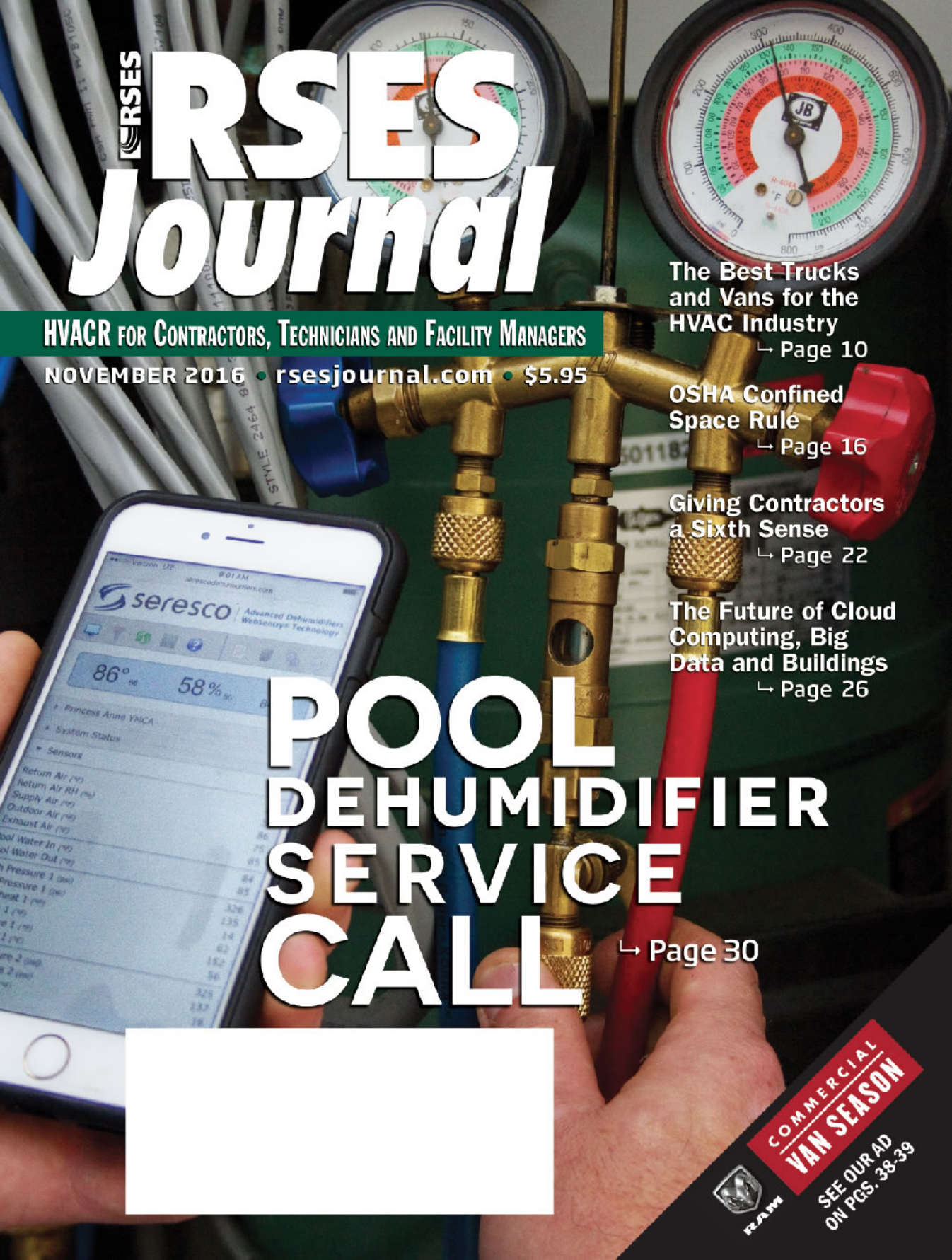

RSES Journal

HVACR for Contractors, Technicians and Facility Managers

NOVEMBER 2016 • rsesjournal.com • $5.95

POOL DEHUMIDIFIER SERVICE CALL

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An hour-by-hour look at a pool dehumidifier service call and how Web browser-based technology shortened the troubleshooting time at a YMCA facility.

BY DON NATION

Images courtesy of Duane Noblick, 3RDICreations, and Mid-Atlantic Companies.

A service call on an indoor pool dehumidifier at the Blocker Norfolk Family YMCA in Norfolk, VA earlier this year might have required a full day or more of troubleshooting. However, it was pared down to less than two hours with Web browser-based diagnostics technology.

