✓ BACnet ✓ Modbus
✓ CEA-709 ✓ M-Bus
✓ KNX ✓ OPC

L-ROC Room Controller

LOYTEC
COMPETENCE PARTNER

LROC-102

Datasheet #89026120

The L-ROC Room Controller LROC-102 provides the basis for a revolutionary room automation system based on IP, which seamlessly integrates with native BACnet/IP networks and LonMark Systems at the controller level. Together with the L-STUDIO software, flexible room solutions can be created with little effort and changed on demand. Integral parts of the L-ROC System are a web-based room operation via an LWEB-802/803 dashboard and the automatic generation of graphics for the L-VIS Touch Panel for local operation. For CEA-709 room control units, CEA-709 multi-sensors and other CEA-709 devices can be connected via the LonMark TP/FT-10 channel on the L-ROC Controller. Local inputs and outputs are provided via L-IOB I/O Modules. KNX S-mode devices can be connected through KNX TP1 by using the optional LKNX-300 module.

Flexible Room Concept for Room Automation

A room segment is the base unit of configuration in the L-ROC System. The L-ROC Library provides a set of functions for every window axis including:

- Lighting control with constant light controller
- Sunblind control with angle adjustment and year shade progression
- Temperature control for heating, cooling, and ventilation
- Occupancy detection
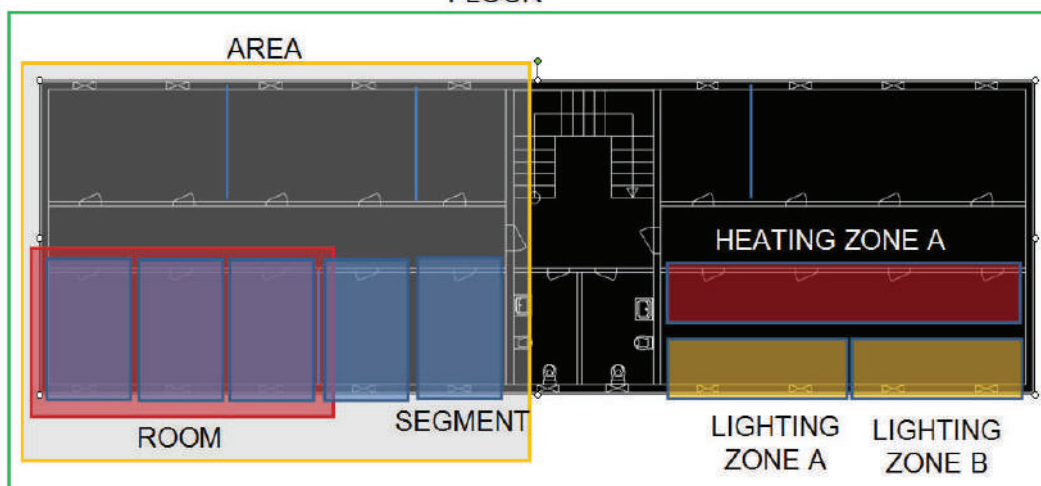- Window monitoring

Each L-ROC Room Controller can handle up to 16 room segments. Based on the various room segment types, larger buildings can be modeled in a hierarchical manner. Areas are built with an area manager by combining multiple room controllers. A floor manager manages multiple areas in one floor. Depending on the architecture, the building can be split up into areas and floors as needed.

Area/Floor Managers are responsible for handling functions needed for corridor, staircase, and bathroom lighting, or even ventilation. Floor managers facilitate the data communication between the floors and handle floor relevant functions.

Rooms can now be created arbitrarily in any size by moving, installing, or removing partition walls. The resulting logical connections between the L-ROC Room Controllers will be built automatically. All graphical user interfaces and network connections are automatically generated and adapted respectively.
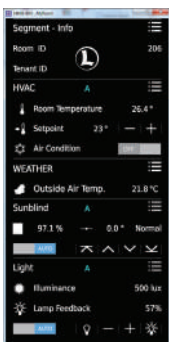
CEA-709 | BACnet | KNX | M-Bus
Modbus | MP-Bus | OPC XML-DA | OPC UA
enocean® | SMI | WLAN | LTE
SNMP | ⚠ | 🕐 | 📈
IoT | ✉ | SMS | 📏
LIOB CONNECT | LIOB FT | LIOB IP | Gateway
⇄ | ⇄ | ▦ | VPN
🌐 | VNC | 🖥 | y=f(x)
IEC 61499 | CEA-709 | BACnet |
🌐 | 👁 | ▦

