

COMPLIANT ELECTRICAL INSTALLATION FOR

RETAIL SPACES

Pluggable concepts that increase safety, flexibility and efficiency.



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YOUR BENEFITS

- + Efficient installation and cost model
- + Safety first – prevent installation errors
- + Flexible room configuration – for anything the future has in store
- + Reduced warranty claims for manufacturers



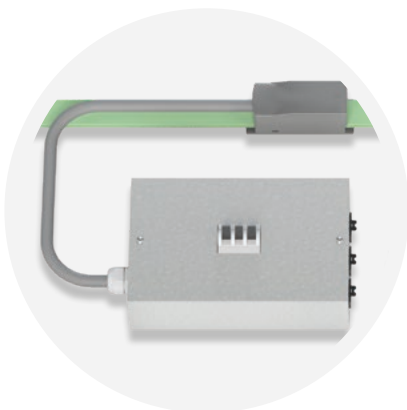
1. WHY USE A **PLUGGABLE** ELECTRICAL INSTALLATION?

Pluggable electrical installations are quicker to assemble/ disassemble, have fewer errors, and require fewer personnel to install.

The prefabricated nature of pluggable components allows planners to standardize their designs across multiple properties and allows for better quality control during the installation process. Staying on top of the latest standards and requirements is easy too. Many integrated safety features allows pluggable systems to be handled more easily and by persons with a lower degree of specialization.

Pluggable installations are not only limited to cable and connector configurations. Whip and panel mount options allows manufacturers of lighting and other electrical fixtures better tamper control and reduces warranty claims.

Wieland has been proudly offering **plug & play** installations in compliance with applicable standards (**VDE 0100, Vds**) for over 40 years.



2. REALITY AND CURRENT REGULATIONS.

In order to be able to react quickly and readily to short-term changes and the requirements of overlapping trades, defined interfaces, such as pluggable solutions, are necessary. It is important that the system that is used complies with the applicable standards and guidelines.

Wieland pluggable installations are approved as ‚fixed installations‘ under the current regulations, allowing for longer intervals between inspection and providing a safer alternative to portable equipment. The regulations of the German Social Accident Insurance (DGUV) provide a framework that focuses on safety on the construction site and in operation:

- According to the accident prevention regulation "Electrical installations and equipment" (DGUV regulation 3, version December 2017), the employer (operator) is obliged to ensure regular repeat inspections.
- When providing and using mobile electrical equipment (work equipment), the employer must ensure that electrical hazards are excluded or adequately limited.
- The subject of the inspection in line with the accident prevention regulation are stationary and mobile equipment and installations.

REPEAT INSPECTION OF ELECTRICAL EQUIPMENT – INSPECTION INTERVALS

As an example, the execution instructions in § 5(1)(2) of the accident prevention regulation provide guidelines for inspection intervals which apply in normal operating and environmental conditions:

Installation / equipment	Guideline and max. value for inspection interval	Type of inspection	Inspector
Electrical installations and fixed equipment	4 years	Good working order	Qualified electrician
Portable electrical equipment Extension and appliance connection cables with plug-in devices Connection cables with plug Movable cables with plug and fixed connection	Guideline: 6 months. With a failure rate of < 2 % the inspection interval can be extended to 2 years maximum	Good working order	Qualified electrician Also someone trained in electrical engineering if suitable measuring and testing devices are used.

Table: DGUV Regulation 3, Electrical installations and equipment (accident prevention regulation), execution instruction in § 5(1)(2).

REPEAT INSPECTIONS ON ELECTRICAL EQUIPMENT – SCOPE

The extent of the repeat inspection depends on the protection rating of the equipment:

