Dual-Speed PID Temperature Controllers

TZ / TZN Series

INSTRUCTION MANUAL

TCD210237AB

Autonics

Thank you for choosing our Autonics product.
Read and understand the instruction manual and manual thoroughly before using the product.
For your safety, read and follow the below safety considerations before using.
For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
Keep this instruction manual in a place where you can find easily.
The specifications, dimensions, etc are subject to change without notice for product improvement Some models may be discontinued without notice.
Follow Autonics website for the latest information.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow instructions may result in serious injury or death

01. 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 personal injury, economic loss or fire.
02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.
Failure to follow this instruction may result in explosion or fire.
03. Install on a device panel to use.
Failure to follow this instruction may result in electric shock.
04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.
05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.
06. Do not disassemble or modify the unit.
Failure to follow this instruction may result in fire or electric shock.

⚠ Caution Failure to follow instructions may result in injury or product damage

01. When connecting the power input and relay output, use AWG 20 (0.50 mm²) cable or over, and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m.
When connecting the sensor input and communication cable without dedicated cable, use AWG 28 to 16 cable and tighten the terminal screw with a tightening torque of 0.74 to 0.90 N m..
Failure to follow this instruction may result in fire or malfunction due to contact failure.
02. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage
03. Use a dry cloth to clean the unit, and do not use water or organic solvent.
Failure to follow this instruction may result in fire or electric shock.
04. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 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 (TC) temperature sensor, use the designated compensation wire for extending wire.
- 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. 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.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
- When changing the input sensor, turn off the power first before changing. After changing the input sensor, 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. 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.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude Max. 2,000 m
  - Pollution degree 2
  - Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website .

TZ / TZN 4 ❶ - ❷ 4 ❸

❶ Size
S: DIN W 48 × H 48 mm (TZN Series)
SP: DIN W 48 × H 48 mm (11 pin type, TZ Series)
ST: DIN W 48 × H 48 mm (TZ Series)
M: DIN W 72 × H 72 mm
H: DIN W 48 × H 96 mm
W: DIN W 96 × H 48 mm
L: DIN W 96 × H 96 mm

❷ Option output

PN	Option output 1	Option output 2
1	Event	-
2	Event	Event
R	Event	PV Transmission
T	Event	Communication
A	Event	Event + PV Transmission
B	Event	Event + Communication

❸ OUT1 Control output
R: Relay output
S: SSR drive output
C: Current Output

Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

Software

Download the installation file and the manuals from the Autonics website.

■ DAQMaster

DAQMaster is comprehensive device management program. It is available for parameter setting, monitoring.

Product Components

- Product, bracket × 2 [TZ4SP, TZ4ST, TZN4S] Product (+ bracket)
- Instruction manual
- Unit sticker

Sold Separately

- 11 pin socket: PG-11, PS-11 (N)
- Communication converter: SCM Series

Specifications

Series		TZ/TZN Series
Power supply		100 - 240 VAC~ 50/60 Hz ±10%
Power consumption		≤ 6 VA, TZ4SP, TZ4ST, TZN4S: ≤ 5 VA
Sampling period		500 ms
Input specification		Refer to 'Input Type and Using Range'.
Display accuracy		F.S. ±0.3% or 3°C higher one
Control output	Relay	250 VAC~ 3 A, 30 VDC⎓ 3 A 1c
	SSR	12 VDC⎓±3 V, ≤ 30 mA
	Current	DC 4-20 mA, load resistance: ≤ 600 Ω
Option output	Event 1/2	250 VAC~ 1A 1a
	PV Transmission	DC 4 - 20 mA, load resistance: ≤ 600 Ω
	Comm.	RS485
Display type		7 Segment (red, green), LED type
Control type		ON/OFF, P, PI, PD, PIDF, PIDS control
Alarm output Hysteresis		1 to 100 (0.1 to 100.0) °C
Proportional band (P)		0.0 to 100.0%
Integral time (I)		0 to 3,600 sec
Derivative time (D)		0 to 3,600 sec
Control cycle (T)		1 to 120 sec
LBA setting		1 to 999 sec
RAMP setting		Ramp Up, Ramp Down: 1 to 99 min
Relay life cycle	Mechanical	• Control output: ≥ 10,000,000 operations • Option output: ≥ 20,000,000 operations
	Electrical	• Control output: ≥ 100,000 operations (load resistance: 250 VAC~ 3 A) • Option output: ≥ 500,000 operations (load resistance: 250 VAC~ 1 A)
Dielectric strength		Between input terminal and power terminal: 2,000 VAC~ 50/60 Hz for 1 min
Vibration		0.75 mm amplitude at frequency of 10 to 55Hz (for 1min) in each X, Y, Z direction for 2 hours
Malfunction vibration		0.5 mm amplitude at frequency of 10 to 55Hz (for 1min) in each X, Y, Z direction for 2 hours
Insulation resistance		≥ 100 MΩ (500 VDC⎓ megger)
Noise immunity		±2 kV square shaped noise by noise simulator (pulse width 1 μs) R-phase, S-phase
Memory retention		≈ 10 years (non-volatile semiconductor memory type)
Ambient temperature		-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity		35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation)
Approval		CE cULus EAC
Unit weight (packaged)		• TZ4SP: ≈ 144 g (≈ 205 g) • TZ4ST: ≈ 162 g (≈ 218 g) • TZ4M: ≈ 228 g (≈ 360 g) • TZ4W: ≈ 246 g (≈ 365 g) • TZ4H: ≈ 246 g (≈ 365 g) • TZ4L: ≈ 304 g (≈ 474 g) • TZN4S: ≈ 164 g (≈ 226 g) • TZN4M: ≈ 246 g (≈ 355 g) • TZN4W: ≈ 232 g (≈ 351 g) • TZN4H: ≈ 232 g (≈ 351 g) • TZN4L: ≈ 303 g (≈ 474 g)

