

RT9N

INSTRUCTION MANUAL

Thank you for purchasing Hanyoung Nux products. Please read the instruction manual carefully before using this product, and use the product correctly. Also, please keep this instruction manual where you can view it any time.

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Safety information

Please read the safety information carefully before the use, and use the product correctly. The alerts declared in the manual are classified into **Danger, Warning and Caution** according to their importance

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or properties damage

DANGER

- The input/output terminals are subject to electric shock risk. Never let the input/output terminals come in contact with your body or conductive substances.

WARNING

- If there is a possibility that a malfunction or abnormality of this product may lead to a serious accident, install an appropriate protection circuit on the outside and plan to prevent the accident.
- Since this product is not equipped with a power switch and fuse, install them separately on the outside (fuse rating: 250 V, 0.5 A).
- Please supply the rated power voltage, in order to prevent product breakdowns or malfunctions.
- To prevent electric shocks and malfunctions, do not supply the power until all the wiring is completed.
- The product does not have an explosion-proof structure, so avoid using it in places with flammable or explosive gases.

- Never disassemble, modify, process, improve or repair this product, as it may cause abnormal operations, electric shocks or fires.
- Do not touch the terminals while energizing, as electric shocks or malfunctions may occur.
- Please disassemble the product after turning OFF the power. Failure to do so may result in electric shocks, product abnormal operations or malfunctions.
- We recommend regular maintenance for the continuous safe use of this product. Some components of this product may have a lifespan or deteriorate over time.
- The warranty period of this product, is 1 year, including its accessories, under normal conditions of use.

CAUTION

- Places in which the ambient temperature is out of the 0 ~ 50 °C range.
- Places in which the ambient humidity is out of the 35 ~ 85% RH range.
- Places in which the temperature changes suddenly or condensation occurs.
- Places exposed to corrosive gases (especially harmful gases, ammonia, etc.) or flammable gases.
- Places where vibrations and impacts are applied directly to the product body.
- Places with liquids, oils, chemicals, steams.
- Places with a lot of dirt, dust, salt, iron, etc.
- Places where large inductive interference, static electricity, magnetic noise can be generated easily.
- Places exposed to direct sunlight.
- Places where heat accumulation occurs due to radiant heat, etc.
- Install the 2 brackets on the fixed halls and tighten them with a screwdriver. The fixing torque is approx. 14.7 N·cm (1.5 kg·cm).
- When water enters, short circuit or fire may occur, so please inspect the product carefully.
- For thermocouple input, use a compensating cable
- For RTD input, use a cable with small lead wire resistance and without resistance difference among 3 wires.
- To avoid the inductive noise influence to input signal wires separate from the power and load wires.
- Keep input signal wires away from output signal wires and be sure to use shielded wires to ground.
- Use a non-grounded sensor for RTD and thermocouple.
- In places with a lot of noise, use the following procedure: connect a surge absorber to the contact coil side if the magnet contacts are connected to the relay contact output load

- When there is a lot of noise from the power, we recommend to use insulation transformer and noise filter. Please install the noise filter to a grounded panel or structure, etc. and make the wiring of noise filter output and product power supply terminal as short as possible.
- The product power line is effective when connected after twisting (tightly twisting is effective against noise).
- The preparation period of the contact output is required during power supply. If used as a signal to external interlock circuit, etc. please use a delay relay together.
- Use an extra relay when the frequency of operation (such as proportional operation, etc.) is high, because connecting the load to the output relay rating without any room shortens the service life. In this case, SSR drive output type is recommended.
- When using electromagnetic switch: the proportional cycle is at least 30 seconds.
- When using SSR: set proportional cycle to at least 2 seconds.
- Contact output life: Mechanical: min. 10 million times (no load) Electrical: min. 100 thousand times (rated load)
- SSR/current output: electrically insulated with internal circuit.
- If the alarm function is not set correctly, it will not be output in case of abnormal operation, so please check it before operation.
- When the input (sensor) is disconnected, the α/β -overscale symbol will be displayed on PV display, then the α/β -burn-out symbol will be displayed and the output will be turned OFF.
- When replacing the sensor, be sure to turn off the power.
- Please do not wipe the product with organic solvents such as alcohol, benzene, etc. (use neutral detergents).

