

System description





The **High-End** building management system

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Introduction



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Introduction | The LCN system



Perfect building automation

LCN, or local control network, is a modular bus system for all types of buildings. It is characterised by its very high transmission capacity, superior reliability and a very extensive range of functions. Despite its high-end features, LCN has a clear concept and is strikingly easy to install.

Practically every function in a building can be automated using LCN. The LCN system can be extended in many ways and enables manual commands to be linked to automatic functions. This means that a building can be controlled and regulated across all systems. It also effortlessly gives the user the highest level of individual convenience and allows him or her to save money thanks to an optimisation that enables efficient energy consumption.

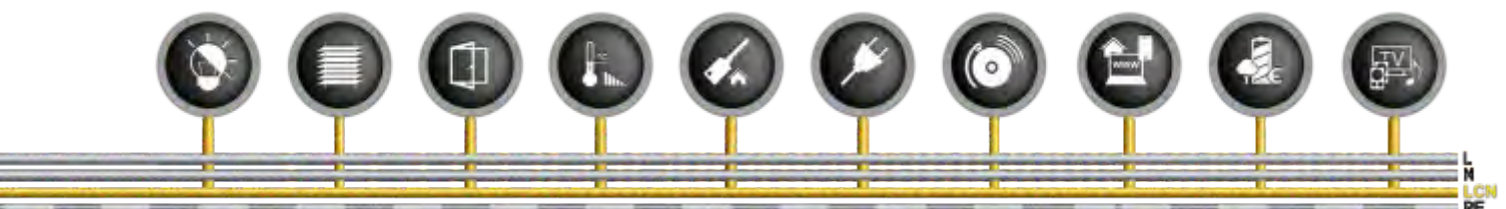
LCN only needs an extra wire for data transfer in a conventional installation network. This data wire can be handled without additional rules as LCN complies with VDE regulations. The installation costs remain very low as LCN does not require an additional wiring system, so every building - big or small - benefits from it.

LCN is a very professional system which is characterised by its four-level acknowledgement and notification system – the first on the market which enables LCN to reliably monitor all states and processes, even in extremely large-scale systems.

With a performance in sending up to 10.000 telegrams per second the LCN system is one of the most powerful building management systems

Every LCN bus module functions independently; even the mains adaptor is built in. A functional bus can be created using two or more bus modules. LCN modules are "intelligent", meaning that they can send and receive commands independently, analyse sensors, control actuators and regulate data exchange between modules. A central processor is not required.

The LCN bus modules can be individually configured at your convenience using the LCN-PRO LCN programming software. This software can be used to design projects in your office that can be transferred to the building later. Alternatively, you can use the LCN-PRO software to directly access the system (via the Internet, if necessary) and transfer all alterations that have been made to the LCN modules in seconds. A pre-configured LCN installation can be read in full at any time and adjusted at your convenience.



Introduction | Features & Advantages



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■ One of the most powerful buses in the world

With 1,000 – 10,000 telegrams in the upper and 100 telegrams in the lower bus level, LCN is the global pioneer in installation buses as a result of its transmission capacity.

■ LCN does not need an extra cable system

No additional changes or alterations to the existing electrical installation are required to assemble or install the LCN system. LCN simply uses a free wire in the existing installation. This saves work, costs and additional effort.

■ Quality: extensive monitoring

LCN is a unique system, because it has a four-level acknowledgement and notification system. This enables all statuses and processes to be fully monitored, even in very large buildings. System status messages also help the installer to do their work quickly and inexpensively.

■ LCN data can be fully retrieved at any time

An LCN system can be easily extended or serviced, even after several years and even if the project file is no longer available.

This is because all of the programming, including comments, are stored in the system. The project file can be fully restored within minutes.

■ LCN is a low-cost system for beginners

The ability to simply install the system in an existing infrastructure means that LCN is better value than other systems. Other aspects that make the system great value for money are the simple, low-cost servicing and the modules' multifunctionality and stability.

■ LCN has a vast range of functions

LCN provides an unrivalled number of functions per module, from lighting to shutter control right through to access control. With up to 6 regulators per module that are supplied from 12 pieces of measured values, LCN also has superior functionality in air conditioning.

This variety enables LCN to adapt flexibly to the building and the building contractors' requirements. It also makes planning very easy.

■ LCN – an open system Added functionality through couplings

As an open bus network, LCN enables simple coupling with almost any system (e.g. BACnet, Modbus, OPC, BMA Bosch, iOS, IP-Symcon, Tobit, EnOcean, etc.) via various interfaces. Coupling does not just provide added functionality, it also constantly enriches the two systems.

■ Programming without databases and applications

LCN is easy to program. Descriptive installation and functional software make it easy to understand how to handle the system. Individual projects can be stored in a template pool and be reused at any time by dragging and dropping them into any LCN system. The LCN-PRO "recognises" all LCN modules manufactured since 1996 or after, and only allows the installer to use the functions that the modules can control: a simple, standardised tool for every building.

■ Control your building from anywhere in the world with the LCN-GVS

The LCN-GVS visualisation system enables all statuses and function values for a building to be controlled from anywhere in the world. The software is simply installed on a central Windows PC and can be used or even configured with any browser-enabled device (a smartphone, PC, tablet, etc.). At any time. From anywhere in the world.

Introduction | ISSENDORFF KG



The company's service portfolio

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Development	ISSENDORFF KG runs a department that develops the company's hardware and software for all LCN components and system software. The LCN-PRO and LCN-PCHK software tools, the LCN-GVS visualisation software and their Apps for iOS and Android all come from one source.
Products	LCN is a hardware and software product that is made in Germany. All components are developed, manufactured and finally assembled in Germany in accordance with very strict guidelines and standards.
Training sessions	There are training sessions throughout Germany run by qualified professionals and/or by state schools, guilds and chambers of crafts.
Planning	ISSENDORFF KG will help you to implement a wide range of requirement specifications when planning your large-scale and small-scale systems: from partially configured family homes to fully automated skyscrapers.
Distribution	The company has a three-step distribution system through an authorised wholesale.
Support	<p>Customer-specific support by competent staff in the company as well as by our nationwide external team.</p> <p>Free software updates for the installer: No costs that then need to be passed on to the customer.</p> <p>Free system hotline for technical issues concerning the LCN system.</p> <p>Free hotline for help with planning and installation issues.</p> <p>Direct and personal support without the use of a call centre.</p>
Support from partnerships	<p>LCN is an open system: any electrician can work with LCN. Our company also has a global network of premium partners. They are particularly competent in consultation, planning, installation, programming and setting parameters.</p> <p>Professional building automation for over 25 years Take your benefit from the experience of a quarter of a century in bus technology!</p>

Concept | The bus



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The LCN bus

One of LCN's specific development objectives has been (and continues to be) to make the system flexible for the largest buildings while also being suitable for smaller-scale systems. LCN has truly succeeded in this due to the following features:

LCN only requires an additional wire in the conventional installation network in order to transmit data. The installer can handle the data wire as he or she usually would as LCN complies with VDE regulations. The installation costs remain very low as no additional wiring system needs to be fitted. Every building – big or small – benefits from this.

High bus power and very reliable data transmission are important factors for large-scale systems. LCN is a leader in both disciplines (around the world): with up to 10,000 telegrams per second, LCN is between 3 and 30 times better than standard systems. LCN has extremely precise functionality due to its unique four-level acknowledgement and notification system.

The range of LCN products has deliberately remained compact so that hidden costs, e.g. storage and training for installers, can be kept low. All LCN bus modules have plenty of storage capacity for operating programs. All modules come with the full range of functions. They are consistent, which makes them easy to learn. The installer simply enables the functions that he or she needs at that time.

Two bus modules alone can form a functional bus. Their "intelligence" means that they can independently send and receive commands, analyse sensors, control actuators and regulate data exchange between modules. A central processor is not needed.

The LCN-PRO LCN programming software is supplied so that the LCN bus modules can be individually configured. This tool that the installer can use is particularly efficient and easy to operate. Projects can be created at the office and then installed in the system at the job site. The LCN-PRO software can also be directly connected to the system via the LCN-PCHK software. This method allows changes to be made directly in the LCN modules in seconds. A pre-configured LCN installation can be read at any time and adjusted at your convenience.

LCN bus - One free wire is enough

Fig.) NYM-J,5 wires: Ready for the LCN bus!



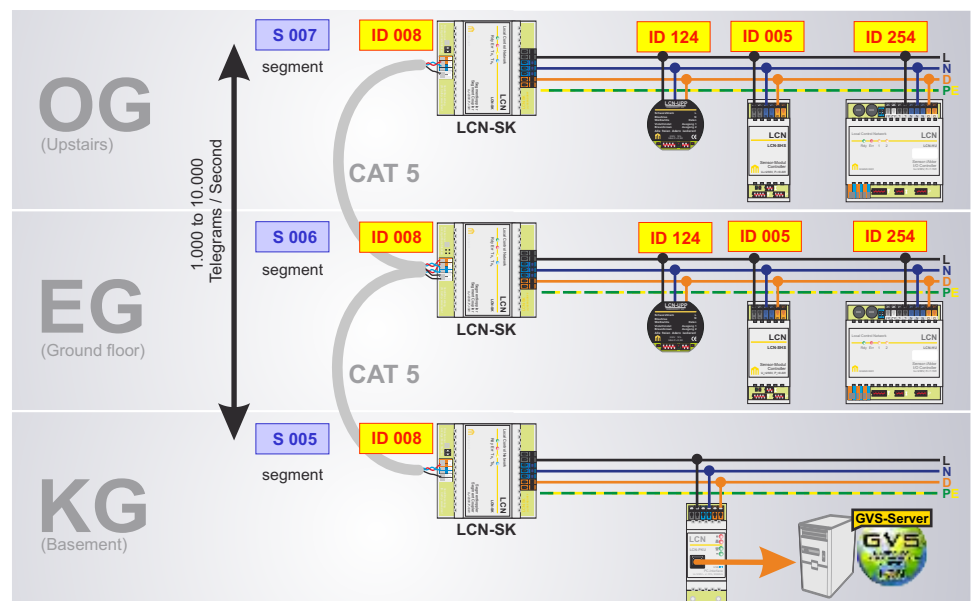
Introduction | Technical data



Technic	■ Data
Data rates	■ Lower bus level: 9600 Bd = typ. 100 telegrams/s Segment bus: 300 kBd - 2.5 MBd = 1,000 T/s (up to 10,000 T/s)
User data	■ 24 bit (or more: up to 120 B/telegram)
Lower bus level	■ max. 250 modules per segment
max. segments	■ 120 segments
max. configuration	■ 30.000 modules > 600.000 sensores/actors
Range	■ 1 km per bus string (over 50 strings per segment) ■ > 20 km with fibre-optic cables
Hierarchy	■ clear (two levels)
Acknowledgement and notification system	■ 4-step: Function reporting Status reporting Status commands System status messages

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Structure



Concept | Operation



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LCN integrates the entire building installation into a comprehensive bus system

- The multi-functional computer modules register signals from reliable control units (switches, keys)
- Built-in outputs switch a wide range of electrical loads such as lighting, valves or motors

All modules are interconnected over an additional wire in the standard installation wiring. The LCN modules exchange messages and commands over this wire and the neutral wire. A module can communicate with any other module:

"Activate your first output!"

