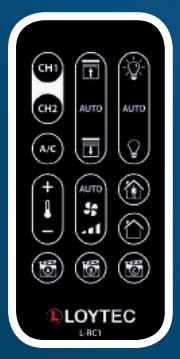
English
01/2018

LOYTEC Express

Magazine for Building Automation



L-RC1 Remote Control

SUPPORT:

IP Network Planning
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PRODUCT NEWS:

LDALI-MS2, LDALI-BM2, LDALI-RM3
and LDALI-RM4, L-RC1, LIOB-585

LOYTEC shines with DALI-2

An Outlook into the Potential of the new DALI-Generation

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LOYTEC Express is a Magazine for customers and friends of LOYTEC.
Owner, publisher and responsible for content:
LOYTEC electronics GmbH, Blumengasse 35, 1170 Vienna, Austria, www.loytec.com
Editor: Mag. David Hammerl, BSc
Authors of this issue: Mag. David Hammerl, BSc, Dipl.-Ing. Hans-Jörg Schweinzer, Dr. Dietmar Loy, Dipl. Ing. Norbert Reiter, Dr. Stefan Soucek-Noe, Dipl.-Ing. (FH) Thomas Pollhammer, Dipl.-Ing. Jörg Bröker, Dipl.-Ing. Dipl.-Wirtsch.-Ing. Harald Hasenclever, Eugen Feichtinger, Dipl.-Ing. Thomas Rauscher, Dipl.-Ing. Marco Liotta, Dipl.-Ing. (FH) Lukas Pilgerstorfer-Lasser, Daryl Clasen, Dipl.-Ing. (FH) Jörg Welskop
Layout and Graphics: Dipl.-Ing. (FH) Lukas Pilgerstorfer-Lasser
Fotos: Mag. David Hammerl, BSc, DI Marco Liotta, Dr. Dietmar Loy, Peter Horvath, Shutterstock, Pixelio, Pexels, Archive, Arkitema Architects

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Dipl.-Ing. Hans-Jörg Schweinzer, CEO
LOYTEC electronics GmbH

Intercultural Business – Like System Integration in Business Life!

Successfully developing business relationships with customers of different cultural backgrounds is still one of the biggest challenges in international business, even in the age of advanced globalization. Mutual understanding and trust are essential when it comes to establishing business relations. Projects can only advance if the involved parties become partners who can rely on each other. This mutual trust has to be established and strengthened through actions. However, we face many challenges in business - sometimes we build them ourselves – especially, if we are not able to interpret statements or actions of our counterparts. Cultural differences are significant even within Europe. Looking at other continents, the differences are often huge. Constant learning and the will to accept the other are the basis for building partnerships that grow and thrive so that great things become possible.

From a technical point of view, big things are possible in our industry, when we implement building management systems that actually work as an integrated whole and do not consist of uncoordinated individual systems that do not know of each other. Unfortunately, the latter is too often the reality these days. As in intercultural business relations, the inter-working of technical systems also focuses on "understanding". Now, more than ever technical specialists from various fields work together to create standards to facilitate effective understanding and cooperation between systems. This is the only way to realize efficient management and the best possible energy management in the future.

The spirit of LOYTEC has always been to develop technical solutions that allow systems within a building to work together effectively. We push ourselves every day and focus on cutting-edge solutions. We always want to be among the first, when it comes to implementing the latest technologies that bring us closer to the goal of the fully integrated and efficient building.

Hans-Jörg Schweinzer

LOYTEC embraces **DALI-2**

by Jörg Bröker

There is a lot of talk about DALI-2 in the industry, but it seems this comes with a fair amount of confusion on the nature of DALI-2. So what is DALI-2 really about and what are its benefits? With this article we try to shed some light on this topic.

The DALI protocol is specified in the IEC 62386 series of standards. The 2009 version of the standards is commonly referred to as DALI-1, while DALI-2 is the 2014 version. So what is the difference between the two? While DALI-1 only covers control gear (drivers, ballasts), DALI-2 standardizes all types of devices typically found in a DALI system, namely application controllers, bus power supplies and all kinds of input devices (sensors, buttons, switches, sliders, touch-panels, and others).

Input devices and application controllers are referred to as control devices and are specified in the new part IEC 62386-103. Other than control gear, these type of devices act as masters on the DALI bus. That is, they can

Dipl.-Ing.
Jörg Bröker
LOYTEC electronics GmbH

As product manager for the L-DALI product family, Jörg Bröker is a master over light and darkness at LOYTEC. The L-IP and L-Switch network infrastructure and the L-STAT network thermostat product lines are also among his competences. After studying computer technology at the University of Technology Vienna, Jörg joined LOYTEC 18 years ago. Before becoming a product manager he made significant contributions to several of LOYTEC's key technology components and products. Currently he is focusing on the evolution of the DALI standard. Since 2017 he has been board member of the DiiA, the DALI user organization.

DALI 2	DALI
Bus power supply (IEC62386-101)	Not explicitly specified
Control devices (IEC62386-103)	Proprietary
Bus (IEC62386-101)	Bus (IEC62386-101)
Control gear (IEC62386-102)	Control gear (IEC62386-102)

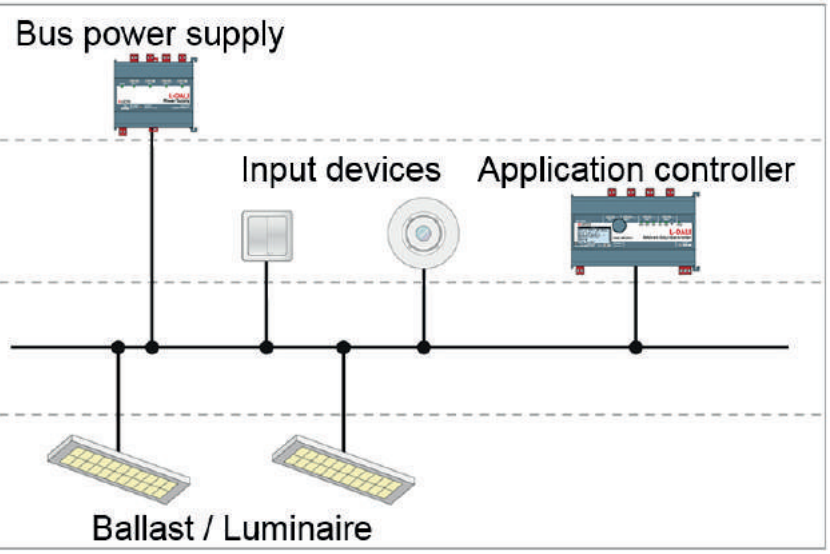


Figure 1: DALI-2 versus DALI-1

actively send messages on the bus. To allow multiple input devices and application controllers on the same DALI channel, multi-master capabilities were introduced in DALI-2. The DALI-2 standard allows up to 64 control devices per DALI channel in addition to the 64 ballasts already permitted by DALI-1.

DALI-2 input devices provide information to application controllers. Typical input devices are multi-sensors (occupancy, lux), buttons, switches and sliders. Each input device consists of one or more instances (up to 32), each providing different information. In addition to a generic instance type, the DALI-2 standard provides detailed specifications for instances of type occupancy, lux level, push-button and absolute input (sliders, rotary switches).

As an example think about a multi-sensor, which provides occupancy and lux level information and has a receiver for IR-remotes. In addition, it also comes with a temperature and humidity sensor. As a DALI-2 device this multi-sensor would provide one occupancy and one lux level instance, multiple push-button instances representing the IR remote and two generic instances for temperature and humidity sensor values.

Information can be read by the application controller using polling (e.g. lux sensor value) or the application controller can configure the input device to actively send out messages in case of certain events (e.g. occupancy detected, button pressed).

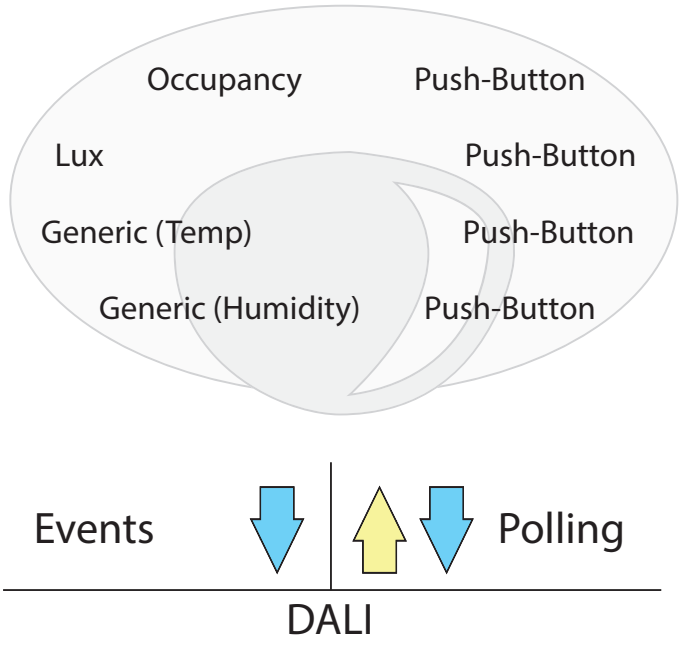


Figure 2: DALI-2 input devices

DALI-2 application controllers receive information from input devices (lux or occupancy sensor values, button events) and control ballasts and luminaires. Optionally they can have an integrated bus power supply. It is important to note, that the DALI-2 standard only covers the DALI interface of the controller, but not the lighting control application or its configuration.

