



**SAVING TIME AND SPACE IN INDUSTRIAL
AUTOMATION DOESN'T HAVE TO BE COMPLICATED.**

HISTORY OF AUTOMATION

To aid developers with the creation of the application and modelling of the robotic behavior, the Robot Operating System Industrial Automation has a long history of improving the efficiency of manufacturing processes. From 1st-century water wheels to 9th-century windmills, humans have been developing innovative ways to reduce the amount of manual labor required for tasks like flour and sawmills. Over the next centuries, the industrial revolution, electrification and computers have forever changed the landscape of manufacturing.



CURRENT STATE OF MANUFACTURING

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These added sensors and controllers require high-speed, reliable connections for data and sensor signals, as well as robust power-handling lines for modern, powerful robotics and manufacturing equipment.

CONNECTING THE SIGNALS

Making connections between manufacturing equipment, sensors and power lines requires taking several aspects into consideration.

- Environment
- Signal Level
- Speed
- Power Level
- Distance

These points will help determine the proper materials and connector or cable types to ensure signal integrity despite the temperature, direct sunlight, moisture, chemicals and flexibility requirements as well as movement.

WHEN TIME AND SPACE MATTER

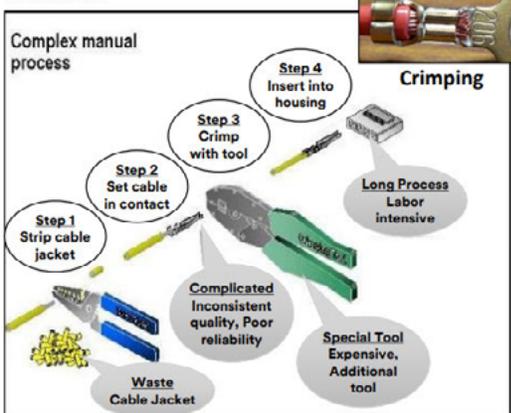
Reducing assembly time and space is crucial to the efficiency of an automated industrial environment. This is a common thread as we examine the 3M™ Mini Stack and 3M™ Mini-Clamp families of connectors.

3M™ MINI-CLAMP CONNECTORS

These simple termination connectors are based on industry standards for industrial, sensor, LED, switch, and other small device connections for 28 to 20AWG and 32V with a max of 3.0A. Their Insulation Displacement Contacts (IDC) offers significant time savings over standard crimp-style termination methods by eliminating the need for stripping which also reduces wire damage. Their single-step termination requires only standard pliers as opposed to the costly tools many other manufacturers need. Once terminated, the semi-transparent cover allows for a quick inspection of connections.



Traditional crimping connection method

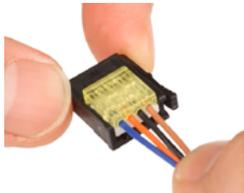


IDC benefit



Simple termination process for fast, reliable installation and maintenance

- Helps minimize risk of conductor damage with no wire stripping
- Stable termination quality with IDC increases reliability of sensor wiring
- Supports wires 28 to 20AWG



