LOYTEC

Focus

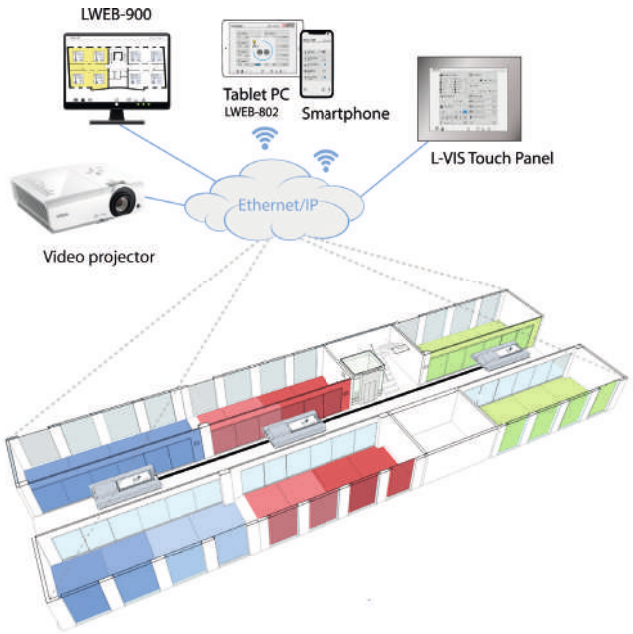
L-ROC
Room Automation

May 2019

English

LOYTEC
A Delta Group Company

CONTENT



MASTHEAD

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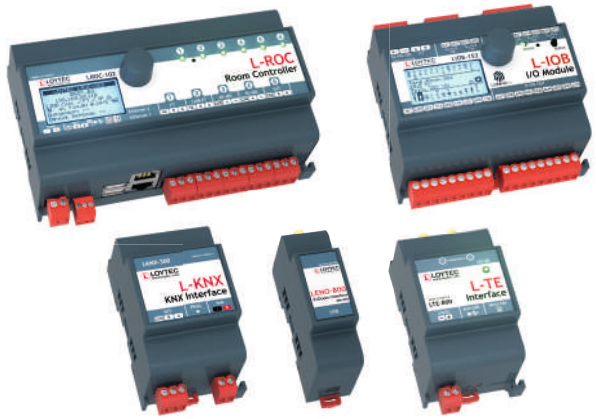
LOYTEC

L-ROC Room Automation

Modular



Compact

Operation/Sensors

Software

Room Automation

Room automation as a sub-discipline of building automation plays a crucial role when it comes to operating a building as energy-efficiently as possible, while providing maximum user comfort. Properly planned and implemented, it also brings the highest level of flexibility to the building, allowing for quick and efficient room changes, such as for use or tenant changes.

Contributing to sustainability

Room automation makes a valuable contribution to achieving sustainability certifications such as DGNB, LEED, and others, by appreciably upgrading the ecological, functional and economic criteria assessed by a scoring system. Today, a state-of-the-art room automation control system not only provides on-board interfaces to the most common protocol standards, but also integrates data from different protocols into a common data model that can be used by all room control functions to provide the optimum energy efficiency with maximum comfort for the user.

For dimmable lighting concepts, DALI is the protocol established for many years. The next generation DALI-2 adds more profiles to the standard, which enhances the possibilities for large lighting applications on the LROC. The Standard Motor Interface (SMI) is enjoying increasing popularity as an alternative to conventional 230 V blind motors. The SMI bus topology allows the addressing of up to 16 sunblind motors for precise positioning of the venetian blinds, including slat angle across the building.

All HVAC functions in the L-ROC can work either on physical I/O terminals or on bus terminals or both. Today's smart actuators and sensors for HVAC applications use bus technology to save wiring costs and provide more data to control applications. L-ROC is ready for this trend and offers bus connectors for Modbus and MP-bus.

The popular EnOcean wireless protocol standard allows connecting a wide range of sensors and switches, and actuators in installations where wiring is not convenient, such as glass walls.

In addition to local control, room automation must provide a large amount of data for communicating with the building management system (BMS) and with plant automation. This is the only way to implement an energy-efficient, demand-driven automation system . For this purpose, BACnet / IP has established itself as the standard communication protocol for the building automation market worldwide.

Intuitive operation

The intuitive operation of lighting, shading and room climate via a common room control unit increases comfort and provides the user with the energy efficiency status of selected comfort settings at any time. With just one touch, the system returns to automatic mode, overriding any user changes and using the standard parameters set during commissioning.

In today's mobile world, virtual room control units for smartphones, PCs, and tablets are in demand more than ever before. The complete operation of a room via workstation is specifically recommended where a suitable mounting location for conventional room control units is difficult to find, such as in open-space offices.

Of course, this trend raises a multitude of questions – especially on IT security. A solution is needed to integrate both IP networks from IT and building automation, in which all participants, such as the IT and FM departments, are satisfied. Overall, the planning and implementation of room automation solutions face a multitude of challenges.

LOYTEC, as one of the leading manufacturers in the industry, offers the L-ROC system, a state-of-the-art room automation system that fulfills all requirements for a contemporary and future-proof solution:

- **All functions provide maximum energy efficiency and maximum user comfort**
- **Built-in flexibility to change room layout**
- **Integration options available for all relevant protocols in building automation**
- **Easily connect to IT networks and have the ability to run each controller on two separate networks, while implementing the latest IT security standards.**

Energy Efficiency

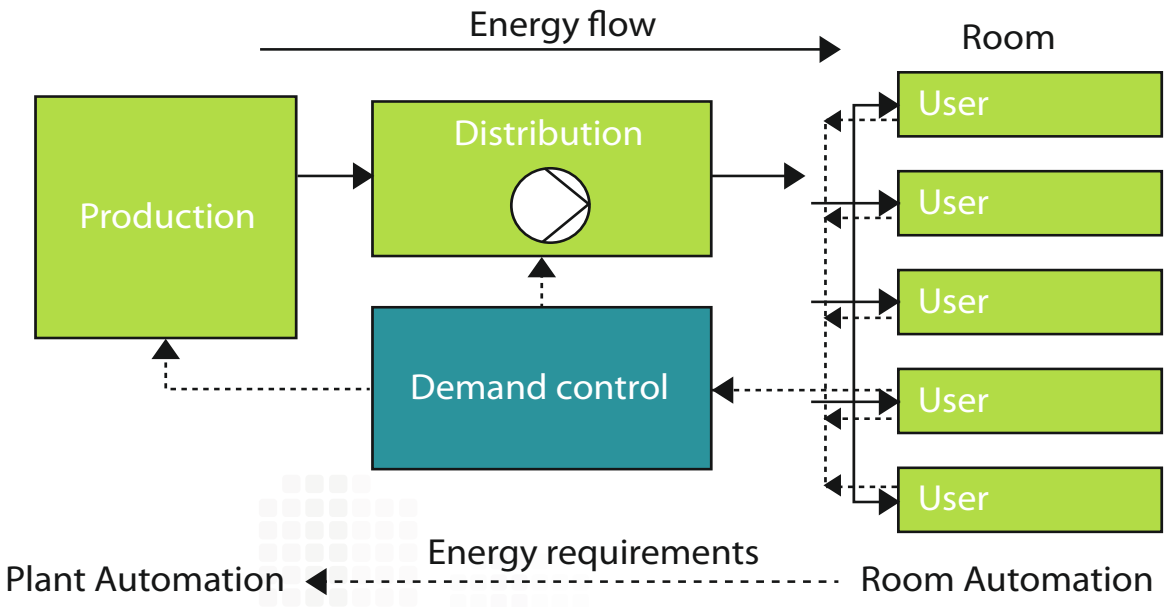
In most buildings, energy is supplied externally or generated in the building itself, both electrical and thermal, which primarily serves one purpose: to condition the individual rooms for optimal use by occupants for living, working or other intended purposes. For example, care must be taken to ensure a room's brightness and temperature always suits the purpose of use. At the same time, the control of sun blinds prevents direct sunlight from dazzling the user while using the space, or fully closes the sun blinds to protect the room from overheating while unoccupied.