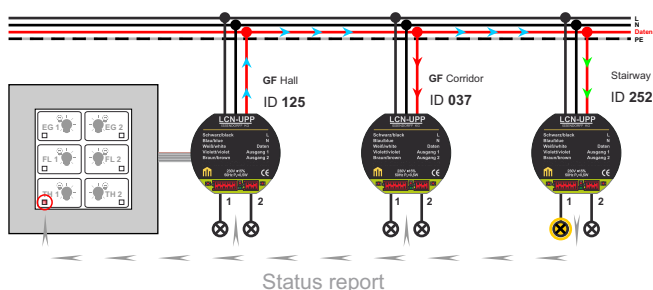
How LCN works

The modules function fully independently. They do not need a separate power supply or their own cables. They can always provide several functions with two switching outputs and two or three independent connections for different peripheral devices. This enables LCN to manage with only a few modules and with a simple wiring system. In addition to sensors and actuators, all LCN modules have several timers, connections, regulators, threshold evaluations and a counting /computing function. These features make it possible to automate controls on site.

Target: to the Modul „ID 252“

Command: control output 1

Values: brightness 50% / blend time 3s



Multi-master bus

The building contractor can start off very small: two modules can create a functioning bus without using any other devices. However, LCN modules can also be used separately, e.g. with an IR receiver as a remote-controlled double dimmer switch with memory or as access control. The LCN bus system can be gradually developed into large building complex systems.

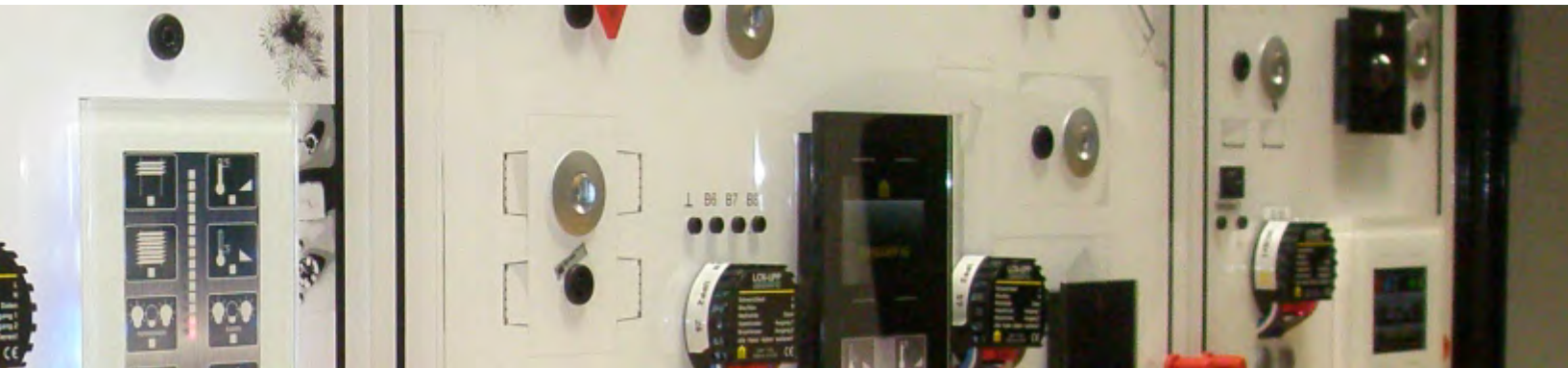


Fig.) LCN-UPP - intelligent bus module for flush-mounting



Fig.) LCN-HU - intelligent bus module for DIN-rail mounting

Concept | Acknowledgement & notification



Very important: acknowledgement and notification

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■ LCN is a unique system on the market in that it has a four-level acknowledgement and notification system.

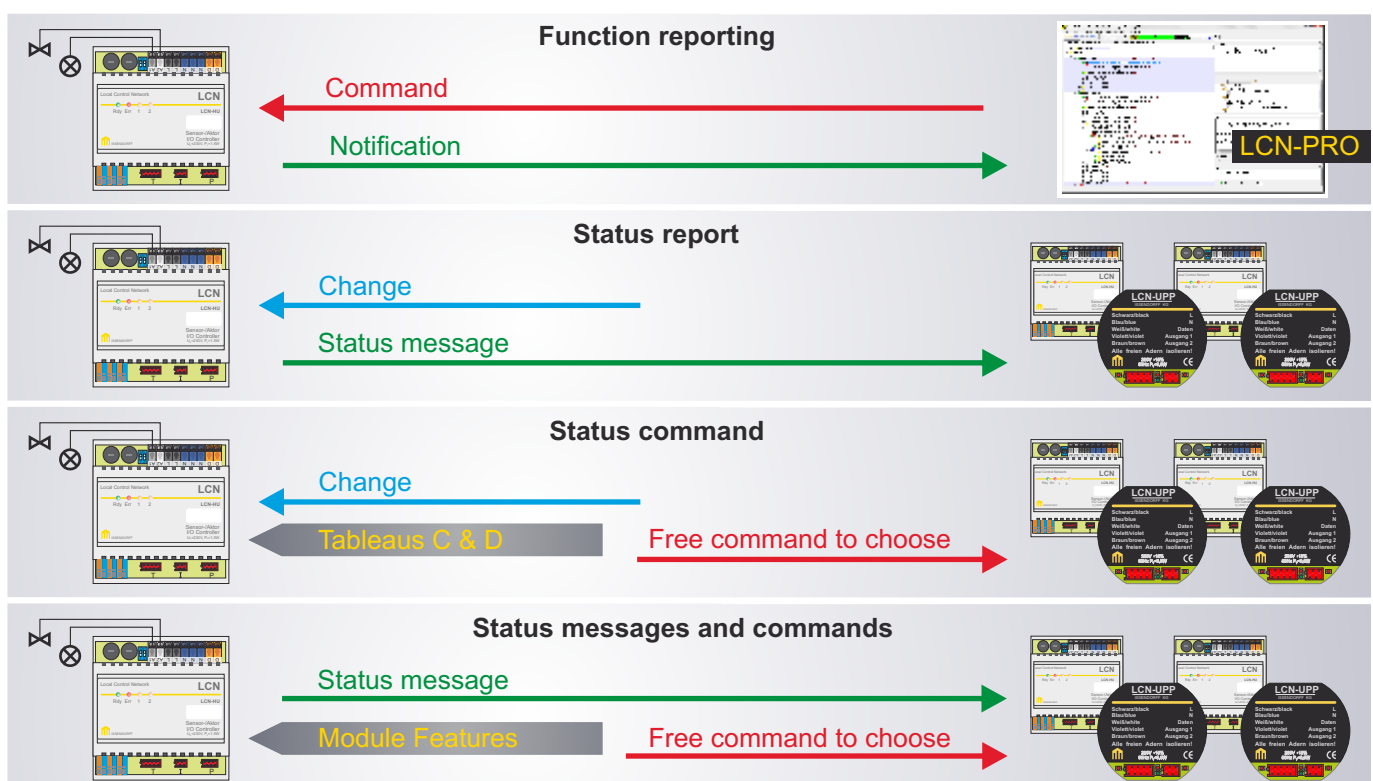
Function reporting is the direct response to a command. In this process, both reception and correct execution are confirmed.

A status report is always sent when the value at an input or output changes. These reports are available throughout the entire bus and are the backbone of the reliable LCN notification system. What is more, tableaus and PC indicators can be set up in just a few simple steps to give a full overview of the building in real time. LCN tableaus have four states (On, Off, Flash and Flicker) and enable first value and last value reporting in line with the DIN standard. They can be used in a hierarchy for systems of any size.

Follow-up controls can be implemented for each status command. Commands are registered, for

instance at an output, for this purpose. The module sends these commands when this output switches or dims. This method can be used to program complex flow controls in combination with timers, pre-programmed routines that conflict with manually introduced commands, etc.

System status messages help the installer. LCN is the only system that monitors and increases the reliability of the entire system using these messages. LCN modules have built-in functions that check for overheating, overloading in the internal mains adaptor and similar installation errors. Critical operational states are automatically avoided and a notification is sent to the installer.



Concept | System components



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Types of modules

Bus modules

Bus modules provide the basis for the LCN system. As they have their own microprocessors, they take on the tasks of querying sensors, controlling actuators and communicating with other devices connected to the bus. In addition to their own outputs, the bus modules have several connectors for external sensors (feelers, detectors, probes) and add-on modules such as relay components and electronic ballasts. All bus modules are supplied with a built-in mains adaptor for 230 V, 110 V or 24 V (50 Hz/60 Hz).

All LCN modules are protected against mains voltage and pulses of up to 2/4 kV in the data wire. This means that LCN does not need overvoltage protection on site – another aspect that makes installation easier.

Switching and dimming modules

The standard LCN modules (e.g. the LCN-UPP, -SH, -HU, -LD) have two dimmable electronic 230 V outputs (between 300 VA and 2,000 VA) plus two more simulated outputs. They control dimming, switching, motor control units, burst mode, etc. The LCN-HU also has three 0-10 V direct voltage outputs to control electronic ballasts that can also be switched to DSI or DALI output. The required function can be individually configured.

Sensor bus modules

Sensor modules (e.g. the LCN-UPS, -SHS) are a low-cost alternative if 230 V outputs are not required. They provide the same functions with their four simulated outputs, but do not have electronic power outputs.

Connections for peripheral devices

The T-port connection

Conventional keypads, LCN touch keypads with no display or KNX standard key sensors are queried via the T-port connection. Adapters such as the LCN-T8 and LCN-TEU are available for this.

The I-port connection

The I-port connection enables several sensors to be connected parallel, e.g. temperature sensors, infra-red remote-control receivers, transponder receivers or even LCN touch keypads with a display. Flexible solutions are possible as the cable in the I-port connection can be extended by up to 50m.

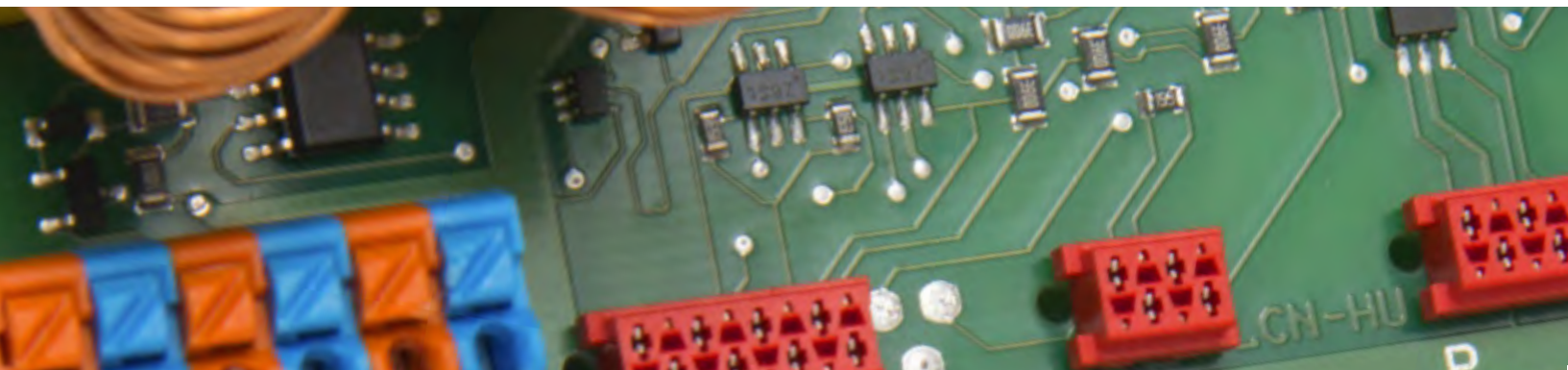
The P-port connection

The P-port connection is only available in bus modules for DIN rail assembly. It enables relays to be connected, which in turn enables a module to control up to eight relay outputs with a 16A load.