Communication Interface

■ RS485

Comm. protocol	BCC
Application standard	EIA RS485 compliance with
Maximum connection	31 units (address: 01 to 99)
Synchronous method	Asynchronous
Comm. method	Two-wire half duplex
Comm. effective range	≤ 1,200 m
Comm. speed	2,400 / 4,800 / 9,600 bps (parameter)
Start bit	1 bit (fixed)
Data bit	8 bit (fixed)
Parity bit	None
Stop bit	1 bit (fixed)
EEPROM life cycle	≈ 1,000,000 operations (Erase / Write)

Input Type and Using Range

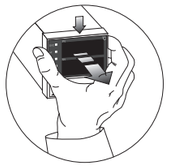
The setting range of some parameters is limited when using the decimal point display.

Input type		Decimal point	Display	Using range (°C)	Using range (°F)
Thermo-couple	K (CA)	1	K CA H	-100 to 1300	-148 to 2372
	K (CA)	0.1	K CA L	-100.0 to 999.9	-
	J (IC)	1	J IC H	0 to 800	32 to 1472
	J (IC)	0.1	J IC L	0.0 to 800.0	-
	R (PR)	1	r Pr	0 to 1700	32 to 3092
	E (CR)	1	E CR H	0 to 800	32 to 1472
	E (CR)	0.1	E CR L	0.0 to 800.0	-
	T (CC)	1	t CC H	-200 to 400	-328 to 752
	T (CC)	0.1	t CC L	-199.9 to 400.0	-
	S (PR)	1	S Pr	0 to 1700	32 to 3092
	N (NN)	1	n nn	0 to 1300	32 to 2372
	W (TT)	1	U tt	0 to 2300	32 to 4172
RTD	JPt100Ω	1	JPt H	0 to 500	32 to 932
	JPt100Ω	0.1	JPt L	-199.9 to 199.9	-199.9 to 391.8
	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
Analog	Voltage	0 - 10 VDC⎓	A - 1	-1999 to 9999 (Display range will vary depending on the decimal point.)	
		1 - 5 VDC⎓	A - 2		
	Current	DC4 - 20 mA	A - 3		

Input Type Setting

Please configure the internal switches before supplying power.
After supplying power, configure the 'Input type' as same value.

■ Detaching the case

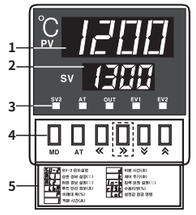


Press the front case then pull the case to detach the case from the body.
Configure the internal switches as input type.

