ISSN 1862-0698 www.enocean.com

ENABLED BY ENOCEAN

E 2016 1

perpetuum®

THE WORLD OF ENERGY HARVESTING WIRELESS TECHNOLOGY

Smartly connected

Intelligent networking in the cloud

EnOcean to IP – we're off to the Internet of Things

thermokon®
HOME OF SENSOR TECHNOLOGY

MADE IN GERMANY

enocean®

SR06 LCD

EasySens® – Room Operating Units

THE TECHNICAL DESIGN HIGHLIGHT

Stylish, compact, user-optimized – the new Thermokon room operating unit SR06 LCD enables a comfortable control of the room climate. Besides current values the display allows the precise input of desired set points.

The solar-cell powered room operating panel is energy self-powered and maintenance-free. In addition, the SR06 LCD is wireless – no wiring needed. Thereby, a free room positioning is no problem.

- Modern, high-graded optics
- Compatible with products from EasySens®-Series
- Best possible flexibility thanks to different types
- Bidirectionality by means of SmartAcknowledge SmartACK
- Easy configuration via PC
- Battery-less operation due to Energy Harvesting Technology
- Compatible to all common switch programmes – three colors at option

» www.thermokon.de

Dear Reader,

Realizing the Internet of Things (IoT) is about convergence, about joining forces of leading market players to enable a seamlessly connected world. The collaboration of the ZigBee Alliance and the EnOcean Alliance is such an industry-changing convergence.

The ZigBee Alliance has established an excellent ecosystem around worldwide wireless 2.4 GHz solutions. At the same time, with the rise of the IoT and associated predictions for billions of sensors, self-powered solutions see a worldwide growing demand. In this field, EnOcean has been the leading technology for over 15 years.

The partnership of the ZigBee Alliance and the EnOcean Alliance brings together the advantages of both, combining the benefits of EnOcean energy harvesting wireless solutions with ZigBee 3.0.

This is a great step towards further growth, which opens up new markets and additional regions, enabling energy harvesting wireless applications for worldwide use. It is important to note that this is an addition and not a shift. The current sub 1 GHz EnOcean ecosystem continues to grow and we continue to develop new products and applications. At EnOcean, we are actively assessing other low power radio ecosystems that could benefit from energy harvesting technology.

CES 2016 was a great event for EnOcean and the EnOcean Alliance, not least because of the well received announcement on the cooperation with the ZigBee Alliance. If there was a lowlight, it was that this was the last CES in which Jim O'Callaghan joined us as President of EnOcean Inc. as he retired in January. I want to thank Jim for his contribution to our efforts and for building our North American team to what it is today. We are actively growing that team to support the ambitious plans we have for that region. Thank you, sir!

Yours,

Dr. Wald Siskens
CEO of EnOcean

SAUTER

Maximum energy efficiency for Switzerland's tallest office building

Schwabenhaus

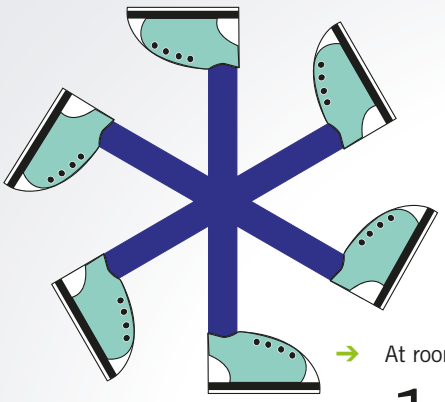
Smart dream home on the water

ZigBee Alliance/ EnOcean Alliance

Unlimited communication in the Internet of Things

Numbers of the EnOcean world

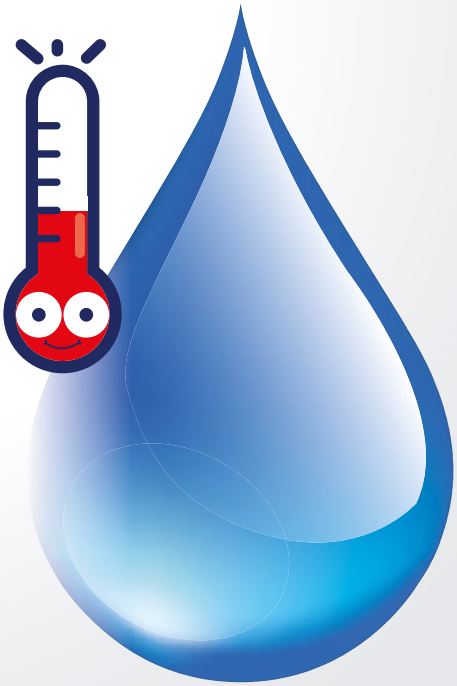
The ocean of unused energy – this is the source of EnOcean energy harvesting wireless technology. How much power is in an EnOcean-based switch or sensor? Our number page gives brief insight into the micro cosmos of energy harvesting.



→ The ECO 200 electro-mechanical energy harvester uses kinetic motion as the energy source. It offers an energy output of 120 µWs to transmit 3 radio telegrams per actuation.

→ At room temperature, the ECO 200 enables a completion of more than 1,000,000 switching cycles.

→ Miniaturized solar modules use indoor light to power sensors. If a measured value is transmitted every 15 minutes for example, 3.6 hours of charging in daytime and 200 Lux are adequate for uninterrupted operation, even at night.



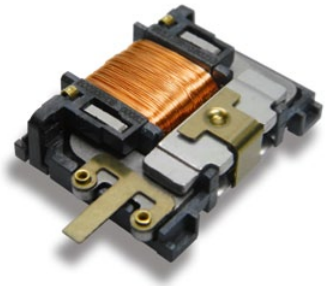
→ Temperature differences offer the ability to harvest a great deal of energy. The warming of a drop of water by 1 degree Celsius (°C) requires the same amount of energy needed to send about 10,000 EnOcean wireless telegrams.

→ The ECT 310 DC/DC converter starts to operate at a minimum of 10 mV as the input voltage. At 20 mV or more, about 2 °C, a useful output voltage of more than 3 V is generated.

→ At a temperature difference of only 7 °C, approximately 100 µW of energy is already produced.

→ Visit the self-powered EnOcean world on the Web: **www.enocean.com** | **www.enocean-alliance.org**

Kinetic power conquers the world



EnOcean introduces a complete batteryless wireless switch module portfolio in the 2.4 GHz frequency band for globally usable applications. This adds to the company's products in 868 MHz, 902 MHz and 928 MHz for new markets and regions. By Matthias Kassner, Product Marketing Director, EnOcean GmbH

With the 2.4 GHz offering, OEMs can now realize batteryless switch applications for worldwide use. This development emphasizes EnOcean's know-how in kinetic energy harvesting based on the field-proven electromechanical energy converter ECO 200.

The 2.4 GHz portfolio enables integration of EnOcean's technology into ZigBee 3.0 systems. It opens the self-powered technology to new markets, particularly for applications that request a global use for energy harvesting wireless communication.

The EnOcean 2.4 GHz product family

- PTM 215ZE – a 2.4 GHz radio pushbutton transmitter module. It is mechanically compatible with the industry standard PTM 21x module form factor (sub-1 GHz) to ensure easy integration into a wide range of switch designs, allowing efficient migration paths.
- PTM 535Z – this 2.4 GHz radio transmitter module combined with the ECO 200 energy converter, has a smaller form factor than the PTM 215ZE and is suitable for custom switch designs in industrial, consumer and Internet of Things (IoT) applications. 3D data, provided together with the technical data sheet, facilitates the prototyping of various housings.
- TCM 515Z – the 2.4 GHz radio transceiver with ESP3 interface enables quick integration of EnOcean 2.4 GHz solutions into actuators, gateways and controllers.

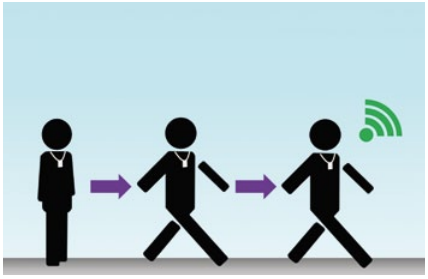
The self-powered Internet of Things

The EnOcean energy harvesting platform enables self-powered Internet of Things devices to communicate on various radio standards – without installing complicated cabling or fitting batteries – for use in building automation, smart home, LED lighting control as well as for industrial applications.

www.enocean.com

Energy step by step

Star Micronics EB10-E harvester beacon detects human motion and broadcasts its signal via EnOcean radio – all without batteries. Like all other Star Micronics harvesters, EB10-E uses electromagnetic induction and generates power from vibrating motion. By Katsuya Ishino, Research & Development Center, Star Micronics Co. Ltd.



Star Micronics has developed a variety of energy harvesters, which use ambient vibration as the energy source. The latest addition to the Star Micronics product family is EB10-E, an EnOcean-compliant transmitter, which generates power of vibration for pedestrian applications.

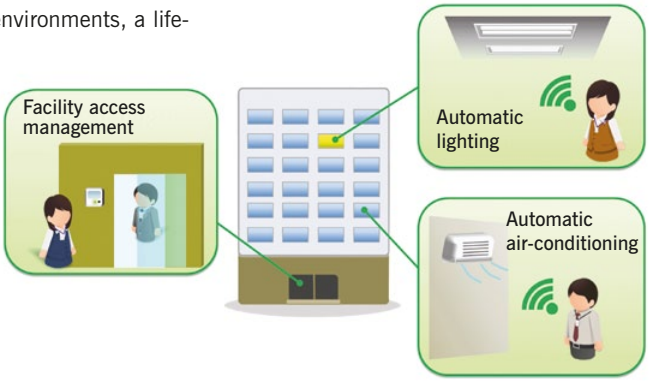
EB10-E is equipped with a Star Micronics vibration harvester and thus eliminates the use of batteries. The device harvests its power from human walking motion, which activates the radio transmitter circuit for wireless communication based on the EnOcean standard. It does not require a power supply of any kind, enabling maintenance-free operation in many applications. The product can be embedded in any EnOcean-based system architecture.

For safety and security purposes

Obvious applications include people location tracking in indoor environments, a life-saving locator for children in trouble and disoriented seniors who may wander around. EB10-E can also be integrated into a wide variety of beacon-based systems, which keep people within a pre-defined safe area, or keep people within a predefined safe area or out of a danger zone.

The EB10-E can also be integrated into building automation applications such as automatic lighting and air-conditioning control.

www.star-m.jp/eng



USB wireless foot switch

Narcohm, a dental equipment manufacturer with over 60 years of experience, has developed a kinetic-powered wireless USB foot switch based on EnOcean technology. This foot switch is being used in dental clinics as a medical input device.

By Narcohm Co., Ltd.

The foot switch enables dentists and other doctors to control machines by foot while keeping both hands free for the patient treatment. The Narcohm foot switch works wirelessly and without batteries as it is powered by the kinetic energy harvester from EnOcean at the press of the rocker.

Reliable operation

With these characteristics, the switch can be flexibly placed wherever needed in the clinic and can easily be moved to another treatment room without pulling wires. In addition, there is no battery change needed and the device never runs out of power.

Easy installation

The Narcohm wireless USB foot switch uses EnOcean radio to transmit data up to a distance of ten meters. The switch is directly connected to the PC using a USB HID keyboard device without a special driver, which makes the installation very easy via a key code. One receiver can connect several foot switches.

Furthermore, due to EnOcean's wireless technology, the switch works maintenance-free. This saves money and time and ensures maximum reliability, preventing any system fails during patient care or an emergency.

www.rohm.com
www.narcohm.co.jp

Large image: The battery-less foot switch enables the doctor to use both hands for the patient treatment.

Right: The switch is connected to the PC via an USB receiver.

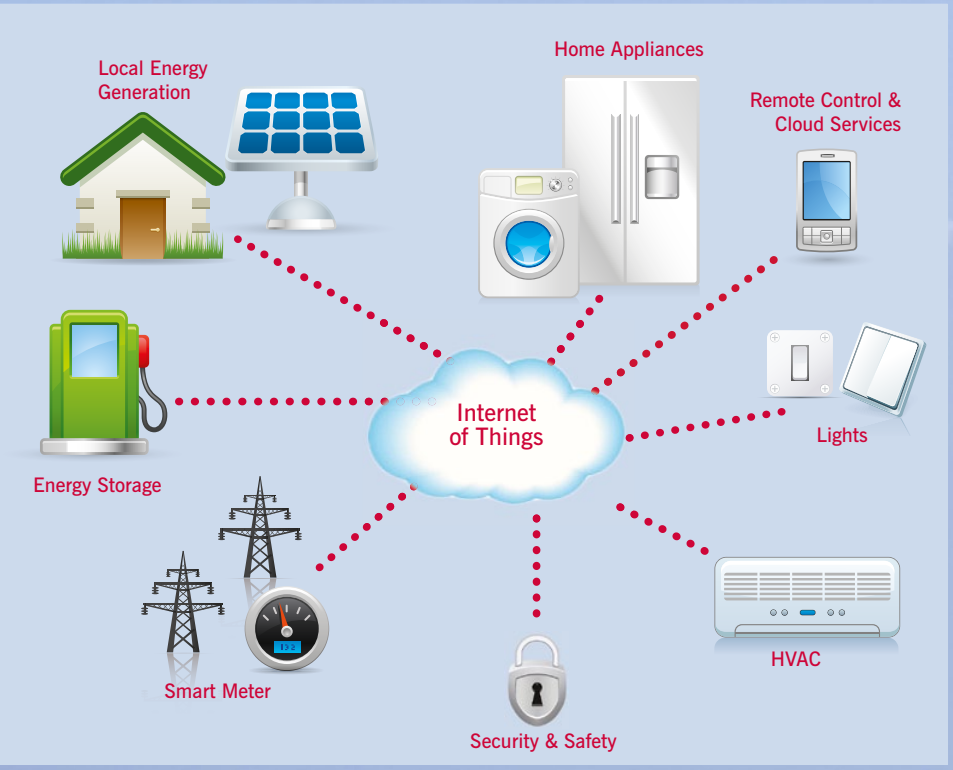
Smart networking in the cloud

The smart home is currently in a period of transition, with less emphasis on technology and more on customer benefits. While the initial focus was on the technical capabilities of controlling lights, heating and blinds from a smart phone, the products are now moving toward the easiest possible installation and intuitive operation. Self-learning heating systems that automatically adapt to the behavior of their users are increasingly found in the highly diverse smart home product range, as are central functions via wall switches and security actions.