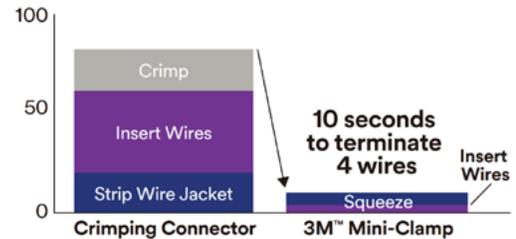
Insert wires with insulation



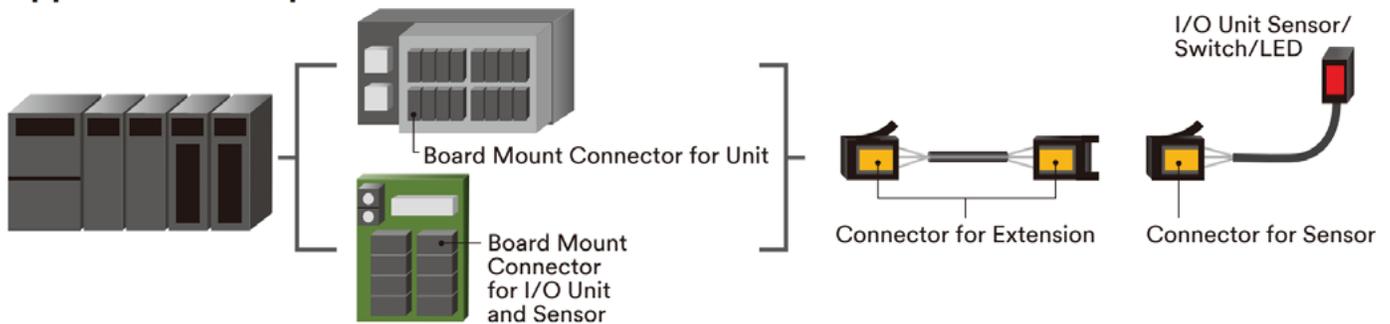
Squeeze with pliers

Optimize network layout with field-installability

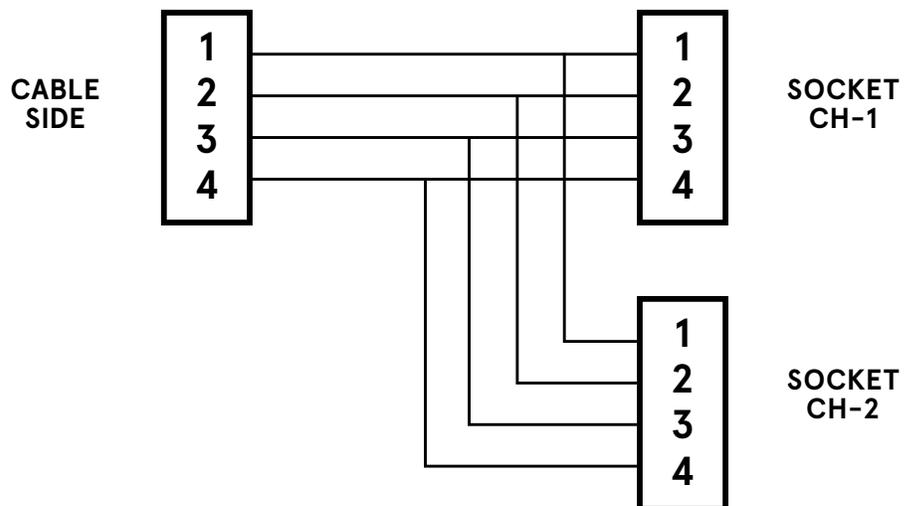
- Easily connect to pig-tail wired sensors
- Field termination allows for optimal cable lengths to save space and wire efficiently



Application Example



The 3M™ Mini-Clamp Connector family fits many industrial needs with features like branching that allows for serial vs parallel processing. This allows for a more simplified network with less wiring, thereby reducing cost and setup time.

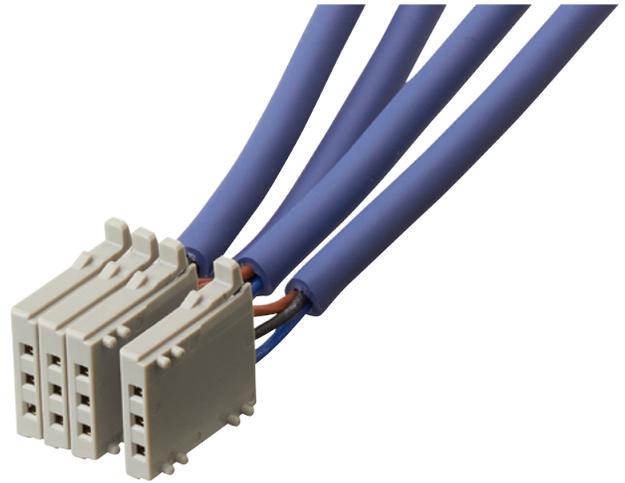


CIRCUIT DIAGRAM

3M™ MINI STACK CONNECTORS

Reducing assembly and installation time leads to increases in productivity as technicians will complete a greater number of installations or repairs as well as greater throughput in manufacturing. These concepts are even more important at a time when cost savings are at the top of many discussions.