The service technician's foresight into requesting operational history logs recorded on the manufacturer's servers saved what could have amounted to hundreds of dollars in troubleshooting costs on an intermittently operating refrigeration circuit.

DEHUMIDIFIER/FACILITY BACKGROUND

The operational log data of the dehumidifier—a 30-ton NP-Series Protocol manufactured by Seresco Technologies, Decatur, GA—lists more than 60 operating parameters to help service techs troubleshoot. The data, made possible by dozens of sensors and transducers, is displayed in real time on the machine's onboard keypad readout via its microprocessor-based onboard command center. It is also reported remotely to an authorized user's smartphone or PC via the dehumidifier's Web browser-based software program. The command center combined with the software also automatically records the log data onto the manufacturer's factory servers, which can also be used for troubleshooting. It sends email or text alarms to the HVACR service contractor, factory, facility manager and any other authorized personnel.

YMCA-South Hampton Roads discovered an intermittent high pressure switch with emerging Web browser-based software technology that transmitted alarms to the facility manager, service contractor and the dehumidifier manufacturer. The dehumidifier factory techs viewed recorded historical data to quickly troubleshoot and verify a faulty high pressure switch and negate the need to test other equipment.

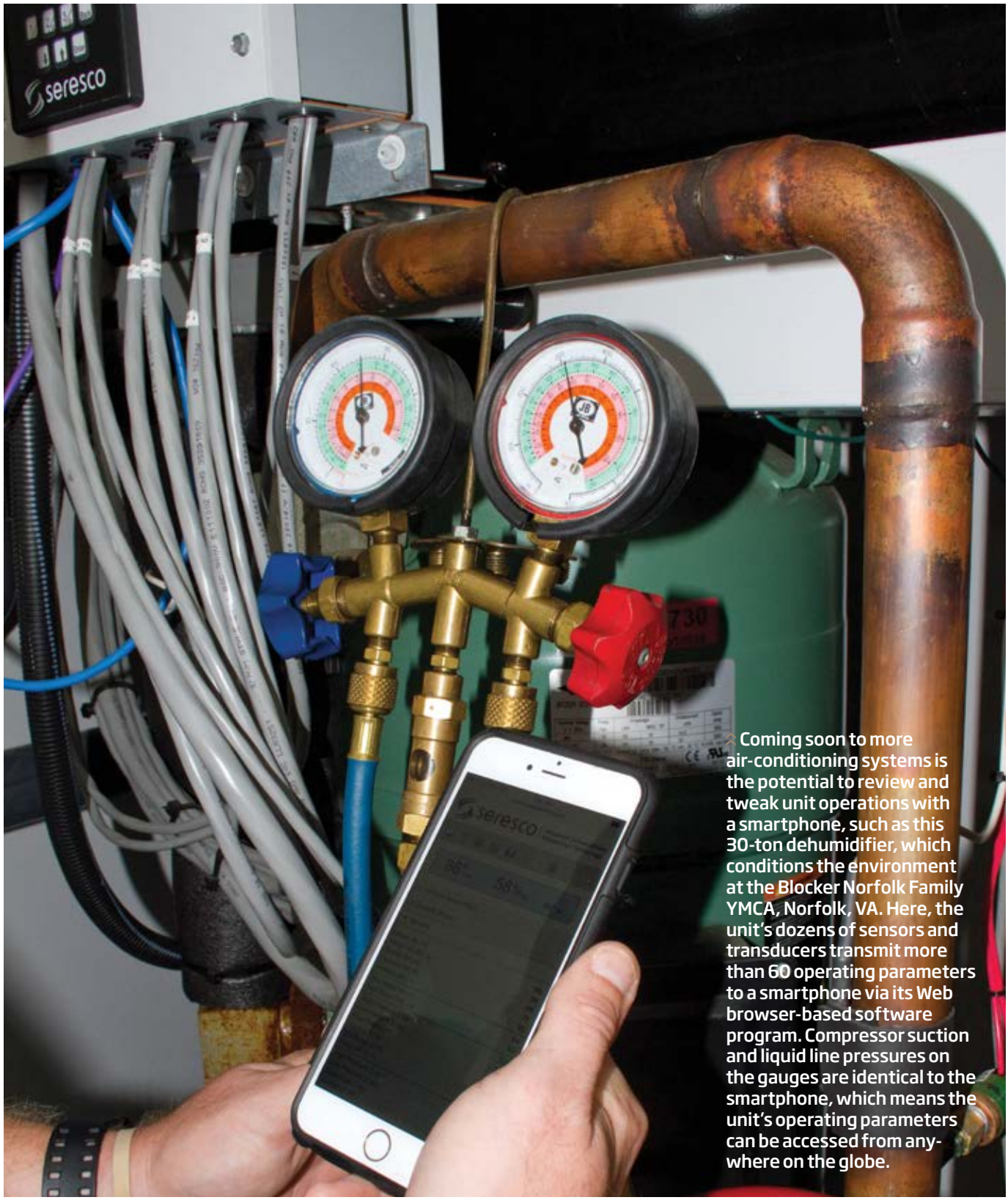
John Mahoney, a 16-year-veteran service tech for Mid-Atlantic Companies Inc., a Virginia Beach, VA-based commercial HVAC sales/installation/service contractor, arrived at the Blocker YMCA, on April 26 to troubleshoot the natatorium's dehumidifier.