Control outputs

In addition to the 230 V outputs, the LCN-HU module has three outputs that supply 0-10 V control voltage with an adjustable characteristic curve. Alternatively, they can control DSI, RGB or 4 DALI channels. This supports the entire DALI address space. There are adaptors for the T-port connection (LCN-DDR) in the flush-mounted modules that also enable these modules to use DALI or DSI controls.

Concept | The module



Configuration for the "intelligent" LCN module (using the example of the LCN-HU)

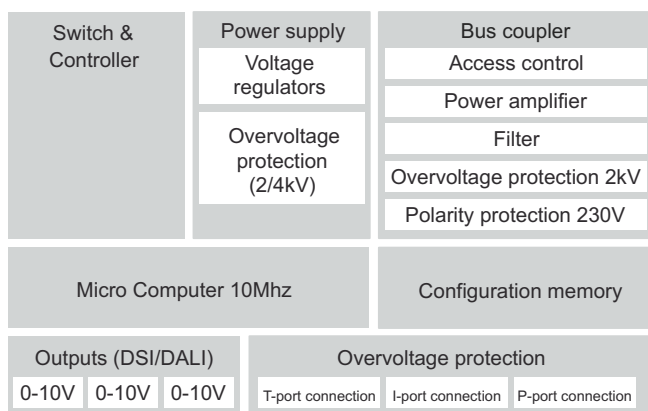
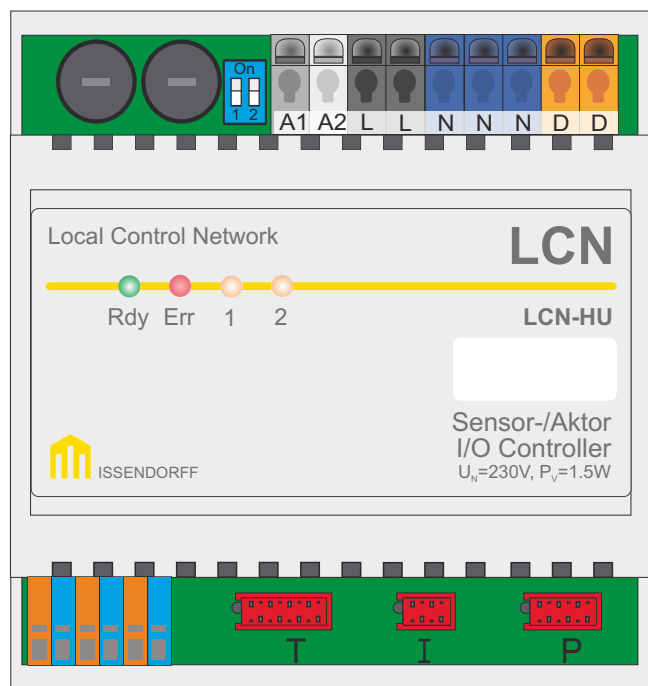


Fig.) schematic view of the LCN-HU
The three 0-10 V direct voltage outputs (that can also be configured as DSI or DALI outputs) can be used to control electronic ballasts or frequency converters, etc.

Designs

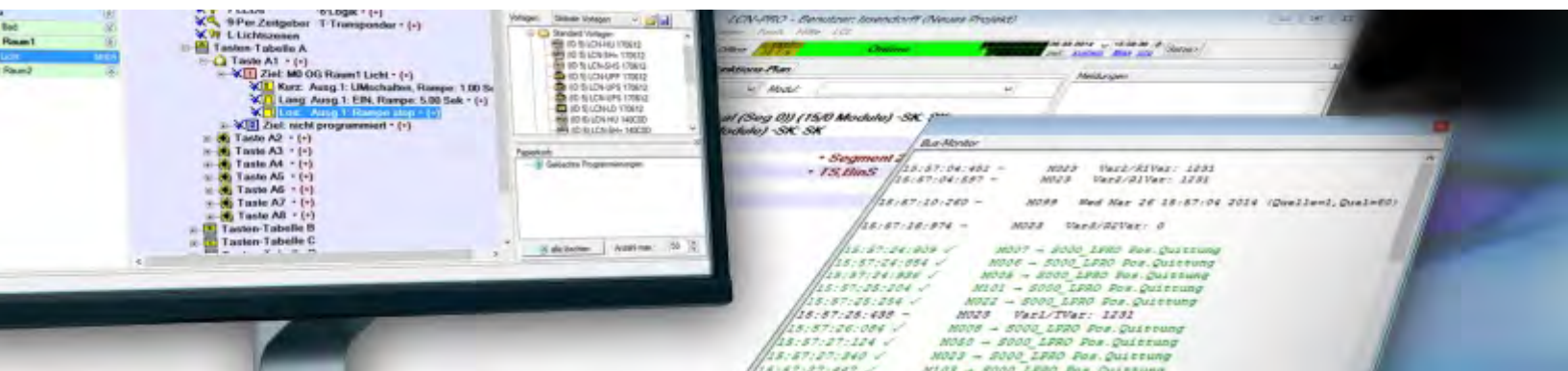
LCN modules are available as flush-mounted or DIN rail modules for distributed or centralised use. The flush-mounted modules can be assembled in flush-mounted boxes behind keypads, sockets and switches or even in junction boxes. In contrast to other bus systems, LCN modules contain various sensor inputs and actuator outputs in the same module as standard. This means that any sensors and actuators can be activated on site.

Centralised use for the DIN Rail.
Distributed in flush-mounted boxes.

Microprocessors

All settings are permanently stored in the configuration memory in the intelligent LCN modules. The settings will not be lost, even in the event of a power outage. With the LCN programming software, the current state of all LCN modules in a system can be read and analysed at any time and be changed and processed if necessary. Each module is given a password to protect LCN systems and/or LCN modules against unauthorised access.

Concept | Software



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The LCN-PRO

The LCN-PRO is the name of the tool that installers use. This software can be used to conveniently program all LCN systems regardless of the system's configuration and size. Free available updates always ensure full compatibility with the latest generation of modules. The LCN-PRO can program any number of projects. Individual projects can be stored in a template pool and be reused at any time by dragging and dropping them into any LCN system. Two data back-ups (one on the PC and one in the system) and the software's ability to recognise available component versions prevents any faults from occurring.

The LCN-PRO has two modes of operation: online and offline mode. In offline mode, the system is pre-configured and stored in a database. The programming is transferred to the project later when connected to the system. If the LCN-PRO is connected to the system in online mode, it can read and change the system's current programming. In addition to general programming, the software controls errors and protocol functions in the LCN system.

The LCN-PRO is available in twelve languages and has a free update service.

The LCN-PCHK

The LCN-PCHK is used to couple an LCN system to the Ethernet/Internet. This enables programs such as the LCN-PRO or the LCN-GVS visualisation system to access the system in-house or via the Internet from anywhere in the world.

The LCN-PCHK supports two protocols:

- The internal mode for the LCN-PRO and LCN-GVS
- The PCK mode with third-party programs can be used conveniently to control the LCN bus and automatically receive all status information.

Examples of use:

- Remote programming using the LCN-PRO via the Internet.
- Remote visualisation using the LCN-GVS via the Internet.
- Access to third-party LCN software, either locally or via the Internet

All couplings can run at the same time. For example, the LCN-GVS can run locally whilst the LCN-PRO is being used on a different continent for programming.

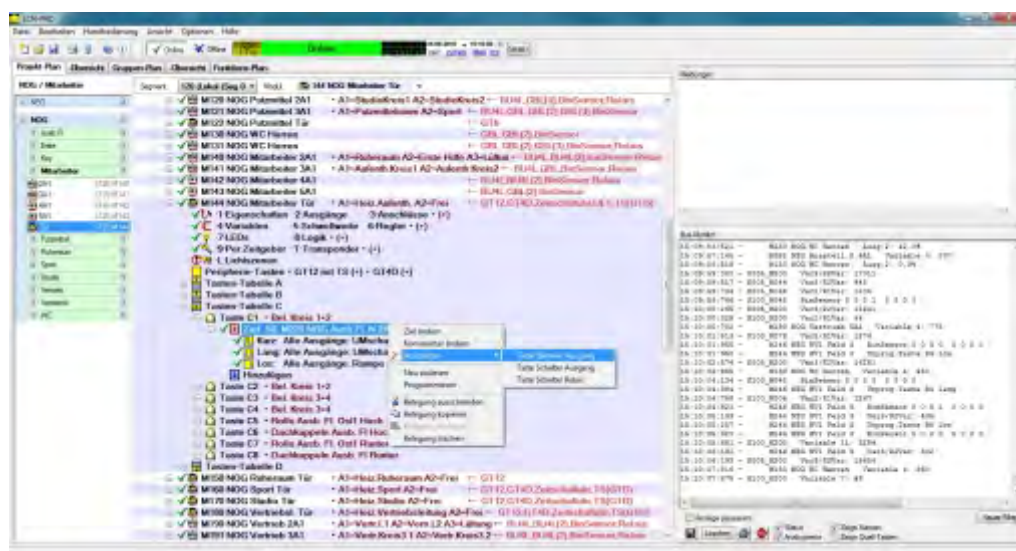


Fig.)
LCN-Programming Software
LCN-PRO (Screenshot)

Concept | Software



The LCN-GVS

The LCN-GVS is a visualisation system that can control and manage almost any number of LCN systems and buildings anywhere in the world.

As the LCN-GVS is purely browser-based, any web-enabled PC, smartphone, etc. in the world can access all of the buildings. With extensive user account control, special rights to access individual appliances, rooms, buildings or groups can be granted. The connections between the LCN-GVS visualisation system and properties around the world are established through encrypted connections.

The LCN-GVS extensively monitors all connected LCN systems and presents the situations in graphic form. Incident reports are available for monitoring. They determine any operations, measured data, calendars, etc. and trigger actions and messages. The LCN-GVS sends emails, SMS messages (time-controlled in accordance with the service schedule) and push notifications directly to mobile phones.

The built-in timer switch can combine several calendars and trigger associated actions.

The extensive access control combines all 5 LCN access methods (IR transmitters, transponders, universal transponders, active transponders (>4m range), fingerprint sensors). It enables time-dependent, personal profiles to be created for each access point. Every access attempt is recorded and can be reviewed, even years later.

The most important features of the LCN-GVS are the detailed user management, the high-performance editor that specifically recognises known Windows applications and the user-friendly menu guide that makes it easy to handle the intuitive visualisation system. Installation assistants support the administrator's work so that even extensive configurations can be executed quickly.

Simply use a browser. Any time.
Worldwide connected.



Fig.) The LCN-GVS runs on any browser-enabled device, which enables decentralised control and monitoring for all buildings. At any time. From anywhere in the world.



Fig.) The LCN-GVS user interfaces have a user-friendly menu guide, clear displays and intuitive application structures.

Concept | Controls



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Controls and transponders

LCN has a wide range of functions and the choice of controls is just as extensive. There are discreet, compact keypads with two, six, eight or twelve touch keys and highly functional info touch panels with a built-in TFT display and timer switch with four or ten touch keys. IR remote controls and transponder applications round off the range of options for operating the LCN system.