Energy harvesting devices that communicate wirelessly are also playing a particularly important role. After all, every home will have approximately 45 networked devices in the future. Users will find it unacceptable to constantly change batteries or deal with outages due to low batteries.

Main Topic

Smartly connected



Embracing interoperability

At the same time, suppliers are setting aside their isolated way of thinking and opening up interfaces to other systems, so that even today users can integrate different brands into their smart homes with only one box. This trend also makes it easier to add new functions to the system later on.

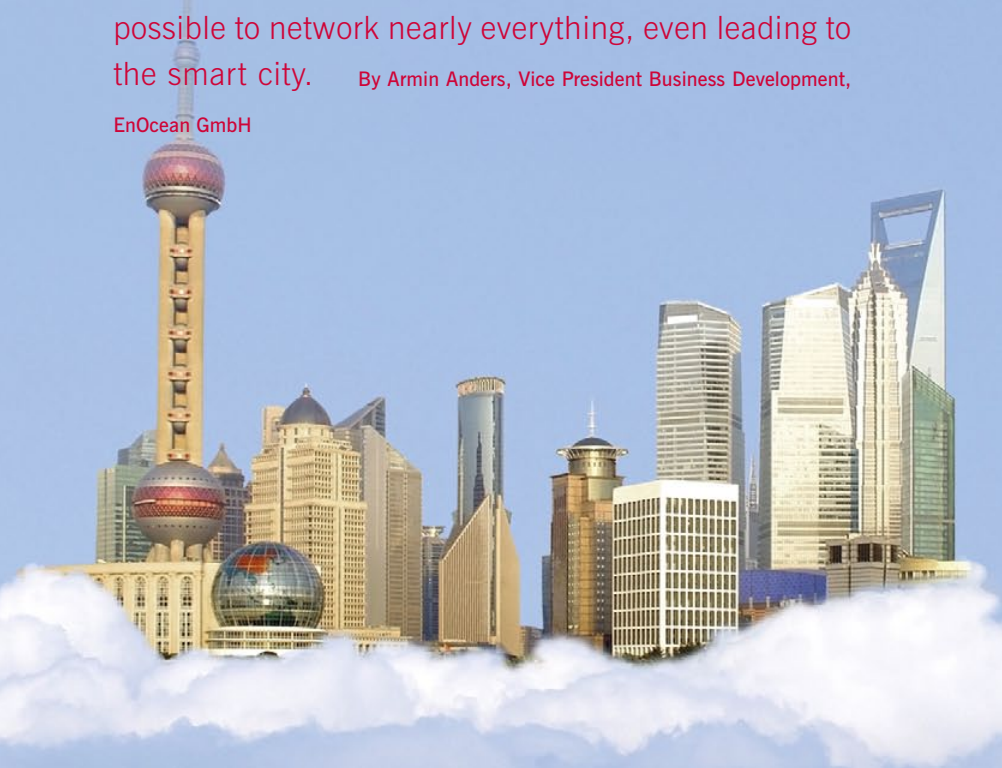
Such developments are essential to the success of the intelligently networked home, since they establish the urgently needed user acceptance. At the same time, the consumer world is increasingly networking with the professional building automation segment. Although the solutions are sold through different channels, and the products and services vary enormously in terms of their functionality and complexity, interconnectivity between the two areas builds a bridge between the easy-to-use starter packages for self-installation and the comprehensive functions of a professional installation done by constructor. The latest gadget, inviting us to try it out, is no longer what matters. Instead, simple basic systems are intended to be extended to comprehensively networked disciplines at any time, delivering the best possible individual benefits.

Via Internet to the cloud

This next step involves the Internet. The isolated solutions for controlling lights, heating, blinds and security functions are being enabled for the Internet. At first it affects only individual areas of the home, so that users can run some functions from apps on their

We've long become accustomed to them in our cars – small electronic assistants that make driving safer and more comfortable. More and more of these helpful systems are finding their way into our home environments, where they're known as the smart home. However, they are not yet as much a matter of course here as they are in vehicles. This circumstance is changing with the move away from technology-oriented to user-oriented control. The cloud makes it possible to network nearly everything, even leading to the smart city.

By Armin Anders, Vice President Business Development, EnOcean GmbH



smart phones. However, when disciplines are networked and energy management and multimedia are added, services and solutions must be developed that connect everything on the cloud.

It is what turns the home into an intelligent assistant. For example, the vacuum cleaner robot automatically returns to its station when a motion detector indicates that the resident has arrived home. The same information activates a "getting home" light scene. The cloud provides the necessary computing power and standardized command sets, so that the resident doesn't have to operate a separate server in his home. At the same time, the number of different applications is reduced. Cool apps, connected to the cloud, will soon be able to run all disciplines.

Secure freedom of choice

Data security is and will remain an important concern. The users must always be able to decide which data they want to keep locally within their own four walls and for which services they choose an encrypted connection to the cloud.

On the way to the smart city

Advances in Internet-based networking will not stop with the smart home. A similar development for the surrounding infrastructure is still in an early stage. Functions for the intelligent control of street lights, parking places and garbage collection, etc. will be added to the smart home cloud. The result is a smart infrastructure that will network the smart home with its smart environment – forming the smart city.

Everyday assistants

The networked world will make many new applications possible. These include, for example, parking place sensors that are activated by pressure when cars drive over them. Commuters can then immediately tell where spaces are still available near the office or whether it would be better to use public transportation. This will simultaneously improve traffic flow by eliminating slowly moving cars searching for the next available space. Another scenario involves solar-based sensors that measure temperature and humidity near streets and can thus selectively warn drivers about wet areas and icy roads. Placed in parks and gardens, they activate automatic or manual irrigation systems as needed.

Infrastructure and buildings can also be networked for garbage disposal services. A single sensor notifies the homeowner whether there is still space available in the dumpster, and lets the service provider know when it's time to pick up the garbage. Users don't have to fret that they forgot to put out the garbage, and the sanitation company can plan resources more effectively. When it comes to supplying power and saving energy, users can adapt their peak demand to the currently applicable electricity prices.

The smart home as a matter of course

The list of possible applications on a cloud that networks homes and infrastructure is almost endless. Many such applications are still a long way off. The smart home is currently taking important steps in this direction. A few years from now, it's intended to become a self-evident and smart assistant, just like our cars are today.

www.enocean.com

EnOcean to IP – we're off to the Internet of Things

The Internet of Things (IoT) is gradually taking shape. The technologies are moving toward a comprehensive network that will make our everyday lives easier, safer and more comfortable. Energy harvesting switches, sensors and actuators that supply necessary information for the IoT from billions of measuring points form an important element of this development. To do this, the EnOcean wireless technology must communicate with the Internet Protocol. By Oliver Fischer, Managing Director, Digital Concepts GmbH

All it takes is a flip of the energy harvesting wireless switch and the smart refrigerator starts the freezer turbo. Minutes later, the apple juice is cold. At the press of a button – even from the sofa. This is only one example of a new application made possible by seamless communication between different standards. In other scenarios, IP-enabled cameras are networked with energy harvesting sensors, the water sensor talks to the washing machine or the inlet valve and the house organizes its own optimum energy consumption according to the residents' requirements.

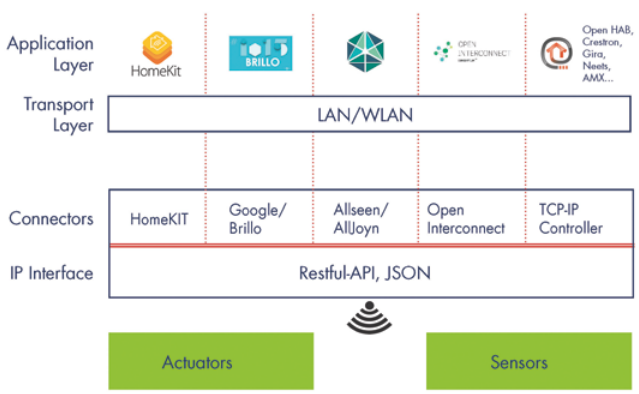
Left: A unified IP Interface creates the link to different IoT platforms.
Right: A gateway connects energy harvesting wireless sensors and actuators to the Internet.

Interoperable network

These scenarios are all possible if the EnOcean protocol (ISO/IEC 14543-3-1X) seamlessly talks to the IP protocol via a gateway. This communication, in turn, forms the basis for integrating the data of energy harvesting wireless sensors into cross-standard, open platforms. The result is a fully interoperable network in which, once collected, the data can be used to intelligently control different devices independently of the technology used, the wireless system or the manufacturer.

Translating EEP into IP

In terms of its technical implementation, a system of this type requires an IP interface that consistently translates the represented EnOcean equipment profiles (EEPs) for the IP side. To do this, the content specified in the EnOcean profiles must be prepared in such a way that the user on the IP side needs little or even no knowledge of the EnOcean protocol in order to operate the particular devices. This is how the "things" on the Internet of Things can be represented. The



1

Representational State Transfer method (REST or RESTful) has proven to be particularly useful here.

However, not all systems can address a RESTful API and therefore require an alternative notation. For this purpose, a second API is provided, which dispenses with hierarchical structures. A line-based API, whose communication is based purely on the TCP layer, maps the full range of "RESTful API" functions. This so-called "string API" allows programmable logic controllers, for example, to be integrated.

Consistent communication

The IP representation of all EnOcean telegrams and functions must be standard. This means that the syntax of an IP specification must always be mapped the same way across all EEPs. In addition, the EnOcean gateway must be able to provide the states of all devices and also deliver them on request. In particular, it must represent and store the different states of the EnOcean profiles individually.

The gateway also ensures that the translations of IP calls in EnOcean telegrams are always complete and unique. As a result, IP-based devices can directly address individual values and functions of a sensor.

Talking API

To ensure smooth communication between the EEP and IP, dependencies must also be resolved and related profile functions aggregated and supplied centrally. The gateway also resolves the coding of functions in such a way that IP-based devices do not have to know this coding.

All these specifications mean that the gateway can deliver the communication structure of all EnOcean-based devices (EEPs) to the IP subscribers on request. It thus meets the need to represent the EnOcean-based devices in a "friendly" manner so that they can be more easily implemented in the IoT network.

www.digital-concepts.eu
www.enocean-gateway.eu

LED design for assisted living

Hands on: The shop shows the several possibilities of energy harvesting wireless control for the smart home.

Design On is a concept store focused on Ambient Assisted Living and technical help systems for elderly people based on EnOcean technology. Recently, the first shop was opened in the center of Belfort; other cities in France will follow. The core product is an easy-to-install LED lighting system, combined with an EnOcean receiver. It can be used as an assisting light, automatically switched on to illuminate rooms and corridors at night or in case of need. **By Emmanuel François, Sales Manager West Europe, EnOcean GmbH**

The LED solution is available in two form factors, 30 cm and 100 cm. It is equipped with a magnet for an easy installation. Thus, the user just needs to stick two small piece of metal on the wall included in the kit to fix the LED light. Beside the light and the receiver, the kit also includes a batteryless switch as a basic control. However, due to the EnOcean wireless standard, the system can also be upgraded with a self-powered motion sensor, a remote control, a smoke detector or an alert button of different vendors without the need of a box.

Light in emergency cases

For safety purposes, the LED light can be equipped with an additional uninterruptible power supply (UPS). This is particularly useful in case of fire when the main is often automatically disconnected. Due to the UPS, the LED light will still illuminate the way to the emergency exit.

Light for comfort and safety

The kit can also be used as a valuable technical help system for assisted living or elderly people. When people get up of their bed at night, the LED light will automatically switch on as soon as an EnOcean-based sensor detects the motion. The solution can be flexibly placed in each room where needed, in the bedroom, the corridor, the restroom or bathroom. It's also useful for young children who feel more comfortable with a discreet light when they wake up at night.

