

the difference between

THE DIFFERENCE BETWEEN:

Push-In Terminals versus Other Types of Connections

The use of DIN-Rail Terminal blocks is widespread throughout every industry (Fig. 1). For everything from individual machines to complete systems and to multiple system factory interconnections, terminal blocks become an important component.

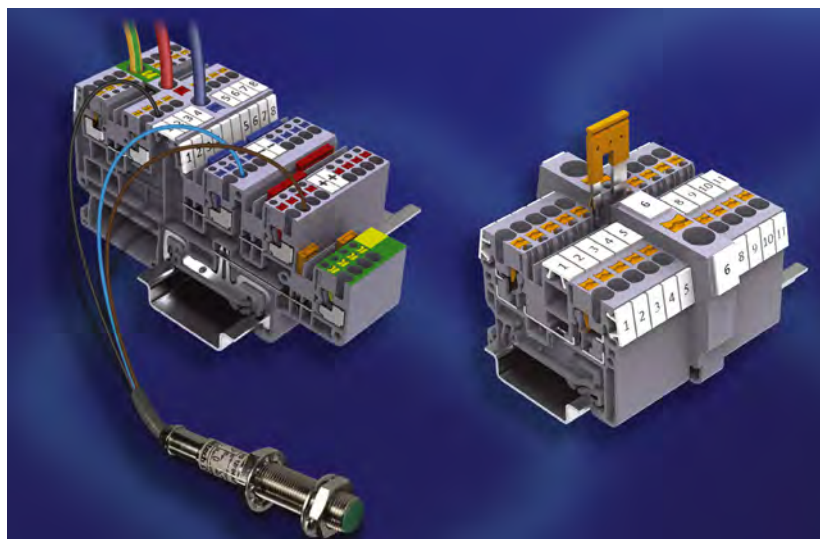
ELECTRICAL AND ELECTRONICS CONTROL

systems use a wide variety of DIN-Rail Terminal blocks with a variety of connection methods dependent on the needs of the application. Electrical panels in automobile plants, chemical plants, utilities, buildings, and all types of automation and manufacturing require hardwired interconnection of some type or another.

Product design engineers have followed the needs of users to create compact products made from a variety of materials for different environments, and which are modular

to expand to the needs of the customer. DIN-Rail Terminal blocks have evolved over time. Ultimately, the choice of terminal block must assure to maintain a long life of reliable service, provide as low maintenance as possible, and be able to be installed quickly and efficiently under any conditions.

We'll discuss the more common connection technology options for your DIN-Rail Terminal block requirements—the screw clamp and the spring/cage clamp DIN-Rail Terminal block—then discuss the features and advantages of push-in type terminals.



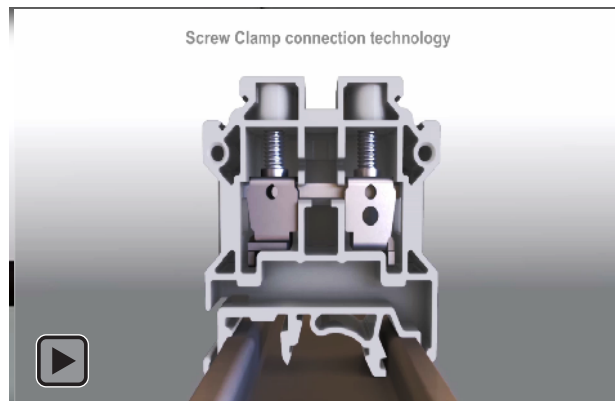
1. The latest push-in technology for DIN rail terminal blocks allows for 33% more wire density.

Screw Type DIN-Rail Terminal Blocks


Screw terminals are used extensively in the distribution of electricity in homes and apartment buildings, as well as in warehouses, plants and factories inside all types of panels and junction boxes. Screw type terminals have been around for a long time and are the most dependent on human interaction because of screw tightening that is required (often at various torque values). They operate simply by inserting a wire into an open elevator type clamp and tightening down on the screw to the specified torque using a screwdriver. Most screw type terminal blocks also incorporate a locking

feature of some kind to guarantee safe connection and prevent the screw from loosening (Fig. 2).

