TMCON

DIN-rail Multi-channel AI Temperature Controller

AiFUZZY8025/8045/8065

Technical Manual

Version number: EN-V8-01

Contact Us

Guangzhou Tmcon Electronic Technology Co, Ltd.
Address: No.1, Xinhe Road West Street, Xier Village, Luopu Street, Panyu District, Guangzhou
Phone: +86 13533063770
WeChat:+86 13533063770
WhatsApp: +86 13533063770
Email: info@tmcon.cn
Alternatively, click on the instant messaging tool on the www.china-tmcon.com
website to answer your questions online

Thank you very much for choosing TMCON products,
In order to better use this product, please read the following before using.

■ 1. Table of Contents

⚠ Attention

Do not touch the terminals while power is on,
otherwise minor injury may be caused by electric shock.。

No metal objects, wires, installation debris or moisture shall be allowed to enter the controller, debugging tool ports or the pins of debugging tool cable connectors. Otherwise, electric shock, short circuit or incorrect machine operation may occur.

Do not use in environments with explosive or flammable gas;
otherwise, minor injuries may be caused by explosion.

Do not disassemble, modify, repair or touch the inside of the device.
Otherwise, minor electric shock, fire or equipment failure may occur.

This device is an open-type processing controller.
Do not use it in control cabinets with potential fire hazards.
When two or more disconnect switches are used,
turn off all switches and cut off power to the product
before maintenance and inspection.

If the product is used beyond its service life, contact melting or burnout may occur.
The service life of output relays varies greatly depending on switching capacity and operating conditions.
Therefore, it shall be used within the rated load and electrical
service life in accordance with actual operating conditions.

■ 3. Main Features

AiFUZZY-8XX5 series DIN rail-mounted multi-channel AI temperature controllers are available in 2-channel, 4-channel and 6-channel models. It supports various thermocouples, 2-wire RTDs and 4-20mA analog signal inputs, and provides multiple control outputs such as SSR voltage output, relay contact output and transistor non-contact output. Each channel adopts independent input and output. It is compatible with multiple IoT communication protocols, and can be connected with configuration software, PLC, touch screen, PC cloud platform and mobile APP for integrated operation.This instrument has two optional power supply voltages: 100~240VAC or 12-24VDC. It has passed CE certification with excellent anti-interference performance and complies with EMC electromagnetic compatibility standards.All power supply and I/O terminals have passed the 6 kV electrical fast transient (EFT) immunity test, ensuring reliable operation under severe electromagnetic interference.Equipped with the core AiFUZZY artificial intelligent regulation algorithm, this controller enables multi-channel inputs to achieve the same measurement & control accuracy and anti-interference performance as single-channel devices.
Main functions of the instrument are as follows:

● Each channel supports independent configuration of input types.
Compatible sensors include thermocouples: K, S, E, J, B, N, T, WRe5-WRe26;
RTDs: Cu50, Pt100;
Analog current signals: 0~20mA, 4~20mA and other linear input types.

● Automatic cold junction compensation for thermocouples.Digital input calibration is provided. Each input channel is equipped with digital filtering, and the filter strength can be independently adjusted or disabled.

● Adopts high-precision and low-temperature-drift components to ensure measurement accuracy. With anti-crosstalk signal design, each channel is free from mutual interference, enabling the multi-loop measuring instrument to achieve the same accuracy and stability as single-channel devices.

● Each channel is equipped with an independent AiFUZZY intelligent regulation algorithm, which perfectly combines fuzzy Fuzzy control and adaptive PID control. It features no overshoot and no undershoot, and delivers excellent control performance for complex and difficult-to-control objects such as large hysteresis and external disturbance.

● Each channel of the instrument can independently set upper/lower absolute value alarm or deviation alarm output. The alarm output ports (AL1~AL4) can be flexibly configured by programming.

● It is equipped with 12 field parameter settings. Users can authorize field operators to access relevant parameters according to actual usage habits, while all other parameters are protected by passwords. This design endows the instrument with powerful functions and simplifies operation greatly.

● Supports automatic cyclic display or manual key-switching display of channel measured values, with adjustable automatic rotation time.

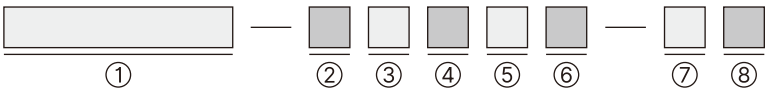
● Optional RS485 or RS232 communication interface, supporting the Modbus-RTU communication protocol.

● By connecting with HT630, HT610, HT620 and HT680 communication gateways, it supports Ethernet, Wi-Fi, 4G and wireless radio frequency communication.

■ 4. Technical Parameters

Outline Code	H-type DIN Rail Mounting
Mounting Method	DIN35 Rail Mounting
Power Supply Voltage	AC 100~240 V, 50/60 Hz; or DC 12~24 V
Allowable Voltage Variation Range	85% ~ 110% of the rated supply voltage
Power Consumption	Approx. 5 VA at AC 100~240 V, approx. 3.5 VA at DC 24 V
Display Mode	Double-row LED digital tube display
Input Specifications	Thermocouple: K, S, R, E, J, T, B, N, WRe3-WRe25, WRe5-WRe26, etc. RTD: Cu50, Pt100 Linear current: 0~20mA, 4~20mA, etc.
Measuring Range	K (-50 ~ +1300°C), S (-50 ~ +1700°C), R (-50 ~ +1700°C), T (-200 ~ +350°C), E (0 ~ 800°C), J (0 ~ 1000°C), B (200 ~ 1800°C), N (0 ~ 1300°C), Cu50 (-50 ~ +150°C), Pt100 (-200 ~ +600°C) Linear input: -999 ~ +3200, user-definable
Decimal Places	0000, 000.0, 00.00, 0.000(Set via dP parameter.)
Measurement Accuracy	Class 0.25
Sampling Period	0.5 seconds
Control Mode	ON/OFF two-position control, AiFUZZY artificial intelligent control (PID+FUZZY)
Control Cycle	Adjustable: 0.5~300.0 s
SSR Voltage Output	12VDC 50mA or 9VDC 50mA (for driving SSR solid state relay)
Relay Contact Switch Output	2-channel relay output, each contact rating: 250VAC/2A, 30VDC/2A; 3-channel relay output, each contact rating: 250VAC/1.3A, 30VDC/1.3A; 4-channel relay output, each contact rating: 250VAC/1A, 30VDC/1A; 6-channel relay output, each contact rating: 250VAC/1A, 30VDC/1A.
Transistor Output	NPN or PNP transistor output,external 5–24VDC can be connected to drive solid state relays or intermediate relays, with a driving current of 100mA per channel.
EMC (Electromagnetic Compatibility)	Electromagnetic Compatibility: IEC 61000-4-4 (Electrical Fast Transient Burst): ±6 kV / 5 kHz; IEC 61000-4-5 (Surge): 6 kV. Under 10 V/m high-frequency electromagnetic field interference, the meter shall not crash nor cause I/O port malfunction, and the fluctuation of measured value shall not exceed ±5% of the full scale.
Isolation Withstand Voltage	Power terminals, relay contacts and signal terminals: isolation voltage ≥ 2300 VDC; Isolated weak signal terminals: isolation voltage ≥ 600 VDC.
Operating Environment	Temperature: -10~+60°C (no frost and condensation);Humidity: 25~85%RH
Storage Environment	Temperature: -25~+70°C (no icing or condensation);Humidity: 25~85%RH

■ 5. Model Definition



① Model	② Outline Code	③ Input Type	④ OUT channel control output	⑤ ALM Alarm Output	⑥ COMM Communication Interface	⑦ Instrument Power Supply	⑧ Terminal
AiFUZZY8025	H	J11	N	N	N	N or blank	N or blank
AiFUZZY8045		J12	R2	R2	S4	D	C
AiFUZZY8065		J13	R3	R3	S2		
			R4	R4			
			R6	T21			
			Q2	T31			
			Q3	T41			
			Q4				
			Q6				
			T21				
			T31				
			T41				
			T61				

① Model

Code	Description
AiFUZZY8025	2-channel DIN-rail AI temperature controller
AiFUZZY8045	4-channel DIN-rail AI intelligent temperature controller
AiFUZZY8065	6-channel DIN-rail AI intelligent temperature controller

② Outline Code

Code	Description
H	DIN-rail mounting type

③ Signal Input Type Code

Code	Description
J11	Indicates support for non-isolated thermocouples, 2-wire RTDs, and 4-20 mA analog signal input(Select this item for 2-channel and 4-channel models.)
J12	Indicates support for 6-channel non-isolated thermocouple and 4-20mA analog signal input.
J13	Indicates support for 6-channel non-isolated 2-wire RTD signal input.

④ ~ ⑥ Module Code Comparison Table

Code	Description
N	None
R2	2-channel relay normally open contact switch output module.Each channel contact rating: 250VAC/2A, 30VDC/2A.
R3	3-channel relay normally open contact switch output module.Each channel contact rating: 250VAC/1.3A, 30VDC/1.3A.
R4	4-channel relay normally open contact switch output module.Each channel contact rating: 250VAC/1A, 30VDC/1A.
R6	6-channel relay normally open contact switch output module.Each channel contact rating: 250VAC/1A, 30VDC/1A.
Q2	2-channel SSR solid state relay drive voltage output module.Each channel driving capacity: 12VDC/50mA.

Q3	3-channel SSR solid state relay drive voltage output module. Each channel driving rating: 12VDC/50mA.
Q4	4-channel SSR solid state relay drive voltage output module. Each channel drive rating: 12VDC/50mA.
Q6	6-channel SSR solid state relay drive voltage output module. Each channel drive rating: 12VDC/50mA
T21	2-channel isolated NPN transistor output module, externally compatible with 5–24VDC power supply to drive solid state relays or intermediate relays; each channel driving current: 100mA.
T31	3-channel isolated NPN transistor output module, which can be externally connected with 5-24VDC to drive solid state relays or intermediate relays. The driving current of each channel is 100mA.
T41	4-channel isolated NPN transistor output module. It can be externally supplied with 5–24VDC to drive solid state relays or intermediate relays, with each channel driving current up to 100mA.
T61	6-channel isolated NPN transistor output module. It supports external 5–24VDC power supply for driving solid state relays or intermediate relays, with each channel driving current of 100mA.
S4	Opto-isolated RS485 communication interface module with built-in isolated power supply
S2	Opto-isolated RS232 communication interface

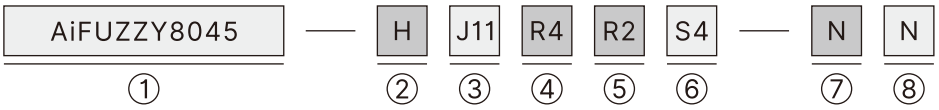
⑦ Instrument Power Supply

Code	Description
N or blank	Default power supply: 100~240VAC
D	Power supply:12–24VDC

⑧ Wiring Method

Code	Description
N or blank	Screw terminal (Default)
C	Spring push-in terminal

For example:



This model designation indicates:

① This is an AiFUZZY8045 4-channel DIN rail mounted intelligent temperature controller.

