Autonics

Dual PID Control Temperature Controller TZ SERIES

INSTRUCTION MANUAL





Thank you for choosing our Autonics product. Please read the following safety considerations before use.

■ Safety Considerations

XPlease observe all safety considerations for safe and proper product operation to avoid hazards.

※▲ symbol represents caution due to special circumstances in which hazards may occur.

Marning Failure to follow these instructions may result in serious injury or death.

▲ Caution Failure to follow these instructions may result in personal injury or product damage.

⚠ Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in fire, personal injury, or economic loss 2. Install on a device panel to use.
- Failure to follow this instruction may result in electric shock.
- Do not connect, repair, or inspect the unit while connected to a power source.
 Failure to follow this instruction may result in electric shock or fire.

- 4. Check 'Connections' before wiring.
 Failure to follow this instruction may result in fire.

 5. Do not disassemble or modify the unit.
- Failure to follow this instruction may result in electric shock or fire.

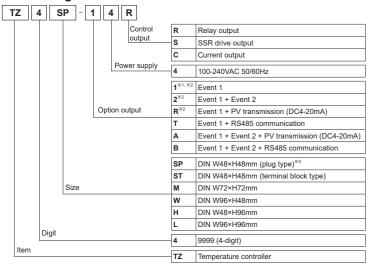
▲ Caution

- 1. When connecting the power input and relay output, use AWG 20(0.50mm²) cable or over and tighten the terminal screw with a tightening torque of 1.0N·m.

 When connecting the sensor input and communication cable without dedicated cable, use AWG 28~16 cable and tighten the terminal screw with a tightening torque of 1.0N·m.
- Failure to follow this instruction may result in fire or malfunction due to contact failure.

 2. Use the unit within the rated specifications.
- Failure to follow this instruction may result in fire or product damage
- Use dry cloth to clean the unit, and do not use water or organic solvent.
 Failure to follow this instruction may result in electric shock or fire.
- 4. Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in fire or explosion.
- 5. Keep metal chip, dust, and wire residue from flowing into the unit. Failure to follow this instruction may result in fire or product damage

Ordering Information



- %The unit cannot be configured with any random combination from the above ordering information. Please refer to InSpecifications for possible configurations.
 %1: TZ4SP only supports Event 1 option output.
- X2: TZ4ST only supports Event 1, Event 1 + Event 2, and Event 1 + PV transmission (DC4-20mA) option
- output. %3: 11-pin sockets (PG-11, PS-11(N)) are sold separately.
- **XThe above specifications are subject to change and some model may be discontinued**
- XBe sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