Screw Clamp Instructions



2. Screw terminals are used for a broad number of electrical distribution functions where high current might be found.

-  *1. Insert wire into open clamp*
- 2. Tighten screw to specified torque*
- 3. Remove screwdriver*
- 4. Screw terminal is closed with locking feature for a reliable/safe connection*

Screw type terminal blocks are often used when the need is to handle the physical stress of multiple, large wires (sizes up to 250 kcmil) mounted in the same general location as well as handle the large currents going through the wires. Because of the larger wires, these terminal block clamps are made from high-impact materials such as steel to guarantee safe and reliable connections.

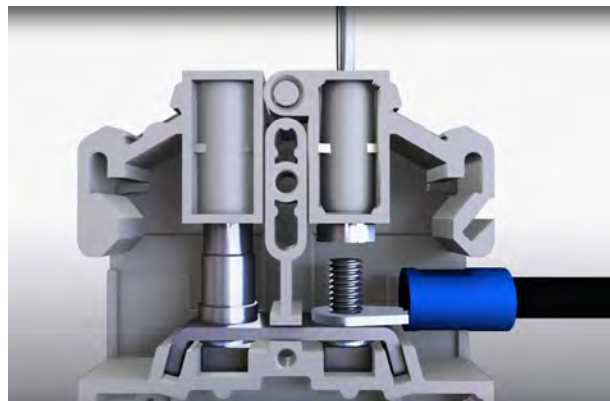
Accessories include screw or push-in type jumper systems, endplates, partition plates for separation, and marking options for terminal and wire identification. Another optional terminal block is the Ring Lug/Stud Terminal specifically used for spade or ring (loop) lug terminating (Fig. 3).

Ring Lug/Stud Terminal Instructions

- 1. Unscrew the ring lug from the screw stud*
- 2. Swing ring lug from the screw stud*
- 3. Place the loop lug terminated wire over the stud terminal*
- 4. Screw the ring lug over the stud to secure the loop lug*

Spring/Cage Clamp DIN-Rail Terminal Blocks

Most engineers working with controllers and inside machine specific interconnection enclosures are familiar with spring clamp terminal blocks (Fig. 4). The human factor for these types of connections is less than that of the screw type DIN-Rail Terminal block. A tool, such as




3. Ring lug/stud terminal blocks allow engineers to use spade or loop lugs at the terminal end of wires to increase the security of the connection.

a screwdriver, is still needed to open the spring, but a specified torque is not necessary. A safe connection is assured through the use of a preloaded spring.

Operation is easy: By using a narrow screwdriver or similar tool, users push the tool into a slot where it opens a preloaded stainless steel spring. Once a wire is inserted into the terminal, the tool is removed, and the spring force presses the conductor against a copper-tin plated current bar for the connection. Solid or stranded wire can be used to create a secure connection in less time than using a screw terminal. This type of terminal block is also designed into elevator cabinets, machines and vehicles for its natural resistance to vibration and shock.

Spring Clamp Instructions

-  *1. Insert flat-head screw driver into insertion space to open preloaded spring*
- 2. (a) Insert wire into opening in spring leg
(b) Remove screwdriver*
- 3. The spring force presses conductor against the current bar for a reliable/safe connection*

Spring clamp terminal blocks can be used with all sizes of wire and are actually easier to use on small wires than a screw type block. Conductors can be terminated securely and independently of one another. Not only are these terminal blocks versatile, offering a reliable gas-tight connection, but having no screw to loosen during operation makes them vibration-proof. Like other terminal blocks, spring clamp devices accept wires with or without ferrules to provide a completely maintenance free operation.

Push-In DIN-Rail Terminal Blocks

Innovative terminal block designs have continued to move forward. Due to the advancements in materials and

the needs of specific applications, the possibly tool-less push-in terminal block technology has provided additional benefits to users. This new wiring option allows users to simply push solid wires and stranded wires with ferrules into the terminal block for quick and reliable connectivity. This type of terminal block needs the least human interaction and works well in automated and robotic wiring situations (Fig. 5).