② DIN rail mounting form factor;

③ Supports 4-channel non-isolated input for thermocouples, 2-wire RTDs and 4–20mA analog signals;

④ 4-channel relay control output;

⑤ 2-channel alarm relay output;

⑥ Opto-isolated RS485 communication interface module with built-in isolated power supply;

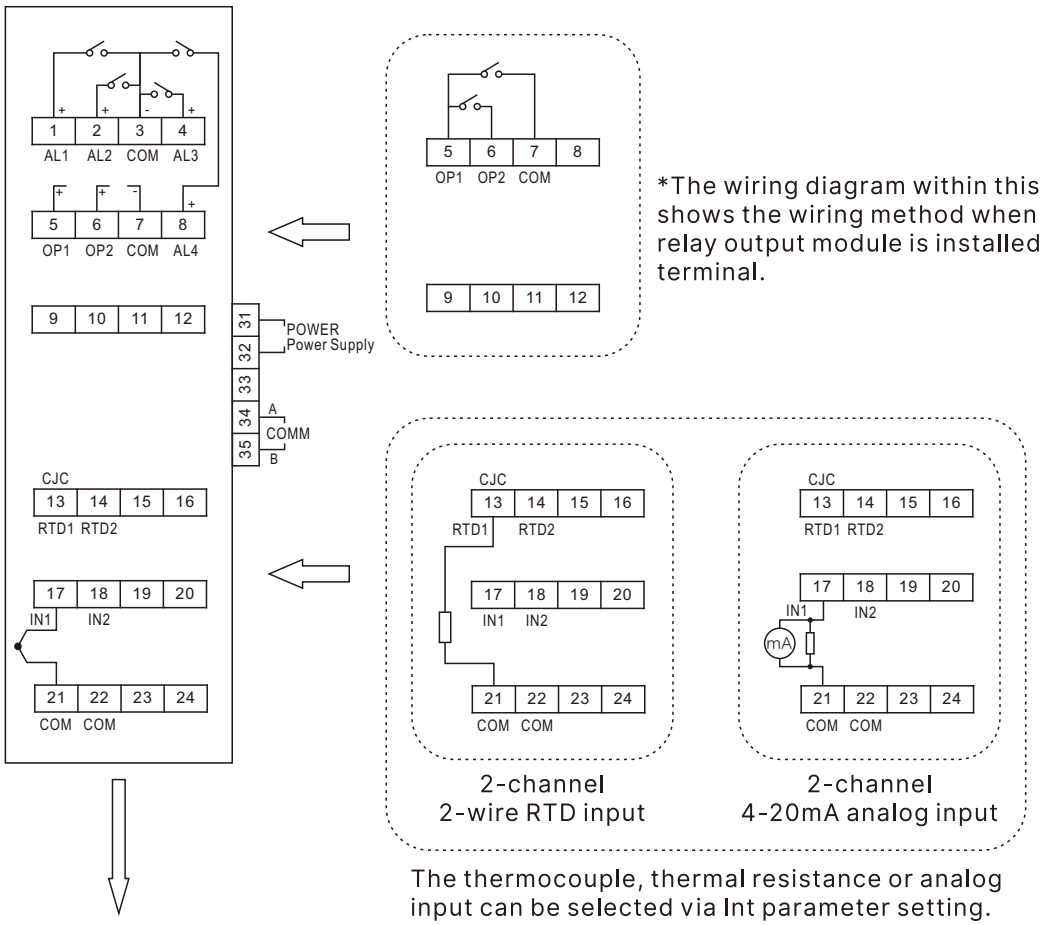
⑦ The instrument power supply: AC 100~240V;

⑧ The instrument adopts screw terminals for wiring.

Note: In accordance with the model requirements specified in customer orders, modules are pre-installed and relevant parameters are properly configured prior to instrument delivery. Users are not allowed to replace the modules by themselves.

■ 6. Standard Wiring Diagram

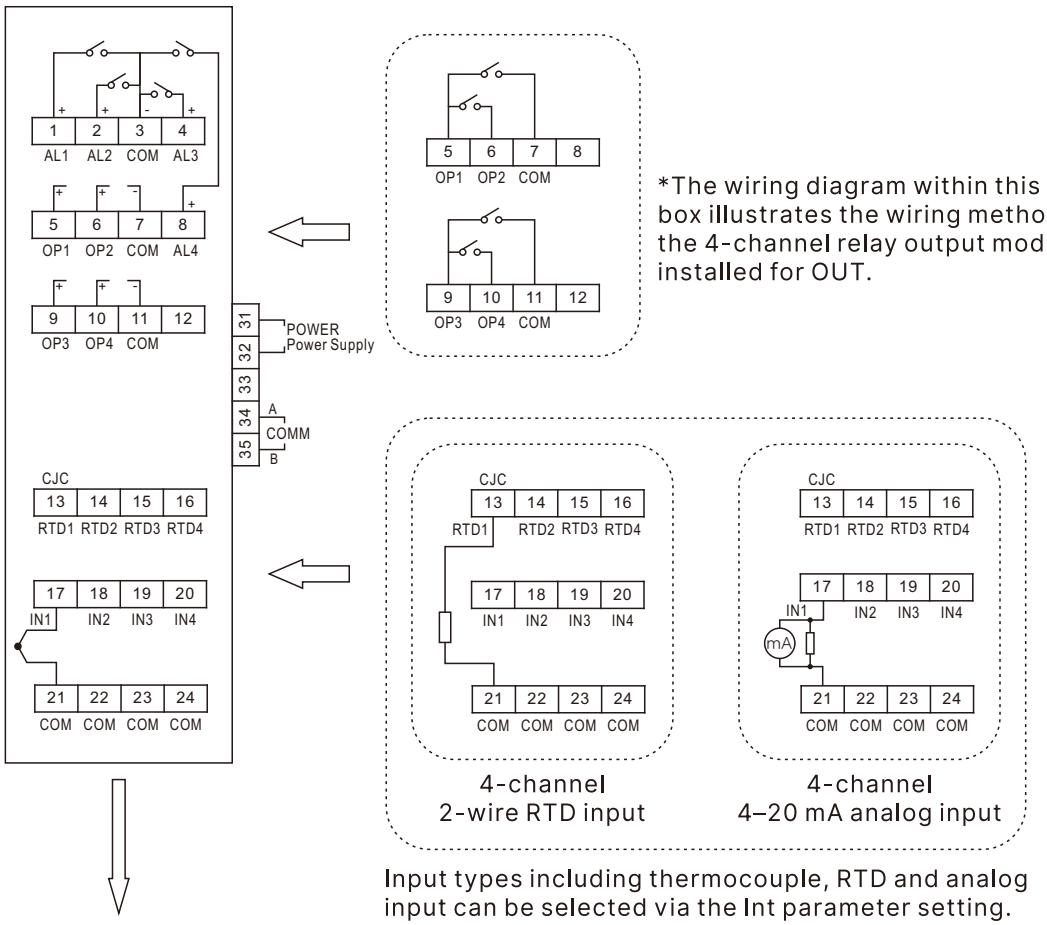
●6.1 Wiring Instructions for J11 Signal Input of AiFUZZY8025 Series 2-Channel Temperature Controller(2-channel non-isolated thermocouple, 2-wire resistance temperature detector, 4–20 mA analog signal input):



*This wiring diagram applies to: 2-channel thermocouple input, 2-way solid state relay control output, and 4-way alarm relay output.
*If the transistor output model is ordered, wire according to the positive and negative markings.

1. Connect the positive terminals of thermocouple inputs to IN1 and IN2 respectively, and connect the negative terminals to COM (Terminal 21 and Terminal 22).
2. Short-circuit CJC and COM (either Terminal 21 or Terminal 24) to cancel the cold junction compensation for thermocouples.
3. Connect one end of each 2-wire RTD to RTD1 and RTD2 respectively, and connect the other end to COM (Terminals 21~22).
4. For 4–20 mA analog signal input, connect a 2.5 Ω high-precision resistor in parallel between the positive IN terminal and negative COM terminal of each channel.
5. When the Q2 module is installed on the OUT side: The main control outputs OP1 and OP2 correspond to the positive terminals of the two solid-state relays respectively, and Terminal 7 is the common negative terminal for OP1 and OP2.。
6. When the R2 module is installed for OUT, wire it in accordance with the wiring method for 2-channel relay output module installation shown in the dotted box.
7. The alarm output supports up to 4 relay output channels:
Channel 1: Connect AL1 (Terminal 1) and COM (Terminal 3);
Channel 2: Connect AL2 (Terminal 2) and COM (Terminal 3);
Channel 3: Connect AL3 (Terminal 4) and COM (Terminal 3);
Channel 4: Connect AL4 (Terminal 8) and COM (Terminal 3).
8. If OUT or ALM is configured with NPN transistor output, wire in accordance with the positive and negative markings on this wiring diagram.The output negative terminal (COM) shall connect to the negative of the external 24V power supply; the output positive terminal shall connect to coil A1 of the external relay, and the positive of the external 24V power supply shall connect to coil A2 of the external relay.