■ Specifications

Series		TZ4SP	TZ4ST	TZ4M	TZ4W	TZ4H	TZ4L		
Power supply		100-240VAC	~ 50/60Hz						
Allowable voltage range		90 to 110% o	f rated power v	/oltage					
Power co	nsumption	Max. 5VA (100-2	240VAC 50/60Hz)	Max. 6VA (10	0-240VAC 50/6	60Hz)			
Display i	method	7-segment LE	D (PV: red, S	V: green)					
Character	PV (W×H)	4 07 0		9.8×14.2mm	0.040.0	2 07 0	9.8×14.2mr		
size	SV (W×H)	4.8×7.8mm		8.0×10.0mm	8.0×10.0mm	3.8×7.6mm	8.0×10.0mr		
	RTD	DPt100Ω, JP	Pt100Ω, JPt100Ω, 3-wire (allowed resistance: max. 5Ω per line)						
Input type	тс		, R (PR), E (C stance: max. 1	R), T (CC), S (I 00Ω per line)	PR), N (NN), V	V (TT)			
	Analog	1-5VDC, 0-	-5VDC::-, 0-10VDC::-, DC4-20mA						
Display a	accuracy	F.S. ±0.3% or	3°C, greater v	alue					
	Relay	250VAC~ 3A	, 30VDC 3A,	1c					
Control	SSR	Max. 12VDC=	±3V 30mA						
output	Current	DC4-20mA (lo	oad resistance	max. 600Ω)					
	EVENT1	250VAC~ 1A	1a						
Option	EVENT2	_	250VAC~ 1A	.1a					
output	PV transmission	_	DC4-20mA (I	oad resistance	max. 600Ω)				
	Communication								
Control	method	ON/OFF, P, PI, PD, PIDF, PIDS control							
Alarm ou	utput hysteresis	1 to 100°C (0.1 to 100.0°C) variable							
Proportio	onal band (P)	0.0 to 100.0%							
Integral	time (I)	0 to 3,600 se	С						
Derivativ	/e time (D)	0 to 3,600 sec							
Control	period (T)	1 to 120 sec							
Samplin	g period	0.5 sec							
LBA sett	ting	1 to 999 sec							
Ramp se	etting	Ramp Up, Ramp Down: 1 to 99 min each							
Dielectri	c strength	2,000VAC 50/60Hz for 1 min (between input and power terminals)							
	Mechanical	0.75mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours							
Vibration	Electrical	0.5mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 10 min							
Relav	Control output	Mechanical: min. 10,000,000 operations, Electrical: min. 100,000 operations (250VAC 3A resistance load)							
life cycle	Option output		min. 20,000,00 n. 500,000 ope	0 operations, erations (250VA	C 1A resistano	ce load)			
Insulatio	n resistance	Over 100MΩ (at 500VDC megger)							
Noise im	nmunity	Square shaped noise by noise simulator (pulse width 1µs) ±2kV R-phase, S-phase							
Memory	retention	Approx. 10 years (non-volatile semiconductor memory type)							
Environ-	Ambient temp.	-10 to 50°C, storage: -20 to 60°C							
ment	Ambient humi.	35 to 85%RH	, storage: 35 to	85%RH					
Approva	ı	(€ c 9/1 us							
Weight ^{*1}		Approx. 205g	Approx. 218g	Approx. 360q	Approx. 365g		Approx. 474g		

Input Type and Range

IIIput type		Decimal point	Display	Imput range (C)	iliput lalige (F)	
	K (CA)	1	E E B H	-100 to	1300	-148 to 2372	
	K (CA)	0.1	FERT	-100.0 to	999.9	Not supported	
	J (IC)	1	JI E.H	0 to	800	32 to 1472	
	J (IC)	0.1	JI E.L	0.0 to	800.0	Not supported	
	R (PR)	1	r Pr	0 to	1700	32 to 3092	
Thermo	E (CR)	1	EEr.H	0 to	800	32 to 1472	
couple	E (CR)	0.1	E E r.L	0.0 to	0.008	Not supported	
	T (CC)	1	E C C.H	-200 to	400	-328 to 752	
	T (CC)	0.1	F C C.L	-199.9 to	400.0	Not supported	
	S (PR)	1	5 Pr	0 to	1700	32 to 3092	
	N (NN)	1	Поп	0 to	1300	32 to 2372	
	W (TT)	1	UEE	0 to	2300	32 to 4172	
	JPt100Ω	1	JPEH	0 to	500	32 to 932	
RTD	JPt100Ω	0.1	JPE.L	-199.9 to	199.9	-199.9 to 391.8	
KID	DPt100Ω	1	dPt.H	0 to	500	32 to 932	
	DPt100Ω	0.1	dPt.L	-199.9 to	199.9	-199.9 to 391.8	
	Voltage	0 - 10VDC	A1	-1999 to 9999	9		
Analog		1 - 5VDC	A5	(display rang	(display range will vary depending on the		
	Current	DC4 - 20mA	R3	decimal point.)			