In a next step, Design On plans to combine the LED light with other innovative products of EnOcean Alliance members, such as the intelligent mattress of IQfy or gas sensors (CO, CO_2, $CH4$) for an additional light color alert.

www.design-on.fr

The ZigBee Alliance and the EnOcean Alliance jointly develop an open, global specification for energy harvesting wireless communication technology to meet the growing demand for interoperable, self-powered IoT sensor solutions. For this purpose, the two organizations combine the benefits of EnOcean energy harvesting wireless solutions with ZigBee 3.0 for worldwide applications.

By Graham Martin, Chairman, EnOcean Alliance

Unlimited communication in the Internet of Things (IoT)

The cooperation connects the two alliances' advantages, synergies and track record of standards advancements to create an open, global specification that will extend energy harvesting wireless communication to a broader range of self-powered IoT sensor solutions. These solutions use the surrounding environment as their energy source, making batteryless connected devices a reality.

New possibilities for smart connectivity

The technical cooperation agreement will build on the EnOcean Alliance's already strong position with more than 1,500 interoperable products available for home and commercial building automation, and expand it, bringing energy harvesting wireless communication to many more applications in the IoT and consumer arenas. It will also take advantage of the newly ratified ZigBee 3.0 standard, which enables batteryless devices to securely join networks across a variety of energy harvesting applications. As a result, the industry will have new opportunities for creating intelligently connected buildings and developing other solutions across a variety of applications.

The collaboration is also designed to provide a foundation to seamlessly bring data to the IoT frameworks of other industry initiatives, in order to facilitate interoperable communication from the sensor to the cloud.

Technical Task Force for details

A Technical Task Force will be built of ZigBee Alliance and EnOcean Alliance representatives to define the technical specifications required to combine standardized EnOcean Equipment Profiles (EEPs) with the ZigBee 3.0 solution, which operates in the worldwide IEEE 802.15.4 2.4 GHz standard. The alliances plan to complete definition of this technical specification and share details of associated collaborative marketing and business activities in the second quarter of 2016.

www.zigbee.org
www.enocean-alliance.org

Climate under control

The world's largest research centre for advanced plant genetics, the Beaver Creek Campus by Pioneer Hi-Bred International, located in Johnston/Iowa, provides continuous supervision and control of constant climate conditions for refrigeration racks containing cricitcal material, using the wireless EasySens® solution by Thermokon.

By Thorsten Kresin, Manager Marketing, Thermokon Sensortechnik GmbH

The refrigeration racks contain highly sensitive material for food research.

Wireless sensors control the temperature and alert discrepancies immediately. Thus, the staff can react promptly.

More than 1,000 scientists employed by Pioneer Hi-Bred International, a DuPont group company, work on increasing productivity and profitability of agricultural farms around the globe. Food safety, nutrition, agriculture and energy saving is the primary focus for the scientists.

Individual temperature monitoring

In order to develop innovative and high-yielding corn, scientists require controlled working conditions, especially when it comes to temperature and humidity control in testing facilities and refrigeration racks, where sensitive materials are stored. The freezers hold critical experimental material that requires to be monitored constantly.

In case of unexpected temperature deviations or communication loss, a quick intervention is essential to prevent scientific material from damage or fatal loss. If temperature increases rapidly, an alarm signal is triggered to generate preventive action by the employee. A direct and quick identification of a deviating temperature measurement in one of the testing facilities is ensured by using a unique BACnet ID to track the sensor.

Wireless, reliable and compatible

For supervision and monitoring of climate conditions, Pioneer decided to use products of the EasySens® range by Thermokon. Through wireless integration of EasySens® transmitters into centralized receivers connected to the BMS, transmitters can be mounted directly "on the spot" that allows for a flexible positioning of freezers in open laboratory space. Also future relocations of laboratories do not challenge the BMS setup. Project Manager Bret Petersen says: "Besides the high flexibility that EasySens® offered already, three more criteria were important for us: wireless reliability, integration into our existing Niagara AX infrastructure and supervision of critical material in the laboratories."

In order to fulfill these requirements, the laboratory space has been divided into four wireless zones to ensure a reliable communication. For an individual analysis of temperature and humidity of the freezers, following products of the EasySens® product family were used:

- SR65-BACnet-315MHz
  Wireless EnOcean to BACnet gateway for a reliable forwarding of EnOcean telegrams/alarms in outdoor areas and challenging environments such as refrigeration, greenhouses, production facilities and warehouses. Compatible for integration into existing EnOcean and BUS networks. Unique IDs to identify malfunctions in the freezers immediately.
- SR-65-DI-315MHz
  Wireless sensor for transmitting binary inputs via EnOcean wireless telegrams to assigned control devices for triggering alarms or switching relays to initiate an action.
- SRE-Repeater-Ext-315MHz
  Repeater for wireless EnOcean telegrams ensuring a proper communication between senders and receivers where needed.

End-to-end monitoring 24/7

The integration of the wireless EnOcean infrastructure was completed within a week. The result: thanks to reliable and flexible wireless EnOcean sensors by Thermokon, Pioneer Hi-Bred International is now able to receive detailed information on each freezer and a quick and easy localization of faulty ones containing critical material. The possibility of future retrofits using additional EnOcean wireless sensors is supported by having the sophisticated Niagara AX software architecture in place.

Cost-savings

Project Manager Bret Petersen is fully satisfied with his decision: "I can recommend the EasySens® system without any limitations. Especially the quick and easy integration of the system needs to be emphasized here. It provides high flexibility and associated cost savings, even in the future. Integrating into the existing Niagara AX infrastructure did not pose a challenge for us at all. Meanwhile, we decided to retrofit and adopt the EasySens® system to another 100 freezers due to its simplicity. Thanks to the adoption and appreciation of the system from our technical guys, we are certain to include additional sensors from the EasySens® product family in future."

www.thermokon.com

Well coordinated teamwork on a smart farmstead

Modern smart home technology revitalizes a former urban farmstead in Mannheim by turning it into an intelligent single-family home. Developed by digitalSTROM, this technology transformed the historic building into a comfortable, energy-efficient living space without requiring any renovations. The best part of all: Thanks to open interfaces, EnOcean technology was integrated into the digitalSTROM house.

By Heiko Wittke, editor, gii

A glimpse through the front gate gives passersby an idea of the special building that lies beyond. The farmstead evokes the charm of a bygone era right in the middle of Mannheim's rectilinear cityscape. Like the house walls, the gate has a great many years under its belt and doesn't always close properly in some kinds of weather. And yet the family dog can no longer slip out unnoticed.

A small solar-operated door contact wirelessly signals if the gate is not properly latched. A notification to this effect pops up on the homeowner's smart phone. However, the contact sensor is only a small part of the

intelligent network that lies behind the farmstead's old walls.

Intelligence without renovations

digitalSTROM provides the historic building with a smart infrastructure, which was installed without any intervention into the physical structure of the house. The smart digitalSTROM terminals easily network a wide range of devices and electrical loads via the existing power line, so the solution is able to be retrofitted without any additional cables. "It would have been too costly for us to do a complete renovation with new wiring. Not to mention all the noise and dirt this would have caused. The farmhouse was completely modernized ten years ago, so the electrical installation was in good working order," says homeowner Thomas Rudolph.

digitalSTROM now lets the residents control functions such as lighting atmosphere, shading and room temperature according to their needs. They can customize lots of individual scenarios to their specific preferences. Thereby, it makes their living space more comfortable, more secure and more energy-efficient. The seamless integration of wireless sensors and actuators turned out to be another benefit of the open system. "We can use the EnOcean-based wireless sensors in places where there isn't any electrical wiring," Rudolph adds.

The right properties

The IP-supported communication between all integrated components converges on the digitalSTROM server in the distribution cabinet. An additional gateway in the office translates the EnOcean wireless signals into IP. The products receive digitalSTROM properties the first time they connect to the network. For example, the wireless smoke detector is linked to the "fire" function in the system. When the detector sounds the alarm, the digitalSTROM smart home system automatically activates the appropriate scene, to which the devices can respond independently, due to the decentralized approach and standard behavior: the lights go on, the blinds are raised and the user receives a push notification. The scenes are programmed in a browser that runs on the network or an app. Customers can program these scenes themselves and do not require a specialist.

Enormous energy savings

digitalSTROM and EnOcean wireless sensors also work together as a well coordinated team when it comes to controlling the heating system. For this purpose, valve actuators from Thermokon, mounted on the radiators, and energy harvesting wireless temperature sensors for individual room control are integrated into the smart home system. The temperature can thus be controlled in the individual rooms according to the current demand. For example, if the guestroom is unoccupied, the ambient temperature there and in the guest bathroom is kept at a constant 15 °C. In addition, digitalSTROM provides a central "Everything Off" switch. When a family member is the last person to leave the house, all it takes is a keypress to automatically switch the heating system to economy mode.

"Since we can't cover the historic facade with new insulation, the heating control system is the number one way for us to save energy. And the effects are clear to see. Solely through the smart temperature controller we've cut energy costs by 400 euros per year", explains Thomas Rudolph.

Open to new things

The digitalSTROM network offers another benefit. Once entered, the data can be used for different applications. The motion sensors are used both to automatically turn on night lighting and trigger an alarm as well as defined light scenes when the system is in security mode.

Thanks to the open interfaces of the digitalSTROM system, the future of the smart farmstead is secure. In the years to come, Thomas Rudolph wants the EnOcean-based wireless window handles to signal when windows or the patio door are open, so that the heat can be automatically turned down in the appropriate rooms during the winter. When the window is closed again, the temperature rises back to a comfortable level.

Embracing interoperability

The homeowner sums up: "I have a lot more ideas for additional functions. Thanks to digitalSTROM's open interfaces, I'm able to add and integrate products and devices from various providers at any time. So I'm not tied to a self-contained system. This is important to me, and I'd be happy to offer this piece of advice to other homeowners. When choosing a system, you should definitely make sure that it can be added to later on without trouble. If the system provides sufficient support, owners can upgrade it later on by themselves without any specialized knowledge. Plug & play is key here. After all, our needs change over the course of our lives. The smart home should be able to keep pace with these changes."

www.digitalstrom.com
www.enocean.com

60 percent less energy in Club Med

The hotel chain Club Med wanted to achieve energy savings in an economical way. In 2014, it tested an EnOcean-based automation system in some rooms, which controls heating and cooling in accordance with guest occupancy. The savings achieved after one year were significant. Therefore, the system will now be rolled out to complete hotels of the chain.

By Piergabriele Cabrini, General Manager, ALTECON SRL

Club Med hotels are very popular around the world and have a high rate of guest bookings. Starting in 2012, the hotel chain was looking for energy saving measures, which have a return on investment (ROI) of less than three years, don't require high maintenance effort and don't disturb the guests' comfort. Due to these specific requirements, the hotel decided on a test automation system based on energy harvesting wireless technology. ALTECON together with Vitec installed the solution in some rooms in Club Med Opio, France, and Club Med Kamarina in Italy.

In Opio, the EnOcean-based wireless room control solution is composed of a window and a door sensor, a motion sensor, a double relay, a fan coil controller, a wired thermostat and an EnOcean/WiFi gateway for central control. The components in Kamarina are similar but include a split controller instead of the fan coil controller and a remote control but no thermostat.

Control for all cases

Whenever the guest is in the room, he can always control the climate unit through an app on a smart phone to achieve a comfortable temperature. In all other cases, the heating and cooling is controlled automatically. The automation system controls the air-conditioning, and reduces it, for example, when the window contact detects an open window or the motion sensor detects the guest's absence. Via the WiFi connection, the hotel staff has central access to the system via smart phone and can start the air conditioning in the room on time for the guest's arrival. If a room is not occupied, the air conditioning can be switched off centrally as well.

Seasonal set-points

The automated control also considers seasonal differences. In winter, when the guest leaves the room, the temperature setpoint changes in three steps after a programmed time. When the guest is back, the temperature setpoint returns to the original value. In summer, the temperature setpoint change has the same logic but at an increased setpoint value.

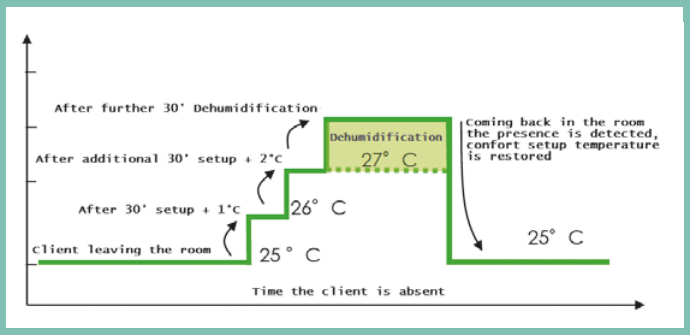
60 percent savings at a two year ROI

The first tests showed a ROI of about two years with an installation effort of 1.5 to 2.5 hours per room. Thanks to the wireless technology, no reconstruction was required, meaning that the guests were not disturbed by noise or dirt during the installation. In addition, the hotel staff doesn't need to maintain the components as all sensors and the remote control are energy harvesting and work without batteries.

