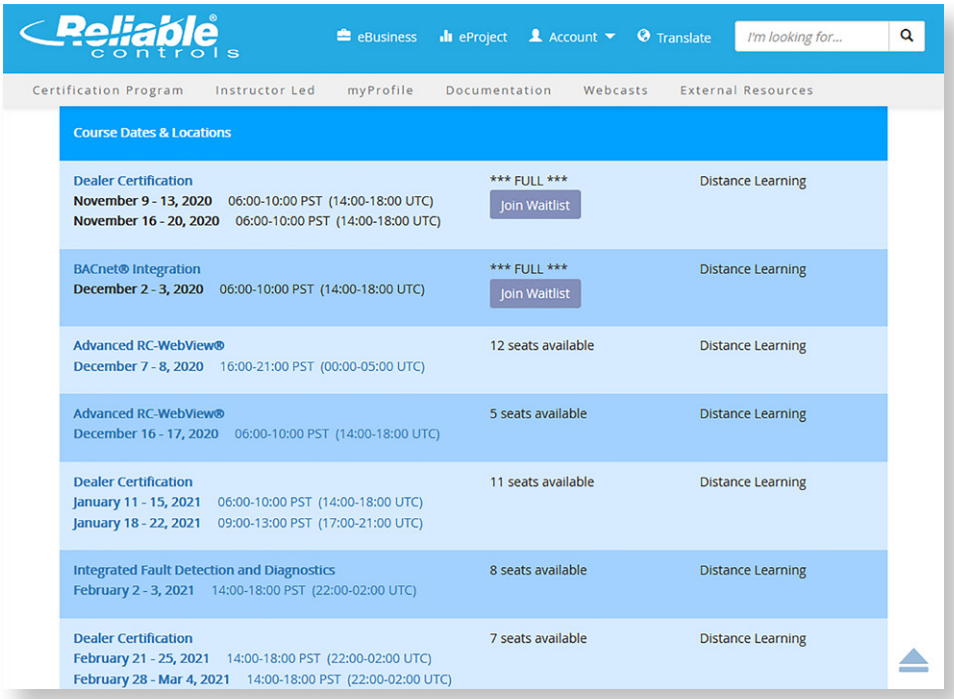

Figure 4: Local time zones and wait list functionality.

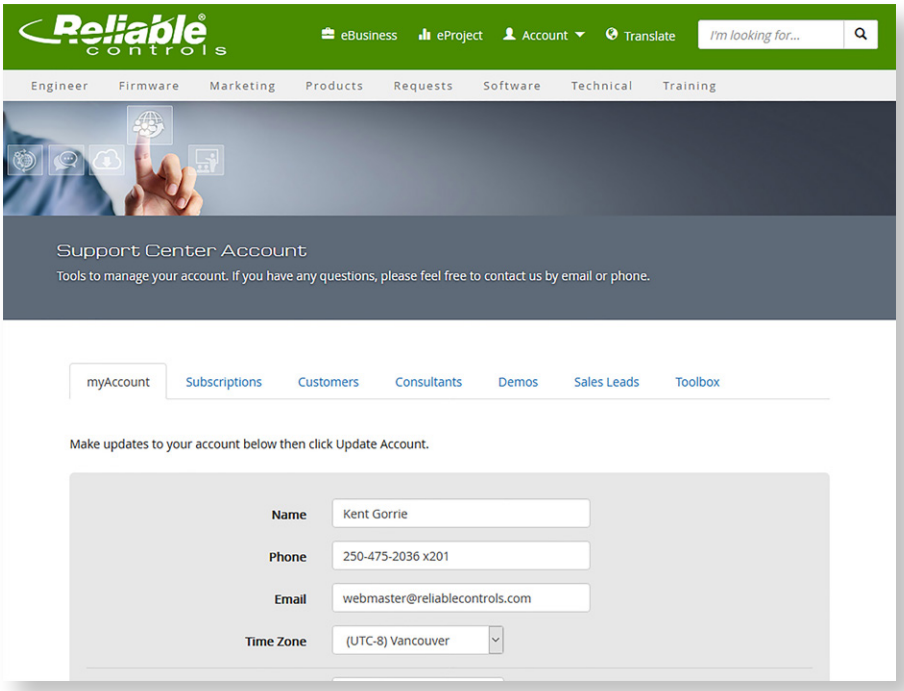

Figure 5: Set your local time zone in myAccount.