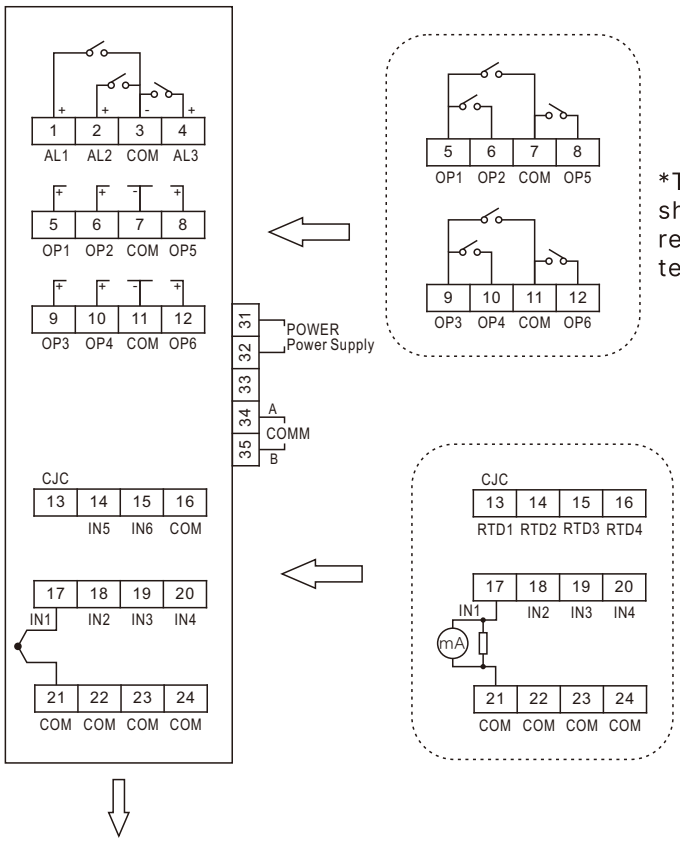
●6.1 Wiring Instructions for J11 Signal Input of AiFUZZY8045 Series 4-Channel Temperature Controller(Non-isolated thermocouple, 2-wire RTD, 4-20mA analog signal input):



*This wiring diagram applies to: 4-channel thermocouple input, 4-channel solid state relay control output and 4-channel alarm relay output.
*If the transistor output model is ordered, please wire according to the positive and negative markings.

1. Connect the positive terminals of thermocouple inputs to IN1 ~ IN4 respectively, and connect the negative terminals to COM (Terminals 21 to 24).
2. Shorting CJC and COM (any one of terminals 21 to 24) can disable the thermocouple room temperature compensation.
3. For 2-wire RTD inputs, connect one end to RTD1~RTD4 respectively, and connect the other end to COM (Terminals 21 to 24).
4. For 4-20mA analog input, connect a 2.5Ω high-precision resistor in parallel between the IN terminal (positive) and COM terminal (negative) of each channel.
5. When the Q4 module is installed for OUT:The main control outputs OP1 to OP4 correspond to the positive terminals of the 4 solid state relays respectively.Terminal 7 serves as the negative terminal for OP1 and OP2, and Terminal 11 serves as the negative terminal for OP3 and OP4.
6. When the R4 module is installed for OUT:Please wire in accordance with the wiring specifications for the 4-channel relay output module of OUT shown in the dotted box.
7. The alarm output supports up to 4 relay channels.
Channel 1 is connected to AL1 (Terminal 1) and COM (Terminal 3);
Channel 2 is connected to AL2 (Terminal 2) and COM (Terminal 3);
Channel 3 is connected to AL3 (Terminal 4) and COM (Terminal 3);
Channel 4 is connected to AL4 (Terminal 8) and COM (Terminal 3)
8. If NPN transistor outputs are configured for OUT or ALM, wiring shall be carried out in accordance with the positive and negative markings on this wiring diagram.The negative terminal (COM) of the output shall be connected to the 24V negative of the external power supply; the positive terminal of the output shall be connected to coil A1 of the external relay; and the 24V positive of the external power supply shall be connected to coil A2 of the external relay.

●6.2 Wiring method for J12 signal input of AiFUZZY8065 series 6-channel temperature controller(6-channel non-isolated thermocouple, 4-20mA analog signal input):



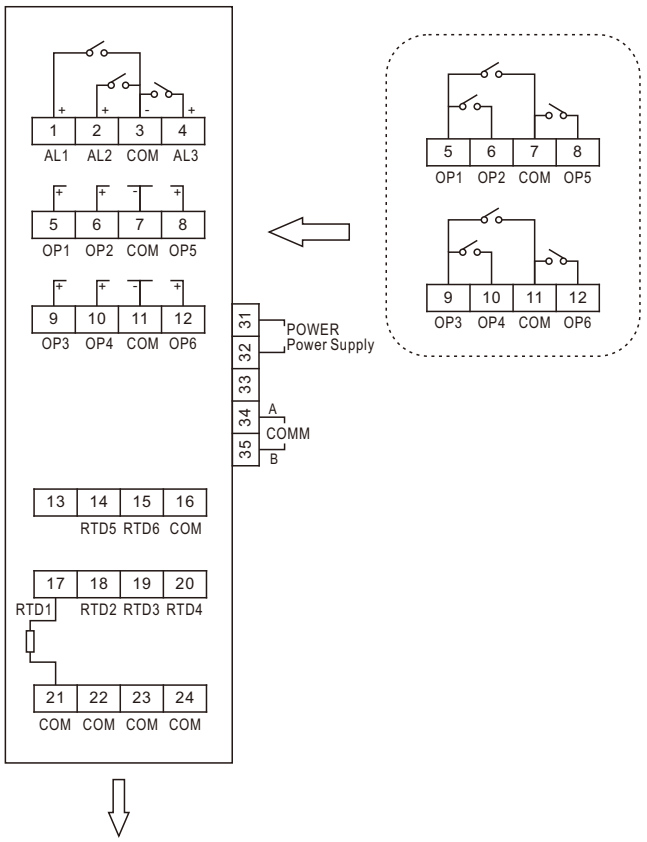
*The wiring diagram inside the dashed box shows the wiring connection for the 6-channel relay output module installed on the OUT terminal.

Four-channel 4-20mA analog input; thermocouple, RTD and analog input types can be selected via Int parameter setting.

*This wiring diagram is for: 6-channel thermocouple input, 6-channel solid state relay control output and 3-channel alarm relay output.
*If the transistor output model is purchased, please wire according to the positive and negative marks.

1. Connect the positive terminals of thermocouple inputs to IN1~IN6 respectively, and connect the negative terminals to the COM terminals (Terminal 16 or Terminals 21 to 24).
2. Short-circuit CJC with any one of COM (Terminals 21 to 24 or Terminal 16) to cancel the cold junction temperature compensation of thermocouple.
3. For 4-20 mA analog input, connect a 2.5Ω high-precision resistor in parallel between the IN terminal (positive) and COM terminal (negative) of each channel.
4. When the Q6 module is installed for OUT:
The main control outputs OP1 to OP6 correspond to the positive terminals of the 6-channel solid state relays respectively.
Terminal 7 serves as the negative terminal for OP1, OP2 and OP5;
Terminal 11 serves as the negative terminal for OP3, OP4 and OP6.
5. When the R6 module is installed for OUT:
Please follow the wiring method for the 6-channel relay output module installed on OUT shown in the dashed box.
6. The alarm output supports up to 3-channel relay outputs.
Channel 1 connects to AL1 (Terminal 1) and COM (Terminal 3);
Channel 2 connects to AL2 (Terminal 2) and COM (Terminal 3);
Channel 3 connects to AL3 (Terminal 4) and COM (Terminal 3).
7.If an NPN transistor output is installed for OUT or ALM, wiring shall be performed in accordance with the positive and negative markings on this wiring diagram.The output negative terminal (COM) shall be connected to the negative pole of the external 24V power supply;The output positive terminal shall be connected to coil A1 of the external relay;The positive pole of the external 24V power supply shall be connected to coil A2 of the external relay.

●6.3 Wiring Method for J13 Signal Input of AiFUZZY8065 Series 6-Channel Temperature Controller(6-channel 2-wire RTD signal input)

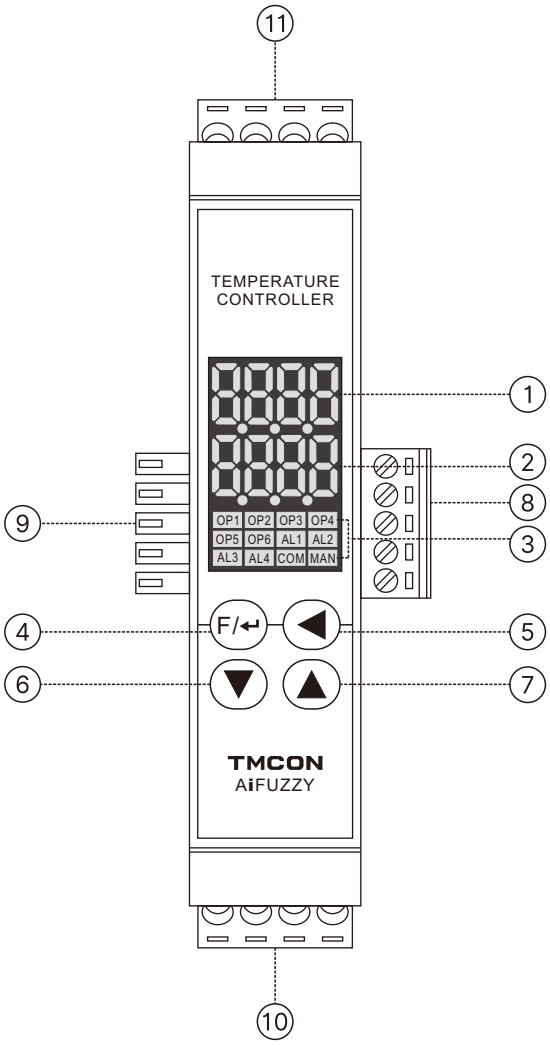


*The wiring diagram within the dashed box shows the wiring method when a 6-channel relay output module is installed at the OUT port.

*This wiring diagram applies to: 6-channel 2-wire RTD input, 6-channel solid state relay control output, and 3-channel alarm relay output.
*If the transistor output version is ordered, please wire according to the positive and negative markings.

1. Connect the positive terminals of the input thermal resistors to RTD1~RTD6 respectively, and connect the negative terminals to COM (Terminal 21–24 or Terminal 16).
2. When the Q6 module is installed for OUT:
The main control outputs OP1 to OP6 are connected to the positive terminals of the six solid state relays respectively.
Terminal 7 is the common negative for OP1, OP2 and OP5.
Terminal 11 is the common negative for OP3, OP4 and OP6.
3. When the R6 module is installed for OUT: please refer to the wiring instructions for the 6-channel relay output module of OUT shown in the dashed box.
4. The alarm output supports up to 3 relay channels.
Channel 1 connects AL1 (Terminal 1) and COM (Terminal 3);
Channel 2 connects AL2 (Terminal 2) and COM (Terminal 3);
Channel 3 connects AL3 (Terminal 4) and COM (Terminal 3).
5. When NPN transistor output is configured for OUT or ALM, wire in accordance with the positive and negative marks on the wiring diagram.
Connect the output negative terminal (COM) to the negative of the external 24V power supply, the output positive terminal to coil A1 of the external relay, and the positive of the external 24V power supply to coil A2 of the external relay.