Whether the energy in the building is used efficiently or not, can only be decided where it is consumed – in the rooms!

Accordingly, the international standard EN 15232 addresses the issue of building automation impact on building efficiency and provides energy efficiency calculation methods for all relevant points to achieve the highest efficiency class A, on-demand based control for each individual consumer.

In practice, this results in various functional requirements for the room automation system. In Germany, a series of directives, VDI 3813, represents a tool for the specialist planner to plan and specify the room automation system with contemporary functionality.

With the L-ROC system, LOYTEC offers maximum energy efficiency through a consistent implementation of all VDI 3813 functions in an easy-to-use L-ROC function library.



Source: DIN EN 15232-1:2017-12

As a result, enormous savings in primary energy demand is achieved, which has a positive effect on the corresponding criteria according to DGNB or LEED.

The L-ROC room automation system consistently and continuously monitors the energy requirements of individual rooms, a rental area or an entire floor, and makes this information available to the plant control system for demand-oriented generation and distribution of energy. The different cost groups for system and room automation according to DIN 276 require cross-cost planning to achieve optimum energy efficiency.

Some of the most important room functions for highest energy efficiency, include:

Presence-dependent comfort control

During occupancy periods the comfort limits for heating and cooling temperature setpoints is relatively small, whereas it gets larger during standby or unoccupied periods. This saves energy without a loss in comfort. A scheduler and/or presence detectors can be used to switch between the setpoints.

Constant light control

This lighting function ensures that the light is switched on only when someone is present in the room and then, in consideration of the daylight, artificial light is dimmed to reach a fixed lighting setpoint (e.g. 500 lux at an office building workplace).

Energy level selection

Depending on the occupancy evaluation of the room, the system automatically switches between the different setpoints for room temperature control. This ensures, for example, that the energy-intensive comfort temperature setpoint is only regulated when the room is occupied.

Daylight harvesting

Control of the sun blinds depends on the sun's position, which can ensure glare-free lighting while at the same time allowing for an optimum use of daylight. 3D models of surrounding buildings can be taken into account during shading over the course of the year.

Thermo control

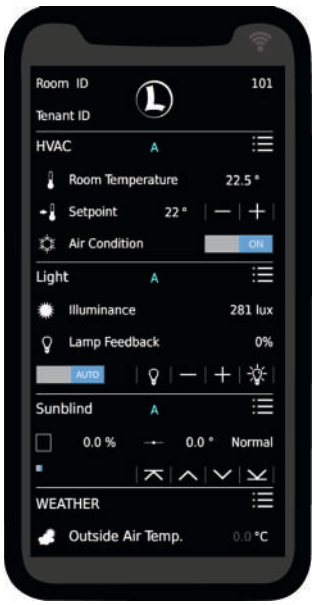
In unoccupied rooms the use of sun shading supports heating and cooling by guaranteeing or preventing solar heat entry.

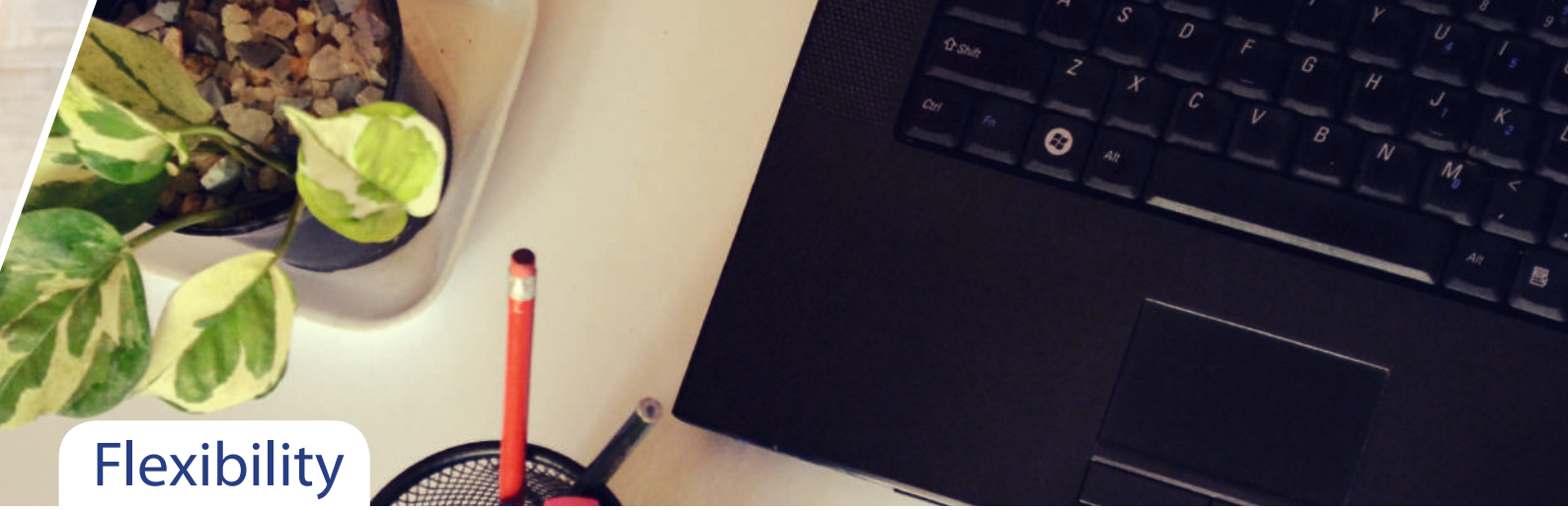
User Comfort

One goal of room automation is to automatically condition the room in an optimum way at all times. Whether it's a comfort temperature of 22°C, ideal lighting conditions, automatic glare protection or the perfect air quality – everything happens automatically. At the same time, the user has the option of adjusting settings manually. With a simple keystroke a return to the energy-efficient automatic mode is possible at any time.

LOYTEC offers various options for the user to adjust the room conditions, such as with an L-STAT Room Operator Panel, L-VIS Touch Panel or virtually with LWEB-802/803 for display on any device such as a smartphone, tablet or PC. The latter variant ensures full scores in sustainability certification due to the exceptionally high ease of use.

In addition, third-party devices can be integrated, as the L-ROC system provides interfaces to all relevant protocols, such as KNX, Modbus, MP-bus, LON, BACnet, and others.





Flexibility

Flexibility in changing a room layout plays an important role in early planning, especially for office buildings. Large office buildings are often planned and commissioned before all floors are leased. To fulfill the needs of potential tenants as quickly as possible, flexible and free space allocation is essential.

The L-ROC system meets this demand and makes it possible to create flexible space solutions with minimal effort and to change them according to requirements. Although the entire building application runs distributed on different controllers, communication is managed centrally and independently of the hardware. This makes changing and redeploying office space easy and can be done effortlessly by the client or facility manager.

The variety of protocols at the room level, and for building automation in general, has grown considerably in recent years.

LOYTEC has it all!

LOYTEC has been around for many years and is known for integrating a wide variety of protocols on high-performance hardware platforms. This enables continuous data exchange among all protocols in the room. There is no standard protocol that LOYTEC products cannot quickly convert into another, which is an essential principle of our room automation solution. The L-ROC room automation solution provides a platform on which all standard building automation protocols are effortlessly integrated according to a consistent concept. All LOYTEC controllers include two Ethernet ports, which can be selectively switched or operated on separate networks – such as for the separation of IT and BA networks in visualizations – and also an integrated web server for configuration and hosting of custom graphic pages, including virtual room control units, floor plan visualizations, and more.

An integrated firewall, SSL encryption, and OPC UA support state-of-the-art methods from the world of IT security and ensure secure and encrypted data transfer in the building automation network.