The keypads from the LCN-GT series, which were awarded the "red dot design award", emphasise the high level of demand for design and functionality found in all LCN products. Another elegant design option was developed with the LCN-GTS series where the mineral glass in the touch keypad is flush with a facet cut in the frame. Both series have the same wide range of functions.

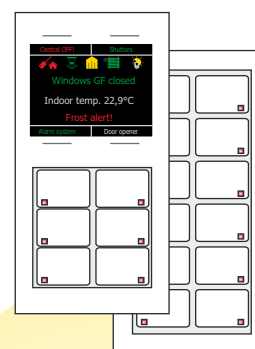
Apart from an LED display, all keypads have Corona® LEDs built in around the edge of the device for atmospheric wall lighting. It can be dimmed as desired by the customer and used as a night light.

Features of the LCN-GT() series

- Capacitive sensor surfaces
- Status LEDs
- Temperature sensors
- TFT colour display
- Eight display languages (including Russian and Arabic)
- Timer switch
- Corona (surrounding) LEDs
- Night light
- Customised design (see next page)

Note

The installation has to be carried out on a mounting plate for a flush mounted wall-box



Outstanding technology.
Award-winning design.

Concept | GT-Designer



The LCN-GT Designer

Designing the GT inlay is now child's play thanks to the LCN-GT Designer web-based software. The possibilities are almost endless when it comes to being creative and designing customised layouts, regardless of whether you use the pre-defined drop-down menus or the drag & drop function.

■ Built-in project management ①

All of the project's inlays are automatically saved in a zip folder: simple with a clear overview.

■ Customised background design ②

A selection of images and a 24-bit colour spectrum for designing backgrounds are available / simply drag and drop your own images.

■ Customised text formatting ③

Text formatting and alignment / pre-prepared bar graph annotation / adding additional text and guides to make text alignment easier.

■ New design options ④

Transparency of the background colours / image scaling / image positioning / keys with rounded corners / frames / ability to swap key positions.

■ Flexible LED design ⑤

Key LEDs can be individually edited / flexible colour display in the bar graph LEDs / pre-installed processes.



Structure | Addressing

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Each module requires an address

Every LCN module requires an address for it to be responsive. This is a number between 5 and 254 and is issued in seconds by the LCN-PRO.

A data telegram can be sent to this address from any point in the entire bus. Group addressing is used if several subscribers need to be contacted with one telegram.

250 group numbers ranging from 5 to 254 can be issued for each LCN bus segment. The number of members of each group is unlimited. Every module can be a member of 12 groups.

In the LCN system, groups are only formed if several loads need to be addressed at the same time.

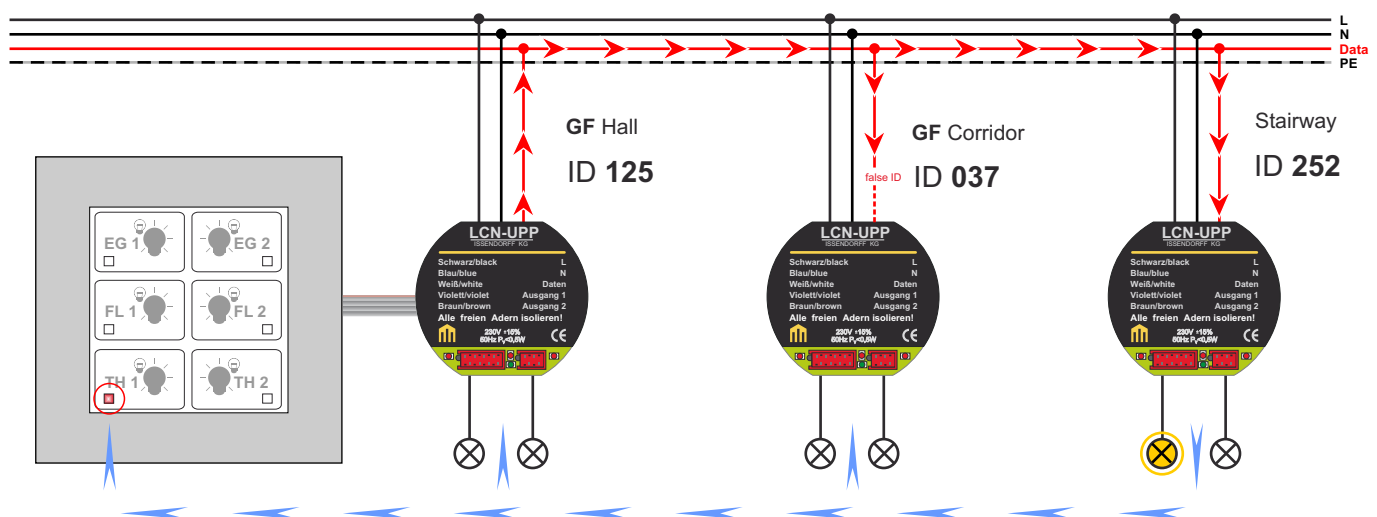
By contrast, modules are addressed directly when using point-to-point transmission ("to module 55: ground floor WC light"); the process is intuitive, as you would expect it to be.

Besides clarity, there is another important reason for direct addressing:

Modules can directly send each other information for processing, which creates a "neuronal" network which becomes more and more intelligent and powerful when more and more modules are added to it. This is important for future automation tasks.

A command is sent

Target: to module „ID 252“
Comand: control output 1
Values: brightness 50% / blend time 3s



The status report from module 254 is sent via the data cable to all modules in the bus and optically displayed via the ON, OFF, FLASH or FLICKER LED in the glass touch keypad.

Structure | Telegrams



The basic components

LCN data telegrams have a flexible structure and may vary in length. Despite a uniquely high level of efficiency, they still have a lot of leeway for future expansions.

On average, around 100 telegrams per second can be transmitted on the lower bus level. A multi-stage procedure to avoid collision ensures that the bus capacity is used to its full potential, even when its loads are high.

Message sending is verified in several stages, which means that LCN can also work perfectly in environments that are much more prone to malfunctioning than those mentioned in the applicable standards.

LCN data telegrams are compact and contain much more information than was previously possible. They give a full description of the role of a sensor or actuator. For instance, a command to a light contains the required brightness and the speed at which this brightness should be achieved. Timers do not need to be pre-programmed in the actuator because every telegram contains the timer information.

This means that the same actuator can control any number of different interval timers. Each key can send a different command to it.

This gives the entire system a previously unseen flexibility using simple resources.

Bus maintenance has been significantly simplified

The bus functions can be directly monitored and documented when in operation. This saves valuable time and makes it easier to service the system.

Every telegram contains all of the information that is displayed in plain text. The installer can check whether his or her work has been successful straight away:

■ Who sends to whom?

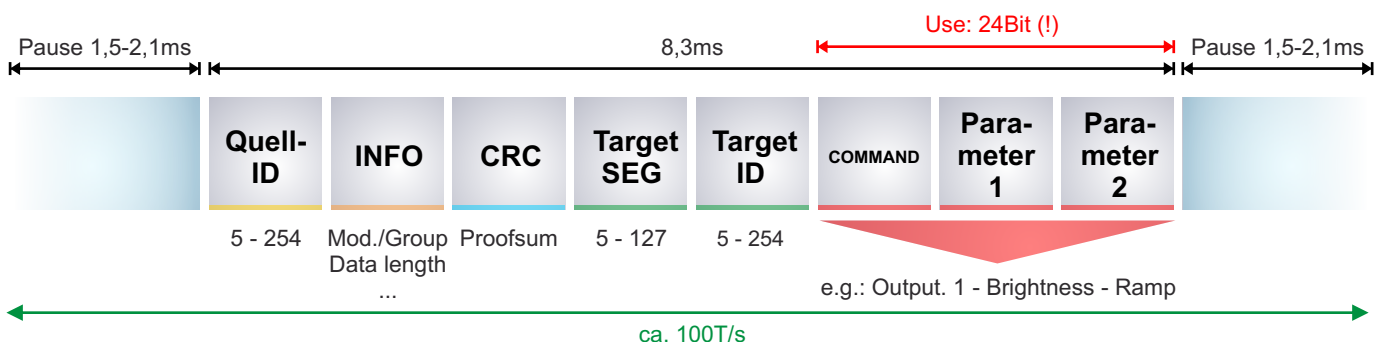
■ What is the command?

The LCN acknowledgement and notification system adds:

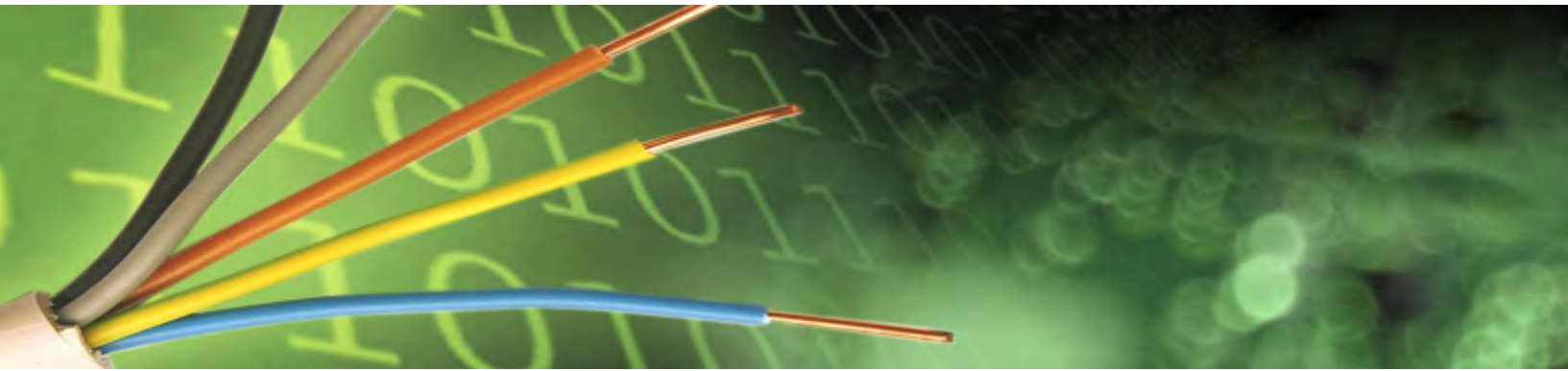
■ How do the loads react?

■ What is happening at the sensors?

