JNC technology
銘祥科技實業股份有限公司

JNC

Smart Box Embedded Edge AI

DO4/DO8/DO16



For firmware v1.19a 261020 or later

V1.08

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Symbols Used in This Manual

What you see	Meaning
DANGER, WARNING, CAUTION (gray box)	Safety messages in three levels; see 1-2 Safety Message Levels (p. 13)
Power off first, Live work, Factory setting – do not change	Pre-operation labels; see 1-4 Pre-Operation Labels (p. 14)
No label	You can complete the task yourself by following the steps in this manual
Red text	Key point
Red underlined text	The most critical words within a key point
Blue text	A second key point paired with red text
1 2	Corresponds to the same number in the screenshot above
A gray line "Path: A → B → C"	Where to click to open this screen
Blue underlined text (page N)	Another section of this manual. Click it in the electronic file; in the printed manual, turn to that page
★	An item in an example scenario that must be set according to the site

Product Overview and Features

The product name is Smart Box Embedded Edge AI.

> **Smart Box Embedded Edge AI is a modular, plug-and-play control box that requires no wire tracing, no downtime, no coding, and no custom panel building, making it a fast way to bring both new and existing equipment onto the IoT. Four functions in one: IoT control / data collection / ESG (optional current detection) / equipment health diagnosis (optional current detection).**

Product web page: https://www.jnc-tec.com.tw/en/product-DO4-DO8-DO16

- **IoT control: Switch equipment on and off remotely from the cloud. On site, you can also use a mobile phone connected to the device web page.**
- **Data collection: Connect sensors to record values and upload them to the cloud.**
- **ESG, equipment health diagnosis: Requires the optional current detection (CT), purchased separately, to measure how much power each output's equipment uses and whether it is running abnormally.**

Product Features:

- **The most compact IoT smart control box.**
- **Modular PCB manufacturing with no customization required, for stable and reliable products.**
- **Controls up to 16 equipment circuits.**
- **Lightning surge protection for power and signal lines.**
- **Solves the problem of IoT systems with no manual switch for on-site equipment (equipment can still be started and stopped on site if the system fails; avoids conflicts between cloud and on-site control).**
- **Easy maintenance with no wire tracing and foolproof connectors; simply replace the circuit board to resume normal operation.**
- **Installation requires no wire tracing, no programming, no downtime, and no custom panel building; shipped directly from stock for fast installation and commissioning.**
- **Equipment protection with quick settings that prevent reverse rotation (forward/reverse equipment).**
- **Plug-in relays for quick replacement.**
- **Each output supports 5 schedule periods; Logic Control supports up to 3 blocks with a total of 15 conditions.**
- **Logic options include Logic Control, Schedule Control, Forward/Reverse Control, Alternating Operation, and channel interlock.**
- **Control logic is configured on the device web page without writing programs, so the system does not depend on the original programmer.**
- **4G (optional) and Wi-Fi communication.**

- **Optional load current detection for real-time monitoring of equipment health and proactive notification of abnormalities.**
- **Full visibility of on-site manual start/stop and cloud start/stop status, keeping cloud and on-site information synchronized.**
- **Quick setup for alternating operation of equipment; when a unit fails, the next unit takes over automatically.**
- **Control equipment names can be entered directly (e.g., 1F Water Pump).**

PART 1.SAFETY INFORMATION

Questions Answered in This Chapter

- Which terms should I understand before use?
- How many levels of warning boxes does this manual use, and how serious is each?
- Which operations require powering off first, and which settings must not be changed?

Not Covered in This Chapter

- Wiring methods → PART 4 Installation (p. 27)
- Power-on and power-off steps → 5-1 Power On and Power Off (p. 41)

1-1 Before You Read: Terms

Term	Meaning	On-site example
Load	Equipment switched on and off by this unit	Fans, water pumps, aerators, lights
Channel (Ch)	A data slot on the web page. Each output and each sensor value occupies one channel	Ch-1 = Output 1 Ch-5 = Temperature from an external thermometer
Output	One output = one panel knob = one relay = one set of terminals = one channel on the web page, all with the same number	Knob 1 = Relay output 1 = Terminals COM1/NO1 = Web page Ch-1
Relay	A small switch inside the enclosure that connects or disconnects the circuit, one per output	DO4 has 4; DO16 has 16
Dry contact	The relay only provides “closed/open” and does not supply power itself	Like a wall light switch; the power comes from elsewhere
MC (magnetic contactor)	A switch in the distribution panel that uses a small current to control a large current	This unit’s relay controls the MC, and the MC controls the motor
Cloud Box (CB)	The name of the built-in controller board and web system of this unit	The “brain” of this unit
Cloud (knob position)	A panel knob position that hands this output over to the web page or automatic rules. No connection to the cloud platform is required	See 5-2 Panel Three-Position Selector Switches (p. 42)

Term	Meaning	On-site example
DO (digital output)	Digital Output, an output with only two states: on and off. Both the product's "DO series" and the "DO channel" on the web page have this meaning; it is unrelated to dissolved oxygen in water quality (also abbreviated DO)	Every output of this unit is a DO channel
Firmware	The program in the controller board; the version number is shown to the right of the JNC logo on the web page, below the system name	v1.19a 261020

1-2 Safety Message Levels

This manual uses three types of boxes to indicate risk. The level is identified by "DANGER/WARNING/CAUTION" on the first line of the box (for other symbols, see "Symbols Used in This Manual"):

DANGER

Failure to comply will result in electric shock, serious injury, or death.

WARNING

Failure to comply may result in personal injury or equipment damage, or cause a load to start when no one expects it.

CAUTION

Failure to comply will result in recoverable problems such as incorrect settings or data loss.

1-3 Safety Precautions

DANGER: This unit is connected to 110/220 VAC mains power

- Always power off before opening the enclosure. For how to power off and confirm it, see 5-1 Power On and Power Off (p. 41).
- Follow local electrical codes when wiring, rewiring, or measuring voltage.
- If any component or module has been removed, do not power on or operate the unit; contact JNC.

1. Do not use the product in locations with strong vibration or strong electromagnetic interference, to avoid product damage, malfunction, or measurement errors.
2. Disconnect power before any repair or maintenance, to avoid accidental electric shock or product damage.

3. When installing in an environment with conductive contaminants (metal dust, moisture, etc.), provide appropriate sealing, ventilation, or filtering.
4. If any component or module of the product has been removed or disassembled, do not operate it, and contact JNC as soon as possible.
5. JNC is not liable for damage resulting from use not in accordance with this manual, or from applications and environmental conditions beyond those stated in the specifications.

1-4 Pre-Operation Labels

Operations without a label can be completed by following the steps in this manual. Operations requiring attention are marked with one of the following labels:

Label	Meaning	Example
Power off first	Disconnect power to the unit and confirm that the power is off before proceeding (see 5-1 Power On and Power Off (p. 41))	Opening the enclosure, internal components, wiring
Live work	Components inside the enclosure must be operated while powered; touch only the specified component	Factory reset, firmware and web page update
Factory setting – do not change	Set up or wired by JNC at the factory; changing it may cause loss of connection or device failure	Controller board and controller board terminals A, B, E, IP setting, Rs485 setting, config data

- Follow local electrical codes for wiring and live work involving mains power (110/220 VAC).
- Rules such as schedules, logic, and alarms are shared by the whole unit; notify other on-site personnel before changing them.

PART 2.PRODUCT INTRODUCTION

Questions Answered in This Chapter

- **What problem does this product solve? What can it do?**
- **How do DO4, DO8, and DO16 differ?**
- **What do the specification values mean?**

Not Covered in This Chapter

- **Names of the components inside the enclosure → PART 3 Part Names (p. 20)**

2-1 What This Product Solves

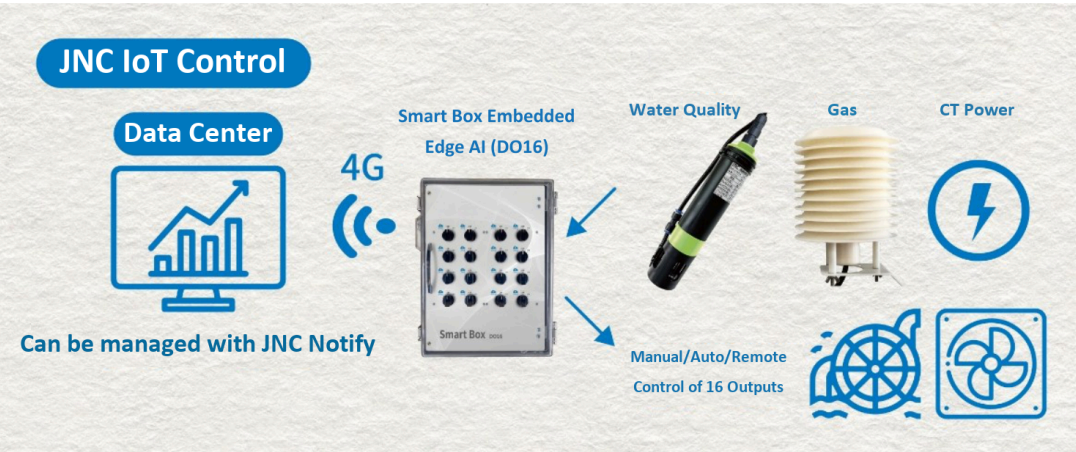
This unit is a "remote switch box" installed next to the distribution panel. It lets on-site equipment such as fans and water pumps be switched on and off from a mobile phone, from the cloud, or automatically based on sensor values; if the network is down, the equipment can still be switched manually on site with the knobs.

At many sites, equipment can only be switched on and off manually at the distribution panel. With this unit installed:

- **Switch equipment without being on site: Use the cloud platform. On site, you can also connect to the device web page from a mobile phone.**
- **Switch equipment automatically: Based on sensor values (for example, turn on the fan when the CO2 concentration exceeds the setpoint) or on schedules (for example, weekday working hours).**
- **The site keeps final control: Each output has a panel knob. When it is turned to OFF/ON, the site decides, and remote control cannot override it.**

Application areas: factory equipment, building utilities, aquaculture, livestock, plant factories, environmental control.

Application architecture:



- Left: Data is uploaded to the cloud platform; see PART 9 Cloud Platform (SCADA) (p. 174).
- Center: This unit. It uploads via Ethernet cable or 4G (optional); a mobile phone connects via Wi-Fi.
- Upper right: External sensors such as water quality and gas sensors can be connected, as well as optional current detection (CT).
- Lower right: Each output can control on-site equipment manually, automatically, or remotely (the figure shows DO16 with 16 outputs).
- "Can be managed with JNC Notify" in the figure: this unit itself has no JNC Notify function; contact JNC for related services.

2-2 What It Can Do

Function	Description	Details
Remote switching	Press once on a mobile phone or in the cloud to switch equipment on or off. On/off only; no speed or dimming control (variable speed control requires an additional RS-485 VFD)	5-6 (p. 49)
Automatic control based on values (Logic Control)	Switches on when a sensor value meets the condition and off when it does not	7-3 (p. 104)
Schedule-based control	Switches on and off at fixed times each week	7-5 (p. 112)
Alternating operation	Two or more units run in turn to even out wear; can also switch over automatically when a unit fails	7-8 (p. 117)
No simultaneous operation (interlock)	For example, for a reversible motor, forward and reverse must not start at the same time, to protect the motor	7-7 (p. 115)
Forward/reverse	Equipment that must run forward and reverse, such as roll-up systems and shade nets	7-9 (p. 121)
Data collection	Connects sensors, records values, and issues alarms	6-6 (p. 73)
Cloud upload	Uploads via Ethernet cable or 4G (optional)	PART 9 Cloud Platform (SCADA) (p. 174)

2-3 Model Differences

All three models are operated the same way on the web page; they differ in control points (number of outputs).

Model	Control points	Panel knobs	Relay boards
DO4	4 outputs	4	1 (8-output board with only 4 relays installed)
DO8	8 outputs	8	1
DO16	16 outputs	16	2

WARNING: A “4R” powered-output type is also available

This series also includes the 4R type (4 groups with intermediate relays, L, N powered output available): the outputs are energized themselves and are not dry contacts. The wiring method differs from the dry contact type; see the 4R type description in 4-4 Wiring (p. 37).

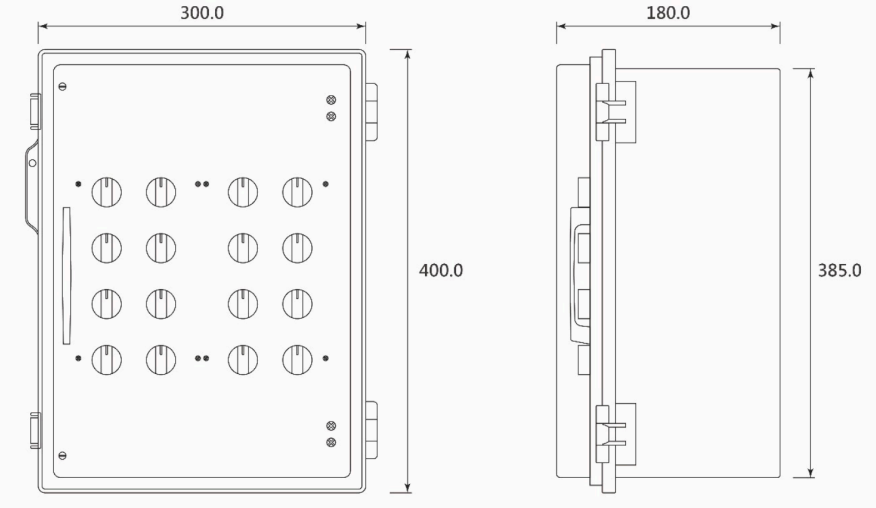
Enclosure material and housing size depend on the order specifications; refer to the shipping specification sheet. This manual describes the standard configuration; for options and the latest specifications, contact your sales representative or refer to the product catalog on the official website.

2-4 Specifications

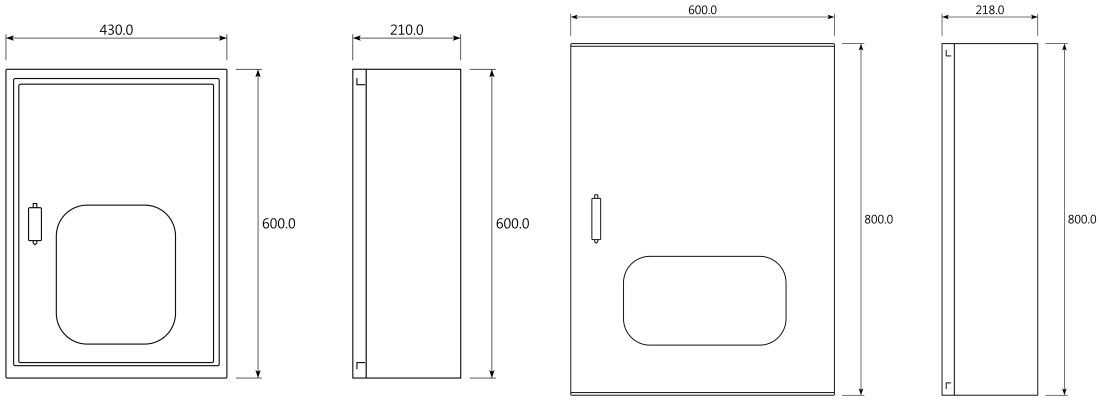
Description:

Item	Value	Description
Power	110/220 VAC, 50/60 Hz	Standard mains power
Power consumption	100 W	
Control points	4/8/16 groups (by model)	Number of devices that can be controlled
Dry contact specifications	current < 1 A, maximum voltage 250 VAC	Each relay can carry only a small current; loads must be switched through an MC
Communication interface	RS-485 × 2 (each configurable as Master or Slave) / Modbus RTU	Lines for external sensors
Ethernet interface	RJ45 Ethernet with Web Service function / Modbus TCP	Ethernet cable port
Wireless communication	Built-in Wi-Fi	A mobile phone can connect directly
Ingress protection (IP rating)	IP67 (ABS enclosure)	Dustproof, waterproof, and weather-resistant
Housing size (W × H × D, mm)	ABS enclosure: 300×400×180 mm; Metal enclosure (powder-coated galvanized steel or 304 stainless steel): DO4 430×600×210, DO8/16 600×800×218 mm	W × H × D; outdoor double door with window
Weight	ABS enclosure < 6 kg; Metal enclosure DO4 < 25, DO8/16 < 38 kg	
Safety certification	CE, FCC	

Product Dimensions (mm):



ABS enclosure: 300×400×180 mm (DO4, DO8, and DO16 use the same enclosure and differ only in the number of knobs; the figure shows DO16)



DO4 **DO8/DO16**

Metal enclosure: DO4 430×600×210 mm (left); DO8/DO16 600×800×218 mm (right)

PART 3.PART NAMES

Questions Answered in This Chapter

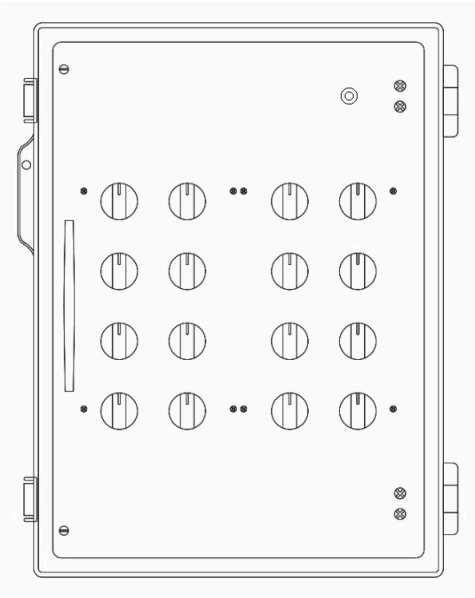
- What are the knobs and the indicator light on the front panel?
- What is each component inside the enclosure called, and what does it do? Which ones should I not touch?
- What is written on the device label?

Not Covered in This Chapter

- How to wire → 4-4 Wiring (p. 37)
- How to use the knobs → 5-2 Panel Three-Position Selector Switches (p. 42)

3-1 Front Panel

The front panel has only two kinds of items: one knob for each output, and one green indicator light in the upper-right corner.



- The figure above shows DO16 (16 knobs). DO4 and DO8 have the same front panel layout, with 4 and 8 knobs respectively (see 2-3 Model Differences (p. 17)).

Icon	Name	What it means	Action required
Green light steady on	Indicator light	Steady on when powered	Off or flashing indicates a power fault
Knob	Three-position selector switch	OFF/ON/Cloud for each output; see 5-2 Panel Three-Position Selector Switches (p. 42)	—

Reading the indicator lights:

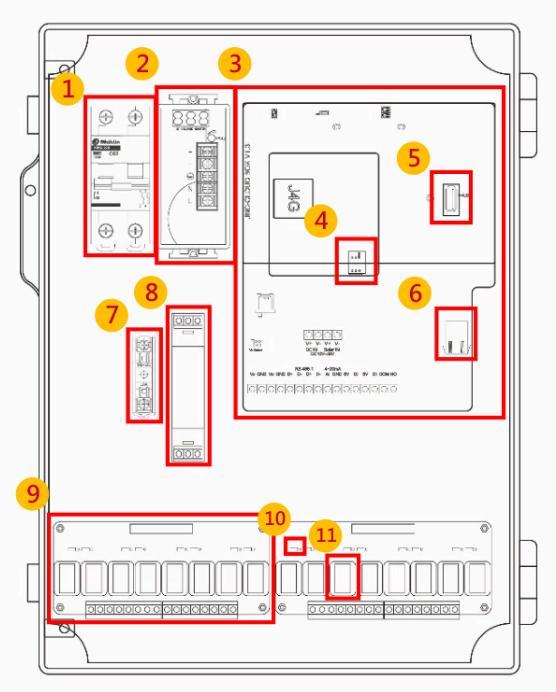
Light	Status	What it means	Action required
Green light, upper-right corner of the front panel	Steady on	Powered	Normal
	Off, flashing	Power fault	Contact JNC
Red digital display of the power supply (inside the enclosure)	Shows about 24.0	Powered (power supply output 24 V DC)	Normal. Do not touch anything inside the enclosure while it is powered
	Completely dark	No power	Confirm it is completely dark before working inside the enclosure
Ethernet port light (inside the enclosure)	On and flashing	Ethernet cable connected normally	Normal
	Off	Ethernet cable not connected properly or faulty	Check the Ethernet cable

The front panel has no run light for each output. To know whether an output is on or off, check the knob position, the equipment itself, or the web page.

3-2 Internal Components

CAUTION

The figures of the enclosure interior in this chapter are for identifying components. Always power off before opening the enclosure (see 1-4 Pre-Operation Labels (p. 14)); the controller board and controller board terminals A, B, and E are factory settings and must not be changed.

