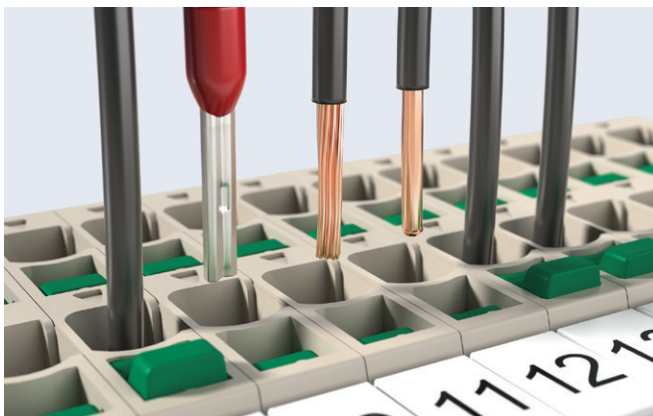


The New Frontier of Connection Technology

The business case for more efficient panel building

Whitepaper

SNAP IN 



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Executive Summary

Nearly every manufacturing or industrial company knows that the most important factors in panel building are speed, safety and reliability. What if you could experience a revolutionary advancement in the wiring of control cabinets that starts as early as the planning phase?

Continuing its pioneering leadership in connection technology, Weidmüller has introduced SNAP IN, an advanced terminal block connection technology that utilizes a precision-engineered spring mechanism for enhanced wire clamping. SNAP IN uses a unique spring to clamp a wire in place.

More specifically, here's how SNAP IN reinvents the modern manufacturing environment:

- **Speed:** Because no tools are required during conductor termination, a connection can be secured with one hand.
- **Reliability:** You know a conductor is terminated securely because you hear an audible "click" when fully inserted – and you see a green lever pop up, signaling it has been properly terminated. Even in high-vibration or high-temperature settings, SNAP IN connections remain secure.
- **Safety:** SNAP IN technology ensures gas-tight connections, meaning the connection between conductor and current bar is so tight that no gas or liquid can pass through.

This white paper demonstrates how SNAP IN technology significantly enhances operational efficiency and effectiveness with wiring and signal transmission. If that's not enough, companies that switch now to SNAP IN technology will be robot ready – even before the next wave of automation unfolds.

Pioneering the Evolution of Connection Technology

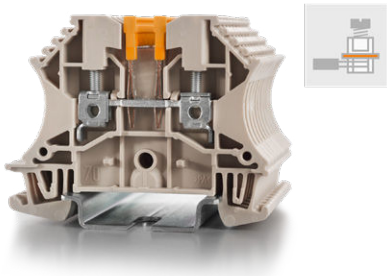
In today's manufacturing landscape, the speed and reliability of daily operations translate directly into enhanced productivity. Miles of wires underpin nearly every industrial operation, and those wires come together in control panels filled with tray after tray of connection terminals.

Due to the high number of conductor termination points, there can be a higher susceptibility of signal loss or intermittence as a result of bad terminations. Any of these interruptions can reduce the ability to meet production goals, as downtime will be necessary until faults are corrected.

Today, more than seven decades after inventing the first IEC plastic insulated terminal block, Weidmüller has unveiled an innovative conductor terminating technology, known as SNAP IN technology, that allows for the fastest wiring connections to date.

To best understand the revolutionary benefits that SNAP IN brings to industry, let's start by exploring the evolution of connection technology.

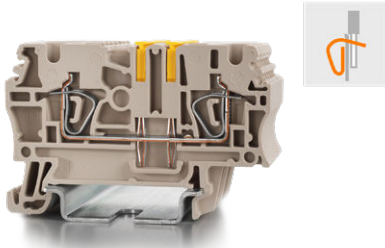
1. Screw clamp



Benefits: Modern screw clamp technology is primarily designed to separate electrical and mechanical functions. A reliable termination (mechanical) contact force is generated to hold the conductor securely and provide a solid conductor to the busbar contact (electrical) to prevent any signal loss. Screw clamp technology provides the highest applied contact force, widest range of configuration types while providing traditional side entry.

