Online Product Information

Date : 2022.07.29

Webpage	www.autonics.com	**Upload Date**	2022.10.05
Notice Type	[NEW]	**Launching Info Sent On**	2022.09.15
Notice Board Headline	[NEW] 2 Degree-of-Freedom PID Temperature Controllers		
Category	Controllers > Temperature Controllers > Standard type		
Series	TN Series		
Headline	2-DOF PID Temperature Controllers (Program/Fixed Control)		
Product Image			
Lead Copy	The TN series temperature controllers offer high precision temperature control with two-degree- of-freedom PID algorithm, high-speed sampling speed of 50 ms and ±0.2% measurement accuracy. The temperature controllers feature simultaneous heating and cooling control, group PID, zone PID control and anti-reset windup functions for optimal temperature control in various applications.		
Ad Copy (ALL)	±0.2% High Display Accuracy with 2-DOF PID Temperature Controllers TN Series Program Control and Fixed Control Models Optimized for Various Control Applications		
Certifications	CE,UL,KC		

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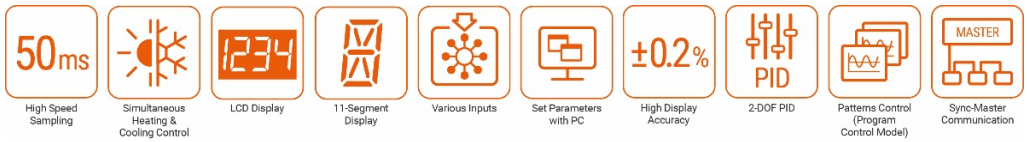
Main Features	**▣ Features** ● 2-DOF PID algorithm optimized for various control applications ● 50ms high-speed sampling rate and ±0.2% display accuracy ● Program control and fixed control models available - Up to 10 patterns x 20 steps program setting (program control model) - Timer function for preset operation (fixed control model) ● Simultaneous heating/cooling and automatic/manual control function ● Control functions: Group PID, Zone PID, Anti Reset Windup (ARW) ● Control status monitoring of up to 10 events ● RS485 communication output model available - Communication protocols: Modbus RTU/ASCII, PLC ladder-less, Sync-Master - Communication speed: up to 115,200bps ● Heater burnout alarm function (CT input) ● Parameter setting via PC - Comprehensive Device Management Software (DAQMaster) provided - Communication converter connection with front loader port (TNH, TNL only) ● Shortcut key setting with front user key button (U) ● Easy maintenance with detachable terminal blocks
Pictogram	 **1. High Speed Sampling** **2. Simultaneous Heating & Cooling Control** **3. LCD Display** **4. 11-Segment Display** **5. Various Inputs** **6. Set Parameters with PC** **7. High Display Accuracy** **8. 2-DOF PID** **9. Patterns Control (Program Control Model)** **10. Sync-Master Communication**
Keywords	**#2DOF #two-degree-of-freedom #Program control #Pattern control #Fixed control #Programmable #PID #Simultaneous heating and cooling control #PLC Ladder-less Communication #Sync-Master #Zone PID #Group PID #Anti reset windup #±0.2% Measurement accuracy #LCD display #Shortcut key #Detachable terminal block #Event setting #Heater burnout alarm #High speed sampling #RS485 #Easy maintenance #Timer function #Preset function**