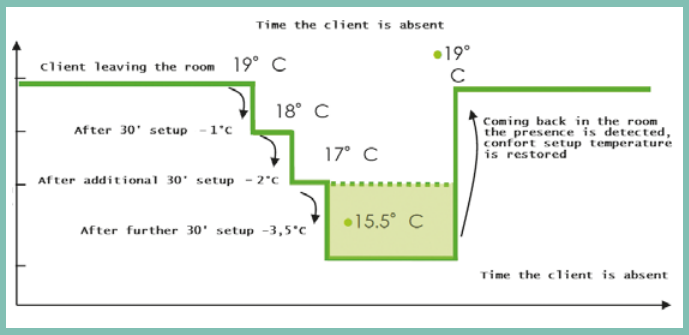
Based on the positive test results, Club Med decided to expand the system and to have it installed in 50 rooms in Opio,

100 rooms in Kamarina and 39 rooms in Club Med Gregolimano, Greece. After one year, the ROI was confirmed at a little bit more than two years. The energy savings of 60% were so impressive that now all 800 rooms in Kamarina will be equipped with the EnOcean-based solution; other Club Med hotels will follow.

www.altecon.it
www.vitec-france.com



Seasonal temperature set-points in summer



Seasonal temperature set-points in winter

The comforts of home are not random occurrences

As the central control unit for customizing the air conditioning, atmosphere and water temperature systems, Vitocomfort 200 synchronizes the needs of its users. Floor and room thermostats, blind and dimmer switches, temperature sensors and more can often be used individually or combined in many different ways. The system thus forms a communicating network of temperature-regulating elements, one that addresses the questions and requirements of its users and does not hide behind one-dimensional functionality.

By Thilo Bienia, staff member Product Management, Viessmann Hausautomation GmbH

Vitocomfort 200 is based on the principle of sustainable thinking and action embraced by the Viessmann Group. Developed by Viessmann Hausautomation GmbH in Wangen, Germany, the central control unit interprets the path toward a sustainable future by raising user awareness of their own needs – for the home that they deserve.

Independent of time and place

The solution makes it easy to individually control and regulate the room climate; thanks to the Vitocomfort app, this can even be done from outside the home at any time. Users can also change the house lighting and shading anytime and anywhere – for their own sense of well-being.

Along with the ambiance that Vitocomfort 200 can customize in the home, security also plays an important role. The radio-based control system keeps the home secure, even when the user is away. Users can also check movements in their own rooms.

Pleasantly unobtrusive

The design is functional and restrained. It does not have an obtrusive visual impact, one designed to obscure the system's supposed hidden weaknesses. To avoid malfunctions, the system checks its own condition round the clock, signals vulnerabilities to prevent down times and offers the user tips on ways to improve energy efficiency.

Above: Vitocomfort 200 is a comprehensive smart home system based on the EnOcean wireless standard, covering heating, ventilation, air conditioning and photovoltaic.
Below: All functionalities can be controlled by smart phone or tablet.

Learning from the surroundings

As an organic part of the building, Vitocomfort 200 learns from its surroundings, i.e. based on the characteristic condition of the building and the relative, individual control and regulation habits of the user.

www.viessmann.de

Pure innovation

The trend toward networked building systems also affects the heating system, made possible by intelligent communication between the SmartDrive MX wireless radiator thermostats from HORA, the wibutler pro smart home solution and the Tzerra gas condensing boiler from Remeha. In the future, users will individually control the most comfortable temperature according to room, time and situation from anywhere, using a tablet or smart phone.

By Ulrike Krüger, Key Account Manager, HORA Holter Regelarmaturen GmbH & Co. KG

This form of heating system control differs fundamentally from classic weather-based regulation, which is common practice in Germany today. Up to now, a heat characteristic setting has been used to preset an inlet temperature at the heat exchanger. It is hard to say whether this is the right temperature, unless the customer is freezing. In this case, the characteristic is incremented and the customer warms up, but the boiler temperature is now too high. Commercial thermostat valves naturally regulate this temperature, but the system does not work efficiently.

SmartDrive MX – the smart way to heat rooms

The new SmartDrive MX wireless radiator thermostat is different, for it has not only a room temperature sensor but also an integrated inlet temperature sensor. It transmits these values to wibutler pro, which acts as the server. wibutler pro detects the desired comfortable temperature as well as the related room topology, analyzes the data and calculates the current heat demand in the individual rooms. It forwards the optimum inlet temperature to the Tzerra gas condensing boiler, and SmartDrive MX regulates the required valve setting via the hub. As a result, it delivers just the right amount of energy, not a single degree too much or too little.

Energy efficiency without sacrificing comfort

The intelligent interaction between the HORA SmartDrive MX radiator thermostats, the wibutler pro server from iEXERGY and the Tzerra gas condensing boiler from Remeha helps cut heating costs by as much as 15%, while also increasing comfort.

www.hora.de/en
www.wibutler.com
www.remeha.de

Energy management of the future: Tzerra gas condensing boiler from remeha, wibutler pro from iEXERGY and SmartDrive MX from HORA.

Smart home software

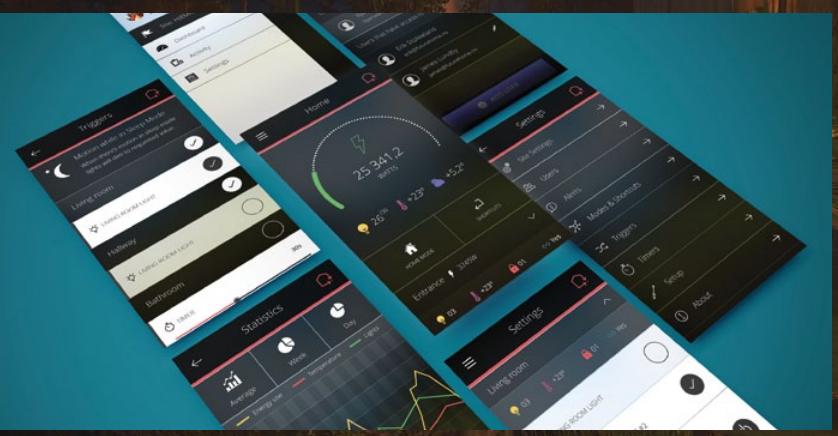
Futurehome is a Norwegian company developing smart home solutions, focusing on making the best and user-friendly application for controlling a wide range of electronic devices based on the EnOcean standard.

By Sigbjørn Groven, Chief Financial Officer and Co-Founder, Futurehome AS

"Futurehome's approach to the smart home is from the electrician's standpoint, it has to be based on solid hardware, have an easy setup and use, and still be a professional solution," says CEO Erik Stokkeland. When the company first started in 2013, it was looking for the best and most solid smart home standard, and the EnOcean standard was the obvious choice. In late 2014, the company successfully crowdfunded $ 200,000 to get a kick start launch in the market. Since then the company has been working hard on adding more devices to control via the Futurehome app.

The App

The app focuses on ease of use and is design driven. The user can easily create customized modes, add timers and add different if-this-then-that triggers. The dashboard gives a clean overview of the state of the house, including real-time power consumption.



The app is also user-oriented in terms of an easy setup and installation of the devices. This is done by having preconfigured solutions in the app, and a simple three step guide for adding devices. This makes it easier for end users and electricians to set up devices supported by the Futurehome system. It reduces the installation time electricians spend, which again lowers the price for a professional smart home installation for the end user, being a breakthrough in the market.

The Smart Hub

Futurehome focuses on integrating all the best devices existing on the market from different vendors, but is making the Smart Hub gateway itself. The Smart Hub communicates both on EnOcean, Z-wave, and WIFI and will support devices on multiple protocols.

Going forward, Futurehome will work on adding support for a wider range of products and improve their all-in-one solution to homeowners as well as the professional installers. Therefore, the company is always on a constant lookout for more interesting devices.

The future home

Futurehome constantly works on being at the frontier of development and staying "future-proof" with innovative solutions. The company recently won a government-backed project, due to the fact that it can provide and display real-time power consumption, which can improve homeowner awareness of energy savings.

For the time to come, Futurehome is looking for international partners, as there is a high demand for user-friendly designed software on the EnOcean standard. Interested parties should check out the company's website.

www.futurehome.no

BACnet, EnOcean and DALI communication for higher implementation flexibility and easier operation

The German appliance manufacturer Miele is building a new office complex in four construction stages at the company headquarters in Gütersloh. The importance of choosing the right building automation solution for fast and flexible implementation of the project as well as optimized operation is shown in the first completed building. This new facility was automated using PC control from Beckhoff and supported by BACnet, EnOcean and DALI communication.

By Bernd Hölscher, Product Manager Building Automation, Beckhoff Automation GmbH

The first of the four new administration buildings has a total of four office floors, each with an area of 1,000 m². Concrete core activation for the basic heating/ cooling load, floating ceiling panels and a ventilation system for implementing the change of air have been implemented. In addition to the classic automation of the heating, ventilation and air conditioning systems, the entire room automation is integrated into the automation system, including sun protection with exterior louvered blinds and and lighting. The technical building infrastructure was planned by the Bielefeld-based engineering firm Schröder & Partner and implemented by system integrator Brüggemann from Versmold.

Automation stations control HVAC and room functions

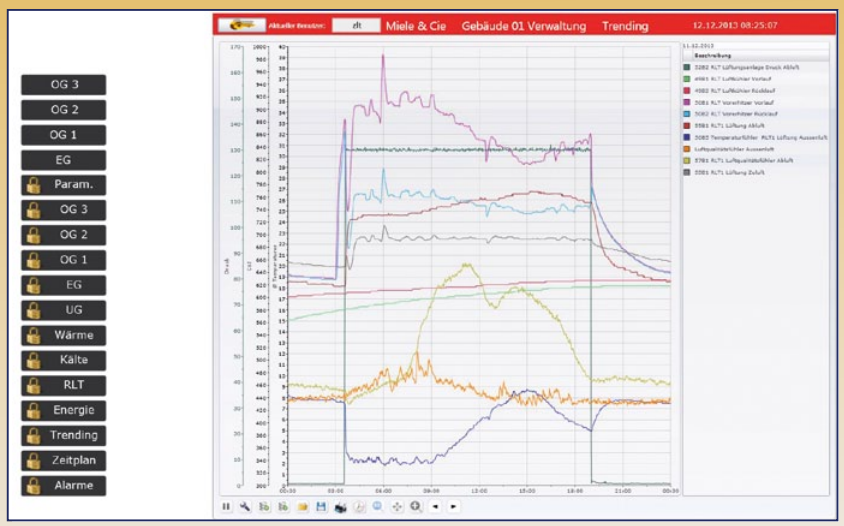
Located in the basement of the building is a central air conditioning plant for the supply of fresh air to all four office floors. The cold water requirement for the air conditioning system, the concrete core activation and the floating ceiling panels is met by the factory's own cold water supply network. The heating energy is similarly provided by a local heating supply.

An automation station is responsible for controlling and regulating the complete HVAC plant in the basement. In order to optimize the efficiency of the energy generation and distribution, the control of all generation and distribution systems is optimized to suit needs through communication with the automation stations for room automation on the floors of the building. For a proactive control of the concrete core activation, the forecasts from the online service wetter.com were integrated in addition to the current weather information.

On each office floor there is an automation station in the form of a CX2020 Embedded PC, to which the room climate, lighting and sun protection systems are connected. The utilization times of the office floors are specified by timer schedules. Outside of the regular utilization times the building is switched to an economy mode; i.e. the ventilation and air conditioning system is switched off and the room temperatures are reduced to a low energy level. Within the utilization times the room temperature setpoint values are raised to the Comfort energy level.

Simple wireless networking of control elements and sensors

The users of the open space work areas can lower or raise the room temperature of individual zones within a small range using EnOcean room control units. The air volume in the floors is controlled by means of flow rate regulators, depending on the air quality. All the windows on a floor are provided with EnOcean-based window contacts. If the windows are open the entire open space area is



Detailed trend display of the RLT system data (image source Brüggemann)

switched to the "Protection" operating mode. When Protection mode is active the room temperature setpoint values are lowered to 6 °C for the heating operation and raised to 35 °C for the cooling operation. By means of the flow rate regulators the air volume is reduced to a minimum in Protection mode.

The communication range of EnOcean wireless signals is at least 30 m, which can considerably reduce the cabling in a building. This has had a positive impact in many respects according to Jürgen Meierarnd: "In order to successfully accomplish Miele's new open-space concept (instead of conventional office and workplace structures), the concrete floor plan of the individual floors had to be finalized at a very late stage. For reasons of time, therefore, a wire-connected installation of light switches, sensors, etc. would have been very difficult. The EnOcean wireless technology offered us maximum flexibility here. Further advantages are the reduction in costs due to the reduced cabling and the correspondingly lower fire loads.

Energy-efficient building operation

In case of bright sunlight outside of the regular utilization times, the blinds are lowered by the automatic thermal control. This reduces the cooling load of the building and saves energy for the generation of cooling water. If the room temperature drops below the setpoint value of the Comfort level, the automatic thermal control automatically raises the blinds in order to use the energy input from the sun to heat the rooms.

In order to create optimum working conditions for the PC workstations in the offices, the "Sun protection" program is activated when the room is in use. The sun protection lowers the blinds to a defined position. The louver angle is aligned in relation to the position of the sun so that glare is prevented whilst still allowing the maximum amount of natural daylight to enter. This saves energy for artificial illumination. The automatic functions of the sun protection system can be manually overridden by the building users by means of EnOcean buttons. Following the manual actuation of an EnOcean button, the blind controller switches back to automatic mode on the expiry of a time parameterized by the operator.