L-ROC Hardware

With the LROC-40x Room Controllers, LOYTEC offers a solution that relegates all problems from room automation requirements to the past.

Embedded in a compact sheet steel housing for installation in a false ceiling or raised floor, the Room Controller provides on-board-interfaces to BACnet (IP and MS / TP), LON-IP, KNX (IP and TP1), Modbus (TCP and RTU, Master or Slave), OPC, DALI, SMI, MP-Bus, and EnOcean. Elaborate and costly gateway solutions such as for integration into a building management system are no longer necessary. Of course, for the physical connection of consumers, a perfectly thought-out constellation of input and output terminals (I / O's) is available too.

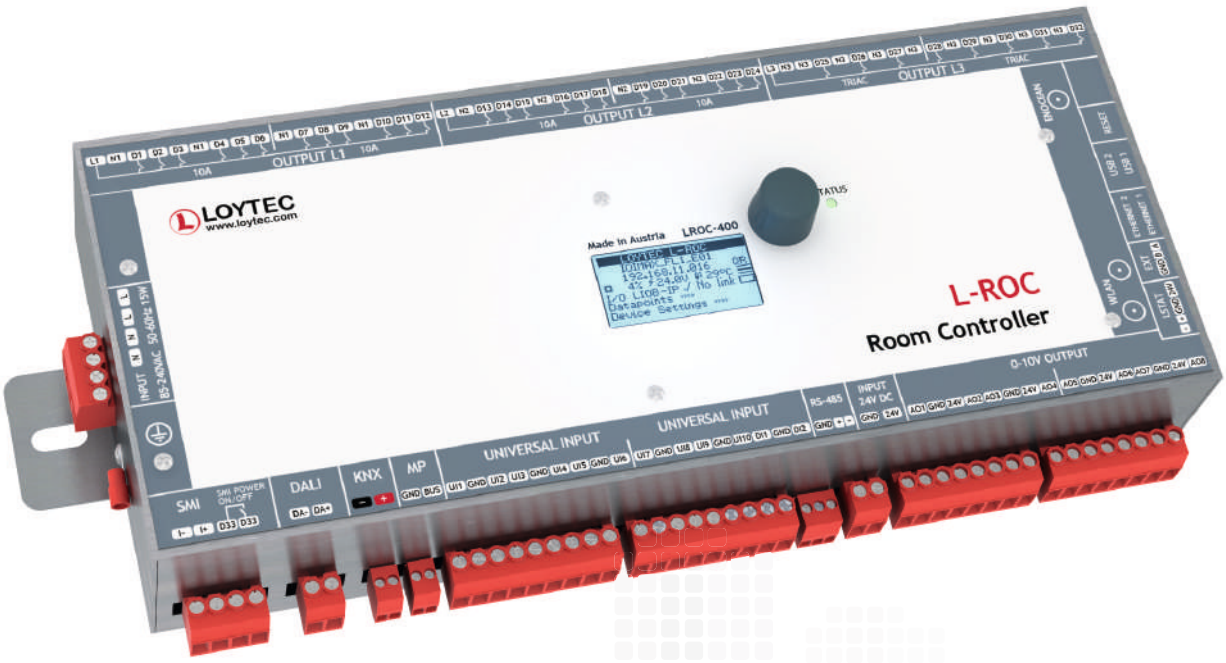
All three LROC-40x models have two Ethernet ports, which can be operated either in switch mode or as separate networks. The integrated web server can be used to provide customized operator graphics and even floor plan visualizations that can be operated as an HTML5 page via any web browser. The integration into LOYTEC's LWEB-900 building management system and the connection to systems from other manufacturers is easy, thanks to the support of all major standard protocols such as BACnet/IP. The optional LTE interface and the possibility of integrating IoT devices ensure expandability and future security.

All models support communication over SSL secured web services. Depending on the model, up to 16 rooms or room segments can be controlled by one L-ROC controller.

LROC-400 – All-in-one

LROC-400 is designed for a cross-system solution that prepares you for anything that can happen in the room. The controller offers 24 relays, 8 TRIAC outputs, 8 analogue outputs, 10 universal inputs and 2 digital inputs as well as communication interfaces for BACnet (IP and MS / TP), LON-IP, KNX (IP and TP1), Modbus (TCP and RTU, Master or Slave), OPC, DALI, SMI, MP-Bus and EnOcean. The physical inputs and outputs can be configured as needed. For example, relays can be optionally used for the control of 3-stage fans, blinds or other switched loads.

The inputs can also be configured for dew point or temperature probes, window contacts or other sensors and dry contacts. Depending on the requirements of the room, the controller can operate up to a maximum of eight rooms / room segments. An interface for L-STAT Room Operator Panels is available for connecting up to 16 room control units. L-VIS Touch Panels can be connected via IP or you can use the virtual room operation option. For the integration of third-party products, the interfaces described above are available. For the complete solution, LOYTEC also offers LDALI-MS2 multi-sensors according to the new DALI-2 standard.

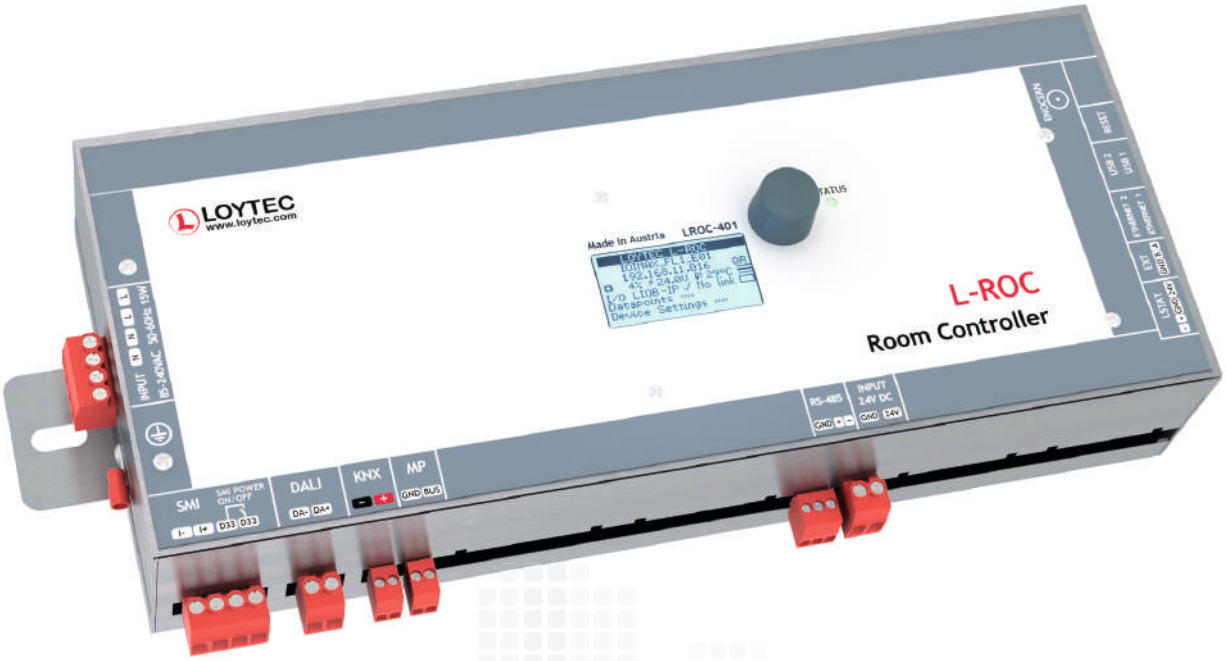


LROC-401 – Smart Office

The LROC-401 Room Controller provides communication interfaces for BACnet (IP and MS / TP), LON-IP, KNX (IP and TP1), Modbus (TCP and RTU, Master or Slave), OPC, DALI, SMI, MP-Bus and EnOcean.