Input range (°C)

Input range (°F)

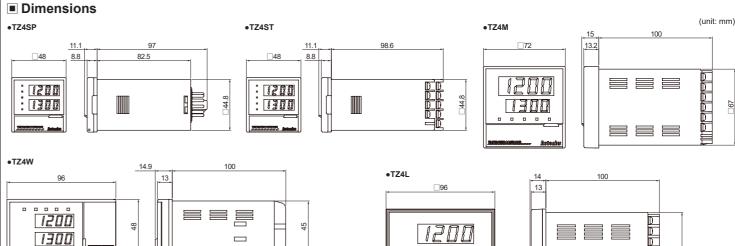
Configuring Input Type

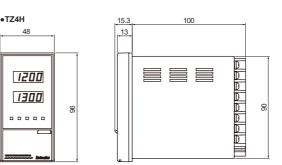
Please configure the internal switches before supplying power. After supplying power, configure the input type [n- b] in parameter group 2 according to the input type

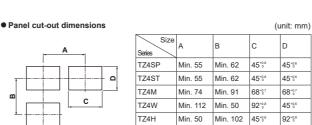
Input typ	ое	S/W 1	S/W 2
Thermo	couple		ட
RTD		1 1	mA V
Analaa	Voltage (0-10VDC, 1-5VDC)	2 2	mA V
Analog	Current (DC4-20mA)	2 2	mA V

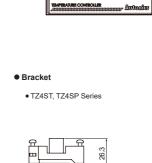
Detaching the case
Press the front case then pull the case to detach the case from the body.
Configure the internal switches as input type.





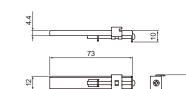






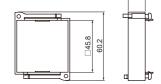
1300

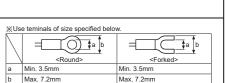
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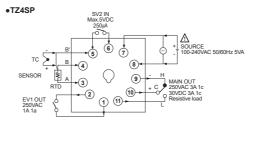


• TZ4L, TZ4M, TZ4H, TZ4W Series



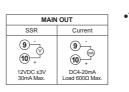


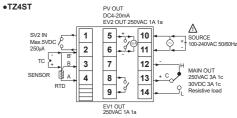




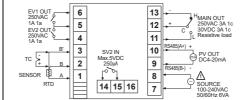
Connections

●TZ4M





MAII	TUO
SSR	Current
12 🕠	12 13
12VDC ±3V 30mA Max.	DC4-20mA Load 600Ω Max

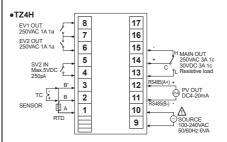


MAIN	OUT
SSR	Current
13 12 12VDC ±3V 30mA Max.	13 (mA) 12 + DC4-20mA Load 600Ω Max.

•TZ4W

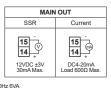
	2	MAIN 250VA 30VD0 Resisti	C 3A C 3A 1	С	+ [20mA	` 10	OURC 00-240 0/60H	OVAC
17	16	15	14	13	12	11	10	9	
8	7	6	5	4	3	2	1]
	۰	لم	Ĺ	1	B'	В	"Å,	RTD	_
EV1 OU 250VAC 1A 1a		OUT VAC 1a	Max.	2 IN 5VDC 0μA	į Ė	±	SENS		