Drawbacks: In some instances screws may need to be retorqued if not done correctly during the original installation. Screws must be torqued to the manufacturer's torque specification value to ensure consistent reliability. Monitoring the performance of this technology is time intensive, dependent upon customer inspection practices and could add steps to validate connections and has some complexities. During quality reviews, inspectors often approach offline control cabinets with flashlights as they look sideways at each screw design to see if a proper connection was made or has come loose. That manual analysis to ensure each wire is secure and functioning means lost productivity and revenues.

2. Tension clamp



Benefits: Tension clamp technology sped up wiring and secured connections even in high-vibration environments. The spring mechanism of the tension clamp automatically secures the conductor when terminated and adapts to different cross-sectional areas. An integrated wire protection bracket ensures fine-stranded conductors do not splay or cut. Due to the high contact force, the tension clamp terminal is particularly suitable for corrosive and high-vibration environments.

Drawbacks: Tension clamps move away from being physically set to a defined torque specification, as was needed with screw versions, but they still require a screwdriver or other tool to open the clamp to terminate a wire. Every task needs two hands to execute.

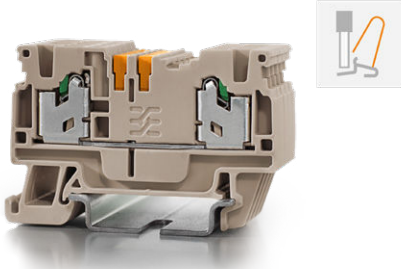
3. PUSH IN



Benefits: Tool-free wiring arrived with PUSH IN technology, with a stripped solid or ferruled wire that is sturdy enough to force open the pressure spring. That stainless steel compression spring guarantees a high contact force of the conductor on the busbar. The spring and conductor stop ensure optimal connection. This connection offers higher conductor pull-out forces than tension springs. The insulated pusher provides freedom to use an uninsulated screwdriver as well as visual guidance on how and where to open the spring clamp

Drawbacks: Wires must be solid or be outfitted with a ferrule to reap the full benefit/consistency of wire termination, which limits applicability or adds time to prepare the conductors.

4. SNAP IN:



Benefits: With its unique spring design, Weidmüller's innovation brings one-handed, tool-free connectivity without the need of a ferrule. Not only is it the fastest wire connection on the market, SNAP IN works with or without wire end ferrules.

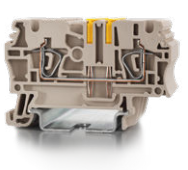
Simply insert a stripped conductor directly into one of the pre-loaded, open connection points and it's snapped into place. The spring mechanism only activates when the wire is inserted deep enough to ensure proper connection. Two methods then verify the wire is connected: You'll hear an audible click and see a green pusher pop up. Once a wire is terminated, SNAP IN technology behaves just like the well known and widely accepted PUSH IN technology and comes with the same perks, such as being maintenance-free and suitable for high vibration conditions. The system can terminate stranded wires without the need for additional tools, further enhancing installation efficiency.

Releasing a connection is just as quick: Simply press the pusher to quickly re-open the terminal point, enabling fast and easy disconnection.