5. Security Alerts portal (Figure 6): Navigate to **Technical > Security Alerts** in the Dealer Support Center to see all Reliable Controls customer sites that use the default BACnet IP communications port 47808. If you find sites on the map that belong to your clients, consider reaching out to them to change these default settings to improve their network security. We update the map in the Security Alerts portal biweekly.

Figure 6: Security Alerts portal.

6. Updated power calculator (Figure 7): We have updated the power calculator, found under the Engineer tab, with new products.

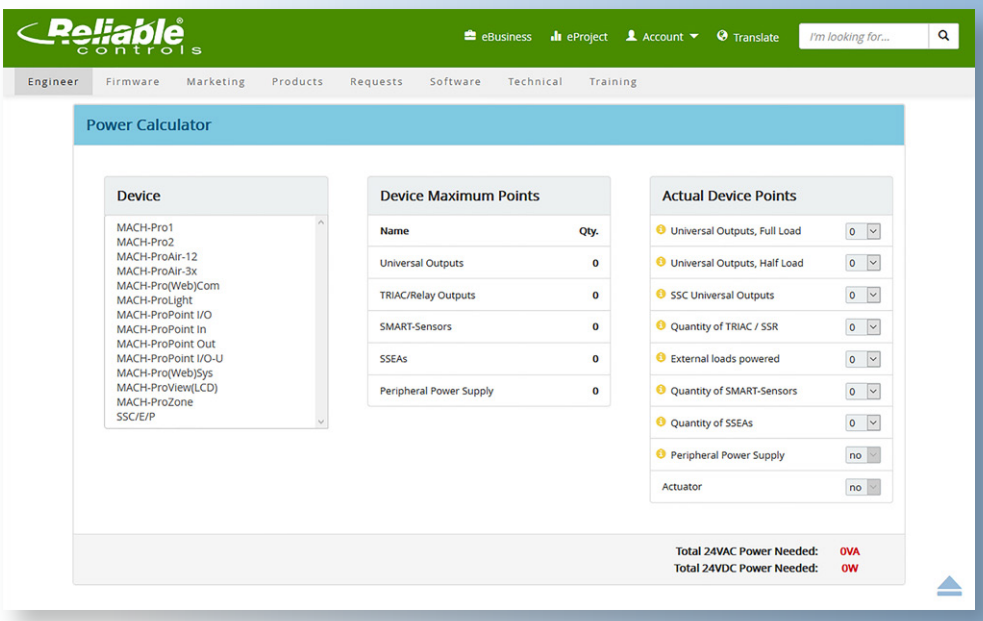

Figure 7: Power calculator.

Training

Training for technicians

Reliable Controls Authorized Dealer (RCAD) certification must be completed by at least one individual in every Authorized Dealer office. Students work with the latest Reliable Controls hardware, firmware, and software to learn installation techniques and program a typical air-handling unit. Register now for distance RCAD certification training.

Advanced training for level 3 technicians

In our advanced classes, students with level 3 technical certification learn to leverage the Reliable Controls system to improve building performance, reduce energy consumption, and simplify maintenance. Please check the Learning Center for current course offerings.

Advanced RC-WebView: Advanced technicians who install and configure RC-WebView learn to build efficient Enterprise Websites for the Reliable Controls system using powerful features like BACnet file synchronization, enterprise scheduling, and Points Reports. (8 hours)

BACnet Integration: Advanced technicians explore strategies for success when working with third-party BACnet products. This includes learning how to elevate third-party products using PICS and BTL documents, working with BACnet properties, writing Control-BASIC, and building System Groups. (8 hours)

Integrated Fault Detection and Diagnostics: Advanced technicians explore how the real-time integrated fault detection and diagnostics capabilities in RC-Studio improve operational efficiency and occupant comfort. Students build intuitive, flexible interfaces using RC-GrafxSet animations and develop strategies for detecting mechanical faults and control errors that affect building performance. (8 hours)

Modbus: Advanced technicians learn to build custom Modbus profiles using the Modbus Profile Creator in RC-Toolkit and explore how Modbus complements BACnet in modern building automation systems. (8 hours)

We add classes to the schedule regularly. Please check the Learning Center for upcoming dates and times.