It is designed as a solution that does not require physical inputs and outputs and can control up to 16 rooms / segments, in contrast to the other models. Up to 16 blinds are connected via SMI, a DALI interface is available for lighting and multi-sensors, valve actuators such as the Belimo 6-way valve are controlled via MP-Bus. As a consequence, the L-ROC-401 supports up to 16 L-STAT Room Operator Panels.

For special requirements, KNX and EnOcean operating devices can also be integrated. The integrated KNX-TP1 interface offers even more flexibility in the selection of field devices based on KNX. For example, every building owner or tenant can choose from the entire range of available room control units throughout the entire life cycle of the building, without ever having to create additional protocol interfaces or having to completely redesign the entire automation system.

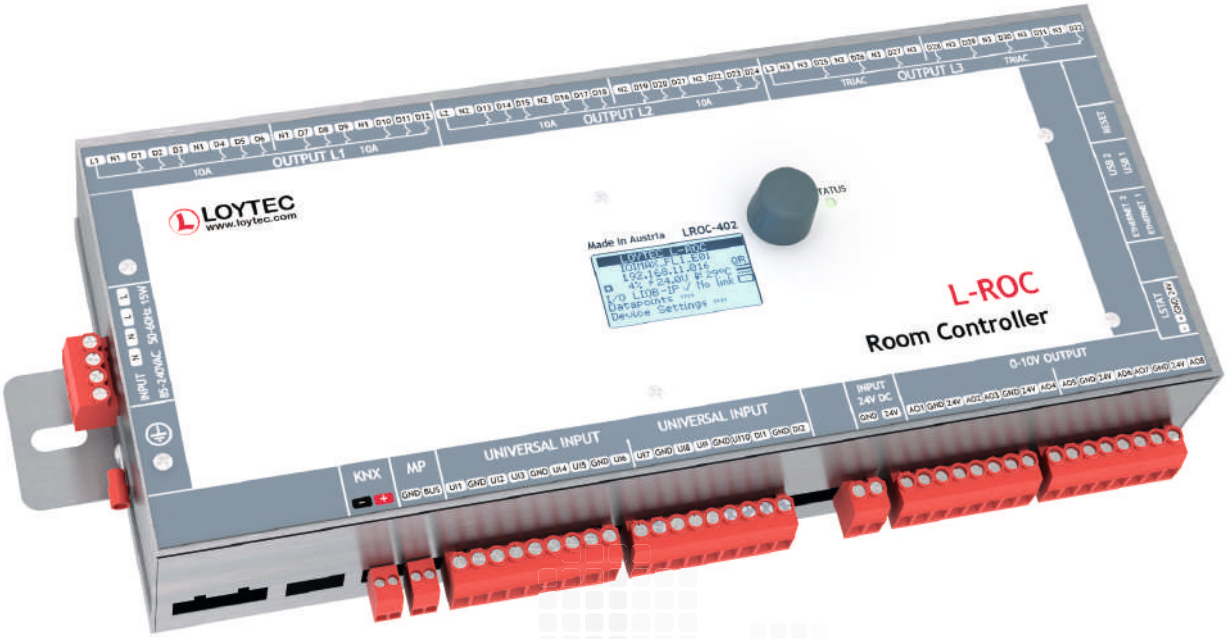


LROC-402 – The HVAC Specialist

Everyday project life is often far from the ideal of an integral, interdisciplinary solution. Lighting and blinds in particular are mostly planned and executed separately from those of the room air conditioning. Again, LOYTEC has the perfect solution with the LROC-402. The gateway function of the controller allows a connection to the building management system despite the separation of trades.

LROC-402 is designed for the control and regulation of heating, cooling and room ventilation systems. It offers the same I / O's as the LROC-400: 24 relays, 8 TRIAC outputs, 8 analog outputs, 10 universal inputs and 2 digital inputs. As a communication interface for fieldbus integration, the MP-bus is available.

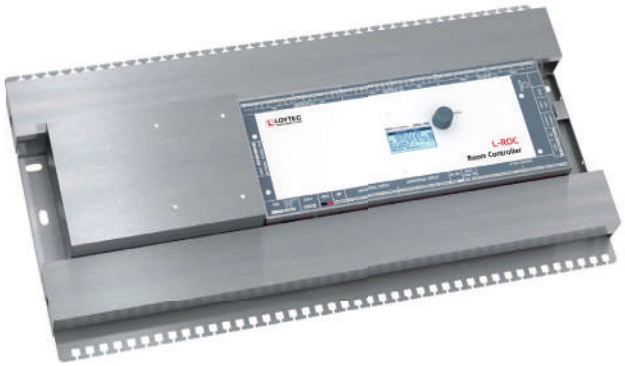
Tricks of the trade: The integrated KNX TP1 interface now makes it possible to integrate the KNX actuators from the electrical side. If the functions integrated in the LROC-402 are used to control the lighting and the blinds, and if the KNX modules are used purely as actuators and sensors, it is even possible to implement an axis-flexible solution despite the separation of trades. If, on the other hand, the lighting and blind functions are implemented by the KNX system, then the LROC-402 can act as a gateway between KNX and BACnet / IP, such as for the connection to a building management system.

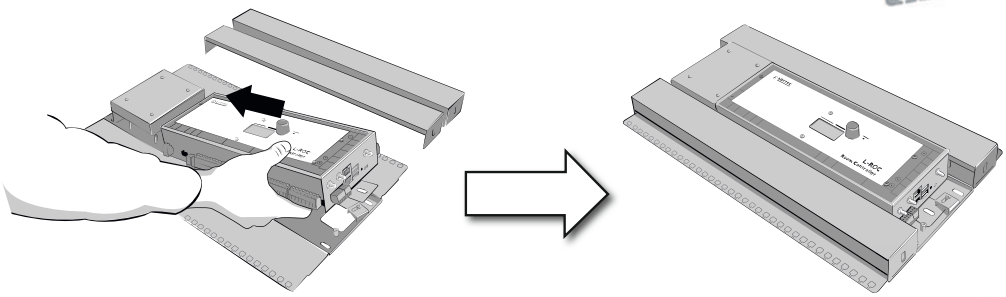


LBOX-ROC1 and L-ROC System Distribution Box

LBOX-ROC1 – Fits like a glove!

For installation in a ceiling or raised floor, LOYTEC offers a tailor-made installation housing made of sheet steel. It contains appropriate devices for the cable strain relief, covers for the contact protection, a distribution box with appropriate spring terminals, and an optional 24 V power supply for external consumers.





L-ROC System Distribution Box – Plug and play

The modular assembly concept through industrial pre-fabrication supports you in completing projects on time. The plug-in solution in a system distribution box for the LROC-400 offers the following advantages:

- Secure planning through small, effectively planned units (BIM)
- High availability for identically arranged distributors in large quantities
- High degree of prefabrication - calculable assembly and commissioning times
- Little documentation effort (Plans included)
- Low error rate when wiring through color-coded connectors
- Prefabricated connecting cables in different lengths with double-sided plugs*
- Simple diagnosis due to plug-in capability, easy replacement in case of error
- Calculable project sequences ensure timely completion

*Not included

L-STAT Room Operator Panels

Design and functionality at a fair price

With L-STAT, LOYTEC offers an integral solution for cross-trade room operation. L-STAT is a room operator panel device with a stylish, modern look that gives users full control over temperature, lighting, and sunblind settings.

Up to 16 L-STAT devices can be connected to one L-ROC Controller. The L-STAT is equipped with an LCD display featuring an adjustable RGB backlight that offers a neat way to make the L-STAT match the interior color concept of an office building. Eight capacitive touch buttons are used to cycle through sensor values, display parameters, and adjust setpoints or air volume. Up to four external buttons can be accessed and processed by the controller.

The L-STAT's internal sensors measure temperature, humidity, dew point, occupancy, and CO_2 level. Additionally, the date, time and the current level of eco-friendliness in the form of green leaves are also shown on the LCD display. The L-STAT comes with a built-in infrared receiver for convenient remote control of the room's lights, sun blinds and HVAC system via the optionally available IR remote control L-RC1.

