



Insights

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What does it mean to be

Kele GREEN?

We have an interesting list of priorities: Improving energy efficiency, recycling materials, preserving water resources, reducing waste streams, fostering natural ecosystems, eliminating hazardous materials, evaluating our effect on the environment, and absolutely minimizing it at every turn.

Kele makes it easy to be Green!



Had I written that list in 1970 when I was in high school, I would have been cast aside by my buddies, labeled a hippie, or labeled a tree-hugger, or both. Today, that list is pretty darn close to becoming the law of the land. We're reading lately how landlords are scrambling to meet the latest standards before their tenants pack up and move to a certified green building. It's good that we can finally embrace the fact that the green movement is in all of our best interests.

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So what does all this mean for Kele's customers?

In short, it means a growing wave of new opportunities to expand upon the traditional BAS offering.

Green means going beyond what's required

It's no longer enough to meet the energy efficiency standards in ASHRAE 90.1, for example. In fact, there's a new standard on the way – ASHRAE 189.1P is the Proposed Standard for the Design of High Performance Green Buildings Except Low-Rise Residential Buildings. It's just finished its third public review, so it won't be long before publication as a standard. The LEED (Leadership in Energy and Environmental Design) scoring standards are already in place. Grant money, stimulus credits, and major corporate funding are already being tied to LEED accreditation for new projects and renovations. Before many more years pass us by, state and local governments will be adopting LEED scores and ASHRAE 189.1P standards as building codes – and by then, there will be even more advanced means available to exceed them.

In all these green advances, there are three threads that so far have remained unbroken...

Control

First, lighting energy control is receiving more and more emphasis, particularly in the area of daylight harvesting. It used to be simply a bit wasteful to burn the lights when sun coming in the windows could supply all or part of what we needed. Now it's really frowned upon. Soon it will be illegal!

Kele's AUTOPHOS® lighting control system, and our MK7 line of Celestial light-level sensors have the horsepower needed to totally exploit available daylight, and AUTOPHOS will integrate with ease into your BACnet® BAS.



AUTOPHOS Lighting Control Systems

AUTOPHOS



MK7 Series Celestial Sensors



PowerTrak 9000 Series



Kele Outdoor Airflow Measurement System (KOAMS)