For drivers and ballasts (control gear), DALI-2 mostly brings minor improvements and clarifications, which

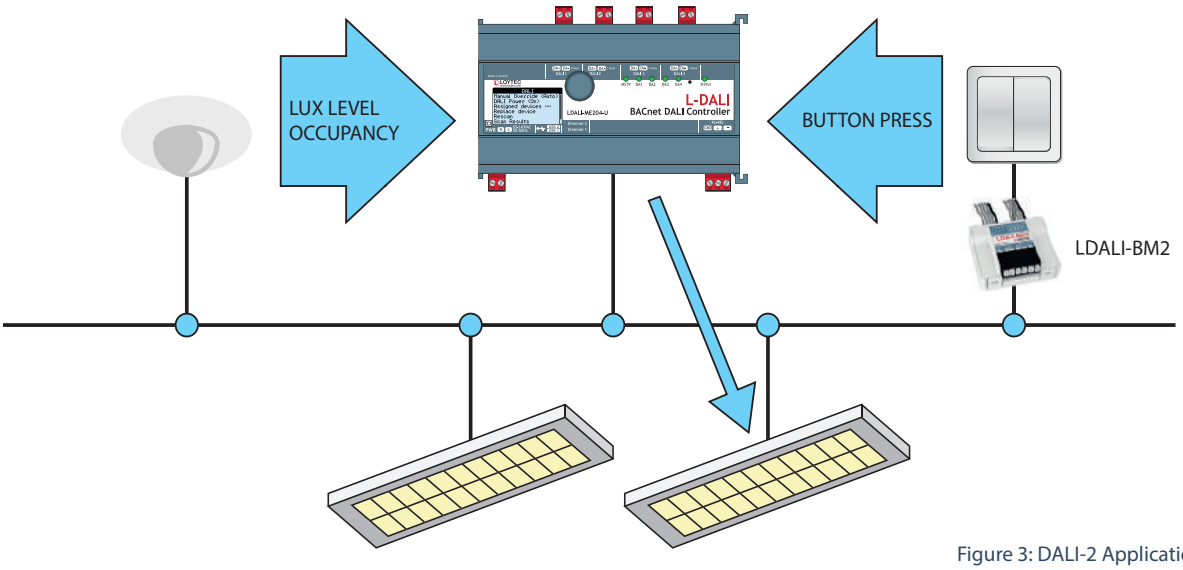


Figure 3: DALI-2 Application Controller

intend to increase interoperability. Most importantly, all changes are backward compatible to DALI-1.

Bus power supplies were not explicitly covered by the DALI-1 standard. For DALI-2 this important device class is specified in the IEC 62386-101 part of the standard. Specifically dynamic and startup behavior are described in every details ensuring electrical interoperability.

DALI-2 Certification for all Device Classes

Another new development in the DALI industry is the founding of a new DALI user organization, the Digital Illumination Interface Alliance (DiiA). While the former DALI-AG as a division of ZVEI was very much focused on Germany, the new organization has a much stronger international focus, making DALI a true worldwide standard.

Most importantly, the DiiA offers certification for all DALI-2 device classes. Rigorous testing performed as part of the certification process ensures conformance in every aspect of the DALI-2 protocol. Only DALI-2 certified products can bear the DALI-2 logo. Luminaires can bear the logo if only DALI-2 compliant components are used. A product database on the DiiA's website lists all DALI-2 certified products. To further improve interoperability the DiiA organizes Plug-Fests, where different manufacturers of DALI components come together to test the interoperability of their products.

The DiiA has received strong industry support right from the beginning. More than 100 companies have already joined the organization. LOYTEC became a regular member – the highest membership level the DiiA offers – early on. Showing our strong support for the DALI technology, we are actively involved in the DiiA's workgroups responsible for defining and improving testing and certification as well as for the promotion of the DALI technology. In April 2017, LOYTECs representative was even elected to the DiiA's board of directors.

Significantly improved Interoperability

What does all this mean for the specifier and the system integrator? Firstly, DALI-2 stands for improved interoperability. Due to the standardization of all components of a DALI lighting system, certification of products and plug-fests, DALI interoperability problems will become history.

Secondly, with the introduction of DALI-2 input devices, we will see DALI-2 multi-sensors, button panels, push-button couplers and similar devices from various vendors appear on the market. Specifiers and system integrators will have a large selection to choose the products best suited for their project. With competitive pricing, lower wiring costs, and a simple commissioning process , why use a KNX sensor anymore, when the same device is available and you get the same sensor with the DALI-2 interface?

Now, after this general view, what is LOYTEC plan-

ning in terms of DALI-2? In short: our DALI products will support DALI-2 in the near future.

LOYTEC will support DALI-2 for all DALI Products

Let's start with the simplest one: Our DALI bus power supplies LDALI-PWR4-U and LDALI-PWR2-U, which were the first DALI-2 certified bus power supplies on the market. For our controllers with a DALI interface – the L-DALI and L-ROC product lines – we have already started the DALI-2 certification process. The integration of DALI-2 input devices and ballasts is already supported starting with firmware 6.3. When it comes to our multi-sensor and push-button connector, we took the chance and used the transition to DALI-2 to introduce a new product generation.

The LDALI-MS1 multi-sensor will be replaced by a LDALI-MS2. Besides DALI-2 compliance, it comes with an improved presence detection zone diameter of 10.8 m at 3 m mounting height. An increased number of detection zones guarantees a finer detection resolution. Thus, the sensor is optimized for use in typical office environments, where even the small movements of somebody working at a desk have to be detected across the complete detection area. Similar lux sensor resolution and range were improved to precise constant light control even at low lux levels.

Like its predecessor, the LDALI-MS2 comes with a receiver for IR remote controls. Together with the LDALI-MS2 LOYTEC will introduce the L-RC1 remote control as an optional accessory. The L-RC1 is optimized for room automation applications, allowing control of the room lights, sunblinds and HVAC system. It supports individual control of up to two channels (groups of luminaires/blinds) and scene control.

L-RC1 Remote Control

On the back of the sensor, there is a connector for three digital inputs, allowing the connection of conventional switches and push-buttons, window contacts, dew point sensors and others. This feature not only saves on additional hardware, but also significantly reduces wiring costs, as the inputs are wired inside the room and wires no longer have to be pulled to the IO modules in the switching cabinet.

In addition to occupancy and lux sensors, the LDALI-MS2 comes with integrated temperature and humidity sensors. In room automation applications those values can be used to calculate the current dew point. The LDALI-MS2 will come with three mounting options: It can be mounted in-wall in standard boxes, spring snap in false ceilings and on-wall with the included surface mounting box. Finally, the power consumption of the device was reduced. The result is less current consumed from the DALI bus power supply. In turn, more bus-powered devices can be connected to one DALI channel.


LDALI-MS2 Multi-Sensor

LDALI-PWR4-U Power Supply

New Generation of DALI Field Devices is coming

The LDALI-BM2 input module replaces the LDALI-BM1. Similar to the LDALI-MS2 it will be DALI-2 compliant and will consume less bus power than its predecessor. The housing was optimized for mounting behind standard switches. Similar pre-confectioned wires drastically reduce installation time. Like its predecessor, it comes with four inputs. However, on the LDALI-BM2 two of those inputs are universal inputs, while the other two remain digital inputs only. For the digital inputs, the maximum

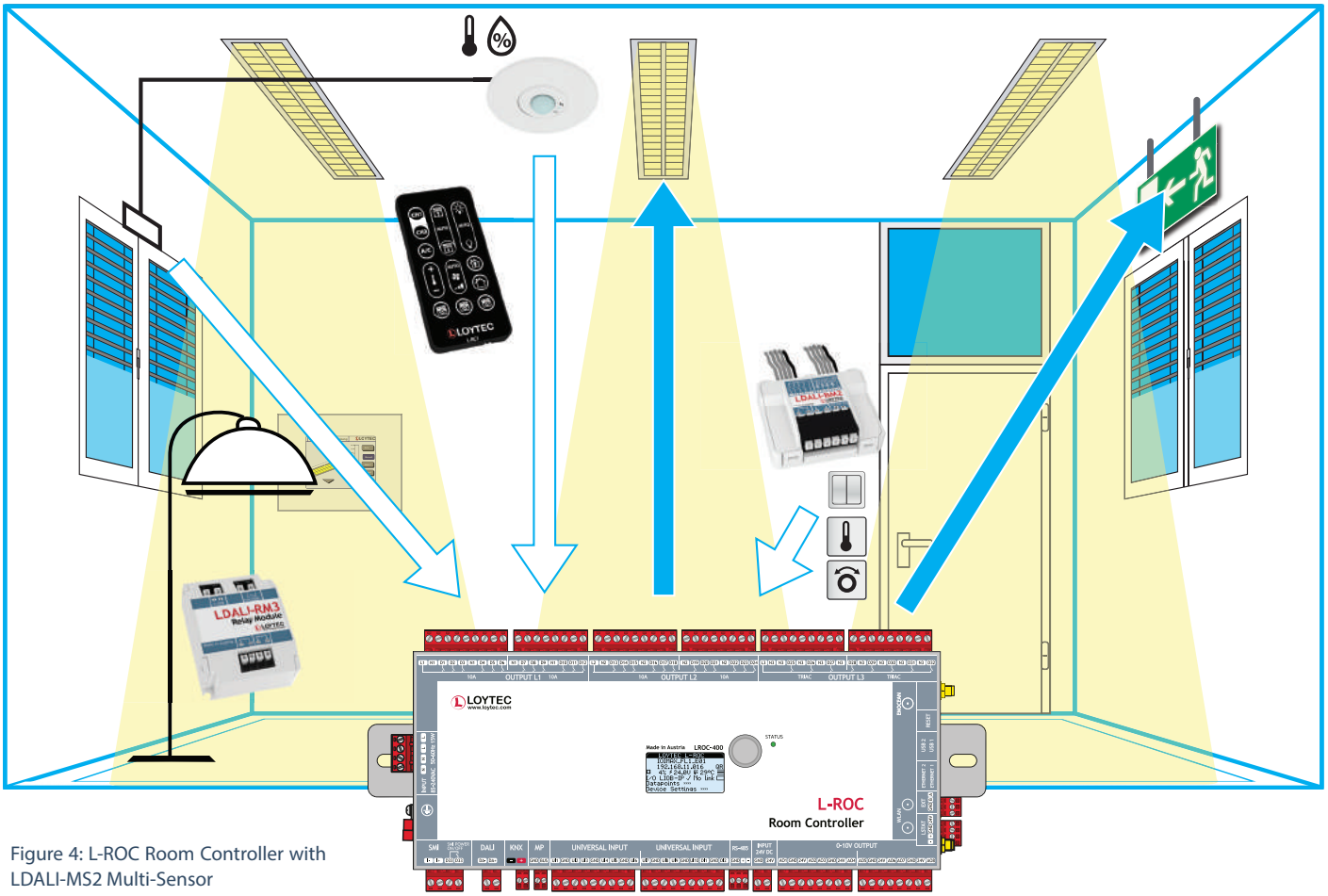


Figure 4: L-ROC Room Controller with LDALI-MS2 Multi-Sensor

wire length was increased to 10 meters. The possibility to connect switches and buttons from multiple locations, allows optimal usage of the devices inputs. Again, digital inputs allow connecting conventional switches and push buttons as well as window contacts, partition wall sensors and more. In addition, the universal inputs can be used to connect sliders, potentiometers, dials, rotary switches and even NTCs. This makes the LDALI-BM2 the ideal device to equip simple room operation devices with a DALI-2 interface.