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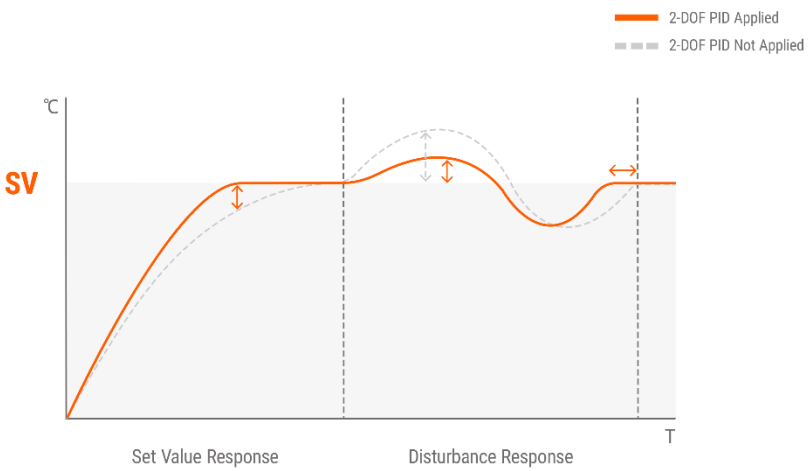
Detailed Features 1	**2-DOF PID Control Optimized for Various Control Applications** The two-degree-of-freedom (2-DOF) algorithm can accurately reach the set temperature (SV) and respond quickly to disturbances for accurate and precise temperature control.  **2-DOF PID Applied** **2-DOF PID Not Applied** **Set Value Response** **Disturbance Response**

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Detailed Features 2	**Program Control and Fixed Control Models Available** Users can choose between two model types for optimal control in various environments. Program control models offer pattern control with easy parameter settings and fixed control models offer timer function.  **Pattern Control Function** **Program Control Models (TN □ -P)** **Timer Function**

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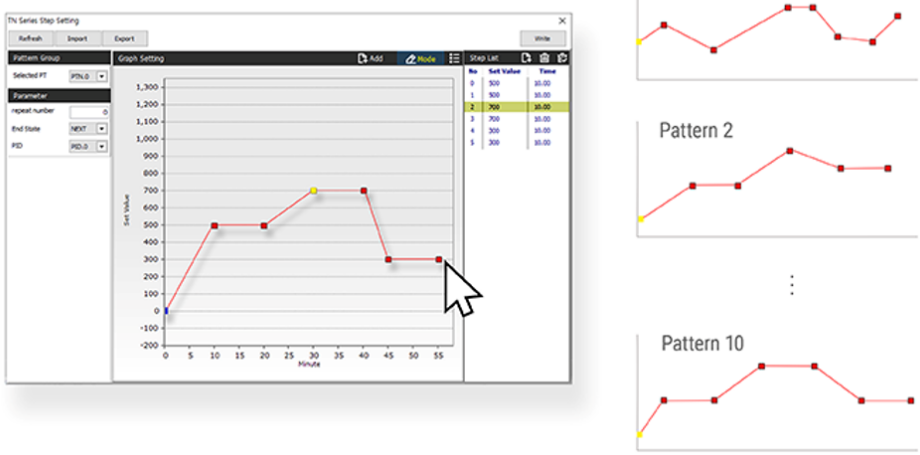
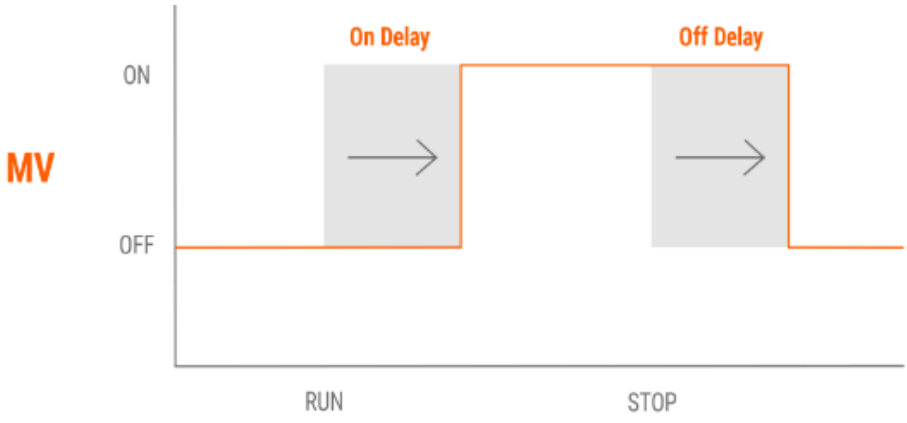
Detailed Features 3	**Easy Parameter Setting for Pattern Control (Program Control Models)** Program control models can be used to easily set the control pattern by sequentially setting the target temperature and time of each step. Users can easily draw the pattern with DAQMaster software by clicking the coordinates of the time-temperature graphs.  **Pattern 1** **Pattern 2** **Pattern 3**
Detailed Features 4	**Timer Function for Preset Operation (Fixed Control Models)** Fixed control models can be used to preset the operation time by delaying the On/Off control outputs or by maintaining the PV for a set amount of time.  **On Delay** **Off Delay** **Run** **Stop**