FLOOR
AREA
ROOM SEGMENT
HEATING ZONE A
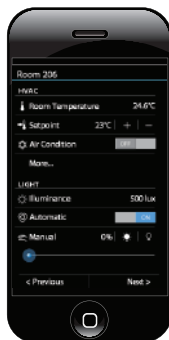LIGHTING ZONE A LIGHTING ZONE B

automation
PROCESS, FACTORY & BUILDING SOLUTIONS

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L-WEB, L-STUDIO Functions

L-ROC

L-INX

L-IOB

Gateways

L-VIS, L-STAT

L-DALI

Routers, NIC

Interfaces

Accessories

L-ROC Room Controller

LROC-102

AST™ for every Room Segment

L-ROC provides a set of functions for Alarming, Scheduling, and Trending (AST™) for every room segment. Each room segment can be operated entirely independently. The AST™ functions are fully available to higher-level systems through BACnet/IP and web services (L-WEB System). Distributed schedulers can be efficiently managed and changed with LWEB-900.

Room Communication through redundant or separated IP Network

L-ROC Room Controllers are interconnected via a 100Base-T Ethernet network. Each L-ROC device is equipped with two Ethernet ports. It can either be configured to use the internal switch to interconnect the two ports or every port is configured to work in a separate IP network.

When the Ethernet ports are configured for two separate IP networks, one port can be connected for instance to a WAN (Wide Area Network) with enabled network security (HTTPS) while the second port can be configured to be connected to an insecure network (LAN) where the standard building automation protocols like BACnet/IP, LON/IP, or Modbus TCP are present. These devices also feature firewall functionality of course to isolate particular protocols or services between the ports. The built-in VPN function provides for simple VPN setup and secure access to remote sites. The LTE-800 interface enables wireless access to remote sites through a mobile carrier.

Using the internal switch, a daisy chained line topology of up to 20 devices can be built, which reduces costs for network installation. The IP switch also allows the setup of a redundant Ethernet installation (ring topology), which increases reliability. The redundant Ethernet topology is enabled by the Rapid Spanning Tree Protocol (RSTP), which is supported by most managed switches.

Integrated L-WEB Room Operation

L-ROC controllers provide graphical user interfaces for room operation directly via an IP connection to the user, without the need for an additional web server. Graphic projects are distributed among the L-ROC Room Controllers and can be accessed by LWEB-802/803 from any PC workstation, smart phone, or tablet PC running Android or iOS.

Integration of the L-STAT Room Operator Panel

Per L-ROC Room Controller up to 16 L-STAT room control devices can be integrated into building automation via Modbus RTU (RS-485) interface. In addition to the attractive, modern design and intuitive operation, L-STAT provides a range of other features to individually increase the room comfort.

Internal sensors measure temperature, humidity, condensation, occupancy, and also the CO_2 value of the air. There is also the possibility to control room functions via an IR remote control. Standard pushbuttons and external temperature sensors can be integrated through additional inputs. A built-in NFC chip (Near Field Communication) provides the ability to direct mobile devices to the address of the respective room website.

Connection to Higher-Level Systems

Higher-level systems can seamlessly integrate L-ROC Room Controllers via BACnet/IP, LonMark IP-852, or web services (OPC).

All these protocols are simultaneously available. It is possible to integrate the L-ROC Room Controller in a BACnet Operator Workstation and at the same time L-ROC will communicate with other CEA-709 devices on the IP-852 channel. Moreover, a higher-level SCADA or ERP System (Facility Management) gets information directly from the L-ROC Room Controller by using web services based on OPC.

L-ROC Room Controller

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Full LWEB-900 Support

The L-WEB System uses web services to communicate with the L-ROC System. All device and operating parameters of every single L-ROC Room Controller are automatically synchronized with the LWEB-900 SQL database by the LWEB-900 client or the LWEB-900 Master Device Manager. The parameters are available to all L-WEB client applications.