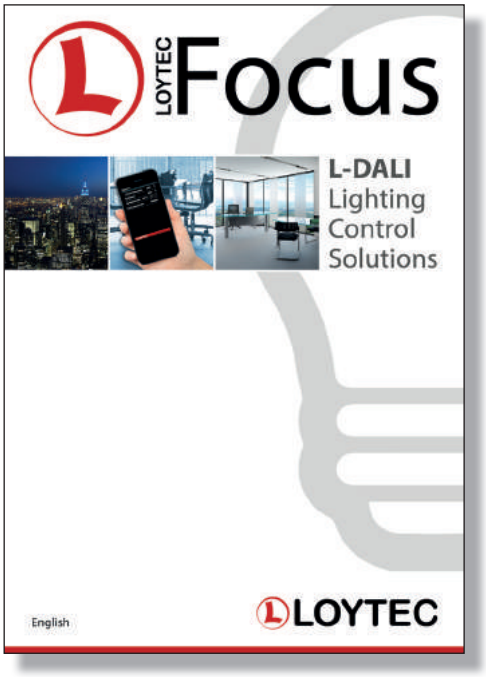
DALI-2 – Thinking beyond Lighting

With the introduction of DALI-2 input devices, DALI is no longer only a bus system restricted to lighting applications. Rather, DALI-2 can and will be used as a low cost, simple to wire sensor bus in room automation applications. With all its inputs the LDALI-MS2 Multi-sensor and the LDALI-BM2 input module allow the connection of all the inputs typically found in a room, from window contacts to simple room operation devices. This makes it a perfect match for LOYTEC's L-ROC room automation controller. Using DALI-2 input devices on the L-ROC's DALI channel and connecting sensors and other inputs in the room to those input devices, instead of to the controllers IOs, saves on controller IO usage and significantly reduces wiring costs as all wiring is done within the room.

LDALI-BM2 Push-Button Coupler

Conclusion

With DALI-2 the industry is taking a big leap forward. The DALI-2 certification program will further improve compatibility and interoperability, while the introduction of DALI-2 input devices will increase the number of DALI sensors, buttons and similar input devices. The result is that more and more devices will be available to choose from. LOYTEC will support DALI-2 in its complete DALI product range. In the cause of this transition, a new generation of DALI field devices – multi-sensor and push button coupler – will be introduced not only supporting DALI-2, but also coming with many improvements and new features.



L-FOCUS: L-DALI Lighting Control Solutions

L-FOCUS is an information brochure about LOYTEC automation solutions. The focus of this edition is on our intelligent L-DALI Lighting Control Solutions.

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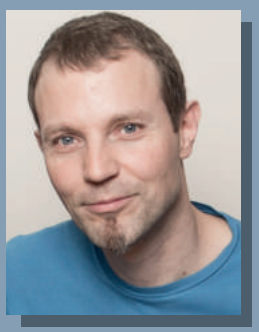
IP Network Planning in the BMS Context

by Thomas Pollhammer

Modern IP based networks make it possible to connect the devices of a Building Management System (BMS) in a proven way for a reasonable price. Once the floor and room plans are available and the requirements are specified, the system integrator can start the BMS planning activities. The result is a long list of LOYTEC devices that will be connected to a large extent within an IP network. In order to ensure system reliability such a network requires careful planning.

Availability of Technical Systems

The primary purpose of a network is to transfer data between devices that are typically not located in the same place. When the customer presses the "ON" symbol on an L-VIS touch panel, he probably expects the lights to go on. This is not only the desired behavior in this very moment, but any time. This behavior is defined by the term "availability" in the context of distributed systems, which is referring to the probability that a system is



DI (FH) Thomas Pollhammer
LOYTEC electronics GmbH

Thomas Pollhammer is employee in the support department of LOYTEC electronics GmbH, where he started to work only in October 2017. Mainly responsible for custom applications, he currently pursues the part-time bachelor studies "Information- and Communication-Systems" at the University of Applied Sciences Technikum Wien. In 2000, he already received a diploma after successfully completing Electronics studies at the same university.

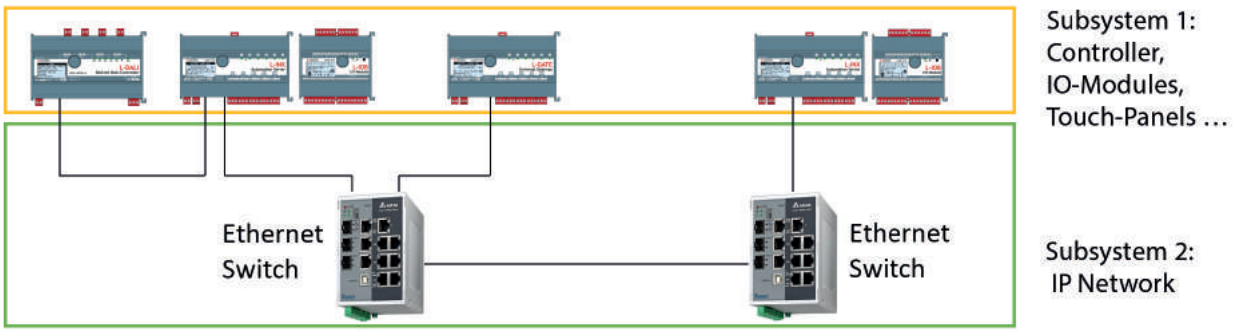


Figure 1: Subsystems in a BMS

ready for immediate usage at a given moment. [1] High availability is a system characteristic in case it exceeds 99.99%, which reflects in a maximum downtime of 53 minutes per year. [4] The term "downtime" refers to the duration when a system is not available. However, it does not include planned downtimes for e.g. maintenance activities.

It is important to keep in mind that the overall system availability is the result of the multiplied subsystem availabilities. Let us assume that the availability of a composition of LOYTEC devices equals 99.7%, resulting in a maximum downtime of 26.3 hours per year. If the availability of the underlying IP network is only 98.3%, the total availability will be 0.997 x 0.983=0.98=98%. This allows a maximum downtime of 175 hours per year after all. Illustration 1 shows an example for subsystems in a BMS.

In case a network switch connecting an L-DALI controller to an L-VIS display fails, the light cannot be switched manually, as the IP datagrams sent by the display will not be forwarded to the light controller. Hence, all network components must be considered as essential parts of the system. This article deals with the increase of an IP network's availability by applying redundancy in order to reach the required availability of the overall system.

Failure Tolerance and Redundancy

Manufacturers of electronic devices specify the Mean Time between Failure (MTBF), which is defined as the average operating period between failures. Nevertheless, as it is a statistical value, it has little relevance to the actual lifetime of a specific device. It cannot be guaranteed that a specific device will operate without failure for e.g. five years. Choosing a high quality product is a first reasonable step, but the key factor is redundancy. Redundancy means the multiple existence of subsystems performing the same tasks in parallel. This allows at least one subsystem to fail without limiting the functionality of the overall system.

Of course, redundancy implies higher efforts in regards to documentation and investments. On the other hand, it eliminates a so-called Single Point of Failure, which causes an overall system outage when failing. Thus, redundancy increases the availability.

Topology Dependent Failure Tolerance

The choice of topology is another factor, which determines the degree of availability. The physical topology of a network describes the arrangement of all components including their connections. [2] Common topologies are the star or the linear Daisy Chain, as they can be easily implemented at low costs. But as both of them include Single Points of Failure, the system availability will be reduced. Once the switch, which constitutes the central component of the star, fails, communication between the connected devices is not possible anymore. In the linear Daisy Chain topology, a failing Ethernet port will partition the network into two subnets, disabling the communication between devices connected to different subnets. In contrast, the ring accepts a broken cable, a failing port or even device without limiting network access of the other devices. Because of this advantage, this article mainly focuses on the ring topology. The described failure scenarios are illustrated in figure 2.