■ 7. Panel Description



① Primary display window (displays process value PV, parameter names, etc.)

② Secondary display window
(displays set value SV, parameter values, alarm codes, loop codes, etc.)

③ Indicator lights:
OP1~OP6: Control output indicators for each channel;
AL1~AL4: Alarm indicators;
COM: Communication indicator;
MAN: Manual loop switching indicator.

④ Parameter setting & confirmation key(also for manual/auto cycle display switching)

⑤ Data shift key (also used to switch between set value setting and AT auto-tuning setting)

⑥ Data decrement key (also for switching to the previous channel)

⑦ Data increment key (also for switching to the next channel)

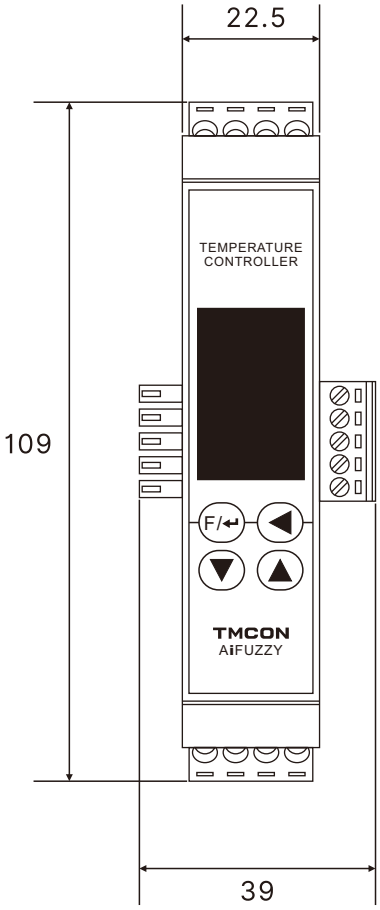
⑧ Power and RS485 communication terminals

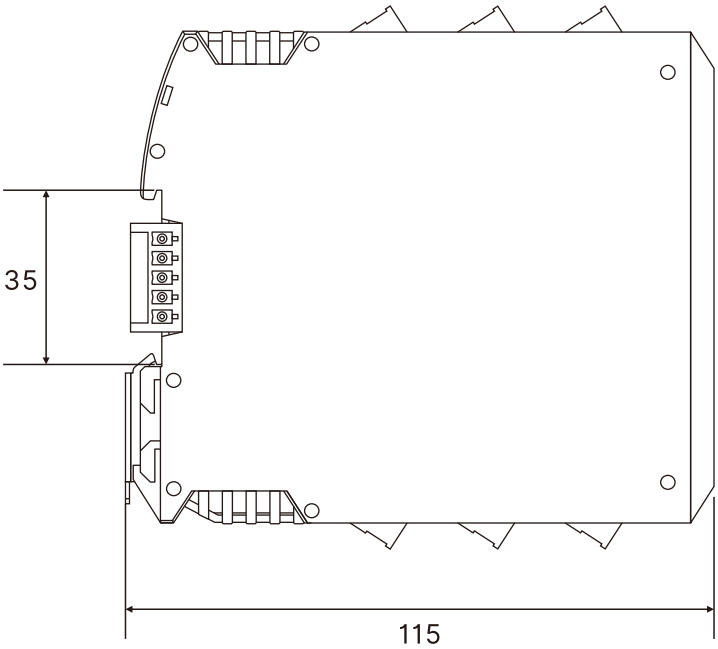
⑨ Multi-device quick-splice pluggable terminals

⑩ Signal input terminals

⑪ Control output terminals

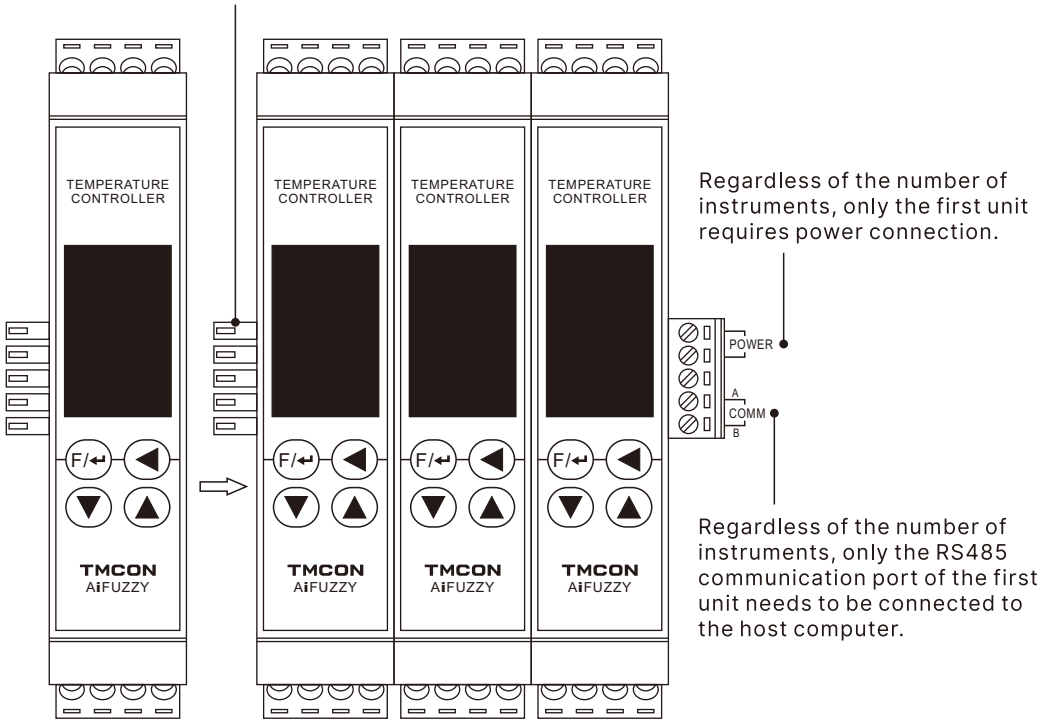
●8.1 Single overall dimensions

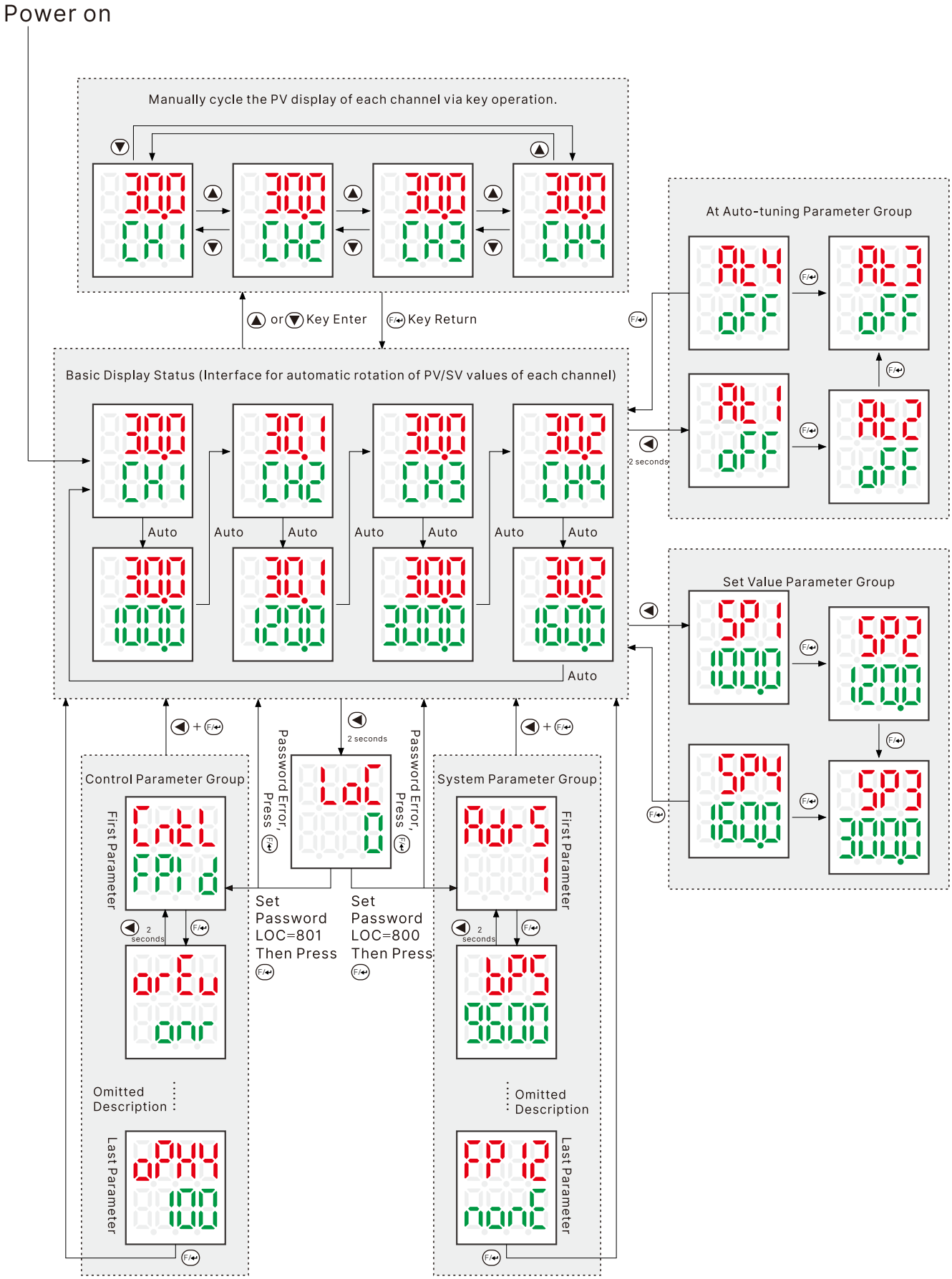




●8.2 Schematic Diagram of Multi-unit Quick Assembly

Splice rapidly through bottom plug-in terminals,
eliminating power and communication wiring requirements.