Kele 200 Series Water Flow Monitors

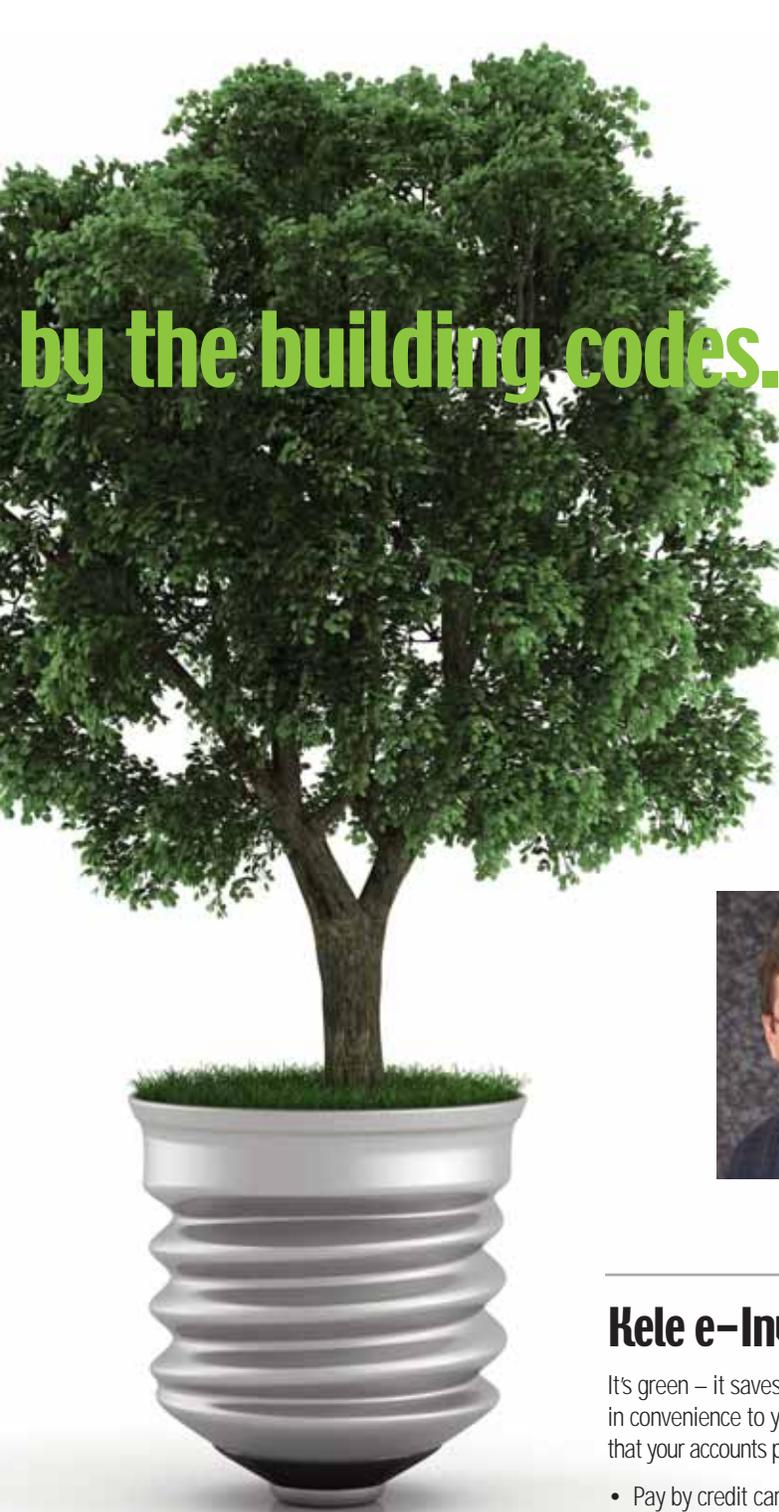


Kele 3000 BTU Monitor

Conservation

Second, each new standard for efficiency or conservation requires additional monitoring to document and verify that the specified results are being achieved on an ongoing basis. That translates into more PowerTrak 9000 Series power monitoring products, with all the associated CTs and accessories, outdoor airflow measurement with the new KOAMS Kele Outdoor Airflow Measurement System, and more 200 Series water flow and 3000 Series BTU monitors for every project.

There are new requirements coming to monitor power on individual HVAC units above a certain size, and documentation of water use budgets for intensive areas such as laundries and kitchens will be a must. At least 10 sections of the Kele catalog, and over 40 of our product families are applicable in satisfying the intent, prerequisites, and requirements of the LEED rating system.



by the building codes. Kele can help!

Certification

Third, and perhaps the most consistent throughout the growth of green standards and regulations, is that they get exponentially more complex with each iteration. Fortunately, Kele has what you need in this category, too. Ready, willing, and able to help you are three LEED Accredited Professionals. Kevin Freidt, Lisa Kisi-Dense, and Clayton Plymill have been through the rigorous training and accreditation process administered by the Green Building Certification Institute (GBCI). They did this in order to serve as an even better resource to you, our Kele customers.

Kele's LEED Accredited Professionals:



Kevin Freidt
ext. 4986



Lisa Kisi-Dense
ext. 4775



Clayton Plymill
ext. 4757

**So when you're ready
to help your customers
put on a new shade of
green, give Kele a call.
We'll be glad to help.**

Kele e-Invoice Management is Here!

It's green – it saves trees, toner, ink, and transportation energy – but most of all, it brings the ultimate in convenience to you, our customers. Our new, full-featured e-bill system puts all of the functionality that your accounts payable group needs, right at their fingertips – and it maintains your files for you, 24/7.