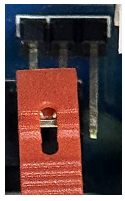


- **The figure above shows DO16. DO4 has only one relay board.**

Description:

Code	Name	Function	What you need to know
1	No-fuse breaker (NFB)	Main power switch of the unit; trips on overload or short circuit	Output 10 A, breaking capacity 6 kA. It is next to the mains terminals; make sure your hands are dry before operating it
2	Power supply	Converts mains power to 24 V DC for the controller board	Input 100–240 VAC, output 24 V DC/2.1 A. The red digital display shows whether power is present (see 3-1 Front Panel (p. 20))
3	Controller board (Cloud Box)	The brain of the unit, handling computation, control, and the web page	Factory setting – do not change
4	SIM card slot	Requires the optional 4G module	Nano SIM, 12×9 mm
5	USB port	For a USB flash drive used for data logging, settings backup, and firmware updates	Type-A. A USB flash drive is inserted at the factory
6	Ethernet port (RJ45)	For an Ethernet cable to access the web page or upload data	
7	Fuse / fuse holder	Blows when the current is too high, to protect the circuit	2 A
8	RS-485 surge protector	Suppresses surges and noise to protect the communication lines	
9	Relay board	One relay for each output	DO4 has 1
10	Jumper cap (JUMP SELECT)	Sets whether two adjacent outputs (1&2, 3&4, 5&6…) are hardware-interlocked; see the table below for the two positions	Not interlocked by factory default; see 7-7 Interlock (p. 115)
11	Relay (DBR)	Plug-in type for quick replacement when faulty	For ratings, see 2-4 Specifications (p. 18)

The two positions of jumper cap 10:

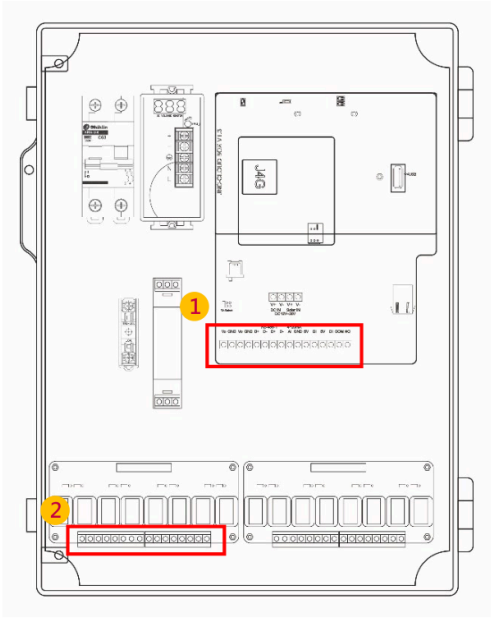
Code	Name	Icon	Function	Photo
10	Jumper cap		Normal, no interlock function.	
			Interlock, jumpered in pairs, e.g. 1&2, 3&4, 5&6…	

- Power off first The jumper caps are on the relay board; always power off before adjusting them.
- To set an interlock, move the jumper caps of both adjacent outputs (e.g., 1&2) to the interlock position.

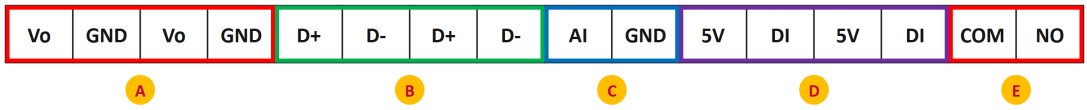
3-3 Contacts and Terminals

WARNING: Terminal diagrams differ by model

The figure below shows DO16. DO4 has only one relay board and uses only the first 4 output terminals; wiring a DO4 according to the DO16 figure will result in incorrect wiring.

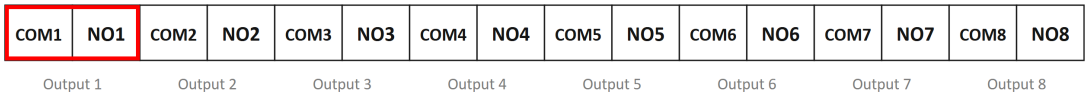


① Controller board terminal block



Code	Terminal	Description
A	Vo, GND	Factory setting – do not change 24 VDC power output, two sets. Connected to external sensors at the factory; do not wire them yourself.
B	D+, D-	Factory setting – do not change RS-485 communication, two sets, connected to the RS-485 surge protector at the factory (see 3-2 Internal Components (p. 22) 8). Each device on the same line must have a unique slave ID.
C	AI, GND	Analog input 4–20 mA, one set.
D	5V, DI	Digital input, counting up to 200 Hz, with a 5 V output; two sets each.
E	COM, NO	Factory setting – do not change Controller board DO contact; do not use. Connect loads to the relay board.

② Relay board terminal block **Power off first**



Each output is a set of COM/NO dry contacts, numbered from left to right as Output 1, Output 2, and so on. Output N corresponds to Ch N on the web page (shown as DO-N on the Control page).

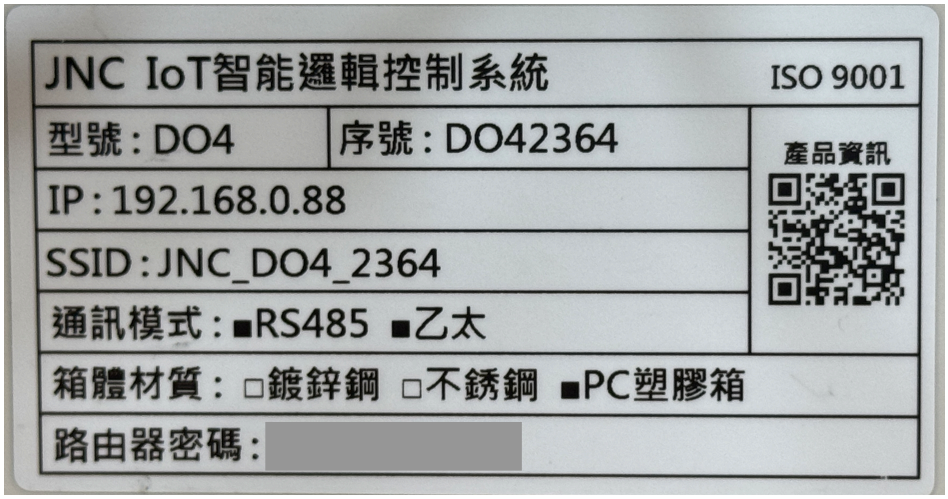
- Each relay board has 8 outputs. DO16 has two boards: the first for Outputs 1–8 and the second for Outputs 9–16.

CAUTION

The relay board terminals are printed only with numbers such as COM1 and NO1 and do not indicate the connected loads. After installation, it is recommended to fill in the reference table in 4-5 First Power-Up and Final Inspection (p. 40) and attach it to the inside of the enclosure door.

3-4 Reading the Device Label

All units have the same IP; the Wi-Fi name (SSID) ends with the last four digits of the serial number and differs for each unit. Always refer to the label on the side of the enclosure; do not copy the values from this manual or from another unit.



The two fields in the table below are used for connection:

Field	Purpose
SSID	The Wi-Fi name of the device; select this name when connecting from a mobile phone. Format: JNC_<model>_<last 4 digits of serial number>, e.g. JNC_DO4_2364
IP	The address to enter in the browser after connecting to the Wi-Fi

PART 4.INSTALLATION

Questions Answered in This Chapter

- **Can this unit be installed in my distribution panel?**
- **Where should it be installed, and what environmental conditions apply?**
- **How do I wire it? How do I check the wiring when finished?**

Not Covered in This Chapter

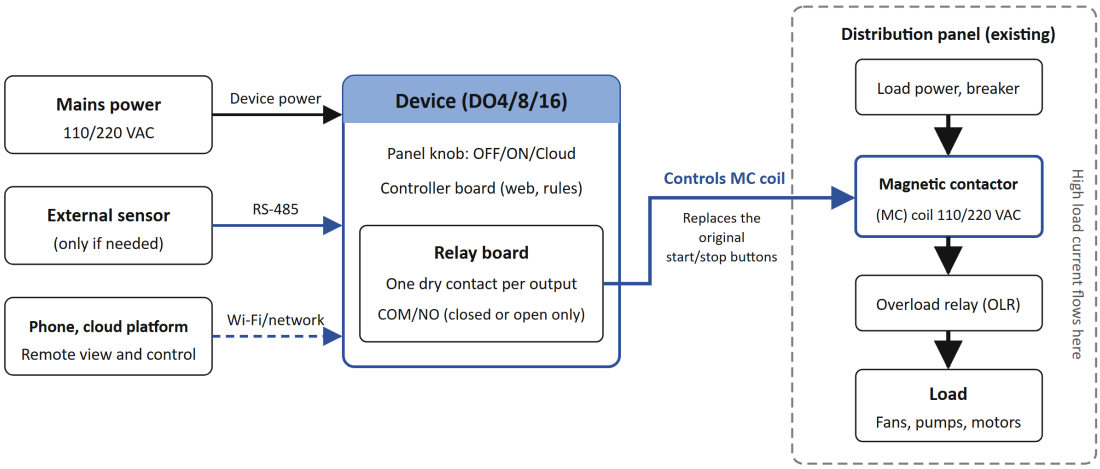
- **Component names → PART 3 Part Names (p. 20)**
- **Web page operation after power-on → PART 5 Basic Operation (p. 41)**

DANGER: The wiring, measurement, and rewiring in this chapter involve 110/220 VAC mains power

Power off before starting work (see 1-4 Pre-Operation Labels (p. 14)), and follow local electrical codes.

4-1 Pre-Installation Check

The relays in this unit only send an "on/off" signal (dry contact); the load is driven by the MC in the distribution panel. The site configuration is shown below:

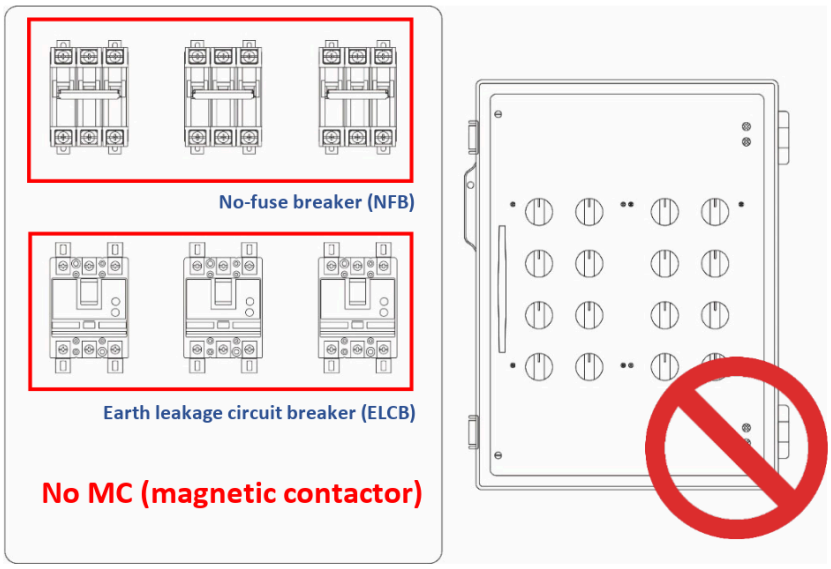


Key point: the device sends only a closed/open signal to the MC, and the MC switches the load;
the high load current **does not pass through the device**.
Keep all protective devices such as the overload relay (OLR).
For wiring and rewiring that involves mains power, follow local electrical codes (see 4-4).

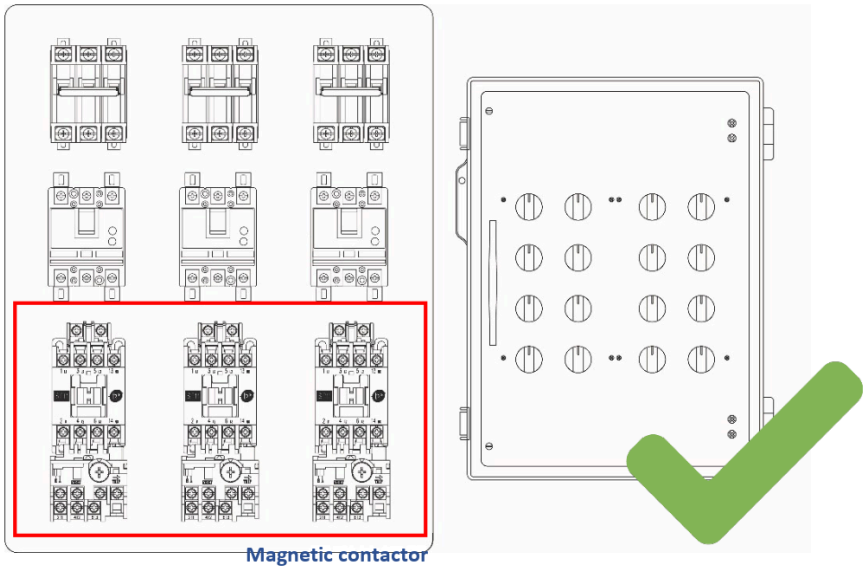
Therefore, answer the following two questions before installation:

Question 1: In the distribution panel, is there a magnetic contactor (MC) below the load's circuit breaker?

No MC: Add an MC before installing this unit.

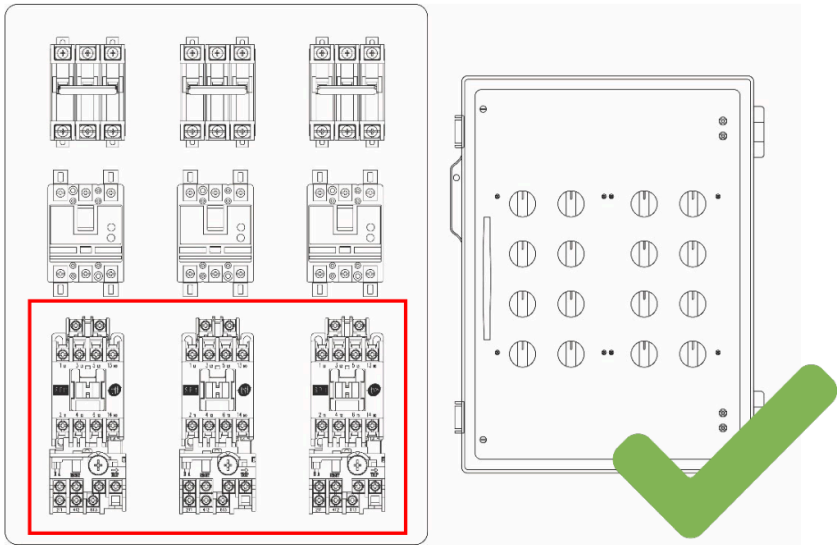


MC present: Go to Question 2.



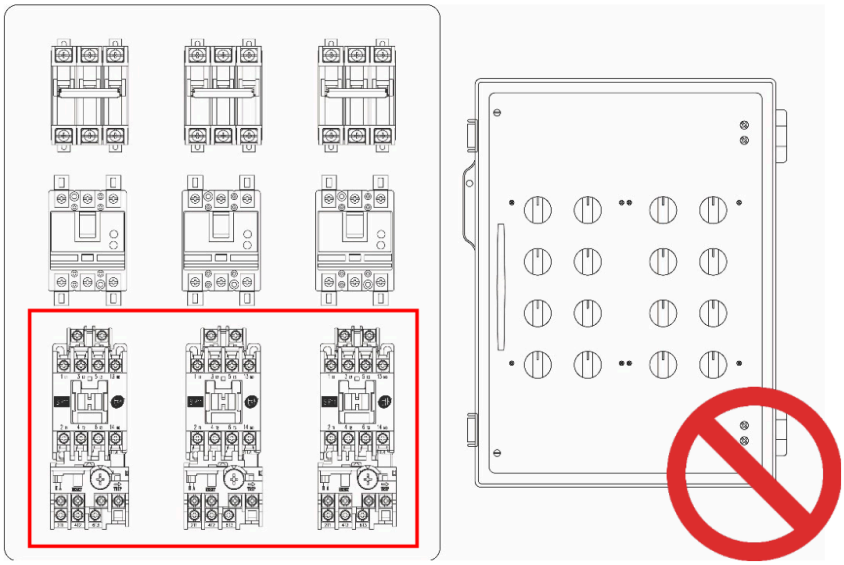
Question 2: What is the MC coil voltage?

110/220 VAC: The device can be installed.



Measured MC coil voltage: 110–220 VAC

380 VAC: This unit cannot drive the MC; the MC must be replaced.



Measured MC coil voltage: 380 VAC

Result	Action
MC present, coil 110/220 VAC	Installation possible
No MC	Add an MC first (select according to the load, with a 110 or 220 VAC coil; follow local electrical codes for distribution panel work)
Coil 380 VAC	This unit cannot drive the MC; replace it with an MC with a 110 or 220 VAC coil (follow local electrical codes for distribution panel work)

4-2 Installation Requirements

Condition	Requirement	Consequence of violation
Waterproofing	IP67 (ABS enclosure): withstands brief immersion; do not install in locations where water accumulates or flooding occurs	Water ingress failure, electrical leakage
Vibration, electromagnetic interference	Avoid locations with strong vibration or strong electromagnetic interference (near large motors or variable frequency drives)	Damage, malfunction, measurement error
Conductive contaminants	In environments with metal dust or high moisture, provide sealing, ventilation, or filtration	Short circuit

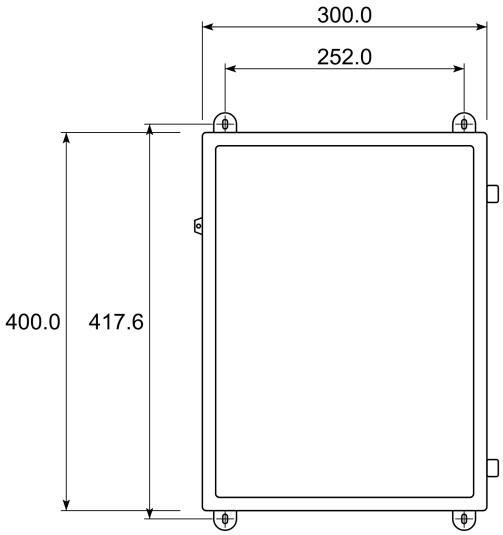
4-3 Mounting

The ABS enclosure can be mounted on a wall or on a user-supplied bracket; the metal enclosure (galvanized steel or stainless steel) can only be mounted on a concrete wall. This section describes how to fix the enclosure; for wiring, see 4-4 Wiring (p. 37).

The supplied accessories, mounting surface screws, and installation steps differ between the ABS enclosure and the metal enclosure. Refer to 4-3-2 ABS Enclosure (p. 32) or 4-3-3 Metal Enclosure (p. 35) according to your enclosure.

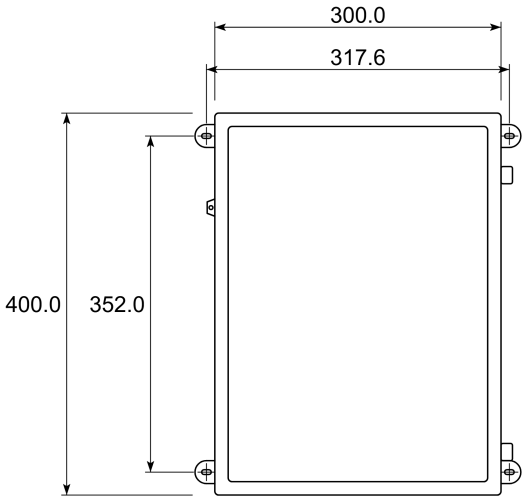
4-3-1 Mounting Hole Layout

Mark 4 fixing positions on the mounting surface according to the enclosure. For the ABS enclosure (same enclosure for DO4, DO8, and DO16), use the mounting hole layout that matches the bracket orientation.



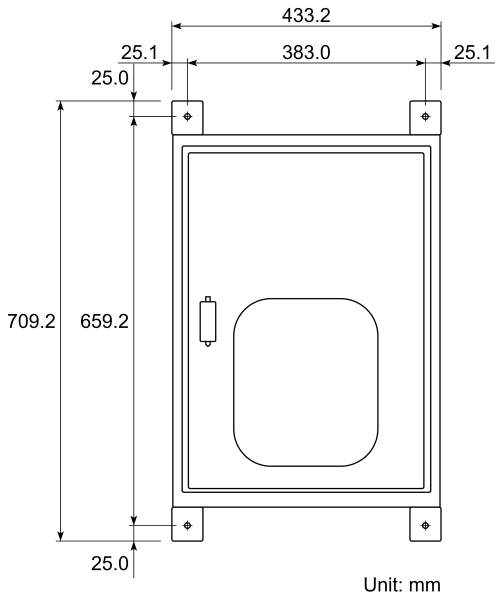
Unit: mm

ABS enclosure: bracket slotted holes facing up and down

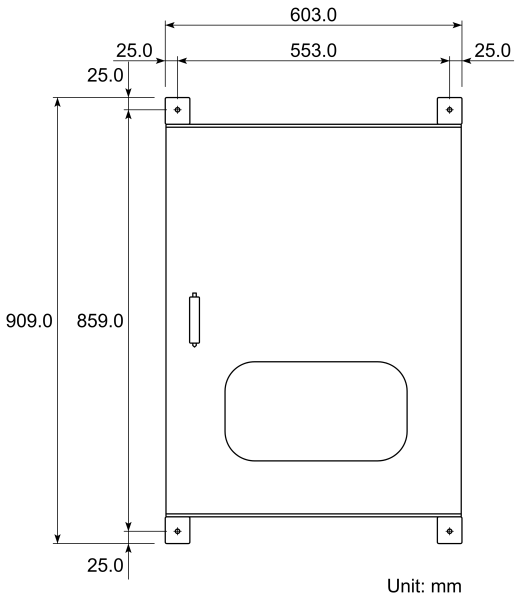


Unit: mm

ABS enclosure: bracket slotted holes facing left and right



Metal enclosure (DO4)

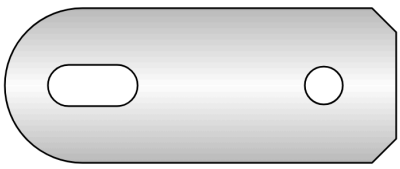


Metal enclosure (DO8/DO16)

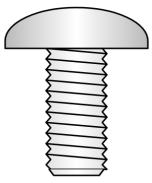
4-3-2 ABS Enclosure

Supplied Accessories

Item	Specification	Qty	Purpose
Mounting bracket	—	4	Fixed to the four rear corners of the enclosure, then fixed to the mounting surface through the slotted hole
Phillips truss-head machine screw	M4 × 8 mm	4	Fix the mounting brackets to the enclosure



Mounting bracket: round hole fixed to the enclosure,
slotted hole fixed to the mounting surface

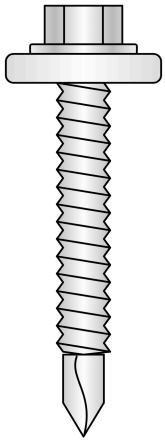


Phillips truss-head machine screw

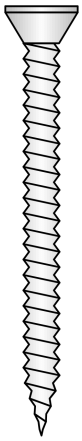
Mounting Surface Screws (Supplied by User)

Prepare screws according to the mounting surface material, 4 per unit:

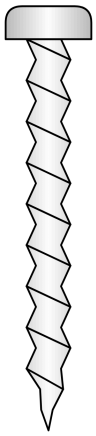
Mounting surface material	Screw	Specification	Pilot hole
Metal	Self-drilling screw (hex washer head, with sealing washer)	Diameter 5.5 mm (#12) Length 38 mm (1.5 in.)	Not required
Wood	Wood screw	Diameter 3.5 mm (#6) Length 38 mm (1.5 in.)	Not required
Concrete	Concrete screw	Diameter 4.2 mm (#8) Length 38 mm (1.5 in.)	Required Drill bit 3.2 mm (1/8 in.) Depth approx. 51 mm (2 in.)