Suffix code

Model	Code	Content
RT9N-	□ □ □ □	2-channel temperature controller & recorder 96(W) × 96(H)
Control type	0	Temperature record only
	1	Temperature record & control
Number of channels	1	1 channel
	2	2 channels
Options	0	None (AL1 built-in)
	1	AL2
	2	AL2, communication (RS485)
	3	Communication (RS485)

Control output configuration

CAUTION

- Control output wiring
- When wiring or removing the control output, disconnect controller body and external power supply.
- Use shielded wires for voltage pulse/current output wiring.

Temperature controller & recorder	Output code (OUT1,OUT2)	Output type
RT9N - 1□□	0	No output (Temperature record only)
	1	Relay (ON/OFF control)
	2	SSR (Contactless relay)
	3	SCR (4 ~ 20 mA d.c.)
	4	Relay (PID control)

Specifications

Input

Input types	- Thermocouple: K, J, E, T, R, B, S, L, N, U, WRε 5-26, PL-II (Refer to input signal and measurement range) - RTD: Pt 100 Ω, KSPt 100 Ω - DC voltage input: 1 ~ 5 V d.c., 0 ~ 10 V d.c., 0 ~ 10 ~ 20 mV d.c., 0 ~ 100 mV d.c. (Free scale method)
Sampling cycle	250 ms
Input display resolution	Basically below the decimal point of "Measurement range index"
Input impedance	Thermocouple and DC voltage input (mV): 1 MΩ min., DC voltage input(V): approx. 1 MΩ
Allowable signal source resistance	Thermocouple: 250 Ω max., voltage: 2 kΩ max.
Allowable wiring resistance	- RTD: 10 Ω max./wire (conductor resistance among 3 wires should be the same) - Thermocouple: 250 Ω max., voltage: 2 kΩ max.
Allowable input voltage	- Within ±10 V (thermocouple, RTD, voltage: mV d.c.) - Within ±20 V (voltage: V d.c.)
Noise removal rate	- NMRR (normal mode): 40 dB min. (50/60 Hz ±1%) - CMRR (common mode): 120 dB min. (50/60 Hz ±1%)
Standards	- Thermocouple/RTD (KS/IEC/DIN)
Standard contact compensation tolerance	±1.5 °C (15 ~ 35 °C), ±2.0 °C (0 ~ 50 °C)
Input disconnection detection (BURN-OUT)	- Thermocouple: OFF, UP/DOWN scale selectable - RTD: UP Scale (detection current during thermocouple and RTD BURN-OUT: approx. 50 mA)
Accuracy	Display and record accuracy: ±0.5% (Full Scale)
Input range	Refer to "Input signal and measurement range". Thermocouple and RTD can be changed within the range of input signal and measurement range chart. DC voltage can change the minimum voltage and maximum voltage within each range. Scaling possible within the conditions of measurement range.

Output

Alarm output	Relay contact output	- Contact capacity: 240 V a.c. 1 A, 30 V d.c. 1 A (resistive load) - Contact configuration: 1a - Output contacts: 2 (AL1, AL2)
Control output (the output type can be selected from relay, SCR or SSR)	Relay contact output	- Contact capacity: 240 V a.c. 3 A, 30 V d.c. 3 A (resistive load), contact configuration: 1C - Output operation: PID, ON/OFF, proportional cycle: 1 ~ 1,000 sec. - Output limit: 0.0~100.0% range high limit (OH), low limit (OL) selectable, also during auto-tuning. - ON/OFF hysteresis: 0 ~ 100% (Full Scale) - Time resolution: lower between 0.1% or 10 ms
	SSR output (voltage pulse output)	- ON voltage: approx. 12 V d.c. min. (load resistance 400 Ω, approx. 30 mA current limit during short circuit) - OFF voltage: 0.1 V d.c. max., proportional cycle: 1 ~ 1,000 sec. - Output operation: PID - Output limit: 0.0~100.0% range high limit (OH), low limit (OL) selectable, also during auto-tuning. - Time resolution: lower between 0.1% or 10 ms.
SCR output (4 ~ 20 mA d.c.)		- Load resistance: 400 Ω max. - Accuracy: ±0.5% of max. scale (4 ~ 20 mA range), resolution: approx. 3,000 - Output ripple: max. ±0.3% (P-P) of max. scale (150 Hz) - Output sampling cycle: 250 ms, output operation: continuous PID - Output limit: -5.0~105.0% range high limit (OH), low limit (OL) selectable, also during auto-tuning