The L-STAT is available in three different hardware versions, with six different button layouts, and two front cover color options providing 36 models in total. Customized versions tailored to the client's requirements can be ordered (minimum quantity 100 pieces). Custom printing on the front of the L-STAT allows for any button layout, individual button symbols and even the end customer's corporate identity. As an option, each L-STAT can be ordered with an EnOcean antenna to enlarge the EnOcean signal range.

L-VIS Touch Panels

Perfect design for the highest requirements

With a timeless design, L-VIS touch panels make a good impression anywhere – individual rooms, conference rooms, or as a central control panel in open-space offices or a hotel lobby. The panels simultaneously support BACnet, LON, Modbus and OPC and are available in sizes 7, 12.1 and 15 inches that seamlessly integrate with IP in the L-ROC system.

L-DALI Multi-Sensors

The key to energy efficiency

No energy-efficient room automation system can be without presence detection in the room! This is the only way to switch the mode of operation in the room across all systems equally – for lighting, sun protection and indoor climate – at the same time to avoid wasting energy.

LDALI-MS2 multi-sensors are two all-rounders that are a perfect fit for L-ROC Room Automation devices. LDALI-MS2 is optimized for use in typical office environments, where even the small movements of somebody working at a desk must be detected across the complete detection area. In addition to occupancy and lux sensors, the LDALI-MS2 comes with integrated temperature and humidity sensors. Both values are used to calculate the current dew point to close the cooling valve of a chilled ceiling. On the back side of the sensor, there is a connector for three digital inputs (dry contact), allowing the connection of conventional switches and push-buttons, window contacts, dew point sensors, and more.

The LDALI-MS2 comes with three mounting options: in-wall in standard flush mounted boxes, spring snap-in false ceilings, and on-wall with the included surface mounting box.

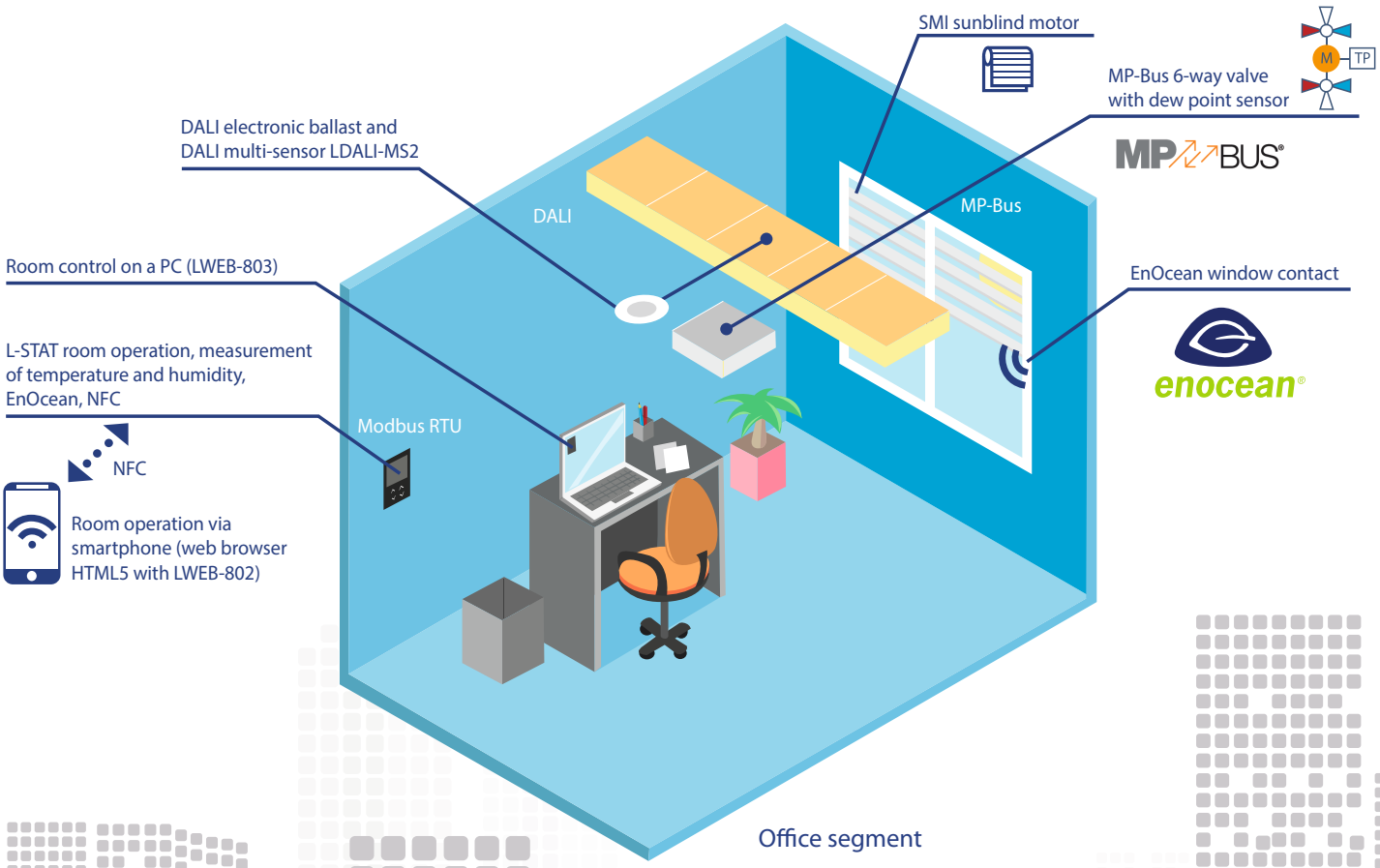
Communication and power supply of both multi-sensors is handled via the DALI bus. LDALI-MS2 multi-sensors and support the DALI-2 protocol as defined in the IEC 62386 2014 standard and can be integrated into the DALI-2 systems of other vendors to ensure investment security.