For metal: self-drilling screw



For wood: wood screw



For concrete: concrete screw

Pilot hole 13 mm (1/2 in.) deeper than the screw length

Installation Steps

1. **Select the installation location: it must meet 4-2 Installation Requirements (p. 30) and leave space for the enclosure (for housing size, see 2-4 Specifications (p. 18)).**

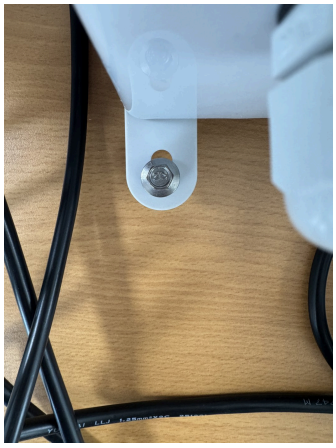
2. Using the Phillips truss-head machine screws supplied with the enclosure, fix the 4 mounting brackets to the bracket mounting holes at the four rear corners of the enclosure: the 2 upper brackets with slotted holes facing up, and the 2 lower brackets with slotted holes facing down. The brackets can also be mounted horizontally: the 2 left brackets with slotted holes facing left, and the 2 right brackets with slotted holes facing right.



Bracket mounting holes at the four rear corners of the enclosure



Upper bracket: slotted hole facing up



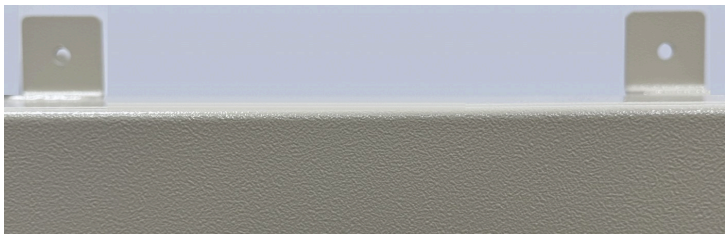
Lower bracket: slotted hole facing down

3. According to the bracket orientation, refer to the corresponding ABS enclosure layout in 4-3-1 Mounting Hole Layout (p. 31) and mark 4 fixing positions on the mounting surface. For a concrete mounting surface, drill pilot holes at the marked positions with a 3.2 mm drill bit to a depth of approx. 51 mm.

4. Align the enclosure with the fixing positions, insert the user-supplied screws through the slotted holes of the 4 mounting brackets, and fix them to the mounting surface.

4-3-3 Metal Enclosure

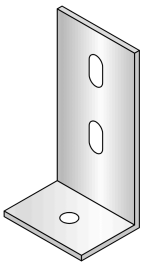
The 2 mounting tabs at the top of the enclosure are welded to the enclosure; the 2 L-brackets at the bottom are supplied accessories and are attached during installation. The installation method is the same for DO4, DO8, and DO16.



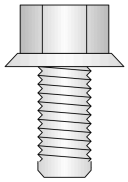
Welded mounting tabs at the top of the enclosure

Supplied Accessories

Item	Specification	Qty	Purpose
L-bracket	—	2	Double-hole side fixed to the enclosure bottom; single-hole side fixed to the mounting surface
Hex washer-head bolt	M6 × 12 mm	4	Fix the L-brackets to the enclosure bottom, 2 per bracket



L-bracket: double-hole side fixed to the enclosure bottom,
single-hole side fixed to the mounting surface

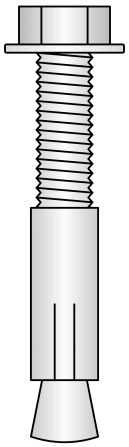


Hex washer-head bolt

Mounting Surface Screws (Supplied by User)

The metal enclosure can only be mounted on a concrete wall, 4 per unit:

Mounting surface material	Screw	Specification	Pilot hole
Concrete	Expansion anchor bolt	Diameter 8 mm (5/16 in.) Length 57 mm (2.25 in.)	Required Drill bit 9.5 mm (3/8 in.) (hole diameter according to the sleeve outer diameter) Depth approx. 70 mm (2.75 in.)



For concrete: expansion anchor bolt

Pilot hole 13 mm (1/2 in.) deeper than the screw length

Installation Steps

1. **Select the installation location: it must be a concrete wall, meet 4-2 Installation Requirements (p. 30), and leave space for the enclosure (for housing size, see 2-4 Specifications (p. 18)).**

2 Using the hex washer-head bolts supplied with the enclosure, fix the double-hole side of the 2 L-brackets to the bracket mounting holes on the enclosure bottom, 2 bolts per bracket; align the single-hole side flush with the rear of the enclosure.



Bracket mounting holes on the enclosure bottom



L-bracket fixed to the enclosure bottom

3 Following 4-3-1 Mounting Hole Layout (p. 31), mark 4 fixing positions on the wall (2 welded mounting tabs at the top, 2 L-brackets at the bottom), drill holes with a 9.5 mm drill bit to a depth of approx. 70 mm, and remove dust from the holes.

4 Align the enclosure with the holes, insert the expansion anchor bolts through the bracket holes and hammer them into the holes, then tighten the nuts so that the sleeves expand and anchor in the wall.

4-4 Wiring

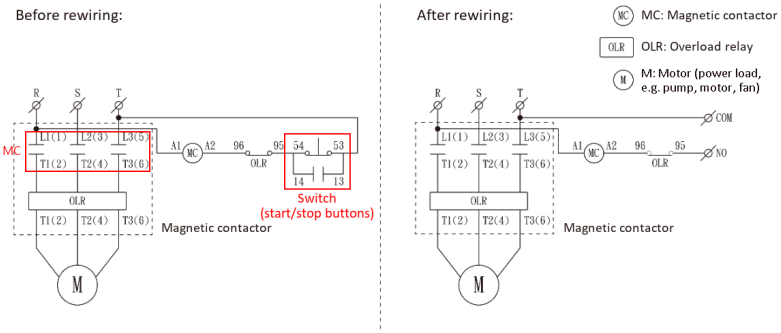
Power off first

Rewiring method: Transfer control of the MC from the “start/stop push buttons” on the distribution panel to the relays of this unit; keep all protective devices such as the overload relay (OLR).

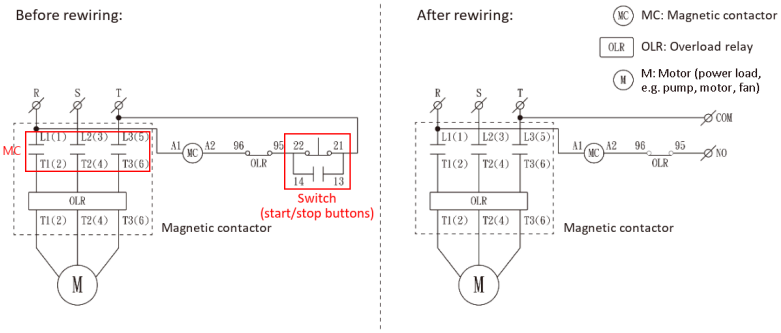
1 Turn off the circuit breaker for the load in the distribution panel, and disconnect power to this unit (unplug it or turn off the distribution panel switch).

2 **Wire according to the diagrams below.**

TECO magnetic contactor wiring:



Shihlin magnetic contactor wiring:



3 **After wiring, perform the final inspection according to 4-5 First Power-Up and Final Inspection (p. 40) before applying power.**

DANGER: Do not connect loads directly to the relay contacts

- **Each dry contact output is limited to current < 1 A, maximum voltage 250 VAC. Loads such as motors and water pumps must always go through an MC and must not be connected directly to the relays.**
- **Only small loads within the above current and voltage limits may be connected directly to the relays.**
- **4R type: Each output is powered (L, N), and its voltage equals the unit's supply voltage. Wire from that output's relay socket terminals (Output 1: terminal 12 is L, terminal 9 is N) directly to an MC whose coil voltage matches the unit's supply voltage, or to a load of the same voltage. Maximum per output: 5 A for heaters and similar loads, 2 A for motors, MC coils, and similar loads; 10 A in total for all 4 outputs. Use an MC above that.**

- **Follow local electrical codes for any wiring involving mains power.**

- **The ground terminal of the power supply must be wired to the protective earth (PE) of the on-site distribution panel; the enclosure (especially a metal enclosure) and the loads must all be grounded.**
- **The MC coil voltage depends on the on-site wiring; confirm it according to Question 2 in 4-1 Pre-Installation Check (p. 27) before wiring.**
- **Connecting a load to the wrong output will burn out the relay.**

4-5 First Power-Up and Final Inspection

1. Confirm that the enclosure door is closed and all knobs are at OFF.
2. Apply power (by plug or distribution panel switch; see 5-1 Power On and Power Off (p. 41)). The green indicator light on the front panel lights up.
3. Connect to the device web page with a mobile phone (see 5-3 Connecting to the Device Web Page (p. 43)) and change the login password immediately (see 6-10-3 Password Setting (p. 90)).
4. Test each output: Confirm that no one is near the load, turn knob 1 to ON, confirm that the correct equipment starts, then turn it back to OFF. Repeat for each output in turn and fill in the table below.
5. For channels with no equipment connected, turn off Discon alarm or hide the channel to prevent continuous alarms.

Channel–terminal–load reference table (fill in and attach to the inside of the enclosure door):

Knob/Channel	Relay terminal	Connected load	Distribution panel MC No.	Test date	Tested by
1/Ch-1	COM1/NO1				
2/Ch-2	COM2/NO2				
3/Ch-3	COM3/NO3				
4/Ch-4	COM4/NO4				
…	…				

PART 5.BASIC OPERATION

Questions Answered in This Chapter

- How do I power the device on and off safely?
- What do the front panel knob positions OFF, ON, and Cloud mean?
- How do I connect to the device web page, log in, and log out?
- How do I read the main screen, the Control page, the Data view page, and the Event Log?

Not Covered in This Chapter

- Channel, alarm, and system settings (including the password) → PART 6 Settings (p. 54)
- Automatic control rules → PART 7 Advanced Control (p. 101)

5-1 Power On and Power Off

The main power switch of the device is the no-fuse breaker (NFB) in the upper-left corner inside the enclosure (see 3-2 Internal Components (p. 22), code 1). Daily power-on and power-off depend on how the device is powered on site:

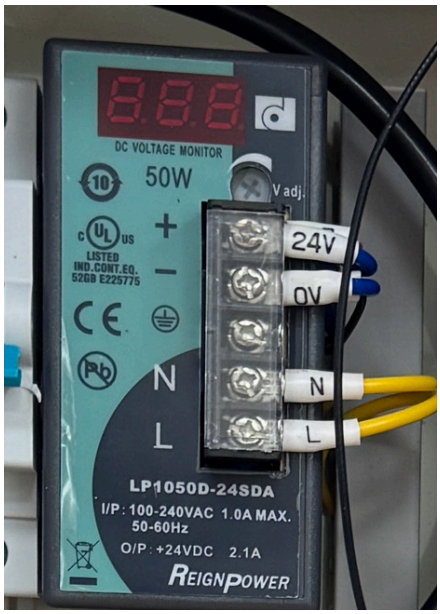
Power connection	Power on	Power off (power disconnection)
Plug-powered (not rewired)	Turn all knobs to OFF → insert the plug	Turn all knobs to OFF → unplug
Panel-powered (rewired)	Turn all knobs to OFF → switch on the branch circuit breaker in the distribution panel	Turn all knobs to OFF → switch off the branch circuit breaker in the distribution panel

Before opening the enclosure, make sure the power is disconnected:

1. Turn all knobs to OFF.
2. Disconnect the power as shown in the table above. If a load has a separate power source, disconnect it as well.
3. Wait about 1 minute before opening the enclosure door (recommended).
4. Confirm that the red digital display of the power supply is completely dark.



Powered: shows about 24.0



Power off: completely dark

- When the power is off, the unlit digit segments may look like “888”. This does not mean the device is powered.

5-2 Panel Three-Position Selector Switches

Each output has one three-position selector switch (hereafter “knob”) with three positions.

On-site Device Information					
Knob	Control Status	Knob	Control Status	Knob	Control Status
	Local-Off (OFF)		Local-On (ON)		Cloud Control (Cloud)

Knob position	Meaning	Who controls the output	Web page display
OFF (top)	Local off	On site. The web page, the cloud, and rules cannot switch it on	Local-Off, no power button
ON (upper right)	Local on	On site. The output is switched on regardless of any rule	Local-On, no power button
Cloud (upper left)	Handed over to remote control	The web page, the cloud, or automatic rules	Cloud, with the M/A button and the power button shown

Under Cloud there are two modes, set in Manual / Automatic on the Control set tab of the channel settings, or with the M/A button on the Control page (see 6-2-2 Control Set (p. 62) and 5-6 Control (p. 49)):

- M (Manual): The output follows the power button on the web page: press on to switch on, press off to switch off.
- A (Automatic): The output is switched on and off automatically by the configured rules (see PART 7 Advanced Control (p. 101)).

The Cloud knob position only means “controlled by the web page or rules”. A connection to the cloud platform is not required.

WARNING: Once the knob is turned to Cloud, remote commands and automatic rules can switch this output on

- When turned to Cloud, the output follows its current switch state on the web page: in Manual (M), it keeps the state of the power button on the web page; in Automatic (A), it follows the rules and starts within a few seconds if the conditions are met.
- After the knob is turned to Cloud, the web page, the cloud, or automatic rules can switch this output on at any time. Before turning the knob, make sure no one is near the load.

CAUTION: Turn the knob to OFF before servicing or cleaning a load

- After the knob is turned to OFF, this output cannot be switched on remotely.
- Before reaching inside the equipment, also disconnect the power to the load.

5-3 Connecting to the Device Web Page

Connecting with a phone (Wi-Fi):

1. Find the SSID (Wi-Fi name) and IP on the device label on the side of the enclosure (see 3-4 Reading the Device Label (p. 26)).
2. Turn on Wi-Fi on the phone and connect to the SSID on the label. If the label is missing, look for a name starting with JNC_ in the list.
3. Open Google Chrome and enter the IP in the address bar: 192.168.0.88.

Connecting with an Ethernet cable:

1. Live work Connect a computer to the Ethernet port (RJ45) of the controller board inside the enclosure (see 3-2 Internal Components (p. 22), code 6). Turn off the power before opening the enclosure, connect the cable, then turn the power back on; after power-on, touch only the network cable.
2. Enter the IP in Chrome: 192.168.0.88.

If the Wi-Fi network cannot be found:

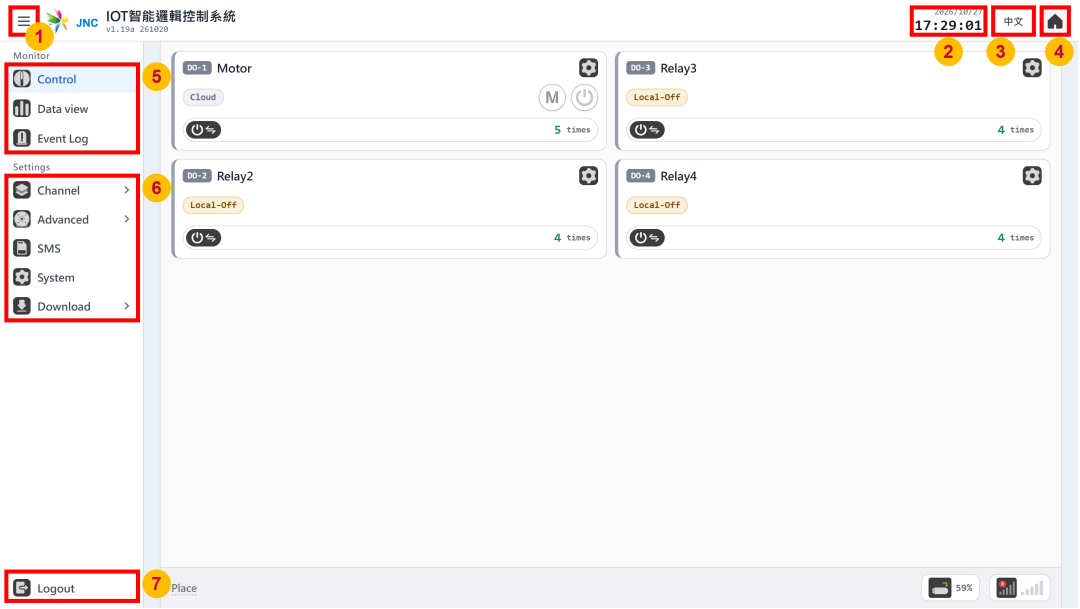
- **Make sure the device is powered (green indicator light on the front panel is on). If the network still cannot be found, contact JNC.**

WARNING: The device Wi-Fi has no password at the factory

- **The factory Wi-Fi is an open network (encryption: none). Anyone nearby can connect to it.**
- **The device can be switched on and off without logging in.**
- **Be sure to change the login password as described in 5-5 Login and Logout (p. 47). To set a Wi-Fi password, contact JNC.**

5-4 Main Screen Layout

The web page consists of a top bar, a menu on the left, and a content area on the right. The Control page opens by default.



Code	Name	Function
1	Menu button	Collapses or expands the left menu (see below).
2	Date and time	Shows the current date and time of the device. Click to switch the display only; the time is not changed.
3	Language button	Switches between the Chinese and English interface. The button shows the language that can be switched to (中文 in the English interface). The selected language is saved in the device.
4	Home button	Returns to the Control page.
5	Monitor group	Control: shows and operates each output (see 5-6 Control (p. 49)). Data view: shows the values of all channels (see 5-7 Data View (p. 51)). Event Log: lists alarm records (see 5-8 Event Log (p. 52)). Shown after login only.

Code	Name	Function
6	Settings group (shown after login only)	Channel ›: Channel, Quick setup, Native System (see PART 6 Settings (p. 54)). Advanced ›: Logic, Timer, CCW, Alternate, Interlock (see PART 7 Advanced Control (p. 101)). SMS: requires the optional SMS module (see 6-9 SMS Settings (p. 79)). System: internal system settings, including the password (see 6-10 System Settings (p. 86)). Download ›: downloads records from the USB flash drive.
7	Login / Logout	Shows Login when not logged in and Logout when logged in (see 5-5 Login and Logout (p. 47)).

- Items marked › open a submenu.
- The device name (example: IOT智能邏輯控制系統) and the firmware version (example: v1.19a 261020) are shown to the right of the JNC logo. Provide this version when requesting repair. The device name and Place are changed in System → Basic Setting (see 6-10 System Settings (p. 86)).
- Place at the bottom left of the content area shows the monitoring location. The USB and SIM status icons are at the bottom right (see 5-6 Control (p. 49)).

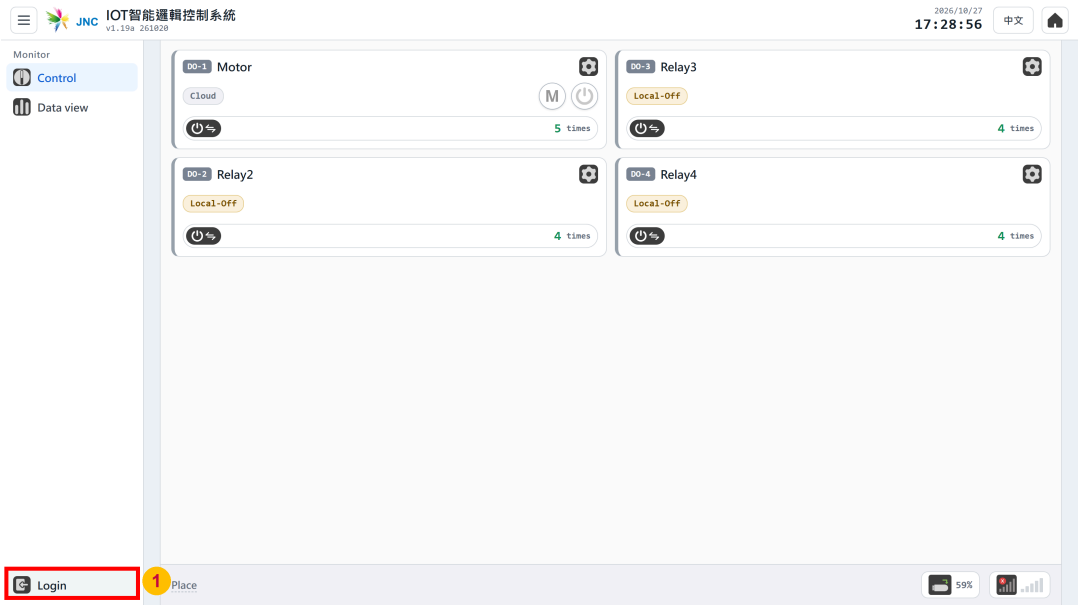
Collapsing the menu:

Click the menu button 1 to hide the left menu and widen the content area. Click it again to show the menu.



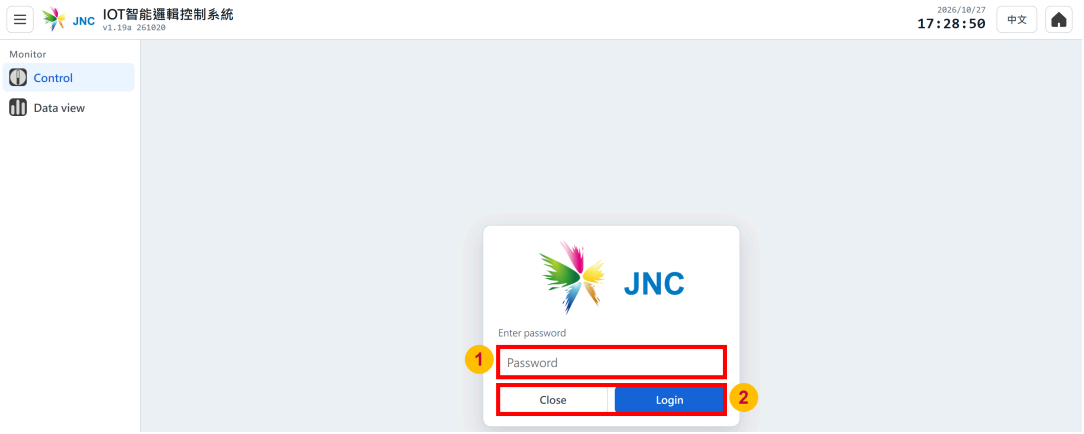
5-5 Login and Logout

Without login, the left menu shows only Control and Data view, and Login (1) at the bottom.