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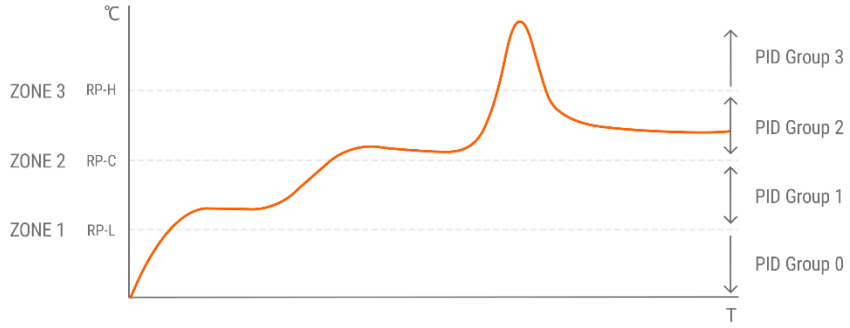
Detailed Features 5

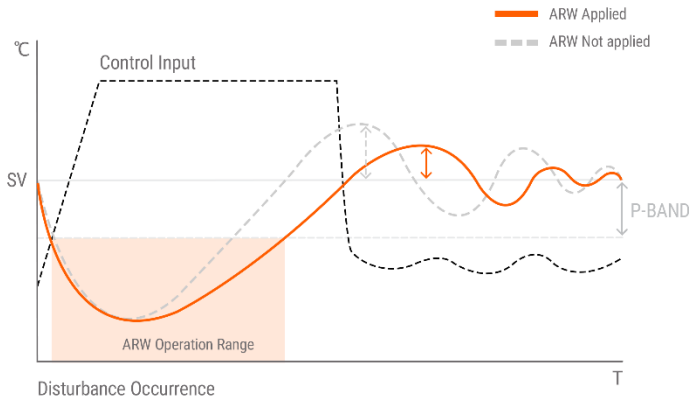
Various Control Function Supported
Various control function including Group PID, Zone PID, and Anti Reset Windup (ARW) available for optimal PID control in various environment.



※ The above graph is a sample graph of autotuning. Autotuning allows optimal PID control as PV changes within the set temperature range.

***The above graph is a sample graph of autotuning. Autotuning allows optimal PID control as PV changes within the set temperature range.**

<Group PID and Zone PID Function>
When the temperature control range is wide, zones can be separated according to the temperature range and apply different PID values to each zone for detailed control.



ARW Applied
ARW Not applied
Control Input
ARW Operation Range
Disturbance Occurrence

<Anti Reset Windup (ARW) Function>
When the control output reaches the maximum point, the range can be set to perform the integral operation to prevent overshoot with ARW function.