The automation station on the fourth floor is connected by a serial communication terminal to a weather station via the Modbus-RTU protocol. The weather data is transmitted via BACnet/IP to the other BACnet stations. By means of the weather information for wind force, precipitation and outside temperature, the blinds are protected against storm and ice damage and are automatically raised in case of danger.

The open space areas are lit by standard lamps at the workplace. The lighting is switched on by an occupancy sensor integrated in the lamps. The standard lamps are also capable of EnOcean communication and are integrated into the building automation system. In order to minimize the energy consumption for lighting the corridors, the lighting systems there are integrated into the automation system by means of a KL6811 DALI interface from Beckhoff. EnOcean brightness sensors measure the light intensity. The presence of people in the corridors is likewise detected by an EnOcean sensor. The lights are thus switched on only when required.

Easy control and flexible design of a complex system

In addition to the EnOcean room control units, the rooms can also be controlled on the floor level by a touch panel (15-inch CP2916 Control Panel). The automation stations on the floors consolidate the data from the DALI, EnOcean and Modbus-RTU devices. There are a total of 15,000 BACnet objects within the five BACnet servers for the room and plant automation. A new BACnet management and control level (MCL) for the entire Miele works in Gütersloh is currently under construction. In the programming of the BACnet servers, however, care was taken in advance to ensure that the future connection of further office buildings to the new MCL at Miele will go without a hitch.

All relevant data and parameters are made available with TwinCAT BACnet/IP via BACnet objects. Also, energy meters are integrated via the KL6781 M-bus terminal from Beckhoff for energy optimization. To implement the project, the room automation functions were programmed in accordance with the new VDI 3813 directive. winCAT libraries and program templates from Beckhoff, including the required BACnet objects, facilitate the engineering even of complex systems and room automation functions.

www.miele.com
www.technik-im-haus.de
www.ib-schroeder.de
www.beckhoff.de/building

Intelligent automation
at the Federal Ministry of Education

With the construction of a new home for the German Federal Ministry of Education in the government district, the employees of the Berlin office now work in one building. The new structure provides up to 1,000 highly flexible office workplaces. As part of a public-private partnership, it fully meets the federal government's requirements for energy efficiency and sustainability and serves as an architectonic flagship. The new building was awarded the BNB Gold sustainability certificate. By Sven Trapp, Team Leader, Sales North, spelsberg gebäudeautomation gmbh

The ministry's new building has a total footprint of more than 52,000 m², distributed over up to six floors in two U-shaped wings. With sustainable architecture designed by Heinle, Wischer und Partner Freie Architekten, an innovative energy management and modern office concept, the 173 m, nearly entirely glassed-in building is setting new standards in urban development. Due to the ministry's ever changing duties, and by leasing office space, the latter is intended to have a highly flexible design. Thus, the room automation system must also be easy to operate.

Limitless concept

To make efficient use of the modern air conditioning concept, the planners decided to use a demand-driven control of all building systems, from power generation to the room level, according to DIN EN 15232. This means that all parts of the building equipment have to be intelligently networked across disciplines.

The technical implementation was based on the e.control™ room automation system from spega, which meets the requirements of the highest building automation efficiency class A according to DIN EN 15232. The precise demand-driven control minimizes energy consumption. For example, the sun shield technology, with its room-by-room thermocontroller, relieves the workload of the heating and cooling systems through targeted reaction to incident sunlight.

Decentralized with axis flexibility and a modular design, the room automation concept from spega, the room air conditioning controller, the SMI blinds for precise positioning and the DALI lighting allow the space to be divided into new zones or rooms at any time without having to change the cabling. 1,100 LON multisensors with integrated EnOcean wireless receivers ensure the necessary design freedom in placing wireless temperature sensors and control elements.

EnOcean, LON and TCP/IP

More than 1,000 wireless and energy harvesting dialog RC-TS room temperature sensors with EnOcean technology are used for measuring the room temperature, with the addition of more than 1,200 dialog RC-xx wireless blind and light switches. In addition, all 1,400 windows are monitored by EnOcean wireless contacts. System distribution boxes in the suspended ceilings, whose LON actuator combinations control the valves of the heated/chilled ceilings, the SMI sunshield drives and the dimmable DALI ballasts in the office lamps complete the e.control™ system.

IP routers on the in the floors provide the transition to the LON segments, which are laid in a free network topology. A TCP/IP-based network connects all parts of the building to each other and to the central building control system. The system integration was carried out with the aid of the e.control™ Designer graphical management tool from spega.

www.spega.com

Tuscan villa with a brilliant, energy-efficient look

La Commenda is an exquisite old villa in the hills of Mugello, an area of Tuscany north of Florence. The area has been well known for centuries as summer country residence of wealthy Florentine families. Today, an exclusive Bed&Breakfast will be opened in the historical building, including an up-to-date climate control system for guest comfort and energy savings.

By Federica Beretta, Advertising and Communication, CALEFFI S.p.A.

Villa la Commenda is a typical example of a "period residence", built in a location where an ancient Lombard fortress once stood. It is a historic, late 19th-century building in an eclectic style, of significant artistic and architectural value, surrounded by a large green park with a pool, a tennis court, a chapel, and an orangery.

The villa is a three story building of approximately 900 m² and will be turned into a residence and directly managed Bed&Breakfast. The living area is on the ground floor, while the kitchen and utility rooms are located in the basement. The first and second floors house the 14 double bedrooms.

Intelligent heating control

The renovation will be completed in spring 2016 and, besides the buildings restoration, also cover a management system for climate control in winter. Thanks to the Caleffi WiCal solution, the tubing network and heating units of the existing system can still be used – but now combined with a highly flexible control depending on the rooms' individual occupancy for reduced energy costs and optimal guest comfort.

Highest comfort, no wires

The experienced designers of Studio Tecnico Taddei Dami, set in Prato, installed the EnOcean-based, wireless Caleffi WiCal 210 series to control 52 heating units in the villa. Electronic radiator valves control the heating in a room, combined with a multi-zone thermal controller on each floor. The temperature in all rooms can now be controlled individually in accordance with the actual need.

Historic charm

The WiCal system could be installed without the need of pulling wires or modifying the radiators' hydronic fittings. Thus, the building's historical charm can be preserved while fulfilling the owner's requirements of energy savings and comfort is fulfilled with latest control technology.

www.caleffi.it

Smart dream home on the water

As they grew older, the married couple wanted another change, so they chose to build themselves a new house. They already had a specific concept in mind. In terms of its energy use, their new home would have an ecological, sustainable design with a view toward future viability. "We simply wanted the convenience of a new house. For us, that meant having all rooms on one level so we wouldn't have to climb stairs anymore. We therefore went with a bungalow," the couple explains. Smart building systems were another important consideration.

By Schwabenhaus GmbH & Co. KG

After locating the right property, the couple wanted to move into their new house as soon as possible. Because of the short construction period, they chose a prefabricated home from Schwabenhaus. The company builds environmentally friendly houses with sustainable wood panel structures and won over the homeowners not just with their energy concept using mass-market geothermal heating but also because the Schwabenhaus architects could help the couple meet their individual requirements in very short order. "We came up with the entire design, which was relatively complex in terms of the floor plan and how we envisioned the division of space," the husband says. Only four months passed from the time the building permit was granted in May 2011 until construction began in September. The house was finished the same month.

Smart home for added comfort

An intelligent smart home concept was important to the couple. Schwabenhaus decided to use the energy harvesting wireless technology from EnOcean. All environmentally friendly houses from the prefabricated home manufacturer come with a smart home basic package as standard equipment, including control of lights and roller/venetian blinds, with the option of adding further intelligent functions. The Efficiency, Security and Comfort groups include different functions – from lockout protection to a timer, e.g. for simulating occupancy, and even the "wibutler" router, which makes it possible to

Luxury bungalow from Schwabenhaus: the homeowners have a wonderful view of the large garden pond.

A 33-m² bathroom, including a spacious sauna, pampers wellness aficionados. A shower flush with the floor makes for easy accessibility.

monitor and control the entire building automation system from a smart phone or tablet. “We can easily program workflows individually, for example automatically turning on the lights at a certain time in the evening or playing a favorite piece of music. This is what we mean by building a home with a view toward future viability. It establishes a special balance between comfort and ecological sustainability,” says the wife, who is particularly delighted with her intelligent living space. The necessary switches, greatly limited in number thanks to the wireless technology, can be placed anywhere in the home, if so desired, and also moved without problems. They can even be mounted on glass or wood surfaces.

Tested healthy living – sustainable concept

Among the homeowners’ main concerns were the use of environmentally friendly construction materials and a sustainable, energy-efficient power supply. The bungalow therefore has geothermal heating with controlled ventilation as well as heat recovery as standard equipment. Thanks to this environmentally safe building and heating technology as well as outstanding basic construction, the environmentally friendly home is classified as a KfW efficiency house and meets energy efficiency class A+ of Germany’s new Energy Conservation Regulation (EnEV).

www.schwabenhaus.de

Cutting-edge kitchen: at the building owner’s specific request, the central ventilation system takes over the exhaust air.

Wireless lighting control

Z-Park Enterprises Credit Promotion Association, located in Beijing, was looking for intelligent lighting control for their 178 m^2 office. They decided for the SINOBEL Energy Harvesting Wireless Control System in the second renovation. The entire project includes three 8-channel actuators and twelve wireless switches to control 18-channel lighting. Each individual actuator can support up to 2200VA and is able to work with LED lighting, adjustable LED and RGB lighting. By Marketing Department, Beijing Sinobel Technology Co., Ltd.

SINOBEL offers a complete range of EnOcean-based wireless control devices to realize customized building projects.

With no additional or new wiring required, SINOBEL delivers easy to install wireless lighting controls with little to no interruption to a customer's operations and without damage to the customer's property. Utilizing the EnOcean technology platform, the lighting control components don't need to be connected to any external electricity or require the use of battery.

Technology meets flexibility

The wireless operation of the control devices lowers renovation costs as there is no need to drill holes in the wall. In addition, users can flexibly place the batteryless wireless switch at any location and easily use it to control multiple lightings. This unique technology, combined with a clever and attractive design creates a highly intelligent and professional working environment.

All parts for an intelligent system

SINOBEL's lighting control system is composed of the following products:

➔ 8-Channel Actuators SA003

The SA003 is a multi-purpose controller unit that can control a series of electric circuits. It can be expanded to a 16-way controller unit. Each individual unit can support up to 2200VA and is able to work well with the most common LED lighting solutions, adjustable LED and RGB lighting. With its interoperability feature, users can easily combine the actuator with other EnOcean-based products for seamless automation control. The controller is suitable for new or retrofit buildings.

The 8-channel actuator connects wireless switches to control LED lighting.

➔ 4-Button Switches SW001/ SZ001

These switches have a lifespan of at least 10 years or more. They can be combined with the 8-channel actuator to control several or particular lighting sources or equipments. This gives any living or office spaces the freedom of choice to create a highly intelligence life or working environment. The convenience of placing the switches wherever needed or using it as a remote control, can improve the quality of life for elderly people, medical patients and more.

➔ Key Card Switch SZ002

The Key Card Switch uses the same principle of kinetic energy harvesting as the batteryless switches. Therefore, it can be flexibly placed at any point in a room. This increases the safety, convenience and speed of operating equipment in any given environment. Therefore, this product is highly suitable for use in hotels, schools and industrial buildings. Combined with the 8-channel actuators, users can easily control lighting or other equipment by inserting the card into the key card slot to activate a wireless signal. Overall, the card switch helps to create a comfortable living space with minimal maintenance and maximum convenience.

www.sinobel.com

Conspicuously inconspicuous at University of Hohenheim

More and more complaints about a heating system in a building from 1989 forced the facility manager to look into maintenance-free solutions. The University of Hohenheim got their solution with self-sufficient thermostatic radiator valves by Micropelt. The system is working so reliable now that students and professors only notice that “in contrast to other lecture halls, it is never cold in here”. By Julia Hinz, Sales Manager iTRV, Micropelt GmbH

The lecture hall is located on the ground floor of building 3.32 at the University of Hohenheim. The building is a typical 1980s building to which insulation can hardly be retrofitted. The windows are merely double glazed. The temperature is difficult to control and adjust. Often while in one corner the window was open in another corner the radiator was set to maximum temperature.

Looking for a scalable solution

Mr. Riehle, head of the technical services division, was faced with complaints during the past heating period. A solution had to be found. It had to be a seamless integration with best possible benefit. Energy had to be saved. It was obvious from the start that a central heating control system was needed. Battery solutions were not an option because of maintenance costs and the concept of sustainability. A scalable solution was required that could be transferred to other lecture halls and buildings of the university.

Now each of the 24 radiators in this lecture hall has a self-sufficient thermostatic radiator valve by Micropelt that generates the required energy for heating control and radio autonomously. Once they are connected, no maintenance is required as the actuators work without batteries. A theft protection bracket prevents unauthorized manipulation.