Logging in:

1. **Click Login at the bottom of the left menu.**
2. **Enter the password in the Password field (1) (numbers in steps 2 and 3 refer to the login window figure below) (factory default: 1234).**
3. **Click Login (2). To cancel, click Close (2).**



After login, Event Log and the Settings group appear in the left menu, and Login changes to Logout.

Status	Available functions
Not logged in	Control, Data view; devices can be switched on and off
Logged in	All of the above + Event Log, Channel, Advanced, SMS, System, Download

Logging out: Click Logout at the bottom of the left menu. Reloading the web page also logs you out.

Change the password immediately on first use: System → Password Setting (see 6-10 System Settings (p. 86)).

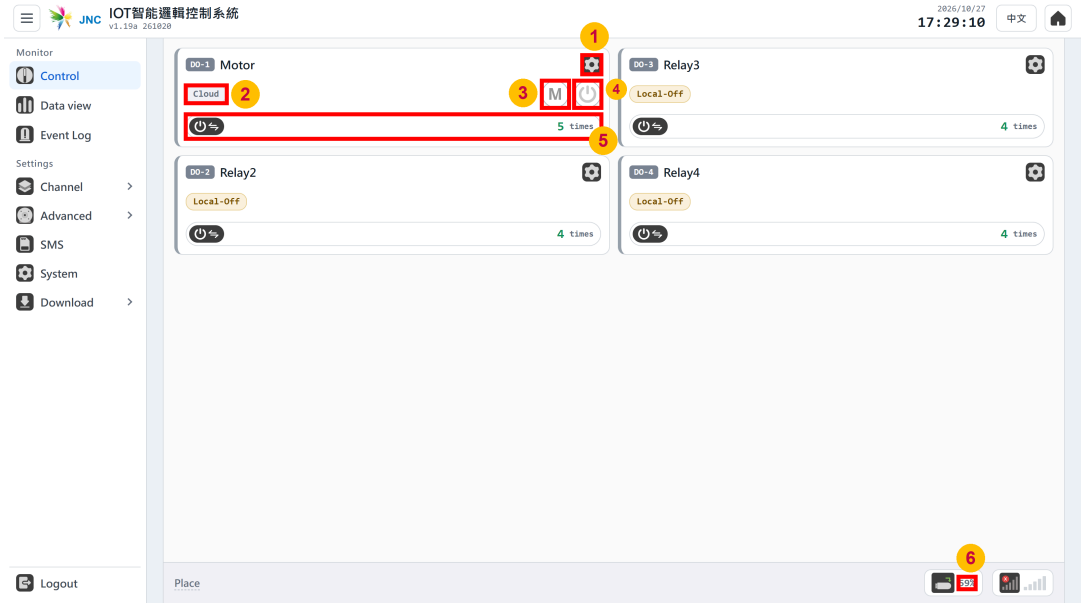
CAUTION: The password is shared by the whole device

- **After the password is changed, other personnel on site must also log in with the new password.**
- **Give the new password to the person in charge for safekeeping.**

5-6 Control

Path: Monitor → Control (or the home button on the top bar).

Each output is shown as a tile (example: DO-1 Motor).



Code	Name	Function
1	Channel settings button	Click to go directly to the settings page of this channel (login required).
2	Status	Cloud, Local-Off, or Local-On, according to the knob position (see 5-2 Panel Three-Position Selector Switches (p. 42)).
3	M/A button	Shows M (Manual) or A (Automatic). Shown only when the status is Cloud. Click to switch between Manual and Automatic.
4	Power button	Switches the output on or off. Works only when the status is Cloud and the tile shows M.
5	Information field	Rotates automatically: total run count (example: 5 times) → total run time → real-time current (requires the optional current transformer CT485-100A). Click it to switch manually.
6	USB status	USB flash drive status. The number next to the icon is a percentage (example: 59%). The SIM status icon is on its right (requires the optional 4G SMS module).

Switching an output remotely (knob at Cloud, tile showing M):

1. Make sure the knob of the output is at Cloud (the power button is not shown in other positions) and the tile shows M.
2. Make sure no one is near the load.
3. Click the power button 4 on the tile.
4. Check the result: a light-green tile with a green DO number = on; a white tile with a gray DO number = off.

WARNING: Switching to A can start the load immediately

- After the M/A button 3 is switched to A, the output follows the rules and starts within a few seconds if the conditions are met.
- Before clicking the M/A button, make sure no one is near the load.

CAUTION: Real-time current requires the optional CT

- Without the optional current detection (CT485-100A), real-time current always shows 0 A.
- 0 A does not mean the equipment is not running.

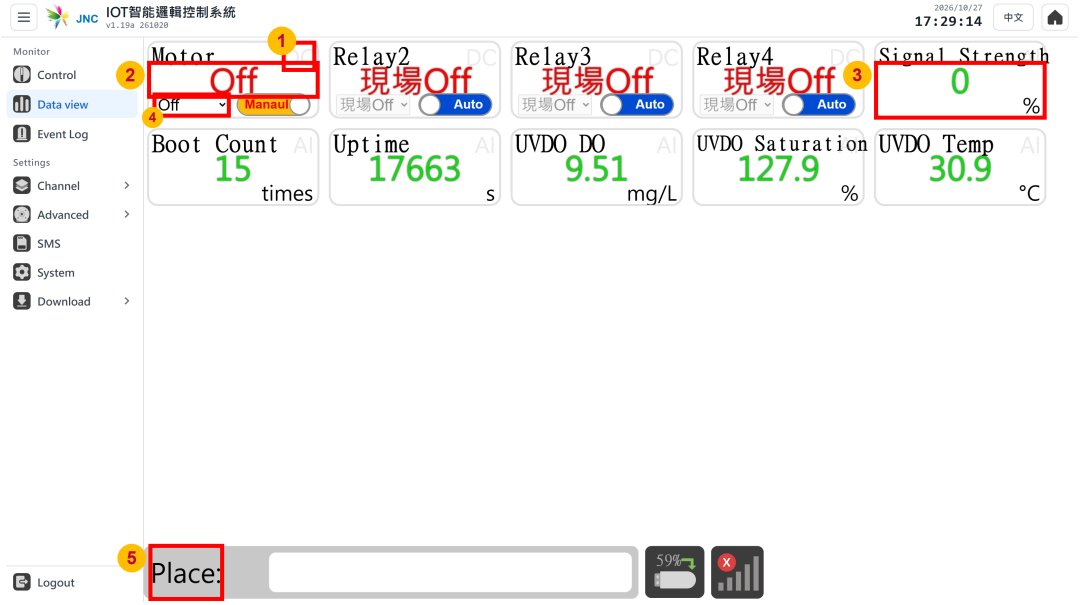
Status icons and required action:

Icon	Meaning	Action required
USB icon with a green arrow (percentage shown next to it)	USB flash drive is read	Normal
USB icon with a red x (no percentage)	USB flash drive is not inserted properly or is faulty	Reinsert the USB flash drive. If it is still not read, replace the USB flash drive.
SIM icon with signal bars	4G is normal	Normal
SIM icon with a red x	SIM not read. Also shown when no 4G module is installed or no SIM card is inserted	—
SIM icon with a yellow !	No service (poor reception)	See 6-9-4 Base Station (p. 86)
🔒 Lock icon (on a channel tile)	Locked by an interlock; the other output is running	See 7-7 Interlock (p. 115) and 10-1 Symptoms and Checks (p. 180)

5-7 Data View

Path: Monitor → Data view.

Shows the values of all channels, including the built-in outputs and added channels such as external sensors.



Code	Name	Function
1	Channel type	Shown faintly in the upper-right corner of each tile (example: DO, AI).
2	Output status	Current status of a built-in output (Off, On). Outputs with the knob at OFF show 現場Off (= Local-Off), and at ON show 現場On (= Local-On), even in the English interface.
3	Channel value	Value and unit of an added channel (example: Signal Strength 0 %).
4	Off/On selector	Turns this output off or on. Works only when the output is in Manual and the knob is at Cloud; in Auto the switch is grayed out. The switch next to it (Manual / Auto) switches between Manual and Automatic.
5	Place	Monitoring location, changed in System → Basic Setting (see 6-10 System Settings (p. 86)).

- **A value of Read.. = the sensor cannot be read. See 10-1 Symptoms and Checks (p. 180).**

WARNING: The controls on Data view switch the load directly

- **The Off/On selector 4 and the Manual / Auto switch act in the same way as the power button and M/A button on the Control page.**
- **Before using them, make sure no one is near the load.**

5-8 Event Log

Path: Login → Monitor → Event Log.



[1]	UVDO Temp 2026/10/27 15:17:20	31.3 ~	Read.. 2026/10/27 15:18:03
[2]	UVDO Saturation 2026/10/27 15:17:20	101.0 ~	Read.. 2026/10/27 15:18:03
[3]	UVDO DO 2026/10/27 15:17:20	7.47 ~	Read.. 2026/10/27 15:18:03
[4]	PWR-S 2026/10/27 12:26:46	off ~	Power Loss 2026/10/27 12:34:46
[5]	PWR-S 2026/10/27 12:24:23	off ~	Power Loss 2026/10/27 12:24:25
[6]	PWR-S 2026/10/27 11:57:36	off ~	Power Loss 2026/10/27 12:13:27
[7]	PWR-S 2026/10/27 11:54:46	off ~	Power Loss 2026/10/27 11:54:50
[8]	UVDO Temp 2026/10/27 09:49:23	0.0 ~	Read.. 2026/10/27 09:49:23
[9]	UVDO Saturation 2026/10/27 09:49:23	0.0 ~	Read.. 2026/10/27 09:49:23
[10]	UVDO DO 2026/10/27 09:49:22	0.00 ~	Read.. 2026/10/27 15:18:03
[11]	PWR-S 2026/10/22 17:30:51	off ~	Power Loss 2026/10/22 18:04:55

Each alarm that has occurred is listed as one entry, newest at the top. Blue text = alarm cleared; red text = alarm active. Each entry shows:

Position	Item	Description
Left, top	Serial number and channel name	The number in brackets (example: [1]) and the channel on which the alarm occurred
Center, top	Value	Value of the channel when the alarm occurred
Right, top	Alarm status	Four-stage value alarms: HIHI, HI, LO, LOLO. Fault alarms: HI FAIL, LO FAIL. Channel disconnected (cannot be read): Read... Power failure: Power Loss (channel PWR-S). Open Record (switched on manually): Manual; see 6-2-2 Control Set (p. 62)
Bottom	Alarm time ~ return time	Left: time when the alarm condition was met. Right: time when the value no longer met the condition after the alarm was triggered

- HIHI/LOLO here are the HH/LL on the alarm settings page; they are written differently but refer to the same alarms.

PART 6.SETTINGS

Questions Answered in This Chapter

- Where is each settings screen, and what does each field mean?
- How are alarms set? Who is notified when an alarm is triggered?
- How do I configure many channels at once, or add a sensor from the built-in device list?
- Where are the time, password, network, and configuration settings? Which ones should not be changed?

Not Covered in This Chapter

- Automatic control rules such as logic, schedule, and interlock → PART 7 Advanced Control (p. 101)
- Modbus addresses → Appendix A (p. 189)

Before reading this chapter, note the following:

- Settings screens that require attention have a pre-operation label below the title (see 1-4 Pre-Operation Labels (p. 14)). Settings without a label can be completed by following the steps in this chapter.
- Settings such as channels, alarms, and rules are shared by the whole device. Notify other personnel on site before changing them.
- When the same field appears on several screens, the full description is given in one place only; elsewhere, one line explains what the field does and states which section has the full description.

Task	Section	Label
Hide or show a channel	6-1 (p. 55)	—
Find a channel by type or name	6-1 (p. 55)	—
Change a channel name or unit	6-1-2 (p. 59)	—
Set an output to manual or automatic	Control set in 6-2 (p. 60)	—
Connect an external sensor (Channel Source)	6-3-1 (p. 64), 6-8 (p. 78)	Factory setting – do not change
Set alarm values and alarm delays	Alarm set in 6-3 (p. 63)	—
Find out who is notified when an alarm is triggered	6-6 (p. 73)	—
Configure many channels at once	6-7 (p. 74)	—

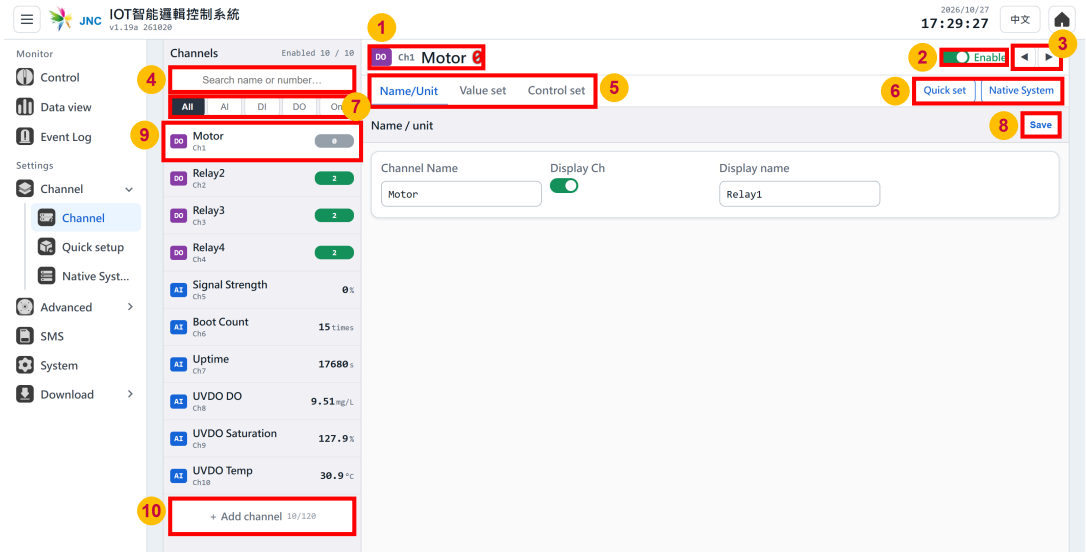
Task	Section	Label
Set up SMS notification and the phonebook	6-9 (p. 79)	—
Correct the device time	6-10-2 (p. 89)	—
Change the login password	6-10-3 (p. 90)	—
Change IP, communication, or upload settings	6-10 (p. 86)	Factory setting – do not change
Back up or import the configuration	6-10-10 (p. 98)	Factory setting – do not change
View the event log or download log files	5-8 (p. 52), 6-11 (p. 99)	—

CAUTION: All settings in PART 6 and PART 7 are examples.

Actual thresholds and parameters must be set by the user organization based on site conditions, applicable regulations, and professional judgment.

6-1 Channel Settings Overview

Path: Login → left menu → Channel → Channel → select a channel in the channel list on the left.



Description:

The Channel page has two parts: the channel list on the left and the settings of the selected channel on the right. The layout is the same for every channel; only the tabs differ by signal type (see the table below the codes).

Code	Name	Function
1	Channel header	Signal type (DO, AI, or DI), channel number, channel name, and current value of the selected channel. For the meaning of DO channel values, see the table below
2	Enable	Switch. Green = shown; gray = hidden. A hidden channel does not appear on the Control and Data view pages. The switch is saved immediately when clicked; no Save is needed
3	◀ ▶	Go to the previous or next channel
4	Search box	Shows only the channels whose name or number contains the text entered
5	Tabs	Settings categories of the selected channel. Built-in output channels: Name/Unit, Value set, Control set. AI channels: Channel Source, Name/Unit, Value set, Alarm set
6	Quick set, Native System	Quick set: opens Quick setup to configure many channels at once (see 6-7 Quick Setup (p. 74)). Native System: adds a JNC sensor from the built-in device list (see 6-8 Native System (p. 78))
7	Filter	All / AI / DI / DO / On (enabled channels only). Shows only the channels of the selected kind in the list
8	Save	Saves the changes in the current tab. Changes are not saved unless Save is clicked
9	Channel list	One row per channel: signal type, name, channel number, and current value. Click a row to open that channel. The count at the top (for example Enabled 10 / 10) shows enabled channels / all channels
10	Add channel	Adds a channel. The number next to it (for example 10/120) shows the channels in use / the maximum number of channels. Factory setting – do not change

- Channels other than the built-in output channels also have a Change type… button next to Enable (see 6-3 External Channels: AI (Analog Input) (p. 63)). Factory setting – do not change : changing the type changes the purpose of the channel.

There are two types of channels:

Type	Channels	What can be changed	Described in
Built-in output channels	From Ch1; the number equals the number of control points (Ch1–Ch4 for DO4)	The signal type is fixed to DO (locked, no Change type… button); name, Value set, and Control set can be changed	6-2 (p. 60)
Other channels	External sensors, virtual channels, etc.	AI/DI/DO can be selected and the Channel Source can be set	6-3 (p. 63)–6-5 (p. 71)

Both types share one numbering sequence: built-in output channels come first (from Ch1), and other channels follow.

What the channel value means (DO channels; the same numbers appear in the channel list, the channel header, and downloaded log files):

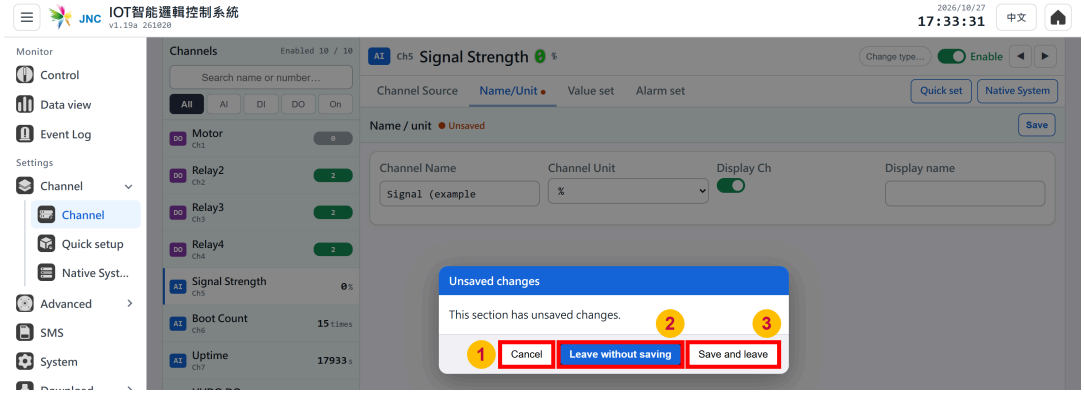
Value	Meaning
0	Cloud, off
1	Cloud, on (1 whether switched on by a person or by a rule)
2	Knob at OFF
4	Knob at ON

- These values are unrelated to the channel type codes (1 = AI, 2 = DI, 4 = DO) in 6-10-9 Data Formats (p. 97).

When there are many channels, use 6-7 Quick Setup (p. 74) to change several at once.

6-1-1 Unsaved Changes

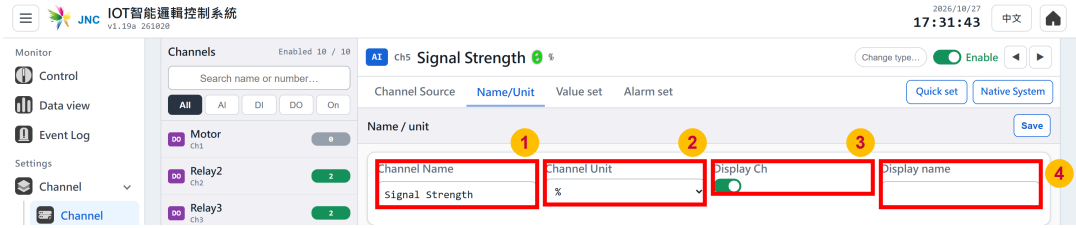
When a field is changed and not yet saved, an orange dot appears on the tab and Unsaved appears next to the section title. If another channel or tab is selected before saving, the following prompt appears:



Code	Button	Function
1	Cancel	Closes the prompt and stays on the current tab; the changes are kept on screen, not yet saved
2	Leave without saving	Discards the changes and moves on
3	Save and leave	Saves the changes, then moves on

6-1-2 Name/Unit

All channels have a Name/Unit tab. The figure below shows an AI channel; DO channels have no Channel Unit field.



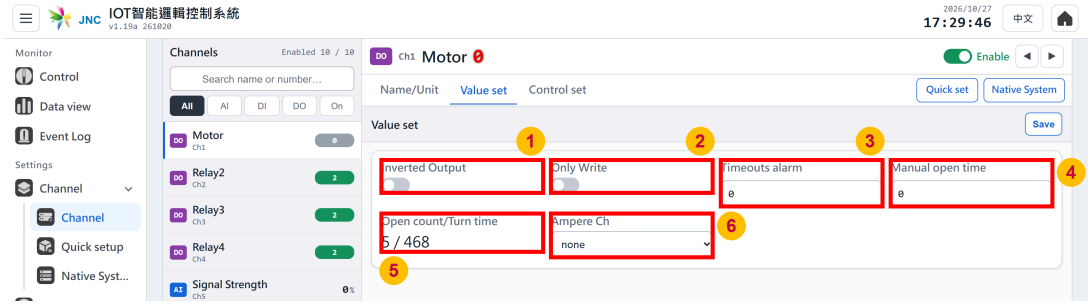
Code	Field	Function
1	Channel Name	Channel name shown on the web page and in alarm SMS messages; up to 15 Chinese characters, letters, or digits
2	Channel Unit	Select the unit from the drop-down list (for example °C, ppm, mA, m/s, %); selecting “Custom” shows an input box (up to 15 characters)
3	Display Ch	For models with a built-in small display. The DO series has no display; no setting is needed
4	Display name	For models with a built-in small display. The DO series has no display; no setting is needed

6-2 Built-in Output Channels

Path: Login → left menu → Channel → Channel → select Ch1–ChN in the channel list (N = number of control points).