I/O Integration via Plug and Play

The L-ROC Room Controllers can automatically integrate physical I/Os by using L-IOB I/O Modules. Up to 24 L-IOB I/O Modules can be connected through LIOB-Connect, LIOB-FT, or LIOB-IP. All I/Os can be used by the L-ROC application and are also available via the web interface of L-ROC. All configurations of the L-IOB Modules are stored on the L-ROC and loaded on demand into the L-IOB I/O Modules. Exchanging I/O modules is done without any configuration effort requiring only a few quick configuration steps.

L-STUDIO

L-STUDIO is the world's first IEC 61499 based room automation system. Any room function can be realized with L-STUDIO in a distributed system of L-ROC devices. We call this new approach in automation "Cloud Control". In a cloud of L-ROC devices, all automation functions are mapped automatically to physical hardware. The object-oriented design method allows the efficient reuse of previously implemented functions. In the graphical development environment of L-STUDIO, areas are created from room segment with just a few mouse clicks. The areas are interconnected to floors and multiple floors form a building. The entire building application is automatically distributed to the L-ROC Controllers installed in the building.

New functions can be added to the room segment objects after initial configuration. These new functions can be applied individually or to all room segment objects very easily. Comprehensive debugging and watch functions allow for complete building troubleshooting. An extensive library of functions is provided for heating, ventilation, cooling, lighting, sunblind control, and security. With the integrated L-VIS/L-WEB Configurator, graphical pages for L-VIS Touch Panels and L-WEB applications can be customized.

Year Shade Progression

Especially in dense city areas, buildings can cast shadows on each other. In case a façade element is shaded by another building, sunblinds can be deactivated for better day light harvesting. The high-performance L-ROC controllers allow to calculate a 3D model in dxf-Format of the building and its close-by neighbors. The model can be constructed using common 3D CAD software or can be derived from a Building Information Model. In case the scenery changes due to new constructions, only the new buildings have to be inserted in the model. The calculation can be done for each window individually or per shadowing zone.

IoT Integration

The IoT function (Node.js) allows connecting the system to almost any cloud service, either for uploading historical data to analytics services, delivering alarm messages to alarm processing services or operating parts of the control system over a cloud service (e.g., scheduling based on Web calendars or booking systems). Processing Internet information such as weather data in forecast-based control is also possible. Finally, the JavaScript kernel also allows implementing serial protocols to non-standard equipment.

L-WEB, L-STUDIO Functions

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L-ROC Room Controller

LROC-102

Features

- Flexible built-in management for room segments
- Room controller for up to 16 room segments
- Networking via redundant or separated IP network
- Programmable with L-STUDIO (IEC 61499)
- Extension with physical inputs and outputs using L-IOB I/O Modules (LIOB-10x, LIOB-15x, and LIOB-45x/55x)
- 128x64 graphic display with backlight
- Local display of device and data point information
- Manual operation using the jog dial or VNC Client
- Integrated AST™ functions (Alarming, Scheduling, and Trending) for each room segment
- Node.js support for easy IoT integration (e.g. Google calendar, Alexa & friends, multimedia equipment,…)
- Event-driven e-mail notification
- Math objects to execute mathematical operations on data points
- Stores customized graphical pages
- Visualization of customized graphical pages through LWEB-900 (Building Management), LWEB-803 (Monitoring and Control), or LWEB-802 (Web Browser)
- Support of the L-STAT Room Operator Panel
- Built-in OPC XML-DA and OPC UA server
- Dual Ethernet/IP interface
- Access to network statistics
- Compliant with ANSI/ASHRAE 135-2012 and ISO 16484-5:2012 standard
- Supports BACnet MS/TP or BACnet/IP
- BACnet Client Function (Write Property, Read Property, COV Subscription)