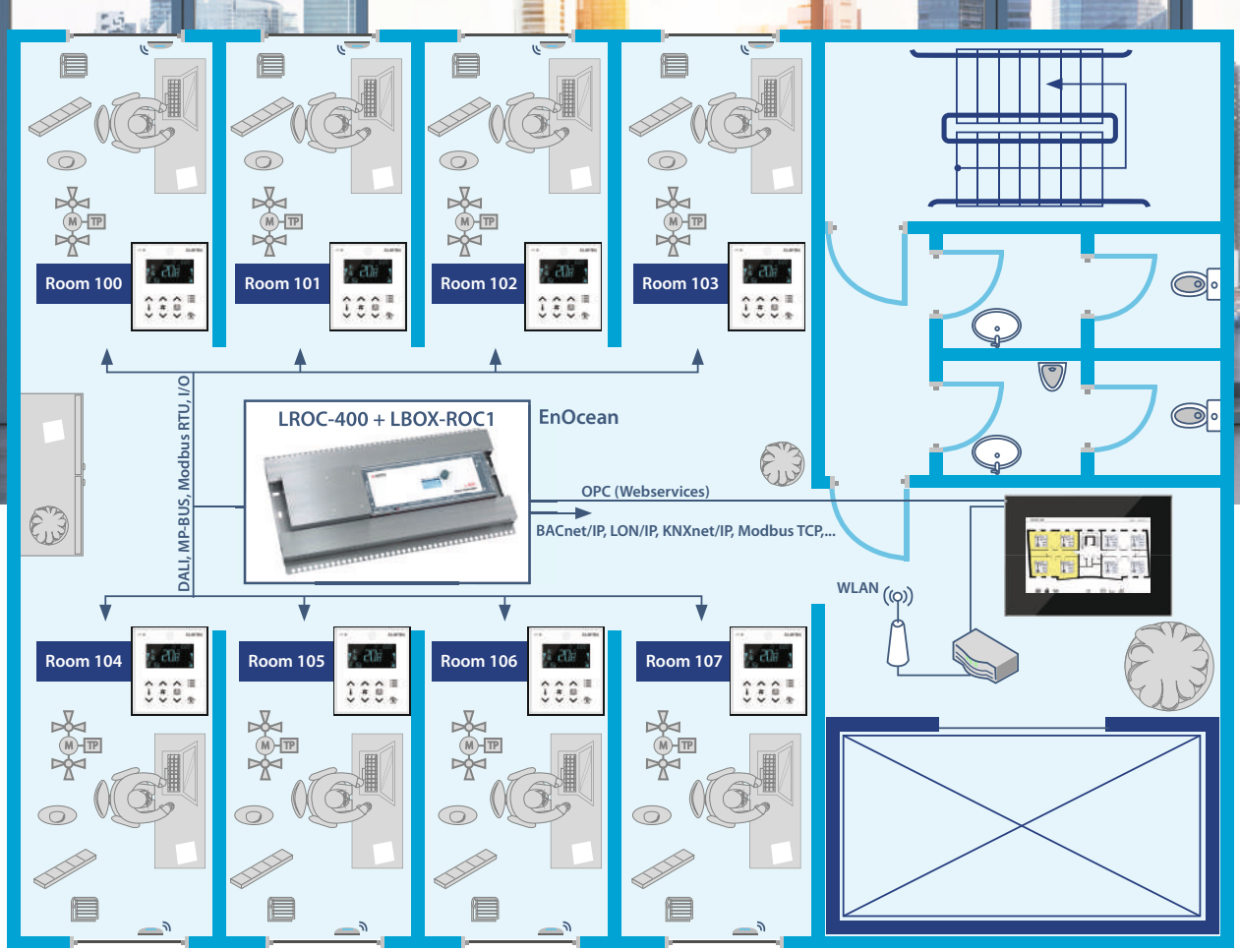
Application: LROC-400

For eight office segments

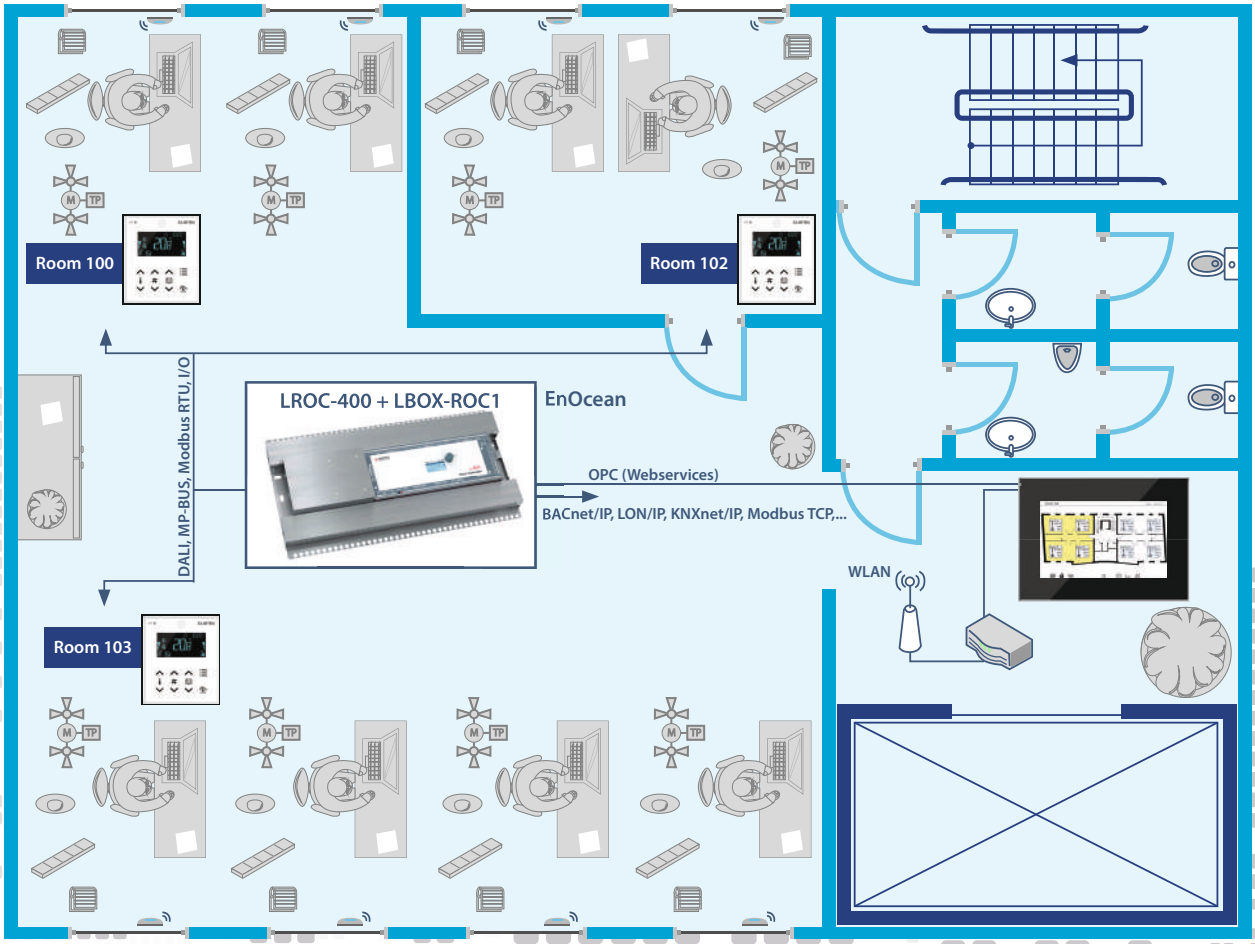
The illustrations on the right show the use of LOYTEC room automation components on a floor with eight office segments. Each office segment contains the equipment described in the graphic below.

By changing the room numbers (parameters), new room layouts can be created quickly and easily. For example, one open plan office and one single office can be changed to eight single offices in no time.





Example 1: Creation of a new floor plan by simply changing room numbers (8 single offices)



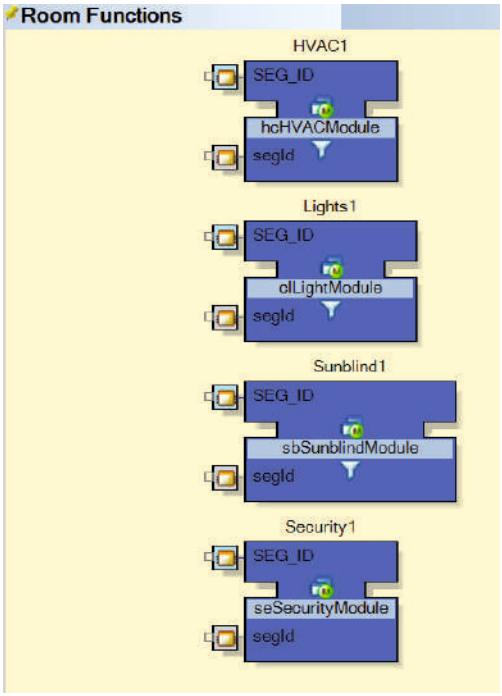
Example 2: Changing 1 open plan office, 1 single office into 8 single offices

L-ROC Software Library – L-STUDIO

L-STUDIO is breaking new ground in efficiently achieving project-specific room automation functions. Not just one L-ROC controller, but the entire project is always planned, programmed, and deployed. After completion of the configuration of all room automation functions, the programs are automatically distributed by L-STUDIO via Ethernet network into all L-ROCs. We call this novel automation approach "cloud control".