The signal type of a built-in output channel is locked to DO. Example: the signal type of the first 16 channels of the DO16 cannot be changed. Built-in output channels have three tabs: Name/Unit, Value set, and Control set. The channel header, Enable, list, and filter are described in 6-1 Channel Settings Overview (p. 55). For Name/Unit, see 6-1-2 Name/Unit (p. 59).

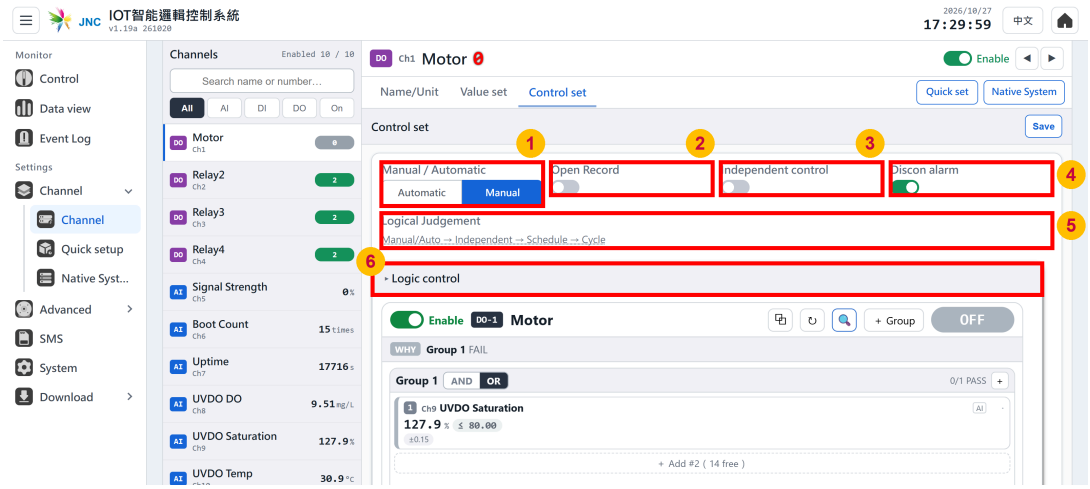
6-2-1 Value Set



Code	Field	Function
1	Inverted Output	On: the output state is the opposite of the displayed state. Off: synchronized. Normally leave off; if on, personnel on site will misread the state
2	Only Write	Sets whether a load switched on manually returns to on after power is restored. On: the load returns to on within a few seconds after power is restored. The load starts by itself when power is restored; check the surroundings for safety first. Off: the output stays off after power is restored, the web page switch returns to off (gray), and the output must be switched on again. While this is on, the web page does not update this output's knob state: when the knob moves from Local-Off to Cloud, the page still shows Local-Off and no power button appears. To switch this output from the web page, turn this function off first

Code	Field	Function
3	Timeouts alarm	When the DO is switched on in automatic mode and stays on longer than the specified number of seconds, a DO alarm is issued, the output is switched to manual, and the output is switched off (unit: seconds). Switching on manually does not trigger it. When the time is up, the output switches to manual and turns off
4	Manual open time	When the DO is switched on in manual mode, it switches off automatically after the specified time. The equipment is switched off directly. Easily confused with the previous row
5	Open count/Turn time	Read-only. On count / total run time (seconds) of this output. Can be cleared in the DO tab of 6-7 Quick Setup (p. 74)
6	Ampere Ch	Drop-down list; select a current channel to bind to this output. Requires the optional CT; without a CT, select none

6-2-2 Control Set



Code	Field	Function
1	Manual / Automatic	Manual: the operator clicks to switch. Automatic: the system switches according to the configured conditions. If rules are set but the output stays in Manual, the rules do not run at all and no error is shown. New channels default to Automatic
2	Open Record	When on, each time this output switches on, one entry is added to the Event Log page: channel name, value 1, on and off times. When switched on manually, the status shows Manual (see 5-8 Event Log (p. 52))
3	Independent control (bypasses Logic Control)	On: Logic Control is not evaluated; the output switches according to Schedule Control (when enabled) and Cycle Control. Off: the output runs according to the enabled logic modes. Turning it on by mistake disables the Logic Control rules
4	Discon alarm	On: an alarm is issued when the device does not return a value and Read.. is shown. Off: not recommended for important channels
5	Logical Judgement	Shows the order in which automatic control is evaluated: Manual/Auto → Independent → Schedule → Cycle (see 7-2 Automatic Control Decision Sequence (p. 103)). Display only

Code	Field	Function
6	Logic control	Expandable section with the Logic Control rules of this output (conditions, groups, Save, Reset data). See 7-3 Logic Control (p. 104)

Below Logic control are two more expandable sections, Periodic Control and Cycle Control: click a section title to expand or collapse it; Off on the right of the title means that function is not enabled.

> NOTE: "Periodic Control" on screen means Schedule Control
>
> The section labeled Periodic Control on screen is Schedule Control in this manual (on/off by time of day and day of week). It is the same setting as Advanced → Schedule Control; for the fields, see 7-5 Schedule Control (p. 112). For the fields of the Cycle Control section (on/off by fixed on and off durations), see 7-6 Cycle Control (p. 114).

- The Logic control section in Control set and Advanced → Logic are the same set of rules.
- How to save: the four switches at the top (1 – 4) are saved with Save at the upper right of the tab; the Logic control section has its own Save at its lower right; the Schedule Control and Cycle Control sections are each saved by the ✓ at their lower right; Save at the upper right of the tab is not needed for them.
- When the front panel knob is at Cloud, if the M/A button on the Control page is pressed or Manual / Automatic in Control set is changed from Automatic to Manual, the output keeps its state at the moment of switching; press the power button to switch it off when required.

6-3 External Channels: AI (Analog Input)

The device can connect sensors over RS-485 (Modbus RTU) or the network (Modbus TCP). Each value occupies one channel. Some sections in this part have a pre-operation label next to the section title.

General users do not need to change "Channel Source". Do not change it unless connecting equipment from another brand. To add a JNC sensor, 6-8 Native System (p. 78) fills in the Channel Source automatically.

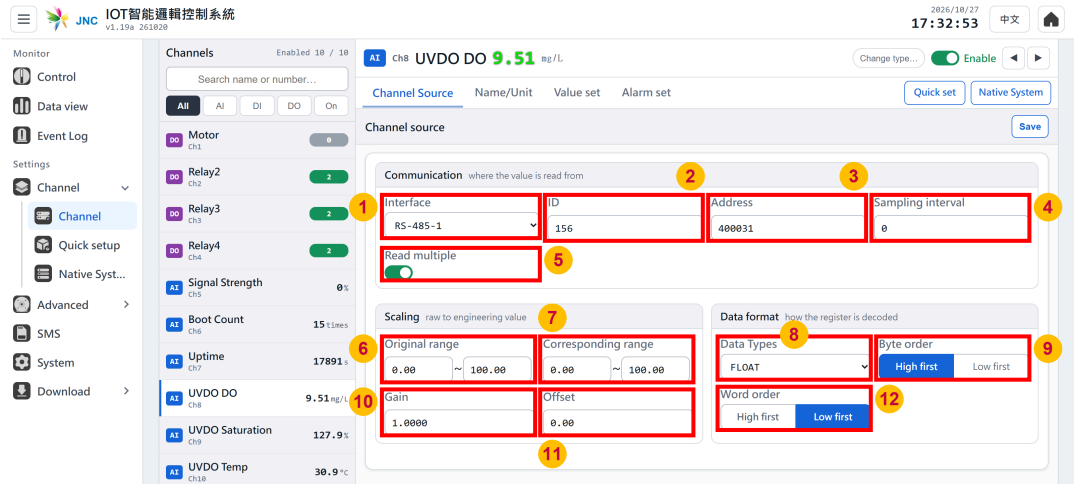
Path: Login → left menu → Channel → Channel → select an AI channel in the channel list (filter AI shows only AI channels).

AI channels have four tabs: Channel Source, Name/Unit, Value set, and Alarm set. The Change type… button next to Enable switches the signal type (AI/DI/DO) Factory setting – do not change. For the fields of the Channel Source tab, see 6-3-1 Channel Source (p. 64). For Name/Unit, see 6-1-2 Name/Unit (p. 59).

6-3-1 Channel Source

Factory setting – do not change (this table applies to AI, DI, and DO channels)

Path: Login → left menu → Channel → Channel → select a channel in the channel list → Channel Source tab.

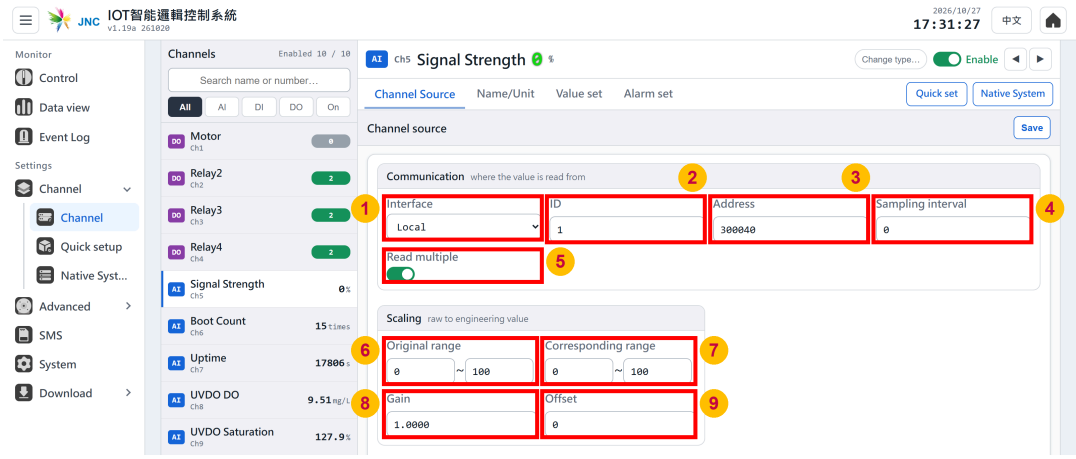


(Example of an external sensor: Interface RS-485-1, ID 156, Address 400031, Data Types FLOAT.)

The tab has three groups: Communication (where the value is read from), Scaling (raw to engineering value), and Data format (how the register is decoded).

Code	Field	Function
1	Interface	RS-485-1: terminals at the bottom of the controller board, RTU communication. TCP: Ethernet port (RJ45) on the controller board, TCP communication. Local: reads an internal value of this unit; the ID is not used. RS-485-2: second set of RS-485 terminals at the bottom of the controller board, RTU communication. Each of the two RS-485 ports can be set as master or slave
2	ID	1–255. Must match the slave ID of the device to be read. Example: if the sensor slave ID is 3, enter 3 here

Code	Field	Function
3	Address	Which value of the device to read; check the Modbus table of that device. How to enter: convert the hexadecimal address to decimal, add the type prefix, then add 1. AI, holding register: prefix 4xxxxx. Example: 0x0023 = decimal 35 → enter 400036 (400035 + 1). AI, input register: prefix 3xxxxx. Example: 0x0023 → enter 300036 (300035 + 1)
4	Sampling interval	How often the real-time value is read (ms)
5	Read multiple	On: faster reading. Has no effect if the other device does not support multi-address reads. Off: one channel is read at a time; not recommended when there are many channels
6	Original range	Minimum–maximum of the input signal. Example: PT100 original range 0–20 (mA)
7	Corresponding range	Converts the original range into readable values. Example: PT100 corresponding range –20–250 (°C). The number of decimal places shown follows the decimal places entered here
8	Data Types	Select according to the data type of the other device: INT16, INT32, INT64 (signed integers); UINT16, UINT32, UINT64 (unsigned integers); FLOAT, DOUBLE (floating-point numbers)
9	Byte order	High first / Low first. Select the byte order of the returned data according to the other device
10	Gain	Multiplier. Example: the reading is 264 and the actual value is 26.4 °C → enter a gain of 0.1
11	Offset	Added or subtracted value. Example: the display shows 26.4 °C and a reference thermometer shows 27.4 °C → enter an offset of 1.0
12	Word order	High first / Low first. Select the word order of the returned data according to the data type



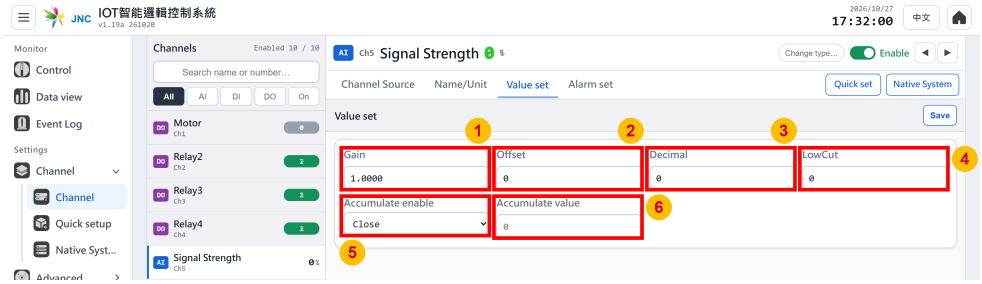
(Example of a channel with Interface Local: the Data format group is not shown. Codes 1–9 are the same fields as codes 1–7, 10, and 11 in the table above.)

CAUTION: An incorrect Channel Source does not produce an error message

If the ID, address, or data type is entered incorrectly, the value shows Read.., or a number that "looks normal but is completely wrong" appears.

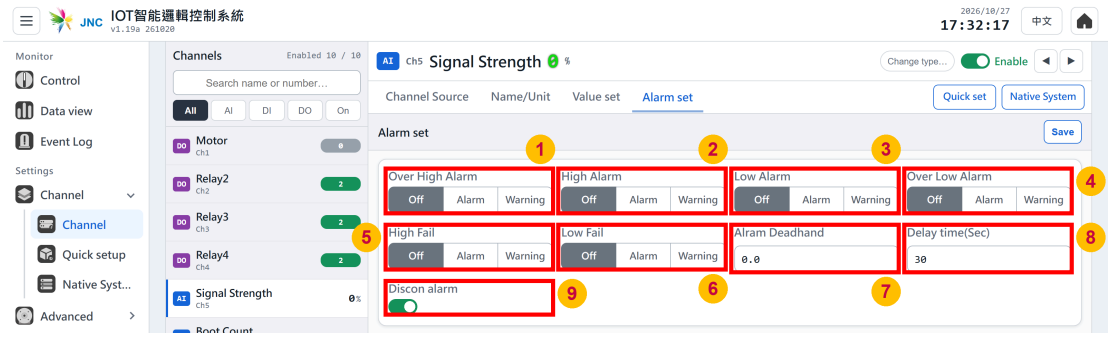
6-3-2 Value Set

Factory setting – do not change



Code	Field	Function
1	Gain	Adjusts the value by multiplication. Formula: V = ax + b (V = corrected value, a = gain, x = original value, b = offset)
2	Offset	Adjusts the value by addition or subtraction
3	Decimal	Number of decimal places shown
4	LowCut	Limits the minimum value
5	Accumulate enable	Accumulates the real-time value over time: Close (off) / Unit sec (seconds) / Unit min (minutes) / Unit hour (hours). Example: power consumption 3.8 W, Unit sec selected; after one minute the accumulated value is 228 (W)
6	Accumulate value	Shows the accumulated value

6-3-3 Alarm Set



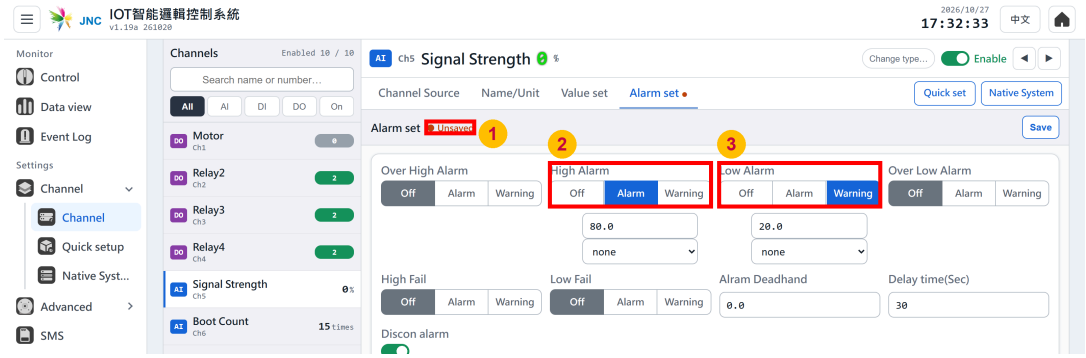
Each alarm level is set with a three-way selector: Off / Alarm / Warning. When Alarm or Warning is selected, an input box for the alarm value and a drop-down list (default none) appear below the selector.

- Alarm: enters the alarm state, is logged in the Event Log, and triggers SMS and upload.
- Warning: enters the alarm state (visible on screen and usable in Logic Control) but is not logged or sent.

- **Drop-down list (HH/HI/LO/LL only): a precondition for the alarm. With none, the alarm is always evaluated; with a DO selected, this alarm level is evaluated only while that DO is on and cannot occur while it is off. Example: for a low alarm on outlet pressure, select the pump motor's DO; the alarm then occurs only when the pressure is low while the motor runs, not when it is stopped. The drop-down list does not switch equipment.**

Code	Field	Function
1	Over High Alarm (HH)	Second-stage high alarm: issued when the value is higher than the set value
2	High Alarm (HI)	First-stage high alarm: issued when the value is higher than the set value
3	Low Alarm (LO)	First-stage low alarm: issued when the value is lower than the set value
4	Over Low Alarm (LL)	Second-stage low alarm: issued when the value is lower than the set value
5	High Fail	Set according to the possible fault values of the device; used to detect sensor faults. When the value exceeds High Fail, the Event Log shows HI FAIL
6	Low Fail	Low fault value, used to detect sensor faults
7	Alarm Deadband	Alarm deadband (hysteresis). Example: HI = 60, deadband = 5 → 60 – 5 = 55; the alarm clears only when the value falls below 55 (called return to normal on screen)
8	Delay time(Sec)	The alarm is triggered only when the value stays out of limits longer than this number of seconds (0–32767 s)
9	Discon alarm	On: an alarm is issued when the device does not return a value and Read.. is shown. Turn it on for important channels. To send a disconnection SMS, the SMS settings must also be configured (see 6-9 SMS Settings (p. 79))

Example: setting a high alarm and a low warning



1. In High Alarm (2), select Alarm, then enter the alarm value (example: 80.0).
2. In Low Alarm (3), select Warning, then enter the alarm value (example: 20.0).
3. Unsaved (1) appears next to the section title. Click Save at the upper right.

- Who is notified when an alarm is triggered → 6-6 Alarm Settings (p. 73).

6-4 External Channels: DI (Digital Input)

Connects signals that have only two states: on and off. Some sections in this part have a pre-operation label next to them.

Path: Login → left menu → Channel → Channel → select a DI channel in the channel list (filter DI shows only DI channels).

The page layout and tabs are the same as for AI channels (see 6-3 External Channels: AI (Analog Input) (p. 63)); only the fields below differ. DI channels have no Control set tab.

Tab	Field	Function
Channel Source Factory setting – do not change	—	Which value of which device to read (Interface, ID, Address, etc.). Only the address prefix differs from AI: for DI enter 100036 (100035 + 1). Full description in 6-3-1 Channel Source (p. 64)
Name/Unit	—	Channel name and unit. Full description in 6-1-2 Name/Unit (p. 59)
Value set Factory setting – do not change	Inverted	On: the state is the opposite of the displayed state. Off: synchronized
Alarm set	Digital Input Alarm	Three-way selector: Off / Alarm / Warning. When Alarm or Warning is selected, a DI alarm is triggered when the value is in the HI state
	Delay time(Sec)	The alarm is triggered only when the condition persists longer than this number of seconds
	Discon alarm	On: an alarm is issued when the device does not return a value and Read.. is shown. Full description in 6-3-3 Alarm Set (p. 67)

6-5 External Channels: DO (Digital Output)

Used for outputs that control external equipment, or for creating virtual channels (see 7-10 When Rules Exceed Capacity: Virtual Channels (p. 124)). Some sections in this part have a pre-operation label next to them.

Path: Login → left menu → Channel → Channel → select a DO channel after the built-in output channels in the channel list.

An external DO channel has the same Name/Unit, Value set, and Control set tabs as a built-in output channel (see 6-2 Built-in Output Channels (p. 60)), plus a Channel Source tab and a Change type… button; there is no Alarm set tab.

Tab	Field	Function
Channel Source Factory setting – do not change	—	Which value of which device to read (Interface, ID, Address, etc.). The address prefix differs from AI: for DO enter 000036 (000035 + 1). There is also Write cmd (single(fc5/fc6) or multiple(fc15/fc16)). Full description in 6-3-1 Channel Source (p. 64)
Name/Unit	—	Channel name. Full description in 6-1-2 Name/Unit (p. 59)
Value set	Inverted Output	On: the output state is the opposite of the displayed state
	Only Write	Sets whether a load switched on manually returns to on after power is restored
	Timeouts alarm	When the DO is switched on in automatic mode and stays on longer than the specified time, a DO alarm is issued, the output is switched to manual, and the output is switched off
	Manual open time	When the DO is switched on in manual mode, it switches off automatically after the specified time

Tab	Field	Function
Control set	Manual / Automatic	Manual: the operator clicks to switch. Automatic: the system switches according to the configured conditions
	Open Record	When on, an event is logged when the equipment runs
	Independent control (bypasses Logic Control)	On: Logic Control is not evaluated; the output switches according to Schedule Control and Cycle Control
	Discon alarm	An alarm is issued when the device does not return a value and Read.. is shown
	Logic control, Schedule Control, Cycle Control	Expandable sections; see 6-2-2 Control Set (p. 62)
	Auto Wash	Starts this DO at the set wash interval to clean the sensor; during the wash and keep time, the selected detection channel stops updating its value
	Scale control	External analog outputs only (address 400001 or above): maps the raw range of a source channel to the output range and writes the result

- For the full description and notes for each field of Value set and Control set, see 6-2 Built-in Output Channels (p. 60). The differences are that external DO channels have no Ampere Ch, Control set also has Auto Wash, and analog outputs also have Scale control.

