

Briefing Paper



Plug & Play Quick Connect Installation

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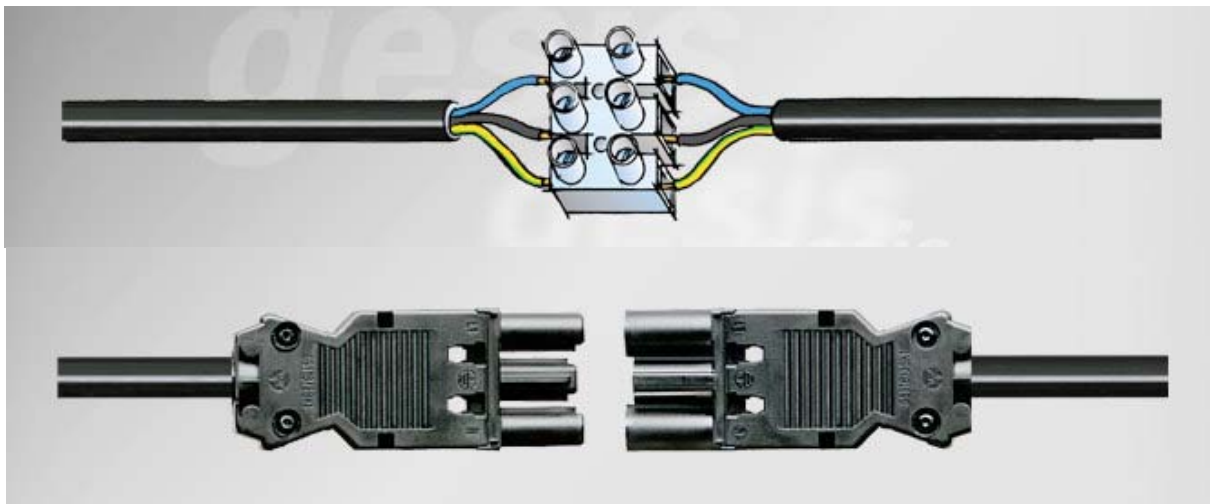


Source: Legrand

Home of the Future

The conventional method of installation with conduit, wires, cables, junction boxes and screw connectors is increasingly giving way to a more modern form of installation that makes use of quick connectors. However, this installation method can only be applied when free space is available in the form of a suspended ceiling, a floating floor or hollow walls. In a standard home with stone walls, which has no suspended ceilings or floating floors, we cannot use this modern form of installation. In many other places such as shops, offices, industrial areas, hotels, hospitals, schools and so on, the use of quick connectors can occupy an important place in the installation process.

In this article, we will endeavour to give an overview of what kinds of product are available and what benefits the quick connectors offer over conventional installation methods.



The conventional connection method (above) in comparison with quick connectors. (Illustration source: Wieland)

Centralised versus decentralised installation

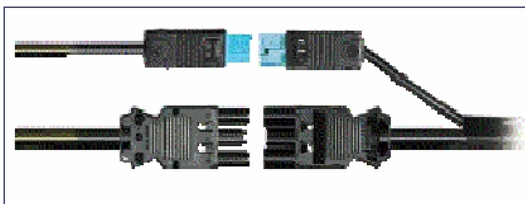
Installations in homes are generally centralised. The cables and wiring go to the distribution board where connections are made to the various circuits. Other connections are also made if it is an installation with remote control switches, or an integrated home system.

In larger buildings, such as offices, schools and hospitals, the decentralised installation method is used. A supply cable is provided for every room (office, classroom, etc). A distribution box is placed above the suspended ceiling. From here, the separate cables go to the wall sockets, the light fittings and switches. With the conventional method of connection, all connections are done by hand. The cables and wires have to be stripped, after which the connections to light fittings, wall sockets and switches generally have to be made with screw connectors. For an installation with a building management system, such as KNX or LON, a bus cable is also provided for each room, to which the actuators and sensors are connected. With conventional connection methods, this means a lot of additional work.