- BACnet Client Configuration with configuration tool (scan and EDE import)
- BACnet/IP compliant with B-BC (BACnet Building Controller) functionality
- Compliant with CEA-709, CEA-852, and ISO/IEC 14908 Standard (LonMark System)
- Connection of any CEA-709 device via TP/FT-10 channel
- CEA-709 integration via LonMark IP-852 (Ethernet/IP) channel
- Support of dynamically created or static NVs
- Support of user-defined NVs (UNVTs) and Configuration Properties (SCPTs, UCPTs)
- Integrated BACnet/IP to BACnet MS/TP Router including BBMD as well as Slave-Proxy functionality
- Integrated IP-852 to TP/FT-10 Router
- Connection to KNXnet/IP directly, KNX TP1 via LKNX-300 Interface
- M-Bus Master according to EN 13757-3, connection via optional M-Bus Converter (L-MBUS20 or L-MBUS80)
- Gateway functions including Smart Auto-Connect™
- Modbus TCP and Modbus RTU (Master or Slave)
- Integrated web server for device configuration and monitoring data points
- Configurable via Ethernet/IP
- Connection to EnOcean wireless devices via LENO-80x Interface
- Supports WLAN through LWLAN-800 Interface
- Supports MP-Bus through LMPBUS-804 Interface
- Supports SMI (Standard Motor Interface) through LSMI-80x
- Supports LTE through LTE-800 Interface
- Stores user-defined project documentation

Functions

L-WEB, L-STUDIO

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General Specifications	
Dimensions (mm)	159 x 100 x 75 (L x W x H), DIM053
Installation	DIN rail mounting following DIN 43880, top hat rail EN 50022
Power supply	24 V DC / 24 V AC ±10 %, typ. 2.5 W
Operating conditions	0 °C to 50 °C, 10 – 90 % RH, noncondensing, degree of protection: IP40, IP20 (terminals)

Specifications	
Type	**LROC-102**

Interfaces	2 x Ethernet (100Base-T):
	    Web services (OPC XML-DA, OPC UA), LonMark IP-852*, BACnet/IP**, LIOB-IP, KNXnet/IP,
	    Modbus TCP (Master or Slave), HTTP, FTP, SSH, HTTPS, Firewall, SNMP
	1 x LIOB-Connect
	2 x USB-A: WLAN (needs LWLAN-800), EnOcean (needs LENO-80x),
	    MP-Bus (needs LMPBUS-804), SMI (needs LSMI-804), LTE (needs LTE-800)
	1 x TP/FT-10* (LonMark System)
	1 x LIOB-FT
	2 x RS-485 (ANSI TIA/EIA-485):
	    BACnet MS/TP** or
	    Modbus RTU (Master or Slave)
	2 x EXT:
	    M-Bus, Master EN 13757-3
	    (needs L-MBUS20 or L-MBUS80)
	    or KNX TP1 (needs LKNX-300)
	    or SMI (needs LSMI-800)

	Router between LonMark IP-852 and TP/FT-10 ** *Router between BACnet/IP and BACnet MS/TP*
L-IOB I/O Modules	Up to 24 L-IOB I/O Modules in any combination of type LIOB-10x, LIOB-15x, and LIOB-45x/55x
BACnet/IP Router	1
LonMark CEA-709 Router	1
Program cycle time	Event-triggered
Programming, tools	L-STUDIO (IEC 61499 based)

Resource limits			
Total number of data points	30 000	LonMark Schedulers	100
OPC data points	10 000	LonMark Alarm Servers	1
BACnet objects	2 000 (analog, binary, multi-state)	E-mail templates	100
BACnet client mappings	5 000	Math objects	100
BACnet calendar objects	25	Alarm logs	10
BACnet scheduler objects	100 (64 data points per object)	M-Bus data points	1 000
BACnet notification classes	32	Modbus data points	4 000
Trend logs (BACnet or generic)	512 (4 000 000 entries, ≈ 60 MB)	KNX TP1 data points	1 000
Total trended data points	1 000	KNXnet/IP data points	1 000
CEA-709 network variables (NVs)	2 000	Connections (Local / Global)	2 000 / 250
CEA-709 Alias NVs	2 000	Number of L-WEB clients	32 (simultaneously)
CEA-709 External NVs (polling)	1 000	L-IOB I/O Modules	24
CEA-709 address table entries	1 000 (non-ECS mode: 15)	Number of EnOcean devices	100
LonMark Calendars	1 (25 calendar patterns)	EnOcean data points	1 000
SMI devices (per channel)	16	MP-Bus devices (per channel)	8 (16 MPL)