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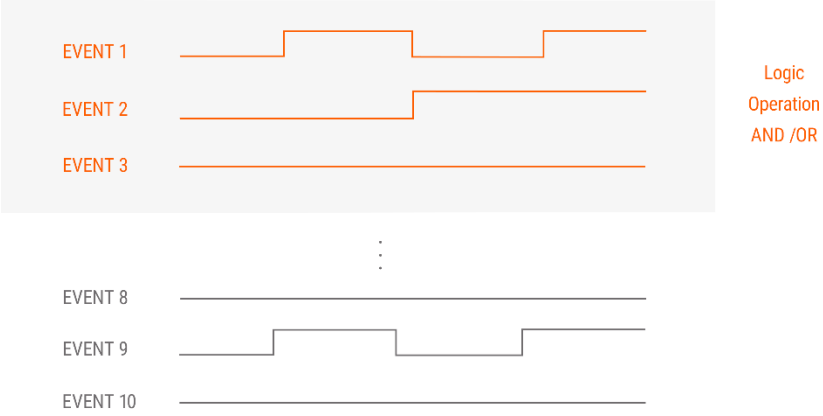
Detailed Features 6	**Control Status Monitoring of Up to 10 Events** Users can set up to 10 events such as PV high/low limit, disconnection and control operation notification. Logic operation result can be transmitted with relay alarm output and real-time monitoring is possible via RS485 communication.  **Logic Operation AND / OR**

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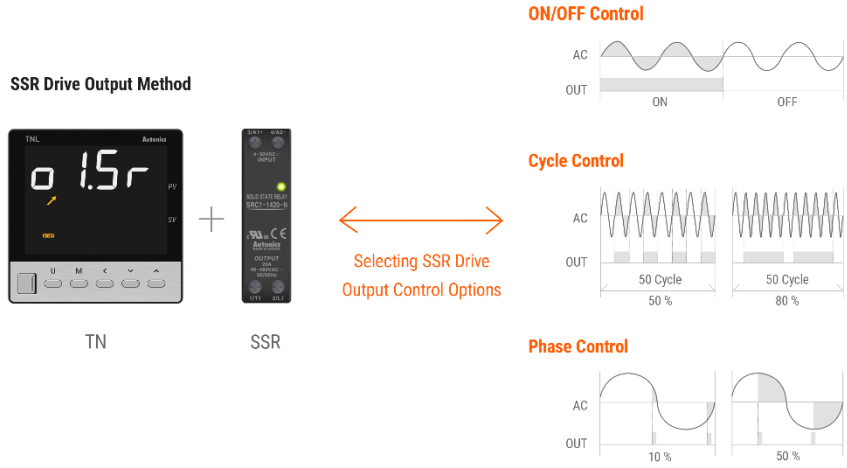
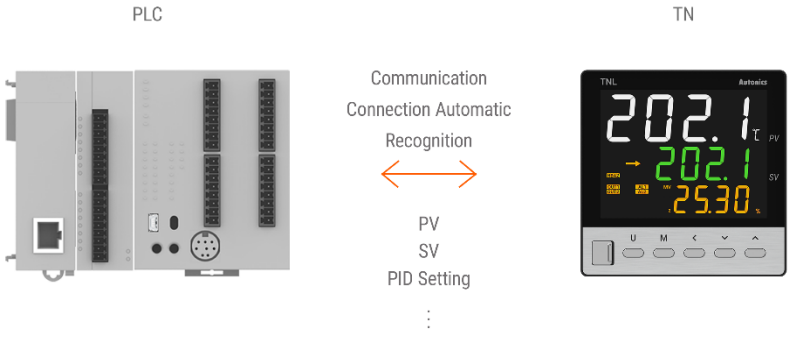
Detailed Features 7	**SSR Drive Output Control Options** Users can select from ON/OFF control, cycle control, and phase control using standard SSR drive output option. Precise and accurate control is possible at low costs.  **SSR Drive Output Method** **Selecting SSR Drive Output Control Options** **ON/OFF Control** **Cycle Control** **Phase Control**
Detailed Features 8	**Easy Set up with PLC Ladder-less Communication** The controllers feature ladder-less and RS485 communication that can communicate with master devices (PLCs) without extra ladder programming.  **Communication Connection Automatic Recognition** **PV** **SV** **PID Setting**

