Honeywell
THE POWER OF CONNECTED | Building

LCBS CONNECT™

SYSTEM DESCRIPTION

Release Version August 14, 2017

LCBS Connect System Overview

LCBS Connect Solution is a new offering available through Honeywell two-step distribution. It meets the needs of small commercial building owners and HVAC controls and service contractors.

For building owners:

- Efficient environmental controls that lead to reduce energy consumption.
- Monitors building conditions constantly adds ability to remotely control schedules and setpoints.
- 21st Century solution - ability for building managers to see, change temperatures and schedules remotely.

For HVAC contractors:

- Increase service efficiency with LCBS Connect service tools.
- Provide valuable information to customers 24/7/365.
- Retain service contracts through demonstration of service value through sharing information and continuous monitoring.

LCBS Connect Solution – Deliverables

The LCBS Connect Solution offers a new control system with new remote tools and services. These tools will help service contractors provide service **more efficiently and effectively** and **retain service contracts**.

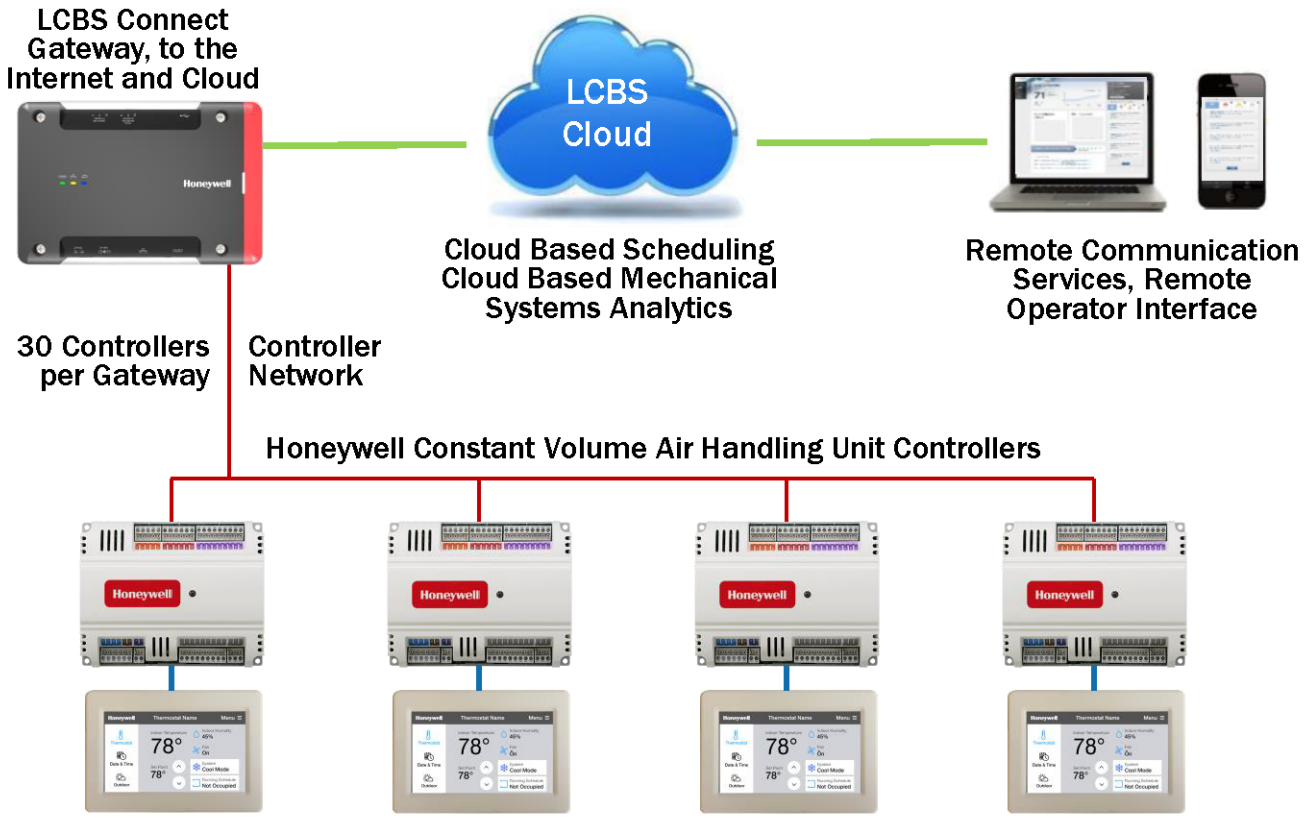
Previous Control Solutions

Previous control system offerings provided by Honeywell have satisfied end users, distributors, and contractors for decades. The new LCBS Connect provides ongoing solutions that can be enhanced and upgraded over the course of the HVAC service contract. Our long-term relationship with customers BEGINS when LCBS Connect is installed. With previous control system sales, that was where the relationship ended.

LCBS Connect System Details

The LCBS Connect Solution supports up to 30 LCBS Connect Controllers per building. For more than 30 controllers, a second LCBS Gateway is needed.

Network configuration and commissioning is highly intuitive and simple. Contractor partners do not need detailed technical knowledge of LonWorks™ network commissioning. The contractor must follow network wiring convention, but is assured of commissioning success indicated by the LEDs on the LCBS Connect Gateway and via the LCBS Wall Module user interface.



LCBS Connect Controller and Wall Module

Unique two piece construction with touch screen color display. The LCBS Connect Wall Module is a compact operator interface that doesn't take much wall space, or can simply be mounted near or in a CHAHU enclosure. The LCBS Connect Wall Module can be connected to the LCBS Connect Controller via reused two conductor low voltage wiring utilizing the Honeywell exclusive "Sylk" bus. This polarity insensitive bus carries control signal, information, and power, making installation simple.