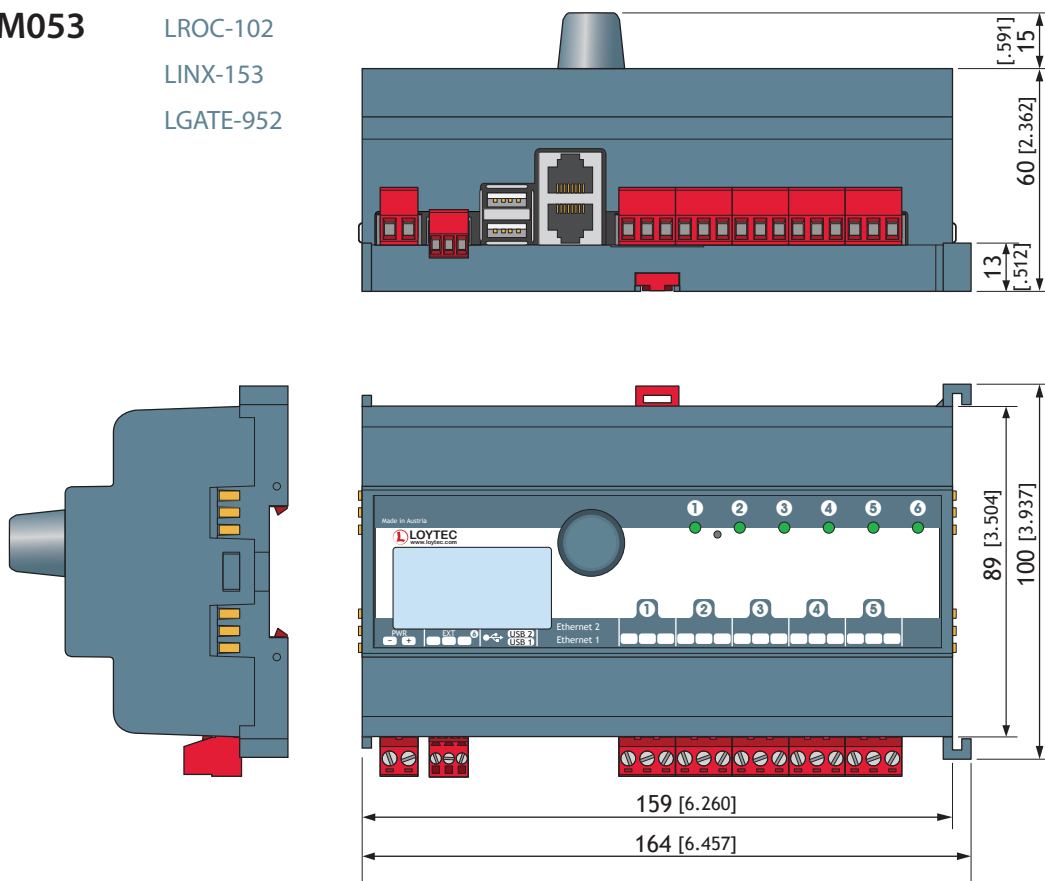| Order number	Product description
LROC-102	Room Controller for room segment, aisle, floor, building, or campus management
LROC-SEG8	License to add 8 segments to L-ROC Controller
L-STUDIO	L-ROC programming and configuration software
L-LIB-LROC	L-ROC Room Automation Library