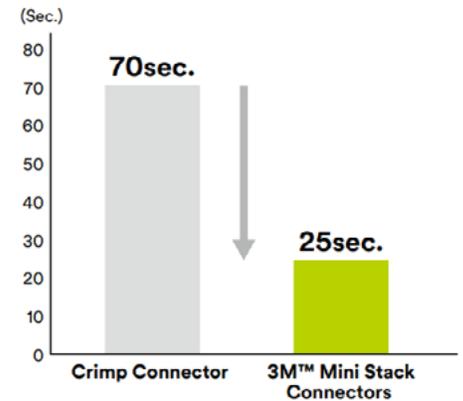
The 3M™ Mini Stack Connector family is ideally positioned to address these concerns. These connectors are designed to provide a reliable connection with a simple, time-saving termination process while reducing the required board footprint. Wiring time is reduced by approximately 60% compared to crimping connectors and the compact form factor allows for 30% more board space in comparison with the 3M™ Mini-Clamp family.



Work Steps

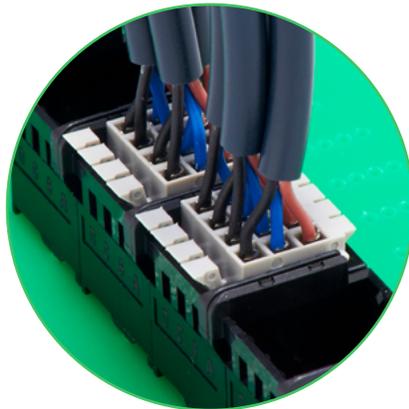
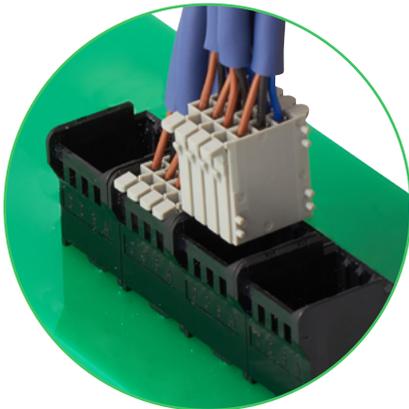
Crimp Connector 3pins		3M™ Mini Stack Connector 3pins	
• Strip wire	x3	• Set connector into tool	x1
• Set terminal in tool	x3	• Set wires into tool and crimp terminals simultaneously	x1
• Set wire and crimp terminal	x3	• Insert terminated wires into housing simultaneously	x1
• Insert terminated wire into housing	x3		
Total 12 steps		Total 3 steps	

Work Time

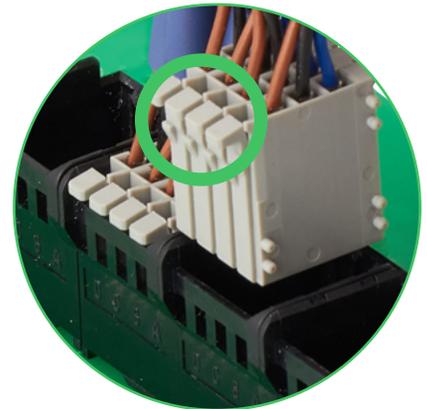


The 3M™ Mini Stack connector products feature a board mount header that forms a block-style connector that stacks four wire mount connectors for a secure, simple mating solution that makes wire handling simple and uncomplicated.

Block style simplifies mating



Ability to easily unplug



CONCLUSION

Industrial Automation has come a long way since the days of water wheels and windmills. Remote monitoring and increased efficiency will only become more prevalent as designers and manufacturers look to keep industries running at peak output.

These advancements will require increased data, speed and power. 3M is uniquely positioned to meet the increased complexity of the Industrial Automation market with its world-class lines of interconnect products.

LEARN MORE AT [AVNET.COM/3MCONNECTORS](https://www.avnet.com/3mconnectors)