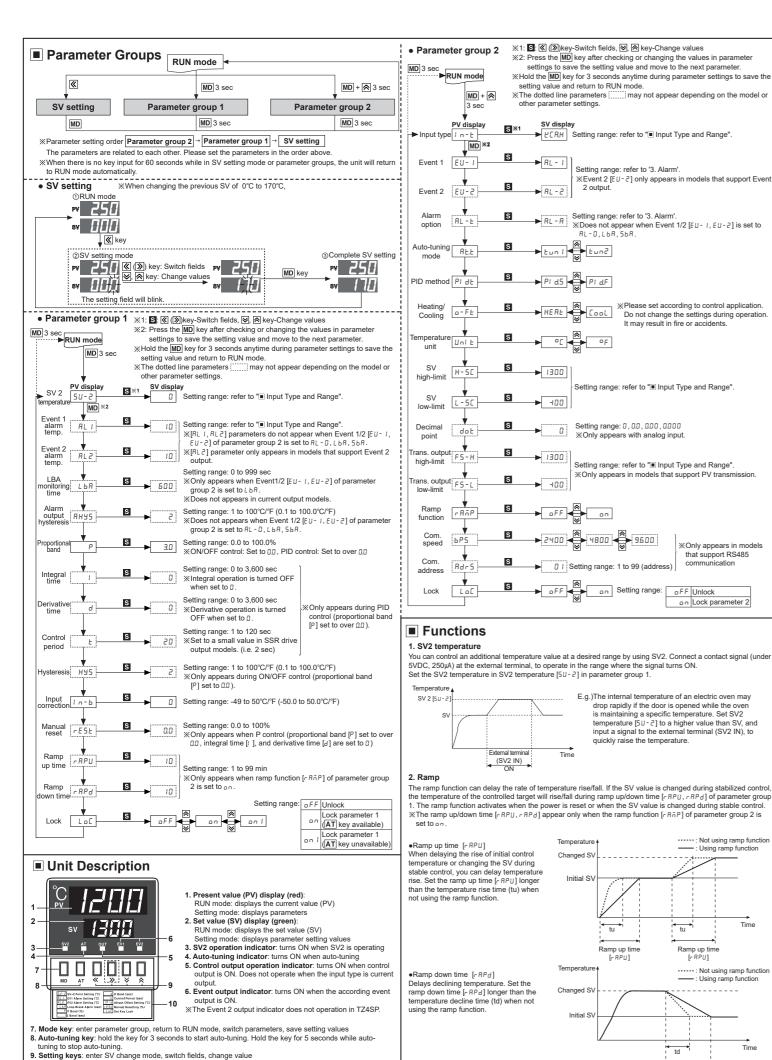
MAIN OUT					
SSR	Current				
15	15 14				
12VDC ±3V 30mA Max.	DC4-20mA Load 600Ω Max.				



MAIN	OUT
SSR	Current
15 V 14 + 12VDC ±3V 30mA Max.	15 14 - DC4-20mA Load 600Ω Max.







(x) key in the dotted line is only available in TZ4M and TZ4L models)

10. Key adjustment order chart

3. Alarm (Event) Alarm output can be configured by combining alarm operation and alarm options. Set the alarm operation in

	/2 [EUT, EUd operation	'] of parameter group 2, and	set the alarm options in ala	arm option[HL - E].	
Mode	Name	Alarm operation		Description	
AL-O	-	-		Alarm output not used.	
AL-I	Deviation high-limit alarm	SV 100°C	SV PV		
AL-2	Deviation low-limit alarm	ON ↑H↓ △ PV 90°C Low-limit de	SV 100°C	If the deviation of PV and SV are higher than the low-limit deviation, the alarm output turns ON.	
AL-3	Deviation high-limit /low-limit alarm	ON H OF PV SV 90°C 100° High-limit/low-lim	If the deviation of PV and SV are higher than the high-limit deviation or low-limit deviation, the alarm output turns ON.		
AL - 4	Deviation high-limit /low-limit reverse alarm	OFF H ON PV SV 90°C 100 High-limit/low-lim	If the deviation of PV and SV are higher than the high-limit deviation or low-limit deviation, the alarm output turns OFF.		
AL-5	Absolute value high-limit alarm	OFF H ON A PV SV 90°C 100°C Absolute value alarm: 90°C	OFF H ON SV PV 100°C 110°C Absolute value alarm: 110°C	Alarm output turns ON when PV is higher than the absolute value.	
AL-6	Absolute value low-limit alarm	ON H OFF A PV SV 90°C 100°C Absolute value alarm:	ON H OFF SV PV 100°C 110°C Absolute value alarm:	Alarm output turns ON when PV is lower than the absolute value.	

	X H: Alarm output hysteresis [ЯНЧ5] 2) Alarm options 2) Alarm options 3. The properties of the						
	Mode	Name	Description				
	AL-A	Standard alarm	Alarm output turns ON upon alarm condition, and alarm output turns OFF when condition is cleared.				
	RL - E Standby The first alarm of		Alarm output turns ON and maintains ON upon alarm condition.				
			The first alarm condition is ignored. It will operate as standard alarm from the second alarm condition. If it is under alarm condition when power is supplied, it will ignore the condition and operate as standard alarm from the next alarm condition.				
	AL-d	Alarm latch and standby sequence	It will operate as both alarm latch and standby sequence upon alarm condition. If it is under alarm condition when power is supplied, it will ignore the condition and operate as alarm latch from the next alarm condition.				