6-6 Alarm Settings

Path: Login → left menu → Channel → Channel → select an AI or DI channel → Alarm set tab.

The alarm fields are in the Alarm set tab of each channel (AI: see 6-3-3 Alarm Set (p. 67); DI: see 6-4 External Channels: DI (Digital Input) (p. 70)). This section describes who is notified when an alarm is triggered.

Step	What happens	Requirement
1	The value crosses the alarm value and timing starts	—
2	The condition persists longer than the alarm delay, and the alarm becomes active	—
3	The alarm is written to the Event Log (see 5-8 Event Log (p. 52))	This level is set to Alarm (Warning is not logged)
4	An SMS is sent to mobile phones	Optional 4G + SIM card + SMS settings + phonebook (all required; see 6-9 SMS Settings (p. 79))
5	Shown or notified on the cloud platform	Data has been uploaded to the JNC SCADA cloud platform
6	Linked switching of equipment	Compare with: Alarm in a Logic Control condition; see 7-3-3 Conditions and Operators (p. 110)

- **Setting an alarm value does not switch equipment by itself; to switch equipment with an alarm, use Compare with: Alarm as a Logic Control condition (see 7-3-3 Conditions and Operators (p. 110)).**
- **How an alarm clears: the red alarm text on the web page disappears only after the value returns to normal (including the deadband). The web page has no acknowledge or mute function.**
- **Restarting during an active alarm: if the condition is still met after startup, the alarm is triggered again, a new Event Log entry is added, and another SMS is sent.**

WARNING: Without a SIM card or a cloud connection, alarms do not actively notify anyone

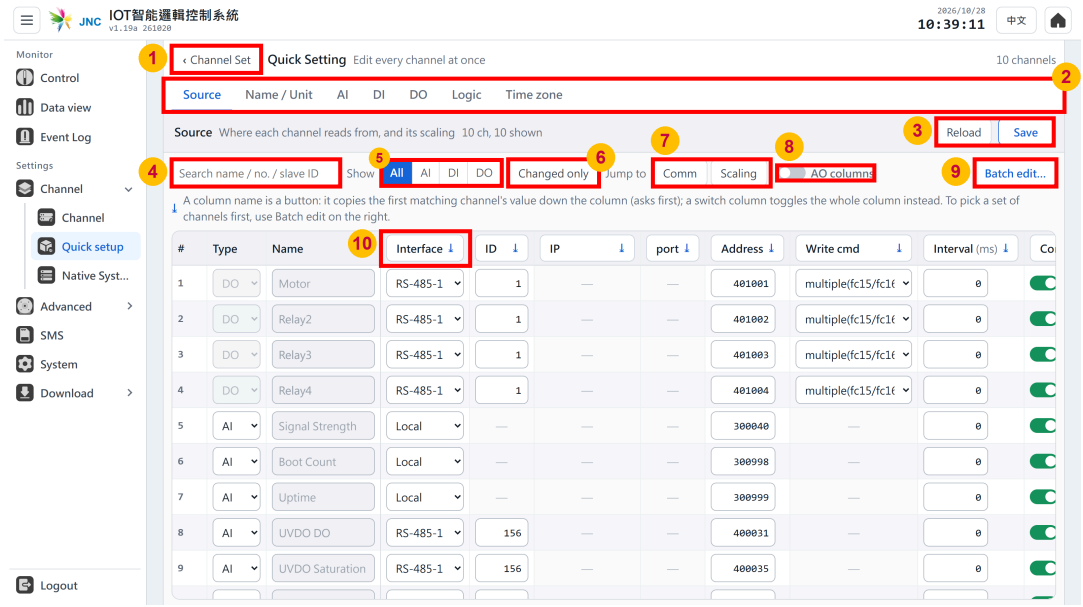
Alarms are only recorded on the Event Log page of the device; someone must check it to find out.

6-7 Quick Setup

Configures many channels at once in one table, saving the time of opening each channel page and making it easy to review the settings of all channels at once. There are seven tabs.

Path: Login → left menu → Channel → Quick setup (or the Quick set button on the Channel page) → select a tab (Source / Name / Unit / AI / DI / DO / Logic / Time zone).

The Source tab is shown when Quick setup is opened.



Buttons common to the tabs:

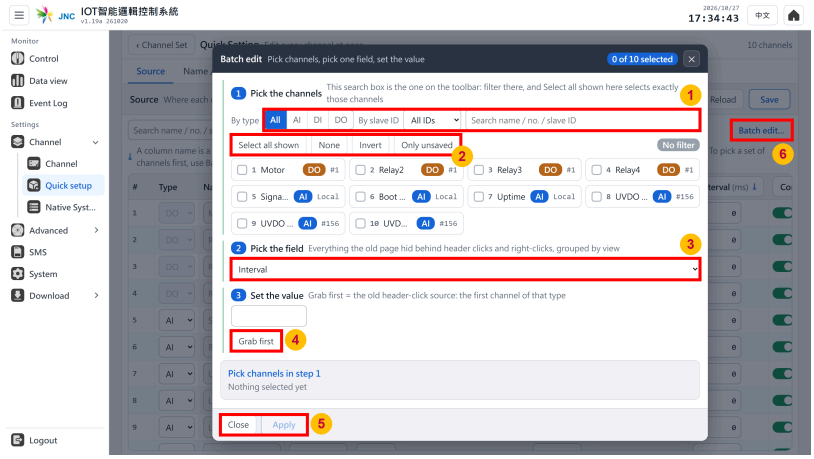
Code	Button	Function
1	‹ Channel Set	Returns to the Channel page
2	Tabs	Switch the parameter category to configure
3	Reload, Save	Reload: reads the settings from the device again and discards unsaved changes. Save: saves all changed channels in this tab. Changes are not saved unless Save is clicked
4	Search box	Shows only the channels whose name, number, or slave ID contains the text entered
5	Show	All / AI / DI / DO: shows only the channels of the selected type (available in Source and Name / Unit)
6	Changed only	Shows only the channels with unsaved changes

Code	Button	Function
7	Jump to	Scrolls the table to a group of columns (Source: Comm / Scaling; AI: Scaling / Counters / Alarm; DI: Basic / Alarm; DO: Basic / Counters / Control)
8	AO columns	Shows or hides the AO columns (Source tab only): when on, Scaled range, Gain, and Offset are replaced by Select cfg, OnValue, and OffValue for analog-output channels
9	Batch edit…	Sets one field to the same value for a selected set of channels (see below)
10	Column names	A column name with ↓ is a button: it copies the value of the first matching channel down the whole column (asks first). A column of switches toggles the whole column instead. Applies to every shown channel; filter first to limit the range

CAUTION: Changes are not saved unless Save is clicked

A changed tab shows an orange dot, and n channel(s) will be saved appears next to Reload; each changed channel has an orange dot next to its row number.

6-7-1 Batch Edit



Code	Name	Function
1	By type, By slave ID, search box	Pick the channels: narrows the channel list by type (All / AI / DI / DO), slave ID, or name/number. The search box is the same as the one on the toolbar
2	Select all shown, None, Invert, Only unsaved	Selects channels: all channels shown, none, the opposite selection, or only the channels with unsaved changes. Channels can also be ticked one by one; the count is shown at the upper right (for example 0 of 10 selected)
3	Field	Pick the field: the field to change (drop-down list grouped by tab)
4	Grab first	Set the value: enter the value, or click Grab first to copy the value of the first channel of that type
5	Close, Apply	Close: closes without changing anything. Apply: writes the value into the selected channels in the table
6	Batch edit...	Click it on the Quick setup page to open this window

Procedure:

1. Click Batch edit... 6.
2. Choose the channel list in 1, then select channels with 2 or one by one.
3. Select the field to change in 3.
4. Enter the value above 4, or click Grab first 4.
5. Click Apply 5.
6. Click Save on the tab (Apply only changes the values on screen).

Fields of each tab: fields that also appear on the single-channel pages are described only in that section.

Tab	Fields described in	Functions found only in this tab
Source Factory setting – do not change	6-3-1 Channel Source (p. 64)	IP, port: required only when the Interface is TCP; IP is the address of the other device, port defaults to 502; enter the port opened by the other device. Write cmd (DO channels only): the Modbus command used to write the output, single(fc5/fc6) or multiple(fc15/fc16). Scaling under Jump to shows the conversion columns; AO columns switches to the analog-output columns
Name / Unit	6-1-2 Name/Unit (p. 59)	AI / DI / DO at the right edge of each row changes the channel type: Factory setting – do not change; switching clears the settings of this channel. Keep Type switch warning on
AI	6-3-2 Value Set (p. 67), 6-3-3 Alarm Set (p. 67)	Clear add-up: clears the add-up value of all AI channels; the cleared value cannot be restored
DI	6-4 External Channels: DI (Digital Input) (p. 70)	Reset delay (s): after the value returns to normal, the alarm clears only when this time has elapsed (0–32767 s)
DO	6-2-1 Value Set (p. 60), 6-2-2 Control Set (p. 62)	Clear on count, Clear run time: clear the counters of all DO channels; the cleared values cannot be restored
Logic	7-3 Logic Control (p. 104)	Select one DO channel and edit its logic rules; it is the same editor as Advanced → Logic; save with the section's own Save at the lower right

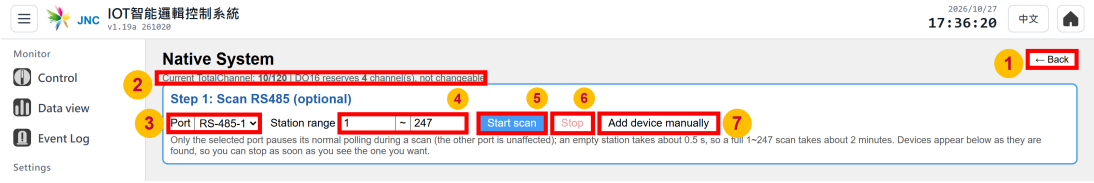
Tab	Fields described in	Functions found only in this tab
Time zone	7-5 Schedule Control (p. 112)	Select one DO channel and set its schedule; save with Save at the lower right of the section

6-8 Native System

Adds a JNC sensor (for example IAQS) as channels: the page fills in the Channel Source of each value from a built-in device list, so the address and data type do not have to be looked up. It can also scan an RS-485 port for connected devices.

Factory setting – do not change

Path: Login → left menu → Channel → Native System (or the Native System button on the Channel page).



Step 1: Scan RS485 (optional)

Code	Name	Function
1	← Back	Returns to the previous page
2	Channel count	Current TotalChannel: 10/120: channels in use / maximum. The text after it (example: DO16 reserves 4 channel(s), not changeable) shows the number of built-in output channels reserved at the beginning of the list. The model name in this text is shown by the device as is
3	Port	RS-485 port to scan (RS-485-1 / RS-485-2)
4	Station range	Range of slave IDs to scan (1–247)
5	Start scan	Starts scanning. Devices found are listed below as they are found. During a scan, the selected port pauses its normal reading; the other port is unaffected. Each empty slave ID takes about 0.5 s, so a full 1–247 scan takes about 2 minutes
6	Stop	Stops the scan; use it as soon as the device needed is listed

Code	Name	Function
7	Add device manually	Opens Step 2 without scanning (available after the page finishes loading)

Step 2 and Step 3: add the device and write

1. In Step 2, select the Device (example: IAQS).
2. Enter the Name prefix (optional; example: Office → Office + tag name), the Interface, and the Slave ID (must match the slave ID of the device).
3. Tick the values to add (all are ticked by default; use Select all / Clear all). Built-in advanced channels need a channel number in the Ch column. Click + Add ticked channels to the list.
4. In the Step 3 Planned list, check the channel numbers and names; remove unwanted rows with ✗ in the Action column.
5. Click Write to CB below the list.

- Below the list are also Clear new rows (deletes the rows added this time and not yet written) and Clear existing channels (releases the existing rows). Hide existing channels shows only the new rows.
- Row colors: grey = already on the device (never rewritten), white = not written yet, green = written (skipped next time), yellow = the total channel count is increased before writing, pink = over the model limit (the write aborts), red = write failed.
- ✗ on an existing row only releases its channel number; later existing channels are never shifted forward, so the channel addresses recorded in data.csv stay valid. New rows are renumbered automatically when a row is removed or moved.

CAUTION: Writing changes the channel configuration of the device

Before writing, back up the configuration (see 6-10-10 Config Data (p. 98)).

6-9 SMS Settings

CAUTION: The functions in this section require the optional 4G module and a SIM card. Skip this section if the device has no 4G

Path: Login → left menu → SMS → select a tab (SMS Setting / Phone Book / Gps Alarm / Cell tower).

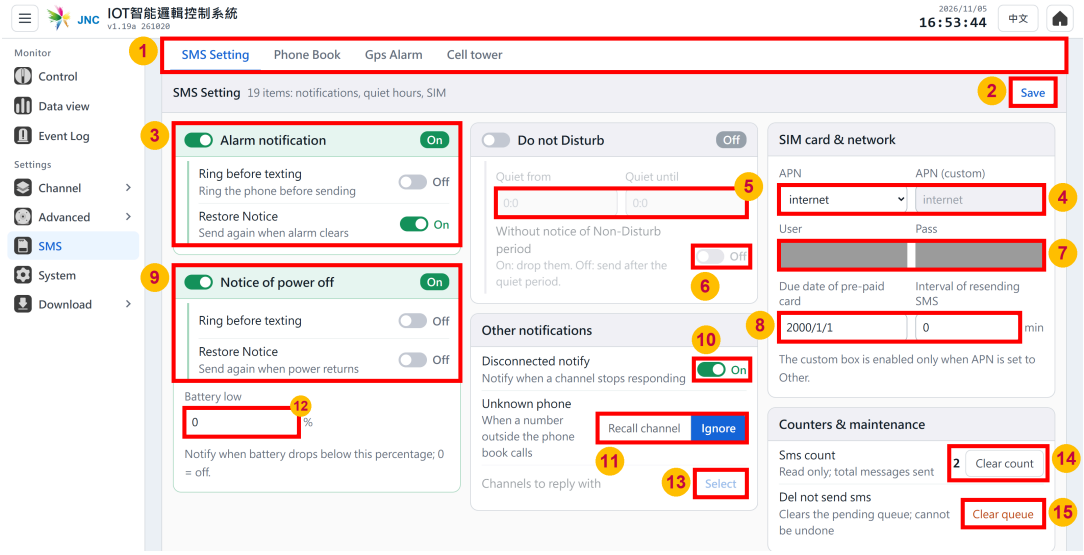
To receive SMS messages, all three of the following are required:

1. SMS Setting tab: turn on Alarm notification.
2. Insert a SIM card and select the correct access point name in APN.

3 **Phone Book tab: enter the mobile number and select the channels to be notified.**

Each tab has its own Save button at the top right. Changes on a tab take effect only after Save is clicked.

6-9-1 SMS Settings Tab



Code	Name	Function
1	Tabs	SMS Setting / Phone Book / Gps Alarm / Cell tower
2	Save	Saves the settings of this tab
3	Alarm notification	Main switch (On/Off): sends an SMS when a value alarm occurs. Two switches below it: Ring before texting: the device calls the phone before sending the SMS; the SMS is sent whether the call is answered, hung up, or not answered. Restore Notice: an SMS is also sent when the alarm clears
4	APN / APN (custom)	Access point name. Drop-down list; select according to the SIM card. internet: carriers in Taiwan, Penghu, Kinmen, and Matsu (Chunghwa Telecom, Taiwan Mobile, Far EasTone, T Star, Asia Pacific Telecom); the APN is obtained automatically. iot.1nce.net: IoT SIM card supplied by JNC; the APN of the local partner carrier is obtained automatically. Other: countries outside Taiwan, Penghu, Kinmen, and Matsu; enter the APN name of the local carrier in APN (custom). The APN (custom) box is enabled only when APN is set to Other.

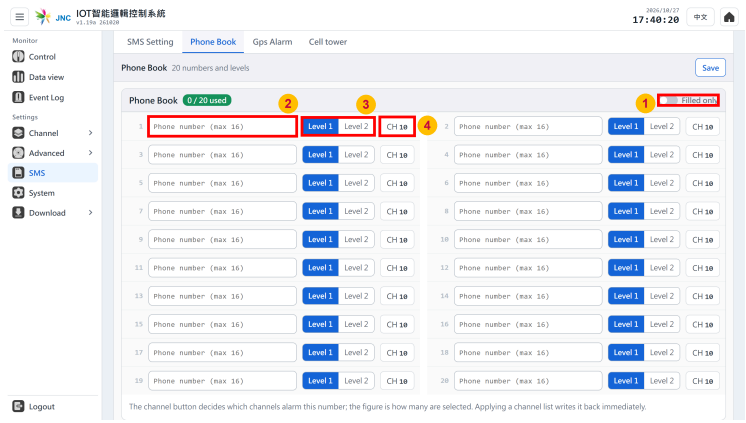
Code	Name	Function
5	Quiet from / Quiet until	Turn on Do not Disturb first. No SMS is sent during this time range. A time range of 0:0–0:0 = no Do Not Disturb period
6	Without notice of Non-Disturb period	What happens to SMS messages held during the Do Not Disturb period. On: they are dropped. Off: they are sent after the quiet period
7	User / Pass	User name and password for the APN; fill them in only when the carrier requires them
8	Due date of pre-paid card / Interval of resending SMS	Due date of pre-paid card: enter the expiration date of the prepaid card; reminder SMS messages are sent 14 days and 1 day before expiration. Note: requires an activated SIM card. Interval of resending SMS (min): while an alarm persists, an SMS is resent at this interval
9	Notice of power off	Main switch (On/Off): sends an SMS when the device loses power (a backup battery is required). It also has its own two switches: Ring before texting: same as above. Restore Notice: an SMS is sent when power returns
10	Disconnected notify	When on, an SMS is sent to the mobile phones bound in the phone book when a channel stops responding
11	Unknown phone	How the device handles calls from numbers not in the phone book. Ignore (factory default): calls from numbers not in the phone book are not answered, and SMS commands from them are not executed. Recall channel: unknown callers also receive an SMS with the site values; the channels included in the reply are set in 13. Note: requires an activated SIM card inserted in the card slot
12	Battery low	Unit %. An SMS is sent when the battery drops below this percentage; 0 = off (default). Note: requires an activated SIM card

Code	Name	Function
13	Channels to reply with	Click Select to choose which channels are included in the reply to a caller; the figure on the button is the number of selected channels
14	Sms count	Read only; number of SMS messages sent by this SIM card. Click Clear count to reset it to zero
15	Del not send sms	When the SIM card data is used up, SMS messages that cannot be sent are held and sent all at once when data is restored. Click Clear queue to clear them first and avoid a flood of alarm SMS messages. Cleared messages are not resent; click it only when these old alarms are no longer needed

WARNING: Keep “Unknown phone” set to Ignore

When it is set to Recall channel, anyone who calls the SIM card number of the device receives an SMS with the site values.

6-9-2 Phone Book

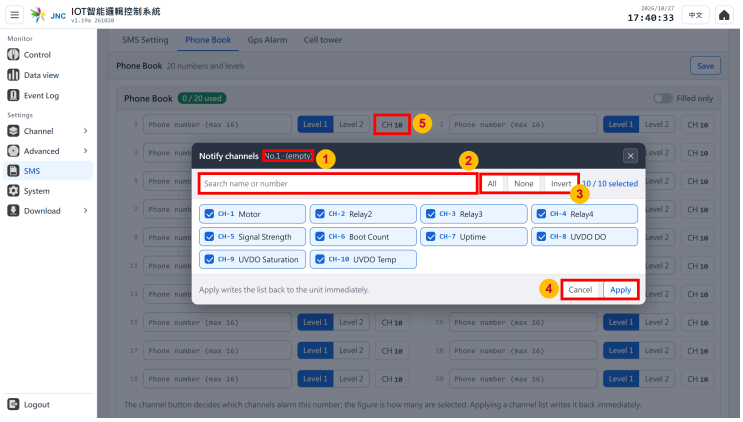


The phone book holds 20 numbers on one page. The counter next to the title (for example, 0 / 20 used) shows how many numbers are filled in.

Code	Name	Function
1	Filled only	When on, only the rows with a number are shown
2	Phone number	Mobile number that receives alarm SMS messages (up to 16 characters)
3	Level 1 / Level 2	SMS alarm stage of this number. Level 1: receives first-stage and second-stage alarms of the channels. Level 2: receives second-stage alarms only (HH, LL)
4	CH	Selects which channel alarms are sent to this number; the figure on the button is the number of selected channels. Clicking it opens the window below

- Fault alarms and channel disconnection notifications are second-stage alarms (same as HH and LL); numbers set to Level 1 or Level 2 both receive them.
- After entering numbers and levels, click Save at the top right.

Selecting the notify channels



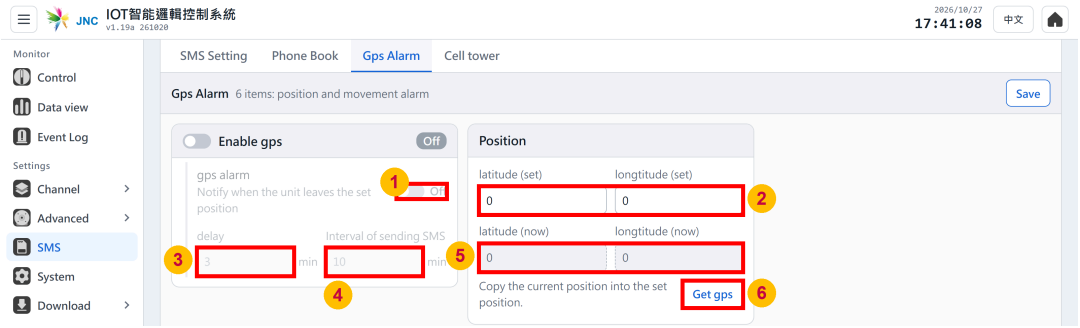
Code	Name	Function
1	Window title	Shows which phone book entry is being set and its number ((empty) when no number is entered)
2	Search	Search the channel list by channel name or number
3	All / None / Invert	Select all channels, clear all, or invert the selection. The figure on the right shows how many channels are selected
4	Cancel / Apply	Cancel: close without changes. Apply: writes the channel list back to the device immediately
5	CH	Click it in the number's row of the phone book to open this window

CAUTION: Apply takes effect immediately

The channel list is written to the device as soon as Apply is clicked, without clicking Save.