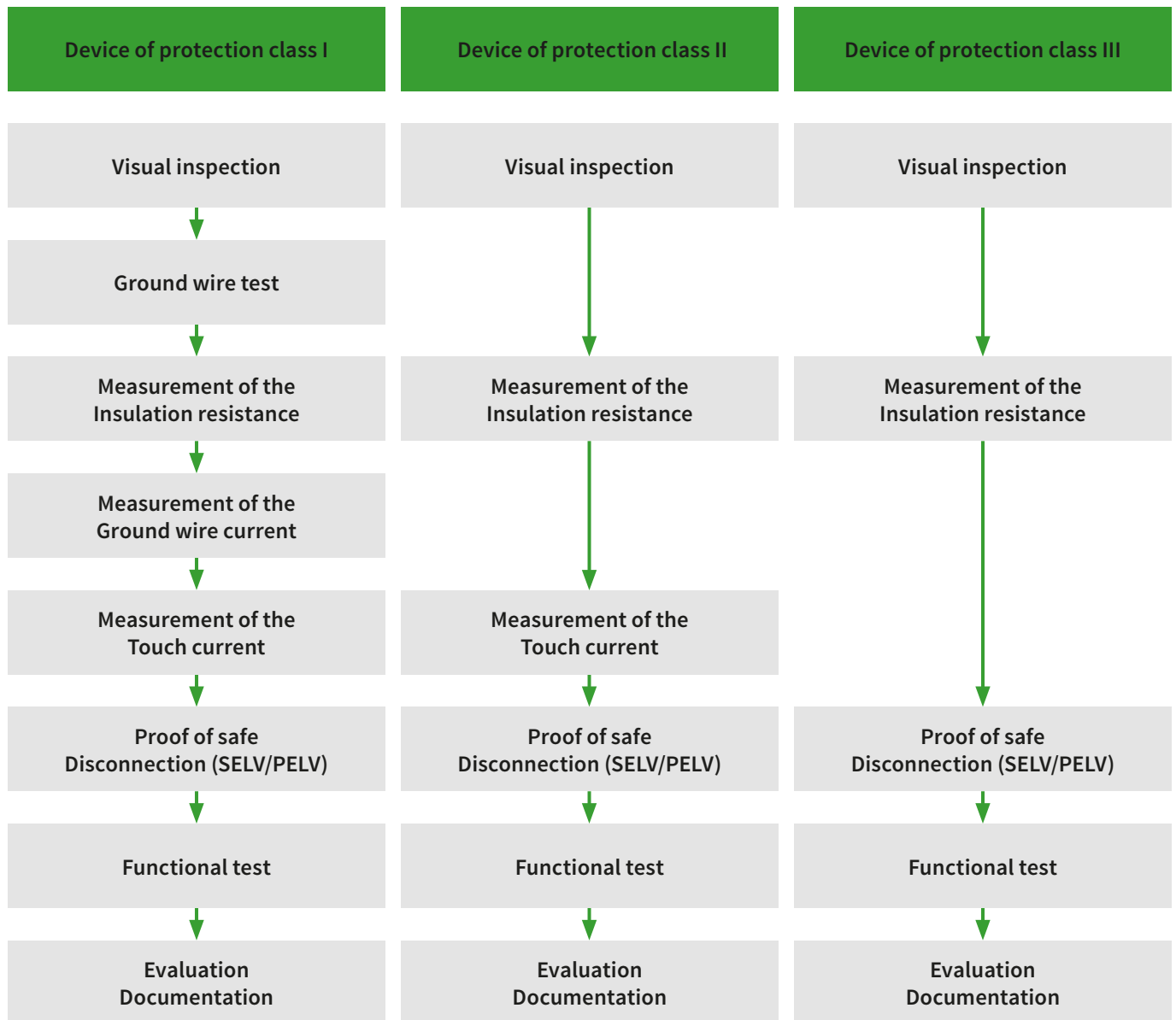


Fig.: Repeat inspections according to DIN VDE 0701-0702



OFFSETTING FOLLOW-UP COSTS

These repeat inspections, some of which are very extensive, entail corresponding costs. For example, the inspection of a luminaire is € 4.00...8.00 (or higher depending on the effort involved) and can add up to the purchase price of the luminaire over its service life (e.g. 10 years x 2 inspections x € 5.00 = € 100).

INSTALLATION OF A LIGHTING SYSTEM

Lighting in retail spaces is electrical equipment that can be installed either as fixed or portable versions. These two installation methods lead to fundamentally different considerations in terms of the construction and the repeat inspection.

The amount of testing can be significantly reduced if the luminaires are installed in a fixed location and connected with an installation connector (e.g. Wieland connector type GST18®).

The inspection interval for fixed luminaires is 4 years.



DGVU STATES:

Luminaires installed in sales areas are generally fixed electrical equipment (fixed equipment or equipment without a support and with a mass that is not easily moved).

Fixed installations can also be done by non-electricians, e.g. as part of the redecoration of a sales area, as long as they have been trained for this activity.

DGVU writes about this:

A person trained in electrical engineering is someone who has been informed and, if necessary, trained by a qualified electrician about the tasks assigned to him or her and about the possible dangers associated with incorrect behavior as well as instructed about the necessary protective devices and precautions. Such persons may include in-house craftsmen and skilled workers, equipment handlers or caretakers.

A corresponding "Smart Manual" as a guide for persons trained in electrical engineering is presented in chapter 6 "Handling instructions".



EVALUATION OF DIFFERENT RETAIL SPACE INSTALLATIONS

	Fixed installation + fixed electrical equipment	Fixed installation PLUGGABLE + fixed electrical equipment	Portable equipment
Operator	Qualified electrician	Person trained in electrical engineering	Layperson – following all the relevant instructions
Material	NYM cable, cable support systems, distribution sockets, only stationary luminaires	Wieland connector system, fixed OR portable luminaires	Safety sockets, only portable luminaires
Relevant directive VDE 0100	✓	✓	–
Relevant standard DIN EN 61535	–	✓	–
Flexibility	– In terms of effort, any change corresponds to a new installation	++ Easy to do and can be carried out by employees on-site.	++ Can be carried out easily and by employees on site
Safety	++	++	–
Costs	€€€	€€	€
Costs for repeat inspections	€€	€	€€€

3. LIGHTING INSTALLATION WITH GROUNDING OUTLETS?

A PRACTICAL EXAMPLE:



A furniture store uses flexible connection cables with grounding plugs for its luminaires. These are then connected with triple socket strips, which are connected to each other through the system ceiling area (cascaded) and fed at a surface-mounted socket in the ceiling area. The background to this procedure is obvious: no electrician is needed to lay the corresponding cables and connect the lighting.

- + **What do the regulations say about this installation method?**
- + **Are luminaires allowed to be operated at all with grounding plugs?**
- + **Is it allowed to cascade multiple socket strips if 16 A are not exceeded?**
- + **Is this "method of laying" even permissible?**

The product standard for luminaires, DIN EN 60598-1 (VDE 0711-1), distinguishes between portable and fixed luminaires. Recessed luminaires are fixed luminaires – the installation instructions for fixed installation apply, especially the standards for:

- **Wiring systems (DIN VDE 0100-520)**
- **Luminaires and lighting systems (DIN VDE 0100-559)**

Both standards include sections for electrical connections in which the allowed wire connections and other connections are listed. These are:

- **Terminal connections**
- **Plug-in installation connections**
- **"other suitable connection material"**

Is a grounding plug together with socket strips regarded as suitable connecting material?

A comparison with the aforementioned installation connectors according to DIN EN 61535 (e.g. Wieland GST18®) helps. These must, among other things, be protected against polarity reversal and equipped with a locking mechanism to guarantee a fixed connection. A grounding plug does not have either, and therefore grounding plugs are not suitable connection material. This means grounding plugs should not be used on recessed luminaires according to DIN VDE 0620.