The LCBS Connect Controller is designed for outdoor panel use in temperatures from -40 to 150°F. It can accommodate a number of service sensors including economizer temperature and humidity sensors, filter differential pressure sensors, current sensors, and photocell sensors.

Simple system configuration via local UI

The LCBS Connect Controller can be configured through the LCBS Wall Module on site or remotely through the cloud. It also works immediately "out of the box" until it is configured. Any parameter setting that can be changed using the LCBS Wall Module can also be changed using the LCBS Connect Remote Interface.

Simple system configuration via remote UI

LCBS Connect sites can be accessed through smart phones, tablets, Android and iOS devices, and personal computers. Chrome, Firefox, and Safari browsers are recommended. Settings created locally using the LCBS Connect Controller Wall Module can also be configured remotely using any of these devices.

Gateway connects building site and system to Honeywell “Cloud”

The HVAC service contractor must locate and acquire an Internet connection site. We provide simple rules for our LCBS Connect distributor to help our service contractor support proper connection. The system supports automatic DHCP network address assignation that will meet most needs. For IT professionals and building owners, static IP assignation is also an option.

Maintaining the intention and spirit of simplicity for our target contractor user, the installation of the Internet to site communication device is simple. As the service contractor installs the gateway, a series of LEDs light up to show successful connection of 1] power to the device, 2] controllers to the controller network, 3] device to the Internet, and 4] the device to the Honeywell “Cloud” lcbs.honeywell.com. If all four LEDs are illuminated and not flashing, the LCBS Connect Gateway device has been installed and connected to the Internet and the Honeywell Cloud.

The LCBS Connect gateway is a sophisticated but simple-to-use device, featuring two gigabytes main memory, consumes 10 VA power at 24 VAC, operates at 10/100base-tx, and support Echelon LonWorks based building control network.

Web Interface and Cloud Based Services

Honeywell Cloud based services are an exciting part of the LCBS Connect. Here are the main points:

Our web interface is not an application, it is a series of carefully crafted HTML5 web pages based on Honeywell design principles. Using a web hosted portal versus applications means:

- Faster development turnaround time
- Easier maintenance and upkeep, without having to push app updates that might not get installed

A web-based portal does require Internet access to use, but our customers already use devices that require the Internet to be up all the time. While our target HVAC contractor target customer may occasionally be in equipment rooms with little or no wireless access, they can usually walk out of these areas to establish Internet communication. The development and support savings make the decision simple.

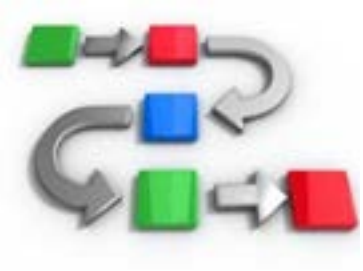
LCBS Contractors will be able to take advantage of numerous remote services that will allow them to service and maintain HVAC equipment more effectively and efficiently. As time goes on, service contractors will be able to select from a variety of tools that will allow them to demonstrate the value of their service to customers. Some of these services are free, and some will be available for a small charge. The LCBS Connect services will be directly acquired from Honeywell by service contractors. LCBS distributors will receive compensation for their sales and technical support efforts in the form of product credits.

Terms and Conditions, License Agreement Execution

The signup process is designed to:

1. Automate the process of executing terms of use and license agreements
2. Build a membership forum for access to support and LCBS Connect updates
3. Make it easy for an LCBS Connect contractor to order Honeywell cloud applications
4. Make it possible to compensate the distributor for contractor web orders.

Process



Honeywell invites distributors, distributors invite contractors, and contractors invite end users, and it's all automated. The LCBS Connect customer database is managed by Salesforce.com (SFDC). All participants must be in the Honeywell Salesforce database before the invitation process is started.

Honeywell Invites an LCBS Distributor

After Honeywell sales professionals identify target LCBS Connect distributors, the target's name, along with key business data, must be entered into SFDC. The Honeywell SFDC administrator sends the designated LCBS Connect distributor business owner an invitation to the LCBS Connect program. The distributor owner is presented with the invitation and the formal Terms of Use agreement. The basic theme of this agreement requests that the distributor understand all aspects of the agreement, treat all Honeywell and customer information in a confidential manner and that they are expected to invite LCBS Connect service contractors to the program. The LCBS Distributor is typically a busy person. They can designate "delegates" that can help them assign their staff members who will assist in the process of signing up contractors. The delegate gets their own credentials so they can enter the Honeywell site.

LCBS Distributor Invites an LCBS Service Contractor

The LCBS Distributor can now invite contractors. It is a core requirement for this program for LCBS Connect Contractor business owners or business leaders be set up in Honeywell's SFDC instances. Before a distributor begins the contractor invitation process, the contractor owner or business leader needs to be set up in Honeywell's SFDC.

The distributor invites a contractor by sending them an invitation via the portal. In this invitation e-mail, the contractor is given credentials to sign into the lcbs.honeywell.com site. Contractors must agree to the LCBS Contractor Agreement. The agreement requires the contractor conform to terms and conditions of the agreement, treat customer information with care and confidence, and invite building owners into the LCBS Connect program. One further aspect of the LCBS Contract Agreement expects that the contractor fully understands that data collected by the system is owned by the customer, not the contractor and not Honeywell. After the contractor accepts the invitation and agreement, they can invite "delegates" and "technicians." Here are some key reasons why there are business owners, delegates, and technicians.

LCBS Connect Contractor Owner	Delegate	Technician
Can use a credit card to purchase HVAC applications from Honeywell. Can invite Delegates and Technicians Can see all buildings in the Owner enterprise	Can change Technician building responsibilities. Can see all buildings in the Owner Enterprise. Is usually a service manager or dispatcher at a service company.	Can see buildings in his or her service area ONLY. It's simple for technicians to compare notes and in conjunction with service manager and dispatcher, maintain appropriate account coverage.