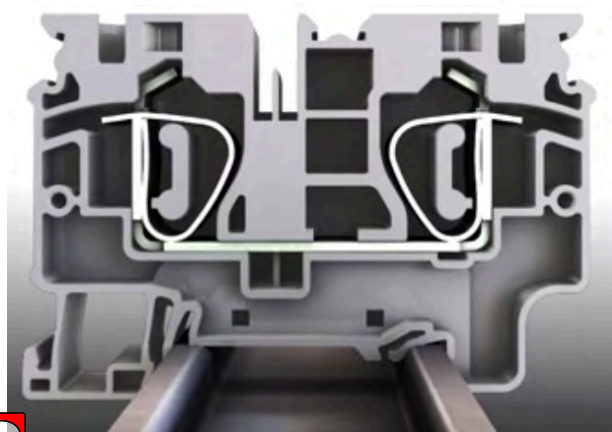
More OEMs are switching to this established technology not only for its installation speed (Fig. 6) and safety, but for its reliability and extremely large pull-out force (Fig. 7). End-users are incorporating push-in terminal block technology to streamline the installation of interconnecting sensor and control devices in I/O and DCS systems for process and automation control.

Overall, push-in terminals are ideal for many applications with their minimum required insertion force to connect even small wire sizes. These terminal blocks are also suitable to withstand harsh environmental conditions as those found in

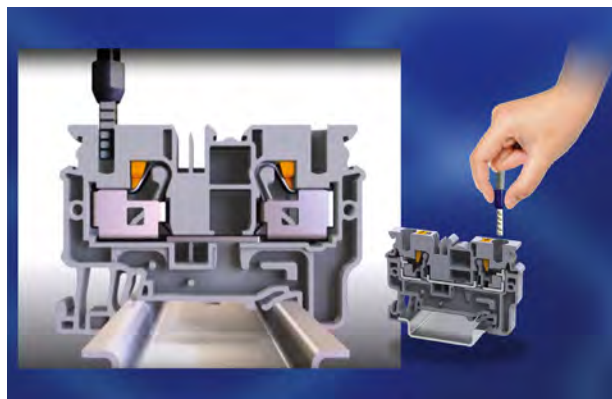
marine applications and chemical plants, owing to the use of non-ferrous metals used in the connection components.

The specially designed clamping mechanism for push-in terminal blocks allows them to be thinner, even with a 600 V capacity. This size reduction allows for 33% more wire density without compromising in voltage stress, pollution degree or surge voltage. A most compact 3.5mm terminal block thickness allows a 14AWG (1.5 sqmm) wire to be connected. application/terminal block examples include sensor and actuator terminal blocks and marshalling terminal blocks (Fig. 8).

Independent rows for insertion of jumpers allows various options for shorting different types of terminal blocks without using external jumper wires. Different positions are available on the terminal block for attaching markers that allow for identification from any angle inside a panel or enclosure. For global electrical system use, these terminal

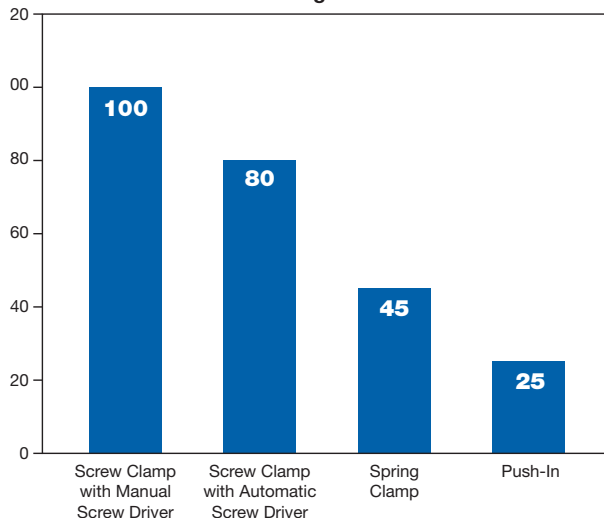


4. Spring clamp terminal blocks can handle controller interconnections in a smaller space than screw type terminal blocks.