Grounding plugs, sockets, and multiple sockets (socket strips) are defined in the product standard DIN VDE 0620-2-1. According to this standard, multiple sockets must be furnished with the warnings “do not connect in series” and “do not operate covered”. This means that everyone who buys a multiple socket outlet is advised in accordance with DIN VDE 0620-2-1 that they must not be cascaded.

It is clear from these two points that socket strips are not allowed for a fixed installation. As an alternative, installation connectors pursuant to DIN EN 61535 (e.g. Wieland GST18®) can be used.

Although installation connectors must not be installed by laypersons, it is possible to train people to become "electro-technically trained persons" and familiarize them with the use of the connector system by means of appropriate simple training (e.g. by a qualified electrician).



SUMMARY

A pluggable, fixed installation in conjunction with appropriate luminaires is the most flexible and safe solution for sales areas. In addition, it greatly reduces the maintenance cost while maintaining the advantages of a simple plug socket.

4. INSTALLATION CONCEPTS FOR LARGE RETAIL SPACES WITH INCREASED ENERGY REQUIREMENTS.

CURRENT SITUATION

The situation frequently found in retail spaces is as follows: The energy supply for the area is provided from the central sub-distribution via cable trays and with a high number of individual lines. NYM cables are laid in a star shape, which leads to a large accumulation in the area of the sub-distribution board and increases the fire load. Alternatively, there is an elaborate installation involving a fixed busbar systems. The lighting connections are partly hard-wired and therefore inflexible. The flexible display sections are connected with grounding sockets without control of the phase distribution or load limits. In addition, uncontrolled coupling of additional fixtures can occur. Any restructuring of the sales areas (particularly at customer service desks) requires extensive installation work.

GOALS

An efficient, decentralized supply of energy to the retail space by means of:

- Local protection of consumers; symmetrical distribution of load to the individual phases; area-wide supply with grounding or system sockets; flexible solution for supplying customer service desk and cash register areas; separation of the line routing for different networks.

Reduce initial installation costs by:

- Reducing the size of the central cable routing systems (cable trays); Eliminating the of inflexible, fixed busbar systems; Reducing the space required for sub-distribution boards; reducing the installation time.

Reduce modification costs by:

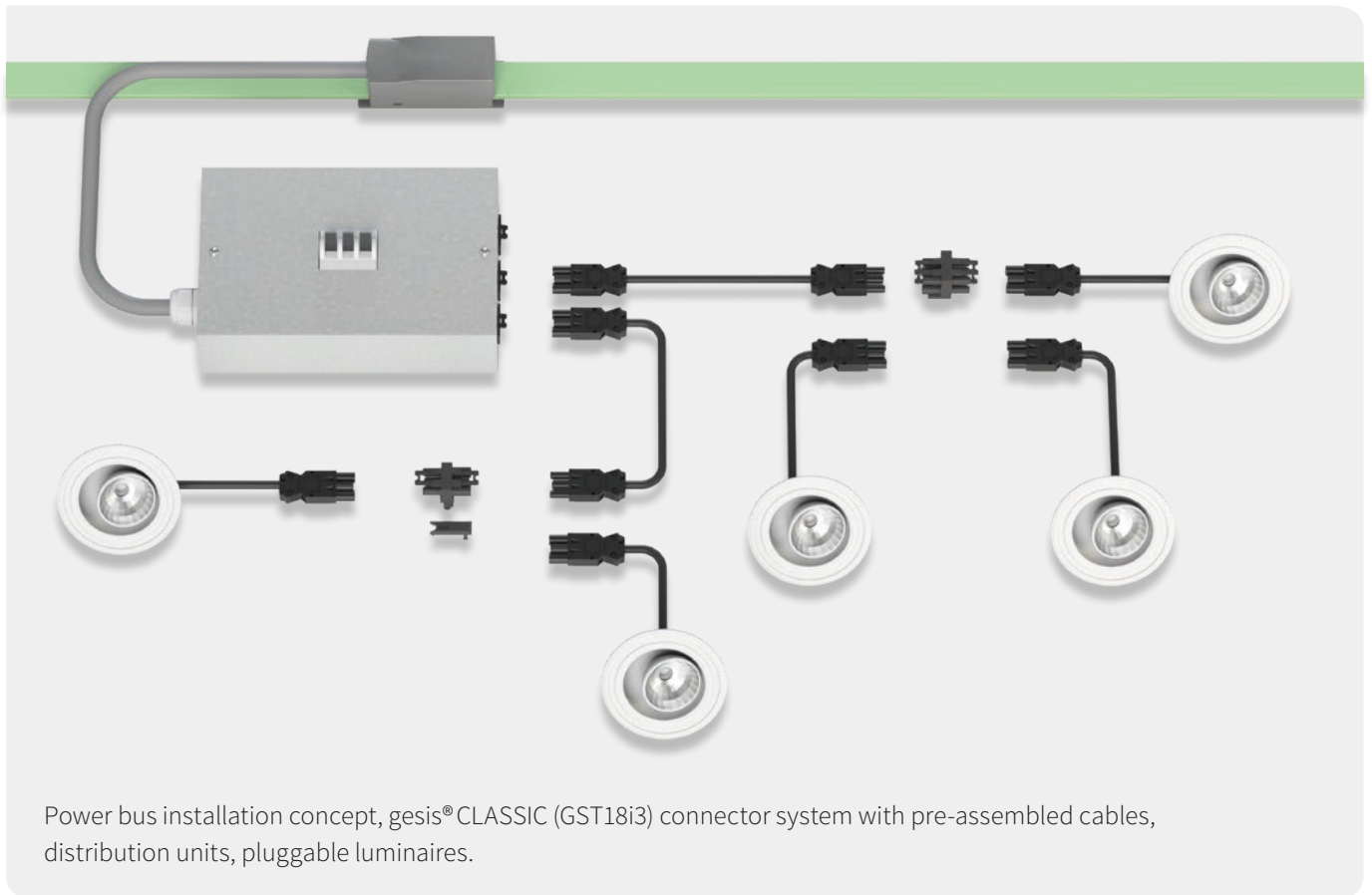
- Using a flexible and pluggable solution; Reducing the amount of time for modifications.