Modern office buildings are characterized by high repetition in the equipment used in individual areas. In addition to the typical cell offices in large numbers, there are open-space areas, think tanks, and conference rooms. With the object-oriented design method, L-STUDIO creates a template for each room type (segment type), which are then instantiated according to the configured number of identical rooms/segments. Compared to a copy, the reference to the template is always retained, so that the L-STUDIO system can react extremely quickly to changes. This minimizes errors and helps adhere to the time requirements of the project.

The L-STUDIO system uses so-called "coupler" blocks, which are available at the segment level, the rental area level, the floor level and the building level. The coupler components form the neural pathways of the digital building. They are used to exchange data throughout the building. Applications for this include data from the weather station, central commands for sun protection, or the energy demand feedback of the individual rooms to the energy producers.



L-ROC and L-STUDIO - the perfect symbiosis of functionality and flexibility!

An L-STUDIO template not only contains the program code for the execution of the respective automation functions, it also contains elements for displaying and operating the functions. User interfaces for operating a room, such as an L-VIS touch panel, a PC or a smartphone, are created completely automatically during configuration. The program code brings its own visualization that is ready for use during the commissioning phase to sustain timely completion of the room automation.

L-STUDIO creates the conditions to make a later change of the room layout as easy as possible. A simple mouse click on a wall in the plan view is enough to turn two individual offices into a larger office. All the room automation functions as well as the room operation adapt themselves completely automatically to the changed room conditions.

LWEB-900 – Perfect Building Management

Highly flexible and scalable

The LWEB-900 building management software with its building management and operating functions represents the user interface in the LOYTEC building automation system. Highly flexible and scalable, LWEB-900 accompanies you from installing and configuring LOYTEC devices in buildings to operating and monitoring the connected building services. In other words, a consistent user interface is available in all phases of the building automation system, from commissioning to operation and optimization.

With its client-server concept, the L-WEB system architecture consists of the LWEB-900 server and one or more LWEB-900 clients as user interfaces. As a central component, the LWEB-900 server manages and stores system and operating parameters, historical data, alarm logs, access rights and device configurations for backup in corresponding SQL databases. Real-time data is exchanged with distributed, autonomous LOYTEC devices via web services, regardless of which communication technologies such as LON, BACnet, DALI, M-Bus, Modbus, KNX, and others, are actually used.

For L-ROC, LWEB-900 provides an import function for the complete L-STUDIO project. All components of the room automation system are imported at one go. Subsequently, LWEB-900 can manage all devices centrally and create comprehensible parameter views for conveniently and quickly parameterizing the entire room automation system.

	Row Name	Room ID	Zone ID	Actuator Init Mode	Actuator Open Time	Actuator Close Time	Actuator Rotation Time	Actuator Min Drive Time	Actuator Rotation Max	Actuator Rotation Min	Actuator Indication Factor	Actuator Overdrive	Actuator Location	Actuator Open Time Offset	Actuator Close Time Offset	Actuator Alarm Delay	Actuator Auto Delay
1	LROC_LROC_Demo:Seg01-SB1	101	A														
2	LROC_LROC_Demo:Seg01-SB1-Act			OPEN	60 s	60 s	1 s	0.05 s	90 °	0 °	5	10 %		0 ms	0 ms	0 s	0 s
3	LROC_LROC_Demo:Seg02-SB1	101	A														
4	LROC_LROC_Demo:Seg02-SB1-Act			OPEN	60 s	60 s	1 s	0.05 s	90 °	0 °	5	10 %		0 ms	0 ms	0 s	0 s
5	LROC_LROC_Demo:Seg0																
6	LROC_LROC_Demo:Seg0																
7	LROC_LROC_Demo:Seg0																
8	LROC_LROC_Demo:Seg0																
9	LROC_LROC_Demo:Seg0																
10	LROC_LROC_Demo:Seg0																
11	LROC_LROC_Demo:Seg0																
12	LROC_LROC_Demo:Seg0																
13	LROC_LROC_Demo:Seg0																
14	LROC_LROC_Demo:Seg0																
15	LROC_LROC_Demo:Seg0																
16	LROC_LROC_Demo:Seg0																

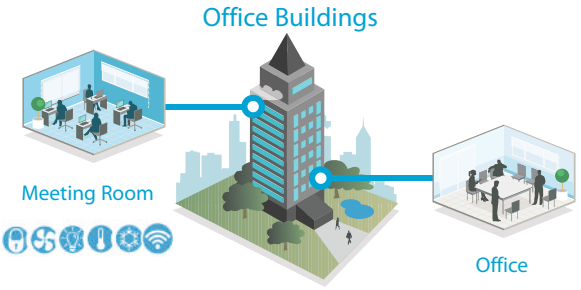
	Row Name	Room ID	Zone ID	Protection Heat Setpoint	Unoccupied Heat Setpoint	Standby Heat Setpoint	Occupied Heat Setpoint	Occupied Cool Setpoint	Standby Cool Setpoint	Unoccupied Cool Setpoint	Protection Cool Setpoint	Setpoint Shift Range
1	LROC_LROC_Demo:Seg01-HC1	101	A	10 °C	16 °C	19 °C	21 °C	23 °C	25 °C	28 °C	40 °C	6 °C (delta)
2	LROC_LROC_Demo:Seg02-HC1	101	A	10 °C	16 °C	19 °C	21 °C	23 °C	25 °C	28 °C	40 °C	6 °C (delta)
3	LR											
4	LR											
5	LR											
6	LR											
7	LR											
8	LR											

	Row Name	Room ID	Zone ID	Zone Location	Lamp State Feedback	Lamp Value Feedback	CLC Lux Setpoint	LuxLevel Feedback	CLC Occupancy Off Delay	Occupancy Feedback	Auto Mode Room	Auto Mode Zone	Auto Mod
1	LROC_LROC_Demo:Seg01-LI1	101	A		ON	59.52557 %	500 lx	460 lx	300 s	OCCUPIED	--	AUTO	AUTO
2	LROC_LROC_Demo:Seg02-LI1	101	A		ON	18.40018 %	500 lx	460 lx	300 s	OCCUPIED	--	AUTO	AUTO
3	LROC_LROC_Demo:Seg03-LI1	103	A		OFF	0 %	500 lx	0 lx	300 s	--	--	--	AUTO