Function

Measurement input	- Input calibration (Bias): -100.0~100.0% for instrument range (can calibrate the desired correction value to the measurement input value) - Scaling: measurement range scaling is possible according to maximum value (SH) and minimum value (SL) settings of measurement range. - Input filter: OFF, 1 ~ 120 sec.
Control	- PID groups: 3 types - Auto-tuning: auto-tuning operates according to set value (SV) (standard type, low PV type) - Proportional band: 0.1 ~ 999.9% (max. range) - Integral time: OFF, 1 ~ 6000 sec. - Derivative time: OFF, 1 ~ 6000 sec. - ON/OFF control: by selecting output code (OT) "1" - PID selection: ZONE PID / Auto 1, 2, 3 selectable - Manual reset: -5.0 ~ 105.0% of output (valid only when integral time is "OFF") - Direct/reverse action selection: selectable by parameter. - Emergency output value: -5.0 ~ 105.0% of output value - ON/OFF hysteresis (HYS): 0.0~100.0% of instrument range (however, valid only if set to ON/OFF control) - ARW (Anti Reset Wind-up): AUTO, 50.0 ~ 200.0% - Fuzzy function: ON or OFF selection by parameter - Ramp function: the rising temperature and falling temperature gradient can be set in hours or minutes when the power is on.
Alarm output	- Set contacts: 2 (1 contact per channel, 1-channel type only supports alarm 1 contact) - Alarm types: high/low, high/low deviation, hold high/low, heater break (refer to "alarm type and code" table) - Setting range: during absolute value alarm: 0 ~ 100% of instrument range during deviation alarm: 100 ~ 100% of instrument range
Record	- Measuring points: 1 - Response time: according to record speed - Record type: thermal line - Printing method: 203 dpi (8.0 dots/mm) 384 dots per line - Recording speed: 20, 30, 60, 120, 180, 300, 600, 900 mm/h - Recorder paper check: if there is no paper the front display window P-END lamp turns on and record stops. - Recorder paper: width 57.5 mm, length approx. 16 m

Operating environment

Installation environment	- Continuous vibration: (5 ~ 14 Hz): Forward width 1.2 mm max., - Continuous vibration: (4 ~ 150 Hz): 4.9 m/s max. - Short-time vibration: 14.7 m/s, 15 sec. max. (each of 3 directions) - Shock: 147 m/s, 11 ms max. (6 directions each 3 times) - Panel dimensions: refer to "dimension and panel cutout"
Normal operating conditions	- Ambient temperature: 0 ~ 50 °C - Ambient humidity: 35 ~ 85%RH (with no condensation) - Magnetic influence: 400 AT/m max. - Warm-up time: 30 minutes min.
Ambient temperature influence	- Thermocouple, voltage input: ±1 μV/°C or ±0.01%/°C of max. range - RTD input: ±0.05 Ω/°C max. - Analog output: Max. ±0.05%/°C of max. range (continuous output)