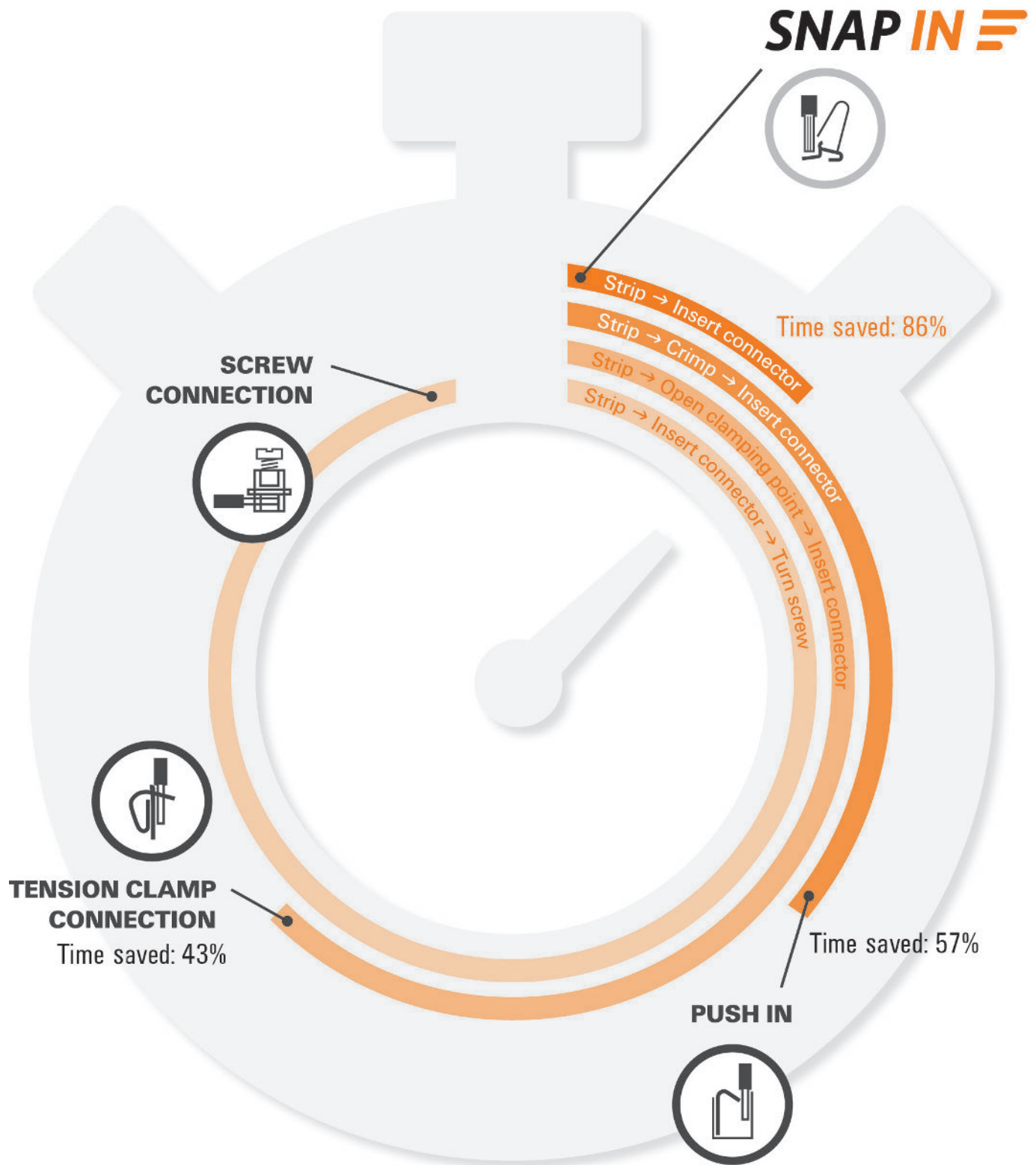
Drawbacks: None

The Business Case for SNAP IN Technology

The evaluation below looks at the savings potential for wiring when it comes to different terminal connection types. Using screw in as the baseline, we see how cost and time savings increase as technology allows for speedier, more productive wiring.

Connection type:		Screw clamp 	Tension clamp 	PUSH IN 	SNAP IN 
					
Wiring time		100%	57%	43%	14%
Time saving		0%	43%	57%	86%
Time to wire for one screw connection = 7 seconds	Total time for wiring (minutes)	4,667	2,660	2,007	653
	Time saving for wiring (minutes)	0	2,007	2,660	4,013
	Total cost for wiring	\$5,055.56	\$2,881.67	\$2,173.89	\$707.78
	Cost saving for wiring	\$ -	\$2,173.89	\$2,881.67	\$4,347.78
Calculation example based on: \$65/h labor rate, 100 panels/year, 200 terminals per panel.					

SNAP IN technology delivers gains from faster wiring times, with a single termination completed in just one second.



With SNAP IN, a panel builder will see 86% time savings over screw clamp technology.

Designed to Deliver Game-Changing Innovation

Guided by ongoing customer conversations, Weidmüller saw a need to improve the workflows and manufacturing processes related to control cabinet construction - a fundamental and practical problem for all companies.

While Weidmüller initially aimed to ease a common pain point, the development team ended up delivering a next-level innovation in connection technology. By tapping into a history of solving control cabinet challenges, the team found inspiration for a revolutionary design.