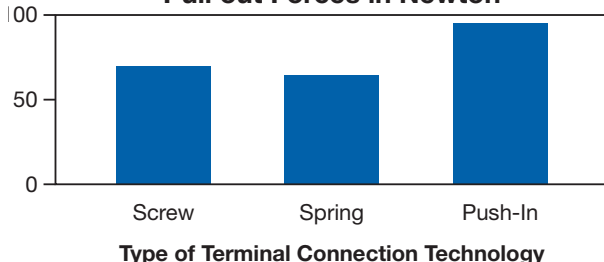
5. Push-in type DIN-Rail Terminal blocks are becoming very popular with OEMs.

Wiring Times

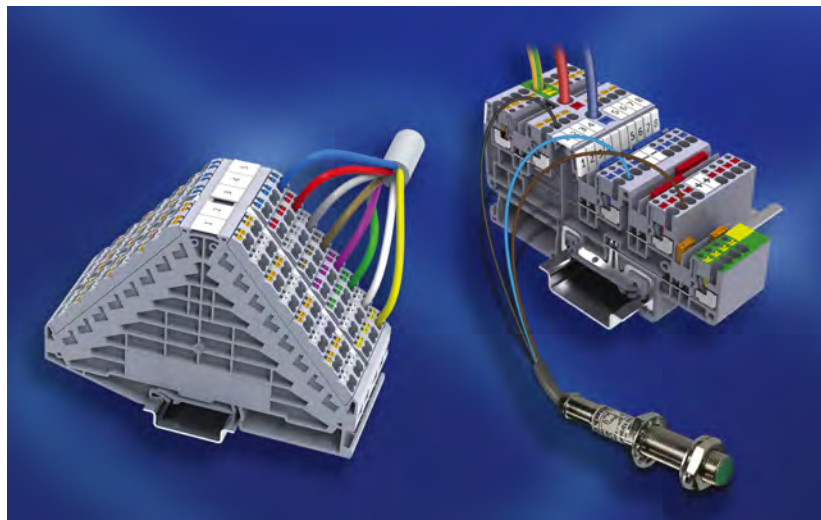


6. This chart shows the time savings gained from using push-in terminals compared with other types.

Pull out Forces in Newton



7. Pull-out forces for push-in terminal blocks are greater than those of screw or spring type terminal blocks, making them highly reliable for low maintenance and long life applications.



wire connections screw type terminal blocks may be the right choice. Yet when fast installation times and less maintenance is required, spring clamp terminal blocks might be the answer to your needs.

Tool-free push-in terminal blocks add an additional option for your toolbox that could save time and money on several levels. Once you have narrowed down your needs, review available data sheets concerning the components you've selected in order to familiarize yourself with what is available and what will best suit the criteria of your particular application.

8. Specially designed terminal blocks are available for specific applications, such as the Sensor and actuator terminal block and the marshalling terminal block.

blocks are available in seven different colors.

Terminal blocks such as those available in Altech's CP Series of push-in components offer single level, double level, and multiple level versions all with grounding versions as well as special sensor and actuator, Knife Disconnect and Marshalling Terminal Blocks, and a large variety of accessories.

Many manufacturers offer a full line of components that fit a broad variety of uses in the industry. Knowing the restrictions and limitations of your application can help in selecting the right terminal blocks. With high-current, large

REQUEST FOR MORE INFORMATION



www.altechcorp.com

ALTECH CORPORATION is an established United States supplier of components and devices used in industrial control, instrumentation, medical and automation applications. Altech provides a very broad line of products that meet UL and international standards and are RoHS and REACH compliant. Altech's commitment to continuous quality management has been recognized since 1999 when they were awarded ISO 9001 certification.