Ethernet Switch Requirements

When using unmanaged Ethernet switches, the ring topology will enable a broadcast storm once a device within the ring sends a broadcast message. In such a case a datagram will circulate endlessly while consuming the available bandwidth (see figure 3). This will cause a communication breakdown between the devices, as the

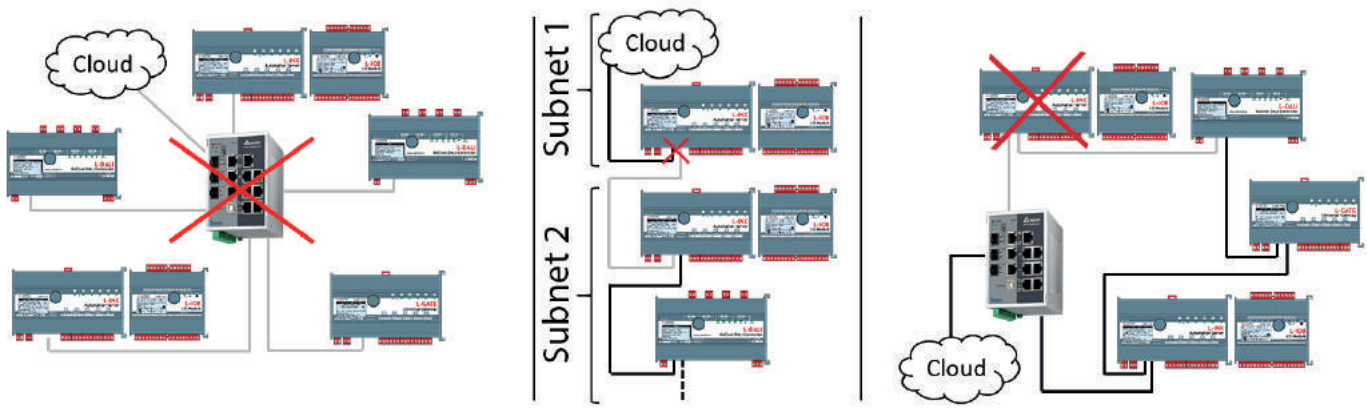


Figure 2: Examples for failure scenarios in the network topologies star (central switch fails), linear Daisy Chain (Ethernet port 2 fails on upper L-INX controller) and ring (upper L-INX controller fails).

network becomes unusable. Therefore, loops are not allowed between two ports of an unmanaged switch.

In order to solve the problem, a managed switch supporting the Spanning Tree Protocol (STP) or one of its improved successor protocols Rapid STP or Multiple STP can be used. The STP forces one of the two ports of the same ring to a hot standby mode, which deactivates the port, but allows immediate activation if needed. [3] The deactivation of one port breaks the loop and consequently prevents broadcast storms (figure 4).

In case a device in the ring fails, the deactivated port of the switch will be activated, as soon as the automatically performed configuration update is completed. This will enable network access for all devices except the failing one (figure 5).

The previously mentioned protocols Rapid STP (RSTP) and Multiple STP (MSTP) should be preferred over the STP, as it takes the STP about 30 to 50 seconds to perform a reconfiguration when the topology changes due to a failing device. In contrast, RSTP does the same job in only five to six seconds. After that time the network is usable again. MSTP is used in case that VLANs shall be addressed to an MSTP instance for a separate monitoring regarding topology changes. However, as this currently is of minor importance in the BMS context, RSTP is the recommended protocol.

Please note that the Delta DVS-110W02-3SFP Switch (figure 6) has recently been added to our product portfolio. This industrial 10-port Ethernet switch is a managed switch, and poses the network component used within the proposed topologies throughout this article. Besides the DIN rail mounting capability, the robust switch offers a redundant power supply, and a wide operating temperature range. As it is normal for managed switches, it comes with manifold configuration options, supporting the protocols STP, RSTP, and MSTP. In addition to the seven Fast Ethernet ports, three Gigabit ports are available offering access via 10/100/1000Base-T or optical SFP

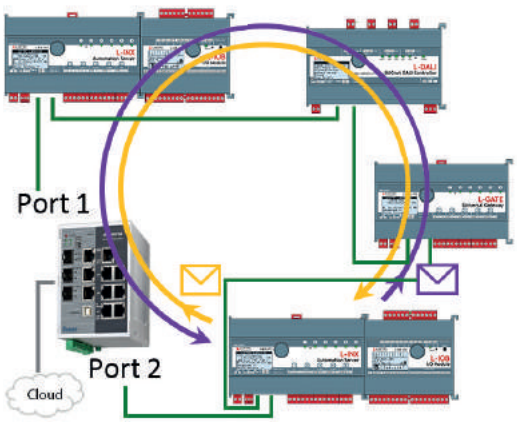


Figure 3: A broadcast message circulates endlessly within the ring while consuming the total available bandwidth. This is called a broadcast storm.

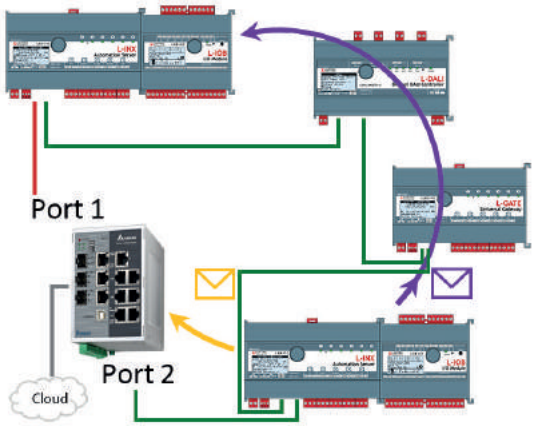


Figure 4: By setting port 1 to standby mode via STP, the switch does not pass on the message. This effectively prevents a broadcast storm.

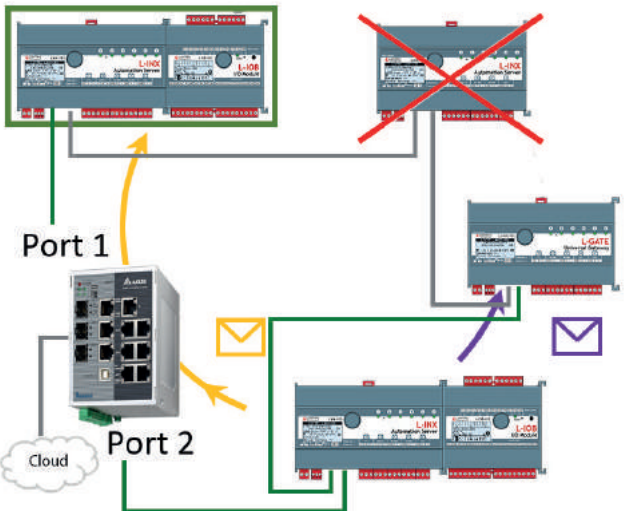


Figure 5: The STP automatically detects the failing device and activates port 1, so that the green bordered L-INX controller will be integrated into the network. Hence, the network is accessible for all operating devices.

connectors. Furthermore, the unmanaged switch Delta DVS-008I00 has been integrated in the product portfolio as well. As of now, LOYTEC offers the underlying IP network infrastructure in addition to the BMS solutions. And of course, comprehensive technical support will be provided for the Delta switches just like for all other LOYTEC products.

BMS Topologies

The recommended maximum number of devices used in a ring is twenty. In order to keep the cabling effort low, every ring should only connect devices located in the same floor. Furthermore, care should be taken not to connect devices in rented sectors of different customers, so that in case of a failing device only one tenant will be affected. Hence, it might be required to install more than one ring per floor. Summarizing these considerations, a topology as illustrated in figure 7 is a possible outcome.

This topology allows the installation of maximum four rings per level, as the Delta DVS-110W02-3SFP is equipped with ten ports, from which dependent on the floor one or two are reserved for the communication to the floors above and below or to the internet. The discussed network topology implements redundancy within the rings, but unfortunately the switches pose a single point of failure. If one of the switches fails, the connected devices will be isolated from the rest of the network. And as the vertical data traffic between the floors also runs over the switches, it will be interrupted.

The example in figure 8 shows the consequences in case that switch 2 fails. No data can be transferred between the floors; as a result, data points from devices in floors 2 and 3 cannot be accessed from the internet.

The described problem can be solved by implementing additional redundancy. For that purpose, the devices in the same ring are connected to two switches instead of one, while the ring is closed in the top floor. Using such a topology, the Delta DVS-110W02-3SFP allows creating eight rings per floor, as only two of the ten ports are needed for data transfer between the floors or for connecting to the internet.

At the expense of using a second switch per floor, the maximum number of rings doubles to eight and increases the degree of network availability. Figure 9 shows an example, in which switch 21 fails. Obviously, all devices still can access the network thanks to the redundant switches.

If the system requires a higher availability, additional redundancy for example by implementing a mesh topology between the floors must be applied. The availability gain causes more effort for the cabling while reducing the maximum number of rings, as more ports are reserved for the vertical data transfer. The benefit finally is that this topology allows one random switch per floor to fail without restricting the network access of any device (figure 10).

Figure 6: DVS-110W02-3SFP Managed10-Port Ethernet Switch and DVS-008I00 Unmanaged 8-Port FE Ethernet Switch

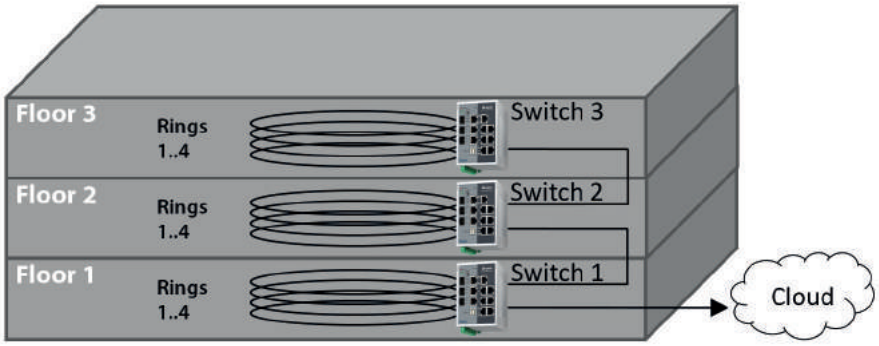


Figure 7: Example topology for a three-level office building. As one ring allows to include up to twenty devices, four rings enable the usage of maximum eighty devices per floor. Tip: if less than four rings per floor are required, a switch can be used to connect rings in different floors, in order to reduce the number of switches.