Power supply

Power voltage	100 ~ 240 V a.c. (voltage fluctuation rate ±10%)
Power frequency	50 ~ 60 Hz
Power consumption	15 W max., 20 VA max.
Insulation resistance	Between primary terminal and secondary terminal: 500 V d.c. 20 MΩ min. Between primary terminal and ground: 500 V d.c. 20 MΩ min. Between secondary terminal and ground: 500 V d.c. 20 MΩ min.
Dielectric strength	Between primary terminal and secondary terminal: 2,300 V a.c. 50/60 Hz for 1 minute Between primary terminal and ground: 2,300 V a.c. 50/60 Hz for 1 minute Between secondary terminal and F-G: 1,500 V a.c. 50/60 Hz for 1 minute

Interface

Standard	EIA RS485
Maximum number of connections	max. 31 (1 ~ 99 address settings available)
Communication method	2-wire half-duplex
Synchronization	Asynchronous
Communication sequence	None
Communication distance	Within 1.2 km
Communication speed	2400(setting value 2), 4800(setting value 3), 9600(setting value 4), 14400(setting value 5), 19200(setting value 6) (communication speed changes by parameter settings)
START BIT	1 BIT
DATA BIT	7 or 8 BIT
PARITY BIT	None, Even Numbers, Odd numbers
STOP BIT	1 or 2 BIT
PROTOCOL	PC LINK(setting value 0), PC LINK SUM(setting value 1), MODBUS-ASCII(setting value 2), MODBUS-RTU(setting value 3)
RESPONSE TIME	Reception handling time + response time × 10 ms

Input signal and measuring range

CAUTION

- Measuring input wiring
- When wiring the measuring input line, disconnect the controller body and external power supply.
- Pay attention to the polarity of the input and wire the input signal between the power circuit and the ground circuit.
- Use shielded wire for input wiring and ground the shield with 1 contact.

Input signal	Input code	Input type	Symbol	Range (°C)	Accuracy	
Thermocouple (TC)	1	K	*2	K	-200 ~ 1370	±0.5% of FS ±1 digit
	2	K	*2	ℓ	-199.9 ~ 999.9	
	3	J	*2	ℓ	-199.9 ~ 999.9	
	4	E	*2	ℓ	-199.9 ~ 999.9	
	5	T	*2	ℓ	-199.9 ~ 400.0	
	6	R	*2	r	0 ~ 1700	
	7	B	*1	b	0 ~ 1800	
	8	S		s	0 ~ 1700	
	9	L	*2	ℓ	-199.9 ~ 900.0	
	10	N		n	-200 ~ 1300	
	11	U	*2	u	-199.9 ~ 400.0	
	12	W		w	0 ~ 2300	
	13	Platinel II		Pl II	0 ~ 1390	
RTD	20※	KSPt100 Ω	*3	ℓ	-199.9 ~ 500.0	±0.5% of FS ±1 digit
	21※	Pt100 Ω	*3	ℓ	-199.9 ~ 640.0	
	30	1 ~ 5 V d.c.		dℓ	scalable range	
DC voltage (VDC/mVDC)	31	0 ~ 10 V d.c.		dℓ	SL-L: 1999 SL-H: 9999	±0.5% of FS ±1 digit
	32	-10 ~ 20 mV d.c.		dℓ		
	33	0 ~ 100 mV d.c.		dℓ		
Direct current	30※	4 ~ 20 mA d.c.		dℓ	※When using current input, install the 250 Ω, 0.1% resistor on input signal terminal.	

- Remarks
- "Digit" is the minimum display value
- *1) 0 ~ 400 °C range: ± 0.1% of FS ± 1 digit
- *2) 0 °C and less: ± 0.1% of FS ± 1 digit
- *3) -150.0 ~ 150.0 °C range: ± 1.0% of FS ± 1 digit
- "FS" is from the minimum value to the maximum value of each range measurable range.
- When selecting the input type, set the input code in the set value display window (SV). However, at this time, do not set numbers not present in the input code of the input signal.

Alarm types and codes

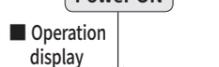
(Note): In case of reverse selection, the output will be OFF when the indicator lamp is ON.

