1-Channel Digital Temperature Indicators

KN-2000W Series

INSTRUCTION MANUAL

TCD210154AC

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 fire or 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. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage
02. 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.
03. 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.
04. Check the polarity of the measurement input before wiring.
Failure to follow this instruction may result in explosion or fire.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- For connecting the power, use the crimp terminal (M3.5, max. 7.2 mm)
- 24 VDC⎓ power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Keep away from high voltage lines or power lines to prevent inductive noise. 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.
- Use twisted pair wire for communication line.
- 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 .

K	N	-	2	❶	❷	❸	W

❶ Alarm output
0: No (Option output: Transmission is not available)
2: 2 alarm
4: 2 alarm

❷ Option Output
0: No
1: PV transmission
4: Communication
5: PV transmission + Communication

❸ Power supply
0: 100-240 VAC~ 50/60 Hz
1: 24 VDC⎓

Product Components

- Product
- Instruction manual
- Bracket ×2

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.

Specifications

Series		KN-2000W Series	
		AC voltage	DC voltage
Power supply		100 - 240 VAC~ 50/60 Hz	24 VDC⎓
Power consumption		≤ 8 VA	≤ 3 W
Sampling period		• Thermocouple, RTD: 250 ms • Analog: 100 ms	
Input specification		Refer to 'Input Type and Using Range'.	
Digital input	Contact	• ON: ≤ 2 kΩ • OFF: ≥ 90 kΩ	
	Non contact	• Residual voltage: ≤ 1.0 V • Leakage current: ≤ 0.03 mA	
	Outflow current	≈ 0.2 mA	
Option output	Alarm	• 2 point relay: 250 VAC~ 3 A 1c • 4 point relay: 250 VAC~ 1 A 1a	
	PV Transmission	ISOLATED DC 4-20 mA (Load resistance: ≤ 600 Ω)	
	RS485 comm.	Modbus RTU	
Display type		7 Segment (Red, Green, Yellow), LED type	
Alarm output Hysteresis		1 to 999 digit	
Relay life cycle	Mechanical	• 2 point: ≥ 10,000,000 operations • 4 point: ≥ 20,000,000 operations	
	Electrical	• 2 point: ≥ 100,000 operations(Load resistance: 250 VAC~ 3 A) • 4 point: ≥ 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 5 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Insulation resistance		≥ 100 MΩ (500 VDC⎓ megger)	
Noise immunity		±2 kV square shaped noise (pulse width 1 μs) by noise simulator	
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 EAC	
Unit weight (packaged)		≈ 200 g (≈ 332 g)	

Communication Interface

■ RS485

Comm. protocol	Modbus 1.1 RTU
Maximum connection	32 units
Synchronous method	Asynchronous
Comm. method	Two-wire half duplex
Comm. effective range	≤ 1,200 m (≤ 700 m recommended)
Comm. speed	1,200 / 2,400 / 4,800 / 9,600 (default) / 19,200 bps (parameter)
Data bit	8 bit (fixed)
Parity bit	None (fixed)
Stop bit	1 bit (fixed)