6-9-3 Location Alarm

Requires a SIM card and the optional GPS function, with no interference or obstruction around the device. Purpose: issues an alarm when the device is moved from its original position.



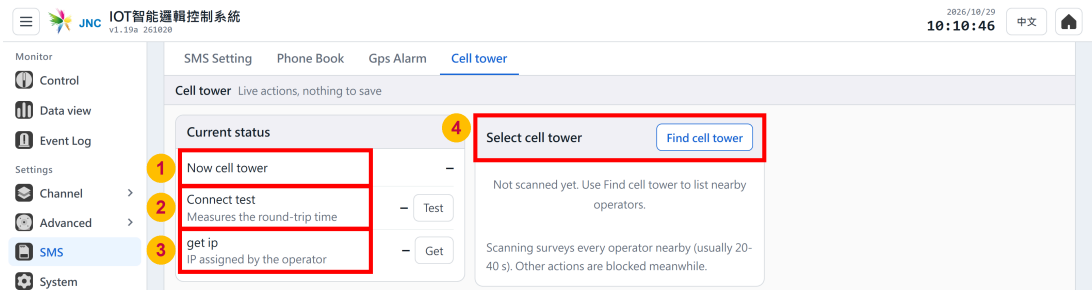
Turn on Enable gps at the top left of the tab first; the fields below it can be set only after it is turned on.

Code	Name	Function
1	gps alarm	When on, an alarm is issued when the device leaves the set position
2	latitude (set) / longtitude (set)	Coordinates of the set position
3	delay	Alarm delay time (min): the alarm is issued only after the condition persists for this time
4	Interval of sending SMS	While an alarm persists, an SMS is resent at this interval (min)
5	latitude (now) / longtitude (now)	Read only; the current coordinates of the device
6	Get gps	Copies the current position into the set position

6-9-4 Base Station

Scans nearby base stations and selects the carrier with the better signal for connection. Path: Login → left menu → SMS → Cell tower tab.

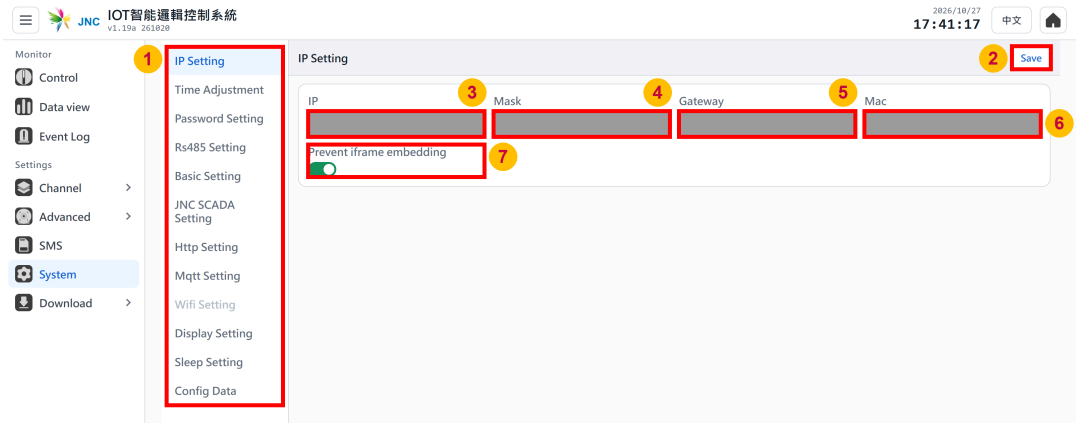
Opening this tab queries the 4G module immediately. When the module is busy, a notification appears; wait a moment and open the tab again.



Code	Name	Function
1	Now cell tower	The cell tower in use
2	Connect test	Click Test. ≤ 20 ms: excellent signal. 50–100 ms: good signal. ≥ 150 ms: poor signal
3	get ip	Click Get to read the IP assigned by the operator
4	Select cell tower	Find cell tower: scans nearby cell towers (also works abroad) and lists them; select the local carrier with the better signal to connect. A scan usually takes 20–40 s; other actions are blocked during the scan. Auto: appears after a cell tower is selected; click it to return the selection to the module. Note: requires a 1NCE SIM card

6-10 System Settings

Path: Login → left menu → System → select the item in the list on the left of the page.



The image above shows the IP Setting page. 1 is the item list; 2 is the Save button of the current page. Each page is saved separately. For 3 – 7, see 6-10-1 IP Setting (p. 88).

Item	Section	Label
IP Setting	6-10-1 (p. 88)	Factory setting – do not change
Time Adjustment	6-10-2 (p. 89)	—
Password Setting	6-10-3 (p. 90)	—
Rs485 Setting	6-10-4 (p. 90)	Factory setting – do not change
Basic Setting	6-10-5 (p. 92)	Per field
JNC SCADA Setting	6-10-6 (p. 94)	Factory setting – do not change
Http Setting	6-10-7 (p. 95)	Factory setting – do not change
Mqtt Setting	6-10-8 (p. 96)	Factory setting – do not change
Wifi Setting	—	Not used on DO series
Display Setting	—	Not used on the DO series
Sleep Setting	—	Not used on the DO series; keep it off
Config Data	6-10-10 (p. 98)	Factory setting – do not change

DANGER: Incorrect IP, Rs485, JNC SCADA, Http, or Mqtt settings may make the device permanently unreachable

These settings are completed at the factory. Do not change them. Incorrect settings may also cause wrong readings or stop uploads. If you have any questions, contact JNC.

If you change a field and then click another item in the list without clicking Save, an Unsaved changes window appears. The page title and the item in the list also show an Unsaved mark. For the window buttons, see 6-1-1 Unsaved Changes (p. 58).

6-10-1 IP Setting

Path: Login → left menu → System → IP Setting.

Factory setting – do not change

Sets the address of the device on the wired network. Incorrect settings may make the device web page unreachable.

For the codes, see the IP Setting figure at the start of 6-10 System Settings (p. 86).

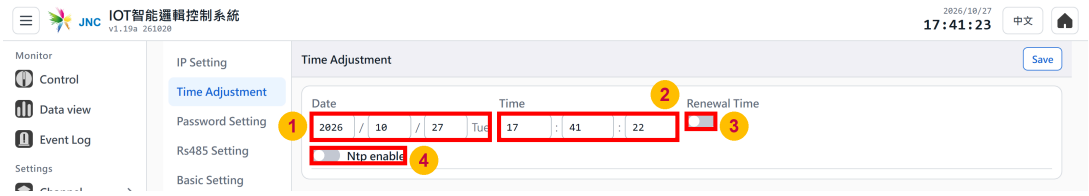
Code	Name	Function
3	IP	Default 192.168.0.88
4	Mask	Subnet mask, default 255.255.255.0
5	Gateway	Default gateway, default 192.168.0.1
6	Mac	Device identifier assigned at the factory, used for network connection. Note: Do not change the MAC unless necessary, to avoid connection errors.
7	Prevent iframe embedding	When on, other websites cannot embed the device pages in a frame (iframe).

- Every device has the same factory IP (192.168.0.88), which is also shown on the device label on the side of the enclosure.

6-10-2 Time Adjustment

What the device time affects: the timestamps of logs and alarms, and when Schedule Control acts.

If the device time is incorrect, Schedule Control switches equipment at the wrong time.

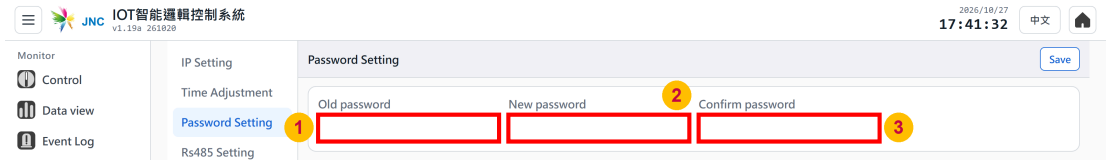


Code	Name	Function	Requirement
1	Date	Year / month / day set manually; the day of the week is shown on the right	None
2	Time	Hour : minute : second set manually	None
3	Renewal Time	When on, the device synchronizes to the time of the phone or computer currently in use; click Save to finish	None
4	Ntp enable (Network Time Protocol)	Synchronizes automatically with a time server on the network. Connection: Ethernet / 4G SIM (optional). Time zone: enter according to the location. Server address: Other allows a custom NTP server; or select a server of the National Time and Frequency Standard Laboratory (tock/watch/time/clock/tick.stdtime.gov.tw)	The device must be able to reach the network. Without network access, turning it on does not synchronize the time

- **When Ntp enable is off, its sub-fields are not shown. They appear only after it is turned on.**
- **The time is retained after power loss by the coin cell battery on the controller board.**

6-10-3 Password Setting

Changes the login password of the web page. The default password is 1234.



Code	Name	Function
1	Old password	Enter the current password
2	New password	Enter the new password
3	Confirm password	Enter the new password again, then click Save

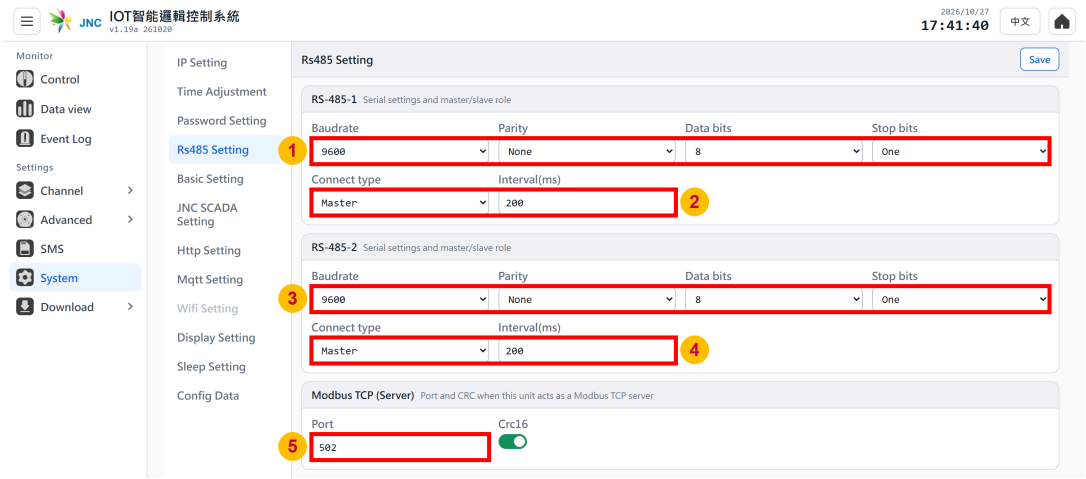
- **Change it immediately on first use.**

6-10-4 Rs485 Setting

Path: Login → left menu → System → Rs485 Setting.

Factory setting – do not change

Sets the RS-485 and Modbus TCP communication parameters so that the device and external sensors or other systems can read each other's data.



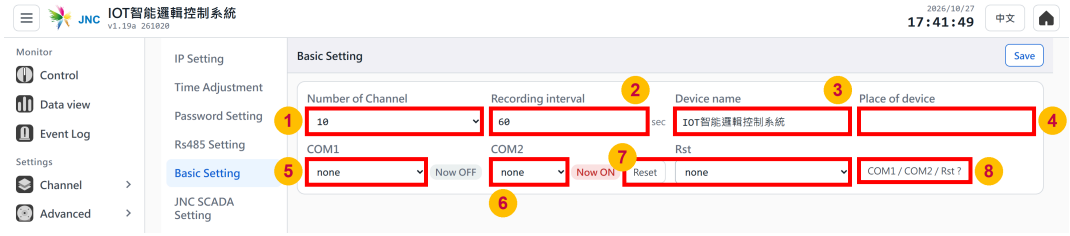
The page has three sections: RS-485-1, RS-485-2 (second RS-485 port), and Modbus TCP (Server). The two RS-485 sections have the same fields and are set separately.

Code	Name	Field	Function
1 3	Serial settings (RS-485-1 / RS-485-2)	Baudrate	2400/4800/9600/19200/38400/57600/115200
		Parity	None/Even/Odd
		Data bits	7/8
		Stop bits	One/Two
2 4	Master/slave role (RS-485-1 / RS-485-2)	Connect type	Master: the device actively reads data from others. Slave: the device passively lets others read its data
		Interval(ms)	Interval between communications
5	Modbus TCP (Server)	Port	User-definable (502 on the screen above); must not duplicate other communication devices

- All devices on the same RS-485 line must have the same baud rate, parity, data bits, and stop bits, and different slave IDs.
- Each of the two RS-485 ports can be set as master or slave.

6-10-5 Basic Setting

Sets the number of channels, the recording interval, and the device name and location shown on the home page. Some fields are factory settings; see the "Label" column in the table.



Code	Name	Function	Label
1	Number of Channel	Shows the current total number of channels. Select a new number from the drop-down list and save; channels are added or removed accordingly	Factory setting – do not change
2	Recording interval	Records one entry every set number of seconds (factory default 60 s, minimum 10 s; 0 = no recording)	Factory setting – do not change
3	Device name	Name shown at the top of the page; user-definable. The current name is the one shown at the top of the page	—
4	Place of device	Device location, up to 16 characters (letters, digits, or Chinese characters)	—

Code	Name	Function	Label
5	COM1	ON while any channel is in alarm. Drop-down list, a DO channel: that DO is written ON while COM1 is ON. 蜂鳴器 (buzzer): sounds once a second. none: no output. The label on the right shows the current state (Now OFF / Now ON)	Factory setting – do not change
6	COM2	Drop-down list works as for COM1, for COM2	Factory setting – do not change
7	Reset / Rst	Rst: select a DI channel; when that DI reads ON, COM2 is cleared (example: a field reset button). Reset (next to COM2): clears the latched COM2 alarm state (COM2 does not clear by itself after the event ends)	Factory setting – do not change
8	COM1 / COM2 / Rst ?	Click to show the help text for these three items	—

WARNING: Reducing the number of channels deletes the channels at the end

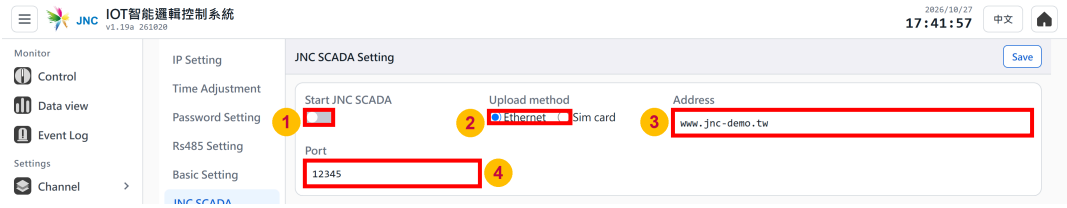
The highest-numbered channels are removed together with their settings.

6-10-6 JNC SCADA Setting

Path: Login → left menu → System → JNC SCADA Setting.

Factory setting – do not change

Sets the upload of data to the cloud platform (SCADA) of JNC.



Code	Name	Function
1	Start JNC SCADA	Turns upload to the cloud platform on or off
2	Upload method	Ethernet: uploads through a router connected with an Ethernet cable. Sim card (4G SIM, optional): uploads through a base station with a 4G SIM card inserted
3	Address	Address of the cloud platform server
4	Port	Port of the cloud platform server

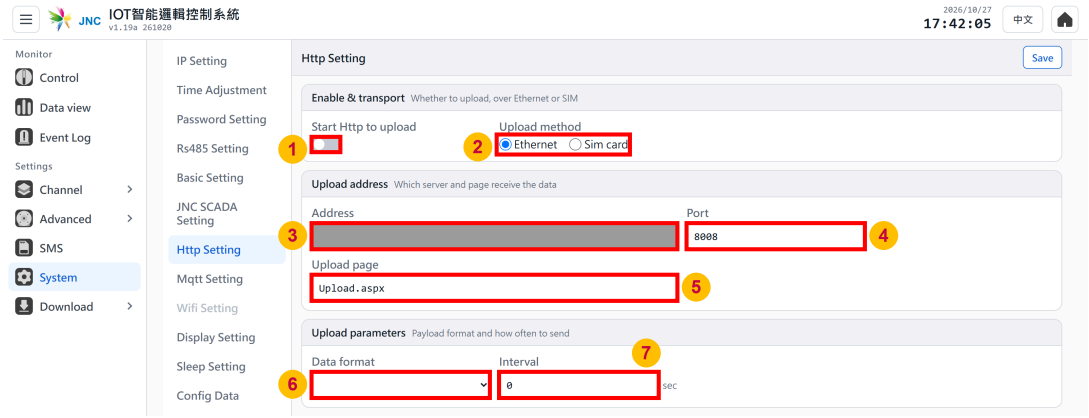
- **Enabling upload does not mean that data is being uploaded: the device must be able to reach the network and the address must be correct for data to be sent.**

6-10-7 Http Setting

Path: Login → left menu → System → Http Setting.

Factory setting – do not change

Sets which server the device uploads data to by HTTP, and how often.



Code	Name	Function
1	Start Http to upload	Turns HTTP upload on or off
2	Upload method	Ethernet or Sim card (optional); same as 6-10-6 JNC SCADA Setting (p. 94)
3	Address	Address (IP) of the destination server
4	Port	Port of the destination server
5	Upload page	HTTP request path, default Upload.aspx. Data is sent to this page by POST/GET
6	Data format	Array/JSON-J001/JSON-J002; the receiving end decides which one to use. Array is a single line of text with fields separated by &; JSON-J001 places each channel in the Value array, including the channel type; JSON-J002 uses channel names as field names and does not include the channel type. For examples, see 6-10-9 Data Formats (p. 97)
7	Interval	How often data is uploaded (s)

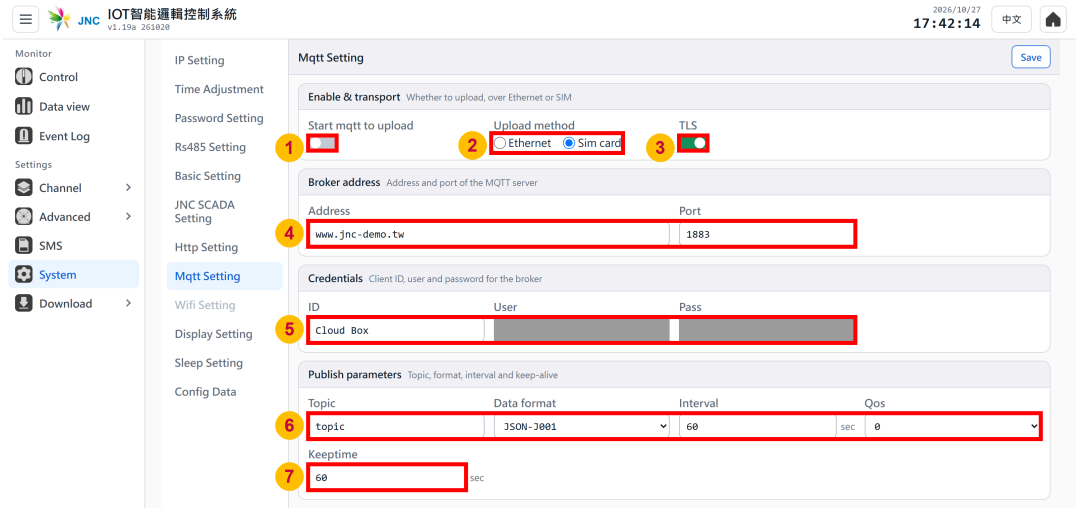
- Enabling upload does not mean that data is being uploaded: the device must be able to reach the network and the address must be correct for data to be sent.

6-10-8 Mqtt Setting

Path: Login → left menu → System → Mqtt Setting.

Factory setting – do not change

Publishes data to a specified broker using the MQTT protocol, for subscribers to receive.



Code	Name	Function
1	Start mqtt to upload	Turns MQTT publishing on or off
2	Upload method	Ethernet or Sim card (optional); same as 6-10-6 JNC SCADA Setting (p. 94)
3	TLS	When on, SSL/TLS encryption is used
4	Address / Port	Address of the MQTT broker (default www.jnc-demo.tw) and port (default 1883). For production use, change to the customer's own broker
5	ID / User / Pass	ID: client ID, default Cloud Box. User, Pass: user name and password for authentication
6	Topic / Data format / Interval / Qos	Topic: the device publishes data to this topic; the receiver must subscribe to the same topic to receive it. Data format: Array/JSON-J001/JSON-J002; the receiving end decides which one to use; see 6-10-9 Data Formats (p. 97). Interval: how often data is published; default 60 s. Qos: 0: at most once, delivery not guaranteed. 1: at least once, may be duplicated. 2: exactly once, delivery guaranteed without duplication

Code	Name	Function
7	Keeptime	The device sends signals to the broker periodically to keep the connection alive (s)

6-10-9 Data Formats

The data format is decided by the receiving end. Confirm which format the other system requires, then select it in Http Setting or Mqtt Setting.

Array

```
TIME=2024-10-04-16-30-58&MAC=0A1B2C3D4E5F&Ch1=1,0.00&Ch2=1,0.00&Ch3=1,0.00&Ch4=1,0.00
```

TIME = upload time; MAC = device MAC; Ch1… = two parameters: channel type (1 = AI, 2 = DI, 4 = DO) and channel value.

CAUTION: Channel type codes are unrelated to DO status codes

The channel types 1/2/4 (AI/DI/DO) in this section and the DO channel value status codes 0/1/2/4 (see 6-1 Channel Settings Overview (p. 55)) use the same numbers with different meanings. Do not confuse them.

JSON-J001

```
{"TYPE":"J001","TIME":"2024/10/04 16:31:58","MAC":"0A1B2C3D4E5F",
 "Value":[[1,1,0.00],[2,1,0.00],[3,1,0.00],[4,1,0.00]]}
```

TYPE = format code of the uploaded JSON (J001); TIME = upload time; MAC = device MAC; Value = [channel number, channel type (1 = AI, 2 = DI, 4 = DO), channel value].