Code	Alarm type	Operation
1	High absolute (NO)	
2	Low absolute (NO)	
*3	High deviation (NO)	
*4	Low deviation (NO)	
*5	High deviation (NC)	
*6	Low deviation (NC)	
*7	High-Low deviation	
*8	High-Low deviation range	
9	High absolute (NC)	
10	Low absolute (NC)	
11	High absolute (NO, hold function)	
12	Low absolute (NO, hold function)	
*13	High deviation (NO, hold function)	
*14	Low deviation (NO, hold function)	
*15	High deviation (NC, hold function)	
*16	Low deviation (NC, hold function)	
*17	High-Low deviation (hold function)	
*18	High-Low deviation range (hold function)	
19	High absolute (NC, hold function)	
20	Low absolute (NC, hold function)	
21	no recorder paper	

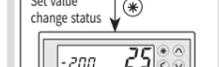
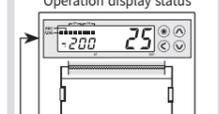
* Marked alarm types are not available for RT9N-0 recorders. The recorder & temperature controller models (RT9N-1) cannot be used with control output 0.

Parameter configuration

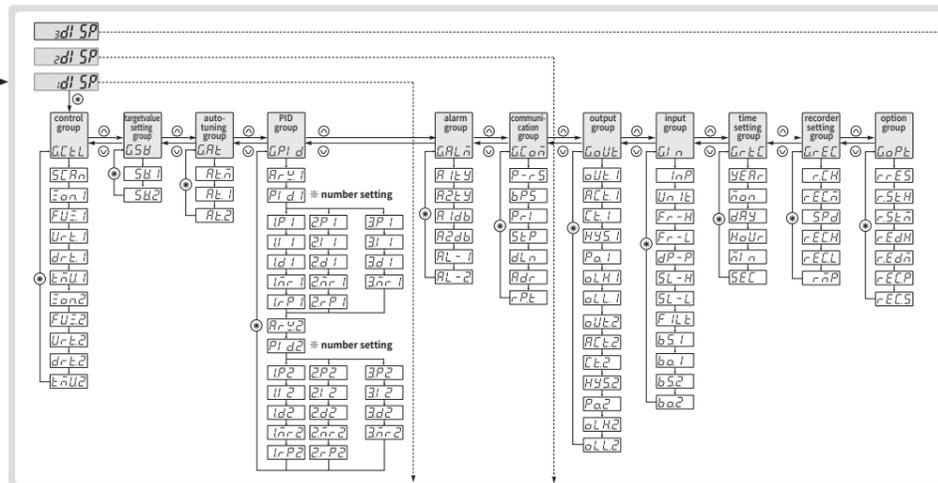
Power ON



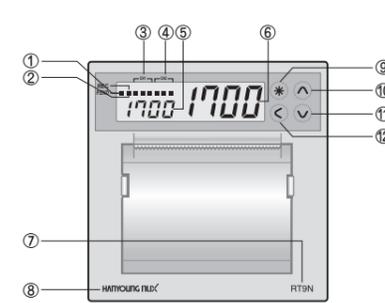
Operation display



Menu display



Part names and functions



CAUTION

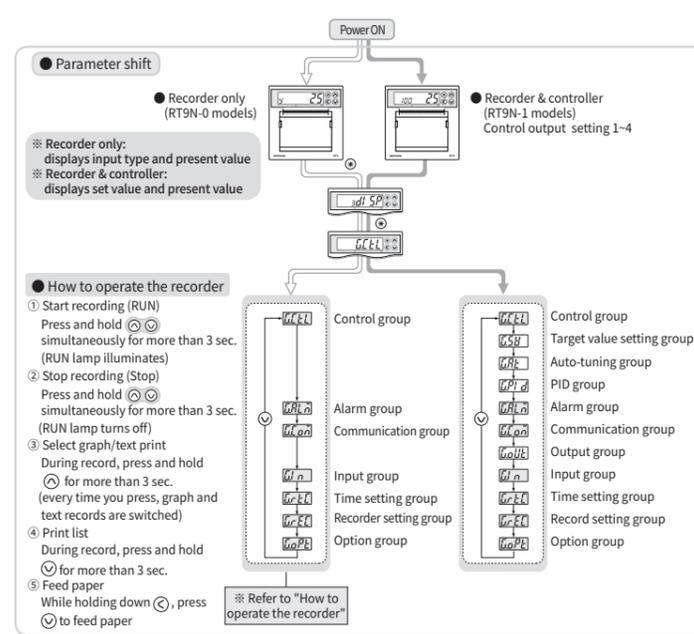
- To operate the keys, press firmly until you feel the fingertip touch
- Do not press the keys with pointed objects (such as pen nibs, etc.), as it may cause key breakdowns.