LROC-102

Order number	Product description
LIOB-A2	L-IOB Adapter 2 to split the LIOB-Connect bus using 4-wire cables
LIOB-A4	L-IOB Adapter 4 to split the LIOB-Connect bus using RJ45 network cables
LIOB-A5	L-IOB Adapter 5 to terminate the LIOB-Connect bus
LIOB-100	LIOB-Connect I/O Module: 8 UI, 2 DI, 2 AO, 9 DO (5 x Relay 6 A, 4 x Triac 0.5 A)
LIOB-101	LIOB-Connect I/O Module: 8 UI, 16 DI
LIOB-102	LIOB-Connect I/O Module: 6 UI, 6 AO, 8 DO (8 x Relay 6 A)
LIOB-103	LIOB-Connect I/O Module: 6 UI, 6 AO, 5 DO (5 x Relay 16 A)
LIOB-150	LIOB-FT I/O Module: 8 UI, 2 DI, 2 AO, 8 DO (4 x Relay 6 A, 4 x Triac 0.5 A)
LIOB-151	LIOB-FT I/O Module: 8 UI, 12 DI
LIOB-152	LIOB-FT I/O Module: 6 UI, 6 AO, 8 DO (8 x Relay 6 A)
LIOB-153	LIOB-FT I/O Module: 6 UI, 6 AO, 5 DO (4 x Relay 16 A, 1 x Relay 6 A)
LIOB-154	LIOB-FT I/O Module: 7 UI, 4 AO, 7 DO (5 x Relay 6 A, 2 x Triac 0.5 A), 1 Pressure Sensor
LIOB-450	LIOB-IP852 I/O Module: 8 UI, 2 DI, 2 AO, 8 DO (4 x Relay 6 A, 4 x Triac 0.5 A)
LIOB-451	LIOB-IP852 I/O Module: 8 UI, 12 DI
LIOB-452	LIOB-IP852 I/O Module: 6 UI, 6 AO, 8 DO (8 x Relay 6 A)
LIOB-453	LIOB-IP852 I/O Module: 6 UI, 6 AO, 5 DO (4 x Relay 16 A, 1 x Relay 6 A)
LIOB-454	LIOB-IP852 I/O Module: 7 UI, 4 AO, 7 DO (5 x Relay 6 A, 2 x Triac 0.5 A), 1 Pressure Sensor
LIOB-550	LIOB-BIP I/O Module: 8 UI, 2 DI, 2 AO, 8 DO (4 x Relay 6 A, 4 x Triac 0.5 A)
LIOB-551	LIOB-BIP I/O Module: 8 UI, 12 DI
LIOB-552	LIOB-BIP I/O Module: 6 UI, 6 AO, 8 DO (8 x Relay 6 A)
LIOB-553	LIOB-BIP I/O Module: 6 UI, 6 AO, 5 DO (4 x Relay 16 A, 1 x Relay 6 A)
LIOB-554	LIOB-BIP I/O Module: 7 UI, 4 AO, 7 DO (5 x Relay 6 A, 2 x Triac 0.5 A), 1 Pressure Sensor
LPOW-2415A	LIOB-Connect power supply unit, 24 V DC, 15 W
LPOW-2415B	Power supply unit with power connector 24 V DC, 15 W
L-MBUS20	M-Bus level converter for 20 M-Bus devices
L-MBUS80	M-Bus level converter for 80 M-Bus devices
LKNX-300	KNX interface to connect KNX TP1 devices
LENO-800	EnOcean Interface 868 MHz Europe
LENO-801	EnOcean Interface 902 MHz USA/Canada
LENO-802	EnOcean Interface 928 MHz Japan
LWLAN-800	Wireless LAN Interface IEEE 802.11bgn
LMPBUS-804	MP-Bus interface for 16 devices per channel, up to 4 channels
LSMI-800	Standard Motor Interface for 16 motors via EXT port
LSMI-804	Standard Motor Interface for 64 motors, 4 SMI channels via USB
LTE-800	USB LTE Interface
LSTAT-800-G3-Lx	Room Operator Panel, black front, white enclosure, Modbus, NFC, temperature, rel. humidity, ext. switch/NTC, IR receiver, Buttons (Lx)
LSTAT-801-G3-Lx	Room Operator Panel, front black, white enclosure, Modbus, NFC, temperature, rel. humidity, ext. switch/NTC, occupancy, IR receiver, Buttons (Lx)
LSTAT-802-G3-Lx	Room Operator Panel, front black, white enclosure, Modbus, NFC, temperature, rel. humidity, ext. switch/NTC, occupancy, IR receiver, CO2, Buttons (Lx)
LSTAT-800-G3-L20x	Room Operator Panel, white front, white enclosure, Modbus, NFC, temperature, rel. humidity, ext. switch/NTC, IR receiver, Buttons (Lx)
LSTAT-801-G3-L20x	Room Operator Panel, white front, white enclosure, Modbus, NFC, temperature, rel. humidity, ext. switch/NTC, occupancy, IR receiver, Buttons (Lx)
LSTAT-802-G3-L20x	Room Operator Panel, white front, white enclosure, Modbus, NFC, temperature, rel. humidity, ext. switch/NTC, occupancy, IR receiver, CO2, Buttons (Lx)
LSTAT-80x-CUSTOM	Customized Room Operator Panel, minimum quantity 100 pieces, enclosure G1: silver, G2: black, G3: white; custom print Lx, EnOcean optional, including 2 working samples, typical lead time 10 weeks