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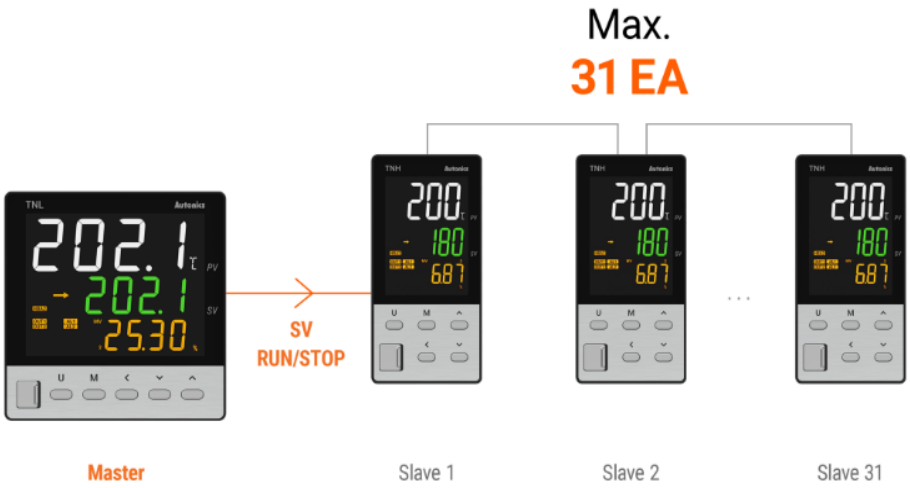
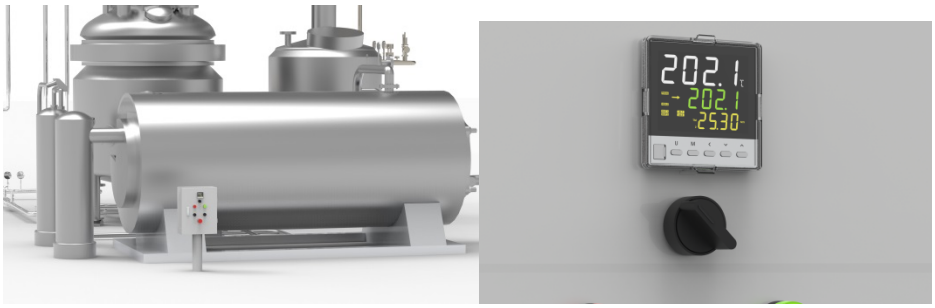
Detailed Features 9	**Synchronous Control with Sync-Master Communication** The SV and Run/Stop status of the master device can be synchronized with up to 31 slave devices to simultaneously control multiple zones.  **Max. 31 EA** **SV RUN/STOP** **Master** **Slave 1** **Slave 2** **Slave 31**
Application 1	**Food/beverage Manufacturing** **Sterilization Machine** Temperature controllers are used to control and maintain appropriate temperature for sterilization in machines. 

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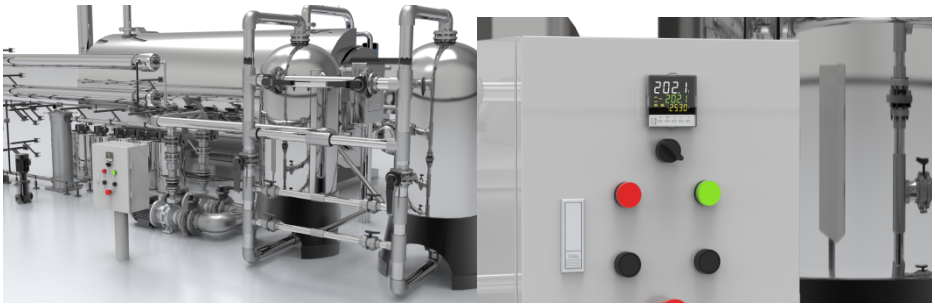
Application 2	**Food/beverage Manufacturing** **Raw Material Mixing Tank** Temperature controllers are used to control appropriate temperature and time for each raw material to equalize the production quality. 
Application 3	**Machine Tools Industry** **Electric Furnace** The set temperature (SV) and control status (Run/Stop) of multiple controllers can be synchronized in separated zones. 
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