Power on
Manually cycle the PV display of each channel via key operation.
CH1
CH2
CH3
CH4
or Key Enter
Key Return
At Auto-tuning Parameter Group
AT4
AT3
AT1
AT2
oFF
2 seconds
Basic Display Status (Interface for automatic rotation of PV/SV values of each channel)
Auto
Set Value Parameter Group
SP1
SP2
SP4
SP3
1000
1200
1600
3000
Control Parameter Group
First Parameter
CtrL
FPid
orEu
onr
Omitted Description
Last Parameter
oPH
100
Password Error, Press
LoC
0
Set Password LOC=801 Then Press
Set Password LOC=800 Then Press
System Parameter Group
Adr
1
bPS
9600
FP12
none

10.1 Parameter Setting: In the basic display state, press F/↵ key and hold it for about 2 seconds to enter the on-site parameter setting state, If set LOC=800,Then press F/↵ key to enter the system parameter setting state,If set LOC=801,Then press F/↵ key to enter the control parameter setting state.Press ◄ 、▲ 、▼ and other keys to directly modify the parameter values.Press ▼ key decrease the data value,Press ▲ key increase the data value, the digit of the modified data bit will flash,press and hold the plus/minus keys continuously, to quickly increase or decrease the value.You may also press ◄ key to directly move to the digit to be modified,for quicker operation.Press F/↵ keycan save the modified parameter value and display the next parameter,press ◄ key press and hold for more than 2 seconds, to return and display the previous parameter;press ◄ + F/↵ key to directly exit the parameter setting state;If no key operation is performed,will automatically exit the parameter setting state in about 30 seconds.

10.2 Set Value Setting: Under the basic display state,press ◄ key The SP1 parameter (Set value parameter of Channel 1) will appear,Then press again ◄ 、▲ 、▼ and other keys to modify the set value,press F/↵ key can save the modified set value and display the set value of the next channel,press F/↵ key Hold down to exit the parameter setting state.

10.3 AT Auto-tuning: Press ◄ key and hold for 2 seconds,The At1 parameter (Channel 1 auto-tuning parameter) will appear,press ▲ key Change oFF to on in the lower display window,Then press F/↵ key Confirm to enable auto-tuning of Loop 1 and display the At2 parameter (Loop 2 auto-tuning parameter) of the next channel,Press the same key ▲ key Change oFF to on on the lower display window,Then press F/↵ key Confirm to enable auto-tuning of Channel 2.Press F/↵ and hold to exit the parameter setting state.Under the basic measurement state,The lower display of the channel in auto-tuning state will flash and show the text “At”,after the meter completes ON-OFF control for two oscillation cycles,it will automatically calculate the PID parameters.If you need to abandon auto-tuning in advance,press again ◄ key and hold for about 2 seconds to enter the auto-tuning setting state,press F/↵ key locate the At parameter of the corresponding loop to be modified,and set the At parameter of this channel from on to oFF,then press F/↵ key for confirmation.

Note 1: The AiFUZZY artificial intelligence fuzzy logic PID regulation algorithm combines fuzzy control (FUZZY) and proportional-integral-derivative (PID) control. It features strong adaptability, excellent control performance, simple operation and high robustness, and can maintain stable control performance in uncertain and complex operating environments. When the instrument adopts the AiFUZZY regulation mode, the auto-tuning function can be activated for the first use to assist in confirming PID and other control parameters.

Note 2: The parameters obtained by auto-tuning vary under different set values. Before executing the auto-tuning function, set the set value (SV) to the most frequently used value or the intermediate value in advance. For electric furnaces with good thermal insulation performance, the set value shall be set to the maximum operating value of the system. Modification of the SV value is prohibited during auto-tuning. Depending on different systems, the auto-tuning duration may range from several seconds to several hours.

Note 3: The control hysteresis parameter HYS also affects the auto-tuning result. Generally, the smaller the setting value of HYS, the higher the accuracy of auto-tuning parameters.However, an excessively small HYS value may cause misoperation of on-off regulation due to input fluctuation, which may in turn result in completely incorrect auto-tuning parameters. The recommended setting of HYS is 2.0.

Note 4: During auto-tuning, do not operate or set the instrument, and power failure is prohibited; otherwise, the auto-tuning result will be affected. Auto-tuning is finished only when the character "At" stops flashing.

Note 5: The control performance may not be optimal immediately after auto-tuning is completed. With the self-learning function enabled, the best control effect will be achieved after a period of operation.

10.4 Character Prompt: The lower display window of the instrument can show the channel number CH*. If the alarm indicator is enabled, when an upper or lower limit alarm occurs in the channel, characters H.AL* or L.AL* will flash on the lower display window. The upper display window displays and flashes the range upper or lower limit value. When the loop is in STOP state, StP* will be shown on the lower display window, and the instrument stops control output.

10.5 Two-wire Thermal Resistance Lead Resistance Compensation: When a two-wire connection is adopted for resistance signals such as Pt100 or Cu50, an offset value (parameter Sc) shall be set to counteract the lead resistance.The instrument provides an operation to automatically set this offset value. The steps are as follows:

1. Short-circuit both ends of the thermal resistance for the channel to be corrected first. (Note: The short circuit shall be made at the sensor side instead of the instrument side.)
2. Set parameter Loc=116, then return to the temperature interface and press and hold the key for more than 2 seconds until the first digit on the left of the lower display shows the symbol A. If an alarm is enabled, cancel it first to prevent alarm icons from interfering with the indication.
3. Wait until the letter A on the instrument display disappears automatically, then remove the short-circuit wire at the sensor end, set Loc to 0, and restore the instrument to the normal measurement state.This operation enables the instrument to invert the measured value and store it into the Sc parameter of the corresponding channel, so as to compensate the measurement error caused by lead resistance.This function is invalid if the input signal is not a resistance type or no short-circuit wire is connected.After completion, check the Sc parameter to view the lead resistance value, which is calculated as the equivalent value at 0Ω.

11.1 Field Parameter Group

Code	Name	Description	Range
User Customization	Custom Field Parameters	Through the settings of FP1~FP12 parameters, any item within system parameters and control parameters can be selected as site parameters for operator use. A maximum of 12 site parameters can be defined. If no site parameters are defined, they will not be displayed here.	
LoC LoC	Password Lock	Enter the parameter group password lock. Set LoC = 800,Then press F/↵ key, Will enter the following system parameter groups. Set LoC = 801, Then press F/↵ key, Access to the following control parameter groups. If LoC ≠ 800 or 801, press F/↵ key, All return to the basic display state.	0~9999

11.2 System Parameter Group (Set Loc=800, press the F key to enter the system parameter group)

Code	Name	Description	Range
AdrS AdrS	Communication Address	If the COMM port of the instrument is equipped with the S4 communication interface module, multi-device connection with a computer can be realized. The computer can be used to read, operate and set various parameters of the instrument. The AdrS parameter is used to define the communication address of the instrument, with an effective range of 0~100. Instruments on the same communication line shall be set with different AdrS values respectively for mutual distinction.	0~100 Factory Default 1
bPS bPS	Baud Rate	The bPS parameter defines the communication baud rate, with an adjustable range of 1200~19200 bit/s (1.2~19.2K).	0~19.2K Factory Default 9600
PArI PArI	Communication Check	nonE:No Parity. odd:Odd Parity. EVEn:Even Parity.	Factory Default nonE
COMM COMM	Communication Protocol	MBUS:The communication protocol of the instrument is MODBUS-RTU.	
CHn CHn	Channel Quantity	The units digit of parameter CHn indicates the actual number of measuring channels in use. For model 8045, the setting range is 1~4; for model 8065, the range is 1~6. Unused channels can be disabled.If CHn is set to 3, the first 3 channels will be displayed in a loop, which simplifies the instrument to a 3-channel temperature controller.	1~4 or 1~6 Factory Default or 6

CHSn CHSn	Channel Start Number	CHSn is used to set the starting channel number indicated on the lower display window of the instrument. The standard channel numbering of model 8065 is 1~6. In multi-instrument applications, the starting channel number can be modified. For example, the first instrument displays CH1~CH6. If the CHSn parameter of the second instrument is changed from 1 to 7, it will display CH7~CH12 accordingly.	1~94 Factory Default 1
CSPE CSPE	Auto Rotation Time	The CSPE parameter can be set within the range of 1 to 8 seconds. The longer the time, the slower the channel switching display speed; the shorter the time, the faster the switching speed.	1~8 Factory Default 1
dU dU	Temperature Unit	Temperature units can be selected for thermocouple or thermal resistance input: °C:Indicates the temperature display unit is Celsius. °F:Indicates the temperature display unit is Fahrenheit.	Factory Default °C
KP KP	Setting Lock Prohibited	Parameter lock for setting prohibition 0: Unlocked (no lock). 1: Lock SP set value (setting prohibited). 2: Lock AT (setting prohibited). 3: Lock SP and AT (setting prohibited). 4: Lock site parameters (setting prohibited).	0~4 Factory Default 0
ASHo ASHo	Alarm Prompt	0: Without alarm prompt function. 1: With alarm prompt function. The lower display window will flash the alarm code when an alarm occurs.	0~1 Factory Default 0
nonC nonC	Alarm Normally Open / Normally Closed Output	Alarm Normally Open / Normally Closed Selection: The units digit corresponds to AL1, the tens digit to AL2, the hundreds digit to AL3, and the thousands digit to AL4. Value 0: Normally open output Value 1: Normally closed output For example, setting 0 means AL1, AL2, AL3 and AL4 are all normally open; setting 1 means AL1 is normally closed, and AL2, AL3, AL4 are normally open. Setting 11 indicates AL1 and AL2 are normally closed, while AL3 and AL4 are normally open. Setting 110 means AL1 is normally open, AL2 and AL3 are normally closed, and AL4 is normally open.	0~11 Factory Default 0
ALtd ALtd	Alarm Definition	0: Both high and low alarms are absolute value alarms. 1: The high alarm is a deviation alarm, and the low alarm is an absolute value alarm. 2: The high alarm is an absolute value alarm, and the low alarm is a lower deviation alarm. 3: Both high and low alarms are deviation alarms.	0~3 Factory Default 0
AoF1 AoF1	AL1 Alarm Output Time	0: Disable this function. The automatic alarm output off time ranges from 1 to 9999 seconds. After alarm output is activated, timing starts automatically. When the set time expires, the alarm output turns off.	0~ 9999 second Factory