**Fully reviewable programming!
Easy maintenance - even after
decades!**



Structure | Data transfer



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100 telegrams per second

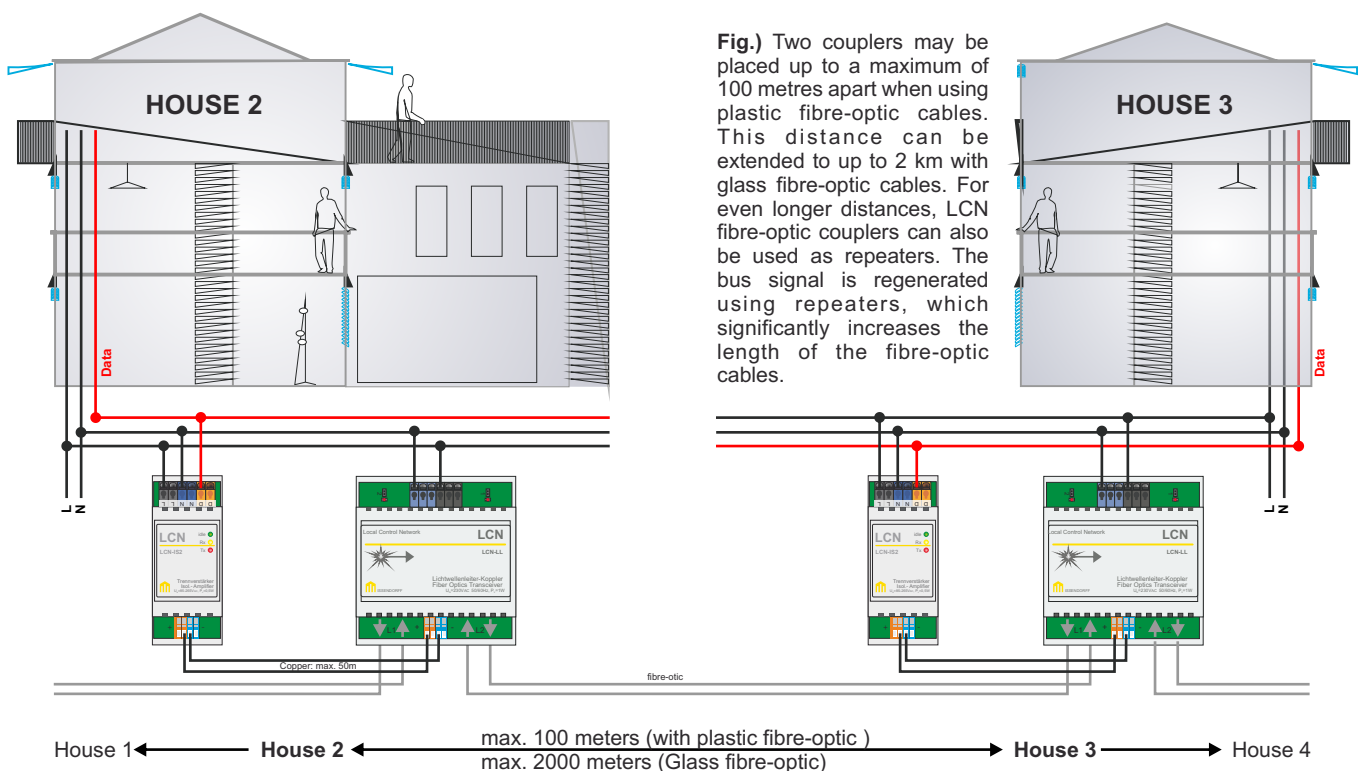
In the LCN system, up to 100 telegrams per second are transmitted between the LCN modules (this figure is between 1,000 and 10,000 in large-scale systems in the LCN segment bus). This equals a data transfer rate of 9,600 Bd (segment bus: 300 kBd - 2.5 MBd). A multi-stage procedure to avoid collision ensures that the bus capacity is used to its full potential, even when its loads are high.

The data wire may be connected in any way in the building. A specific topology, e.g. the star network, does not need to be used. The maximum total length is 1 km; this can be extended using booster amplifiers. Fibre-optic couplers can also be used, e.g. between sub-distribution boxes.

Fibre-optic coupling

In order to perform central control and monitoring tasks, several remote terminal boxes can be interconnected via fibre-optic cables using fibre-optic couplers (LCN-LLK, LCN-LLG) and isolation amplifiers (LCN-IS).

Plastic fibre-optic cables can cover distances of around 100 metres; glass fibre-optic cables can cover up to 2 km. The established connections can be expanded to a maximum of 15 times their length using series-connected fibre-optic couplers as repeaters, which therefore create ranges of up to 30 km.



Construction | Keys



Easy to use

For normal tasks: every key sends a command to the LCN network when it is actuated. Three different commands can be triggered for each key.

A concept that is easy to understand:

Key A7 sending to: M44 GF Office 102 Wall Light	
Short:	Output 1 On/Off pushbutton, ramp 1
Long:	Output 1 dim to 50, ramp 20
Release:	Output 1 ramp stop

In this mode, up to 8/12 keys can be assigned and up to 24 loads/groups controlled. (A further 68 keys can be triggered using IR remote controls, sensors, etc.)

Sensors also use key tables for standardisation: up to 16 switching thresholds with hysteresis can be used per module. If the thresholds are exceeded/not met, the LCN module then sends the command consigned to the relevant key to the bus.

All modules also include a shadow table for every key table: every key has a "sister" that can also be freely assigned with a target address and three commands. As a result, two completely different commands can be triggered by just pressing one key.

Short. Long. Release.
Three commands with two
target adresses per button.

In every LCN module, a total of 480 different commands can be sent to 160 addresses: a world record!

LCN keys can be remotely controlled

For each command, every module can be prompted "to press any keys themselves". The "press key" command can be delayed for a period of 1 second up to 45 days. Using this method, a pulse relay for mood lighting can be programmed in the same way as a long-term time lapse device.

In total there are four independent timers in every single LCN module. All modules also have a periodic timer which enables recurring tasks to be conveniently organised. The timers can of course be combined for complex tasks.

(More timers are available in the module's electronic outputs. Switching and dimming times of 10 ms and 32 min can be reached here.)

There is also the option of blocking any key, even with a time limit if required. This function enables complex control functions to be executed in connection with the above mentioned functions without you needing to know a great deal about IT.

Key	Target Address	Short	Long	Release
1	Segment 5 Module 21	A1 = On Ramp 0s.	A1 = On Ramp 4s.	A1 = Ramp Stop
2	Segment 8 Module 10	Relay = 1	Relay= 0	n/a
3	Segment 7 Module 10	L-scene 9 retrieve	L-scene 9 save	n/a
4	...	...	...	...
5	...	...	...	...
6	...	...	...	...
7	...	...	...	...
8	...	...	...	...

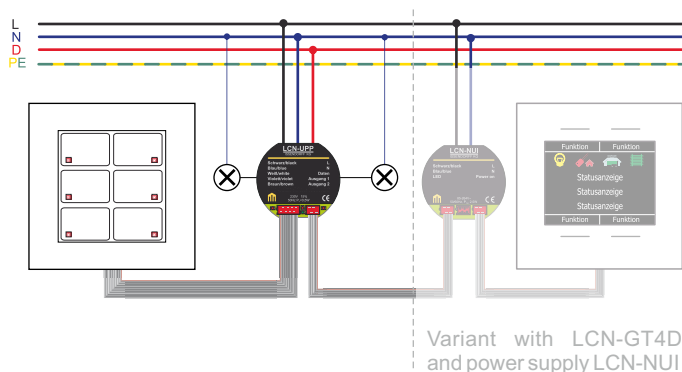
Fig.) Every LCN module contains four key tables with one shadow table each, e.g. "A" with "A'", "B" with "B'", etc. Any three commands can be assigned to each of eight keys per table. Example: briefly pressing key 1 means: "Activate output A1 in module 21, segment 5".

Planning | Examples



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Simple lighting control (with the LCN-GT4D), decentralized installation example:

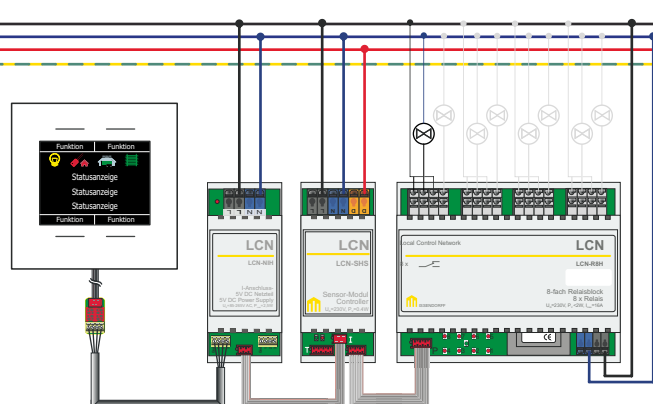


You wish to regulate the lighting in a room by using two lighting circuits that can be individually controlled. In doing so, programmable lighting scenes and dimming levels for the respective (dimnable) lighting can be set in the programming. The operation (see example) is carried out over an LCN-GT6.

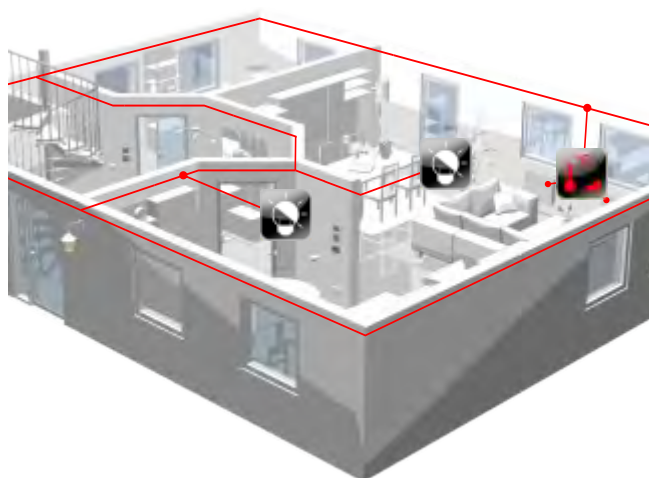
The LCN-GT4D display panel (power fed over the LCN-NUI power supply unit) can also be installed to control heating or further electrical appliances.



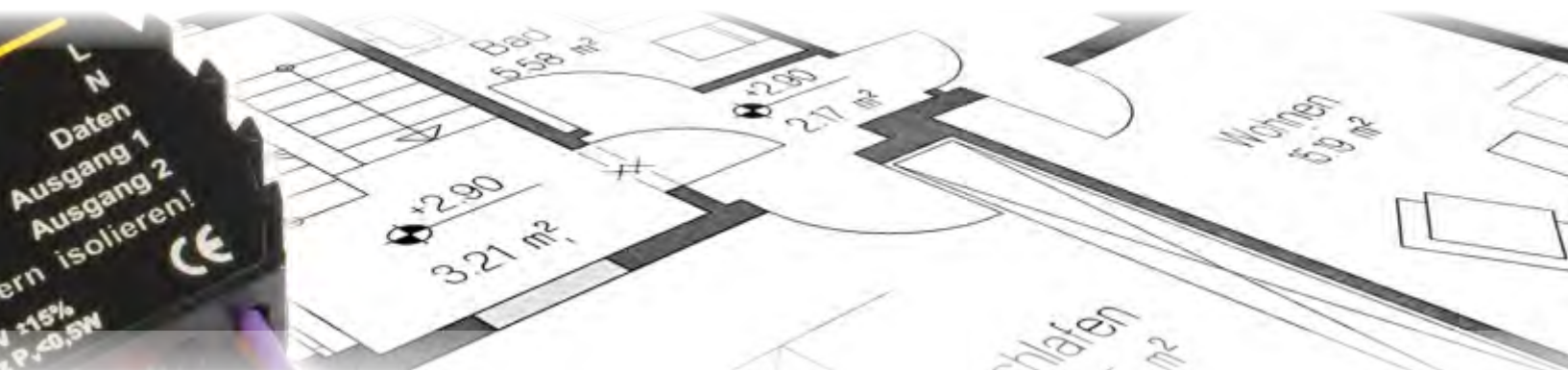
Simple temperature regulation (with the LCN-GT4D), centralized installation example:



You wish to preselect the temperature manually within a room and the temperature should be kept stable automatically. In order to do this, the existing actual values are permanently compared with the specified set values. This comparison is done by using the built-in temperature sensor within the LCN-GT4D. This method allows deviations to be regulated at any time by using the corresponding valves via the eight individual controllable relays in the LCN-R8H.