- Pay by credit card or Automated Clearing House (ACH) transfer, no more checks or postage
- Convenient fields for in-house (private) annotation or notes to Kele are included
- You configure your own levels of approval
- Set up e-mail notification of new invoices, postings, receipts, and other account activity as you like
- Communicate quickly and conveniently with your Kele account representative
- There's plenty more you can customize to make this tool fit your needs.

Log in at www.kele.com today, click on "account," and follow the "Invoice Gateway" link, so you can start experiencing the convenience of the Kele Green e-Invoice system!



Lightning Speed

We're hearing too often of high-dollar pressure transmitters being toasted during thunderstorms lately. The situation usually involves installations in chilled water or steam pipes that are connected to an underground campus loop, or fuel pipes that are heading to an underground tank or a remote generator enclosure. In each case, there is good surge protection at the controller end of the circuit, from each line to ground and from line to line on every analog input.

What else could have been done to save these expensive transmitters?



We spend lots of effort designing ways to force lightning's energy to safely bypass our systems on its way from the sky to the ground. Lightning can sometimes surprise us, though, and come back out of the ground to bite our electronics from the other side where we've left no defense in place to stop it. Piping systems for chilled water, hot water, diesel fuel, steam, waste, and other utilities may enter a building at a location remote from the electrical service, and thus may not be effectively bonded to the electrical grounding system.

The difference in potential between the piping system and the electrical system ground during a lightning event can be very high, and the voltage rise time can be incredibly short. So, even though the piping in question is buried in the ground, it isn't always a good idea to think of it as "grounded." It's the back door that lightning can use to get into our systems to wreak its havoc.

Think of it this way – the computer guys here at Kele can put the best UPS available on my PC, with so many joules of surge protection capacity that the worst possible electrical

system disturbance can't possibly make it down the power cord or Ethernet cable into my machine to do any damage. Yet, I can open the case, shuffle my feet across the carpet, and let a blue spark into the motherboard with my finger – doing just as much damage as lightning might have if we hadn't protected it so well.

(Note to Kele IT: that's not a confession, just a hypothetical illustration.)



P51

Lightning can be sneaky – so watch the back door, too!

Have a look at the P51, PSS2, 209, and PTX1 pressure transmitters below. These rugged, stainless steel transmitters are quite compact. While the internal electronics are not connected to the steel case in these units, the gap between the case and the sensitive parts is very small. The high potential spike that can result from intense, lightning-induced ground currents flowing around and through buried piping may thus behave a lot like the blue spark from my fingertip, jumping from the case to the sensitive, small parts within.

Since predicting the level of energy to be handled in this case is just about impossible, let's look at several levels of protection that can be employed.

First and best, arrest that pipe! Remember that the main problem is that the transmitter case is quickly rising to a potential much higher than its electronic innards, which are constrained by the electrical system ground. Electrical codes call for the grounding system to be bonded to building steel, water piping, and a grounding electrode, to prevent wide variations in ground potential from presenting hazards during faults or other disturbances – why not add this bit of piping to the mix, if practical? As long as the electrical service isn't too far away, a bonding jumper may be in order. However, in most facilities this will require a consult with a locally

licensed electrical engineer to ensure it's done in accordance with code and without compromising the coordination of any existing ground fault protection. If it works out, a bonding jumper may vastly reduce or even totally eliminate the problem.

Next, Isolate. Get the pressure transmitter away from the pipe. If at all possible, come off the pipe to be monitored with a model PT pigtail syphon and gauge cock to eliminate conductive fluids, and extend a few more inches with insulating pipe such as PVC that is rated for the pressure and service involved. (Figure 1)

Finally, if the sensor can't be physically isolated from the pipe, and the pipe can't be sufficiently bonded to electrical system ground, the effect of the transient can be mitigated to some extent by isolating the circuit with a DT-13E Signal Isolator. This will allow the sensor electronics and connected wiring to float up in potential with the pipe during the lightning strike, then settle back down when it's over.