Input Type and Using Range

Input type			Display	Using range (°C)	Using range (°F)
Thermo-couple	K (CA)		tC-H	- 200.0 to 1350.0	- 328 to 2462
	J (IC)		tC-J	- 200.0 to 800.0	- 328.0 to 1472.0
	E (CR)		tC-E	- 200.0 to 800.0	- 328.0 to 1472.0
	T (CC)		tC-t	- 200.0 to 400.0	- 328.0 to 752.0
	R (PR)		tC-r	0.0 to 1750.0	32 to 3182
	B (PR)*		tC-b	400.0 to 1800.0	752 to 3272
	S (PR)*		tC-S	0.0 to 1750.0	32 to 3182
	N (NN)*		tC-n	- 200.0 to 1300.0	- 328 to 2372
	C (W5)*		tC-C	0 to 2300	32 to 4172
	L (IC)*		tC-L	- 200.0 to 900.0	- 328.0 to 1652.0
	U (CC)*		tC-U	- 200.0 to 400.0	- 328.0 to 752.0
	Platinel II*		tC-P	0.0 to 1390.0	32 to 2534
RTD	Cu50Ω*		Cu50	- 200.0 to 200.0	- 328.0 to 392.0
	Cu100Ω*		Cu10	- 200.0 to 200.0	- 328.0 to 392.0
	JPt100Ω		JPt.1	- 200.0 to 600.0	- 328.0 to 1112.0
	DPt50Ω		dPt.5	- 200.0 to 600.0	- 328.0 to 1112.0
	DPt100Ω		dPt.1	- 200.0 to 850.0	- 328.0 to 1530.0
Analog	Current	0.00 - 20.00mA	A.An1	- 19999 to 19999 (Display range is variable according to decimal point position.)	
		4.00 - 20.00mA	A.An2		
	Voltage	- 50.00 - 50.00mV	A.Au1		
		- 200.0 - 200.0mV	A.Au2		
		- 1.0000 - 1.0000V	A-u1		
		- 1.000 - 10.000V	A-u2		

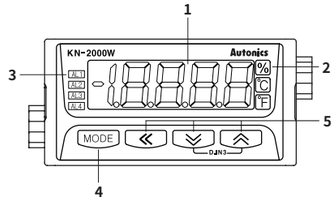
- Above input types which have the * mark are not displayed. To display the above input types, supply the power with pressing the [M] key.

■ Display accuracy

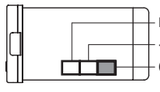
Input type	Using temperature	Display accuracy
Thermocouple RTD	At room temperature (25 °C ±5 °C)	PV ±0.2% F.S. ±1 digit • Thermocouple below -100 °C: (PV ±0.4% F.S.) ±1digit
	Out of room temperature range	PV ±0.3% F.S. ±1 digit

- In case of TC-T, TC-U, ±2.0 °C will be added to the degree standard.

Unit Descriptions



1. Display part(Red)
Run mode: Displays PV (Present value).
Setting mode: Displays parameter and setting value.
2. Unit Indicator
Displays the set unit.
3. Alarm output indicator
Turns ON when the alarm is ON
4. [MODE] key
Used to enter parameter set mode, move to parameters, save SV and return to RUN mode.
5. [◀], [▲], [▼] key
Used to enter and change parameter setting value.
6. Selection switch for input specification

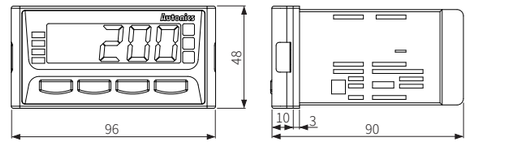


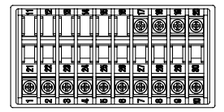
RTD / TC / mV / ±1 V: Select it for RTD, Thermocouple, ±1 V, mV input
-1 - 10 V: Select it for -1 - 10 VDC⎓ input
0 - 20 mA: Select it for DC 0 (4) - 20 mA input (default)

- The setting of input type selection switch and the setting value of input type parameter should be same and it can display the proper measurement value.

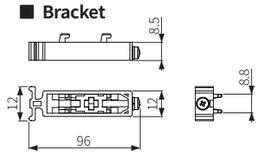
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

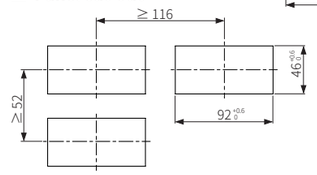




■ Bracket

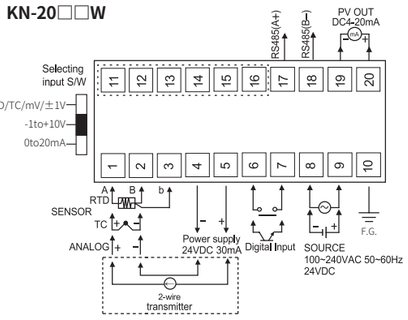


■ Panel cut-out

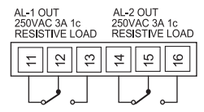


Connections

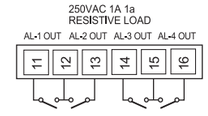
■ KN-20□□W



■ KN-22□□W



■ KN-24□□W



Errors

Display	Description	Troubleshooting
bUrn	Flashes when input sensor is disconnected or sensor is not connected.	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.	
Err	Flashes when there is an error of setting value	Check the setting condition and reset.
Err1	Flashes when parameter and selection switch setting for input specification are inconsistent	Check input specification.