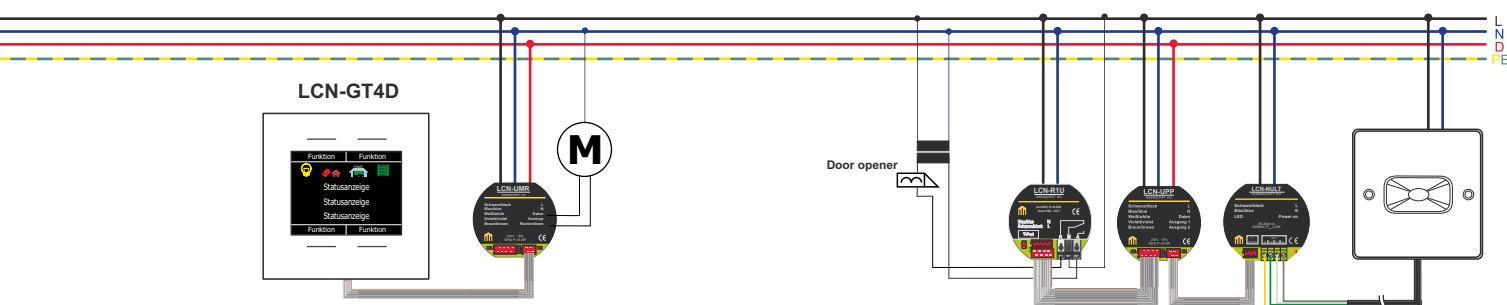
Planning | Examples



Simple shutter control (with LCN-GT4D)

Access control using universal transponders

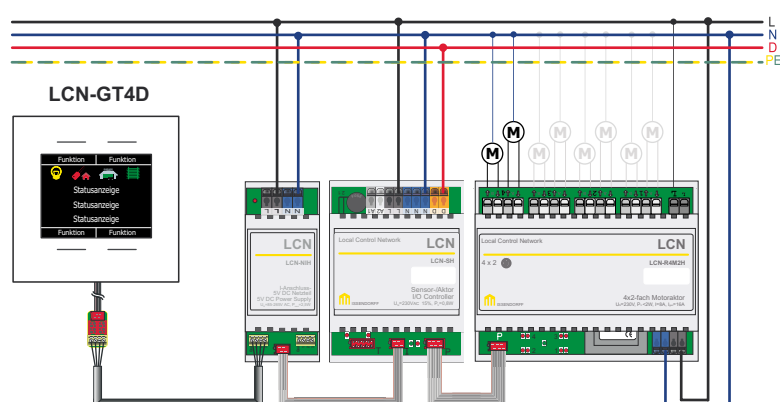
23



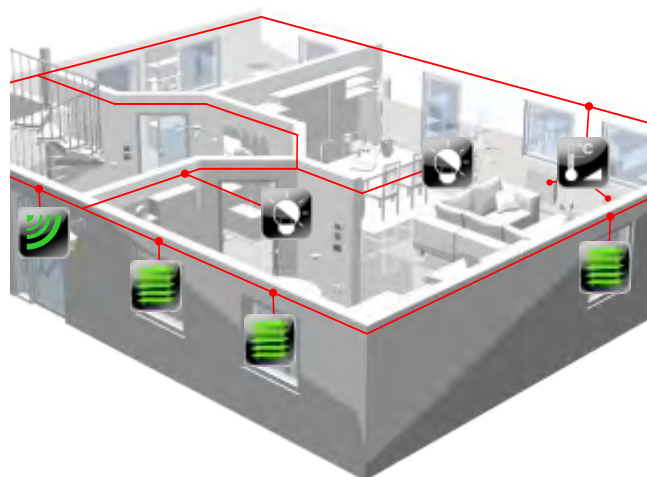
The shutter motor is directly controlled by a LCN-UMR sensor module. For operating and visual status feedback the LCN-GT4D display keypad is used in this example.

The LCN-ULT universal transponder reader is integrated into the bus in order to control a building's foyer. Up to 16 transponders can be directly analysed in the LCN-UPP module. Doors are opened using a relay switch controlling the electric door opener. The LCN-GVS is available for more complicated requirements (recognising people, recording, only granting access at certain times of the day).

Central shutter control (with LCN-GT4D)



You wish to control several electrical shutters in order to shut out the outside light from a room/building. 4 x 2 motor pairs can be directly addressed and controlled using the LCN-R4M2H motor relay block. This method allows the light to be shut out at individual zones or an entire building at the press of one button. The LCN-GT4D display panel is integrated to receive a central, visual status report of the current condition.



Planning | Examples



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Built-in room control

You wish to manually preselect a temperature within a room, and it should be kept maintained automatically, but only when the room is in use. If the window is open, the heating must be automatically switched off. After closing the window, it must heat the room back up to the preselected room temperature. If the room is unoccupied for a long period of time, the temperature should be automatically reduced to a low maintenance value.

It must also be possible to access all functions manually. A decentrally installed bus module (here: UPP) that is connected to every sensor, the regulator for the heating valve and the keypad required for manual operation is all that is needed for the implementation.

Various temperatures can be preselected via the LCN touch keypad. The current room temperature will then be shown on the display or in the form of a bar graph. Alternatively, EIB/KNX, EnOcean or conventional keypads can be used to operate this system.

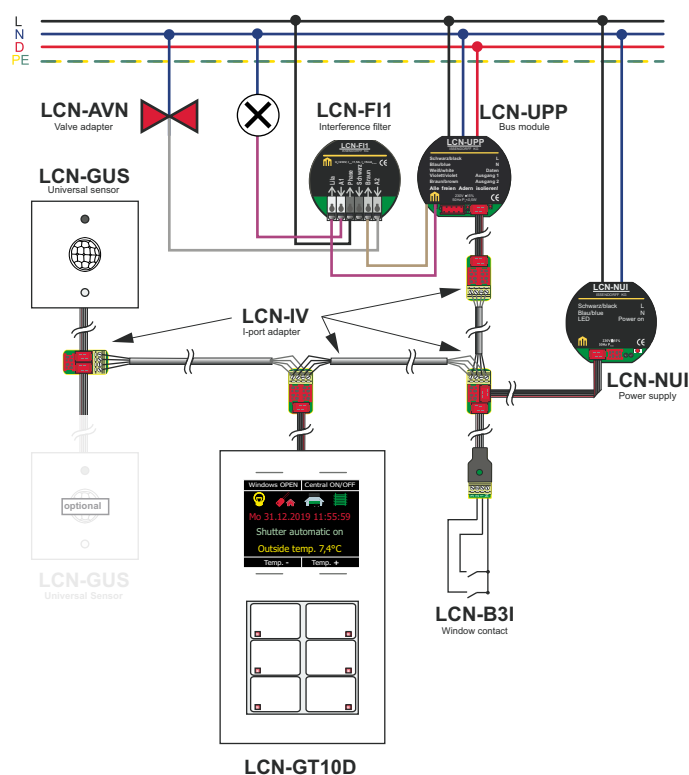
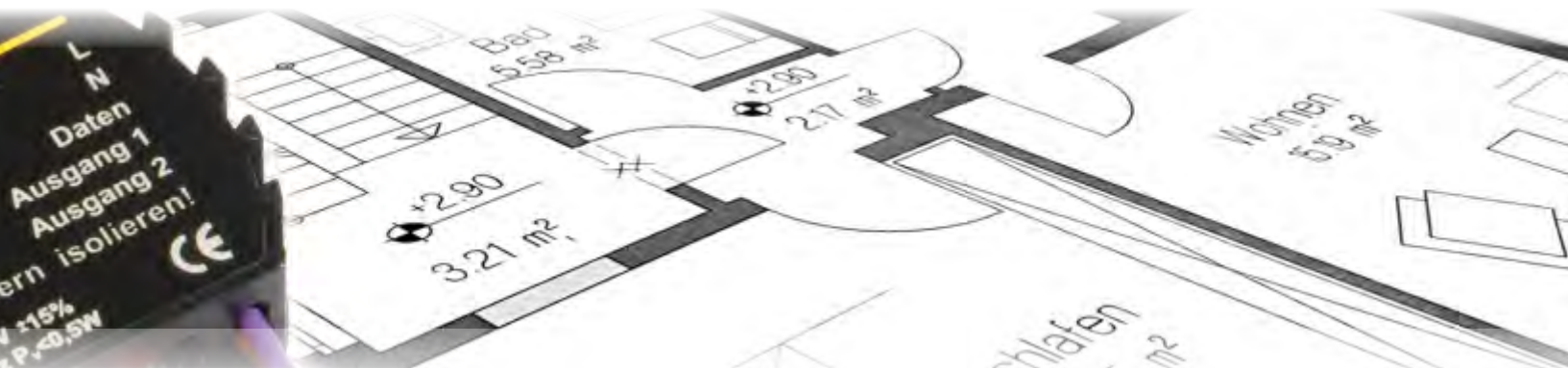


Fig.) Example for several sensors on the same module:

The LCN-GUS universal sensor for indoor use enables the LCN module not only to regulate temperature but also to regulate a precise constant light.

The second LCN-GUS is optional. In addition to the light sensor and temperature sensor, the LCN-GUS offers further sensors such as a presence detector and an IR receiver.

Planning | Examples



Access control and alarm system with remote function via the LCN-GVS visualisation system

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A door can be unlocked over a transponder system to allow entry to the building. The lighting around the door area is automatically activated using presence detectors when a person approaches it. A door contact has been installed to protect against misuse of the open door. If the door stays open for a certain amount of time, a security service may be informed via the LCN-GVS visualisation system. The LCN transponder systems enable the use of LCN transponders and/or transponders made by various manufacturers, including those used in car keys.

The LCN-GVS allows the entire LCN system to be remotely controlled using browser-enabled operator devices (smartphones, tablet PCs, notebooks, etc.), in this case to control and monitor the entrance door.

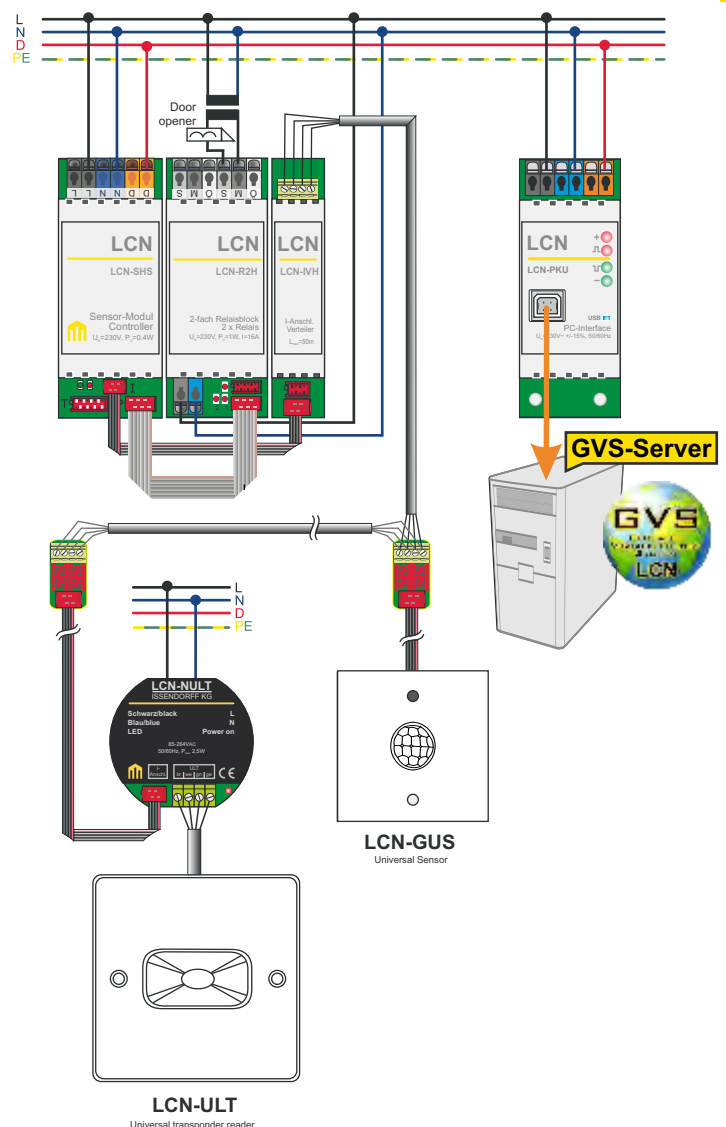
The LCN-GVS system also gives you the option of sending SMS messages via the Internet or with a GSM modem via the LCN-GVS system. By using the LCN-GVS App, any number of employees can receive important information as a push notification directly to their smartphones.