Dehumidifiers are typically serviced by air-conditioning technicians. However, they differ in several ways from air-conditioning (see sidebar). A major difference between routine air conditioning and the Blocker YMCA's dehumidifier is it is designed to dehumidify, cool and heat the pool space to 50% RH and 86°F space temperature, respectively. It also uses heat recovery to heat the pool water to 84°F and pre-condition the facility's outdoor air requirement. Furthermore, it also uses 75% less refrigerant than most modern-day dehumidifiers, because it uses glycol instead of refrigerant for heat rejection. Only the internal refrigeration circuit uses refrigerant (R-410A).

DIAGNOSING THE INTERMITTENT OPERATION

The dehumidifier was designed with two refrigeration circuits for redundancy, so the natatorium was still open for business and comfortable for patrons even though the second circuit was operating intermittently. High pressure shutdowns occurred intermittently between April 21 and April 25 when the onboard command center sent notice of the circuit shutdowns, resets and three hard-locks within a 60-minute period to authorized personnel.

A shutdown can many times occur only once, possibly from voltage spikes or acts of nature, therefore the dehumidifier is designed to reset itself automatically and send an alarm notice to several people, which in this instance was R.A. Parks, Association Property Asset and Project Management Director,



Coming soon to more air-conditioning systems is the potential to review and tweak unit operations with a smartphone, such as this 30-ton dehumidifier, which conditions the environment at the Blocker Norfolk Family YMCA, Norfolk, VA. Here, the unit's dozens of sensors and transducers transmit more than 60 operating parameters to a smartphone via its Web browser-based software program. Compressor suction and liquid line pressures on the gauges are identical to the smartphone, which means the unit's operating parameters can be accessed from anywhere on the globe.

YMCA-South Hampton Roads, an aquatic-oriented YMCA organization that operates indoor pools in 14 of its 17 facilities. Brandon Fitchet, Blocker YMCA Property Director, and Parks both received alerts and had both been trained by the manufacturer to manually reset the circuit after a hard-lock via their personal smartphone, PC or onboard reset button. Hard locks occur after three machine automatic resets within 60 minutes. The manufacturer has a built-in safeguard design where the circuit's compressor will not restart after three lock-downs, thus requiring a service call or at the very least, an online diagnosis by factory technicians.

The dehumidifier was installed three years ago as a replacement for a 25-year-old unit. During the installation and start-up, Seresco Factory Tech, Jerry Choate trained Parks, Fitchet and Mid-Atlantic's Bob Masotti, Principal, Dave Ragan, Principal, John Fussell, Service Manager, and Mahoney on system operation and alarm response.

Following is the timeline of the service call:

Monday, April 25: Parks, Fitchet and Masotti decided an on-site service call was needed after all had received recent smartphone and email HPTD (high pressure transducer) alarms from the dehumidifier's command center over the weekend.

Tuesday, April 26:

→ **8 a.m.—**Mahoney arrives on site.