Part of an integrated system

The actuator is the last piece in a chain built on the building control system BACnet. The heating is controlled from the central control room located in the heating plant building on campus by using Schneider Struxture Lite. The heat carrier district heating is fed from the cogeneration unit on Campus into the secondary network and finally distributed in the basement of building 3.32. The Thermokon room sensor checks the room temperature and sends this information back to the control center. Using the Orca View visualization by Delta Controls, data and trends can be evaluated and monitored.

Good prospects for energy savings and comfort

The lecture hall accommodates 120 students. Towards the inner courtyard and the north-facing wall, 12 radiators are installed directly under the windows. The room has to be heated according to the weekly changing booking plan which is fed into the heating control system.

Due to the building structure and the usage behavior, maximal energy savings of 30% and more can be realized here. With annual average heating requirements of about 330 MWh for this type of building significant savings can be expected. The future heating periods are expected with renewed confidence and the professors are pleased with “the comfortable room conditions”.

www.micropelt.com

Maximum energy efficiency for Switzerland's highest office building

In a 41-storey Green Building, SAUTER technology guarantees the highest level of energy efficiency – from the seamlessly integrated primary system to room lighting and sunshading.

By Otto Kräuchi, Project Manager MSR, SAUTER Schweiz, Sauter Building Control AG

"Building 1" in the north-western Swiss city of Basel measures 178 m. The internationally active pharmaceutical company, Roche, has workstations for about 2,000 employees concentrated in "Building 1" at the group's headquarters. Apart from the distinctive architecture, another exemplary feature is the extremely high energy efficiency level of the building, which outshines most skyscrapers the world over with an expected primary energy requirement of only 80.2 kWh/m2/a for heating, cooling, ventilation and lighting.

The intelligent building and room automation system devised by SAUTER makes a considerable contribution to "Building 1's" exceptional energy efficiency.

The office spaces in the building are constructed in a modular fashion, thus permitting utmost flexibility. This modular system is also reflected in the building management system employed, SAUTER's novaPro Open. When redesigning from a single to a group office, for example, the room automation can be adapted to the new floor plan with just a few clicks of the mouse.

Integration of all equipment systems

In each room module, one SAUTER ecos500 room automation station from the EY-modulo 5 system family controls heating, ventilation, cooling, lighting and sunshading. Demand-controlled and energy-efficient room automation is ensured in conjunction with presence and light sensors. The system automatically switches off the lights, ventilation and heating/cooling when a workstation is not in use.

The tower is heated solely using waste heat from the nearby Roche industrial area. Heat is recovered in a highly efficient process in the monoblocs and a heat pump produces hot water. For cooling, "Building 1's" sustainability concept relies on ground water from extraction wells. Accordingly, low heating circuit and high cooling circuit temperatures were needed for all consumers.

Solar-powered room operating units

Room lighting is consistently based on current-saving LED technology. Communication with the SAUTER room automation stations

Wire- and batteryless room operating unit SAUTER ecoUnit with EnOcean technology

is assured via the DALI protocol. In addition to the daylight-adaptive constant-light control, the employees also have LED desk lamps at their disposal.

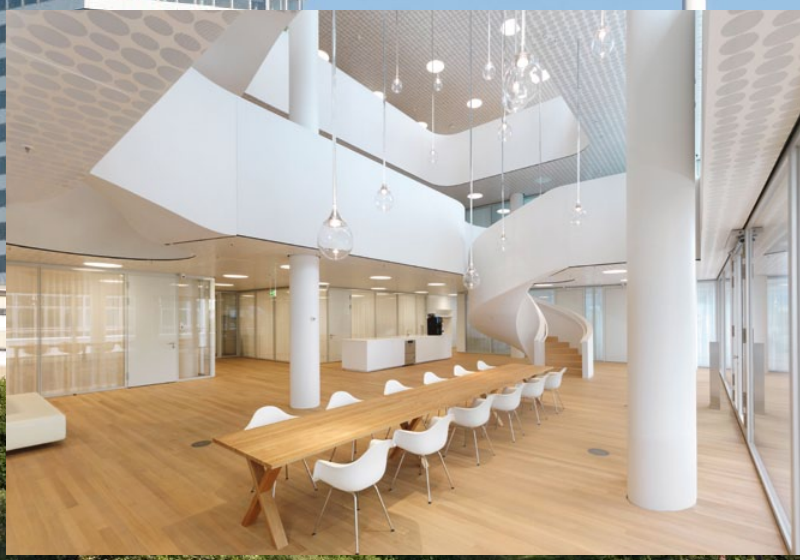
Each room segment is also equipped with a SAUTER ecoUnit room operating unit with bi-directional wireless EnOcean technology. The built-in solar cell renders these wireless devices independent of any external power supply and offers up to five days' availability, even in complete darkness.

Sunshading and reduced light emission

Sunshading for the exposed tower is also included in the SAUTER room automation concept. And as "Building 1" is located right in a very densely populated part of Basel, the blinds also close automatically in darkness to avoid unnecessarily lighting up the neighborhood.

To ensure that "Building 1" maintains and even actually improves its high level of energy efficiency for the long haul, the energy flow is measured and monitored using the energy management system SAUTER EMS. With it, the technical staff can identify and correct any systems operating incorrectly.

www.sauter-building-control.ch



"Building 1" is a Green Building, raising the bar in terms of sustainability and energy efficiency while also ensuring impressively high room air quality.

The perfect way

to upgrade a single-family home

The homeowners had thought of everything when they built their 180 m² single-family home in 2011. Their main concerns were security, remote access and occupancy simulation. After using the building automation system intensively for four years, however, they needed a few more applications to meet their growing needs.

By Claudia Trebo, Marketing, Ekon GmbH

The lady of the house hired Mr. Steiner of FHMS to upgrade the system. The conditions were anything but ideal, since the home electrical system was complete, rewiring it would have been almost impossible, and parts of the house were enclosed in concrete. Everything was relatively new, and the owners did not want to live on a construction site.

Wireless and hardwired

They therefore decided to go with the myGEKKO smart building controller as well as EnOcean-based solutions from Eltako and the IO system from WAGO. The control technology was divided between wireless and hardwired control.

myGEKKO controls and visualizes many applications, such as control of the blinds, video surveillance of the building, smoke detectors, window contacts, the garage contact and garage door control, garden irrigation, window access and window control as well as the control of various electrical circuits.

Cross-vendor system

Working hand in hand with the homeowner, the contractor implemented her wishes independently of the hardware component manufacturers. The customer thus received a future-oriented, flexible building system, including the wireless upgrade. The main focus was on a simple system configuration, one that the homeowner could modify herself. Thus, the blind timer settings, the fountain control and the lighting times were changed.

www.my-gekko.com/en

Unprecedented possibilities

The APP MODULE from BAB TECHNOLOGIE provides an EnOcean interface and is based on the proven modular app concept: choose, install, get going.

By Stefan Mainka, Marketing, BAB TECHNOLOGIE GmbH

Similar to a smart phone, the module provides the opportunity to individually load easy to use apps. For example implementing SONOS, Philips hue or Bose devices into EnOcean has never been easier before.

Any number of combinations

It therefore doesn't matter if components are controlled via pushbuttons or from an existing visualization solution. All apps are available in the BAB APPMARKET and can be combined as needed on an APP MODULE.

www.bab-appmarket.de

Networked for the future

A networked home offers many benefits. Mobile apps help manage daily routines and organize leisure time as well as control home entertainment electronics and individual household appliances. Many different building systems are already being reliably monitored or operated wirelessly. Everything is gradually becoming part of an intelligently networked living environment. By Stephan Frank, Product Manager Building Automation, AFRISO-EURO-INDEX GmbH

The AFRISOLab solution environment networks all areas of a smart home.

And yet consumer uncertainty is growing with each decision to purchase the individual smart components. All too often, complete systems available on the market unfortunately turn out to be "self-contained," that is, lacking any way to integrate sensors and actuators of other manufacturers. Users must trust the particular vendor and hope he will remain on the market in the future with the ability to continue offering compatible components.

Choosing the right solution

Many manufacturers use their own proprietary wireless protocols and therefore are unable to network with other systems. This results in isolated solutions and a dependency on each individual provider. Moreover, it is often difficult to install additional cables for supplying power to the sensors. However, battery operation as an alternative means

maintenance work, high follow-up costs and down times. Many systems also are unable to be operated manually on site. Smart phones are generally needed, for example to adjust the room temperature.

The AFRISOLab smart home solution from AFRISO can solve each of these problems.

AFRISOLab solution environment

AFRISO develops and manufactures sensors and actuators based on EnOcean technology and is an official member of the EnOcean Alliance, which ensures product interoperability. The company's unique energy harvesting, wireless sensors maximize flexibility, save time and money and offer a wide range of applications. On this basis, AFRISOLab supplies the right solutions for heating control, lighting, shading, security and equipment protection. AFRISO also continuously develops industry-specific solutions for the plumbing, heating and air-conditioning trade in order to incorporate key parameters from industrial and building systems.

The company also has a high degree of vertical integration in its Baden Württemberg factory, making it possible to implement individual customer solutions effectively, quickly and economically.

Customized scalability and flexibility

AFRISOLab makes it easy to gradually enter the networked world. The sensors and actuators can generally communicate with each other directly. Users thus enjoy the benefits of wireless technology without having to sacrifice familiar operating characteristics. The central AFRISOhome building controller is available for linking different equipment components or for mobile operation from a smart phone. Thanks to its modular design, this controller also allows multiple wireless standards to be used in parallel or to interact with each other. The EnOcean and Z-Wave wireless modules are already on board, and the Wireless M bus can be added as an option. Extra ports for wireless modules make the system viable for the future.

Home stays at home

However AFRISOLab is a self-contained system in one respect: when it comes to security. All user data and passwords are stored and processed locally on the building controller. AFRISOLab also uses the same encryption methods as online banking.

www.afrisolab.de

Smart valve

PM DM GmbH presents the Smart Valve® radiator valve, which runs without batteries and produces the electricity it needs with a thermoelectric generator (TEG). The Smart Valve® won the Energy Harvester Award in Berlin while still in the development stage.

By Roman Klein, Manager Public Relations, and Stefan Schwamberger, Development Engineer, PM DM Precision Motors Deutsche Minebea GmbH

The TEG consists of series-contacted thermocouples and two different electric conductors. The newly developed valve uses the difference in temperature between the radiator and the room to generate electrical energy (energy harvesting).

The temperature difference is at least 15 °C at inlet temperatures of more than 40 °C and room temperatures around 20 °C. The chip-like TEG thus generates a voltage of approximately 1 V. Compressible heat conducting foils prevent air pockets and thereby reduce thermal resistance. The heat sink has the greatest influence on the generated TEG voltage, which is why an ingenious thermal design was developed, based on many simulations. The gearset requires five to ten times less energy to adjust the valve, compared to conventional designs.

Maximum efficiency

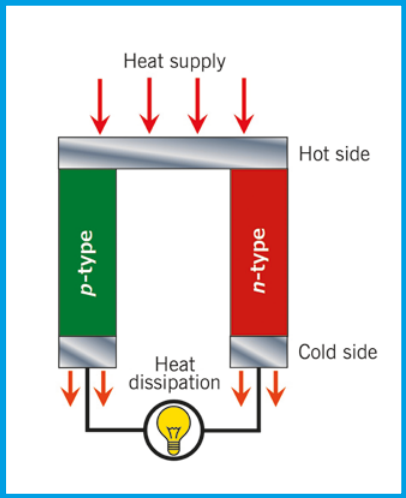
The valve currently achieves energy efficiency well above 80%. An electric double-layer capacitor with few losses due to intrinsic leaks is used as the energy store. It can also easily handle the low charge currents. Integrated output stages are used for the motor drivers, since they have leakage currents of less than 100 nA. An ultra low-power microcontroller provides the system's intelligence and controls the drive, positioning, communication and power management functions. It consumes less than 3 µW of power in sleep mode. It is woken up cyclically by a timer and can measure all necessary operating parameters.

Sleep and awake phases

The capacitive sensor also requires only a fraction of the energy of earlier systems. All unnecessary components are systematically disconnected from the power supply, for example during the summer, when the TEG does not supply any energy. The system automatically wakes up when the heating period begins in the fall. The valve supports all common energy-efficient protocols, such as Bluetooth Low Energy, ZigBee and EnOcean.

www.pmdm.de/en

Representation of the radiator valve (PM DM design)



Simplified representation of a TEG through the Seebeck effect

ARCO – AWAG remote commissioning for Omnio

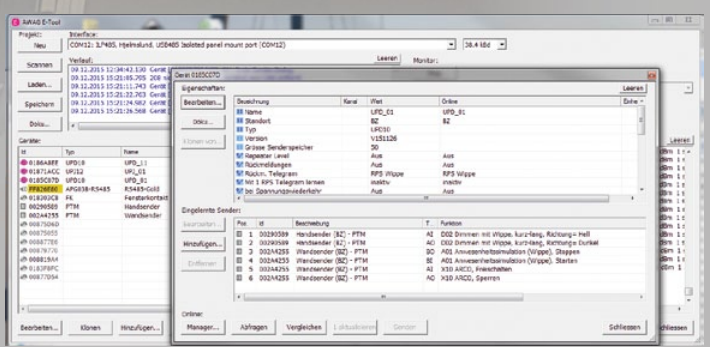
With ARCO, all actuators of the Omnio product line can be configured completely by radio without manual access to the device. The powerful software E-Tool constitutes the key component for conveniently planning, configuring and documenting projects of any size right at your desk. Startup, troubleshooting and project changes are greatly simplified since all Omnio devices can be reconfigured at will via ARCO.

