



# OMRON'S SYSTEMATIC APPROACH TO A BETTER PCB CONNECTOR

## About OMRON

We believe in creating a more confident, informed and healthy way of living. As a global company, we've defined the path to better living for over 40 years through research, industry-leading innovation, and proven education strategies. For more information, visit [www.omron.com](http://www.omron.com)

## A NEW DESIGN ENSURES HIGH CONTACT RELIABILITY WITH LOWER INSERTION FORCE

Connectivity is an intrinsic part of today's industrial automation and robotic applications. An ever-increasing number of devices and peripherals depend on stable connections to transmit power and signals to the printed circuit board (PCB). Managing these connections is labor-intensive, leading many OEMs away from traditional screw terminals. Push-in terminal block PCB connectors offer easier installation and tool-free assembly that can reduce the wiring workload by more than 50%. However, as automation systems become more complex and labor shortages persist, engineers are looking for new ways to enhance connector efficiency. This inspired Omron to take a fresh look at their PCB connectors for opportunities to optimize. The result is a new dual-spring structure that builds upon useful features and minimizes the potential for missteps.

### Conventional connector structure vs. new dual-spring design

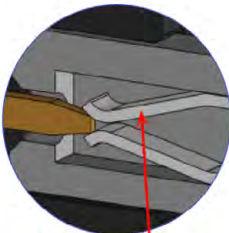
Conventional push-in connectors have a single spring. Omron's new PCB connector socket (XW4M) features a second spring that, when connected to the plug (XW4N), ensures contact reliability through the combined contact force of both springs. The dual-spring design reduces the required insertion/removal force via a release lever that opens the second spring when inserting and removing. By placing the blue release lever in the same direction as the connector handle, the user can easily insert or remove the connector with one hand.

*(See video and diagrams on next page.)*



### Structure of conventional connectors

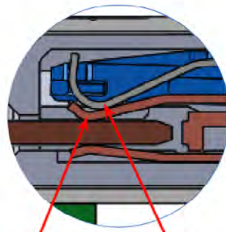
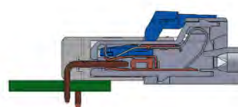
The contact parts of conventional products will receive the contact force needed for engaging the wings one by one on each side, thus making it difficult to reduce the insertion and removal force.



Spring (only the first spring referred to by OMRON)  
Inserting and removing/engaging contact.

### OMRON's unique dual-spring structure

The unique dual-spring structure allows you to control the contact force, thus reducing the contact force of the connector and ensuring the contact force needed for engaging.

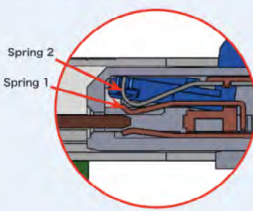
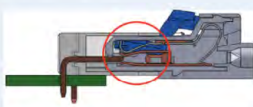


Spring 1  
Inserting and removing/  
engaging contact.

Spring 2  
Inserting and removing/  
release.  
Engaging application  
of contact force.

### Connector inserting/removing

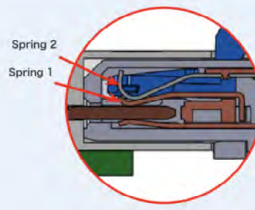
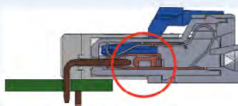
The second spring is released and the insertion and removal force is reduced by pushing the detachable lever (blue)



Spring 2  
Spring 1

### Connector engaging

Contact reliability is ensured by applying the force of the second spring to the first spring



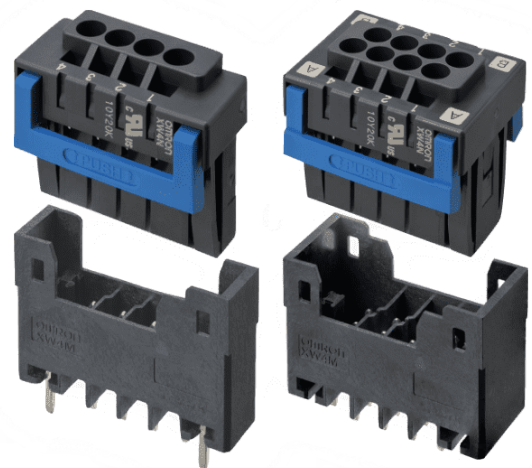
Spring 2  
Spring 1

## Designed for ease of use in the field

Eliminates torque errors. Improper torque is one of the NEC's most cited code violations. While push-in connectors aren't vulnerable to over-torquing like screw terminal connectors, inadequate torque creates different problems. Loose connections affect signal quality, impedance mismatch, signal attenuation, and EMI/RFI levels, as well as posing the risk of electrical fire. The XW4N terminal connector eliminates the risk of improper torque. Wires are securely connected by simply pushing them into the connector. No adjustments or special tools are necessary.

Prevents accidental wire removal. The individual release buttons in conventional PCB connectors are intended to simplify wire removal. Because the user must push and hold the button with a screwdriver, it's easy to press other buttons accidentally. Omron replaced release buttons with holes designed to hold a slotted screwdriver in place, keeping the user's hands free for cabling.

Speeds up maintenance. Many standard connectors require removing the socket during maintenance checks. This takes additional time and increases wear on the terminals. The release holes allow technicians to conduct continuity checks without disconnecting the socket from the plug. This simple feature reduces time spent on maintenance and wear due to repeated disconnections.



*XW4M/XW4N push-in terminal block PCB connectors. (Courtesy of Omron)*

Learn more about Omron's PCB terminal block connectors at [XW4M/XW4N Push-in Terminal Block PCB Connectors](#).

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