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CORPORATE UPDATE
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RC-GrafxSet
Updated icon library

We recently released an update to the RC-GrafxSet icon library, with high-quality, easy-to-use icons that will help you create professional System Groups and Views in RC-Studio. You can find the updated Icons section in the RC-GrafxSet Isometric library (Figure 1).

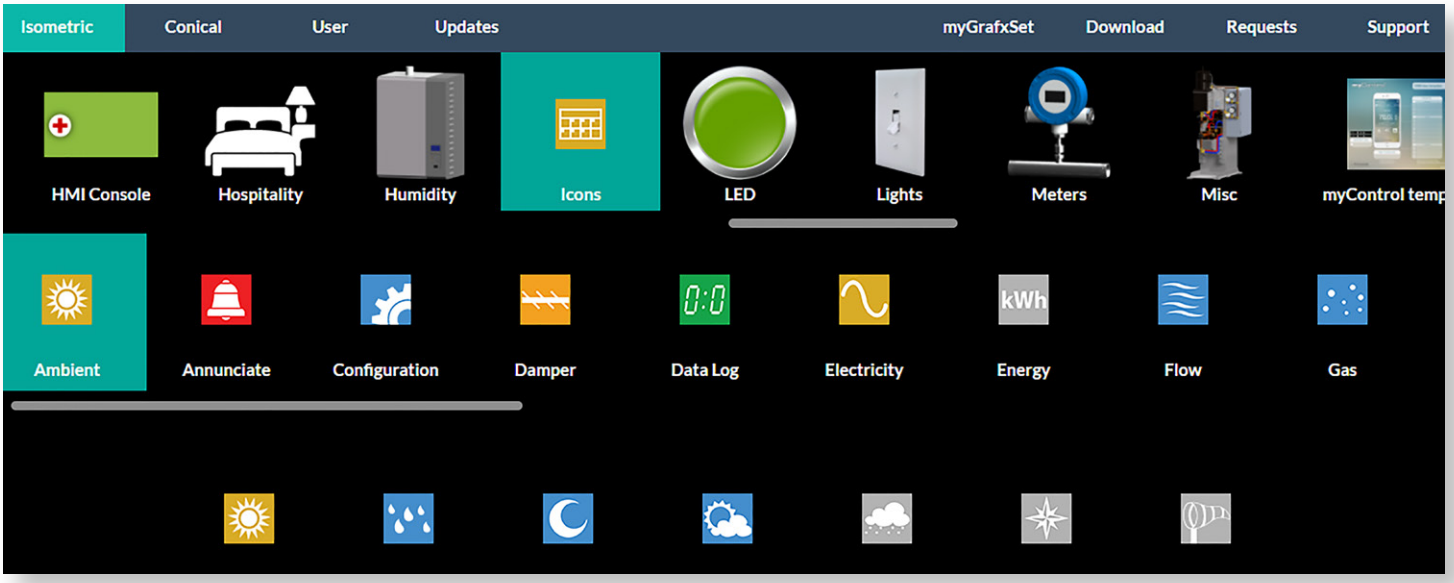

Figure 1: Icons area in the Isometric library.

In the Icons area, click the icon of your choice to view it and its associated icons, which you can download as a set in a zip file (Figure 2).