AoF2	AL2 Alarm Output Time	Ditto	Default 0
AoF3	AL3 Alarm Output Time	Ditto	
AoF4	AL4 Alarm Output Time	Ditto	
C1~4.Hi C1~4.Hi (4-channel) C1~6.Hi C1~6.Hi (6-channel)	High Alarm Value	When the high-limit alarm is an absolute value alarm: When the measured value PV exceeds C*.Hi, the instrument activates the high-limit alarm; When the measured value PV is less than the value of C*.Hi-AHY*, the instrument will release the high-limit alarm. When the high-limit alarm is set as deviation alarm: When the deviation (Measured Value PV - Set Value SV) is greater than C*.Hi, a deviation high-limit alarm is triggered. The alarm is cleared when the deviation is less than C*.Hi-AHY1. When C*.Hi is set to the maximum value of 3200, this alarm function is disabled.	-999 ~ 3200 Factory Default 3200
C1~4.Lo C1~4.Lo (4-channel) C1~6.Lo C1~6.Lo (6-channel)	Low Alarm Value	When the low-limit alarm is an absolute value alarm: When PV is less than C*.Lo, a low-limit alarm is triggered; the low-limit alarm is cleared when PV is greater than C*.Lo + AHY*. When the low-limit alarm is a deviation alarm: When the deviation (Measured Value PV - Set Value SV) is less than C*.Lo, a deviation low-limit alarm is generated; the alarm is released when the deviation is greater than C*.Lo+AHY*. When C*.Lo is set to the minimum value -999, the corresponding alarm function is deactivated.	-999 ~ 3200 Factory Default -999
APo1~4 APo1~4 (4-channel) APo1~6 APo1~6 (6-channel)	Alarm Output Port Definition	The units digit represents the high limit alarm C*.Hi, and the tens digit represents the low limit alarm C*.Lo. Value 0: Disable this alarm function. Value 1: Output via AL1 port Value 2: Output via AL2 port Value 3: Output via AL3 port Value 4: Output via AL4 port Values 5 and 6 are reserved for future use. If Aot1=1, C1.Hi is output by AL1, and the alarm function of C1.Lo is disabled. If Aot1=11, it means C1.Hi and C1.Lo are both output through AL1. If Aot1=21, it indicates that C1.Hi is output via AL1 and C1.Lo is output via AL2.	0~66 Factory Default 21

<table>
<tr>
<td>AHY 1~4
AHY1~4
(4-channel)
AHY 1~6
AHY1~6
(6-channel)</td>
<td>Alarm Hysteresis</td>
<td>Also known as alarm hysteresis, this function prevents frequent cycling of the alarm relay at the critical threshold. It creates a delay difference between the ON and OFF actions of the alarm output.</td>
<td>0.0~999.0
Factory Default 1.0</td>
</tr>
<tr>
<td>Int 1~4
Int1~4
(4-channel)
Int 1~6
Int1~6
(6-channel)</td>
<td>Input Specification</td>
<td>
<table>
<tr><th>In-t</th><th>Input Type</th><th>In-t</th><th>Input Type</th></tr>
<tr><td>0</td><td>K(-50.0~+1300°C)</td><td>19</td><td>Reserved</td></tr>
<tr><td>1</td><td>S(-50~+1700°C)</td><td>20</td><td>Cu50</td></tr>
<tr><td>2</td><td>R(-50~+1700°C)</td><td rowspan="2">21</td><td rowspan="2">Pt100(-200.0~+600.0°C)</td></tr>
<tr><td>3</td><td>T(-200~+350°C)</td></tr>
<tr><td>4</td><td>E(0~800°C)</td><td rowspan="2">22</td><td rowspan="2">Pt100(-100~+300.00°C)</td></tr>
<tr><td>5</td><td>J(0~1000°C)</td></tr>
<tr><td>6</td><td>B(200~1800°C)</td><td>25</td><td>0~75mV</td></tr>
<tr><td>7</td><td>N(0~1300°C)</td><td>26</td><td>0~80 Ω Resistance</td></tr>
<tr><td>8</td><td>WRe3-WRe25</td><td>27</td><td>0~400 Ω Resistance</td></tr>
<tr><td>9</td><td>WRe5-WRe26</td><td>28</td><td>0~20mV</td></tr>
<tr><td>10</td><td>For customized special input specifications</td><td>29</td><td>0~100mV</td></tr>
<tr><td>12</td><td>F2 Radiation Pyrometer</td><td>30</td><td>0~60mV</td></tr>
<tr><td>13~16</td><td>Reserved</td><td>31</td><td>0~50mV(0-20mA)</td></tr>
<tr><td>17</td><td>K(0~300.00°C)</td><td>32</td><td>10~50mV(4-20mA)</td></tr>
<tr><td>18</td><td>J(0~300.00°C)</td><td>33~37</td><td>Reserved</td></tr>
</table>
Note: For 0–20 mA or 4–20 mA input, an external 2.5 Ω resistor is required. Afterwards, set Int=31 or Int=32 accordingly.
</td>
<td>0~41
Factory Default 0</td>
</tr>
<tr>
<td>dP 1~4
dP1~4
(4-channel)
dP 1~6
dP1~6
(6-channel)</td>
<td>Decimal Point</td>
<td>Four display formats are available: 0, 0.0, 0.00 and 0.000.
Note: When using common thermocouple or thermal resistance input, only two formats (0 or 0.0) are available for selection.</td>
<td>1~3
Factory Default 1</td>
</tr>
<tr>
<td>InL 1~4
InL1~4
(4-channel)
InL 1~6
InL1~6
(6-channel)</td>
<td>Input Scale Lower Limit</td>
<td>Used to define the lower scale value of the linear input signal.</td>
<td>-999~3000
Factory Default 0.0</td>
</tr>
</table>

InH1~4 InH1~4 (4-channel) InH1~6 InH1~6 (6-channel)	Input Scale Upper Limit	Used to define the upper scale value of the linear input signal.	-999 ~ 3000 Factory Default 100.0
SC1~4 SC1~4 (4-channel) SC1~6 SC1~6 (6-channel)	Input Correction	The Sc parameter is generally used for offset correction of thermocouples to compensate for errors of sensors or input signals, as well as cold junction compensation errors of the controller. The unit of Sc correction value is 0.1°C. For example, if Sc is set to -10.0, the measured value will be 10.0°C lower than that when Sc=0.0.The SC parameter is normally set to 0. Do not adjust it unless necessary. Incorrect settings will cause measurement errors. When the input adopts two-wire thermal resistance wiring mode, the correction value of Sc = Sc multiplied by the signal unit. One signal unit equals 0.02 Ω for Pt100 input. For example, to correct 50 signal units, set Sc = -5.0. When using a Pt100 sensor, the correction value is -1 Ω. If the lead resistance is 1 Ω, it can exactly offset the lead resistance error. Refer to Section 8.5 for the setting method of automatic lead resistance compensation for two-wire thermal resistance.	-199.0 ~ 999.0 Factory Default 0
InF1~4 InF1~4 (4-channel) InF1~6 InF1~6 (6-channel)	Digital Filtering	InF determines the digital filtering intensity. The higher the setting, the stronger the filtering, and the slower the response speed of measured data. When severe interference occurs during measurement, gradually increase the InF value to keep the instantaneous fluctuation of the measured value within 2 to 5 digits.When the controller is under metrological verification, set InF to 0 or 1 to improve response speed.InF is in the unit of 0.5 seconds.	0~40 Factory Default 1
SPL1~4 SPL1~4 (4-channel) SPL1~6 SPL1~6 (6-channel)	SV Operation Lower Limit	Minimum adjustable value of the SP setpoint.	-999 ~ 3200 Factory Default -999

SPH 1~4 SPH1~4 (4-channel) SPH 1~6 SPH1~6 (6-channel)	SV Operation Upper Limit	Maximum adjustable value of the SP setpoint.	-999 ~ 3200 Factory Default 3200
FP 1 ~ FP 12 FP1 ~ FP12	Custom Site Parameter 1	Through FP1~FP12, any 12 parameters from the system parameter group and control parameter group can be selected as site parameters for on-site operators. If the number of required site parameters is less than 12 (or even none), define the used parameters in sequence from EP1 to EP12, and set the first unused parameter to nonE. For example: If the set value SP of each channel needs frequent on-site modification on the controller, the EP parameters can be set as follows: FP1=C1.Hi,FP2=C2.Lo,FP3=AHY1,FP4=AHY2,FP5~FP12=nonE(FP5~FP12 Undefined Site Parameter),At this time, the controller's site parameters can be displayed.C1.Hi,C2.Lo,AHY1,AHY2 These four parameters are for on-site operators to use.	Factory Default nonE

11.3 Control Parameter Group(Set Loc=801 and press the F key to enter the control parameter group)

Code	Name	Description	Range
CntL CntL	Control Mode	ONOF: Adopts ON-OFF two-position regulation, only suitable for occasions with low control accuracy requirements. FPID: Adopts advanced AiFUZZY (PID+FUZZY) artificial intelligent regulation algorithm, recommended for general use.	Factory Default FPID
orEu OrEV	Direct / Reverse Action	ONR: Reverse acting control mode. When the input increases, the output tends to decrease, applicable to heating control. OND: Direct acting control mode. The output increases as the input rises, which is applied to cooling control.	Factory Default onr
CP CP	Control Cycle	CP reflects the response speed of the controller's calculation and control, and its value directly affects the control accuracy. When adopting SSR solid state relay or transistor output, the control cycle is generally set to 0.5–3.0 seconds. When relay switching output is adopted, an excessively short control cycle will shorten the service life of the mechanical switch, while an overly long cycle will reduce control accuracy. Therefore, the control cycle is generally set between 15 and 40 seconds. It is recommended that the CP value be set to approximately 1/5 to 1/10 of the derivative time, which shall basically be equal to the system lag time.When the regulation mode parameter CntL is set to the ON-OFF mode, CP defines the delay time for ON action after output disconnection or power-on. It prevents immediate re-closure right after disconnection. This function is designed to protect loads such as compressors that cannot withstand frequent starting.	0.5~ 300.0 SSR output factory default 1.0, Relay output factory default 15
HYS 1~4 HYS1~4 (4-channel) HYS 1~6 HYS1~6 (6-channel)	Control Hysteresis	Used to prevent frequent switching of the output relay in ON-OFF two-position control. Used for reverse-acting (heating) control: the relay turns off when PV is greater than SV, and the output re-engages when PV is less than SV-HYS. Used for direct-acting (cooling) control: the output turns off when PV is lower than SV, and re-energizes when PV exceeds SV+HYS.	0~999.0 Factory Default 1.0
P 1~4 P1~4 (4-channel) P 1~6 P1~6 (6-channel)	Proportional Band	Defines the proportional band of FPID. Its unit is the same as the PV value, instead of adopting the percentage of the range.For familiar systems, directly enter the known and correct P, I, D and CP parameters without activating the auto-tuning (AT) function.	0.0~ 3000 Factory Default 30.0