Access control with LCN

LCN has five different access control systems:

- The IR remote control transmitter
- The LCN-UT transponder (125 kHz)
- The LCN-ULT universal transponder (which also recognises car keys)
- The LCN-ATW active transponder with 4 m "+" range
- The LCN-GFPS fingerprint sensor which can recognise people using the LCN-GVS

All access control systems are compatible with each other. They can also be used as a mixture.



NOTE

The I-Port extensions (all sections together) should not be longer than 50m.

Please note that a power supply unit is required to operate the LCN-ULT transponder reader. This is included in the scope of delivery.

Planning | Examples



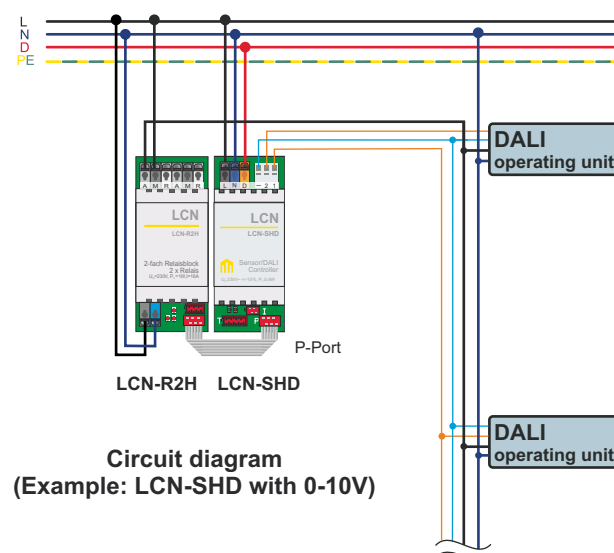
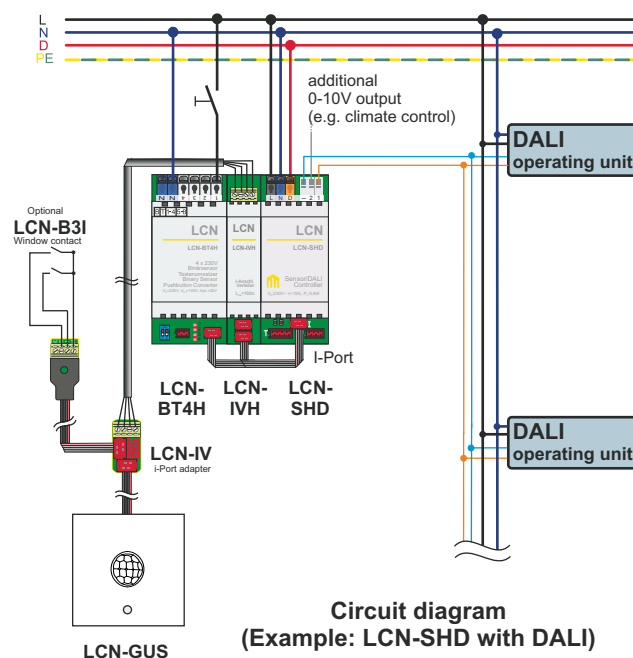
Daylight-dependent lighting with 0-10 V / DALI / DSI

You wish to have the daylight dependent room lighting, as well as controlled heating in an office building. The available brightness of light is measured using a light sensor (LCN-GBL) and supplemented to the desired value using dimmable fluorescent lamps. A presence detector (LCN-GBL) is used to ensure that light is only automatically supplemented if the room is occupied. A timer function ensures that the lighting stays on even if the people using the room do not move for a short period of time.

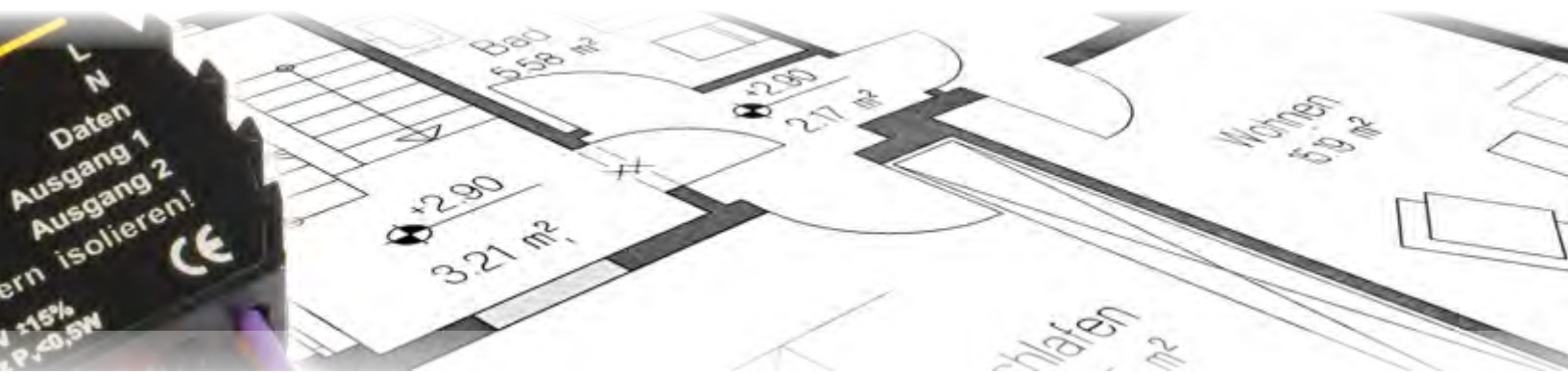
A conventional keypad can be used to manually control the lighting. By simply pressing a key, the lighting in the room can be set to a low level when using an overhead projector and switched back to a higher level for the discussion that follows.

The temperature (heating/air conditioning) within a room is controlled centrally (there is an option to use the LCN-GT4D for decentralised temperature adjustment instead of the LCN-BT4H and the conventional keypad). The temperature is automatically kept at a constant level, but only when the room is in use. If the window is open, the heating must be automatically switched off. After closing the window, it should reheat the room back up to the preselected room temperature. If the room is unoccupied for a long period of time, the temperature should be automatically reduced to a low maintenance value. The binary sensor is used for controlled air conditioning.

Note The I-port connection extensions (all partial sections together) may not be longer than 50m.



Planning | Examples



Segment bus installation

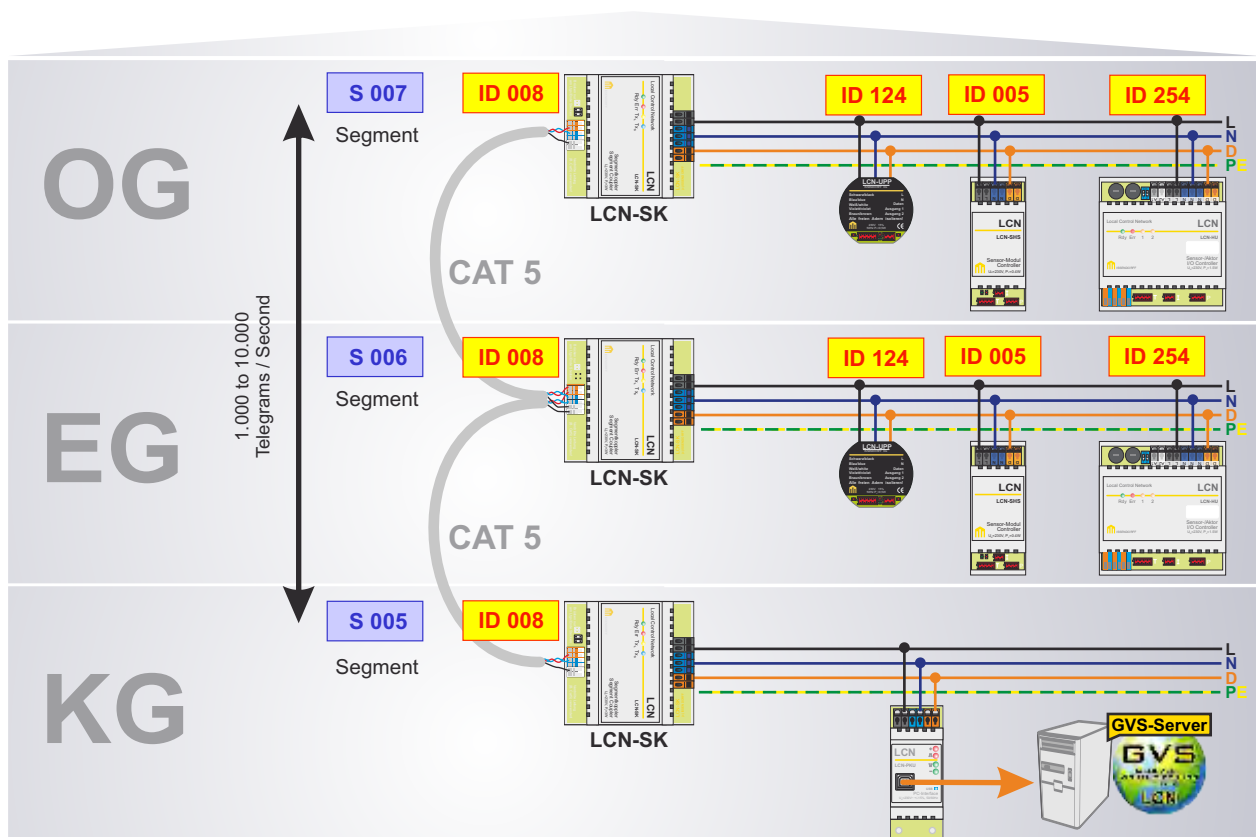
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The LCN segment bus is used in systems with more than 250 modules and/or if a project needs to be divided into several subsections so that it can be structured better.

The individual bus segments are interconnected via the segment bus, which means that the individual floors in a high-rise building can be defined as separate segments. Alternatively, large individual departments on business premises, e.g. manufacturing and administration departments, can be divided into separate segments to optimise data traffic and to improve clarity. Up to 120 segments can be interconnected via the segment bus for a maximum configuration. This configuration is coupled to the LCN bus using a CAT5/6/7 data cable together with the LCN segment coupler LCN-SK.

The segment bus must always be wired in series (loop through). Its length depends on the number of segment couplers installed and on the data rate in the segment bus. Similar to the module ID, every segment is identified and addressed using a segment ID. In its maximum configuration, an LCN system can therefore include up to 30,000 LCN modules. The transfer rate in the segment bus of 1,000 – 10,000 telegrams per second is much higher than the data rate within a segment, where it reaches a maximum of 100 telegrams per second. This means that LCN can easily process very large amounts of data.