There is still the risk that arcing will occur inside when the initial spike hits, though – but this can also be at least partially abated by applying fast-acting devices such as Transzorb's as close as possible between the transmitter case and each loop conductor, plus one more Transzorb between the two loop conductors. (Figure 2)

These same back-door attacks can be directed toward immersion temperature sensors, flow switches, pressure switches, and other electrical devices we place in pipes. Fortunately, these are typically more rugged and are less prone to failure when popped with a bit of a spark – and even when they do fail, they're not as costly as the typical pressure transmitter.

In summary, when pipes are entering from outdoors or underground, check to see if they might actually be preparing a future surprise attack on the BAS electronics. If you can arrest them or isolate them in advance, you'll be dollars and downtime ahead of the game!

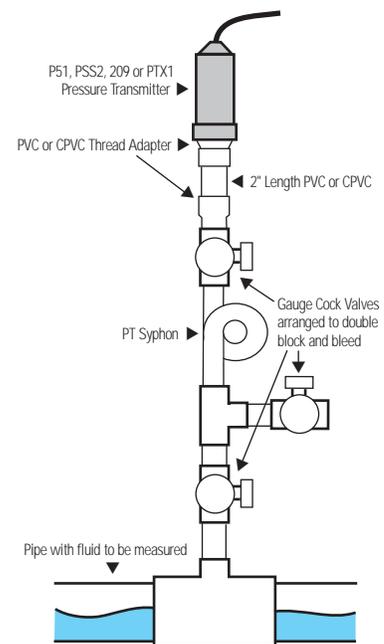


Figure 1
Isolation with PVC

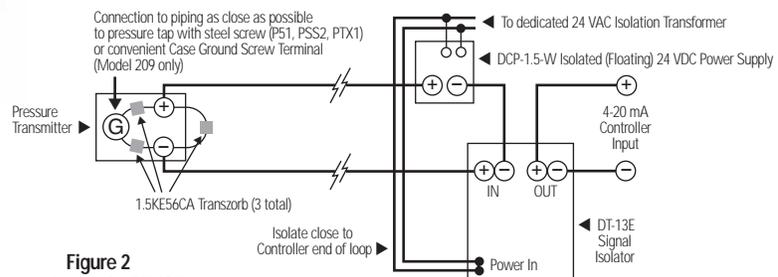
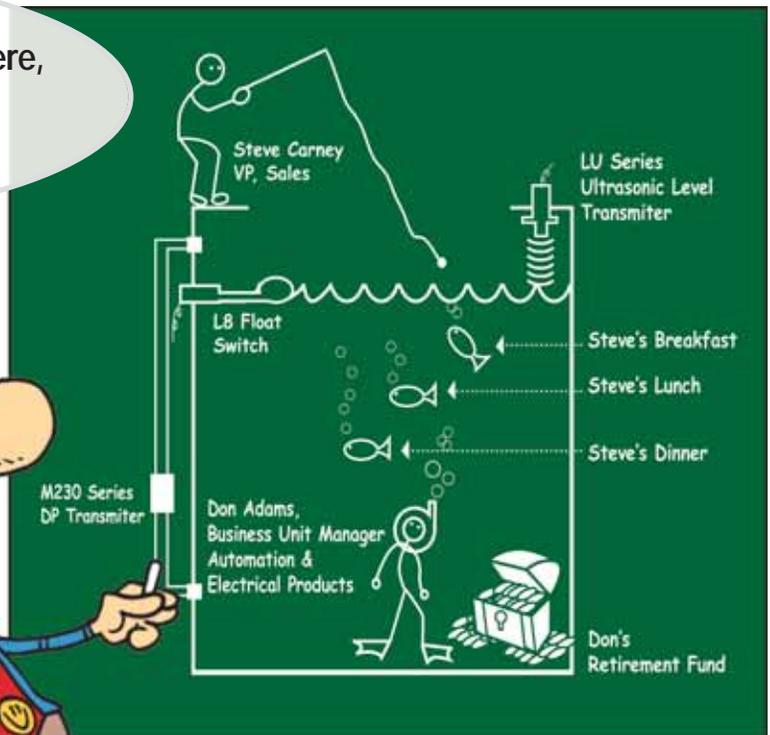