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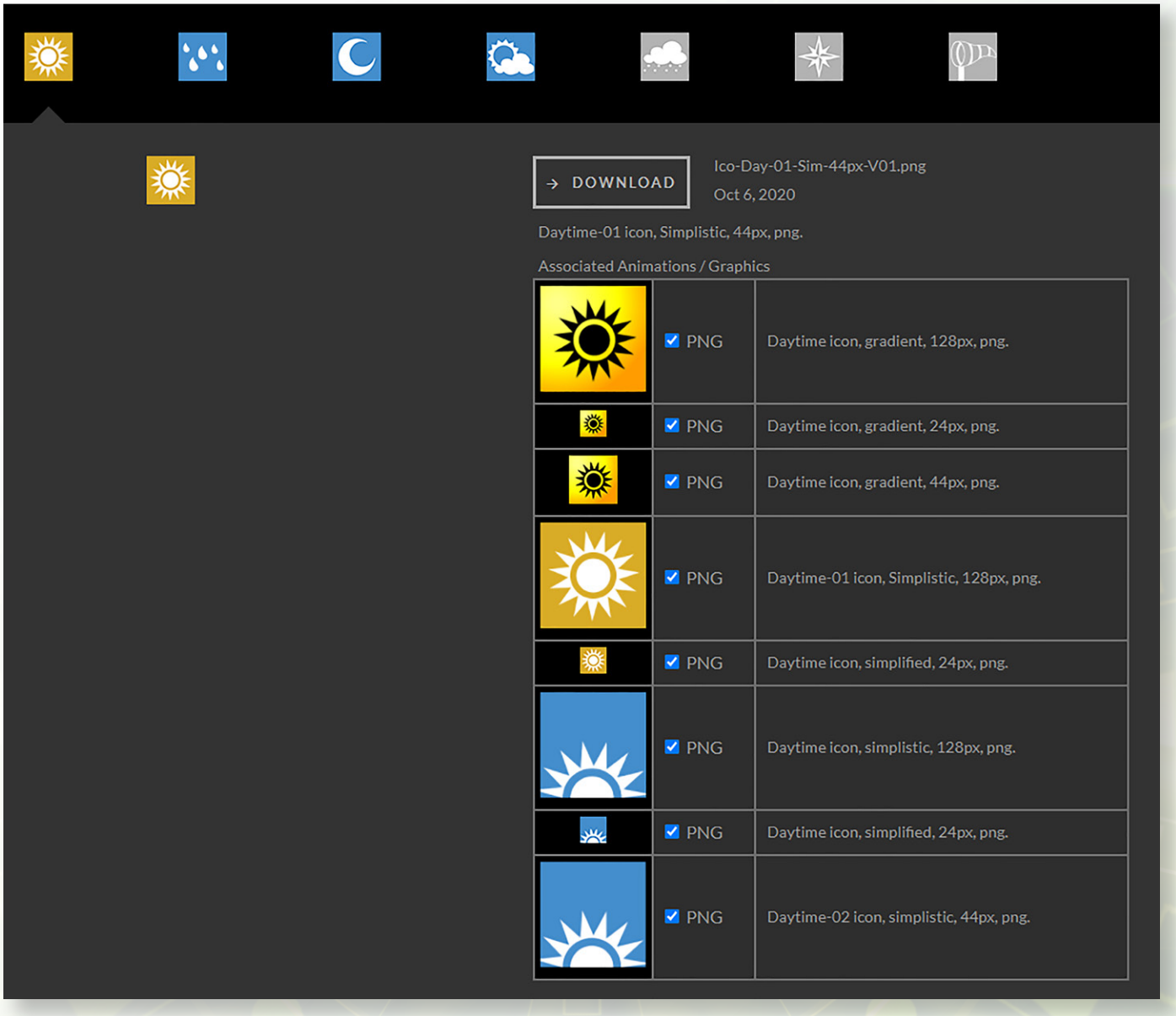

Figure 2: Daytime icon set.

The zip file for each icon set contains color and style variants of the icon in three sizes: 24, 44, and 128 pixels square. Ideally you will not need to scale icons, which causes image degradation, but can use the size best suited to your needs.

You also have the option to download only specific icons rather than the full set. To do so, clear the check box beside PNG to remove the file from the download (Figure 3).

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	☑ PNG	Outdoor air temperature icon, 1lockout, gradient, 128px, png.
	☑ PNG	Outdoor air temperature icon, 1lockout, gradient, 24px, png.
	☑ PNG	Outdoor air temperature icon, 1lockout, gradient, 44px, png.
	☑ PNG	Icon, OAT outdoor air temperature, 2-lockout, 24px, png.
	☑ PNG	Outdoor air temperature icon, 2lockout, gradient, 128px, png.
	☑ PNG	Outdoor air temperature icon, 2lockout, gradient, 24px, png.
	☑ PNG	Outdoor air temperature icon, 2lockout, gradient, 44px, png.
	☑ PNG	Outdoor air temperature icon, gradient, 128px, png.
	☑ PNG	Outdoor air temperature icon, gradient, 24px, png.
	☑ PNG	Outdoor air temperature icon, gradient, 44px, png.
	☑ PNG	Outdoor air temperature icon, simplified, 128px, png.
	☑ PNG	Outdoor air temperature icon, simplified, 24px, png.

Figure 3: Clear the PNG check box for any icons you do not wish to download.

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As you can see in Figure 3, some variations of the icon are wide, so it is best to scan the icon thumbnails in any section to find what you need, then click the shortlist of possible icons to narrow the search for specific attributes. Most of the icons are available in a modern, flat style as well as with more elaborate detail.