110°C

568 Sensor

break

3) Sensor break alarm Alarm output turns ON when sensor is not connected or loses its connection during temperature control. Set disconnection can be tested by connecting buzzers or other devices to the alarm output contact. Sensor bre alarm output operates through EV1 OUT or EV2 OUT contacts. Alarm output is disengaged after resetting the

oower. 4) Loop break Alarm (LBA)

1) Loop break Marm (LBA)
Joagnose control loop and transmit alarm output through temperature change of control target. During leating(cooling) control, the alarm output turns ON if the PV does not rise/drop by a specific amount (approx. 2°C) suring LBA monitoring period [£ hB] while control output amount is at 100%(0%).

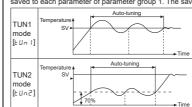
Xif the thermal response of the control target is slow, the LBA monitoring period [£ hB] of parameter group 1

should be set longer.

KLBA only operates when the control output amount is 100%(0%) so it cannot be used in current output models.

If the alarm output turns ON after the sensor has been disconnected, the alarm output will not turn OFF even after reconnecting the sensor. To disengage the alarm output, the temperature controller power must be reset

4. Auto-tuning
Auto-tuning allows the temperature controller to detect the thermal characteristics and response rates of the
control target. It then calculates the PID time constant and sets the value to allow fast response rates and high
accuracy. Hold the ATI key for 3 seconds during RUN mode to start auto-tuning. The auto-tuning indicator will
blink. When auto-tuning is completed, the auto-tuning indicator will durin off and the PID time constant will be
saved to each parameter of parameter group 1. The saved parameters can be adjusted as desired.



To manually stop auto-tuning, hold the AT key for 5 seconds. When auto-tuning is stopped, the controller maintains the PID value before auto-tuning.

Alarm output turns ON when sensor

Alarm output turns ON when loop

disconnection is detected.

TZ Series supports 2 auto-tuning modes IZ Series supports 2 auto-tuning modes.

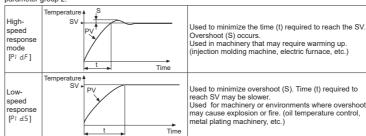
Select TUN1 mode or TUN2 mode [EUn 1,EUn2] from auto-tuning mode [RELE] of parameter group 2.

**Run auto-tuning during initial setup of the temperature controller.

**If the thermal characteristics of the control target device has changed after extended usage, re-run auto turing the superstance.

auto-tuning.

5. Dual PID control
The response rate of the PID control can be selected depending on the characteristics of the control target.
Select high-speed response mode or low-speed response mode [P1 dF, P1 d5] from PID method [P1 dE] of



6. Input correction [i n-b]
Used to correct deviation from external devices such as temperature controllers.

Ramp down time

E.g.)If the actual temperature is 80°C but the display value is 78°C, set the input correction [! n - b] value to 2 and it will display 80°C as the display value.

and it will display 80°C as the display value.

7. Manual reset [-E5Ł]
When using proportional control (P control), the time of temperature rising time and falling time may differ depending on factors such as the heat capacity of the control device or the heater. A certain amount of deviation occurs even under stable conditions.

This deviation is referred to as offset, and can be configured/corrected using manual reset [-E5Ł].

When PV and SV are equal, the reset value is 50.0%. If the PV is lower than the SV during stable control, set the value to over 50.0%, and if the PV is higher than the SV, set the value to under 50.0%

 Configuring manual reset [r E 5 b] according to control results. Reset value set at under 50.0% Offset Offset eset value set at over 50.0%

■ RS485 Communication

Communication distance Within 1.2km

Applicable for models that support RS485 communication. Please refer to '■ Ordering Information'

It is used to transmit PV or SV, and/or set the SV. EIA RS485 Applied standard Start bit 31 units (address: 1 to 99) Data bit 8-bit fixed Communication method 2-wire half duplex Parity bit Synchronization method Asynchronous Stop bit

Comprehensive Device Management Program[DAQMaster]

DAQMaster is a comprehensive device management software for setting parameters and monitoring processes. DAQMaster can be downloaded from our website at www.autonics.com.