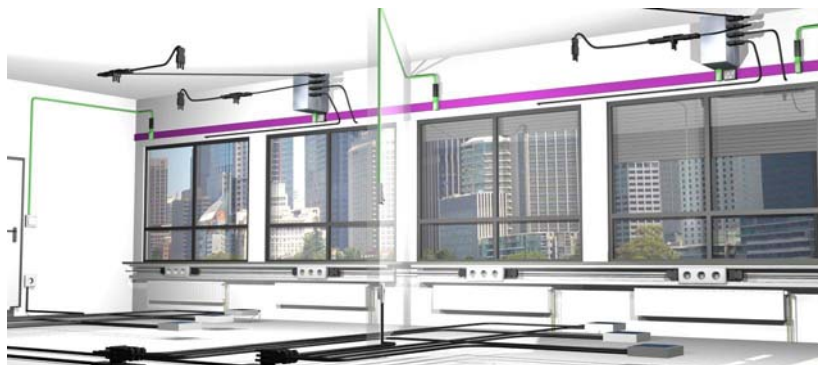
One of the benefits of a decentralised installation is that a well-organised installation is obtained for each room. Furthermore the distribution boards are smaller because the actuators of the building management system are also decentralised and often even built into the light fittings. When changes and modifications have to be made, people can carry on working in the same room while the work is carried out, and the cabling does not have to pass through any other rooms. As a result, staff are not disturbed as much in their work. A decentralised installation is also more flexible than a centralised installation.

Working with quick connectors

A supply cable, and possibly also a bus cable, are fitted in a room. They are connected to one or more distribution boxes that have quick plug connectors. From there, connections are made to the wall sockets and light fittings using prefabricated, flexible cables with quick plug connectors. These cables are available in different lengths. Depending on the type of equipment that has to be connected, there are larger and smaller quick plug connectors and different types of cables. Certain wall sockets have quick plug connectors. These sockets – in a plastic or metal installation duct, for example – are then connected using the quick connectors. There are also fluorescent light fittings and sensors (for example presence detectors) that are equipped with a quick plug connector.



Less material is required to make connections with quick connectors (photo on the left). (Illustration source: Isolectra)



Example of an installation with quick connectors (Illustration source: Wieland)

In the illustration above, we see that a purple ribbon cable has been fitted above the windows. This acts as a supply cable for a number of rooms. In every room, one or more distribution boxes are connected to the ribbon cable. The distribution boxes are pre-cabled internally and have plug connections. From there, cables with quick plug

connectors lead towards the various fittings and wall sockets. In the drawing, we can also see the green KNX cables, which are also connected to the ribbon cable. The ribbon cable contains both supply wires and bus wires. The KNX switches and sensors can thus be quickly and easily connected to the bus.

In the installation duct (just below the windows), we see the connections to the wall sockets, for which quick connectors are used. There is also a supply cable on the floor. This is tapped off with quick connectors to the various floor boxes in which wall sockets have been fitted. The floor boxes are fitted into the floating office floor.

Benefits of using quick connectors

They are a great time saver. Depending on the source, time savings of 70 to 80% compared to the traditional installation method have been reported. This is also why an installation with quick connectors equates to an initial cost saving of 30 to 40%. In addition, the failure costs fall by around 90%. The failure costs are the costs incurred when certain items – such as light fittings, wall sockets, sensors or switches – are installed in the wrong place and subsequently have to be installed in another place. Wrong connections can also be made that must be repaired later on, resulting in wasted money. The drop in failure costs is due to the great flexibility of a quick connector installation. The modification of an existing installation only takes a minute, which is convenient and saves on renovation costs, or costs incurred when rearranging an open plan office or shop.



Connecting a light fitting the conventional way takes 111 seconds. With quick connectors, it can be done in 24 seconds with far fewer tools. (Illustration source: Isolectra)