LCBS Service Contractor Invites Building Owner

The LCBS Contractor owner or delegate invites building owners to gain access to their local system.

It will be up to the contractor to designate the building owner and and associate them with the physical building location. This builds the service company's database of building owners. The LCBS Contractor needs to invite the building owner. The LCBS Connect service contractor should inform their customer that they must accept the terms of the agreement to participate.

Important! The LCBS contractor can't access the site and commission the user's site remotely until the building owner accepts the agreement. The agreement indicates that the building owner understands they are accepting the agreement, that Honeywell and the contractor won't distribute their personal information for gain, and that the building owner owns all data accumulated from their site.

Contractually, Honeywell claims the right to use the data for commercial purposes after the data is "anonymized." Honeywell and LCBS Contractors do NOT have the right to associate data with specific building owners.

Cloud-Based Remote Applications

Remote services applications are provided for LCBS Connect HVAC Service contracting professionals in the service language they use every day, not "control-ese." We provide ubiquitous remote access by service and controls contractors over the Internet using smart phone, tablet, and personal computers.

A service contracting firm can have multiple accounts to permit building access to appropriate users. For example, a contracting company owner, service manager, or dispatcher can see all service activity in any building that's in the service contractor's enterprise. Technicians can see service activity for the buildings they service only. Backup resources can be easily designated, maintaining service coverage even when people are on vacation or out sick.

The LCBS Connect Remote Service offer is highly scalable. It works for companies that have one owner and a service manager, and it works for the largest company with hundreds of contracts, vehicles, and service managers and dispatchers.

Sophisticated service and control alerting is available to service contractors. It will be rapidly followed by graphic tools and predictive and preventive service analytics. It's very different from standard BMS alarming. So much, in fact, we've redefined BMS alarming and we now call it "Service Alerting."

Cloud-Based Remote Applications for End User Customers

Building owners and occupants will have limited ability to change data remotely on their personal computing devices, but they will have the ability to change schedules and set points for their HVAC equipment.

Don’t panic

If end users want more control, we can provide contractor login for them. This will set them up as “technicians” to access their own building. Further, many end user, building owner customers have a “self-servicing function.” This is common for many commercial retail chains, school districts, banking and mortgage retail buildings and belt line health care HMOs. These customers can simply set up in-house service professionals with “contractor - technician” personas.

Service Alerting

Why is it different? Why is it Service Contractor Friendly? Honeywell takes great care to make sure that alerting messages are:

1. Explained in easily understandable language
2. Highly actionable and customizable, with threshold values that are easy to change remotely
3. Recorded in detail for customer “proof of value” reporting

Alarming can be **ALARMING** in HVAC Service World. Another important feature of Honeywell alerting is “alarm rain prevention.” Most control systems require that when failures occur, the event is recorded along with the time and maybe some data about the event. These are called alarms. In many environments where customers monitor for alarms, a digital event occurs where there is a rapid toggling or fluttering of electronic relay or an analog value that ignores time, temperature hysteresis and moves rapidly back and forth across an analog value boundary. In the case outlined above, thousands of alarms could be recorded in just a few moments. **For a service contractor, this is a nightmare.**

Honeywell LCBS Connect alerting prevents this in two ways. The first is a simple hysteresis setting. If a rapid change of state occurs, a timer starts to run. As this timer runs, the alert won’t be registered. If the alert condition still exists when the timer expires, an alert is recorded. The second is Pragmatic Alert Logic, or PAL. Our patented PAL watches for repeated changes of state and will not re-report an alert unless the first is dismissed by an LCBS Connect user. After the alert is dismissed, a new alert is reported if the condition still exists.

Alert Management – Features and Capabilities

Alert Management is a key feature of the LCBS Connect solution. Alerting will permit HVAC service contractors to identify issues and problems with their customer’s building sites. Messages can be tailored to be sent to any number of LCBS users. In many cases, the information provided through the alerting service will give the service managers and technician a head start in diagnosing HVAC issues. The technician might even be able to use the Remote Management capabilities to diagnose and solve the problem remotely using their smart phone or tablet.

Key LCBS Connect Alert Management features that will be available for launch

Digital points can be configured as alerts and can be assigned a customized notification protocol. Examples of digital alerts are dirty, fouled air filters and dangerously cold discharge air. Alerts can be stored in the contractor’s Honeywell Cloud database via the Alert Log, and can be sent to LCBS users via text or e-mail. Each user can “silence” alerts so they don’t create downstream disruption, but if they occur again, the user gets an additional notification. In addition to this definition, a timing or hysteresis value can be assigned to prevent rapid alert generation.

Analog points can be configured as alerts and can be assigned a customized notification protocol. Examples of analog alerts are measurement of pollutants lodged in air filters, measurement of current flowing through cables connect to fans and compressors, and CO2 levels, among many others. Alerts can be stored in the contractor's Honeywell Cloud database via the Alert Log, and can be sent to LCBS users via text or e-mail. Each user can "silence" alerts so they don't create downstream disruption, but if they occur again, the user gets an additional notification. In addition to this definition, a timing or hysteresis value can be assigned to prevent rapid alert generation. Users can assign high and low limits for certain sensors.

Zone Demand

LCBS Connect include many HVAC service analytics that will allow the service contractor to operate more effectively. One of these analytics is Zone Demand.

The Zone Demand analytic demonstrates the ability of heating and air conditioning equipment to meet the load required to heat and cool the space.