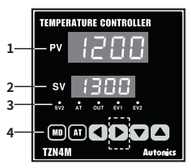
Input type		S/W 1	S/W 2
Thermocouple		1 1	mA V
RTD			
Analog	Voltage (0-10 VDC⎓, 1-5 VDC⎓)	2 2	mA V
	Current (DC4-20 mA)	2 2	mA V

Unit Descriptions

■ TZ Series



■ TZN Series



1. PV Display part (red)
• RUN mode: Displays PV (present value)
• Setting mode: Displays parameter name

2. SV Display part (green)
• RUN mode: Displays SV (setting value)
• Setting mode: Displays parameter setting value

3. Indicator

Display	Name	Description
SV2	SV2 operation	Turns ON during SV2 operation
AT	Auto tuning	Flash during auto tuning
OUT	Control output operation	Turns ON when the control output is ON. Not operate when control output is current output
EV1	Event 1 output	Turns ON when Event 1/2
EV2	Event 2 output	Output is ON

4. Control key

Display	Name
[MD]	Mode key
[AT]	Auto tuning execution key
[◀], [▶], [▼], [▲]	Setting value control key • The key in dotted line ([▶]) is only for TZ4M, TZN4M, TZ4L, TZN4L Series

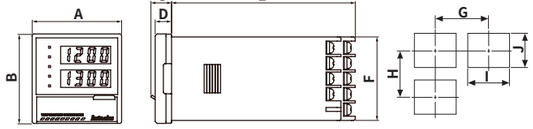
5. Key adjustment order chart

Errors

Display	Description	Troubleshooting
oPEn	Flashes at 0.5 sec interval when the sensor is break or disconnected.	Check input sensor status.
HHHH	Flashes when PV is higher than input range.	When input is within the rated input range, this display disappears.
LLLL	Flashes when PV is lower than input range.	
Err0	Flashes when internal chip is damaged by strong noise (> 2,000 VAC~).	Locate the source of the noise and devise countermeasures. Please contact our technical support.
-	If there is no output in RUN mode	If the control output indicator is not working, check parameter settings.
		If the control output indicator is working, disconnect the wiring from the output terminal of the temperature controller and check the output (replay contact, SSR drive, current)

Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.
- Below is based on TZ4ST Series.

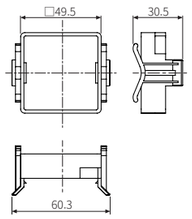


■ Panel cut-out

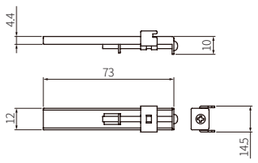
	Body						Panel cut-out			
	A	B	C	D	E	F	G	H	I	J
TZ4SP	48	48	11.1	8.8	97	□44.8	≥ 65	≥ 65	$45^{+0.6}_{0}$	$45^{+0.6}_{0}$
TZ4ST	48	48	11.1	8.8	98.6	□44.8	≥ 65	≥ 65	$45^{+0.6}_{0}$	$45^{+0.6}_{0}$
TZN4S	48	48	10	-	90	□45	≥ 65	≥ 65	$45^{+0.6}_{0}$	$45^{+0.6}_{0}$
TZ4M	72	72	15	13.2	100	□67	≥ 74	≥ 91	$68^{+0.7}_{0}$	$68^{+0.7}_{0}$
TZN4M	72	72	10	-	85	□67	≥ 91	≥ 91	$68^{+0.7}_{0}$	$68^{+0.7}_{0}$
TZ4W	96	48	14.9	13	100	45	≥ 112	≥ 50	$92^{+0.8}_{0}$	$45^{+0.6}_{0}$
TZN4W	96	48	13	-	100	45	≥ 112	≥ 50	$92^{+0.8}_{0}$	$45^{+0.6}_{0}$
TZ4H	48	96	15.3	13	100	90	≥ 50	≥ 102	$45^{+0.6}_{0}$	$92^{+0.8}_{0}$
TZN4H	48	96	13	-	100	90	≥ 50	≥ 102	$45^{+0.6}_{0}$	$92^{+0.8}_{0}$
TZ4L	96	96	14	13	100	□90	≥ 98	≥ 106	$92^{+0.8}_{0}$	$92^{+0.8}_{0}$
TZN4L	96	96	13	-	100	□90	≥ 98	≥ 106	$92^{+0.8}_{0}$	$92^{+0.8}_{0}$

