

## Digital temperature and process controllers



- Feature-rich and high speed temperature controller
- Faster design, assembly and setup
- Compact body to free-up space in your panel

# Next generation of controllers the era of A.I.

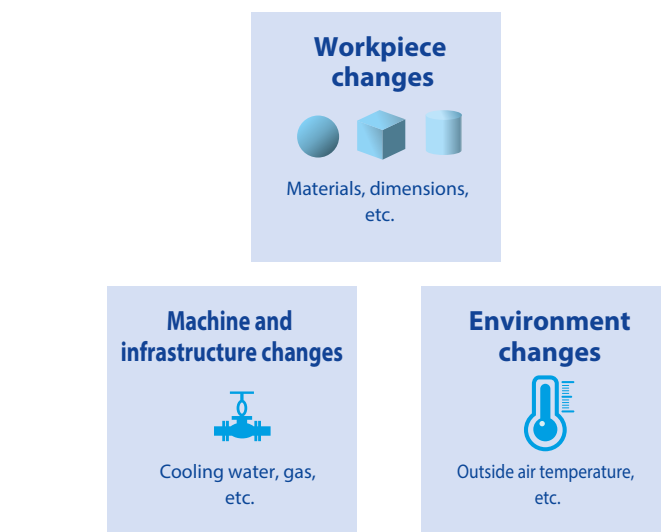
Omron's E5\_C series substantially raised the bar for temperature control in the past five years thanks to its user-friendliness, high precision and highly reliable control. Now, the E5\_D series - the next generation of controllers built on the successful E5\_C platform - is designed to achieve optimal and automatic temperature control without human intervention. In fact, from now on all typical adjustments made in the field by experts are automated using Artificial Intelligence (AI).

With standard temperature controllers, not only do you need a long time to define initial start-up PID settings, but it is also really challenging to make the optimal adjustments without having many years of experience in this area. That's why Omron developed the E5\_D Series with "adaptive control technology". This automatically detects changes in the process under control and adapts the PID accordingly. The result? Perfectly fine-tuned PID algorithm and ultra-stable temperature control.

## Adaptive control

Changes in ambient or processing conditions can be both planned and unforeseen. In either case, a responsive tuning algorithm will manage these variations quickly. This precision Adaptive control algorithm finds the right PID settings and reacts fast to any fluctuations.

### Causes of temperature variations on production lines



**Previously**  
 Production speed: Slow  
 Failure rate: High  
 Adjustment by workers: Necessary

**E5\_D**  
**It is possible to continue producing good products**  
 without making set point changes or PID adjustments



## PID control

The E5\_C and E5\_D series by design have been developed for high-sampling speeds. They use powerful algorithms to enhance control stability.

Moreover 2-PID innovation offers high precision advantages over standard controllers, providing greater security and safeguarding of product quality.

## High-contrast

Control rooms are generally known to have subdued lighting conditions. This is a key factor in which E5\_D actually outperforms E5\_C. It's large, high-contrast, white LCD display enables clear visibility. View settings comfortably from greater distances and wider viewing angles. Be assured of accurate readings thanks to our clear data display.

# Perfect sealing temperature control for packaging machines

On a conventional sealing machine temperature sensors can often be located too far away from the sealing surface of the heating bar. This causes a difference between the temperature of the sealing surface and the temperature that was actually being controlled. This temperature difference and resulting sealing failures, increase as the packaging speed increases and also in correlation with thinner packaging materials or changing in ambient temperature. Thanks to the E5\_D series, this issue is solved with the following approach:

- bringing sensor closer to the sealing surface - thanks to special temperature sensor models for faster detection
- adopting special algorithms (automatic filter adjustment function) built-in E5\_D, specifically developed to suppress temperature variations. The result is a better sealing quality of the packages.



## Locate temperature sensor in the right place

Omron is able to provide special sensors to be placed closer to the sealing surface to acquire the correct measurement.

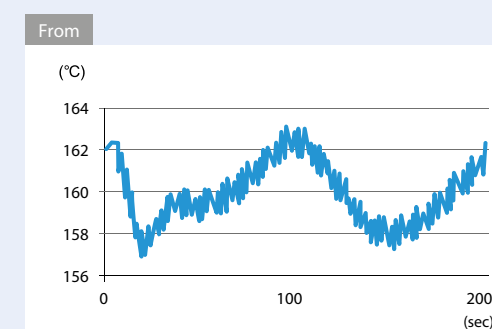


Because of not perfect sensor location there is 5°C difference vs temperature sealing surface.

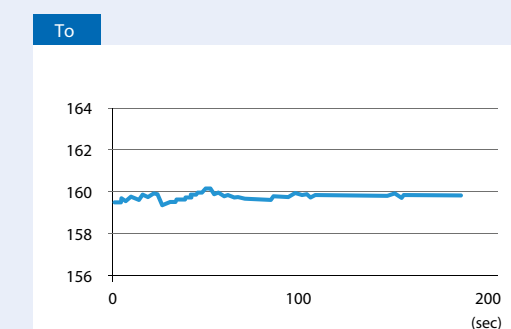
Sensor is able to acquire real temperature sensor surface.