Please refer to the example image below. The cooling Zone Demand analytic ranges from 0% to 163% 1. At 0% there is no requirement to cool the monitored space to a specific setpoint. Cooling will be energized at a Zone Demand level as small as 1% 2. As the requirement for cooling increases, Zone Demand increases. At 50% Zone Demand 3, we are experiencing half of the capacity required to cool the space. For two stage systems, we should see the second cooling stage energized. At 100% Zone Demand 4, cooling requirement should be performing cooling at total capacity; two stages of cooling should be energized. When we observe more than 100% Zone Demand, we have exceeded the capacity of our cooling equipment, so we will no longer be able to control the cooling setpoint 5. This will be an interesting area for a service contractor. First, does the equipment meet the cooling requirement? Second, is the inability to extract heat being caused by a service issue? This could require service intervention.

Note: If the setpoint is lowered in cooling, Zone Demand will increase. If the setpoint is raised in cooling, Zone Demand will drop, and perhaps all the way to 0% 6. When the setpoint is dynamically changing, i.e. from unoccupied to occupied cooling, Zone Demand will be reset dynamically 7.

This logic works in reverse for heating. Heating Zone Demand analytic ranges from 0% to -163%.

Pre-Defined Condition Analytic Alerts

There are six simple analytics that instantly and accurately determine effective operation of fan, cooling, and heating.

Fan, Proof of Operation; Digital Input Proof

Fan, Type A. Two inputs are required for the Fan Type A analytic: fan output status and a digital input.

This compares what the LCBS Controller is telling the fan to do to what the fan is doing. The "true" condition is when both are "on." If fan command is "on" and digital input is "false," alert is issued.

Fan, Proof of Operation; Air Pressure Proof

Fan, Type B. Two inputs are required for the Fan Type B analytic: fan output status and an analog air flow pressure drop.

This compares what the LCBS Controller is telling the fan to do to pressure drop across filter. It uses analog pressure input from across the filter, measuring pressure drop. A value must be provided that indicates that air is not moving. If the fan is "on" and the filter pressure drop is below the setting, an alert is issued.

Fan, Proof of Operation; Compressor Proof

Fan, Type C. Two inputs are required for the Fan Type C analytic: fan output status and an analog current value from a transformer.

This compares what the LCBS Controller is telling the fan to do to what the fan is doing. If the fain is "on" and amperage is below the setting, an alert is issued.

Compressor, Proof of Operation

Compressor. Two inputs are required for the Compressor analytic: compressor output status and an analog current value from a transformer.

This compares what the LCBS Controller is telling the compressor to do to what the compressor is doing. The "true" condition is when compressor is on and amperage is well above 0.1 A. If compressor is "on" and amperage is below 0.1 A, alert is issued.

Heating, Proof of Operation

Heating. Three inputs are required for proof of heating operation: fan output status, coil entry temperature sensor (mixed air) and coil exit temperature sensor (discharge air).

This compares what the LCBS Controller is telling the heating system to do to what the heating system is doing. It uses the difference between a downstream air temperature sensor and an upstream air temperature sensor. If the value is below a user selected value, an alert is issued.

Cooling, Proof of Operation

Cooling. Three inputs are required for proof of heating operation: fan output status, coil entry temperature sensor (mixed air) and coil exit temperature sensor (discharge air).

This compares what the LCBS Controller is telling the cooling system to do to what the cooling system is doing. It uses the difference between a downstream air temperature sensor and an upstream air temperature sensor. If the value is below a user selected value, an alert is issued.

Ventilation Analytics

There are five (5) simple analytics that instantly and accurately determine inappropriate operation of ventilation systems and components.

One or more ventilation sensors failed

Outdoor, return, or mixed air sensors have failed. An alert is issued if one of these sensors is not providing appropriate readings.

Providing ventilation air when the system should not be doing so

Honeywell algorithm continuously calculates the amount of air required to ventilate or economize properly. If this value is OVER this calculated value, an alert is issued.

Providing too much ventilation air to system

Honeywell algorithm continuously calculates the amount of air required to ventilate or economize properly. If this value is OVER this calculated value, an alert is issued.

System components stuck, not providing appropriate economizer, ventilation control

Honeywell algorithm continuously calculates the amount of air required to ventilate or economize properly. If this value is DIFFERENT from this calculated value, an alert is issued.

Not providing ventilation air to cool the building when the system should be doing so

Honeywell algorithm continuously calculates the amount of air required to ventilate or economize properly. If this value is UNDER this calculated value, an alert is issued.

Dismiss Building Alerts

All alerts can be dismissed, activated, and reactivated by building by any user. The purpose of the process of dismissing is to allow new, similar alerts to occur. Remember, if you don't dismiss an alert, "new' alerts on the same point will NOT be to delegate, technician account. This ensures that alert recipients are not bombarded with alert messages.

Activate and Deactivate Messaging

Messages can be activated or deactivated for anyone with access to a building's LCBS system, allowing dispatchers to assign service technicians as needed.

Multiple Alerts, One Point

Multiple alerts can be assigned to the same point. A service technician may determine that a monitored point is important enough to select multiple alert levels. A good example of this would be for a critical filter. One alert could be activated if the filter media takes a long time to acquire, so this alert could indicate that it's time to order critical filter media. The second alert could be set to go off when the filter is actually loaded to the point where it needs to be replaced.

Customize Messaging

LCBS users, business owners, service managers, dispatchers, and technicians can choose to receive text messages to any smart device. The maximum character length is 160 characters. They can also choose to receive e-mail messages. These messages can be written so they are highly prescriptive and provide specific messaging to help solve the problem.