■ Bracket

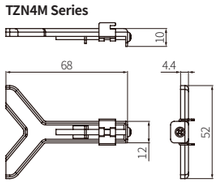
TZ4ST, TZ4SP, TZN4S Series



TZ4L, TZN4L, TZ4M, TZ4H, TZN4H, TZ4W, TZN4W Series

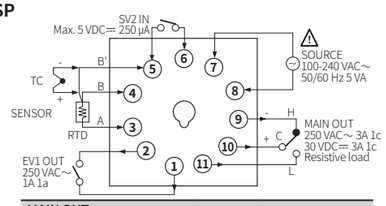


TZN4M Series



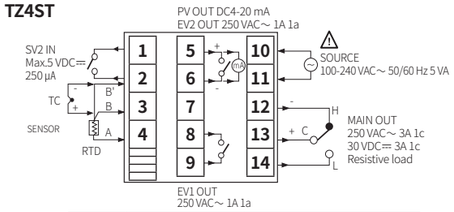
Connections

■ TZ4SP



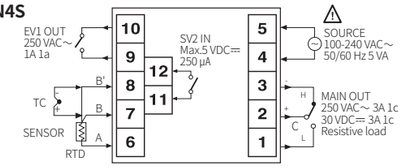
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

■ TZ4ST



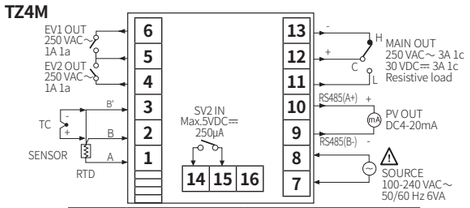
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

■ TZN4S



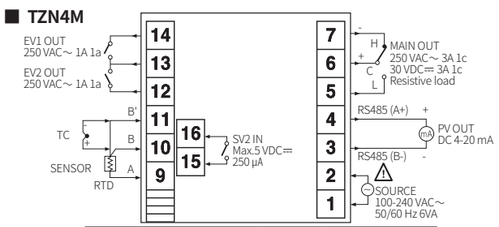
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

■ TZ4M



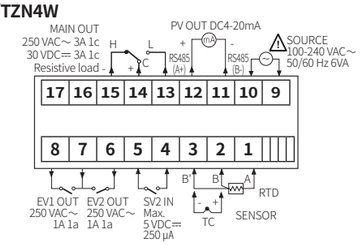
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

■ TZN4M



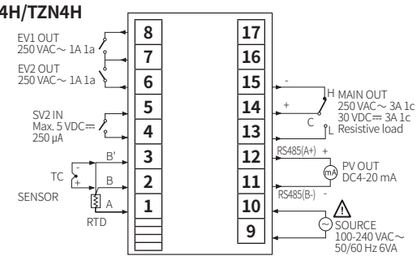
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

■ TZ4W/TZN4W



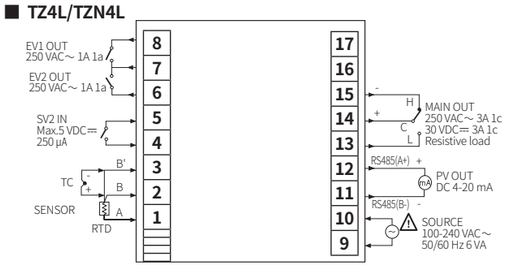
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

■ TZ4H/TZN4H



MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

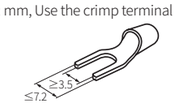
■ TZ4L/TZN4L



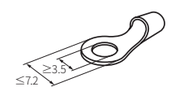
MAIN OUT	
SSR	Current
12 VDC⎓ ±3V 30 mA Max.	DC 4-20 mA Load 600 Ω Max.

Crimp Terminal Specifications

- Unit: mm, Use the crimp terminal of follow shape.

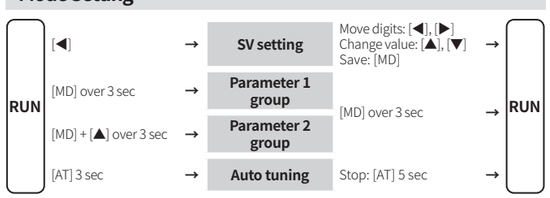


Fork crimp terminal



Round crimp terminal

Mode Setting



Parameter Setting

- Some parameters are activated/deactivated depending on the model or setting of other parameters. Refer to the descriptions of each item.
- [MD] key: Move to next item after saving / Return to RUN mode after saving (≥ 3 sec)
  [◀] key: Select parameter / Move digits / Return to the upper level without saving (≥ 2 sec) / Return to RUN mode without saving (≥ 3 sec)
  [▲], [▼] key: Select parameter / Change setting value
- Return to the upper level without saving when there is no key input for more than 30 seconds.
- The range in parentheses '( )' is the setting range when the set value of the 'input specification' parameter is used with one decimal point.
- Recommended parameter setting sequence: Parameter 2 group → Parameter 1 group → SV setting mode