I 1~4 I1~4 (4-channel) I 1~6 I1~6 (6-channel)	Integral Time	Defines the integral time of PID control in seconds. The integral action is disabled when I=0.	0~9999 Factory Default 100
d 1~4 d1~4 (4-channel) d 1~6 d1~6 (6-channel)	Derivative Time	Defines the derivative time of PID control, with a unit of 0.1 seconds. The derivative action is disabled when d=0.	0.0~999.9 Factory Default 50.0
oPH 1~4 OPH1~4 (4-channel) oPH 1~6 OPH1~6 (6-channel)	Control Output Upper Limit	Limits the maximum percentage of OUTP and AUX control output.	0~110 Factory Default 100

■ 12. Display / Special Status Character Codes

Character Code	Description	Countermeasures
SV At1 Display:At1	Indicates that Channel 1 is performing self-tuning.	If this is an incorrect operation and you need to turn it off, set the At1 parameter to oFF. If self-tuning is required, let the device finish the tuning process automatically following the self-tuning rules. The same operation applies to other channels.
SV StP1 Display:StP1	Indicates that Channel 1 executes STOP, and Loop 1 will stop control output.	To restart Channel 1, set the At1 parameter from Stop to oFF. Channel 1 will resume normal control operation, with the same effect for other channels.
SV H.AL1 Display:H.AL1	Indicates that the first high-limit alarm is triggered on Channel 1.	If you need to turn off the alarm reminder while maintaining normal alarm functions, set the ASHo parameter from 1 to 0. To disable the upper limit alarm function, set C1.Hi to the maximum value of 3200. The same setting applies to other channels.
SV L.AL1 Display:L.AL1	Indicates that the first low-limit alarm is triggered on Channel 1.	If you want to mute the alarm prompt while keeping the alarm function enabled, set the ASHo parameter from 1 to 0. To disable the low-limit alarm function, set C1.Lo to the minimum value of -999. The same applies to other channels.
PV orAL Display:orAL	Indicates an input signal error of this channel.	Over-range is indicated by the flashing PV value along with the display of the maximum or minimum value.At this time, check whether the Int input specification parameters are correctly configured, and inspect for broken wires, incorrect wiring, damaged temperature sensors and other abnormal input faults.

■ 13. Communication Expansion Module

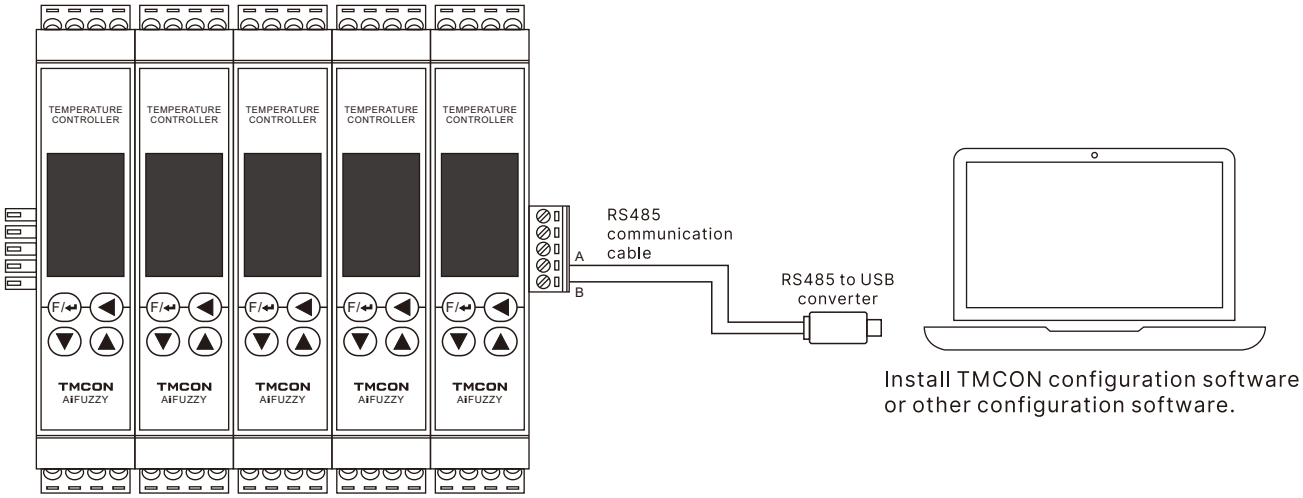
In addition to built-in RS485 communication, the AiFUZZY8XX5 rail-mounted multi-channel intelligent temperature controller can convert RS485 communication into Ethernet, Wi-Fi, 4G and RF wireless communication via a communication expansion module.

HT630 RS485 to Ethernet Communication Module

HT610 RS485 to Wi-Fi Communication Module
HT620 RS485 to 4G Communication Module
HT680 RS485 to RF Wireless Communication Module

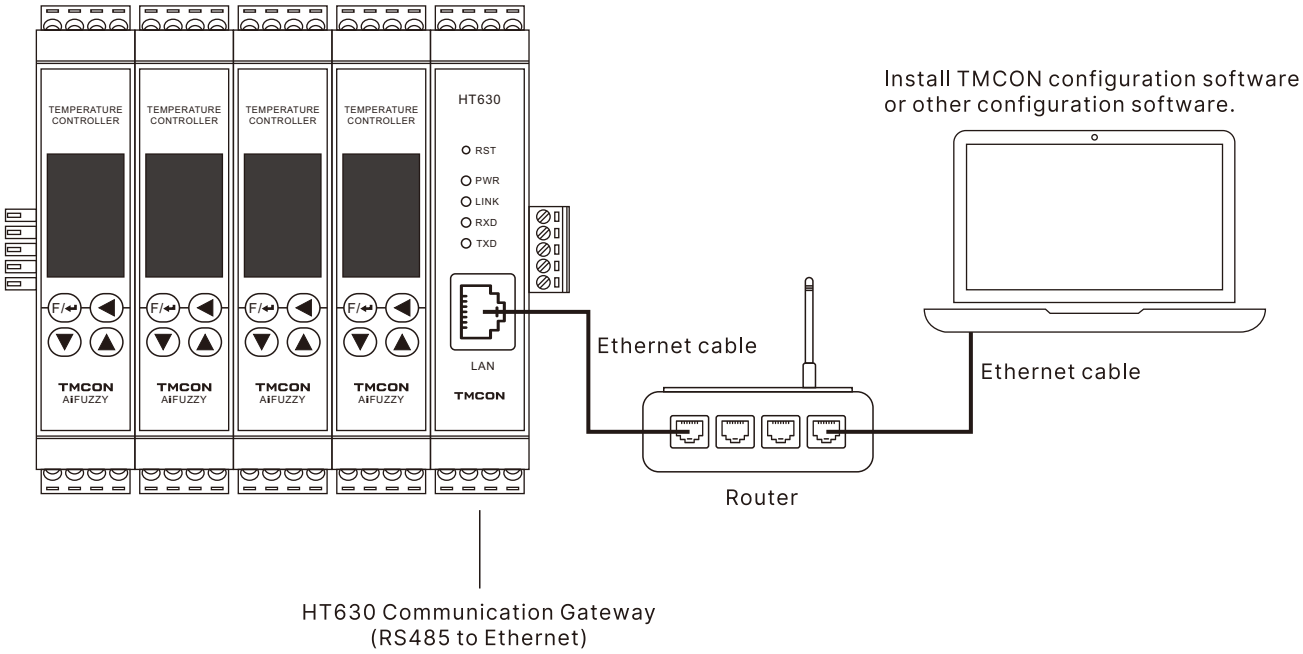
Note: The above communication expansion modules are optional accessories.
For details, please contact our company's sales or technical staff.

14.1 RS485 Communication Case



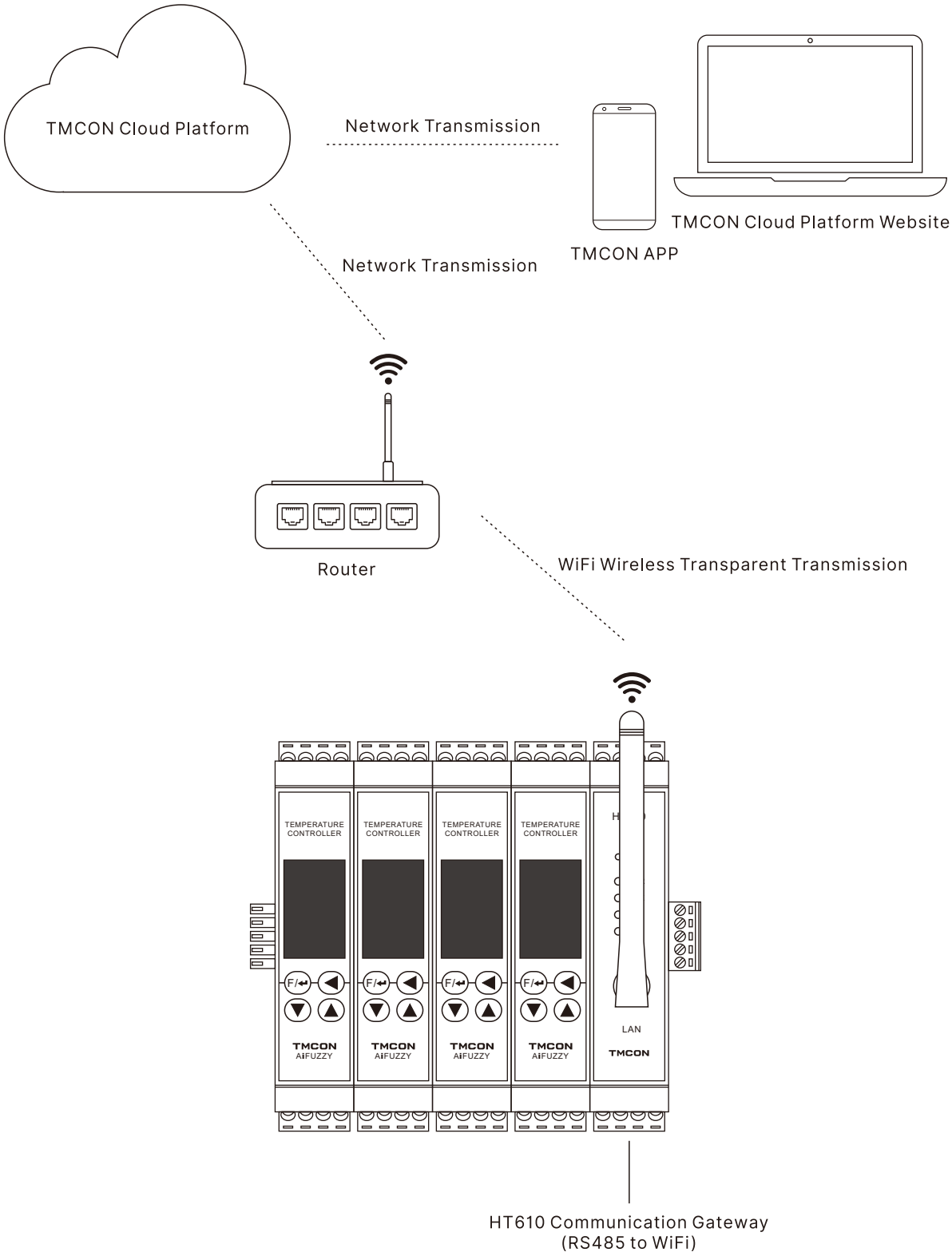
Thermostats can be quickly assembled via bottom pluggable terminals, eliminating communication wiring between units. Only the first thermostat at the end needs to be connected to a computer, touch screen or PLC with an RS485 communication cable.