E-mail messages can contain unlimited characters and information

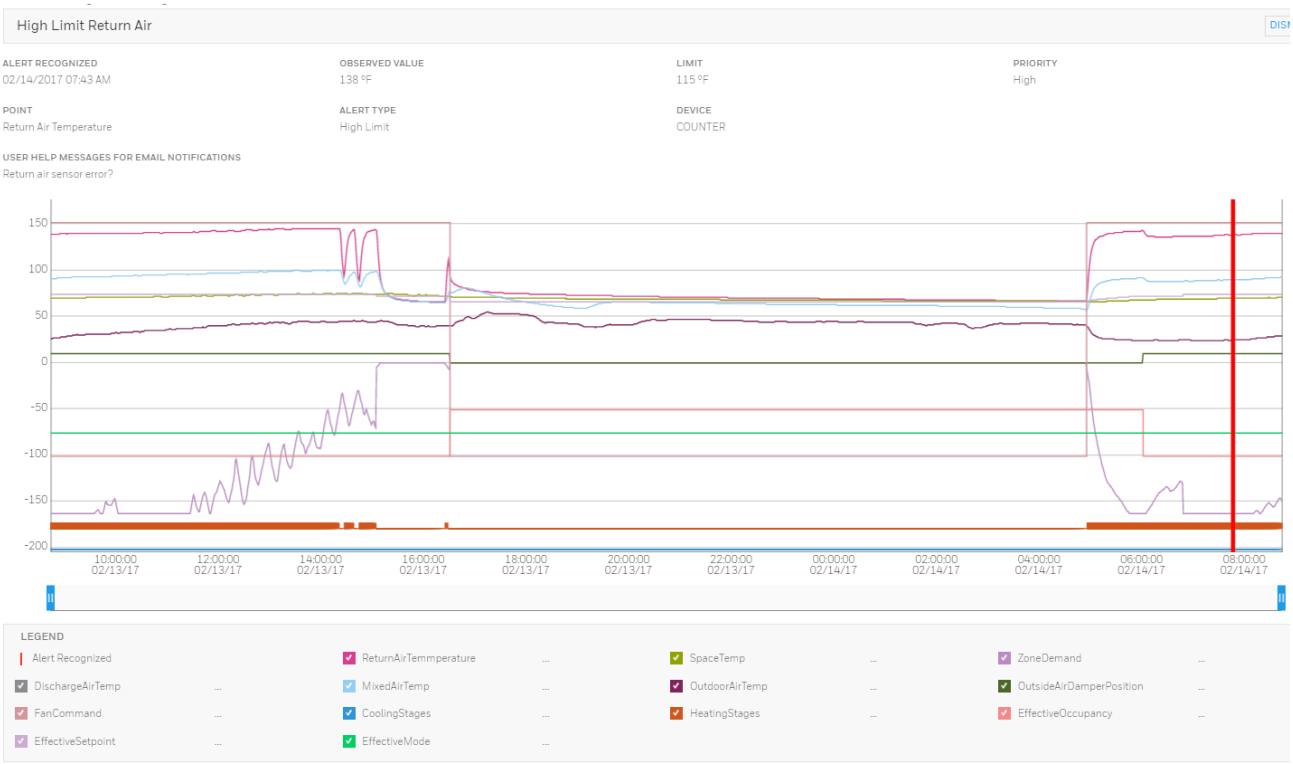
This can include anything, such as the contract limit, who to contact at the site, what process to follow at the site, special catalog numbers for motors, gas, filters, and other parts, etc.

Alert Log

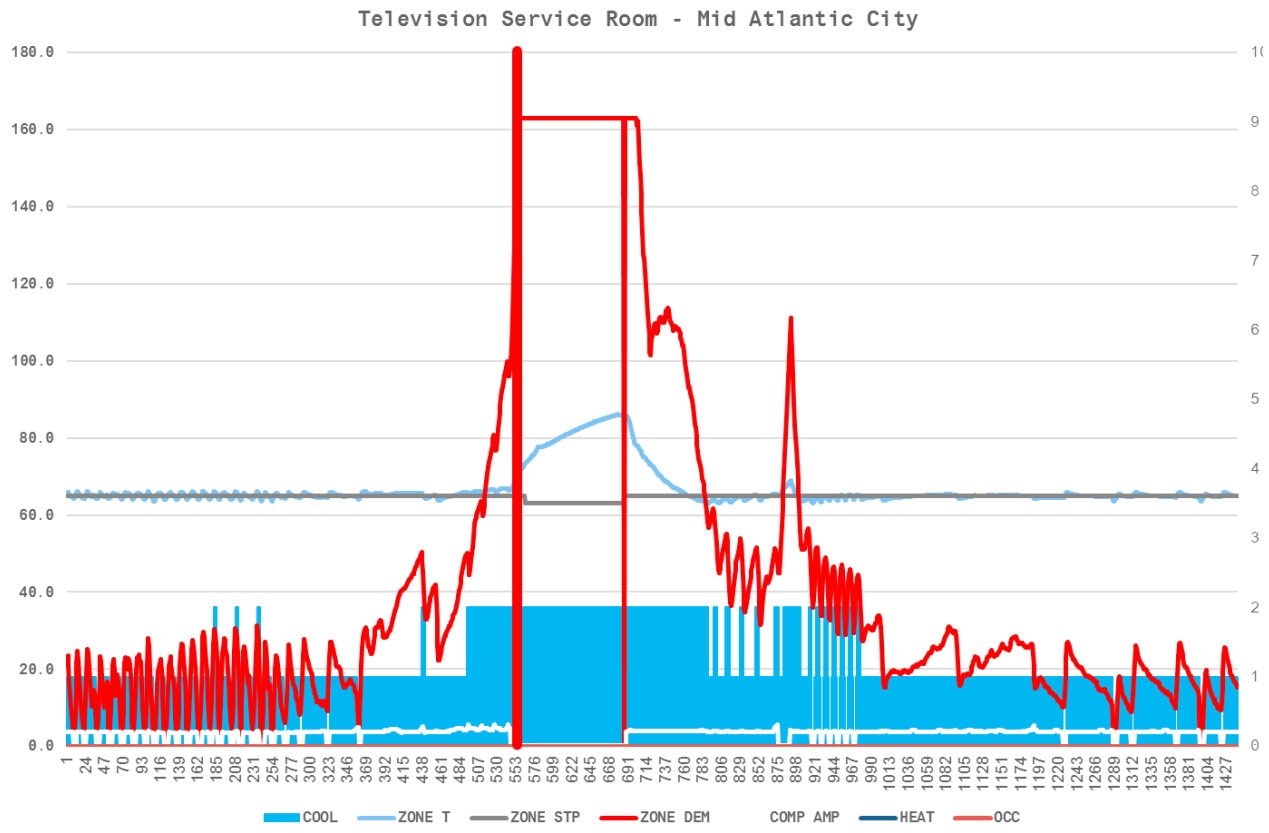
Each alert is stored in an Alert Log that can be accessed by anyone with access to the LCBS system on an enterprise level. The Alert Log not only contains historical data about the alert, it contains graphic data about each alert.