Figure 2
Isolation with DT-13E

Hi again, everyone. Fundamental Fred here, with a word or two today about liquid level measurement.

On the Level



Opportunities abound in the building automation business to measure liquid level. Sometimes it's just for logging or display purposes, like a monitor for the level of a water treatment chemical in a storage drum. This log or display could be used by the facility engineer to decide when it's time to order more, or he could use it to track how much his system uses each month for budget planning purposes.

Another common opportunity might be the level of water in a cooling tower sump that is monitored as an input to a BAS control loop. That control loop, in turn, modulates a makeup water control valve to keep the cooling tower sump level constant. One more level application could be as a secondary monitor to critical stand-alone systems like sewage sump pumps or generator fuel day tanks. Monitors such as these can allow the BAS to sound the necessary alarms and send necessary e-mail/tweet/SMS messages to alert staff when these critical systems may be failing.

Level measurement is indeed a versatile tool to have in the old BAS tool pouch. More opportunities are coming as the green movement takes hold, too. Harvesting rain water and recycling treated waste water for irrigation, for example, will each require storage tank level monitoring in order to minimize the use of precious potable water.

Level measurement is done in many ways in the industrial world, employing technologies based on capacitance, conductivity, load cells, photo detection, and even tank-penetrating radar. Due to the more limited scope (and budget) of most BAS installations, though, we commonly deal with only four:

- **the float switch,**
- **the differential pressure switch,**
- **the differential pressure transmitter,**
- **and the ultrasonic level transmitter.**

Float switches are the simplest. They float on top of the liquid, and through a magnetic coupling (which keeps the switching part totally dry) they operate a switch to signal whether the liquid level is above or below the point at which they are mounted. Of course, there is a small distance between the level at which the switch changes state on rising fluid and the level at which it changes state on falling fluid, to prevent rapid cycling. This distance is known as the float's deadband.

Differential pressure switches operate just like float switches, with a deadband between rising and falling switch points.

Instead of floating on top of the liquid, though, they sense level through a pressure connection beneath the surface. The distance from the pressure connection to the surface of the liquid is directly proportional to the difference in pressure between the two points. Differential pressure transmitters work on the same principle, but they produce a linear signal that indicates level over a calibrated range instead of a simple on/off indication.

Finally, ultrasonic level transmitters mount at some distance above the top of the liquid. They transmit a signal down toward the liquid and listen for its echo to return, then calculate the distance covered by measuring the elapsed time. These can produce a linear signal that is proportional to level over a range, and can also be equipped with relays for alarm or control.

There you have it, the most common reasons we measure level in the BAS world and the most common ways we do it. Look for the new, dedicated LEVEL section in the upcoming 2010 Kele catalog, with an expanded offering to meet your needs. Call Kele for all your level-measuring projects – we'll be glad to help you match your application to the product that's best!

Q&A From the Field



SHOP TALK

Q: My customer is developing an upscale strip shopping center in an area that's off the beaten path. In fact, while the zoning is OK for what he's building, it's far enough away from the utility's three-phase distribution that he'll be getting single-phase service "...and don't bother arguing about it," they said. Well, the whole project was designed with three-phase in mind, and we have a lovely VAV scheme that we don't want to change. What's the best way to do variable speed with our fans if we only have single-phase 240V available? Most of them are bigger than solid-state, single-phase speed controllers can handle, and I don't want to think about messing with multi-speed, multi-winding motors and a bunch of relays.