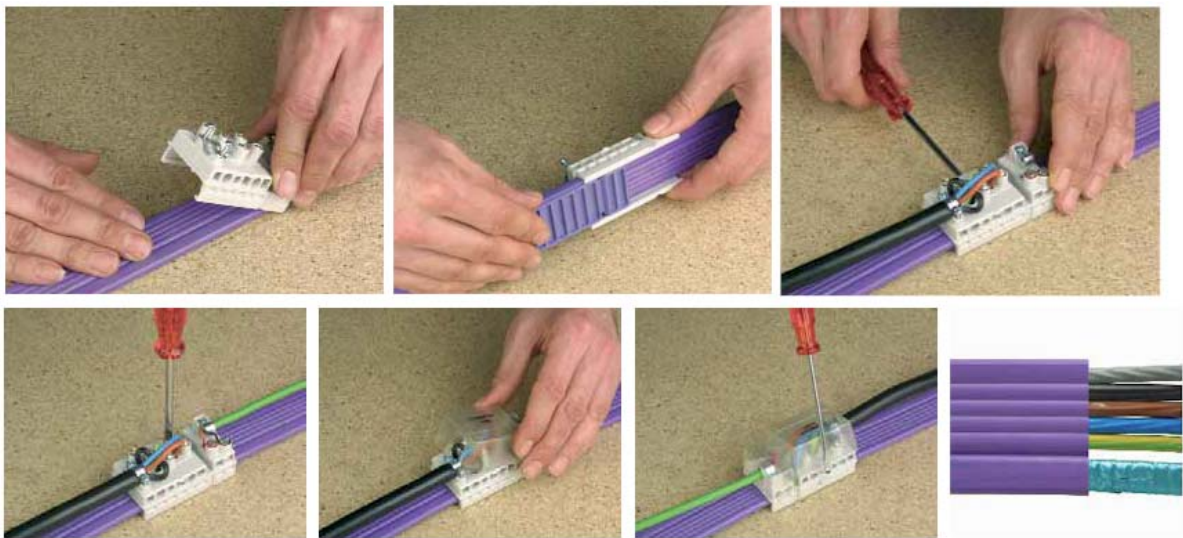


A 70% time saving can be made. (Illustration source: Wieland)

The use of quick connectors is also better for the environment. The entire system can be easily and simply reused. When an installation is dismantled, the cables with quick connectors and the distribution boxes can be used again in a different installation. If, however, the material is too old or damaged, everything can be recycled, resulting in less waste. Furthermore, home-work traffic is reduced because installation on site is much quicker. Finally, energy-saving techniques such as presence detectors, movement detectors, window detectors and integrated KNX or LON controls can easily be used with quick connectors. Energy bills fall and CO₂ emissions are reduced.

Overview of the different materials

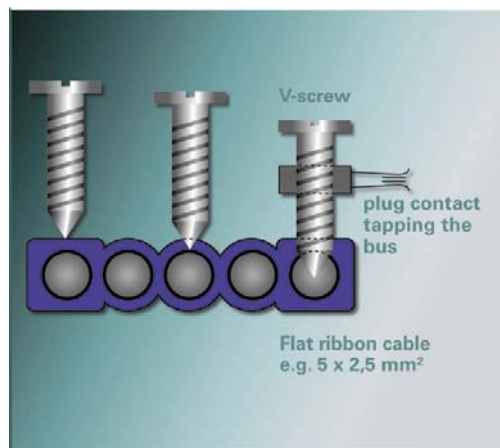
Let's begin with the ribbon cable. This is used as a supply cable and for bus distribution. This cable consists of an outer sheath, in which are placed 5 x 2.5 mm² conductors insulated from one another. Sometimes there are also a further 2 x 1.5 mm² conductors for bus distribution. Using small junction boxes, screws are screwed into the cable in order to make the connections. These junction boxes generally have a connection for a plug to which different items of equipment are connected with a connecting cable using quick plug connectors, or a supply is sent to a connection box.



Example of the installation of a connector on a ribbon cable. (Illustration source: Woertz)

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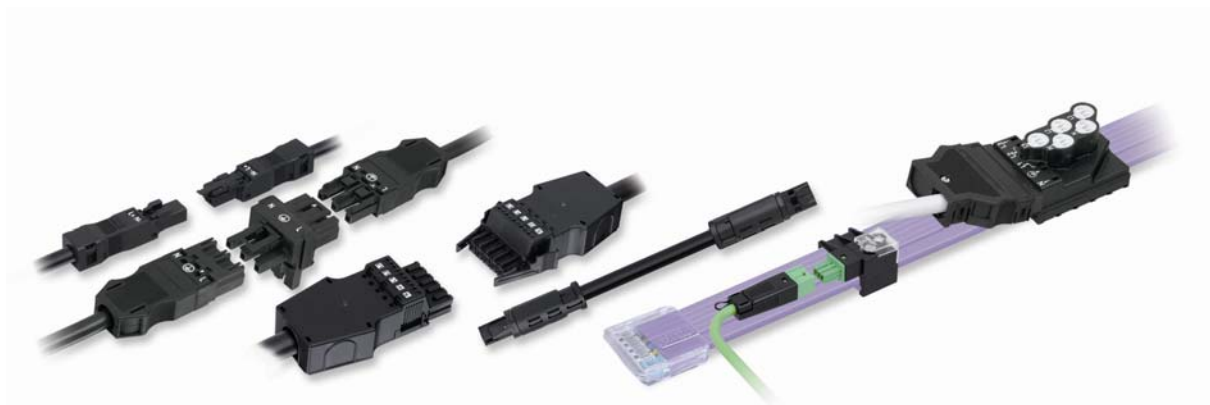
The connecting screws are screwed into the conductors. (Illustration source: Wieland)