All this requires a system solution that enables a simplified and standardized plan, offers clear interfaces between supply and load, and thereby guarantees planning certainty in terms of investment volume and functionality.

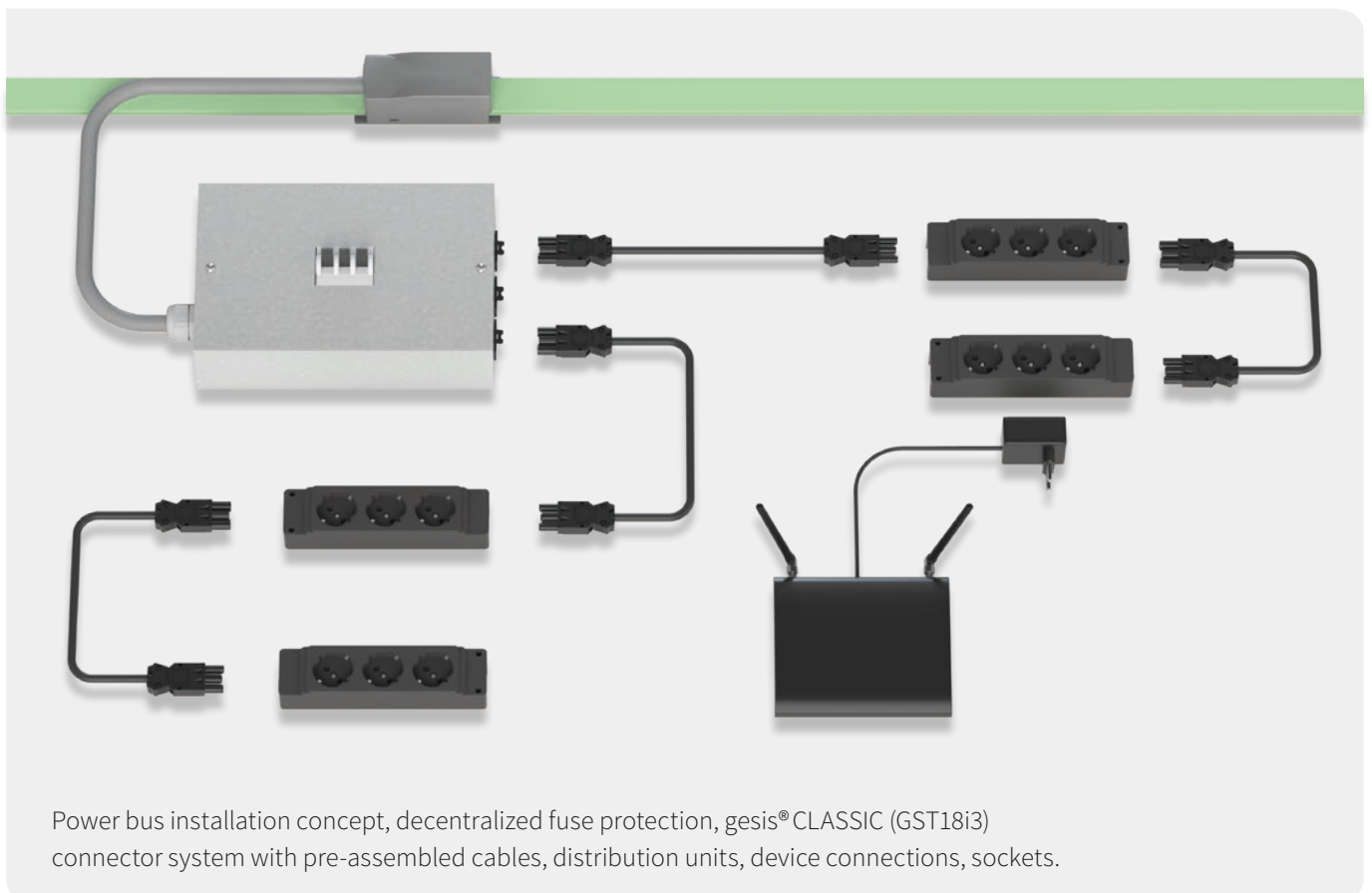
INSTALLATION CONCEPT

The centerpiece is a comprehensive supply of power via an energy bus (flat cable system 5G10 mm²) with energy taps with local protection that can be dynamically positioned. The floor space is divided into energy cells with a fixed structure of taps. Defined interfaces for lighting and other consumers ensure phase balance. The pluggable installation of the outputs allows flexibility of the system.

Time and effort are reduced for the initial installation as well as for further modifications – as a result, the user gains a high degree of flexibility. The structured cabling in connection with the area-wide supply of grounding sockets ensures more safety, as uncontrolled cascading is prevented. This also prevents phase imbalance and overloads.



Power bus installation concept, gesis® CLASSIC (GST18i3) connector system with pre-assembled cables, distribution units, pluggable luminaires.



Power bus installation concept, decentralized fuse protection, gesis® CLASSIC (GST18i3) connector system with pre-assembled cables, distribution units, device connections, sockets.