As a point of reference, back in 2018, Weidmüller delivered the first breakthrough of a SNAP IN connection technology for the HDC heavy duty connector line and then again in 2020, debuting its OMNIMATE line of printed circuit board connectors (PCBs) with SNAP IN technology. The OMNIMATE design provided a foundation to bring about a SNAP IN design platform that was conducive to DIN rail terminals.

Bringing this new technology to terminal blocks required rethinking how a connection could operate in a narrow footprint, with a single connector spanning only 5 millimeters. The team needed to solve how an adapted SNAP IN mechanism like this could withstand high forces and work reliably over long periods.

1. Engineering a better SNAP IN spring design

Advancing to this faster, safer and more reliable terminal connection technology started with understanding of the practical needs within a panel or system integrator shop. A team of product managers, developers and designers first analyzed control cabinet construction to identify potential improvements. Workshops and targeted discussion sessions with customers allowed us to capture additional insights later integrated into design concepts.

An iterative process allowed the team to work through different challenges, including operating pressures that caused the mold to bend and abrasion issues with plastic parts rubbing on other plastic parts. The team arrived at a new design tailored for terminal blocks.

SNAP IN features a single metal strip that creates its own spring, which resolved previous bending and abrasion difficulties. That simplified design structure transferred to simplified production, because no additional or tiny plastic parts – some smaller than a plastic granule and so lightweight an air draft could blow them away – needed to be aligned perfectly for the connection to work.

The end design is a one-piece, self-holding metal spring - the heart of the SNAP IN clamp. Once a wire is fed into the opening and hits the pressure plate on the bottom, the spring mechanism is released. Once activated, it forms a self-contained force system that ensures the best and safest connection.



2. Internal testing validates technology

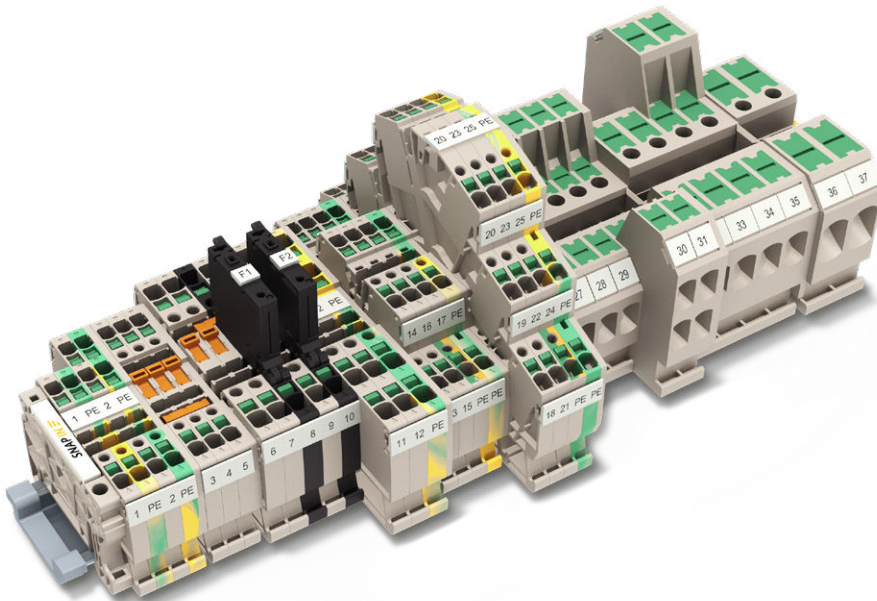
Weidmüller conducts comprehensive in-house testing across the development cycle to ensure that new products deliver consistently before launch. That rigor includes ensuring that SNAP IN terminals meet stringent requirements for continuing to operate in a high-vibration environment and meet flammability standards. Weidmüller oversees that testing to ensure that SNAP IN terminals are ready to be wired – right out of the box – and without fail in a live production environment.

The terminals can accept stranded, solid or ferruled copper wires, providing customers with the proper range of options. Even though each SNAP IN connection is resettable dozens of times, industry best practices recommend limiting repeat wire connections to 20 times to protect operational integrity.

3. Prepared for the next generation

SNAP IN meets every electrical requirement as other spring-type terminal blocks – such as widely accepted tension clamps or PUSH IN technology – and adds in ease of use. SNAP IN can be introduced with other connections in the same terminal cells. The unique snap mechanism and its special spring-geometry design are patented.