## "Automatic filter adjustment function"

Suppress the instability on the temperature surface measurements



When sensor is placed closer to sealing surface, sometimes periodic temperature variation is caused by the heat switching on and off during the sealing period.



The "Automatic filter adjustment function" suppresses automatically. This phenomenon guarantees stable temperature control.

\* Data measured by Omron on a vertical flow packer.

# Temperature variations in molding machines minimized by a new algorithm

On a water-cooled extrusion molding machine, increased speed leads to temperature variations due to various factors such as the materials compounding and cooling water. For human operator that means repeatedly making valve adjustments to stabilize the quality. However, it is difficult to achieve high speed production while also maintaining quality.

With the E5\_D, the water-cooling output adjustment function suppresses the temperature variations to a minimum and maintains quality by increasing production capacity.

## Causes of temperature variations

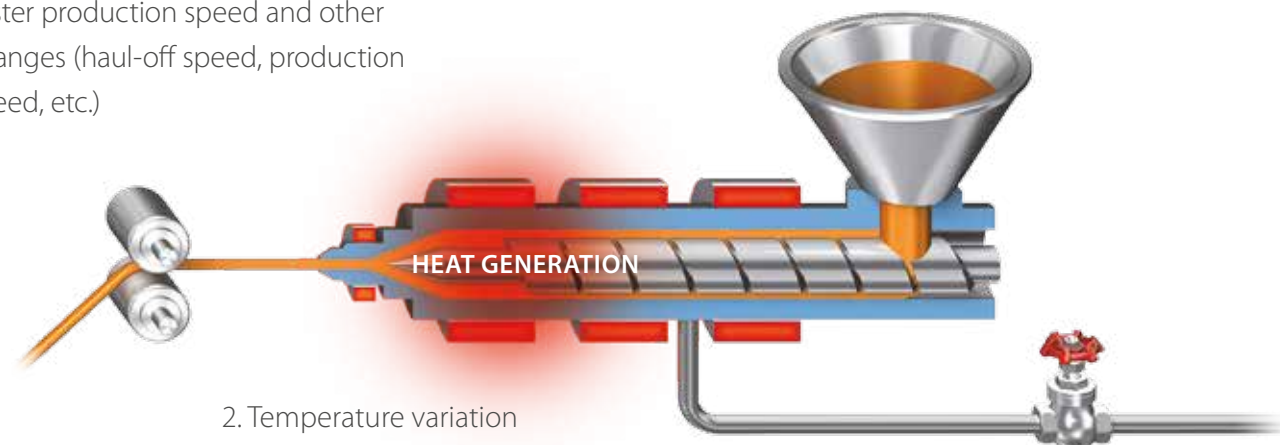
### Non-linear characteristic of water cooling

This kind of cooling method has a non-linear behavior that could create temperature variation.

### Changes in water cooling system

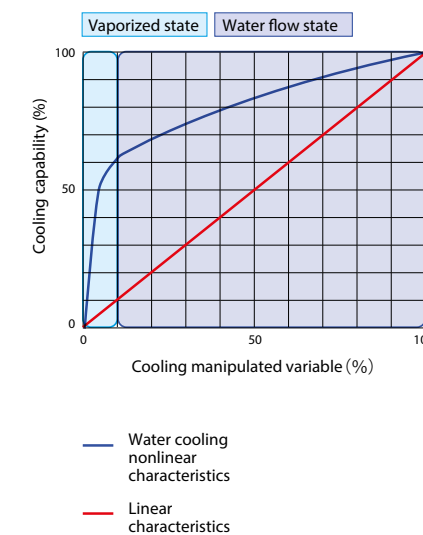
If changes in the cooling water system occurs, temperature variations could happen with conventional auto-tuning PID algorithm because it is not possible to make adjustments in the setting during continuous operations.

1. Faster production speed and other changes (haul-off speed, production speed, etc.)



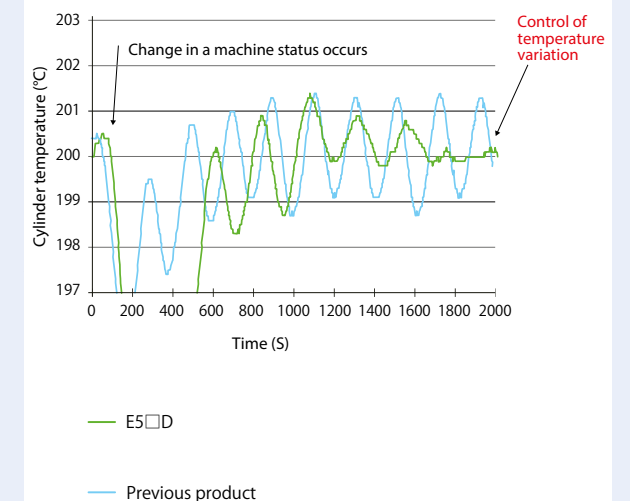
### Auto-tuning (Water cooling)

It is possible to suppress the temperature variations that occur due to the non-linear water cooling characteristics selecting in advance the right AT tuning algorithm on the E5\_D controller setting menu.



