

A photograph of a male technician wearing a yellow safety vest and a hard hat, working on a complex electrical control panel with many wires and components. The image is partially obscured by a dark blue overlay containing text.

# HARNESSING NEW POWER DISTRIBUTION PRODUCTS TO DESIGN TODAY'S CONTROL PANELS

*By: Vincent Ménager, marketing and training specialist at TE Connectivity*

This is an exciting era for panel builders. As industrial manufacturers move toward automation and robotics in their processes, control panels are becoming more important than ever. They are also becoming more complicated to design and build.

Embracing the evolution happening within panel building could change the way you work.

## IMPROVING EFFICIENCY AND PRODUCTIVITY AND DELIVERING THE RESULTS YOUR CUSTOMERS EXPECT

In this article, we will focus on power distribution in control panels and how to incorporate more advanced components into your designs to reduce installation time, free up space, use more affordable materials, and simplify identification during servicing.

## The Golden Rule of Panel Building

Before getting into the advancements and new products, here is a quick review of the basics. The golden rule of panel building is to respect the layout of the electrical components in the panel, which is the control section that is separate from the power section.

**The equipment inside the panel can be divided into two main groups.**

1. The power section is made up of power components (main protection — the switch or breakers, splitters, power terminal blocks, etc.).
2. The control section is made up of low power/voltage components or equipment (relays, programmable logic controllers (PLC), terminal blocks, etc.).

Each group can be further divided into subgroups.

While the control section is generally well-designed, there is typically opportunity to improve and optimize the power distribution section. **ENTRELEC Electrical Solutions by TE Connectivity (TE)** provide products and concepts that simplify the layout and wiring of power functions inside the panel. The ENTRELEC line of power terminal blocks offers screw clamp or stud technologies up to 500A and 300mm<sup>2</sup>. We also offer DBL power distribution blocks with compact and modular design, and DBLK PI-Spring technology (push-in and spring) that brings new performance in power distribution applications.



## POWER DISTRIBUTION 101

Power distribution within the panel is laid out in a logical, functional manner; most generally from top to bottom because the main incoming power disconnect switches are commonly located in the upper part of the panel.

Each group of power distribution circuits typically consists of a main breaker, splitters, distribution breakers or fuses, and terminals. This keeps each power distribution group consistent, which facilitates easier troubleshooting.

**The power terminal blocks in the power distribution circuit serve three important functions.**

**1** Terminal blocks distribute energy on the input side within the control panel and the control equipment inside (control panels, switchgears, solar combiner boxes, and railway panels). This is accomplished through the connection of main power feed cables in a one-to-one configuration (usually 3PH+ N) using standard feed-through power terminal blocks that are typically installed before the main breakers.

**2** There are power distribution blocks or splitters inside the panel to split the main power that is distributed to the various circuit branches. They are installed between the main breaker and the branch circuit breakers.

**3** Terminal blocks connect power on the output side to power loads (such as motors and heaters) in HVAC, drives, motor control centers and other applications.

## An Alternative to Stud Technology

Some customers prefer stud technology for its wiring density, reliability, and security, since the conductor is crimped on a ring terminal or lug and offers a pull-out resistant connection (because the lug is locked on the stud). However, this option requires the use of a specific and costly crimping tool (electrical or hydraulic for large wire sizes).

To combat the cost and extra time needed for stud technology, many panel builders are moving toward hybrid terminal blocks (stud/screw clamp) that allow them to use lugs on their side to support connection reliability, even after transportation. This option does not require a specific tool to achieve the connection, just a standard tool (screwdriver or Allen-key).

### When selecting a stud power block, look for these features:

- Ability to accept two lugs on the same stud for higher flexibility and wiring density.
- Studs equipped with spring vibration-resistant washers to ensure connection reliability.
- Terminal blocks equipped with covers for isolation and protection that can be removed or rotated to ease the wiring operations.
- Products with a top visible marking area to clearly identify the incoming main power voltage.
- Products that offer the versatility of mounting either on rail or panel.



## An Alternative to Copper Bars

When using traditional copper bars for power distribution (splitters), holes are drilled and then ring terminals and splices are used to tap the power where needed. This approach requires special crimping tools and extra time and work to install the distribution block (requiring isolators, fasteners, protection screens, etc.). While this is a very sturdy approach and will continue to be used for specialized situations with high vibration, like railways or HVAC units, there is an alternative method.



With new modular options, you can greatly reduce installation time because the power distribution blocks have a simple input and output configuration in a single module, which is easy to split within a closed product. No special tools or extra steps are required.

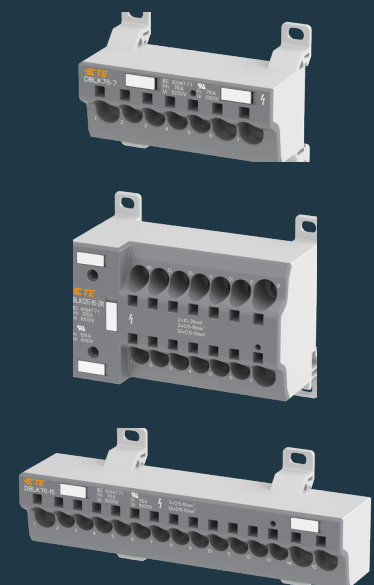
THE  
MODULAR  
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The modular approach can reduce assembly time up to 80%, which significantly reduces installation costs. The more flexible configurations are easier to install, and the compact design takes up less space than the traditional copper bar system. Plus, identification is clear — all the technical specs, markings, and labels are on the front of the distribution block. It also improves safety because the block is covered (closed).

### PI-SPRING TECHNOLOGY (PUSH-IN AND SPRING) COMBINED WITH MODULAR DESIGN BRINGS NEW WIRING PERFORMANCES IN POWER DISTRIBUTION APPLICATIONS.

If you are tired of time-consuming wiring connections for multi-pole products, TE offers the **DBL power distribution block**. Compared to screw technology traditionally used in power distribution applications, the PI-Spring technology reduces wiring time by up to 50%. The modular design reduces assembly time by up to 90% compared to conventional bus bar systems. **ENTRELEC DBLK power distribution blocks** feature up to 16 connection points from 10mm<sup>2</sup> to 35mm<sup>2</sup> in a compact, modular and vibration-resistant design. Ratings up to 1000V AC, 1500V DC, and up to 125A allow use in automation, machinery, HVAC, solar and wind, and switchgear panels.





## Utilizing Compact Power Blocks Provides Needed Miniaturization

For panel builders who want to replace stud blocks and standard terminal blocks, TE offers compact power blocks that are growing in popularity. **Compact power blocks** ensure proper connection of critical power cables and are designed to be highly versatile and easy to install in tight places, such as main power control cabinets (switchboards), building control panels, HVAC control panels, EV charging stations, and machinery that requires secure and reliable connections. They can be used in a wide range of applications, including mechanical engineering, industrial equipment, automation controllers, wind turbines, solar energy, and switchgears.

These compact power blocks are also highly versatile and accept a large range of conductors. They provide a highly versatile and compact connection with reduced oxidation risks. TE's compact power blocks are easy to install and use — with two mounting options and 2 or 4 connections for distribution purposes — and packaged in a lightweight envelope. Finally, they offer excellent quality with a rigid and robust body and a strong grip on the DIN rail.



For more information about ENTRELEC products available from TE, please visit [te.com/usa-en/products/brands/entrelec.html](https://te.com/usa-en/products/brands/entrelec.html).

### About the Author

Vincent Ménager is a marketing and training specialist at TE Connectivity. With his technical background, Vincent provides a unique perspective as a communicator, trainer, and product expert.

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