By Beat Zbinden, Product Manager Omnio, AWAG Elektrotechnik AG

The Omnio building automation system with its multifunctional actuators consistently follows the decentralized and distributed intelligence approach. The complete configuration of the actuators takes place via radio with the software E-Tool and no longer at the device itself. Learning-in and un-learning transmitters, changing functions or adjusting device parameters becomes child's play, even with inaccessible actuators.

Pre-configured projects

The Omnio E-Tool simplifies the entire project workflow enormously. Since all project data is available centrally in the PDF or CSV format, the planning and configuration can take place in advance in the office before the actuators are updated at the end with a mouse click via ARCO. This allows completely preconfigured projects before leaving the factory and, in addition, guarantees seamless project documentation.



Search by scan

On site all Omnio actuators within range can be detected with a Scan command and their configuration adjusted at will. This is an invaluable advantage, particularly during startup, troubleshooting or changes to external projects without documentation.

Comprehensive support

Besides the EnOcean Remote Management commands, all Omnio switch and thermostat actuators (EEP: D2-01-01/11), dimmers (EEP: D2-01-03) and blind actuators (EEP: D2-05-00) are supported at the moment. On the sensor side there are PTM, room temperature sensors (EEP: A5-10-03/05/10), CO_2 sensors (EEP: A5-09-04) as well as the functionality "learning-in actuator in actuator." Ingenious access protection ensures the greatest possible system security, with the customer itself able to determine the desired security level.

www.omnio.ch/en

This year's biggest Smart Home innovations will be more than hardware: smart process technology and an optimized holistic system to boost energy efficiency will be dominating the future of Smart Homes.

By Margarete Sackarend, Marketing, and Michael Juediges, Building Technology & Sales, iEXERGY GmbH

Demand-based heating and ventilation technology in smart homes

Powering room climate and energy efficiency with automated ventilation systems

We stay indoors for up to 90% of our time, yet in 17% of German households at least one room is affected by mold. Main reasons are a high humidity and wrong ventilation practices. Smart home systems such as wibutler automate ventilation systems and take care of what humans tend to forget. In order not to waste heating energy, the system only ventilates based on demand. For instance, humidity sensors automatically start the ventilation when the humidity level rises or the system can time ventilation to start for five minutes.

The configuration of the demand-based heating is easily set up with the wibutler app.

Integrated heating systems

In a smart home, window contacts can easily regulate radiators via actuating drives and turn down the heating if the window is opened. wibutler is now able to communicate with heating boilers, thermostats and actuating drives and uses the data of various smart devices within the home to automatically adapt the whole heating system to the daily routines of people and the actual heat demand of the whole home.

ERP Labeling: Upgrade for heating systems

The European Union has passed the ERP Labeling directive for heating systems to give consumers an overview of the systems energy efficiency. Heating systems that are connected to an energy efficient smart home solution qualify for an upgrade. A package including a wibutler pro server, smart heating actuators, and a smart module for a heating boiler leads to an upgrade of a gas condensing heating system from A to A+.

Demand-based heating

Up to now, it has been common practice to regulate the performance of a heating boiler based on the temperature outside. In contrast, a system integrated into a wibutler smart home, can identify the actual heat demand and optimize the whole heating system accordingly.

Individual separately regulated heating circuits can be created and wibutler can adapt the separate heating circuits to what is currently happening in the building. For instance, wibutler can communicate whether heating sources exist or windows are open. It then passes the information to a smart boiler module and only turns up the heating boiler performance, when it is actually needed.

www.wibutler.com

[1] *Immobilienscout24: Study "Wohnen und Leben". Nuremberg: 2012.*

ViACT – intelligent, modular EnOcean actuators

ViACT is a family of modular actuators for smart buildings and the Internet of Things. The products meet the strictest requirements when it comes to safety, reliability and resistance to interference from the power supply grid. They therefore ensure worry-free operation in the smart home for many years to come.

By Thomas Rieder, CEO, ViCOS GmbH

ViACT can be operated locally with one or two rocker switches right on the actuator and can be easily matched to the home decor lines of prominent manufacturers. A mechanical light switch is replaced by a ViACT, and existing pushbuttons are integrated via the external input. The actuator makes tried-and-tested installations "smart," both in new buildings and by upgrading.
ViACT provides an optimum radio range in smart buildings. The optional ViNET routing system ensures complete wireless coverage and eliminates the use of repeaters.

Individual customization

Devices on the ViACT product platform can be placed into operation without any tools. Thanks to the remote commissioning standardized by the EnOcean Alliance, they further adapt to a wide range of individual requirements. The ViCOS Remote Commissioning software, developed specifically for installers, enables individual devices to be trained and configured intuitively. Project documentation is generated automatically in the background, making later modifications much easier.

Faster market launch

ViACT is aimed at companies that would like to launch EnOcean-based actuators under their own brand or integrate them into their own systems. ViCOS creates desired product features from certified function blocks and customer-specific device firmware. Using a product platform cuts costs and lowers the risk of individual product development and also significantly speeds up market launch.

www.vicos.at

Building the future with OPUS® greenNet

Whether it's a new construction project, a conversion or a renovation – all are aimed at the same thing: People want to feel comfortable in their surroundings. Intelligent technology makes home, office or hotel a whole lot smarter.

By Ina Trautmann, Marketing Management, JÄGER DIREKT

OPUS® greenNet, the intelligent building system from JÄGER DIREKT, provides many functions that make living space more comfortable, more secure and more energy-efficient. After all, a smart house offers benefits. There is a whole range of clever solutions, from an "everything off" switch to timers for lighting, heating and shading. The building-block principle of OPUS® greenNet makes it possible to put together a modular system according to individual requirements and add to it later, thanks to EnOcean wireless technology.

It's easy to get started with just two products

All that's needed for individual intelligent solutions are a transmitter and an actuator that are trained to each other. The floor lamp in the living room can then be operated by an additional wireless switch that can be positioned anywhere.

Operate switches from the bathtub

OPUS® greenNet switches can even be mounted on the bathtub. This solution enables residents to conveniently dim the lights or operate the blinds from the tub.

What if…

…Laura is 12 years old and wants to have a loft bed? The freely positionable switch on her old bed just moves to the new one.

Office made of glass

Desks and workspaces are frequently rearranged, particularly in offices. Glass partition walls and acoustic barriers are not infrequently used. Thanks to flexible wireless technology, the light switches or motion sensors can easily move to the new location.

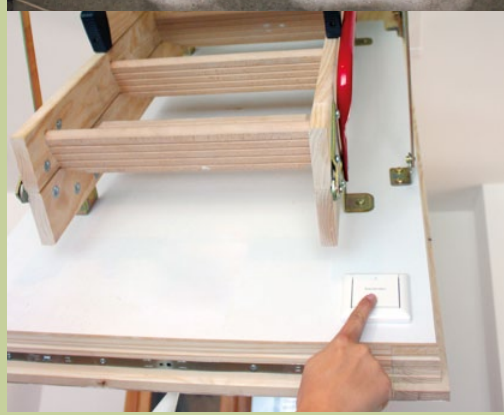
Detect water leaks early on

Water leaks can lead to extensive damage, especially if they go unnoticed. Two OPUS® greenNet components offer protection. For example, as soon as water leaks from the washing machine, the water detector emits a loud audible warning and simultaneously sends a signal to a receiving device that automatically closes the main water line.

A problem that everyone knows

Where do you turn on the light for the attic? With the OPUS® greenNet switch mounted right on the trap door – without any cables, batteries or maintenance required.

www.Jaeger-Direkt.com



Technical design highlight

Stylish, compact, user-optimized: The new Thermokon room operating unit SR06 LCD enables a comfortable control of the room climate. The attractive design in high-grade optics fits perfectly to all common switch programs.

By Thorsten Kresin, Manager Marketing, THERMOKON Sensortechnik GmbH

Besides current values, the display allows the precise input of desired set points. Several room parameters can be easily adjusted via function buttons so that the operation of the SR06 LCD is quite simple. Programming and adaptation to device settings are made via the PC while offering best possible ease of use.

Smart and Maintenance-Free

Flexibility is rated very highly even with regard to installation and maintenance. Thanks to the energy harvesting technology, the solar-powered room operating panel is not only self-powered but also maintenance-free. As no wires are needed, the room operating unit can be freely positioned in the room.

By means of the EnOcean-based wireless technology, the SR06 LCD automatically communicates with the building control technology. The SR06 LCD is compatible with all EasySens® products. Thanks to the SMART ACKNOWLEDGE function, the device communicates bi-directionally.

www.thermokon.com

Flexible room automation for open-plan room design

Modern buildings with open-plan room concepts demand highly flexible room automation and operation. With the SAUTER Vision Center visualisation software and the ecoUnit EnOcean room operating units from SAUTER, it only takes a few mouse clicks to modify the room automation. **By Frank Moschner, Product Manager Building & Energy Management Solutions, SAUTER HeadOffice**

With SAUTER Vision Center, the building automation can be operated anytime and from any place with just a few clicks.

In modern office buildings, open-plan rooms can often be partitioned as necessary or combined into large, open rooms. This means it is crucial that the room automation system can be adapted to the different conditions. With the EnOcean wireless room operating units and Vision Center building management software, SAUTER offers an uncomplicated solution.

Excellent interaction

The various room segments are represented in SAUTER Vision Center very clearly and comprehensibly for all groups of users. No servicing or programming work is required for modifications. Individual room segments can be moved and reassigned by drag and drop. Connected rooms are shown in the same colour. Information relevant to rooms can be displayed in a summary or individually for each segment. The excellent interaction between SAUTER ecos room automation and Vision Center is perfect for regulating flexible room concepts.

www.sauter-controls.com

Innovative energy

savings for each room

The Chinese manufacturer Menred expands its energy-saving portfolio with batteryless wireless solutions based on the EnOcean standard for highly flexible, maintenance-free customized systems.

By Chen Lin, General Manager, Menred Automation System (Shanghai) Co., Ltd.

Along with its membership in the EnOcean Alliance, the Chinese top HVAC expert Menred brings the EnOcean-based MIBEE intelligent control system to the market. It includes wireless batteryless switches and sensors, for example, an occupancy sensor and a door/window contact, multifunctional actuators for lighting and shading control as well as a smart gateway supporting EnOcean, KNX, Modbus, Ethernet and WiFi.

The combination of highly flexible maintenance-free devices and comprehensive system design perfectly complies with Menred's strategy and goal of offering its customers the best solution meeting their individual requirements and highest standards in energy efficiency.

Added value for customers

The MIBEE system not only can manage the intelligent control of lighting, shading and security, but also fully combines Menred's long-term experience in the HVAC industry with EnOcean's energy harvesting wireless technology to provide customer-specific HVAC solutions. Due to their highly flexible operation, the batteryless wireless devices enable individual system design at maximum energy savings. At the same time, the eco-friendly technology ensures comfort in the long run with no need for a battery change.

www.menred.com

Above: Wireless and batteryless switch with different decoration styles.

Left: Solar-powered thermostat with LCD display, integrating air-conditioning, heating and ventilation control.

New people

Robert Hall, Field Applications Engineer, EnOcean Inc

As the new Field Application Engineer at EnOcean Inc for North America, Robert Hall will be assuming the responsibilities of this position and take the opportunity to work in this forward-thinking, environmentally responsible company. Robert has an extensive background in firmware, software, and some hardware product development. He personally enjoys being creative, which is helpful in finding solutions to engineering problems. He speaks English and German.

robert.hall@enocean.com

Magic cube and secretary desk

A true unicum, handmade of solid walnut and birch wood. The secretary desk of our colleague Marian Hönsch, Product Marketing at EnOcean, is a minor masterpiece. Not only is it a decoration for each living room. It also integrates EnOcean technology. It is controlled from a cube.

The combination of dark and light wood gives the secretary desk a specific look, accents drawers and doors, while the light working surface invites to office activities. Together with the cabinet element, it fits perfectly with the modern living environment. The desk's outstanding feature is its indirect lighting, controlled by EnOcean wireless technology, which gives it an especially attractive appearance.

Door open – light on

Due to electromechanical door contacts from Eltako, the desk's light is automatically switched on when the doors or the drawers are opened. This motion alone is enough to generate a wireless signal, sent to a Bilton controller that activates the luminaires at the corresponding position. They are switched off the same way as soon as the doors are closed again.