A: Modern variable frequency drives (VFDs) can be configured to accept a single-phase input while driving a three-phase load. This method allows the use of a three-phase fan motor and brings along the advantages of soft start, continuously variable speed, and excellent energy efficiency.

Be aware that the VFD you need will be about twice the size of the one you would choose if its input were three-phase. First, so that the input power matches the output power, the input current must be 1.732 times larger than the output current. Also, since it's tougher to rectify and smooth a single-phase input than a 3-phase input, more capacitance is needed. All you really need to know, though, is that it will be a hunkier piece of equipment than you're used to seeing. Choosing the correct one for your application is easy – call Kele. Our new F700 line of premium VFDs from Mitsubishi is UL and cUL listed for use with single-phase input supply at 240V or 480V, and we'll be glad to help you pick the models to fit your application.

Q: We save a few dollars from time to time by mounting a wall-style CO₂ sensor or humidity sensor on an access door inside a return air duct instead of buying the more expensive duct-mount version with the sampling tubes and all. I've noticed that in some cases, the humidity in the return air will rise to 100 percent and stay there for sometimes a couple hours after an air handler shuts down for the night. When I look at the sensor itself after it's been in there through a cooling season, the circuit board looks like it's been left outside in the rain. What do you think is causing this?

A: Before we get into your moisture issue, we need to strongly recommend that you spend the few dollars you've been saving and get duct mounting kits with sampling tubes for your humidity and CO₂ sensors. Room products are not rated for use in air handling ducts or plenums, with very few exceptions (Telaire 8001B and 8002B CO₂ sensors are the only ones of which we're aware). So, putting them in there is violating a number of building codes. Don't do that!

As for moisture in the return air after daily shutdown, it's a phenomenon we hear about more often than we'd like. It does interfere with the performance of properly mounted duct humidity probes, but only

when they're installed a little too close to the fan. If you think about the different thermal states of air and matter in an operating chilled water or DX air handler on a hot summer day, it's quite a diverse mix in a relatively small space. The gaseous mix includes saturated supply air at 55°F (13°C), return air at maybe 78°F (26°C) and a lower RH (40% perhaps), outside air that might be 95°F (35°C) and fairly humid (60% RH), and mixed air somewhere between the outdoor and return conditions. The mix of solids and liquids includes a chilly, dripping-wet cooling coil, a massive, hot motor (sometimes in the airstream, sometimes not), and a pan full of cold water.

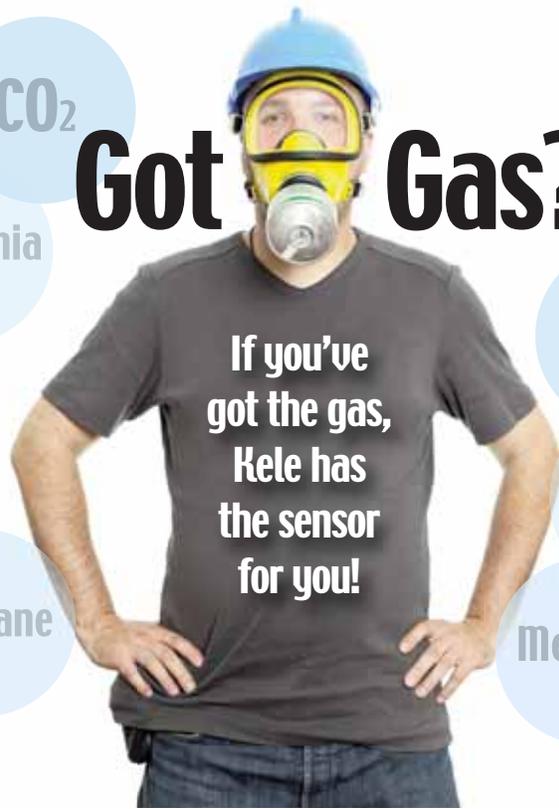
When the fan stops, all of those different heat and moisture levels have to begin heading toward equilibrium. During the transition period, heat from the motor and the surrounding equipment room can quickly raise the air temperature in the return duct near the unit. This same air will also begin to rapidly absorb moisture from the condensate pan and will mix with moisture-laden air flowing backward through the cooling coil. Stratification will also occur in the duct, so the warmest air will be on top. Since the humidity sensor is solid, it will warm much more slowly than the air. At some point in this process, the air's dew point will rise higher than the temperature of the surface of the humidity element, and at that point the sensor itself will become wet, along with its circuit board, mounting hardware, and enclosure. The duct liner tends to keep this from happening to the duct itself, so it really looks as if the moisture has singled out our sensor for attack. In any event, you then have a wet sensor, and it takes a few hours for it to dry out and work normally again.