But Weidmüller didn't design SNAP IN solely for today's needs. SNAP IN terminal blocks provide a scalable product for the transition to next-generation operations. With increasing developments and opportunities for industrial automation, switching to this connection technology positions companies to be "robot ready" – and capture exponential financial gains and faster operations.



Some products shown in this picture are a sneak peak of releases coming in 2025. Currently available are feed-through and ground terminal blocks in single level versions (2.5mm² and 4mm² cross-sections) and double level versions (2.5mm² cross-section).

SNAP IN Generates Quantifiable Savings

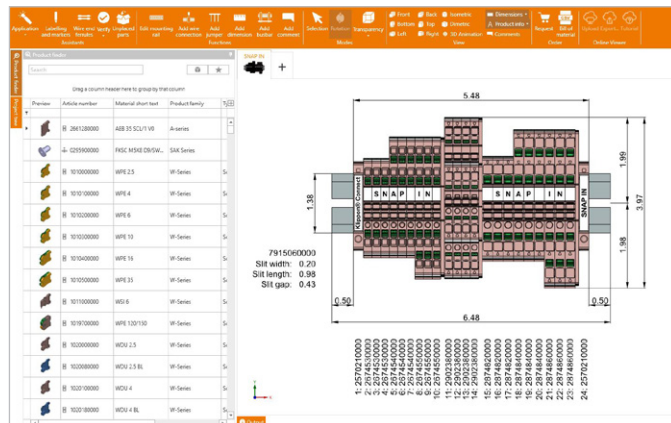
The innovation behind SNAP IN doesn't serve any specific industrial segment, but instead provides a trusted technology for any environment where efficient, effective connections are required. SNAP IN currently supports any business using up to 10-gauge wires in control cabinets, such as intralogistics, industrial automation, data centers and process industries (e.g. food and beverage, oil and gas). Users can apply this technology to any signal wiring projects.

1. Planning panels

SNAP IN technology was designed with users in mind, giving them an easier, safer and faster way to plan their control panels – not to mention providing a highly reliable resource. By design, SNAP IN can scale up with business needs.

The Weidmuller Configurator (WMC), which is provided as free design software, allows rails to be planned in single- and double-layer layouts, using pluggable cross-connectors that marshal these components into space-effective designs. Especially in mid- to large-sized shops, where thousands of panel connections must be executed every week, designers can quickly line up modular terminal blocks on rails and connect those signals according to targeted business needs.

The WMC gives users greater flexibility in planning for rail assembly with SNAP IN terminal blocks. The tool delivers full documentation, along with 3D images of all cabinet components. SNAP IN terminal blocks share the same accessories as other Weidmuller terminal blocks, such as PUSH IN terminals, which helps panel designers adapt their solutions as technology evolves. Next releases of SNAP IN terminal blocks will accept larger wires, which will support higher current applications, such as power distribution.



The Weidmuller Configurator is a software solution for selecting, configuring and ordering terminal rails and terminal rail components from the Weidmuller product offering.

2. Executing new panels

Time and cost savings continue in the execution stage, because installation is faster and easier. The technology's streamlined structure minimizes installation issues due to human error because terminations only happen when wires are inserted correctly at the proper depth to trigger the spring clamp. With its tool-free and one-handed operation, SNAP IN offers the fastest installation in the market, directly serving up precisely what customers need for success.

Again, SNAP IN delivers two verifications: Installers hear an audible click once the conductor is secure, and a visible green pusher pops up. No questions remain about whether a wire is terminated correctly. Other traditional technologies may require manually checking each point to ensure every wire is connected properly, a time-intensive maintenance requirement even after the installation is completed. Each SNAP IN terminal's clamping system is delivered with an open clamping point, making the technology conductor-termination ready.