There are different types of connectors to suit different requirements. (Illustration source: Wieland)

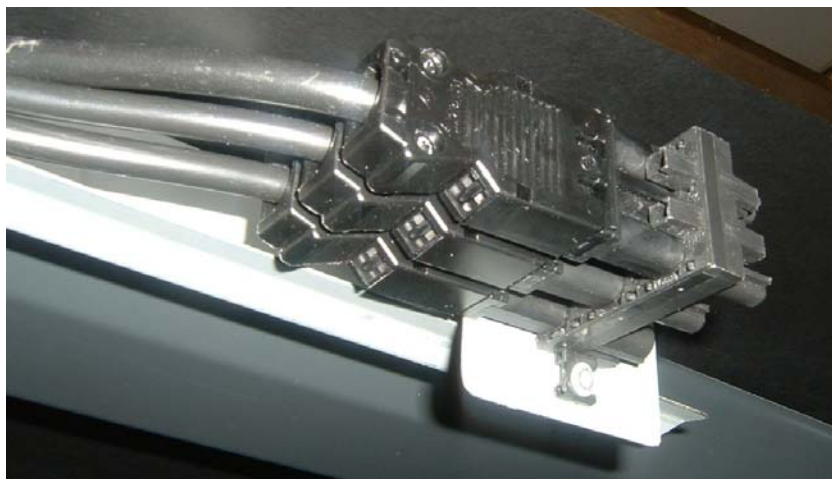
With such cables, multipole 230V connections can be made between the neutral and L1, L2 or L3. However, 400V connections can also be made between the phases. A two-pole connector is also available for the bus.

Different types of flexible connecting cables with quick plug connectors are generally available, so there are cables with 2.5 mm² or 1.5 mm² of wiring. The pre-mounted plugs on these cables are respectively larger or smaller. In this way, it is not possible to wrongly go from a 2.5 mm² cross-section to a 1.5 mm² cross-section without additional protection. The smaller cross-section is often used for lighting, the larger for wall sockets.



Small and large plugs, three-pole, four-pole or five-pole, splashproof or otherwise. (Illustration source: Wago)

When making a number of branch connections to equipment, distribution blocks can be used. On the one hand, the supply from a distribution box or black box is connected to this. On the other hand, connections can also be made to the same distribution block for several other appliances.



Three plug cables have been connected to this distribution block. On the right, there is still space for three additional connections. (Illustration source: Wieland)

Various producers offer distribution boxes with plug connections. For example, Attema has fairly traditional distribution boxes that are supplied with conventional cables or wire in a conduit. Covered plug connections are another possibility. Legrand and others have distribution boxes as well. Here, the supply to the distribution box is made with a plug connection.



*Here we see a distribution box in which the supply is on the left. On the right, the supply cable goes on to the next distribution box. At the top and bottom, branch connections can be made to the equipment.
(Illustration source: Legrand)*

A further step can be taken with the 'black box'. This is also a distribution box, but with installation equipment inside (actuators such as relay modules and dimmers, for example). The black box has a supply and a bus connection, and plug connections for light fittings are also available. They are not connected directly to the supply, but via an actuator controlled by bus commands.



This black box from Peha has a three-pole power-in and power-out connector. Six pieces of equipment can be connected to it that are switched via a PHC relay. There is also a bus-in and two bus-out connections. Finally, up to eight push buttons can be connected. This is done internally via an input module on the bus. (Illustration source: Peha)

The costs again

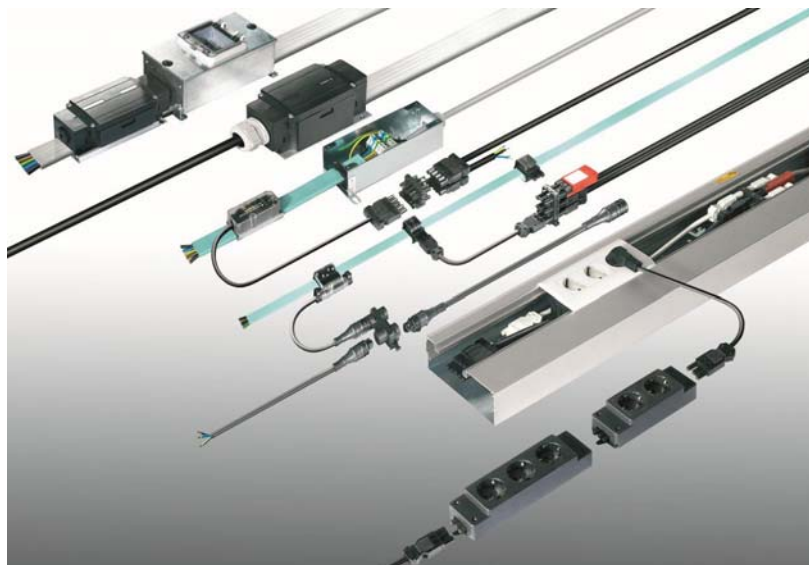
Isolectra calculated the costs per m² for different forms of lighting installations in offices. The prices below are net prices for the installation material, including labour, but excluding light fittings and operating points.