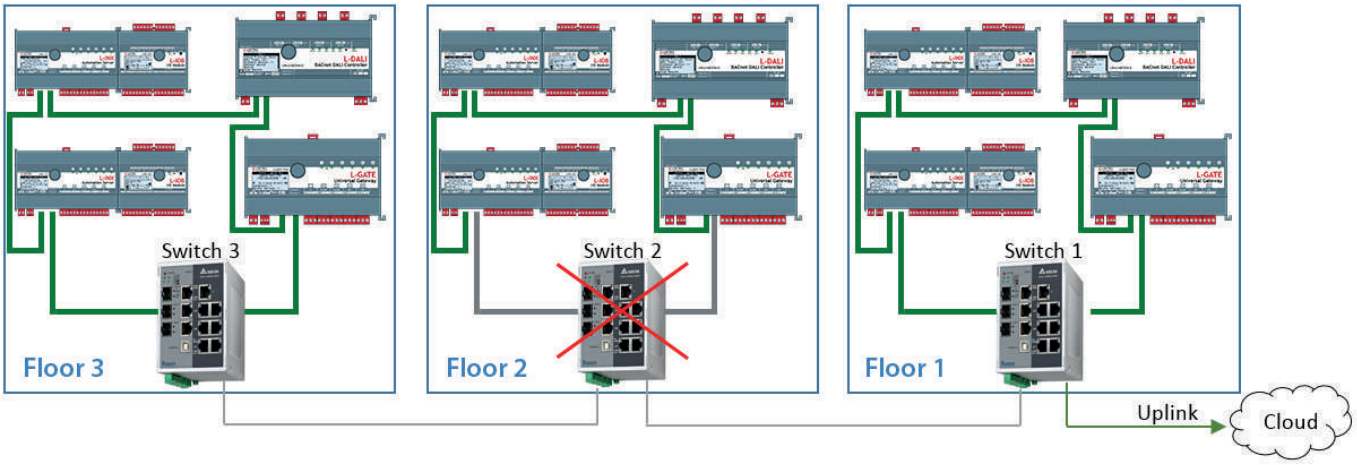


Figure 8: In the example shown in figure 7, the switches constitute a single point of failure. The failing switch 2 interrupts the vertical communication between the floors as well as the access to data points on devices located in floors 2 or 3 via the internet. The illustration shows only one ring per floor for the sake of clarity.

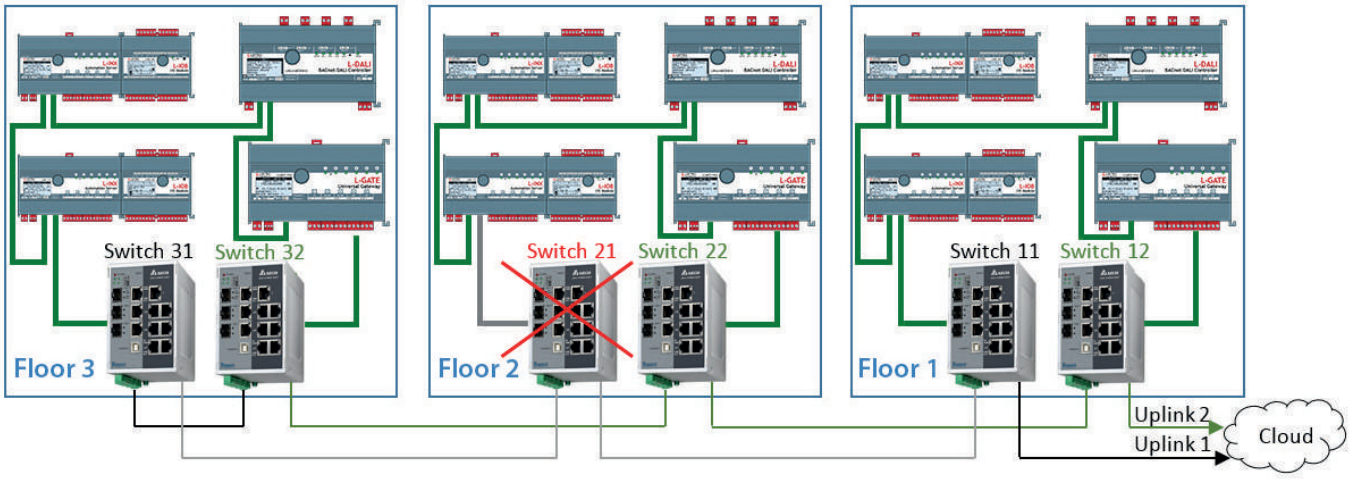


Figure 9: A failure of switch 21 does not cause a restriction related to network access for any device. An additional failure of switch 11 and/or 31 is still no problem, as all devices are connected via switches 12, 22, and 32. Nevertheless, if one of the switches 12, 22, or 32 fails in addition to switch 21, the data transfer becomes affected internally as well as from the internet point of view. In the worst-case scenario, only one switch in the whole building may fail while maintaining full availability. However, it should be considered that the probability for two switches failing at the same time is very low, particularly in small systems.

Conclusion

When specifying the requirements of a BMS based on an IP network, the system integrator should be made aware of the benefits that come with a higher degree of availability. Through an example, table 1 gives a rough indication about the relation of topologies and the costs for the required IP network components. A significant savings potential exists if the number of rings per floor is small enough, so that switches can be used to combine rings located in different floors. This reduces the number of required switches and hence the costs.

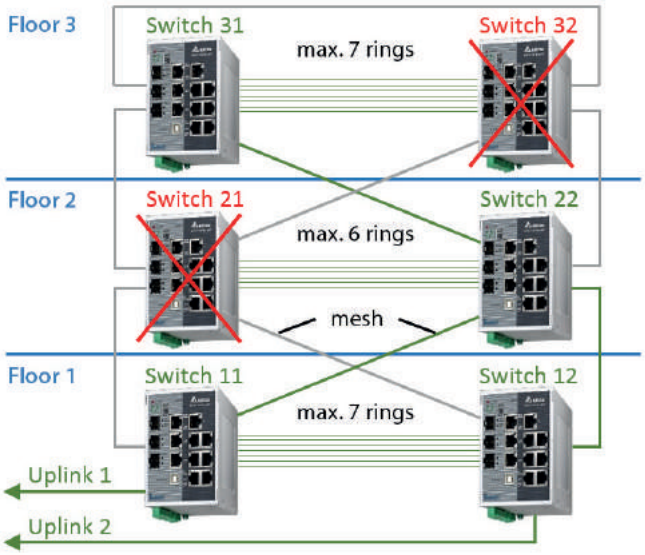


Figure 10: Thanks to the implementation of a mesh between the floors, one random switch per floor may fail without affecting the network access for any device. The green connections highlight the paths to the operating switches that allow access to all devices in the network.

Topology		Redundancy	Cable length [m]	48-port switches	10-port switches	Invest [€]
Star	*Center node in ground floor (just for reference)*	-	*8624*	*4*		*14.624*
Ring	1 non-redundant switch per floor (see fig. 8)	low	2672		8	10.592
	2 redundant switches per floor (see fig. 9)	medium	2672		16	18.512
	2 redundant switches per 2 floors	medium	2736		8	10.656
	2 redundant switches per floor plus mesh (see fig. 10)	high	2728		16	18.568
	2 redundant switches per 2 floors plus mesh	high	2792		8	10.712
	2 redundant switches per 4 floors plus mesh	high	2792		4	6.752

Table 1: Topology comparison regarding investment. The following assumptions were made:
Office building with eight floors, floor area 60m x 30m, floor height 4m, 22 L-ROC per floor, two rings per floor
Costs: 48-Port Ethernet switch: €1.500, Delta DVS-110W02-3SFP: €990, Ethernet cables: €1 per meter
Average cable length: Star: 33m horizontally (average distance on a floor from the riser to a device)
Ring: 15m horizontally (average distance between devices), 16m vertically

References:
[1] A. Tanenbaum, M. Van Steen. Distributed Systems: Principles and Paradigms. Upper Saddle River, NJ: Pearson Education, Inc., 2nd edition, 2006.
[2] D. Groth, T. Skandier. Network+ Study Guide. Sybex, Inc., 4th edition, 2005.
[3] M. Pustylnik, M. Zafirovic-Vukotic, R. Moore. Performance of the Rapid Spanning Tree Protocol in Ring Network Topology. White Paper, 2007
[4] Page "Verfügbarkeit" in Wikipedia. Editing date: October 23, 2017, 16:26 UTC.
URL: https://de.wikipedia.org/wiki/Verf%C3%BCgbarkeit (called up: February 19, 2018, 13:30 UTC)

Winner of China's Intelligent Building Brand Awards

Delta's LOYTEC BMCS (Building Management & Control System) has been accoladed with the honor of being one of the "Top Ten Building Automation Brands"

December 7, 2017 - Winners of the Intelligent Building Brand Awards came forward at the climax of the 18th China International Building Intelligence Summit, the annual premier event for the Building Automation Industry. Once again, Delta's LOYTEC Building Management and Control System (BMCS) received accolades as one of the "Top Ten Building Automation Brands" based on its innovation and merits as an industry-leading intelligent building solution, as well as excellent market performance.

General Manager You Wen-ren, of Delta Greentech, remarked, "In line with the rapid development of the intelligent building construction market, Delta has very successfully leveraged its own product development and technological innovations to create comprehensive energy-saving intelligent building solutions that provide customers with a safer and more comfortable, efficient and reliable green-energy building environment." This award recognizes the high level of customer acceptance of Delta's LOYTEC Building Management and Control System.

Top 10 Building Automation Brands

With its proven customer recognition, Delta's LOYTEC BMCS confers a high integration capability that centers around building operator needs for diverse systems as such

as the Building Management System (BMS), Building Automation (BA), Intelligent Lighting System, Energy Efficiency Metrics System, Office Automation System, Touch Screen Solution, Building Network Infrastructure and other intelligent building solutions. As an organic whole the LOYTEC BMCS helps customers achieve both building energy efficiency and occupant comfort.