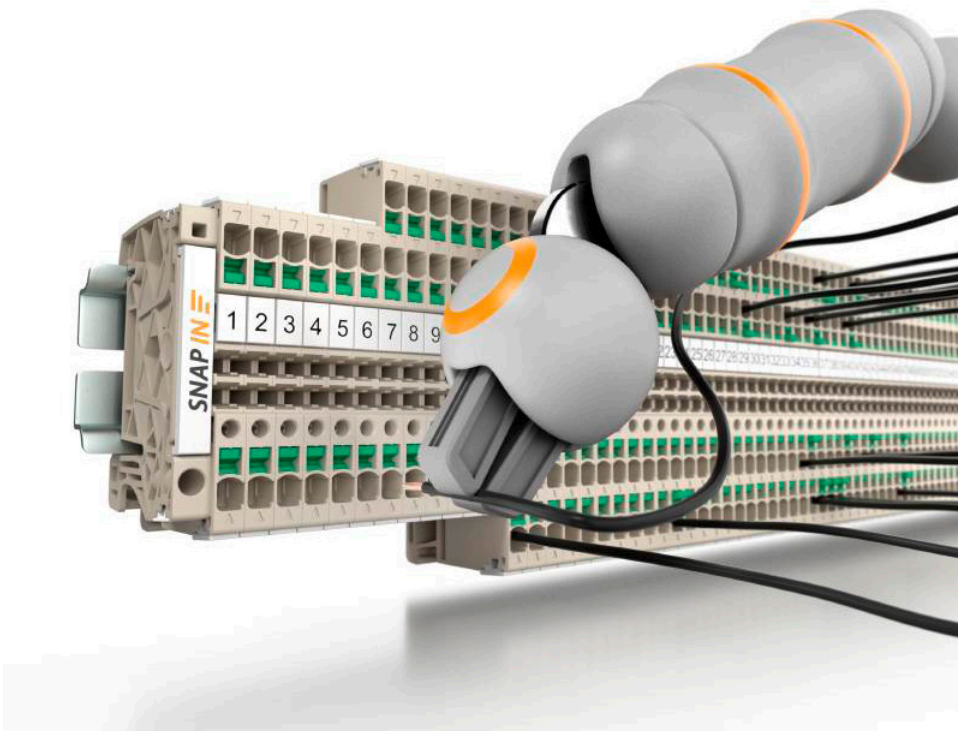
Each SNAP IN terminal block also comes with integrated test tabs, allowing for users to test circuits and perform troubleshooting tasks.

3. Design intended for future automation

The design intentionally puts companies in the ready position for automation. The shape of the terminal molding was developed to meet specifications for robot handling, in preparation for the transition to a future of automated wiring. Two features are important for automation:

- **Strategic design:** The contour of the SNAP IN terminal block mold is flat on the sides. That is critical for allowing a robotic gripper to pick up and place the block on a DIN rail, opening opportunities for automated rail assembly.
- **Ease of installation:** The amount of pressure required to insert a wire to trigger the spring mechanism is very low, a targeted feature for automation.
That means SNAP IN delivers not just automated assembly, but automated wiring – which is not possible with any other technology.

Additionally, the terminal block series comes with pre-marked components, which makes automated marking possible with technologies like our Klippon® Automated RailLaser. Using terminal blocks with markers already attached eliminates the need to separate, assign and mount individual markers, driving time savings of up to 90% in marking processes.



SNAP IN is designed to meet specifications for robot handling, which not only supports automated assembly but delivers a breakthrough in automated wiring.

Conclusion

As a pioneer in industrial connectivity, Weidmüller has played an integral role in shaping panel building for decades. With the introduction of SNAP IN technology, our customers have an innovative technology that is redesigning how control cabinets are constructed – leading to time savings, higher reliability and greater safety.

More importantly, SNAP IN allows customers to act now and ready their wiring and signal transmission for automation, where they will benefit from exponential gains in effectiveness and efficiency, significantly enhancing their competitive advantage in their market.

About Weidmüller USA

For nearly five decades, Weidmüller USA, based in Richmond, Virginia, has been a beacon of innovation in smart industrial connectivity and automation. As part of the globally renowned Weidmüller Group, the company leverages a rich legacy and expertise that spans across production sites, sales offices, and representatives in over 80 countries. Weidmüller USA's mission is to power the pioneers of industry with cutting-edge and sustainable technology.

From the invention of the first plastic insulated terminal block to the groundbreaking SNAP IN connection technology - Weidmüller remains the leader in terminal block innovation.



Registered Trademarks

- Klippon® Connect
- Klippon® Automated RailLaser
- Klippon® Automated RailAssembler
- Klippon® Connect SNAP IN

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