14.2 Ethernet Communication Case



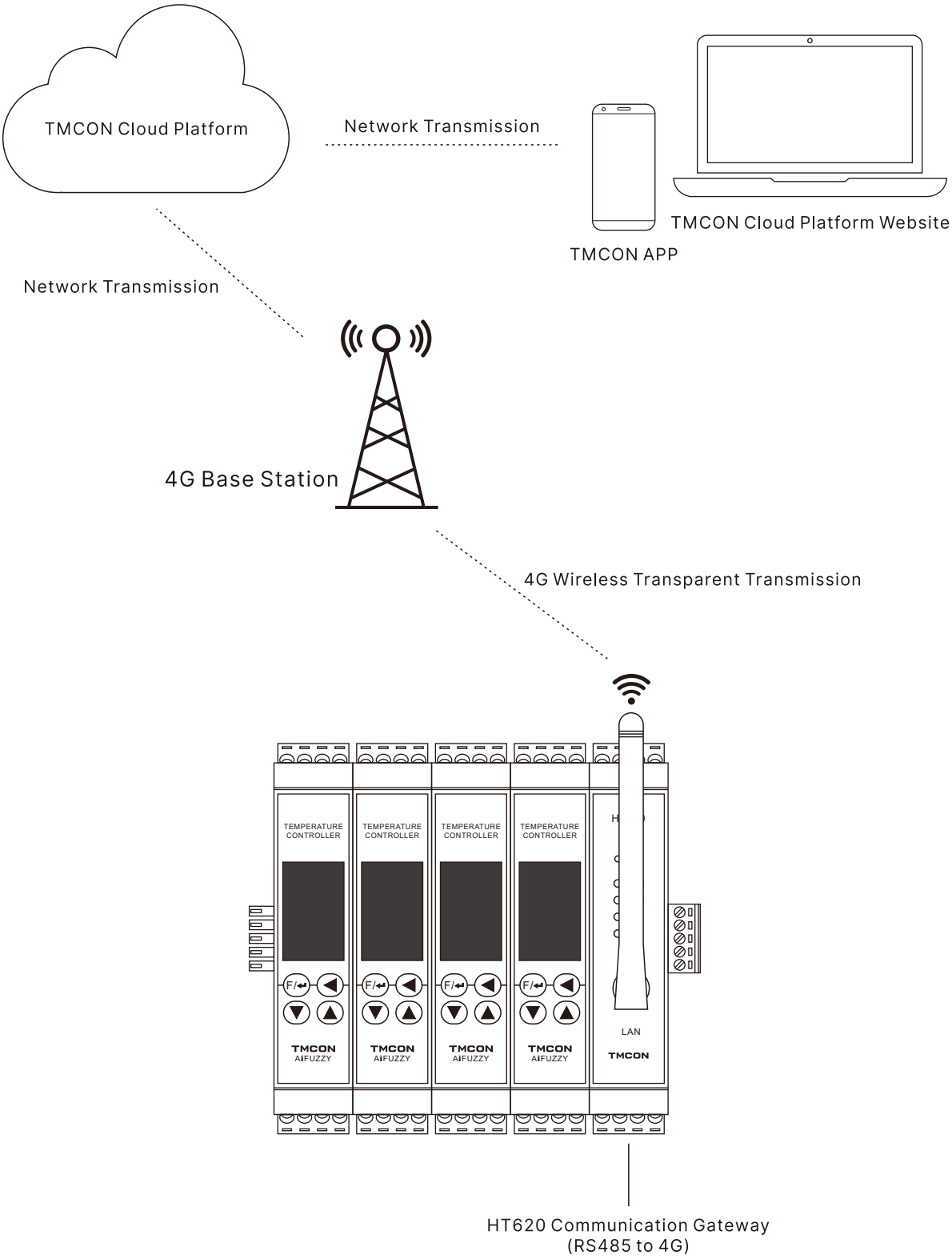
Cooperate with the HT630 communication gateway to convert RS485 communication to Ethernet communication and realize local area network (LAN) communication.

14.3 WiFi Wireless Communication Case



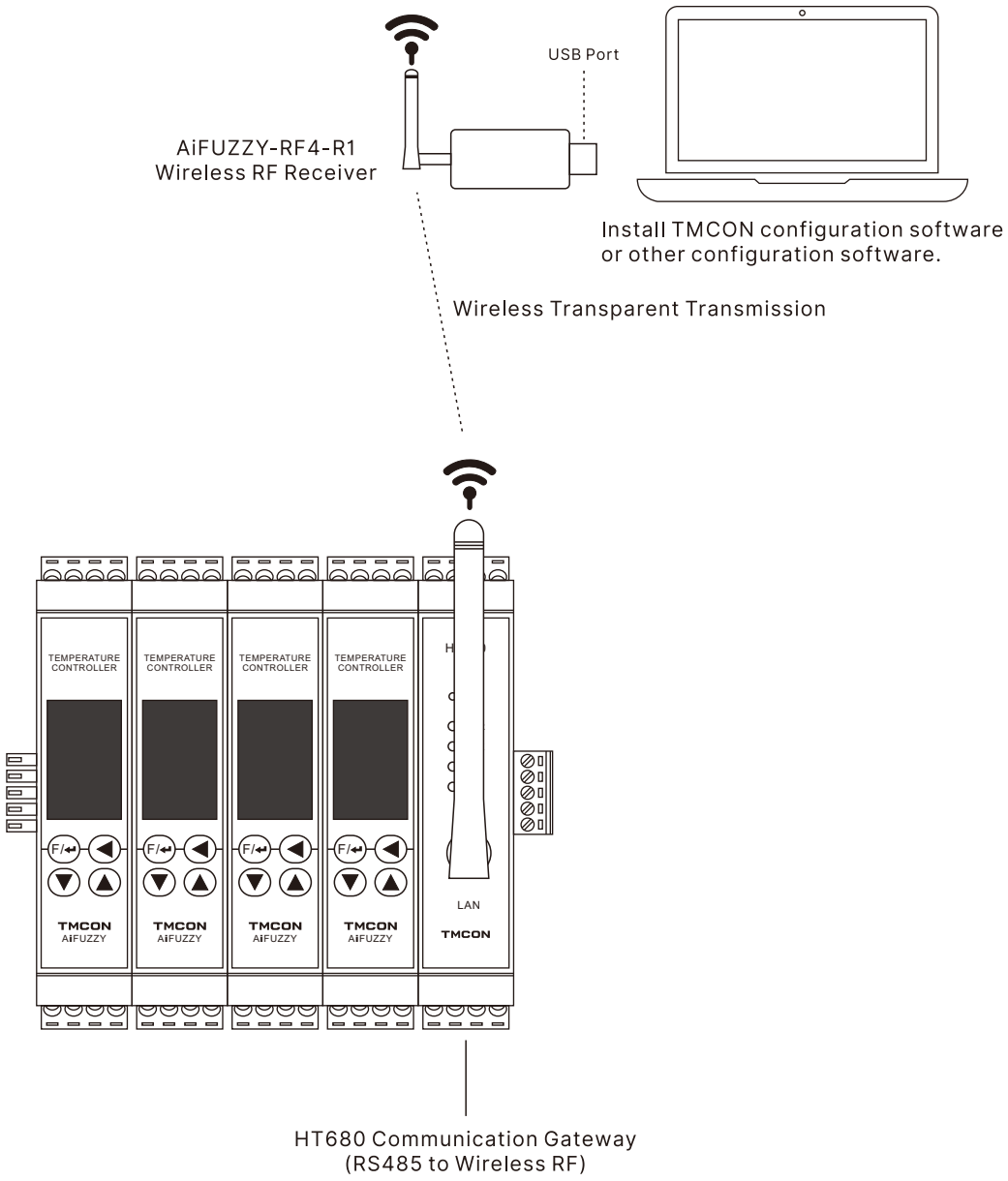
Combined with the HT610 communication gateway, it converts RS485 communication into WiFi communication, enabling connection with PC cloud platforms and mobile APPs.

14.4 4G Wireless Communication Case



Combined with the HT620 communication gateway, RS485 communication is converted into 4G communication to realize data interaction with the cloud platform on PC and mobile APP.

14.5 AiFUZZY-RF4 Wireless RF Communication Case



Combined with the AiFUZZY-RF4-HT communication gateway, RS485 communication is converted into wireless RF communication. It functions as wireless 485 communication, an ideal solution to replace traditional wired RS485 communication. Its advantages are listed below:

1. Compatible with all upper computer software for wired RS485 communication.
2. No wiring or complicated settings required, plug and play.
3. Long communication distance up to 1km, strong anti-interference ability and stable communication signals. In long-distance application scenarios, wired RS485 communication is susceptible to signal attenuation and interference, while the AiFUZZY-RF4 delivers more stable communication performance.
4. It supports more communication devices than RS485, enabling connection with thousands of instruments, and is highly suitable for multi-device wireless communication scenarios.