5. STANDARDS + REGULATIONS.

AN OVERVIEW OF THE REGULATIONS RELEVANT TO THE ELECTRICAL INSTALLATION:

VDE 0100 – LOW-VOLTAGE INSTALLATIONS

All electrical installations are subject to the installation regulations of DIN VDE 0100 (for luminaires, part DIN VDE 0100-559 "Selection and erection of electrical equipment – Luminaires and lighting installations").

VdS – GUIDELINES FOR LOSS PREVENTION

This guideline of the Association of Property Insurers (Verband der Sachversicherer, VdS) (VdS 2005:2014-03 (05)) is mainly aimed at qualified electricians and contains minimum requirements for avoiding or minimizing fire hazards. It refers to the relevant regulations to which luminaires are subject with installation in buildings.

Section 7.2.2.3 Connections makes explicit reference to the use of installation connectors according to DIN EN 61535.

In particular, it points out that, according to DIN EN 61535, only installation connectors by one manufacturer may be used for an installation. Any mixing of connectors (female-male) is therefore not permitted:

"To ensure compatibility, (other) installation connectors may only be used if it is a system approved by the manufacturer". (Section 7.1.9)

Apart from the original Wieland system gesis® (GST, RST, ...) there are no systems of other manufacturers that are certified by us.

EN 60598 – LUMINAIRES – PART 2-23: PARTICULAR REQUIREMENTS – EXTRA LOW-VOLTAGE LIGHTING SYSTEMS

The planning and selection of the individual components (power source, cable, connector, illuminant, etc.) to go together is carried out by the luminaire manufacturer. Clear information is required regarding cable lengths, cable cross-sections, and the maximum number of luminaires. Within the framework of these clearly described lighting systems, connectors can be used with cable cross-sections < 1.5 mm².

- Products of the GST18®, GST15, GST08 series are available with cable cross-sections of 1.0 / 0.75 / (0.5) mm² and can be used in systems defined by the lighting manufacturer.

EN 61535: INSTALLATION COUPLERS INTENDED FOR PERMANENT CONNECTION IN FIXED INSTALLATIONS

This concerns installation connectors for permanent connection in indoor installation systems with a rated voltage of up to 500 V and a rated connection capacity of up to 10 mm².

These installation connectors are intended for installation by a qualified person or instructed personnel, since the national installation regulations must also be observed for installation.

The installation instructions allow the use of such installation connectors for the through-wiring of luminaires which are part of the fixed installation. The following requirements, among others, are examined:

- Hazardous interchangeability
- Protection against electric shock and protection rating
- Mechanical interlock
- Ground wire
- Protection of the poles against short circuit
- Strain relief

Our product groups gesis® CLASSIC, gesis® MINI, RST® CLASSIC and RST® MINI meet this standard.



CAUTION: Installations with multiple grounding sockets and, in particular, the cascading of these sockets do not meet the requirement set out in this standard! This can result in overheating of the contacts, causing failure or a fire.

6. HANDLING INSTRUCTIONS.

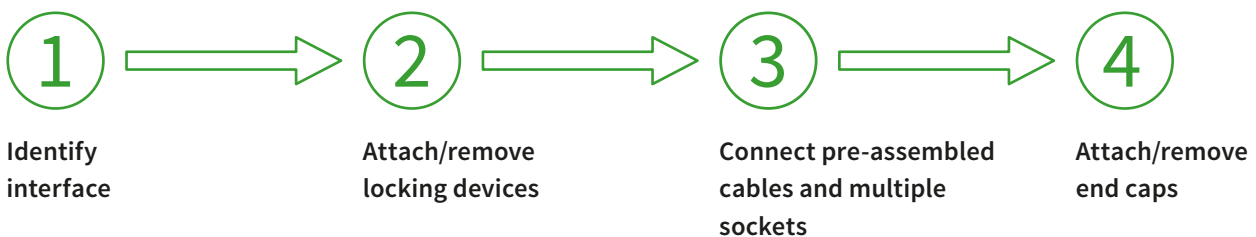
A major advantage of pluggable installation is the option for changes and extensions to be performed quickly and by employees on-site. While erection of the fixed installation and the initial connection have to be carried out by a qualified electrician, the pluggable installation can also be executed by persons trained in electrical engineering.



THE FOLLOWING HANDLING INSTRUCTIONS APPLY EXCLUSIVELY TO TRAINED PERSONNEL AND PROVIDE INSTRUCTIONS FOR:

- Connecting cable assemblies
- Connecting luminaires with installation connectors
- Connecting multiple sockets
- Attaching/removing locking devices and end caps

HANDLING IN PRACTICE:



1. IDENTIFY INTERFACE

The socket with the marking of the circuit designation, which was installed by the electrician, is considered to be the interface.

The work area of the trained person starts at this interface.

The trained person is NOT allowed to intervene in areas in front of this interface!

The reactivation of miniature circuit breakers (fuses) on the distribution box may only be carried out by a qualified electrician.

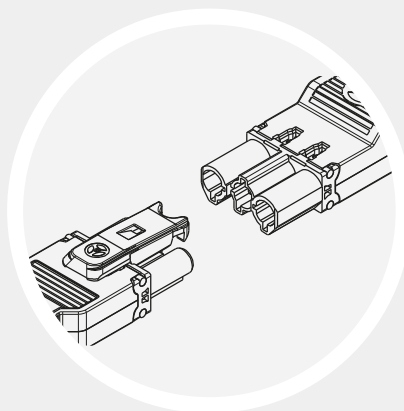
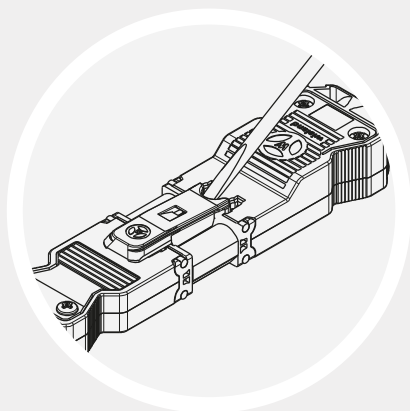


2. ATTACH/REMOVE LOCKING DEVICES

Unsecured connections must be protected against unintentional disconnection. Many components have an integrated interlock, which must click audibly into place when connecting two elements. If there is no interlock, it must be attached manually. To do this, click the interlocks into the plug.