In large-scale systems, a separate individual segment is recommended for visualisation (LCN-GVS). The advantage of this is that the LCN-GVS can use the full LCN bus speed.



Operation | Notes



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Power outage & power recovery

LCN modules recognise operational states and can execute functions if the following events occur:

- The peripheral devices or the electronic ballast interface are short circuited
- An overloading in the electronic outputs
- The fuse in the LCN-SH, -HU & -LD fails
- Voltage recovery after a <20 second power dip
- Voltage recovery after an outage of over 20 seconds
- Important sensors (LCN-TS, -BU4L, etc.) fail

In all of these cases, LCN modules remain fully functional and distribute a message immediately. What is more, they can be programmed so that they launch countermeasures.

Examples:

- Any function can be executed after power is recovered: dimming to certain or dynamic levels / updating tableaux / setting regulators for the air conditioning system, and many more.
- Activating the replacement lighting system if circuit breakers fail.
- Measures to protect boilers and piping networks (frost protection) in the event of an outage / if a wire breaks in the temperature sensor.
- Many other applications are possible - all LCN functions will be available to use.

These commands can be sent to individual modules or any groups of modules.

(Group commands should be sent with a 1 second delay (e.g. using the "Send key delay" command) so that all modules are actually ready for use once power is recovered.)

When using the LCN-GVS visualisation software, the operator can also be informed of all processes via SMS, push notifications direct to their smartphone and via email.

A comprehensive solution!

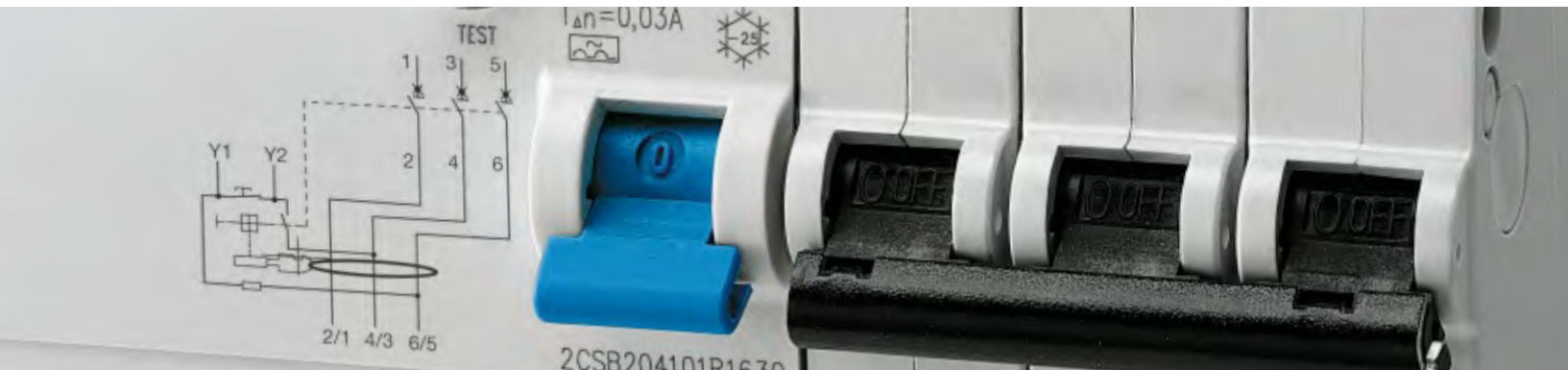
Transfer method

In LCN, data transfer is based on the CSMA/CA (carrier sense multiple access with collision avoidance) method:

- Carrier Sense:**
Every module checks whether the data cable is free.
- Multiple Access:**
Several modules share the data cable.
- Collision Avoidance:**
If several modules send data at the same time, they recognise this collision and resolve it. This method enables full capacity to be available, even if the bus load is high.

The LCN modules verify their own transmission. In so doing, it is checked bit for bit whether the amplitude and length are OK. If a fault occurs, the telegram is aborted and repeated. This is one of the aspects that makes LCN extremely reliable.

Planning | Installation & Protection



VDE 0100

According to the VDE (german regulations) definition, the data wire is to be seen as the outer conductor.

To prevent the data wire from carrying voltage in the event of a fault, it must be routed over an auxiliary contact attached to the respective circuit fuse. This ensures that the data wire of the corresponding circuit is also disconnected when the circuit breaker is tripped.

FOR YOUR OWN SAFETY: FI-PROTECTIVE CIRCUIT-BREAKER

Use of isolation amplifiers

With LCN circuits that extend beyond a residual current circuit, a current can flow off via the LCN data wire. To avoid tripping an RCD switch, two FI circuits should not be connected over just one LCN data wire.

The LCN-IS2 isolation amplifiers can be used up to a range of approx. 50 meters (all sections together) for a clean separation of distributions. The LCN-IS2 separates the data line using optocouplers and is used to bridge RCD switches.

By using the LCN-LLK (up to 100 meters) or the LCN-LLG fibre optic couplers, the range can be increased to up to two kilometers (see page 20).

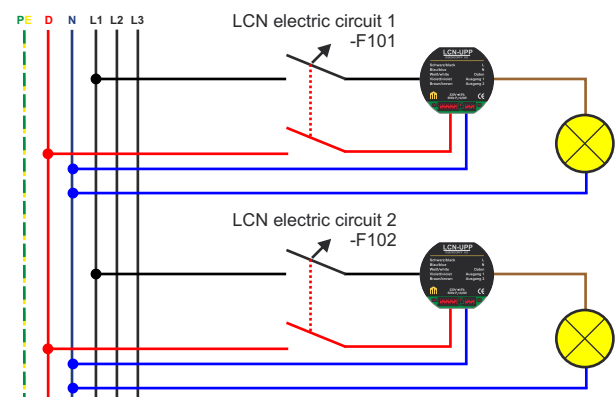
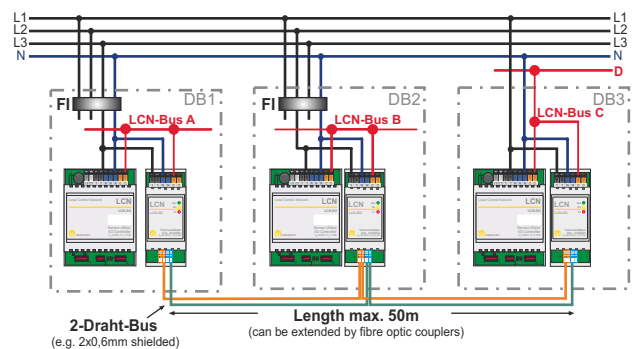
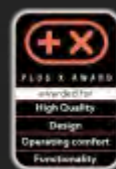


Fig.) Switching off the data line

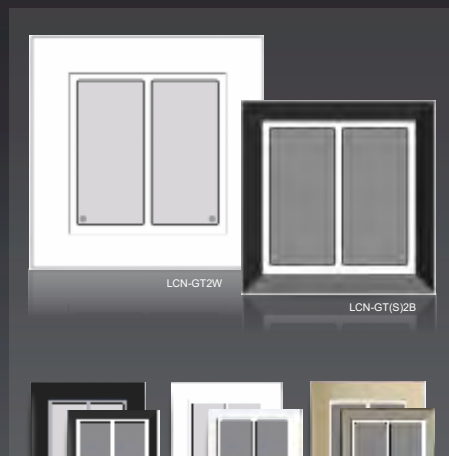


The LCN-GT[⚡]series

Hightech in excellent design



reddot design award

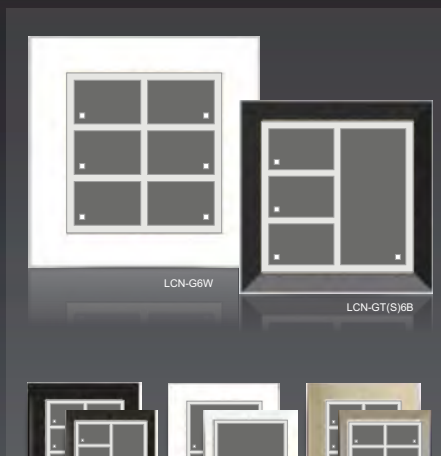


LCN-GT2 / LCN-GTS2

- fine-polished mineral glass surface
- 2 capacitive sensor keys
- 2 Status-LEDs
- Corona®-Light
- Key-Backlighting
- individual inlay-design

LCN-GT2:
90mm x 90mm x 13mm (5mm glass)

LCN-GTS2 (frameless):
75mm x 75mm x 11mm (3mm glass)



LCN-GT6 / LCN-GTS6

- fine-polished mineral glass surface
- 6 capacitive sensor keys
- 6 Status-LEDs
- Corona®-Light
- Key-Backlighting
- integrated temperature sensor
- individual inlay-design

LCN-GT6:
90mm x 90mm x 13mm (5mm glass)

LCN-GTS6 (frameless):
75mm x 75mm x 11mm (3mm glass)

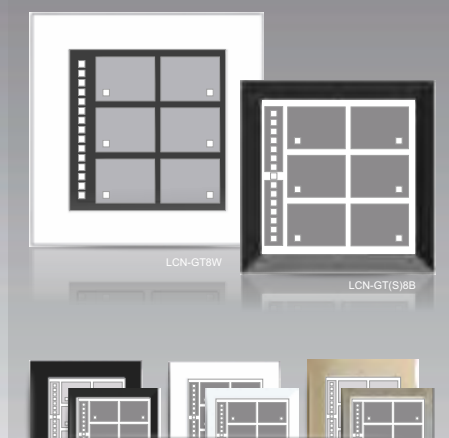


LCN-GT4D / LCN-GTS4D

- fine-polished mineral glass surface
- 4 capacitive sensor keys
- 2,8" TFT color display
- integrated 24-channel timer
- Corona®-Light
- integrated temperature sensor

LCN-GT4D:
90mm x 90mm x 13mm (5mm glass)

LCN-GTS4D (frameless):
75mm x 75mm x 11mm (3mm glass)



LCN-GT8 / LCN-GTS8

- fine-polished mineral glass surface
- 8 capacitive sensor keys
- 6 Status-LEDs
- bar graph
- Corona®-Light
- Key-Backlighting
- integrated temperature sensor
- individual inlay-design

LCN-GT8:
90mm x 90mm x 13mm (5mm glass)

LCN-GTS8 (frameless):
75mm x 75mm x 11mm (3mm glass)



LCN-GT10D / LCN-GTS10D

- fine-polished mineral glass surface
- 6+4 capacitive sensor keys
- 6 Status-LEDs
- 2,8" TFT color display
- integrated 24-channel timer
- Corona®-Light
- Key-Backlighting
- integrated temperature sensor
- individual inlay-design

LCN-GT10D:
90mm x 160mm x 13mm (5mm glass)

LCN-GTS10D (frameless):
75mm x 145mm x 11mm (3mm glass)



LCN-GT12 / LCN-GTS12

- fine-polished mineral glass surface
- 12 capacitive sensor keys
- 12 Status-LEDs
- bar graph
- Corona®-Light
- Key-Backlighting
- integrated temperature sensor
- individual inlay-design

LCN-GT12:
90mm x 160mm x 13mm (5mm glass)

LCN-GTS12 (frameless):
75mm x 145mm x 11mm (3mm glass)



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Perfection.



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