NO	Name	Functions
9	Mode button	Changes the mode
10	Increase button	Increases the set value
11	Reduction button	Reduces the set value
12	Shift button	Shifts the set digits

NO	Name	Functions
1	P.END	ON when there is no paper
2	RUN	ON when recording is in progress
3	CH1	consists of AT, OUT, AL
4	CH2	AT: flashes during auto-tuning OUT: ON during control output operation AL: ON during alarm operation
5	Set value (SV) display	Displays set value during operation (green), and several other parameters during function setting (however RT9N-0 displays input type).
6	Present value (PV) display	Displays present value during operation (CH1: red, CH2: green), Displays several modes during function setting.
7	RT9N	Model name
8	HANYOUNG NUX	Manufacturer

Setting method

- When the power is turned on after the wiring, the management version is displayed on the display, and the measured value and set value are displayed as below (RT9N-0 models only display input type and present value).
- This time, to set a display level of the set items, you can enter \square \square \square \square setting mode by pressing and holding \odot for more than 3 sec. The initial value is set as level 3.
- When \square \square \square \square is displayed, if you press \odot , control group (G.CTL) will be displayed. Set each group-related parameter according to the purpose of use.



Parameter structure

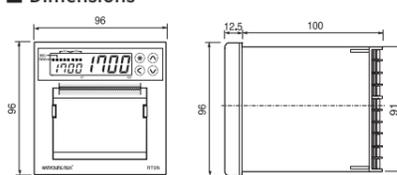
- Recorder only (RT9N-0 models):
- Control group
- Alarm group
- Communication group (optional)
- Input group
- Time setting group
- Recorder setting group
- Option group
- Temperature controller & recorder (RT9N-1 models): same also when the control output is set to "0"

CAUTION

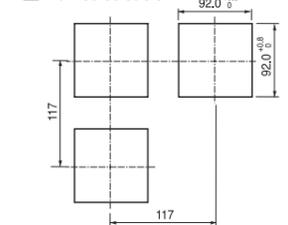
- In parameter setting mode, there are input/output functions and control function setting modes, but please do the setting in the input/output sequence.
- If you change the specifications of input-output after setting the other parameters, some parameter values will be initialized.
- Any parameter may not be displayed depending on the controller type, additional specifications, control type, type selection.

Dimensions and panel cutout

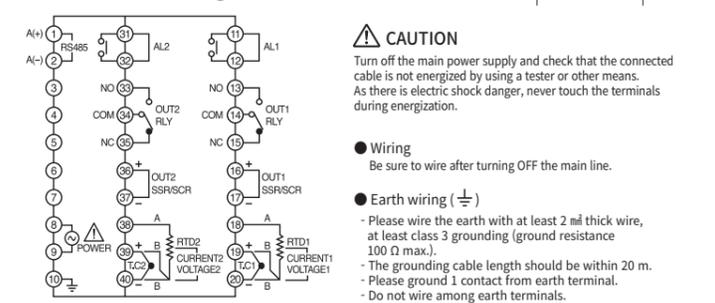
Dimensions



Panel cutout



Connection diagrams



For further information, please visit our homepage (www.hynux.com) and refer to the user's manual in the archive.