To undo the connection again, raise the interlock slightly using a screwdriver.

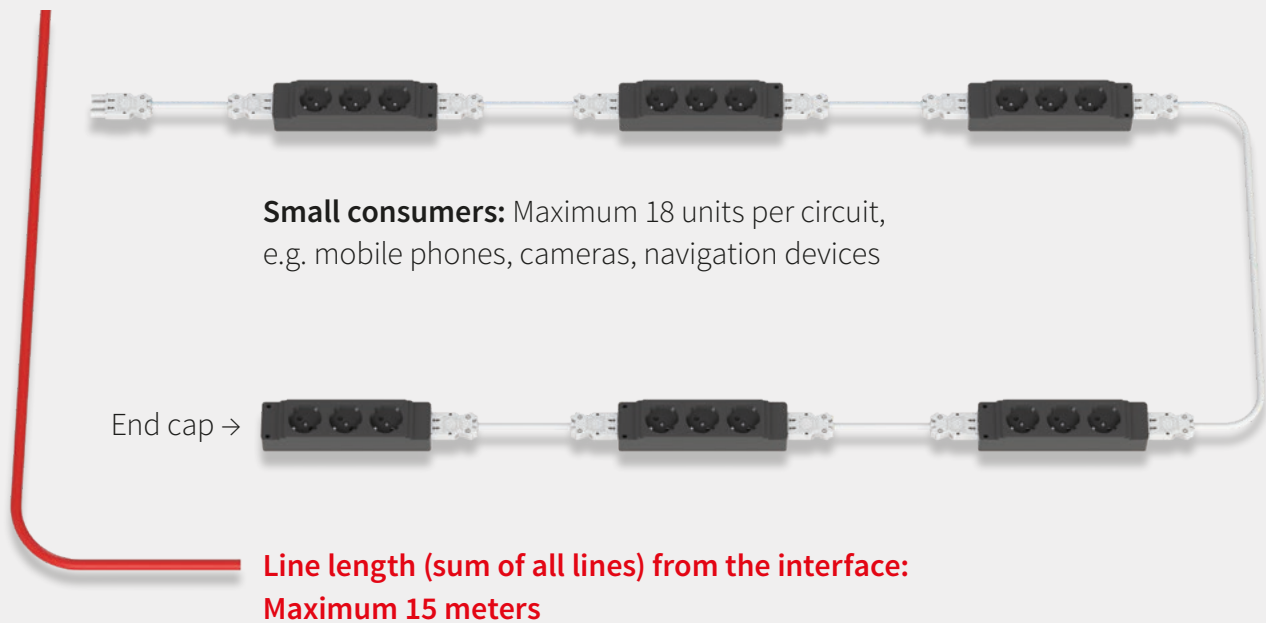
CAUTION! Only use insulated screwdrivers!



3. CONNECT CABLE ASSEMBLIES AND MULTIPLE SOCKETS

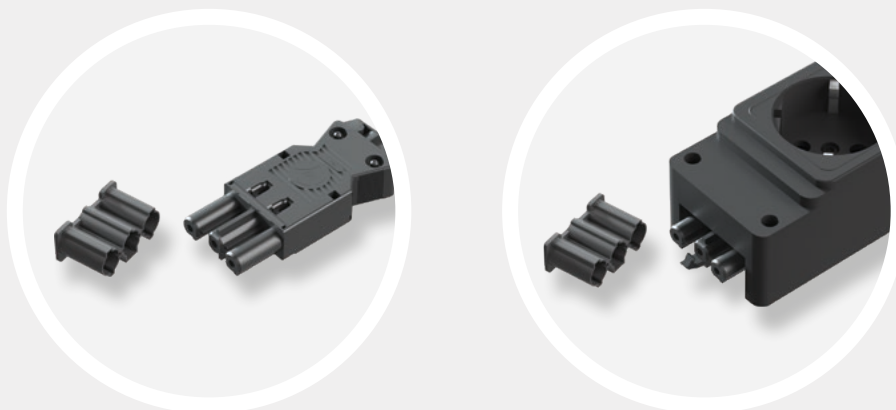
All work on the electrical installation must be carried out without load (pull out the mains plugs of all connected loads)

WARNING! Due care must be exercised at all times with the electrical installation.



4. ATTACH/REMOVE END CAPS

Free connector parts must be sealed with suitable end caps to protect personnel and customers.



7. SAFETY INSTRUCTIONS.

Laying cables, connectors, and multiple sockets.

- Only use components supplied by Wieland Electric GmbH!
Compatibility between products of other manufacturers and Wieland products is not guaranteed.
- Only pre-assembled connection cables (at least 2.5 mm²) may be used for all connections.
Male or female connectors may only be connected to cables by qualified electricians.
- To connect different consumers (e.g. sockets, etc.), connecting cables (min. 2.5 mm²) are used, which have been assembled with plug and socket.
- Spiral cables are always laid freely in the air.
- Normal cables must always be laid in cable routing systems.
- Cables and connectors may only be exposed to low mechanical loads.
- Plugs and cables must not be tampered with.
- Do not crimp cables, do not route them over sharp edges, do not walk on them, and keep them away from hot surfaces.
- Check cables and connectors for damage regularly.
CAUTION! Never use damaged components!
- Multiple sockets must rest flat on the subsurface (floor, shelf, etc.), and free connector parts must be furnished with end caps.
- Make sure that the cable is routed in the plug direction.
- Every socket circuit can only be loaded with up to 3,000 W.
- The applicable safety and accident prevention regulations must be observed.