■ Parameter 1 group

Parameter	Display	Default	Setting range	Condition
1-1 SV2 setting	SU-2	0	Refer to 'Input Type and Using Range'.	-
1-2 Event 1 alarm temperature	AL1	10	Refer to 'Input Type and Using Range'.	2-2/3 Event 1/2: AL-1 to 6
1-3 Event 2 alarm temperature	AL2	10	[Option output 2: Event model] Refer to 'Input Type and Using Range'.	
1-4 LBA time	LbA	600	[Relay, SSR drive output model] 0 to 999 sec	2-2/3 Event 1/2: LBA
1-5 Alarm output hysteresis	AHYS	2	1 to 100 (0.1 to 100.0) °C/°F	2-2/3 Event 1/2: AL-1 to 6
1-6 Proportional band	P	30	0.0 (ON/OFF control) to 100.0%	-
1-7 Integral time	I	0	0 (OFF) to 3,600 sec	1-6 Proportional band: > 0.0
1-8 Derivative time	d	0	0 (OFF) to 3,600 sec	
1-9 Control cycle	t	20	[Relay, SSR drive output model] 1 to 120 sec • Set to a small value in SSR drive output models. (e.g. 2 sec)	
1-10 Hysteresis	HYS	2	1 to 100 (0.1 to 100.0) °C/°F	1-6 Proportional band: 0.0
1-11 Input correction	In-b	0	-49 to 50 (-50.0 to 50.0) °C/°F	-
1-12 Manual reset	rESt	00	0.0 to 100%	1-6 Proportional band: > 0.0 1-7/8 Integral/ derivative time: 0
1-13 RAMP up time	rAPU	10	1 to 99 min	2-14 RAMP function: ON
1-14 RAMP down time	rAPd	10		
1-15 Lock	LoC	oFF	OFF ON: Parameter 1 group lock ON1: Parameter 1 group + [AT] key lock	-

■ Parameter 2 group

Parameter	Display	Default	Setting range	Condition
2-1 Input spec.	In-t	ycRH	Refer to 'Input Type and Using Range'.	-
2-2 Event 1	EU-1	AL-1	AL-0: Off AL-1: Deviation high limit alarm AL-2: Deviation low limit alarm AL-3: Deviation high, low limit alarm AL-4: Deviation high, low reverse alarm AL-5: Absolute value high limit alarm AL-6: Absolute value low limit alarm SBA: Sensor break alarm LBA: Loop break alarm (LBA)	-
2-3 Event 2	EU-2	AL-2	[Option output 2: Event model] Same as 2-2 Event 1	
2-4 Alarm option	AL-t	AL-A	AL-A: Standard alarm AL-B: Alarm latch AL-C: Standby sequence AL-D: Alarm latch and standby sequence	2-2/3 Event 1/2: AL-1 to 6
2-5 Auto tuning mode	AtE	tUn1	TUN1: Tuning based on SV TUN2: Tuning based on 70% of SV	-
2-6 PID type	PIdE	PIdS	PID.S: Low speed response PID.F: High speed response	-
2-7 Control output mode	o-Ft	HEAt	HEAT: Heating, COOL: Cooling • Please set according to control application. Do not change the settings during operation. It may result in fire or accidents.	-
2-8 Temperature unit	Unit	°C	°C, °F	-
2-9 SV high limit	H-SC	1300	Within input range	-
2-10 SV low limit	L-SC	-100	Refer to 'Input Type and Using Range'.	-
2-11 Decimal point	dot	0	0, 0.0, 0.00, 0.000	2-1 Input spec. : Analog
2-12 Transmission output high limit	FS-H	1300	[Option output 2: PV Trans. model] Within input range Refer to 'Input Type and Using Range'.	-
2-13 Transmission output low limit	FS-L	-100		
2-14 RAMP function	rAnP	oFF	OFF, ON	-
2-15 Comm. speed	bPS	2400	[Option output 2: Comm. model] 2400, 4800, 9600 bps	-
2-16 Comm. address	AdrS	01	[Option output 2: Comm. model] 1 to 99	-
2-17 Lock	LoC	oFF	OFF, ON: Parameter 2 group lock	-

18, Bansong-ro 513Beon-gil, Haeundae-gu, Busan, Republic of Korea, 48002
www.autonics.com | +82-2-2048-1577 | sales@autonics.com

Autonics