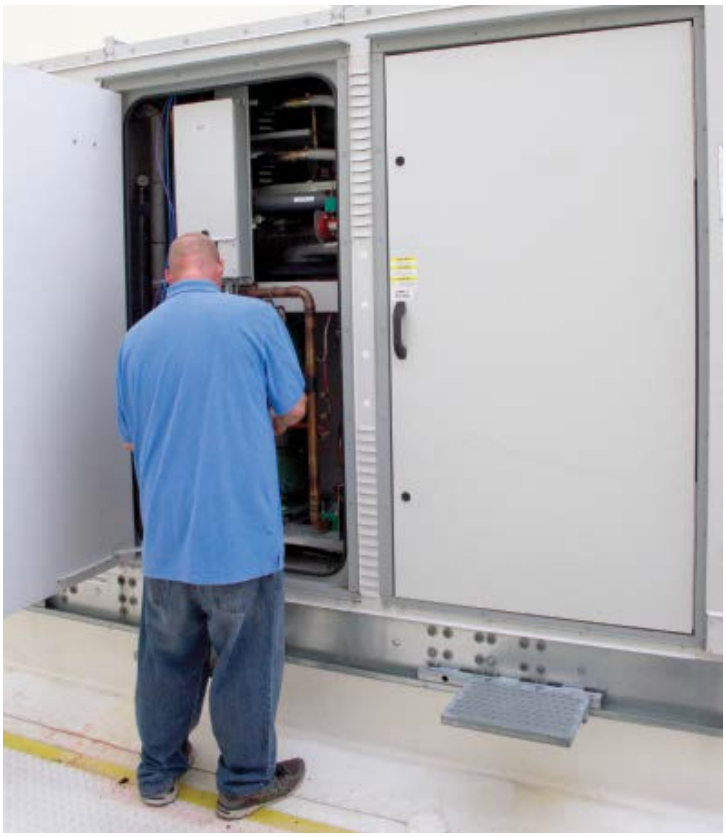
→ **8:10 a.m.—**Mahoney puts on pressure gauges, but finds the R-410A system is between an acceptable pressure of 350 psi to 450 psi.

→ **8:30 a.m.—**Mahoney suspects the high pressure switch is failing intermittently, based on the HPTD alarms. However, he did not want to replace the high pressure switch, only to discover another component was the source of the problem, such as a faulty high pressure transducer. He also tested each of the four condenser fans individually in the dehumidifier's service mode, which all checked out fine. During initial troubleshooting, Mahoney noticed the high pressure switch failed briefly for no apparent reason.

→ **9:00 a.m.**—Before going through more time-consuming troubleshooting of related components, Mahoney called factory Service Technician Jerry Choate for a possible confirmation. Also, some other component could have been faulty, such as a control, loose wiring or any number of other things that could create a high-pressure situation tripping the high pressure switch. Since the dehumidifier rejects heat to the pool water, a pool water-circulation problem, such as a pool service company inadvertently closing a water supply valve to the dehumidifier could also create a high pressure situation.

→ **9:10 a.m.—**Choate checks the machine's history of alarms and pressures. A 30-day historical recording on factory servers from several transducers reports the dehumidifier did not have a history of high pressure. This indicates possible false high-pressure alarms.

Insert.



John Mahoney, Service Tech, Mid-Atlantic Companies, saved hours of service call fees for the Blocker Norfolk Family YMCA, Norfolk, VA, by using 30 days of recorded historical data of the 30-ton dehumidifier's operations to troubleshoot a high pressure alarm. Emerging Web browser-based diagnostics technology will change future refrigeration service.

→ **9:15 a.m.—**Choate specifically checked the high pressure transducer's recorded historical reports of pressures, which were negative. Meanwhile, Mahoney cross-checked the transducer's current pressure with his gauges to assure it was reading correctly.

→ **9:25 a.m.—**Choate produces a chart of operational logs detailed in a graph covering the previous 24 hours. He notices each high pressure switch trip had occurred before the transducer tripped. The transducer high pressure trip point is factory preset to trip before the high pressure switch when pressures rise. In short, the high pressure switch was tripping at about 50 psi lower (possibly around 450 psi) than for what it was designed (500 psi).

→ **9:40 a.m.—**Choate and Mahoney are convinced it is the high pressure switch and the diagnostics are completed in less than a two-hour span.

→ **9:50 a.m.—**Mahoney buys a common high pressure switch at a local wholesaler and replaces the faulty switch.

→ **10:30 a.m.—**After replacing the high pressure switch and doing one more system check, Mahoney leaves for the next service call.

Wednesday April 27: While on another job, Mahoney takes a minute to check in on the Blocker YMCA system with his smartphone. He finds no alarms and that the system pressures are fine. The RH, the space temperature and the pool water temperature are all on setpoint.