Mode Setting

RUN [MODE] → **Monitoring mode setting** [MODE] over 3 sec → RUN

RUN [MODE] over 3 sec → **Program mode setting** [MODE] over 3 sec → RUN

RUN [▲] + [▼] over 3 sec → **Digital input** Auto → RUN

Supply the power with pressing [M]+ [◀] → **Parameter reset** Auto → RUN

Parameter Setting

- Some parameters are activated/deactivated depending on the model or setting of other parameters. Refer to the descriptions of each item.
- [MODE] key: Move to next item after saving / Return to RUN mode after saving (≥ 3 sec)
- [◀] key: Select parameter / Move digits
- [▲], [▼] key: Select parameter / Change setting value
- Return to the upper level without saving when there is no key input for more than 30 seconds.

■ Monitoring mode

Parameter		Display	Default	Setting range	Condition
1-1	AL1 alarm temperature	AL1	099.9	Within input range Analog Input: L-SC ≤ AL□ ≤ H-SC	2-12/14/16/18 AL-1/2/3/4 alarm operation: AT1, AT2
1-2	AL2 alarm temperature	AL2	099.9		
1-3	AL3 alarm temperature	AL3	000.1	[4 alarm output model] Same as 1-1/2 AL1/2 alarm temperature	
1-4	AL4 alarm temperature	AL4	000.1		
1-5	High peak display	HPEK	----	Check only (not available to set) Displays high/low peak (Max./Min. input) value • Initial high/low peak is saved after 2 sec from supplying the power. • Value reset: [▲] + [▼] key over 3 sec in 1-5/6 High/Low peak display parameter	-
1-6	Low peak display	LPEK	----		