Dice the light

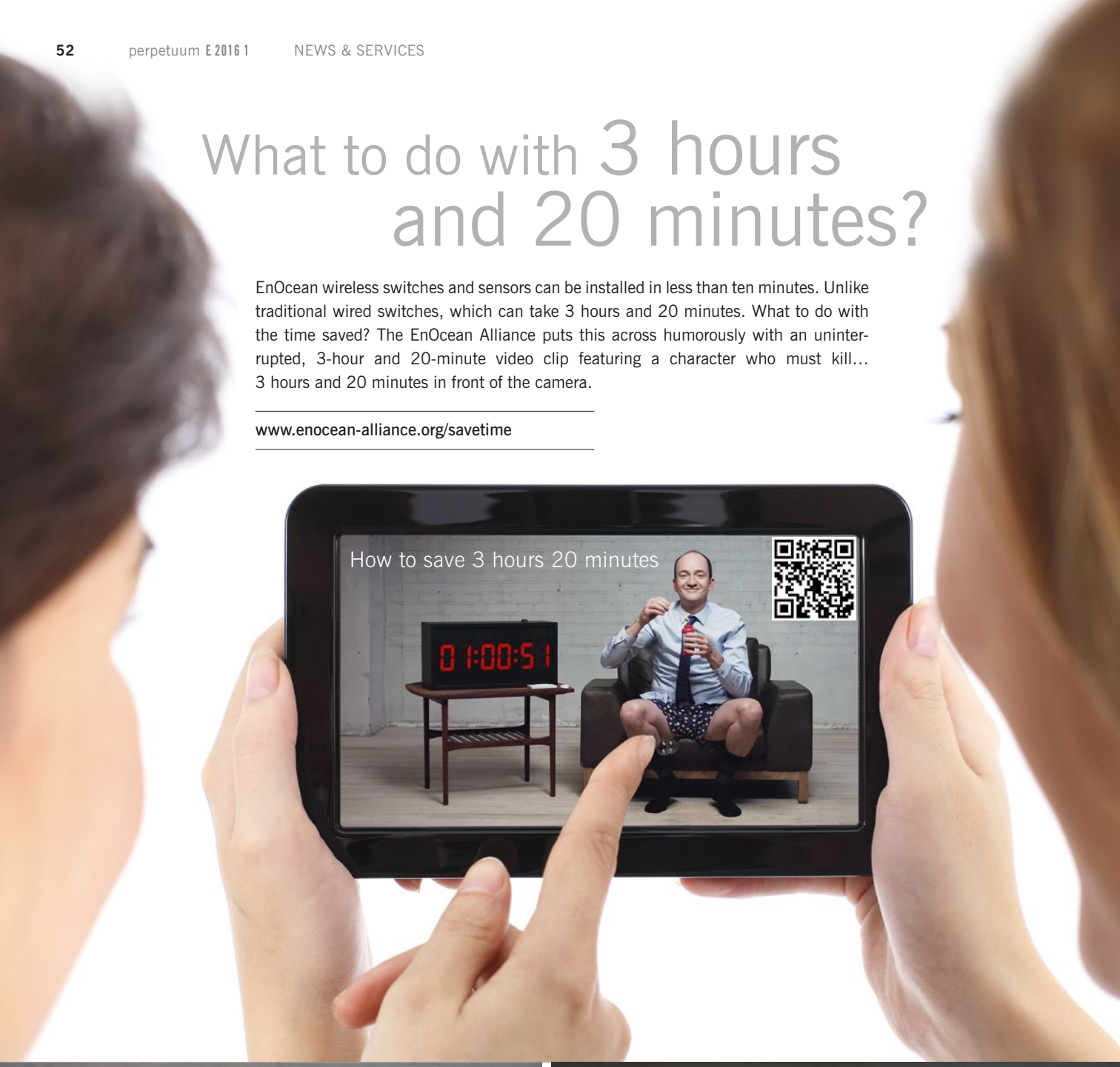
The control cube, also made of wood, is the special feature. It is powered by two solar cells. Little symbols at the surface show where to find which functionality. Users can dim the light and switch it on an off just by turning and tapping the cube. That's rather magical.

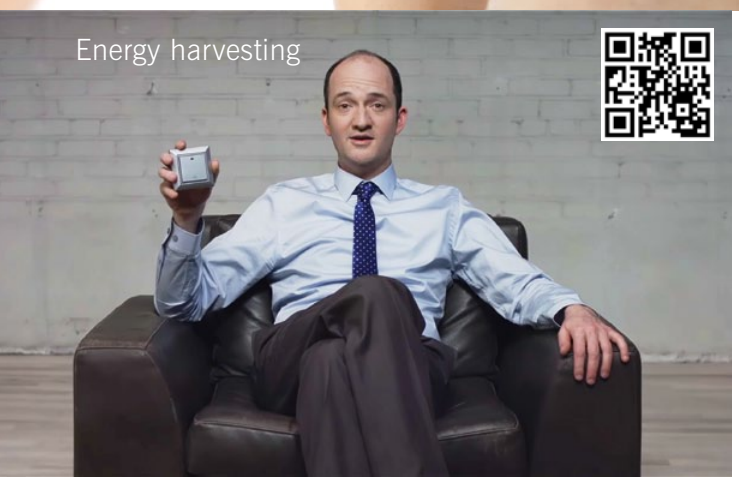
www.enocean.com

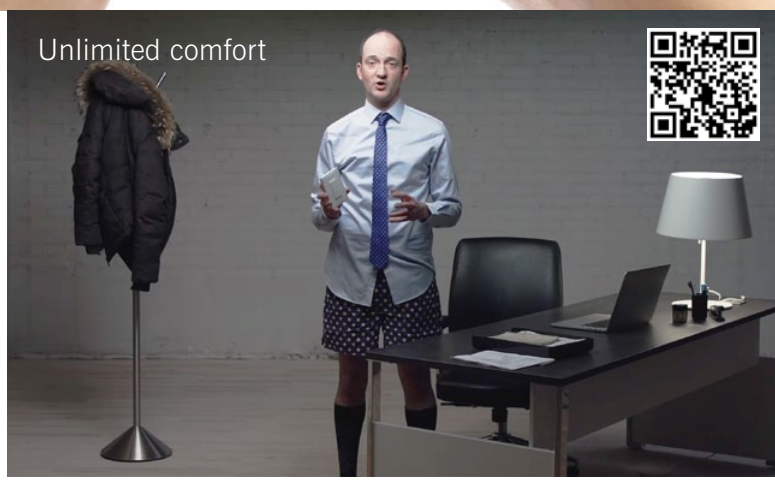
What to do with 3 hours and 20 minutes?

EnOcean wireless switches and sensors can be installed in less than ten minutes. Unlike traditional wired switches, which can take 3 hours and 20 minutes. What to do with the time saved? The EnOcean Alliance puts this across humorously with an uninterrupted, 3-hour and 20-minute video clip featuring a character who must kill… 3 hours and 20 minutes in front of the camera.

www.enocean-alliance.org/savetime







EnOcean products

RoHS COMPLIANT 2002/95/EC

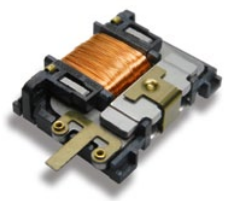
enocean Wireless Standard ISO/IEC 14543-3-1X

2.4 GHz standards

Products with 868 MHz for Europe and other countries adopting R&TTE/RED specification.
Products with 902 MHz for North America adopting FCC/IC specification.
Products with 928 MHz for Japan adopting ARIB specification.
Products with 2.4 GHz for worldwide usage with R&TTE or FCC/IC specification.

Energy converter

Energy converters collect and save the tiniest amounts of energy from their environment.

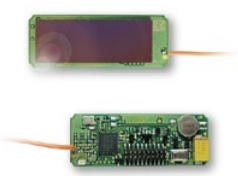


Energy harvesting wireless switches

Energy harvesting switches use kinetic energy for switching applications in buildings and the Internet of Things.

For energy harvesting wireless sensors

Solar-powered energy harvesting sensors monitor and sense the environment to transmit this data to a wireless node.



For controllers and actuators

Wireless transceiver modules and products receive sensor data as well as transmit values to other devices.

Tools

Starter kits and development tools help OEMs to implement energy harvesting wireless modules and products easily.

EnOcean products: **www.enocean.com/products/**

Product finder: **www.enocean.com/product-finder/**

Energy harvesting rocks the world of the Internet of Things

Events around the globe show what the Internet of Things can look like. Front and center: EnOcean energy harvesting wireless technology. Energy harvesting is the key element for implementing trillions of sensors in a connected world. Tiny energy converters accomplish what wires and batteries cannot: maintenance-free solutions, which deliver the information for an intelligent system.

Visitors to the international shows IFA 2015, SIBT 2015 and CES 2016 were able to experience how this works.

MASTHEAD

perpetuum – the innovative magazine for customers and partners of EnOcean GmbH
EnOcean GmbH, Kolpingring 18a, 82041 Oberhaching, Germany
Phone +49.89.67 34 689-0, Fax +49.89.67 34 689-50, perpetuum@enocean.com, www.enocean.de

Publisher EnOcean GmbH, Munich, Dr. Wald Siskens, CEO
Editorial EnOcean GmbH, Angelika Dester, PR Manager, angelika.dester@enocean.com

Concept and design
artcollin Kommunikationsdesign, www.artcollin.de

Photo credits: Anca Goodwin: p8 (child on bike), Bernadette Grimmenstein: p28 below, F. Hoffmann-La Roche Ltd: p36/37, **www.fotolia.de**: p46 (childrens room), **www.istock.com**: p8 (senior woman), p10/11 (illustrations), **www.photocase.de:** p23 kallejipp (eye), **www.shutterstock.com**: S6 (shoes), **www.thinkstock.com**: title, p4, p5, p6 (drop and thermostat), p10-11 (citiy on clouds), p12 (woman), p15 (illustration), p16 (laboratory), p20-21 (on the beach), p32 (Bejing), p40-41 (young women), p42 (girl)

Print RMO, Munich

International circulation 11 000 (print and e-paper)
Appearance semi-annual
Reader service perpetuum@enocean.com, Phone +49.89.67 34 689-0

EnOcean®, easyfit® and perpetuum® are registered trademarks of EnOcean GmbH

Deutsche Nationalbibliothek has archieved the electronic publication "perpetuum international edition," which is now permanently available on the archive server of Deutsche Nationalbibliothek

+++ ISSN 1862-0698

perpetuum 2 I 2016 (German & English) will appear in October 2016
Editorial deadline: July 2016

Overview of members

www.enocean-alliance.org/products

enocean®

PROMOTERS

Embedded Intelligence

Green. Smart. Wireless. enocean®

Honeywell

jäger DIREKT

Pressac

ROHM SEMICONDUCTOR

thermokon®

PARTICIPANTS

ABB, AD HOC ELECTRONICS, ADEE electronic, Advanced Devices, AFRISO, ALLSEEN ALLIANCE, alpha one, ALPS, ALTECON, ART, ASIC

avidsen, AWAG Elektrotechnik, BAB TECHNOLOGIE, beck, BECKHOFF, BILTON, BIODIT, BootUp, BRUCK, BULL公牛, CABA

CALEFFI Hydronic Solutions, CONNECTED LIVING, CONTEMPORARY CONTROLS, DALITEK, DEBFLEX, Decelect, Delta CONTROLS, DEUTA Controls, DIEHL, DIGITAL CONCEPTS, DISTECH CONTROLS

DOMADOO, DOOYA, DRSG, Dwyer, EKE, enno, EMerge ALLIANCE, echoflex, Eltako ELECTRONICS, embedded systems, EMERSON

ETC, EUROtronic Technology GmbH, wattch, Ex-Or, FLEXtron, 方正集团 FOUNDER, Functional Devices, RIB, Funk Technik, futurehome, GE Energy, GE Lighting

GFR, Giga-concept, GRUPPO CONTROL, Haier, HELLA, Helvar, HIDEKI, HOPPE, HORA, Hotel Technology next generation, HOWDENS

HUAWEI, HUBBELL, ID-RF, ILLUMRA, Intesis, INVENTRONICS, iQfy, ITEC, itho daalderop Climate for life, KERMI, kieback&peter

KMC CONTROLS, KOMATSU, lenovo, LEVITON, LIXIL, LONMARK INTERNATIONAL, LOYTEC, MAICO VENTILATOREN, MARUBUN CORPORATION, MechoSystems

menred, micropelt Energy harvesting, Midea, MITSUMI, mivune, MK by Honeywell, molex, muRata, MYFOX, NEC, neptronic

nimbus, NIESHA, NTT EAST, NXT CONTROL, obx, o-flexx energy boosting, OGGA, OMRON, ON Semiconductor, OPTEX, OSRAM

OSRAM SYLVANIA, oventrop, overkiz, PEHA, permundo, Plugwise, PM DM Minebea Group of Companies, POSTEL, RAUH SR GmbH, Redring Xpelair Group, Reliable controls

RESOL, RIEDEL, RUSKIN, S+S REGELTECHNIK, SAUTER, Schneider Electric, SECO, sensortec, SIEMENS, SIMICS, SINOBEL

sirlan, SMARTHOME, SODA, somfy, spartan, spega, star, TAIYO YUDEN, TERRALUX, Thomas Research Products, Titus

TORAY, TRIDONIC SYS, ubiant Creative solution for smart building, UCHIDA, USNAP ALLIANCE, Vaillant, VICOS, VIESMANN climate of innovation, VIMAR, VS LIGHTING SOLUTIONS

WAGO, Waldmann, WattStopper, WEINZIERL, wibutler, wieland, WIT, Wurmitzer, YAMAHA, ZigBee Alliance, ZUMTOBEL

... and more than 230 associate members