### Water-cooling output adjustment function

It constantly detects changes in the temperature behavior and suppresses the temperature variation by automatically adjusting the proportional band (cooling).



# Free-up space in your panel

## Compact, space-saving body

With a depth of just 60 mm, the E5\_C and E5\_D are especially ideal for panels with limited space. And since E5\_C has a push-in plus technology, wiring is performed from the back, enabling horizontal group mounting to achieve compact panel surfaces.



E5CC/D  
E5EC/D

## Push-in plus technology enables side-by-side mounting

Because push-in plus technology allows you to wire straight into the back of the terminals, it is now no longer necessary to plan the sequence of products in the panel. This allows side-by-side mounting, making your panel cleaner and more space efficient.

E5CC-B  
E5EC-B



# Faster design, assembly and setup

## Fast wiring via push-in plus technology

Just insert the wires – no tools required. Do all your wiring in less than half the time needed with screw type terminals.

## Temperature sensors

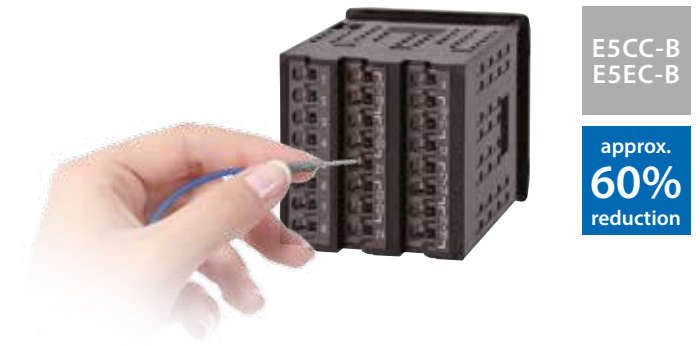
Our push-in plus technology assures contact reliability even with a very small signal such as Pt100 and Thermocouple.

## No retightening required

Retightening screws is often necessary for screw terminals. However, with push-in plus, there is no (re)tightening.

## Easy to insert

Our push-in plus technology is as easy as inserting to an earphone jack – reducing your work load and improving wiring quality at the same time.

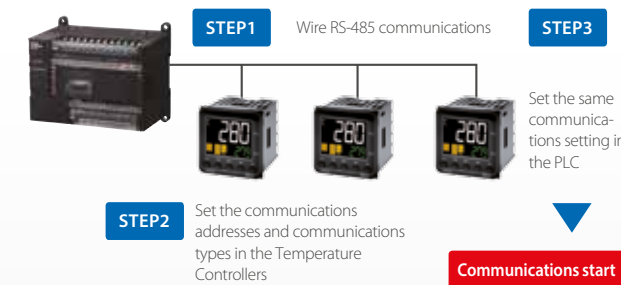


## Held firmly in place

Even though less insertion force is required than other temperature controllers with push-in technology, the wires are held firmly in place – thanks to the advanced mechanism design and manufacturing technology.

IEC standard	Push-in plus technology	Screw technology
20 N	125 N*	112 N*

\* Data from our own research.



## Just 3 steps - no PLC communications program

In addition to communications with PLCs, you can share target temperatures and copy parameter settings with other E5\_C series controllers.



## Intuitive software - quick setup and operation

Our CX-Thermo software gives you the fastest possible parameter setting, instant device adjustment and simpler maintenance. And you don't even need to connect a power supply to the controller – the USB bus to your laptop takes care of that. Also, if you need to log your temperature curves on an external PC, the CX-Thermo software tracks your data in an organised and understandable way

# Family E5\_C/D

"We are family"



## Closing the (control) loop

**Temperature controller + solid state relay + temperature sensor in one**

Good regulation results don't necessarily need to be expensive.

To achieve the best results in the regulation process we'd recommend you to purchase the complete package from Omron. All parts of the control loop harmonise and assure stable conditions for many years.

We offer you a wide range of Solid State Relays with different driving currents and zero/ non-zero crossing functions. Add to that multiple simple temperature sensors of various shapes and temperature ranges, allowing you to get all the relevant parts at once for a quick machine setup.

Special tube lengths and cable confectioning can also be provided without needing to order large quantities.

Model name	DIN size	Dimensions	ON-/In-Panel	Terminal type
E5GC	1/32 DIN	(24 x 48 x 90) mm	On-Panel	screwless and screw
E5CC/CD	1/16 DIN	(48 x 48 x 60) mm	On-Panel	push-in plus* and screw
E5EC/D	1/8 DIN	(48 x 96x 60) mm	On-Panel	push-in plus* and screw
E5AC	1/4 DIN	(96 x 96x 60) mm	On-Panel	screw
E5CC-U	1/16 DIN	(48 x 48 x 60) mm	On-Panel	screw
E5DC	22,5 mm DIN rail	(22,5x 96 x 85) mm	In-Panel	screw
E5CC-T	1/16 DIN	(48 x 48 x 60) mm	On-Panel	screw
E5EC-T	1/8 DIN	(48 x 96x 60) mm	On-Panel	screw
E5AC-T	1/4 DIN	(96 x 96x 60) mm	On-Panel	screw



(\*) E5\_D push-in plus models planned during 2017



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