Functions
L-WEB, L-STUDIO
L-ROC
L-INX
L-IOB
Gateways
L-VIS, L-STAT
L-DALI
Routers, NIC
Interfaces
Accessories

Dimensions of the devices in mm and [inch]

DIM053

LROC-102
LINX-153
LGATE-952

15 [.591]
60 [2.362]
13 [.512]

89 [3.504]
100 [3.937]

159 [6.260]
164 [6.457]

DIM054

LINX-154
LIP-3333ECTC
LIP-ME204C

15 [.591]
60 [2.362]
13 [.512]

89 [3.504]
100 [3.937]

159 [6.260]
164 [6.457]
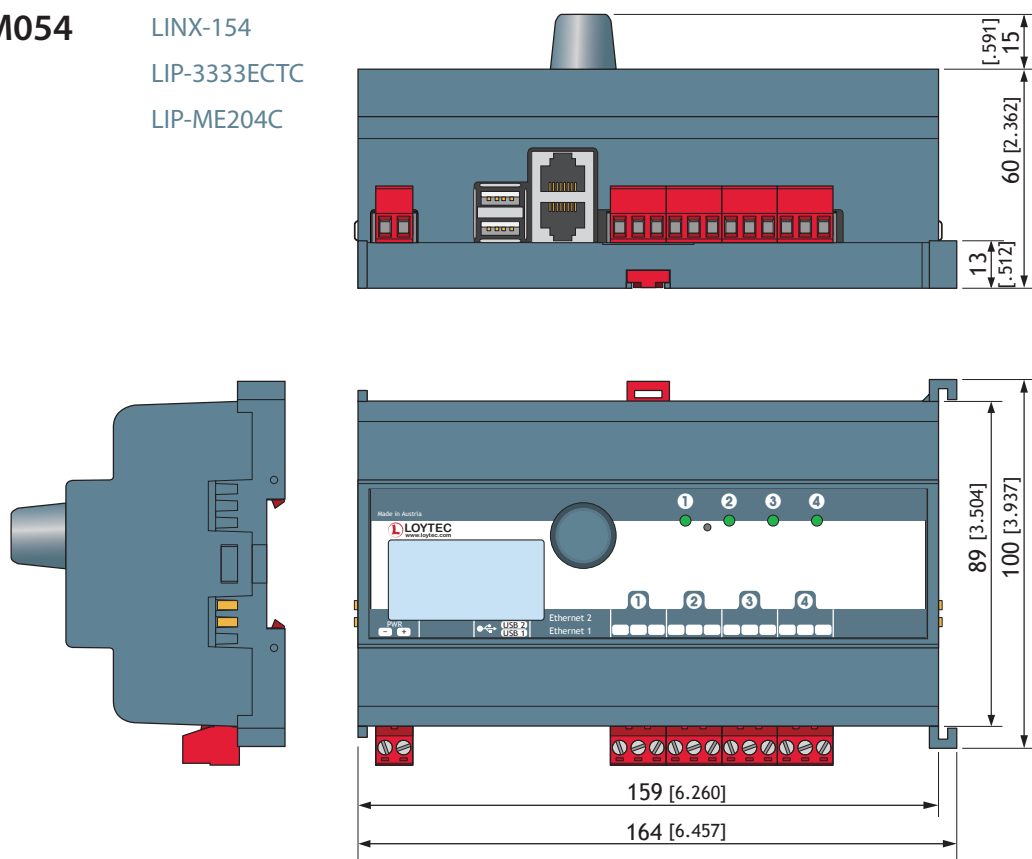
SCALE 1 : 2
10   0   20   40   60   80   100 mm

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