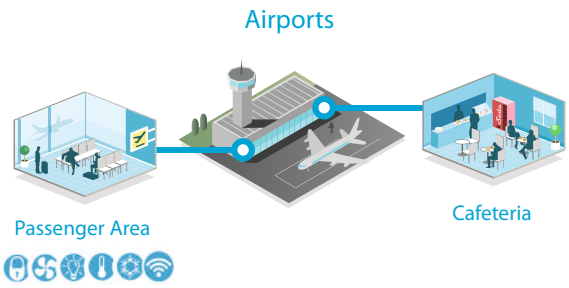
Case Studies

Austria Campus
Vienna, Austria

Roomers Hotel
Baden Baden, Germany
© Piero Lissoni



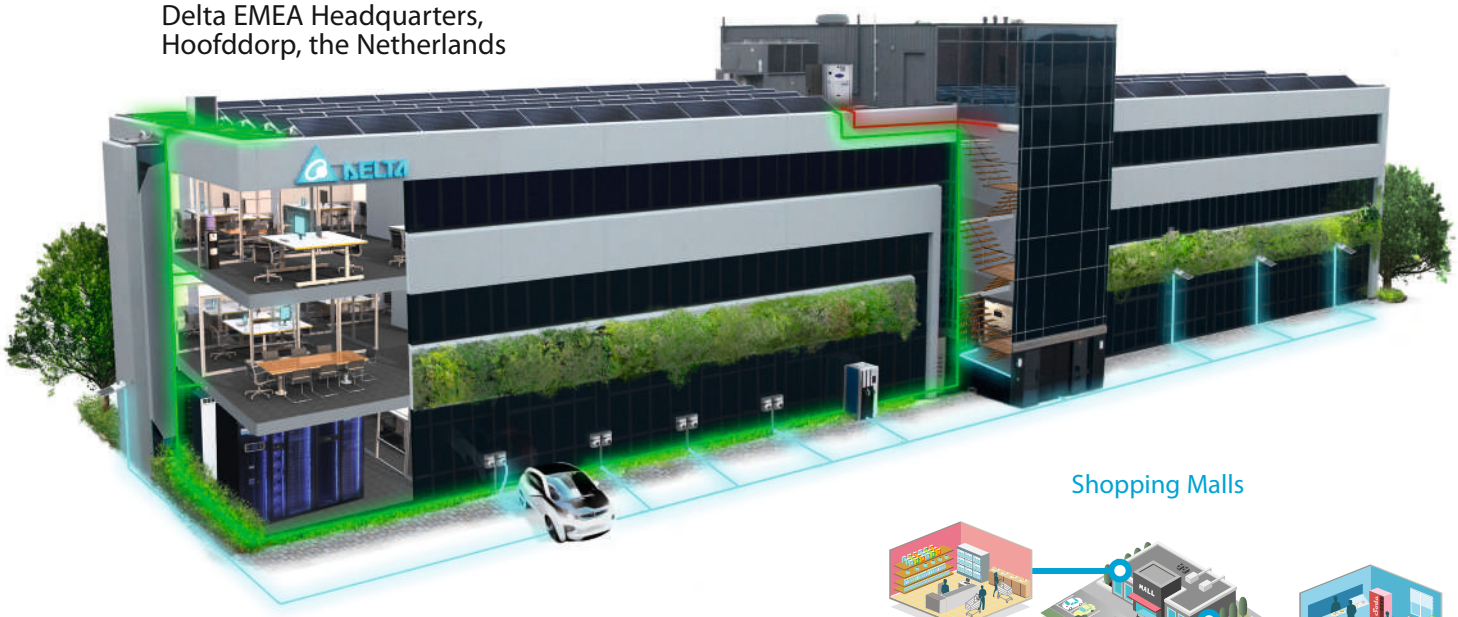
WINX Tower
Frankfurt/Main, Germany



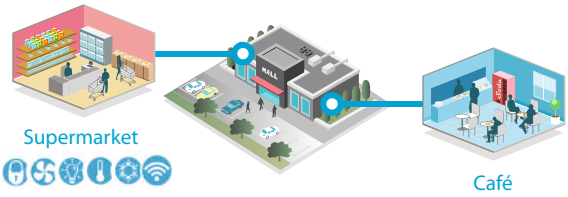
Kunstcampus Berlin, Germany

Case Studies

Delta EMEA Headquarters,
Hoofddorp, the Netherlands



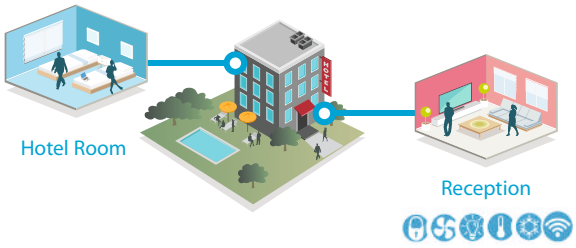
Shopping Malls

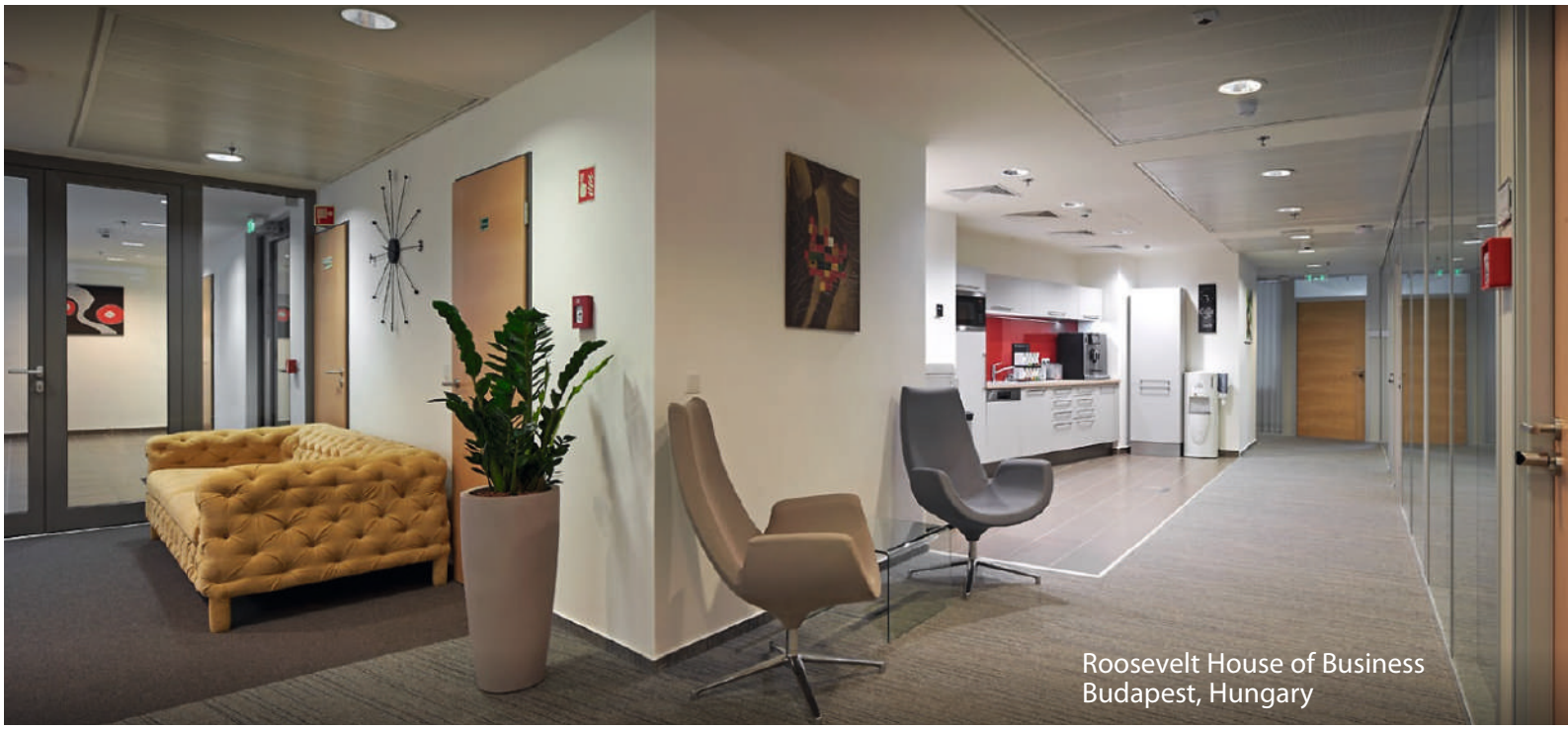


Generali Tower
Linz, Austria

Take a look at some of our case studies for L-ROC Room Automation. To see more case studies, please visit our website:
www.loytec.com/case-studies

Hotels





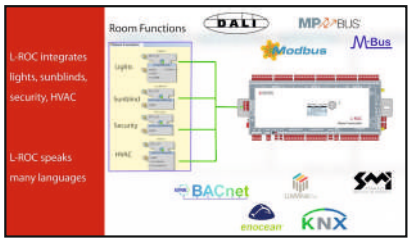
Roosevelt House of Business
Budapest, Hungary

L-ROC
Room Automation

LOYTEC, one of the leading manufacturers in the industry, offers the L-ROC system, a state-of-the-art room automation system that fulfills all requirements for a contemporary and future-proof solution:

- All functions for maximum energy efficiency and maximum user comfort
- Built-in flexibility for changing room layout
- Integration options for all BA-relevant protocols
- Easily connects to IT networks with the ability to run each controller in two separate networks and implement the latest IT security standards.

L-ROC Room Automation Video on Youtube



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