Item	Minimum specifications			
System	System IBM PC compatible computer with Pentium III or above			
Operations	Windows 98/NT/XP/Vista/7/8/10			
Memory	256MB+			
Hard disk	rd disk 1GB+ of available hard disk space			
VGA	VGA Resolution: 1024×768 or higher			
Others	RS232C serial port (9-pin), USB port			

Troubleshooting

Symptoms	Troubleshooting				
oPE∩ is displayed on the PV display during operation	Disconnect the power and check the input connection. If the input is connected, disconnect the input wiring from the temperature controller and short the $+$ and $-$ terminals. Power the temperature controller and check if it displays the room temperature. If it does not display the room temperature and continues to display $oPEn$, the controller is broken. Please contact our technical support. (Input type is thermocouple)				
Load (heater, etc.) does not operate during operation	Check the state of the control output indicator on the front panel. If the indicator is not working, check parameter settings. If the indicator is working, disconnect the wiring from the output terminal of the temperature controller and check the output (replay contact, SSR drive, current)				
Err ((error) is displayed on the PV display during operation	Indicates damage to internal chip by strong noise (2kVAC). Please contact our technical support. Locate the source of the noise and devise countermeasures.				

Error Dispaly

Display	Description	Troubleshooting	
oPEn	Blinks when input is disconnected.	Check input status.	
нннн	Blinks when the measured input value is higher than the temperature range.	Adjust the value to within the temperature range.	
LLLL	Blinks when the measured input value is lower than the temperature range.		

■ Factory Default

Parameter group 1

	• .				
Parameter	Default	Parameter	Default	Parameter	Default
5U-2	0	Р	3.0	In-b	0
AL I	10	1	0	r E S E	0.0
AL2	10	d	0	r RPU	10
LBR	600	Ł	20	rRPd	10
AHY5	2	H95	2	LoC	oFF

Parameter group 2

Parameter	Default	Parameter	Default	Parameter	Default
In-E	FCUH	o-FE	HERL	F5-L	400
EU-I	AL-I	Uni E	٥٤	rRñP	oFF
EU-2	AL-2	H-5C	1300	bP5	2400
AL-E	AL-A	L - 5C	400	Adr5	0 1
Rt.L	Eun I	dot	0	LoC	oFF
PI dE	PI d.5	F5-H	1300		

Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. Check the polarity of the terminals before wiring the temperature sensor.
For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length.
For thermocouple (CT) temperature sensor, use the designated compensation wire for extending wire.
3. Keep away from high voltage lines or power lines to prevent inductive noise.
In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.

wire at input signal line.

wire at input signal line.

Do not use near the equipment which generates strong magnetic force or high frequency noise.

Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the

power.

5. Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.

6. When changing the input sensor, turn off the power first before changing.

After changing the input sensor, specify internal switch and modify the value of the corresponding parameter.

Do not overlapping communication line and power line. Use twisted pair wire for communication line and connect ferrite bead at each end of line to reduce the effect of external noise

Make a required space around the unit for radiation of heat.

Make a required space around the unit to radiation of near.
 For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
 Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
 Do not wire to terminals which are not used.

This unit may be used in the following environments.
 Olndoors (in the environment condition rated in 'Specifications')

③Pollution degree 2

②Altitude max. 2.000m (a)Installation category I

Major Products

■ Photoelectric Sensors
■ Temperature Controllers
■ Fiber Optic Sensors
■ Temperature/Humidity Transducers SSRs/Power Controllers

■ Door Side Sensors

Area Sensors
Proximity Sensors
Pressure Sensors
Rotary Encoders
Connector/Sockets

Sors/Power Controllers

Counters
Timers
Panel Meters
Tachometer/Pulse (Rate) Meters ■ Display Units ■ Sensor Controllers

■ Connector/Sockets ■ Sensor Controllers
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO₂, Nd: YAG)
■ Laser Welding/Cutting System

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