Conventional installation method (conduit, cables, junction boxes, labour)	€5.47/m ²
Cable boxes with quick plug connectors in the office area	€3.99/m ²
Black box on the cable duct	€2.59/m ²
Ribbon cable 5 x 2.5 mm ² with the cable duct	€2.19/m ²
Ribbon cable 5 x 2.5 mm ² + bus with the cable duct	€2.26/m ²

Depending on the form of installation, the price falls to less than half that of a conventional installation.

Conclusion

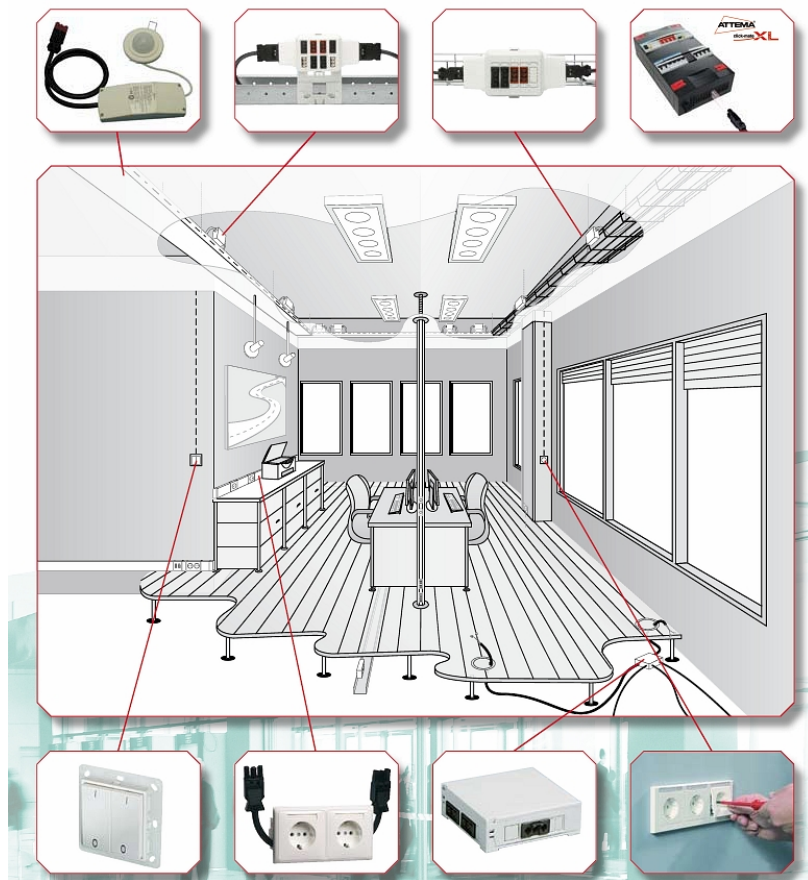
For electrical installations in office buildings, schools, hospitals and shops, a quick connector installation offers many benefits. Working time is reduced, costs fall and the installation is much more flexible than conventional installations. The same benefits also apply to renovations and repairs. There are a number of producers operating in this market. Some have only a limited number of products while others offer an extensive range of solutions for all types of situation. Plug & Play installation could well become the standard installation method in the near future, so why not try it?



An overview of a small section of Wieland's Gesis quick connector system. (Illustration source: Wieland)

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Example of an installation in a small office. (Illustration source: Isolectra)

Links

Attema website: www.attema.nl

Isolectra website: www.isolectra.nl

Legrand website: www.legrand.co.uk

Peha website: www.peha.de

Wago website: www.wago.com

Wieland website: www.wieland-electric.com

Woertz website: www.woertz.ch/ch_en