■ Program mode

Parameter		Display	Default	Setting range	Condition
2-1	Input specification	In-P	RAA2	Refer to 'Input Type and Using Range'.	-
2-2	Temperature unit	Unit	°C	°C, °F	2-1 Input specification: Thermocouple, RTD
2-3	Display unit	dUnt	°/o	%, OFF, °C, °F	2-1 Input specification: Analog
2-4	Low limit Input	L-rG	0400	Within input range, L-RG + 20% of F.S. ≤ H-RG	
2-5	High limit Input	H-rG	2000		
2-6	Decimal point	dP	0.0	0.0, 0.00, 0.000, 0	
2-7	Low limit scale	L-SC	0000	-19,999 to 19,999	
2-8	High limit scale	H-SC	1000	-19,999 to 19,999	
2-9	4 mA output scale	L.oUt	0000	[PV transmission output model] • Input: Thermocouple, RTD: Within input range • Input: Analog L-SC ≤ L.OUT + 10% of F.S. ≤ H.OUT ≤ H-SC	-
2-10	20 mA output scale	HoUt	1000		
2-11	Input and transmission output extension 01)	EHIO	SP	[PV transmission output model] Setting value / Input range / Transmission output range 0P / no extension / 4 - 20 mA 5P / ±5% extension / 3.2 - 20.8 mA 10P / ±10% extension / 2.4 - 21.6 mA	2-1 Input specification: Analog
2-12	AL1 alarm operation	AL-1	AtLA □□□■	[Alarm output model] □□□ AT0: Off AT1: Absolute high limit alarm AT2: Absolute low limit alarm SBA: Sensor break alarm	-
2-13	AL1 alarm option			■ A: Standard alarm B: Alarm latch C: Standby sequence D: Alarm latch and standby sequence • Enter to option setting: Press [◀] key in 2-15 AL-1 alarm operation.	-
2-14	AL2 alarm operation	AL-2	AtLA	[Alarm output model] Same as 2-12/13 AL1 alarm operation/ option	-
2-15	AL2 alarm option				
2-16	AL3 alarm operation	AL-3	At2A	[4 alarm output model] Same as 2-12/13 AL1 alarm operation/ option	-
2-17	AL3 alarm option				
2-18	AL4 alarm operation	AL-4	At2A		
2-19	AL4 alarm option				
2-20	Alarm output hysteresis	A-HY	001	001 to 999	2-12/14/16/18 AL-1/2/3/4 alarm operation: AT1, AT2
2-21	Input special function	InSF	Lin	LIN: Linear, ROOT: Root, SQAR: Square, TUF: Two unit function	-
2-22	Input correction	In-b	0000	-999 to 999	-
2-23	Input digital filter	nAuF	04	01 (OFF) to 16	-
2-24	Digital input Terminal	di-t	Hold	HOLD: Hold, ZERO: Zero-point adjustment, AL.RE*: Alarm reset *[Alarm output model]	-
2-25	Digital input key	di-K	Hold		
2-26	Display color	CLor	rEd	Setting value / Display part Color: RUN mode / Error RED / Red / Red GRN / Green / Green YELO / Yellow / Yellow R--G / Red / Green G--R / Green / Red	-
2-27	Alarm display color 02)	C-AL	rrrr	[Alarm output model] Select each digit separately. R: Red, G: Green, Y: Yellow rGrY Display color when alarm is ON AL-1: Green → Yellow AL-2: Yellow → Red AL-3: Red → Green AL-4: Green → Red	-
2-28	Sensor break alarm output	bUrn	on	[Transmission output model] OFF: 4 mA - 5%, ON: 20 mA + 5%	-
2-29	Comm. address	Adrr	01	[Communication output model] 01to99	-
2-30	Comm. speed	bAUd	9.6K	[Communication output model] 1.2K: 1200, 2.4K: 2400, 4.8K: 4800, 9.6K: 9600, 19.2K: 19200 bps	-
2-31	Comm. write	ConY	EnA	[Communication output model] EN.A: Enable, DIS.A: Disable	
2-32	Lock	LoC	oFF	OFF LOC1: Program mode lock (check only) Monitoring mode unlock LOC2: Checking and setting program mode lock Monitoring mode setting lock (check only)	-

01) Extension is not allowed below 0 mA and 0 V. ±1 V and 10 V Inputs cannot be set to 10P.

02) When alarm is cleared, or two alarms operate at the same time, the latest alarm's color is applied. When error occurs during alarm, the set color of 'Display color' parameter is applied.

Communication Parameter Setting

■ Read Input Status (Func: 2, R/W: R)

Address	Parameter	Output range	Condition
100001 (0000)	AL1 indicator	0: OFF, 1: ON	-
100002 (0001)	AL2 indicator		
100003 (0002)	AL3 indicator		
100004 (0003)	AL4 indicator		
100005 (0004)	°F indicator		
100006 (0005)	°C indicator		
100007 (0006)	% indicator		

■ Read Input Register (Func: 4, R/W: R)

Address	Parameter	Output range	Condition
300001 (0000)	Present value	-19999 ~ 19999	-
300002 (0001)	Input specification	Refer to 'Input specification parameter setting/output value'	-
300003 (0002)	Decimal point	0004H: .0000, 0003H: 0.000, 0002H: 0.00, 0001H: 0.0, 0000H: 0	2-1 Input specification: Analog
300004 (0003)	PWM OUT	0 ~ 20000	-
300005 (0004)	X (MSB)	-	-
	% indicator	0: OFF, 1: ON	-
	°C indicator		
	°F indicator		
	AL4 indicator		
	AL3 indicator		
	AL2 indicator		
	AL1 indicator (LSB)		

■ Program mode setting group (Func: 03/06/16, R/W: R/W)