Graphic Representation of Alert Data

The contractor can review graphic data logs to diagnose problems. In addition to a log before an alert occurred, the system continues to log data after the alert. The contractor will be provided a link to interrogate the system and potentially solve the problem remotely.



Graphic data can be manipulated by the user, such as selecting or deselecting points to zoom in on. This allows the user to review data in smaller increments, as 24hours' worth is a lot to consume in one picture. The user can also review individual data values by moving a "wand" across the 24-hour data range to see data in 5-minute increments. Customized Data Acquisition. LCBS Connect permits system users to request and plot 24 hours of data at any time. Data is stored in a conventional comma delimited format and can be converted into a spreadsheets from which graphic creation is easy. Here is an example of the customized data acquisition output:



The chart above tells us volumes about what is happening at this site. At approximately 8:20 AM, load in the service room increases and a second stage of cooling is energized. As you can see from the graphic, the temperature in the room exceeds the set point, indicating that the cooling system it is having a hard time removing heat from the space. At 9:20 AM, compressor amperage goes to zero and the amperage alert is active, indicated by the larger red, vertical bar. The compressor has tripped the circuit breaker. The temperature in the service room rapidly rises from 65F to 85F. The service contractor is notified and got the system back on line about 20 minutes after they arrived. Without LCBS Connect, this problem could have been far worse.

Alerting Points

The Alerting function will give the technician knowledge about what to do and where to go when they arrive at the customer site. See a complete list of LCBS Connect Alerting Points and what they do in Appendix A.

LCBS Connect Local Controller Capabilities

The LCBS Connect Controller features inputs and outputs to support a wide variety of commercial control strategies, data logging, and data capture for advanced service and control analytics. While our LCBS Connect Controller and Wall Module solution operates as a “thermostat” in a stand-alone manner, it provides superior temperature and humidity control and serves up data to the Honeywell Cloud to perform beneficial analytics that will help service contractors do their jobs and keep customers.

On-Site or Remote Configuration

The LCBS Controllers can be configured completely via remote interface or via local LCBS Connect Wall Module display. Key settings can be changed via the LCBS Wall Module and via remote interface.

Flexible, Appropriate Access to Building Occupants

As with many Honeywell control devices, the contractor and building manager can collaborate to provide appropriate access to building dwellers. In some cases, building occupants should have full on-site control of the control system. In other cases, limited access is better. The LCBS Service Contractor and building owner can assign password strategy to local interface device and remote user interface to:

1. Ensure the building owner can manage HVAC to ensure comfort.
2. Limit unauthorized users from disrupting HVAC operation.

LCBS Connect CVAHU Applications

The LCBS Connect Controller controls single- or two-speed air to air heat pumps and up to two stages of auxiliary heating. The controller can provide up to three stages heat, three stages cooling control for conventional rooftop units and split systems.

Temperature Control

LCBS Connect controllers feature six heat and cool set points:

- Occupied heat
- Occupied cool
- Standby heat
- Standby cool
- Unoccupied heat
- Unoccupied cool

Schedules and set points can be changed through LCBS Wall Module and remote interface.

Schedules

The controller can support up to 2 occupied/unoccupied periods a day. Scheduled occupancy, occupancy bypass, and bypass initiated by remote sensor are supported. Vacation scheduling is supported as well. The ability to

temporarily adjust set points to address comfort issues and control deviation is a feature of LCBS control system. Schedules and overrides can be initiated through the LCBS Wall Module and through remote interface.

Adaptive Intelligent Recovery

To make sure building occupants are comfortable when they arrive to work, we provide Adaptive Intelligent Recovery, a long-time Honeywell customer favorite. This feature enables smooth transition of temperature set points from unoccupied to occupied periods. This helps ensure the equipment is not "hammered" to provide excessive heat or cool; the heating/cooling process is gradual. Properly deployed, it can extend equipment life. This also limits the potential impact of starting multiple HVAC units at the same time, which can cause an excessive "demand" registration. If there is a utility tariff in place, this can result in a high energy cost penalty for the customer. Parameters can be adjusted to account for individual systems, climate differences, and equipment capacity via LCBS Wall Module or remote interface. This is described further in the LCBS application manual.

Heat Pump "Comfort" and "Energy Saving" Operation Option

A heat pump auxiliary heat recovery is provided so heat pumps run in an energy efficient manner. Parameters can be adjusted to account for differences in equipment capacity via LCBS Wall Module or remote interface. The LCBS Connect Service Professional can offer an energy saving option for heat pump users, or a comfort option. The latter ensures excellent comfort conditions; the former lets building owners provide basic comfort conditions to building occupants and concentrates on operational efficiency.