EXAMPLES OF HOW A LINE SHOULD NOT BE HANDLED!



8. KEY INFORMATION AT A glance

40⁺
YEARS
GESIS[®]

THE GESIS[®] SYSTEM:

gesis[®] is type-tested according to IEC 61535. gesis[®] is designed to minimize typical sources of error in electrical installations.



TOUCH-PROTECTED:

The gesis[®] connectors are touch-protected if they are used properly (IP20 unplugged). When plugged in, they meet the requirements of IP40 and therefore allow application in easily accessible areas as well. Open connector parts must be sealed with suitable end caps.



LEADING GROUND WIRE:

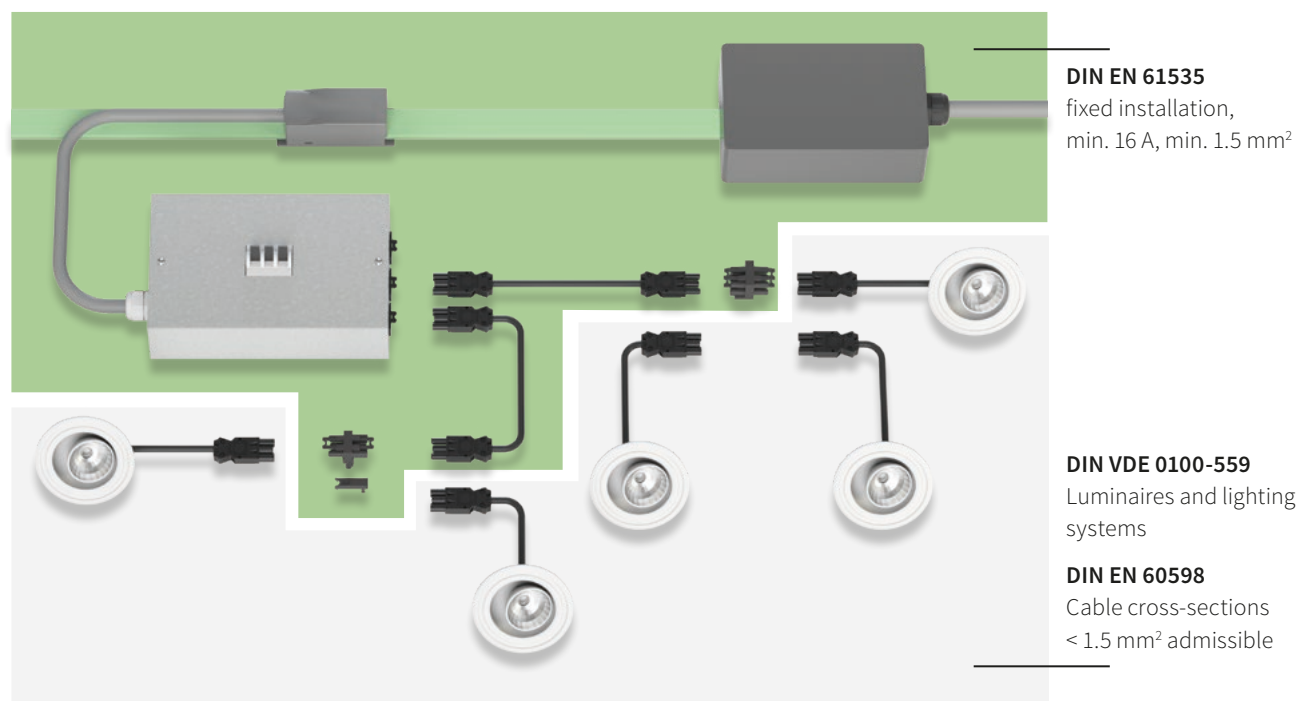
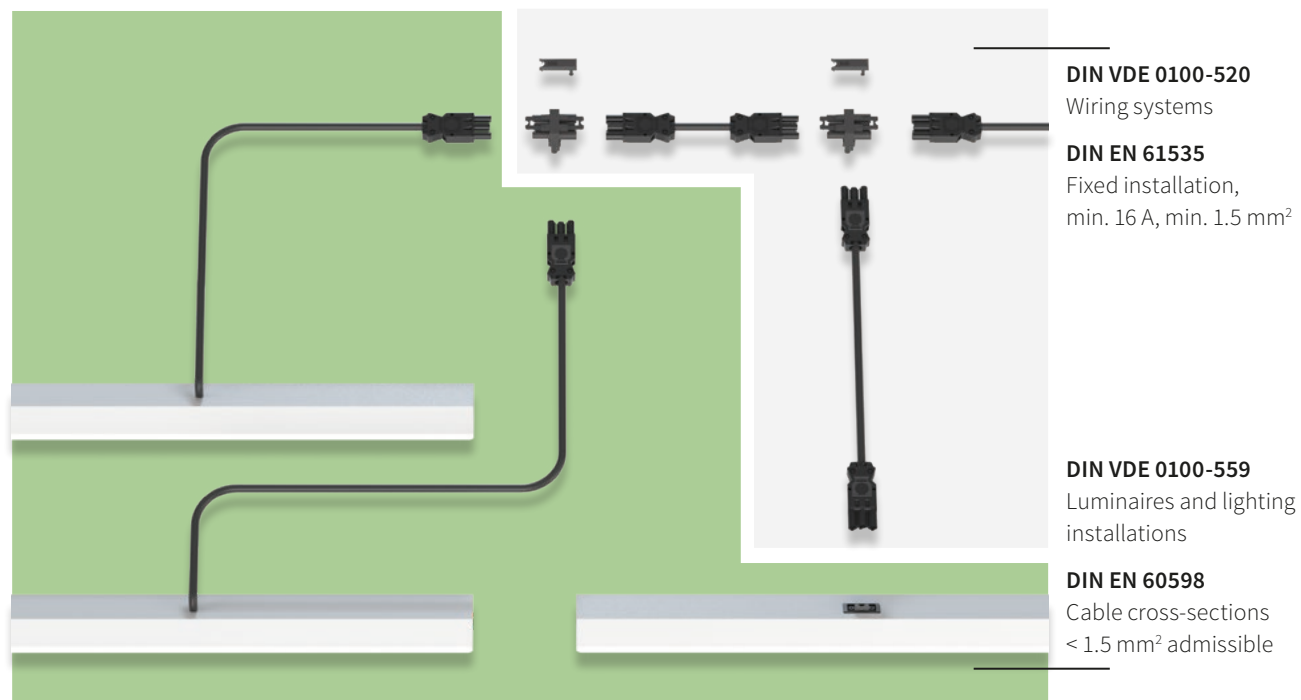
In the gesis[®] connector systems, a leading protective earth contact ensures safety; it is connected first of all and disconnected last.