We plan to release new versions of the RC-GrafxSet animations that feature icons to provide greater size flexibility in System Groups without image degradation.

Let us know if you have ideas for additional icons. The RC-GrafxSet team is always up for a challenge.

Featured animation

The Button-Security-Cover-V01 animation is ideal when you need to confirm that users are sure they want to click a button to make a value change (Figure 4).

This animation can be used with binary and multistate values and requires the user to slide open a shield before clicking the value, thereby preventing accidental clicks and unwanted value changes.

Figure 4: Button-Security-Cover-V01 animation.

The button displays all the states of a linked binary or multistate object. Linked multistate objects can have eight states, but the button is best suited for use with an object with up to four states to prevent visual clutter. Reduce the font size if you use the animation for an object with more than four states.

A security shield with a chevron pattern covers the button and prevents the user from accidentally clicking it. To activate the button, this shield must be dragged to the side.

You can turn off the shield in the animation attributes, which excludes it from being seen, or you can control it to show or hide with an optional binary or analog linked object. Use one or the other method to control the display, not both.

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Once you click the button, the shield covers it again. You can specify the amount of time the button is clickable using a setting in the animation's attributes.

Other animation attributes include the following (Figure 5):

- Add a text label to display above the button. If you exclude the label, the button is centered vertically within the animation's height.
- Set the font family, size, and color for the button and label text. The button and label text can be different colors.
- Choose the background color, current state color, border color, and corner radius of the button. The corner radius is applied to both the current state and the area that contains all states.
- Add a color tint and opacity to the shield. You can also select a color for the three-dot icon.

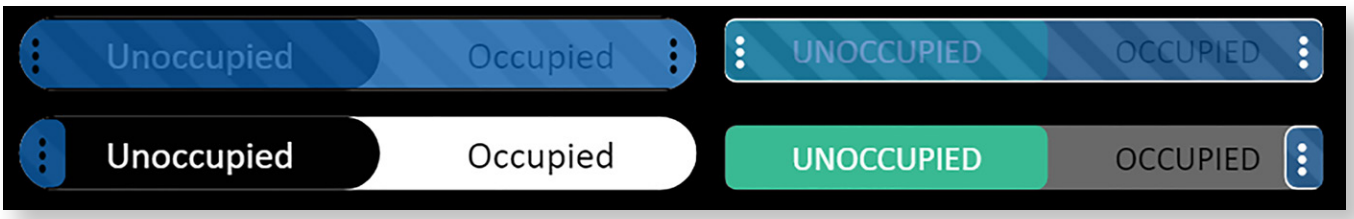

Figure 5: Different styling attributes applied to the animation. Top row: The shield is in a closed position. Bottom row: The shield is open and the buttons are clickable.

Do you have suggestions for alternative styles or attributes? Send a request via the RC-GrafxSet request form.

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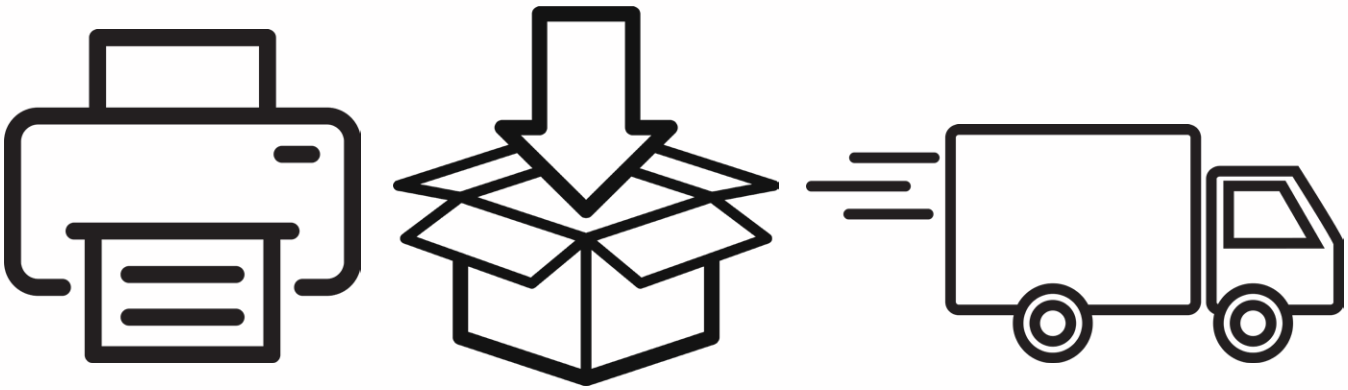