Address	Parameter	Display	Setting range	Condition
400001 (0000)	Input specification	In-P	Refer to 'Input specification parameter setting/output value'	Same as each parameter setting condition
400002 (0001)	Temperature unit	Unit	0: °C, 1: °F	
400003 (0002)	Display unit	dUnt	0: °C, 1: °F, 2: %, 3: OFF	
400004 (0003)	High limit Input	H-rG	Same as parameter setting range	
400005 (0004)	Low limit Input	L-rG		
400006 (0005)	High limit scale	H-SC	Same as parameter setting range	
400007 (0006)	Low limit scale	L-SC		
400008 (0007)	Input correction	In-b	Same as parameter setting range	
400009 (0008)	Input digital filter	nAuF	Same as parameter setting range	
400010 (0009)	AL1 alarm operation	AL-1	1: Absolute high limit alarm 2: Absolute low limit alarm 3: Sensor break alarm 4: No alarm	
400011 (000A)	AL2 alarm operation	AL-2		
400012 (000B)	AL3 alarm operation	AL-3		
400013 (000C)	AL4 alarm operation	AL-4		
400014 (000D)	AL1 alarm option	AL-1	10: Standard alarm 11: Alarm latch 12: Standby sequence 13: Alarm latch and standby sequence	
400015 (000E)	AL2 alarm option	AL-2		
400016 (000F)	AL3 alarm option	AL-3		
400017 (0010)	AL4 alarm option	AL-4		
400018 (0011)	Alarm output hysteresis	A-HY	Same as parameter setting range	
400019 (0012)	20 mA output scale	HoUt	Same as parameter setting range	
400020 (0013)	4 mA output scale	L.oUt		
400021 (0014)	Decimal point	dP	0004H: .0000, 0003H: 0.000, 0002H: 0.00, 0001H: 0.0, 0000H: 0	
400022 (0015)	Input and transmission output extension	EHIO	0: 0%, 1: 5%, 2: 10%	
400023 (0016)	Digital input Terminal	di-t	0: Alarm reset, 1: Hold, 2: Zero-point adjustment	
400024 (0017)	Digital input key	di-K		
400025 (0018)	Input special function	InSF	0: Linear, 1: Root, 2: Square, 3: Two Unit Function	
400026 (0019)	Sensor break alarm output	bUrn	0: ON, 1: OFF	
400027 (001A)	Lock	LoC	0: OFF, 1: LOCK1, 2: LOCK2	
400028 (001B)	Display color	CLor	0: Red, 1: Green, 2: Yellow, 3: Red-Green, 4: Green-Red	
400029 (001C)	AL1 display color	C-AL	0: Red, 1: Green, 2: Yellow	
400030 (001D)	AL2 display color			
400031 (001E)	AL3 display color			
400032 (001F)	AL4 display color			
400033 (0020)	Comm. address	Adrr	Same as parameter setting range	
400034 (0021)	Comm. speed	bAUd	0: 192000, 1: 9600, 2: 4800, 3: 2400, 4: 1200	
400035 (0022)	Comm. write	ConY	0: Disable, 1: Enable	

- Func : Read Holding Register/Preset Single Register/Preset Multiple Register

■ Monitoring mode setting group (Func: 03/06/16, R/W: R/W)

Address	Parameter	Display	Setting range	Condition
400051 (0032)	AL1 alarm temperature	AL1	Same as parameter setting range	Same as each parameter setting condition
400052 (0033)	AL2 alarm temperature	AL2		
400053 (0034)	AL3 alarm temperature	AL3		
400054 (0035)	AL4 alarm temperature	AL4		
400055 (0036)	High peak display	HPEK	Same as parameter setting range	
400056 (0037)	Low peak display	LPEK		

- Func : Read Holding Register/Preset Single Register/Preset Multiple Register

■ Input specification parameter setting/output value

Input spec.	Display	Value
Thermocouple	tC-K	0
	tC-J	1
	tC-E	2
	tC-t	3
	tC-r	4
	tC-b	5
	tC-S	6
	tC-n	7
	tC-C	8
	tC-L	9
	tC-U	10
	tC-P	11

Input spec.		Display	Value
RTD		CU.50	12
		CU.10	13
		JPt.1	14
		dPt.5	15
		dPt.1	16
Analog	Current	0A1	17
		0A2	18
	Voltage	0u1	19
		0u2	20
		A-u1	21
		A-u2	22

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