Ventilation, Economizer Control

Unlike almost all of our competitors, multiple ASHRAE compliant economizer strategies are supported. We can enable or disable an existing economizer with control relay output. We can also provide direct drive economizer strategy: this features single and dual temperature changeover, and single and dual enthalpy changeover. Key settings can be changed via the controller and via remote interface. Additionally, IAQ, DCV CO2 air quality control is offered to the economizer strategy. We control to CO2 ppm as well as classic DCV control, and set minimum and maximum DCV control positions. Key settings can be changed via the controller and via remote interface.

Title 24 and IECC Compliance

LCBS Connect is compliant to Title 24 2016 and IECC guidelines.

Dehumidification

There are two dehumidification strategies using heating and cooling control. First is a simple dehumidification control that cycles a designated dehumidification device when a dehumidification set point is reached. Second is a staged reheat control that cycles heating stages in response to a humidity set point. Cooling is locked on as heating is cycled. Heating and cooling operate simultaneously to provide dehumidification. Finally, LCBS Connect controllers provide a minimum on time control that extends cooling operation for a designated period. Dehumidification set points and parameters can be changed through the LCBS Wall Module and via remote interface. Please refer to LCBS Application information for details.

Accessory loop control

The LCBS Connect system allows designed loops to be defined. The applier selects the control sensor, method of control (staged, modulating), PID parameters, and minimum operating parameters. These set points and parameters can be changed through the LCBS Wall Module and via remote interface.

Multispeed fan control

The applier can designate up to six fan speeds associated with a specific control strategy. If there is no call for heating and cooling and ventilation is still required, this can keep the supply fan running, providing ventilation at a lower energy rate. These set points and parameters can be changed through the LCBS Wall Module and via remote interface. This is required by law in many locations in the USA.

LCBS Control System Inputs, Outputs

Analog Inputs	Digital Inputs
• Space Temperature (on board LCBS Wall Module) • Space Humidity (on board LCBS Wall Module) • Space or Return CO2 (Connect to LCBS Controller or Sylk Bus) • Discharge Air Temperature Outside Air Temperature (20K) • Mixed Air Temperature (20K) • Filter Differential Pressure (0-10 VDC) • Monitor Sensor (Up to three: one temperature, two user defined; one 20K, two 0-10 VDC) • Fan or Compressor Current Sensor	• Fan Flow Status (dry contact) • Occupancy Sensor (dry contact) • Dirty Filter (dry contact) • Pulse Meter, energy, flow logic (dry or electronic pulsing contact) • System shutdown (dry contact) • Monitor Switch (dry contact) • Economizer Enable(dry contact)
Analog Outputs	**Digital Outputs**
• Economizer (0-10 VDC) • Accessory Loop 1 (0-10 VDC) • Accessory Loop 2 (0-10 VDC)	• Auxiliary Economizer (dry contact) • Occupancy (dry contact) • Free Output (dry contact) • Heating, Cooling, Fan, Reversing Valve (dry contact)

Network Sensors

- TR40 (Address=3), Space Temperature, Relative Humidity, CO2; TR40 (Address=4), TR40 (Address=5), TR40 (Address=6), Space Temperature only
- C7400S (Address=8), Outdoor Temperature and Relative Humidity, Overrides UI
- C7400S (Address=9), Return Air Temperature and Relative Humidity
- Space Multi-Temperature Option (Ability to Average Sensor Inputs)

Remote Services LCBS Connect Controller Remote Setting and Configuration

Remote configuration of the LCBS Connect Controller provides abundant flexibility and power to system users.

Remote Settings

It is essential that LCBS Connect Service Contractor Specialists have access to remote settings. In many cases, well-intentioned building owners and managers make changes attempting to make occupants more comfortable. This can unintentionally cause long-term system performance problems, unnecessary service calls to the site, and system failures.

For example, a business manager might change the configuration setting to “Cool/Off” because building occupants are hot. If this setting is not changed back, it could stay that way through the heating season. The next time heating is required, it won’t come on. Fortunately, the service contractor and technician can change the setting remotely. The alert that would be triggered in this case is Zone Demand.

Setting Specifics	Notes
Basic Heating and Cooling Settings, Set point Options	These are essential remotely adjustable settings, including occupancy, fan operation, and system switch setting. All temperature set points can be altered from this portal. These remotely adjustable settings can save a trip to a jobsite.
RH and CO2 Limits	If humidity or air quality control are implemented at a site, an LCBS user can change these settings and limits remotely.

Remote Configuration

Remote Configuration is provided so that experienced LCBS Connect professionals can remotely perform final configuration to new sites. Occasionally, a well-intentioned user will unwittingly alter configuration settings. Remote Configuration saves on the aggravation of unneeded truck rolls.

As a rule, you and your service technicians should be at the customer site to observe the results of configuration alteration if the system has already been commissioned.

Configuration Specifics	Notes
Conventional CVAHU operation to Air to Air CVAHU Heat Pump operation. Stages of compressor, heating used (up to three cool, three heat).	Not recommended to configure remotely. If the system is improperly set up initially via LCBS Wall Module, remote capability would be necessary.
Fan Operation in Heat Mode	Not recommended to configure remotely If the system is improperly set up initially via LCBS Wall Module, remote capability would be necessary.
System Switch	A commonly abused configuration parameter. If set incorrectly, remote capability is necessary.
Heating, Cooling Lockout, Limit, Operation configuration	There are 16 remotely adjustable equipment control option settings. Some have more remote adjustability value than others. Individuals doing on-site or remote adjustments should observe equipment operation closely after changing adjustments.