The solution? Keep your return air duct humidity sensor a respectable distance from the air handling unit, at least 20 duct diameters upstream, and never outdoors. Preferably, mount it as close to the occupied space as possible.



Mitsubishi F700 Series
Variable Frequency Drive

Got Gas?



If you've got the gas, Kele has the sensor for you!

There is no other source in the industry that has gathered the range of gas sensing products under one roof that you'll find at Kele today, and it's because we have listened to what our customers have said. You want us to have the sensor you need, when you need it.

So here's a reminder of our comprehensive line of gas sensors – note the newest entries with the yellow star. As always, when something new comes up to be sensed, call us. If there's a sensor that can sniff it, we'll find you one. It's what we do.

Gas to be sensed	Applicable Sensor line
Refrigerants of all types	Bacharach HGM-MZ*, HGM-SZ*
CO ₂	Kele CD-AS Series; CD-A Series; The Nose; Telaire 8000 Series; Honeywell C7232 Series; Telaire's T8000 & T5000*
CO	Kele KCO, CO25*, WCO-1; Vulcain TP1-M, BA/420-CO*
NO ₂	Kele GD Series*
Ammonia	Bacharach AGM-SZ*
O ₂	Kele OS-1, GD Series*
H ₂	Kele GD Series*
H ₂ S	Kele GD Series*
Propane, Methane and other Combustibles	Kele GD Series*
Calibration Kits	C Kits*, 3015 Series*, UCK Kits

New from Kele!

KMC Pneumatic VAV Repair Kits (KIT-1001, 2, 3, 4)

- Bundled controller, actuator, thermostat, tools
- Kits for most common applications
- Quality KMC parts
- Instructions included

More info is available in the Pneumatics Section of Kele's online catalog.



BACnet Graphic Display (BBC-SD)

- Touch-screen interface for BACnet automation systems
- 50 configurable data screens
- 480 x 272, 12-bit color display
- BACnet MS/TP standard

More info is available in the Network & Wireless Section of Kele's online catalog.

Wireless BACnet Transceiver (WBT900, WBT900-IP)

- Extend a BACnet network across tough-to-wire gaps
- One-to-one or one-to-many configuration
- Short to very long (many miles) range
- Very secure data delivery



More info is available in the Network & Wireless Section of Kele's online catalog.

LASCAR USB Data Loggers (EL-USB Series)

- Temperature, humidity, voltage, current, and carbon monoxide models in stock
- As easy to deploy as a thumb drive!
- Simple data format (.txt), simple download, and simple conversion
- Works with Windows 2000®, XP®, and Vista® 32-bit OS



More info is available in the Test Equipment Section of Kele's online catalog.

Hot Film Air Velocity Transmitters (EE65-01 Series)

- Good accuracy at low velocity
- Low sensitivity to dust and dirt
- Adjustable insertion length
- NEMA 4 enclosure

More info is available in the Flow Section of Kele's online catalog.



For information or pricing on any of the products showcased in this issue, or to download product data sheets, contact Kele at

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