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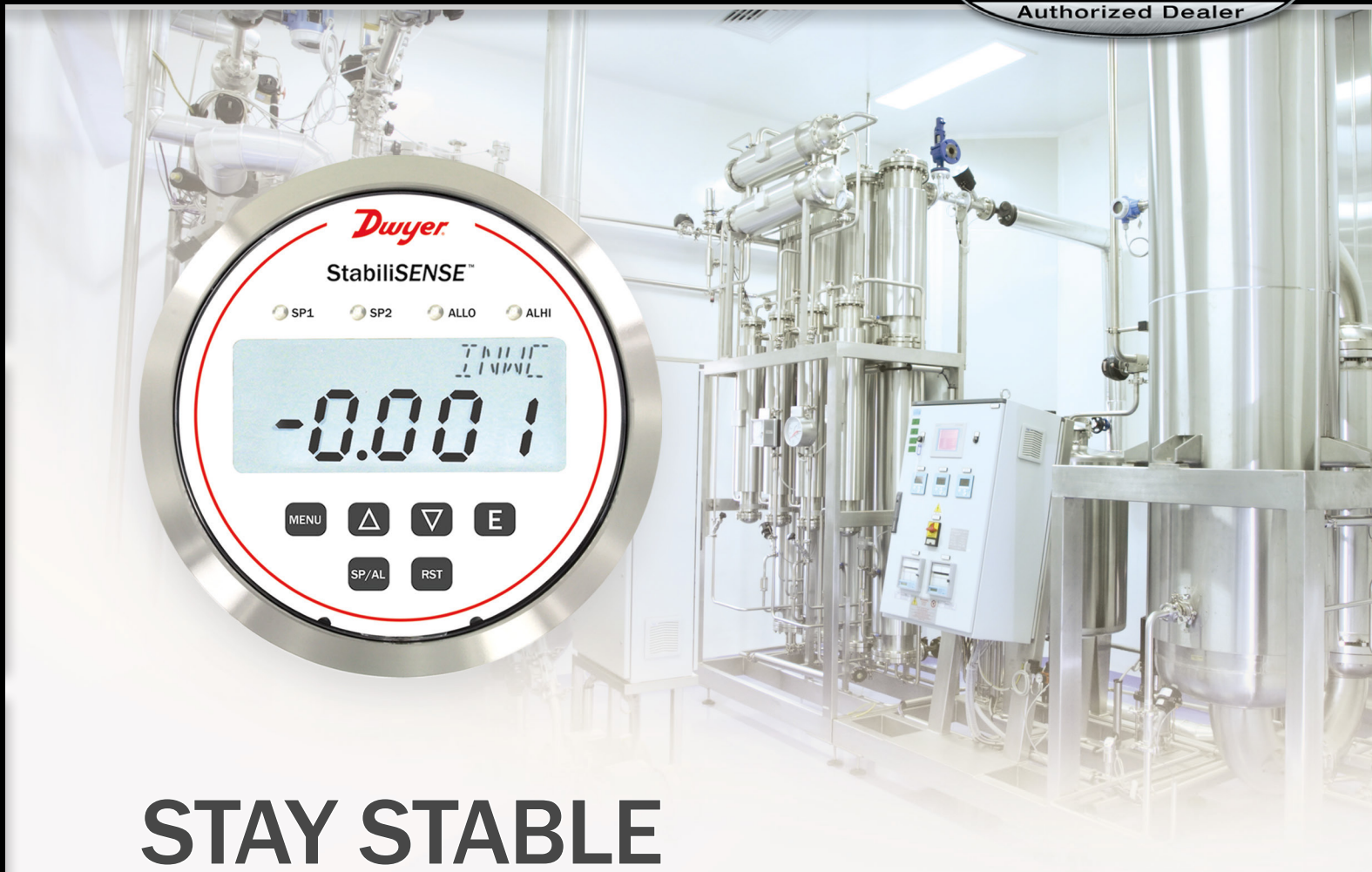

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It is a pleasure at this time of year to say

Thank You

and wish you a healthy, happy and successful 2021!

Happy Holidays

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