Configuration Specifics	Notes
Adaptive Intelligent Recovery configuration	There are 9 adjustment options available for Adaptive Intelligent Recovery. These values could change if initial assumptions about equipment capacity are incorrect. Results of on-site or remote adjustments should be monitored closely.
Ventilation, Economizer, Demand Controlled Ventilation	In some cases, it is possible to change ventilation and economizer settings, particularly minimum ventilation and changeover, high limit settings. It is not advised to enable extreme control strategy alterations remotely; they should be done at the site so technician can observe results.
Sensor Selection	Sensor selection can be performed remotely, although care must be taken not to leave jobsite without assigning primary control sensor to respective control loops.
Terminal Assignments	Terminal assignments can be done remotely, but care must be taken to have LCBS Connect control systems operating properly before technician leaves jobsite.
Dehumidification	Dehumidification configurations can be changed remotely, but the technician should observe the outcome of changing the configuration.

Appendix A – Point Alert Listing

Sensor Name	Digital Alerts	High Limit Analog Alerts	Low Limit Analog Alerts	Sensor Malfunction Alert	Description and Use Cases
Dirty Filter Digital	●	●		●	Indicates the state of the Dirty Filter digital input.
Proof of Airflow Digital	●	●		●	Indicates the current state of the Fan Status digital input. When fan output is on and fan status is off, this may indicate a fan failure or the fan has been manually turned off at the motor starter. When fan output is off and fan status is on, this may indicate the fan has been manually turned on at the motor starter.
Free Digital Output	●	●		●	User Defined
System Shutdown	●	●		●	Indicates any input that needs to shut down the roof-top unit. Among these: freezing coil condition, smoke shutdown from a smoke detection system, any system anomaly that requires HVAC system shutdown.
User Configured Input	●	●		●	Monitor Switch: Indicates the state of the Monitor Switch digital input.
Pulse Meter	●	●		●	When a pulse meter is configured, this value is the calculated Pulse Meter value.
Return Air Enthalpy	●	●		●	Return Air Enthalpy

Sensor Name	Digital Alerts	High Limit Analog Alerts	Low Limit Analog Alerts	Sensor Malfunction Alert	Description and Use Cases
Return Air Humidity	●	●		●	Return Air Relative Humidity (RH)
Return Air Temperature	●	●		●	Return Air Temperature
Indoor CO2	●	●		●	Space CO2
Indoor Humidity	●	●		●	Space Relative Humidity (RH)
Indoor Temperature	●	●	●	●	Space Temperature
Compressor Current Transformer Sensor	●	●		●	Indicates compressor current in amps when input UI6 is configured to measure compressor current.
Discharge Air Temperature	●	●	●	●	Discharge Air Temperature
Fan Current Transformer Sensor	●	●		●	Indicates fan current in amps when input UI6 is configured to measure fan current.
Filter Static Pressure	●	●	●	●	Indicates the pressure drop across the filter when input UI5 is configured to measure Filter Pressure.
Mixed Air Temperature	●	●	●	●	Mixed Air Temperature
Outdoor Air Damper Actuator	●	●		●	Indicates current Outdoor Air Damper position
Outdoor Air Enthalpy	●	●		●	Outdoor Air Enthalpy
Outdoor Air Humidity	●	●		●	Outdoor Air Relative Humidity (RH)
Outdoor Temperature	●	●	●	●	Outdoor Air Temperature
Zone Demand	●	●	●	●	The effective zone demand of the controller. A positive value indicates a cooling load and a negative value indicates a heating load.
Monitor Sensor 1	●	●	●	●	When input UI5 is configured to “Monitor sensor,” this indicates the value read by the sensor. This is a 0-10 VDC sensor.
Monitor Sensor 2	●	●	●	●	When input UI6 is configured to “Monitor sensor,” this indicates the value read by the sensor. This is a 0-10 VDC sensor.
Monitor Temperature	●	●	●	●	When input UI2 is configured to “Monitor Temperature” this indicates the value read by the sensor. To be clear, this is a temperature sensor.
Y1 Runtime	●	●		●	Compressor run time stage 1, circuit 1
Y2 Runtime	●	●		●	Compressor run time stage 2, circuit 2
Y3 Runtime	●	●		●	Compressor run time stage 3, circuit 3

Sensor Name	Digital Alerts	High Limit Analog Alerts	Low Limit Analog Alerts	Sensor Malfunction Alert	Description and Use Cases
G Runtime	●	●		●	Fan run time
W1 Runtime	●	●		●	Heat run time stage 1
W2 Runtime	●	●		●	Heat run time stage 2
W3 Runtime	●	●		●	Heat run time stage 3
Sylk Address 3 CO2	●	●		●	TR40 remote wall module CO2, Sylk bus address 3
Sylk Address 3 Humidity	●	●		●	TR40 remote wall module humidity, Sylk bus address 3
Sylk Address 3 Temperature	●	●	●	●	Temperature measured by TR40 remote wall module at Sylk bus address 3.
Sylk Address 4 Temperature	●	●	●	●	Temperature measured by TR40 remote wall module at Sylk bus address 4.
Sylk Address 5 Temperature	●	●	●	●	Temperature measured by TR40 remote wall module at Sylk bus address 5.
Sylk Address 6 Temperature	●	●	●	●	Temperature measured by TR40 remote wall module at Sylk bus address 6.
Sylk Address 8 Humidity	●	●		●	Outdoor Air relative humidity measured by C7400S sensor at Sylk bus address 8.
Sylk Address 8 Temperature		●	●	●	Outdoor Air temperature measured by C7400S sensor at Sylk bus address 8.
Sylk Address 9 Relative Humidity		●		●	Outdoor Air relative humidity measured by C7400S sensor at Sylk bus address 9.
Sylk Address 9 Temperature		●	●	●	Outdoor Air temperature measured by C7400S sensor at Sylk bus address 9.
Local TS120 Sensor Relative Humidity		●		●	TS120 wall module relative humidity
Local TS120 Sensor Temperature		●	●	●	TS120 wall module temperature

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