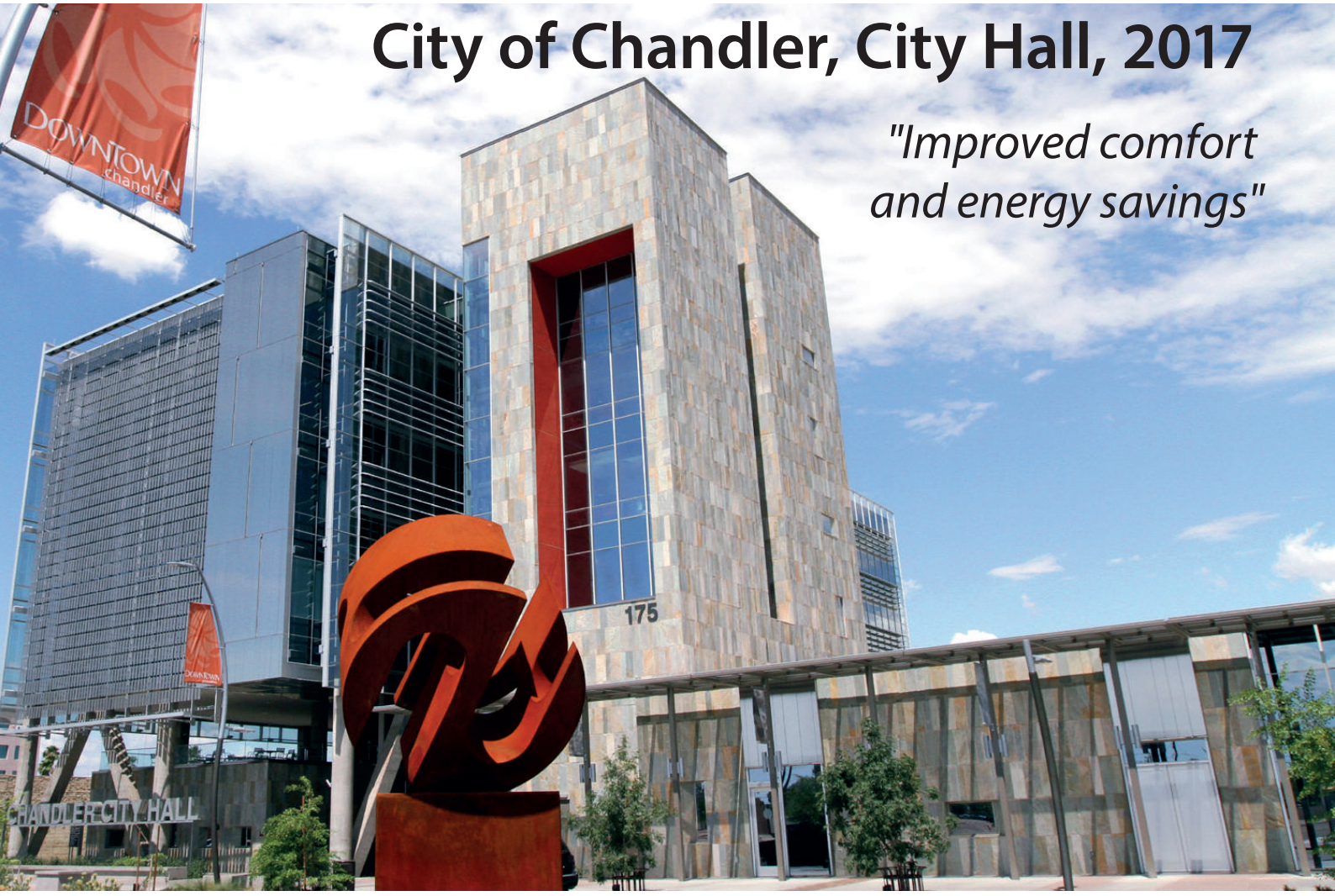
The "Oscars" of the intelligent building industry

Outstanding Performance

The Intelligent Building Brand Awards are widely acclaimed in China as an award of distinction in the intelligent building industry. It is judged and presented by the innovative QianJia Smartech in conjunction with its Qianjia Brand Lab. Winners are selected among many contestants based on effective data acquired by QJ Smartech that specifically focuses on brand presence, market survey & analysis, user feedback, expert reviews and user votes. The Intelligent Building Brand Awards encourage and promote highly achieving companies that have demonstrated outstanding performance with their annual brand-building endeavors, and it has become known as the "Oscars" of the intelligent building industry.

City of Chandler, City Hall, 2017

"Improved comfort and energy savings"



With a recent City Hall project the City of Chandler is once again using LOYTEC products in order to benefit from energy savings. Back in 2012 LOYTEC Competence Partner Mechanical Products Building Automation System, Inc. (MPBAS) completed an impressive project in the region.

The new project involves a building complex consisting of several buildings: a parking garage, a single story house, and a five-story building. In order to implement a modern retrofit solution several LOYTEC L-INX and L-IOB products are used.

Previous Conditions

Before the modernization there were issues to stabilize temperature conditions especially in large areas. Also the underfloor AHU supply fans did not control together. The underfloor system is a common duct between 2 AHUs on every floor. One AHU did run its VFD much higher than the other, adding this inconsistency across each floor. Furthermore, the supply duct static and supply temperature control did not include any kind of reset factors. The building occupants reported temperature issues throughout all the buildings due to sporadic supply fan and supply temperature control. Another issue was the FT-10 based communication which was very slow and unreliable, and caused controllers to be consistently shown as offline. In addition, the system in use (HMI) was not user friendly and was not a part of the city standard. Most graphics had broken datapoints.

Proposed Solutions

MPBAS's proposed modernization addresses the issues stated above and involves replacing the former controllers with new LOYTEC L-INX controllers (LINX-113 / LINX-121) and also eliminates and breaks apart FT-10 channels. To allow for demand control from the VAVs to AHUs to CP

a custom sequence of operations is provided. In addition, an advanced reset functionality was implemented - Supply Duct Static Reset, Supply Temperature Reset, Building Chiller Water Pressure Reset, or Chiller's Chilled Water Supply Temperature Reset. Another achievement of the project was to provide an HMI based on the City's standards with newly designed unit report pages.

As an IP based system, the communication between the controllers is extremely fast and reliable. The HMI pulls data from all controllers within milliseconds to populate each graphical screen. A further improvement is the addition of Advanced Reset logic to all LOYTEC Controllers - to supply just enough Outside Air, Duct Pressure, & Supply Temperature as requested by all connected FT-10 based VAV systems. Reset logics are also included at the very top level of the central plant, to only provide what is requested for Chilled Water Pressure and Temperature by all connected units with chilled water coils.

Improved Comfort and Energy Savings

The City of Chandler's facilities group is extremely happy with the results. Temperatures throughout spaces are more consistent and with the implementation of all of the reset logic, energy bills have decreased considerably.

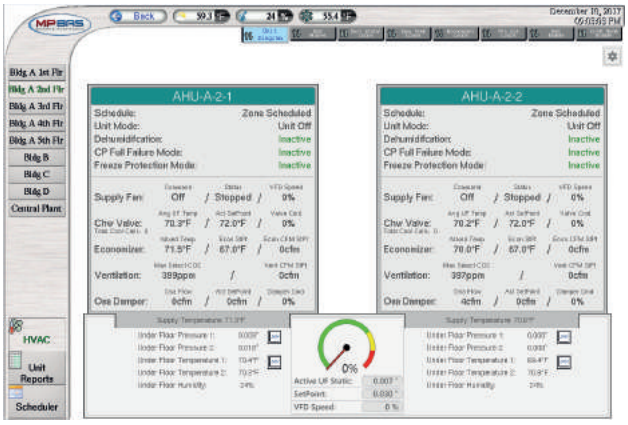


Figure 1: AHU A-2-1 and AHU A-2-2 Status Screen

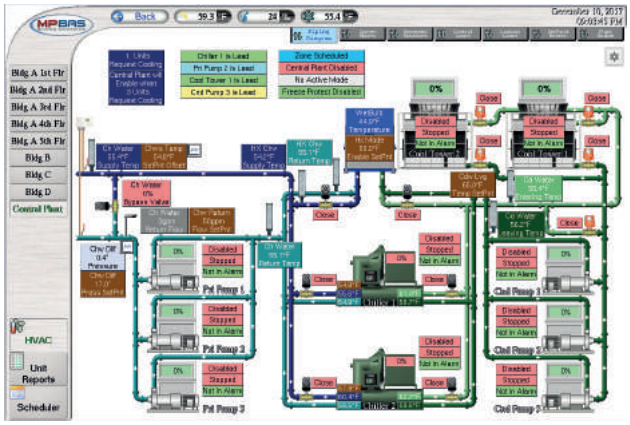


Figure 2: Central Plant Status Screen

FACTS	
Location	City of Chandler, Arizona, USA
Companies involved	MPBAS, Mechanical Products Building Automation Systems Inc.
LOYTEC components	13x LINX-113 Automation Servers 5x LINX-121 Automation Servers 18x LIOB-101 I/O Modules 2x LIOB-102 I/O Modules 17x LIOB-103 I/O Modules 4x LIOB-150 I/O Modules 7x LIOB-151 I/O Modules 1x LIOB-152 I/O Modules 4x LIOB-154 I/O Modules

Buildings under Control Symposium 2017

Here are some impressions of our Buildings under Control Symposium 2017. From October 3 - 6 Tech Gate Vienna was the venue for the sixth installment of our expert conference. Interesting presentations, lively expert discussions, socializing and networking were on the agenda. On the first two days the symposium was held in English language, on the latter two days the symposium was repeated in German.