- + Flexible & modular
- + Extendable & retrofittable
- + Resource-efficient
- + Reusable
- + IP40



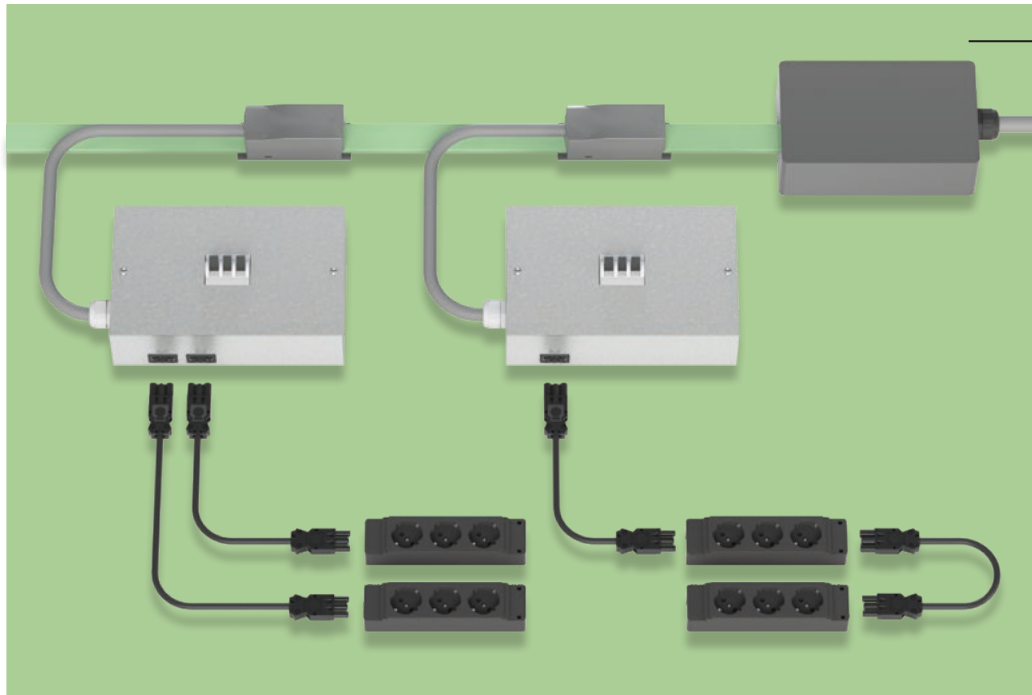


APPENDIX: SCHEMATICS EXPLAINING THE SCOPE OF FIXED INSTALLATION DESCRIBED ABOVE:





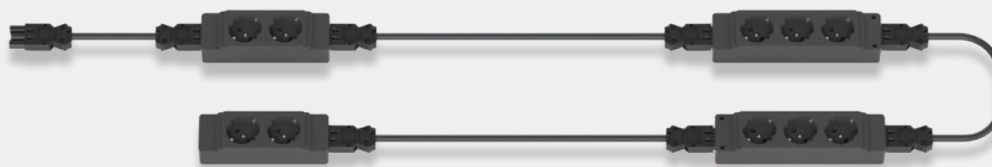
**APPENDIX: SCHEMATICS EXPLAINING THE SCOPE OF THE
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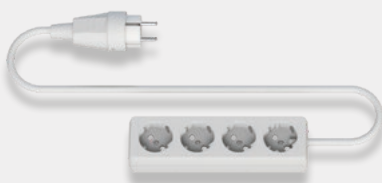
DIN VDE 0100-520
Wiring systems,
DIN EN 61535
Fixed installation,
min. 16 A, min. 1.5 mm²

CASCADING MULTIPLE SOCKETS:

Stationary (fixed or placed in an area not accessible to the layperson)
multiple socket with connection level according to DIN EN 61535, **testing period 4 years**



Portable equipment, **testing period 6 months to 2 years**



Use contrary to the use intended and described by the manufacturer. **Not permitted**



CONNECTION TECHNOLOGY FOR FIXED EQUIPMENT:

Fixed luminaire with connection system according to DIN EN 61535, **permissible**



Fixed luminaire with grounding plug connection system, **not permitted**





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