CONCLUDING OBSERVATIONS

Mid-Atlantic's Masotti said building management systems can give some diagnostic help on HVAC equipment, but most reveal just basic operational data and do not have the breadth of data supplied by the dozens of sensors on Blocker YMCA's dehumidifier. Mahoney is looking forward to the day when all types of air-conditioning equipment offers Web browser-based software programs for remote communication and diagnostics.

"It's nice to know you can call the manufacturer and they'll have a service tech within minutes look at the system with you via the Internet and help troubleshoot, if you need it," said Mahoney.

"Plus, it's so easy to take a couple of minutes and check in on a recent service call just to make sure it's still operating the way it did when you left the job," notes Masotti.

Now that this type of technology has reached the market, Parks is now an advocate of proactively replacing aging R-22 refrigerant dehumidifiers before they experience a catastrophic failure. The Blocker YMCA's R-410A dehumidifier using new technology, such as direct drive motors, exhaust heat recovery for energy-efficiently preconditioning outdoor air, plus Web browser-based diagnostics and notification is saving the facility more than $1,200/month in energy costs during peak winter months versus the similar sized unit it replaced, according to Parks. Furthermore, a catastrophic coil leak and loss of an older unit's R-22 refrigerant charge, which is common with aging refrigeration equipment, would cost the organization more than $10,000, not to mention environmental damage. Most of the expense would be attributed to R-22 costs, which have experienced exponential price increases during the current EPA HCFC phaseout.

Technology that can detect slight operational inefficiencies can save hundreds or thousands of dollars of energy costs by alerting authorized personnel long before the annual or semi-annual service call is scheduled for the unit. Furthermore, in an application such as a natatorium where humidity and temperature levels are far higher than normal occupied spaces, a slight degradation of environmental conditions can go unnoticed for months if there are no notifications when setpoint thresholds are surpassed.

Thus, today's electronics technology is changing refrigeration service by the day. Some HVACR manufacturers have already jumped into Web browser-based control and diagnostics. Within the next five years most major commercial HVACR manufacturers will have some type of onboard controller that reports and records information through a web browser-based software program.

Don Nation has been the Technical Services Manager for 12 years at Seresco USA, Decatur, GA, North America's largest manufacturer of mechanical indoor pool dehumidifiers. Nation has a total of 17 years' experience in the pool business. Seresco has recently established a two-level (online and factory-based) service training and certification school for indoor pool HVAC equipment at http://service.serescodehumidifiers.com for service contractors that want to specialize in dehumidifier service. For more information, email donnation@serescodehumidifiers.com or visit www.serescodehumidifiers.com.

Dehumidifiers Are Not Air-conditioners (and Vice Versa)

Mechanical dehumidifiers are quite different than air-conditioners, even though they share similar components such as compressors, cooling coils, condensing coils and a refrigeration circuit that transfers energy interchangeably between different refrigerant states of gas and liquid. Many dehumidifier manufacturers offer service schools to train and certify service techs.

The following points are a few ways mechanical dehumidifiers and air conditioners differ:

↳ Air-conditioners are optimized for sensible heat recovery where the heat captured from a space is rejected to a single heat rejection source such as an air cooled condenser, a chilled water loop, or a dry cooler loop;

↳ Indoor swimming pool dehumidifiers are optimized for latent heat rejection (moisture removal) and can be built to reject heat to at least two separate condensing sources simultaneously–such as an air reheat coil and the pool water–or to an outside air-cooled condenser, water-cooled condenser or a dry cooler loop;

↳ Air-conditioners typically supply space air below 60°F in order to achieve temperatures in the low 70°F during the cooling season. Indoor pool dehumidifiers usually supply air above the dew point temperature for a given set of conditions. As an example, the air in an indoor pool being maintained at 82°F and 50% RH has a dew point of approximately 63°F. If air is supplied below 63°F, the moisture level in the space rises and could cause supply air-duct sweating. Therefore the supply air from a pool dehumidifier running in cooling mode usually remains above 65°F;

↳ Dedicated air-conditioners (unless they are purchased as heat pumps) typically do not reject heat back into the conditioned space. Indoor swimming pool dehumidifiers will reject the heat of vapor compression back into a space to help maintain warmer temperatures indoor pools require; and

↳ Dedicated air-conditioners typically are not connected to a fresh air source with that air being introduced into the treated area. All indoor swimming pool dehumidifiers installed in facilities open to the public must be selected with the appropriate capacity for introducing and treating a specified volume of fresh air when occupied.