Open House Tour, 10th Anniversary Wine & Dine Tour

In addition to our Buildings under Control Symposium, LOYTEC hosted two side events.

On October 2, we started off with the Open House Tour at LOYTEC HQ, a great opportunity to see LOYTEC at work, to socialize and network and take part in lively expert discussions, while enjoying fine wines and delicious snacks. On Saturday 7, Hans-Jörg Schweinzer hosted a very special tour to celebrate 10 years of BUCS in his home region of Wachau. On the agenda were a guided tour of Melk Abbey, lunch at Gasthof Prankl with a panoramic view of the river danube, wine tasting at Loisium Weinwelt below the city of Langenlois, and finally dinner at Weinresidenz Sonnleitner, where local products are mixed up with international ingredients for a nice variety.

Boston, USA

GREENBUILD
INTERNATIONAL CONFERENCE AND EXPO

From November 8–10, 2017, we presented our products and solutions at Greenbuild, the worlds largest conference and expo dedicated to green building, in the USA.

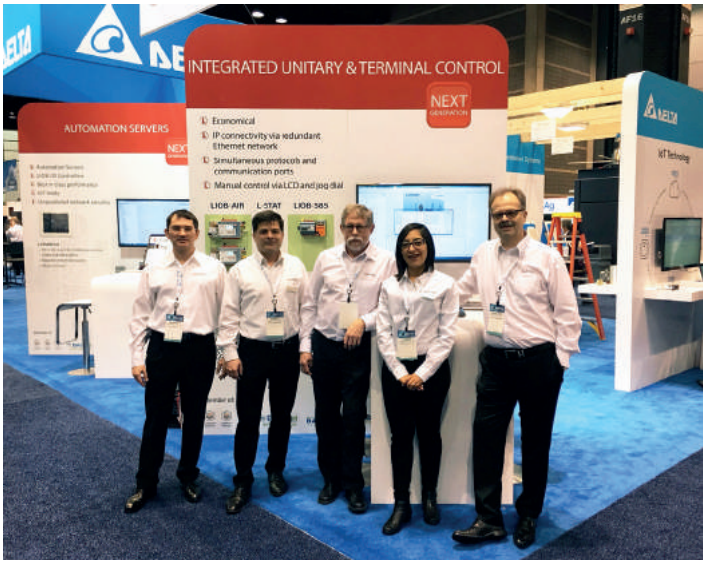
From February 6 - 9, LOYTEC product solutions were experienced at first hand at the VSK 2018 in the Netherlands. Here are some pictures of the booth from LOYTEC Competence Center Vedotec! Our LOYTEC team was on site and we were happy to present our solutions together with a strong business partner.

SMART BUILDING EXPO

Fiera Milano, November 15 - 17, 2017

For LOYTEC the SMART BUILDING EXPO 2017 (November 15 - 17) in Milan was the first opportunity to present itself in public after the creation of new offices in Italy, and has met with great success.

The availability of an interactive demonstration panel has made it possible to highlight the versatility and comprehensiveness of our product portfolio. We had the opportunity to show our existing solutions and future products to end customers and designers, and it was great for us to be able to respond to all of their requests. The value of the fair's success is enhanced by the sharing stand with Delta Energy Systems and its Energy Management proposals: a vivid step for the near future.



AHR EXPO
CHICAGO JAN 22-24 2018

Shortly before our L-EXPRESS deadline, we recieved some last minute photos from Chicago. At AHR 2018 our LOYTEC team had the opportunity to show solutions and future products to customers and designers. For the first time the upcoming LIOB-585 I/O Controller was presented.

PRODUCT NEWS

01 New LDALI-MS2 Multi-Sensor

The LDALI-MS2 Multi-Sensor supports DALI-2 and comes with an improved presence detection zone diameter of 10.8 m at 3 m mounting height.

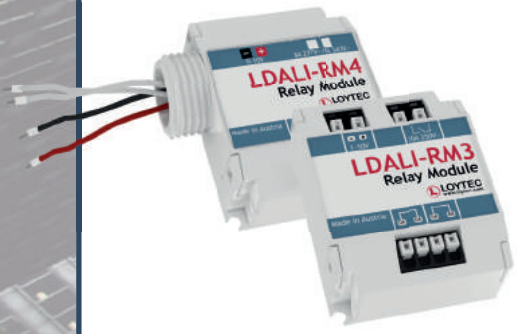
An increased number of detection zones guarantees a finer detection resolution. Thus, the sensor is optimized for use in typical office environments, where even the small movements of somebody working at a desk have to be detected across the complete detection area. Similar lux sensor resolution and range were improved to allow precise constant light control even at low lux levels.

Like its predecessor LDALI-MS1, the LDALI-MS2 comes with a receiver for IR remote controls. Together with the LDALI-MS2 LOYTEC will introduce the L-RC1 remote control as optional accessory.

On the back of the sensor, there is a connector for three digital inputs, allowing to connect conventional switches and push-buttons, window contacts, dew point sensor etc. This feature not only saves on additional hardware, but also significantly reduces wiring costs, as the inputs are wired inside the room and wires no longer have to be pulled to the IO modules in the switching cabinet.

In addition to occupancy and lux sensors, the LDALI-MS2 comes with integrated temperature and humidity sensors. The LDALI-MS2 will come with three mounting options: It can be mounted in-wall in standard boxes, spring snap in false ceilings and on-wall with the included surface mounting box. Finally, the power consumption of the device was reduced. This results in less current consumed from the DALI bus power supply. In turn, more bus-powered devices can be connected to one DALI channel. The LDALI-MS1 multi-sensor will be replaced by a LDALI-MS2.

02 The new LDALI-RM3 and LDALI-RM4 Relay Modules



The LDAL-RM3 relay module allows the integration of non-DALI luminaires or other loads that are controlled by the L-DALI controller together with lighting. Typical application scenarios are fans in toilets or washrooms and motors for partition walls or screens that should be moved up or down based on a scene selected. Its 1-10V interface even allows controlling legacy dimmable ballasts.

03 The new LIOB-585 I/O Controller

LIOB-585 I/O Controllers are programmable and multi-protocol Automation Station with I/O and graphical visualization. The LIOB-585 is designed to efficiently implement Unitary and Terminal applications in a compact form factor. The integrated differential pressure sensor, I/O and MP-Bus port provide connectivity to actuators and sensors. In addition, the RS-485 port allows connection of the L-STAT wall module for temperature, air quality measurement and user interaction. To satisfy and migrate from legacy BACnet systems the port can be used for BACnet MSTP to help transfer aging systems to a modern architecture.

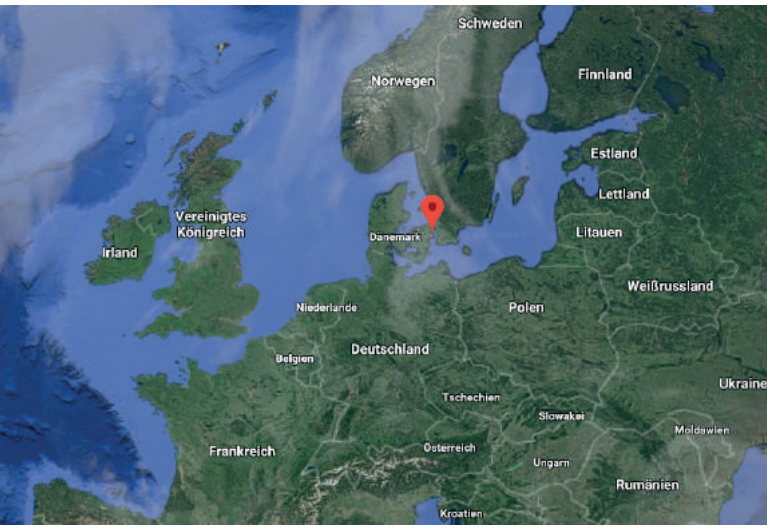
04 The new LDALI-BM2 Pushbutton Coupler

The LDALI-BM2 Pushbutton Coupler will be DALI-2 compliant and will consume less bus power than its predecessor LDALI-BM1. The housing was optimized for mounting behind standard switches. Similar pre-confectioned wires drastically reduce installation time. Like its predecessor, it comes with four inputs. However, on the LDALI-BM2 two of those inputs are universal inputs, while the other two remain digital inputs only. For the digital inputs, the maximum wire length was increased to 10 meters. The possibility to connect switches and buttons from multiple locations, allows optimal usage of the devices inputs. Again, digital inputs allow connecting conventional switches and push buttons as well as window contacts, partition wall sensors etc. In addition, the universal inputs can be used to connect sliders, potentiometers, dials, rotary switches and even NTCs. This makes the LDALI-BM2 the ideal device to equip simple room operation devices with a DALI-2 interface. The LDALI-BM2 input module replaces the LDALI-BM1.

05 New L-RC1 Remote Control

The L-RC1 IR Remote Control is optimized for room automation applications, allowing to control the rooms lights, sunblinds and HVAC system. It supports to individually control up to two channels (groups of luminaires/blinds) and scene control. The L-RC1 is compatible with LDALI-MS2 and L-STAT devices.

PPP Kalvebod Brygge, 2018



Grue + Hornstrup, LOYTEC Competence Partner since 2010, was founded in 1981 and is an "AAA" rated Denmark based engineering and consultancy company. The company concentrates on providing innovative solutions to private, public, and financial sectors worldwide for automation, communication networks, building engineering, and energy & environment.

Kalvebod Brygge is placed as a visual landmark at the gateway to central Copenhagen both for drivers along Kalveboderne Quay and for train passengers going to and from Copenhagen.

Built on an area of 60,000 m^2 at Kalvebod Brygge, Carsten Niebuhrsgade it will soon be the new administrative center of Banedanmark (Danish railway infrastructure company and administrator of the Danish rail network), The Danish Transport Authority, The Danish Road Directorate, and The Danish Energy Agency.

Room Automation

An important consideration for this project is that no physical I/Os are used in room automation. As sensors and actors are integrated via Modbus, KNX and DALI only, cabling costs are reduced dramatically. In addition, this ensures highest flexibility for future changes with a minimum of cable work.

All LROC-401 room controllers on each floor in the respective tower are installed in a common switchboard. There are no distribution boxes spread over the ceiling with the consequence that costs for power supply, backbone network, and installation are very low. This also affects and allows easy commissioning and servicing.

HVAC Control

HVAC Control is realized via L-INX Automation Server. All frequency inverters are connected via Modbus RTU. M-Bus meters are connected for centralized energy management.

"A visual landmark at the gateway to central Copenhagen"

Building Management

LWEB-900 Building Management for

- Energy Management
- Room / HVAC Automation
- Operating and Monitoring
- Data Storage and Reporting
- Device Management
- System/Network Management
- Backup/Restore

Conclusion

During all project phases a close cooperation with LOYTEC helps to reduce risks. Therefore, Grue + Hornstrup can ensure a smooth project implementation. Because there is no need for physical I/Os for room automation, the use of bus technologies results in high efficiency and enables cost reduction. Furthermore, with the L-STUDIO software efficient engineering is made possible. The integrated building management system LWEB-900 is used for operating and managing the complete building, as well as the BA network / LOYTEC devices.

GRUE + HORNSTRUP

FACTS	
Location	Kalvebod Brygge, Copenhagen, Denmark
Companies involved	LOYTEC Competence Partner: Grue + Hornstrup PPP operator: A. Enggaard A/S Engineer: MOE Client: Danish Building & Property Agency Architect: Arkitema Architects
LOYTEC components	LROC-401 Room Controller L-STAT Room Operating Unit LDALI-MS1 Multi-Sensor L-INX Automation Server L-IOB I/O Modules
LOYTEC Tools	LWEB-900

Delta's Building Automation Equipment Intelligently Powers Training Classrooms

Official 1st-stage Cooperation between Delta Group and Shanghai Sanda University

Delta Greentech, a member of the Delta Group, and Shanghai Sanda University have jointly signed a cooperation agreement between the school and the enterprise, effective starting from December 21st, 2016. This marks the official launch time of the current Industry-Academic Cooperative Educational Base, an intelligent building operated by the Delta Shanghai Operation Center, on behalf of Sanda University. The objective of this cooperative mission is to integrate and optimize available resources on both ends, and to give full play to each's respective advantages, both in academia and industry. The result of this joint endeavor is a technology-leading educational base for practical training and hands-on practices. The first installation of building automation control equipment at Shanghai Sanda University's Training Classrooms has been officially inaugurated and is now being put to practical use. It is a grand step towards further deepening long-term cooperation, which provides an incubation platform to cultivate brain power for intelligent buildings, while promoting LOYTEC products for an even longer perspective.

According to the features of the training classroom and teaching activities, diverse scenarios are implemented or imagined and are included as well as simulated. Each has its specifically designated configuration, including air-conditioning system, environmental monitoring system and DALI intelligent lighting system. To meet the purpose of Mobile Learning, a portable Mobile Test Box is ingeniously put to use. What we see is a project that is adequately equipped with things such as LINX Starter Kits, DALI Starter Kits, gateways and more, that aim to provide students with a better building automation environment, while simultaneously facilitating their hands-on practices and exercises.

LOYTECs Kitchen-ABC

Rosemary Chicken with Vegetable Risotto

Our chef de cuisine Eugen exclusively reveals his cooking secrets. This time he tells us how to prepare a delicious chicken risotto dish!

INGREDIENTS (serves 4)

0.7 l vegetable bouillon (hot)
300 g risotto rice
1 piece of onion
1/8 l of white wine
1 piece of carrot cut
1 piece of zucchini cut into small pieces
100 g peas
100 g of celery cut into small pieces
1 piece of butter (small piece)
100 g of Parmesan (grated)
olive oil
4 chicken legs
4 small branches of rosemary
Chili chopped small
Salt and pepper from the mill

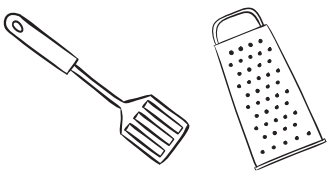
Preparation Risotto

For preparing the risotto, cut the onion into small cubes and fry them in some olive oil in a pan. Then add the risotto rice, the sliced vegetables and fry for a short time.

Now add the white wine and bring to a boil. Gradually add the hot vegetable soup and stir constantly. When the rice is almost cooked, stir in the butter, peas and parmesan, then remove from the heat, and cover.

Preparation Rosemary Chicken

First salt the chicken thighs, add pepper and fry them in a pan with a little oil on the side of the skin for 10 minutes. Turn the chicken in the pan, add rosemary branches, chili and cook (depending on the size) for 5-10 minutes on a low heat. If necessary, cook the risotto again on a low flame and prepare it "al dente" to serve with the chicken.



ENJOY YOUR MEAL!

Building Automation and Room Automation as a Lifetime Task

Harald Hasenclever, Sales Director EMEA

Harald Hasenclever has been working at LOYTEC since September 2017 and is responsible for sales in the EMEA region as Sales Director. He is not a real newcomer at LOYTEC. Since the company's founding in 1999, he has maintained a partnership with the employees and the management as a client in various positions.

Harald Hasenclever is a qualified electrician and he started his professional career as a Product Manager (EIB / KNX) at Merten after completing his studies in electrical engineering and economics. In addition, he has led the departments of Marketing, Sales and / or Product Management in companies such as SVEA Building Control Systems, Schneider Electric and Theben.

To utilize and deepen his knowledge of building and room automation, both from a technical and sales perspective, he gained comprehensive experience at the ZVEI (Zentralverband Elektrotechnik- and Elektronikindustrie e.V.), the DALI working group, the initiative "Electric Labels. Strong Partners" initiative, "Elektro +", LonMark Germany, and the KNX Association's executive board.

LOYTEC's integration into the Delta Group in 2016, a globally operating innovative electronics group with an annual turnover of approximately US $ 7.7 billion and 80,000 employees, has made it a startup within the group again. The Delta Group has set itself the goal of becoming one of the market leaders in the field of building automation in the medium term. And this is where Harald Hasenclever sees his primary task and the biggest challenge: To set up a quick-witted and successful sales organization to the specifications of a fast-growing international group of companies.

LOYTEC Trainings

We offer trainings in German, English, French, Italian, and Chinese. For further information on trainings please contact sales@loytec.com.

LTRAIN-LSTUDIO

Programming the L-INX Automation Server (3 days)

- Introduction into the L-STUDIO Software
- Concepts and structure of the IEC 61131 and IEC 61499 language
- Creating function logic with data points and graphical systems
- Working with function blocks, device types and resources
- Testing and debugging of the system
- Configuration of schedulers, alarms, and trends
- Deploying of logic and graphical projects
- Contents of the LOYTEC building automation library
- Working with the LOYTEC building automation library

LTRAIN-LSTUDIO-PRE

Preparation for L-STUDIO training (2 days)

- LOYTEC data point concept
- Creating data points for various bus systems in L-INX Configurator
- Configuration of schedulers, alarms and trends
- Implementation of L-IOB Modules via LIOB-Connect, LIOB-FT, LIOB-IP Bus
- Configuration of L-IOB I/Os for var. types of sensors and actuators
- Connection of sensors/actuators to L-IOB I/Os
- Creating of an L-VIS/L-WEB project
- Using various display controls / Using the Graphics Library
- Efficient project management by using templates

LTRAIN-LROC

Room Automation with L-ROC (2 days)

- System design based on a sample project
- Creating the IEC 61499 application for the same project
- Creating virtual room operating units and using them with LWEB-802/803
- Creating floor plan visualizations
- Integration into LWEB-900
- Parameterization, testing, and debugging the application
- Concepts and features of important IEC 61499 function blocks

LTRAIN-GATEWAY

Gateway Applications and data point management (2 days)

- LOYTEC data point concept
- CEA-709, BACnet, M-Bus, Modbus, OPC XML-DA
- AST™ functions, local and remote
- Building gateway applications with L-GATE, L-Proxy and L-INX

LTRAIN-BMS

LWEB-900 Building Management System (2 days)

- Introduction to the LWEB-900 system
- LWEB-900 Project Setup
- Working with LWEB-900 Views
- LWEB-900 User Management

LTRAIN-DALI

Lighting control with L-DALI (2 days)

- Introduction to DALI
- Features of the LOYTEC DALI Controllers
- Configuring LOYTEC DALI Controllers
- Setting up a DALI network
- Troubleshooting the DALI installation

LTRAIN-GRAPHICS

Graphical design with L-VIS and L-WEB (2 days)

- Creating L-VIS and LWEB-803 projects with the L-VIS/L-WEB Configurator
- Creating a distributed visualization based on L-INX and LWEB-803
- Efficient project design using templates

LTRAIN-LIOB-AIR

VAV Control with LIOB-AIR (2 days)

- Introduction to the LIOB-AIR system
- Adapting device templates
- Creating a complete VAV system
- Using the graphical user interface
- Connection to the AHU
- Integration into BACnet and CEA-709 systems
- Advanced features, examples and use cases

New LOYTEC L-DALI Family

Fully integrated. Seamlessly connected. Securely networked.

DALI-2 SUPPORTED

L-DALI Lighting Controllers, Power Supplies & Accessories

The LOYTEC L-DALI Lighting Control System sets new standards:

- Simple planning and quick project implementation
- Large built-in functionality – no programming necessary
- Commissioning and configuration through built-in web server or configuration tool
- Optimally matched system components
- Building management system integration via BACnet, OPC-UA or ModBus TCP
- DALI-2 support

www.loytec.com

LOYTEC
A Delta Group Company