JSON-J002

```
{"TIME":"2024/10/04 16:32:58","MAC":"0A1B2C3D4E5F",
 "CH-1":"0.00","CH-2":"0.00","CH-3":"0.00","CH-4":"0.00"}
```

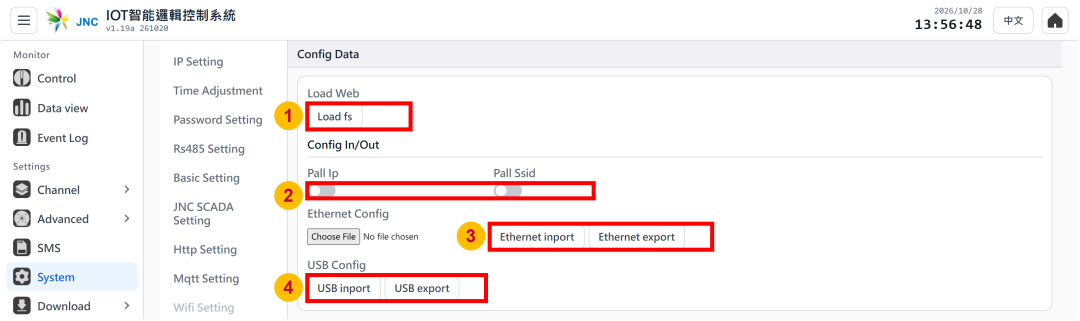
TIME = upload time; MAC = device MAC; ChTagName = the channel name used as the field name, followed by the value of that channel (CH-1–CH-4 in the example above).

6-10-10 Config Data

Factory setting – do not change

Configuration = a backup file of all settings of this unit (config.cws). It can be exported for safekeeping and imported when a faulty device is replaced, saving the effort of reconfiguring.

Path: Login → left menu → System → Config Data.



Code	Name	Field	Function
1	Load Web	Load fs	Make sure a USB flash drive containing the fs.bin file is inserted in the controller board. This function is used by engineers to update the device web page; general users should not click it
2	Config In/Out	Pall Ip/Pall Ssid	Pall Ip (overwrite IP): when on, the device IP is replaced by the IP in the configuration file during import. Pall Ssid (overwrite SSID): not used on DO series
3	Ethernet Config	Ethernet inport / Ethernet export	Export and import are performed on the phone or computer currently in use. When importing, select the config.cws file
4	USB Config	USB inport / USB export	Export and import are performed on the USB flash drive of the device. config.cws must be in the root folder of the flash drive for import

CAUTION: This page has two sets of export/import buttons

Ethernet Config saves to the phone or computer; USB Config saves to the USB flash drive of the device. Check which set it is before clicking.

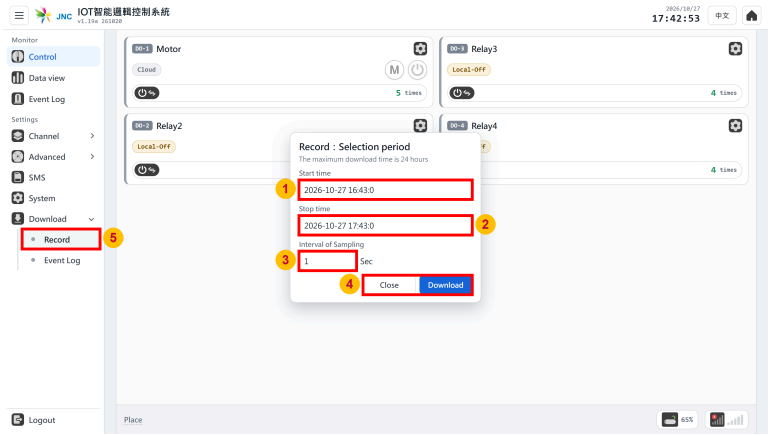
WARNING: If Pall Ip is on before importing, the device label will no longer match

6-11 Download

Path: Login → left menu → Download → Record / Event Log.

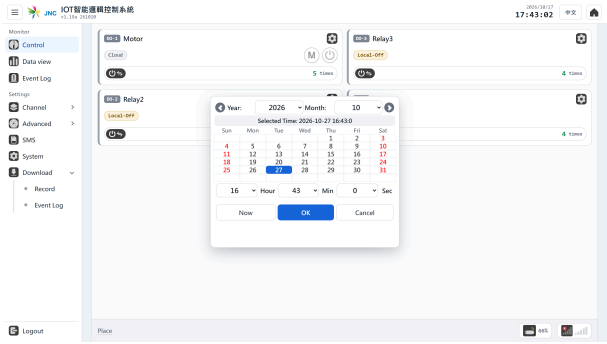
Record

Clicking Record opens the Record : Selection period window. After setting it, click Download; click Close to cancel.



Code	Name	Function
1	Start time	Start of the data range to download; any date and time since the device started running can be selected. Click the box to open the date and time picker
2	Stop time	End of the data range. Up to 24 hours can be downloaded at a time
3	Interval of Sampling	Interval between data entries (s). The file type is .csv
4	Close / Download	Close: cancel. Download: download the data
5	Record	Click it under Download in the left menu to open this window

Clicking Start time or Stop time opens the date and time picker:



1. Select the year and month at the top (or use the arrows), then click the day.
2. Select Hour, Min, and Sec below. Selected Time shows the result.
3. Click OK. Now sets the current time; Cancel closes the picker without changes.

Event Log

Clicking Event Log directly downloads the alarm information since the device started running, as file event.csv, without opening a window. The columns are, in order: date, time, channel, value, type, return date, return time. The event log is stored only on the USB flash drive; when no flash drive is inserted, the screen shows not find data.

Things to know:

- The device keeps its own logs even without a cloud connection: logs are stored on the USB flash drive with no specific retention limit. When no flash drive is inserted, only the internal buffer is available (about 28 KB; with a recording interval of 60 s and 4 channels, about 5.7 hours of data, after which the oldest data is overwritten). Download and save important data regularly.
- One month of data must be downloaded in several parts.

PART 7.ADVANCED CONTROL

Questions Answered in This Chapter

- What must be set for equipment to switch on and off automatically?
- Which situations suit logic, schedule, cycle, interlock, alternating operation, and forward/reverse control?
- How do I troubleshoot a rule that is set but does not act?

Not Covered in This Chapter

- Complete settings for real-world examples → PART 8 Examples: Logic and Rule Settings (p. 127)
- How to set alarms → 6-6 Alarm Settings (p. 73)

Path: Login → left menu → Advanced → Logic / Timer / CCW / Alternate / Interlock.

Every type of rule in this chapter can start a load when no one presses a button. Before setting and testing, make sure the area around the load is safe. Rules are shared by the whole device; notify other personnel on site before changing them.

Recommended reading order:

1. First read 7-1 Four Conditions for Automatic Control (p. 102) and 7-2 Automatic Control Decision Sequence (p. 103): the conditions for automatic control and the order in which rules are evaluated.
2. Then read 7-3 Logic Control (p. 104) and 7-4 Deadband and Delays (p. 111): the most common value-based automatic control.
3. Read whichever of 7-5 Schedule Control (p. 112)–7-10 When Rules Exceed Capacity: Virtual Channels (p. 124) the site requires; if a rule is set but does not act, see 7-11 Checklist: Rule Set but Output Does Not Respond (p. 126).

7-1 Four Conditions for Automatic Control

For an output to switch automatically, all four of the following conditions must be met at the same time. If any one is missing, the output does not act, and no error message appears on the screen.

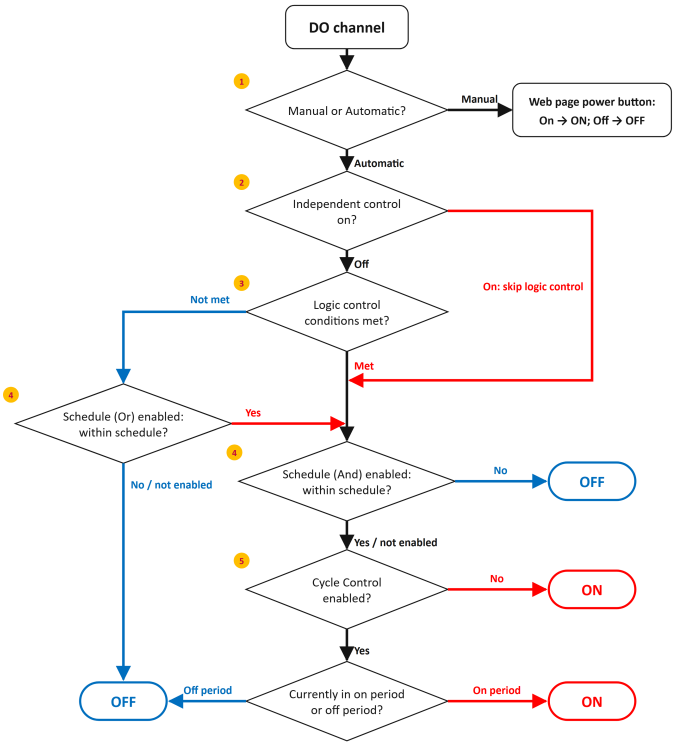
Order	Check item	Required state	If not	Where to check
1	Front panel knob	Turned to Cloud (upper left)	OFF (top) is always off, ON (upper right) is always on; rules are not executed	Front panel of the device
2	Control set of the channel	Automatic	Manual follows only the power button on the web page; rules are not executed	Channel → Channel → select the DO channel → Control set → Manual / Automatic
3	Enable switch of the rule	On (green)	Off (gray) = not enabled; the rule is not executed (most often missed)	Upper left of each rule page (Enable, Use Periodic control, and so on)
4	Rule condition	Met (example: CO2 ≥ 1000)	The condition is not met; no action	Each rule page; on the Logic page, the WHY row and the diagnosis window show which condition is not met

When troubleshooting “set but not acting”, checking from item 1 downward is fastest. The four conditions are items 1, 2, 4, and 5 of 7-11 Checklist: Rule Set but Output Does Not Respond (p. 126); see that section for all 11 items.

7-2 Automatic Control Decision Sequence

When several rules are set for one output, they are evaluated in the following order (prerequisite: the front panel knob is at Cloud). The Control set tab of each DO channel shows the same order under Logical Judgement: Manual/Auto → Independent → Schedule → Cycle.

1. **Manual or automatic: in manual, the output follows only the power button on the web page; no rules are executed.**
2. **Independent control: when switched on, Logic Control is skipped and treated as met.**
3. **Logic Control: evaluates whether the condition is met.**
4. **Schedule Control: when not enabled, only the result of item 3 is used; And = condition met and within the schedule, Or = condition met or within the schedule. If satisfied, proceed to item 5 (see 7-5 Schedule Control (p. 112)); otherwise the output is switched off.**
5. **Cycle Control: when not enabled, the output is switched on directly; when enabled, the output alternates between on and off according to the on and off times.**



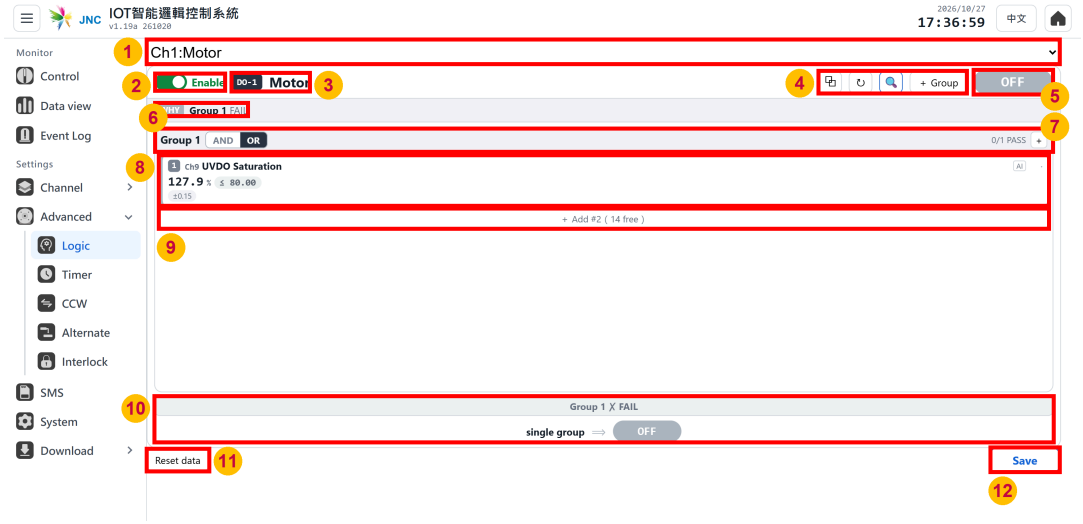
7-3 Logic Control

Scenario: start the motor when the UVDO saturation falls to 80% or below, and stop it when the saturation rises above the release value.

Switches an output automatically according to sensor values or the states of other channels.

Path: Login → left menu → Advanced → Logic → select the DO channel to control from the drop-down list at the top.

The same Logic Control panel also appears on the Control set tab of each DO channel (section Logic control). Both show the same rules.



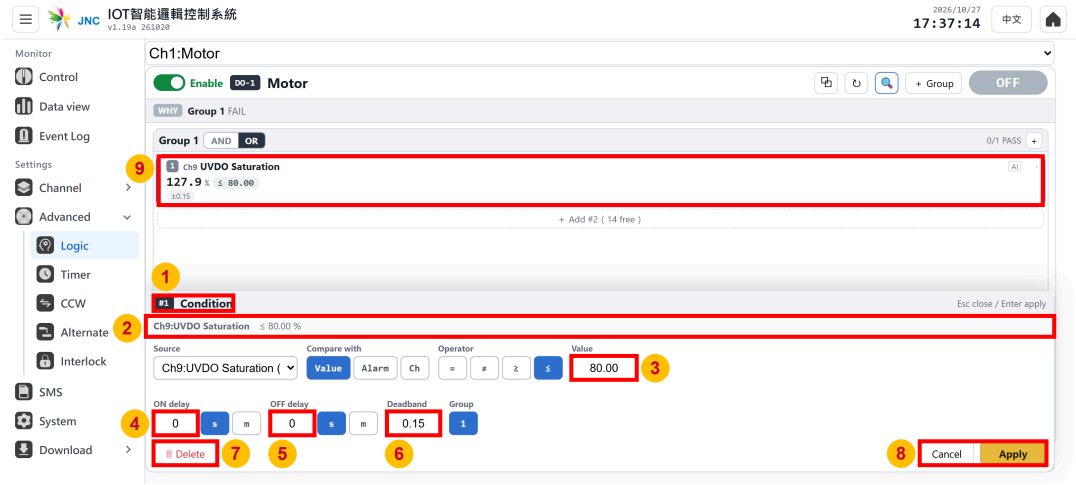
Setup procedure:

1. **Make sure the knob is at Cloud and the Control set of the channel is Automatic (items 1 and 2 of 7-1 Four Conditions for Automatic Control (p. 102)).**
2. **Advanced → Logic → select the channel in 1.**
3. **Click Add 9. In the condition editor, set Source, Compare with, Operator, Value, ON delay, OFF delay, and Deadband, then click Apply.**
4. **Select AND or OR for the block in 7.**
5. **If a second block is needed, click + Group in 4, add its conditions, and select AND or OR under N groups in 10.**
6. **Switch on Enable 2 and make sure it turns green.**
7. **Click Save 12 in the lower right.**
8. **After making sure the area around the load is safe, check whether the equipment starts when the condition is met. The WHY row 6 and 🔍 Logic diagnosis show which condition is not yet met.**

Description:

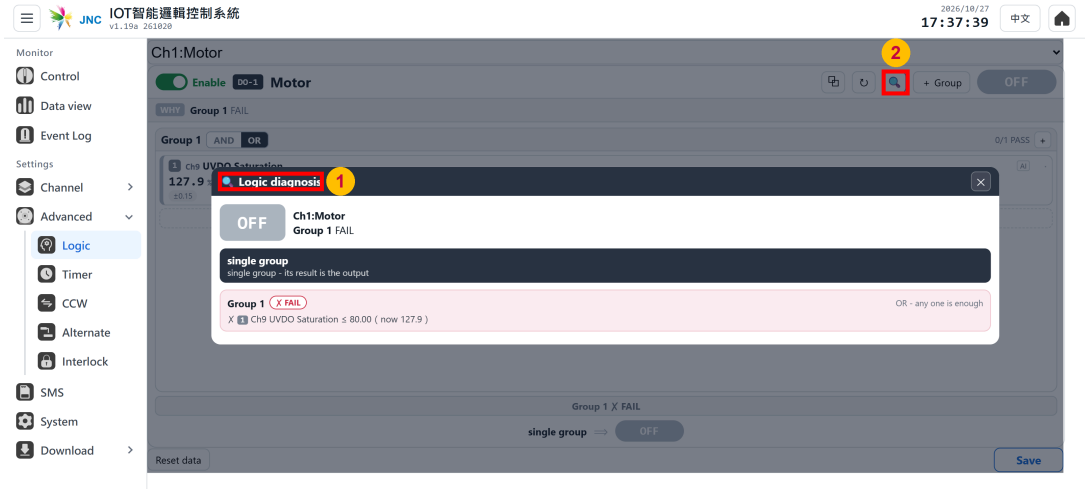
Code	Name	Function
1	Channel selection	Drop-down list; select the DO channel for which logic is set
2	Enable	Switch on (green) to execute the logic of this output. Gray = not enabled
3	Output number and name	The DO output being edited (example: DO-1 Motor)
4	Tools	Four buttons, from left to right: copy = Copy logic from another channel (see below) / ↻ = Reload (re-reads this output's settings from the device; unsaved changes are discarded) / 🔍 = Logic diagnosis (see below) / + Group = add a block (up to 3, see 7-3-2 Capacity Limits (p. 109))
5	Output result	The current result of this output: ON or OFF
6	WHY	One line explaining the current result (example: Group 1 FAIL; a channel without rules shows no condition set yet)
7	Block header	Group 1 and so on. AND/OR here combines the conditions within this block. On the right: the number of met conditions (example: 0/1 PASS) and + to add a condition to this block
8	Condition	One condition: number, channel, current value, operator and set value, deadband (example: ±0.15). Click it to open the condition editor (see below)
9	Add	Adds a condition. The number in parentheses is the remaining quota (example: Add #2 (14 free); 15 per output in total)
10	Block results and final result	The result of each block (example: Group 1 ✗ FAIL) and how the blocks are combined into the output result (one block: single group → OFF). With two or more blocks, N groups and the AND/OR switch between blocks appear here
11	Reset data	Clears the logic conditions of this output. Read 7-3-4 Reset Data (p. 111) before clicking
12	Save	Writes all logic on this page to the device. If it is not clicked after changes, the changes do not take effect

Condition editor (click a condition 8, or Add 9 in the Logic page figure):



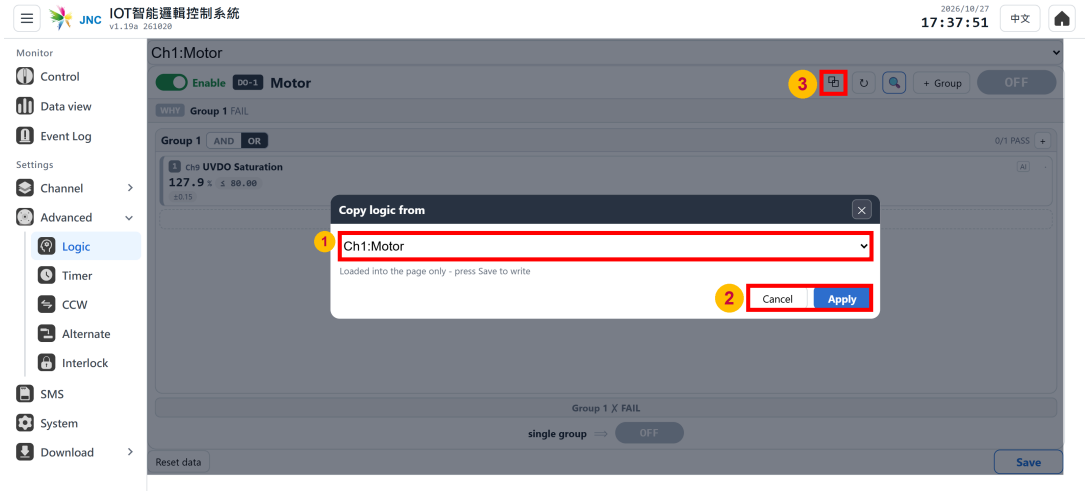
Code	Name	Function
1	Condition	Number of the condition being edited (example: #1)
2	Summary	The condition as it reads now (example: Ch9:UVDO Saturation ≤ 80.00 %). A new condition shows (Add)
—	Source	The channel whose value is checked
—	Compare with	AI channel: Value / Alarm / Ch. DO channel: Value / Ch / A/M. See 7-3-3 Conditions and Operators (p. 110)
—	Operator	= / ≠ / ≥ / ≤
3	Value	The value to compare with
4	ON delay	After the condition is met, it must persist for this time before triggering. Unit s or m
5	OFF delay	After the condition is no longer met, it must persist for this time before canceling. Unit s or m
6	Deadband	Also called hysteresis; see 7-4 Deadband and Delays (p. 111)
—	Group	The block this condition belongs to
7	Delete	Deletes this condition. Click only when it is no longer needed
8	Cancel / Apply	Cancel discards this change; Apply keeps this condition on the page (keyboard: Esc closes, Enter applies). Apply does not write to the device: click Save afterwards
9	Condition card	Click it on the Logic page to open this window

Logic diagnosis (🔍 in 4 of the Logic page figure): shows the output result, how the blocks are combined (example: single group - its result is the output), and for each block whether it passes, with each condition and its current value (example: Ch9 UVDO Saturation ≤ 80.00 (now 127.9)). Use it first when a rule does not act.



Code	Name	Function
1	Logic diagnosis	Read only; close it with ✕
2	Magnifier button	Click it on the Logic page to open this window

Copy logic from (copy button in 4 of the Logic page figure): loads the rules of another channel into this page.



Code	Name	Function
1	Source channel	Select the channel to copy from
2	Cancel / Apply	Apply loads the rules into the page only (Loaded into the page only - press Save to write). Check them, then click Save
3	Copy button	Click it on the Logic page to open this window

7-3-1 Rule Structure: Blocks and Conditions

Numbers in this section refer to the Logic page figure at the start of 7-3 Logic Control (p. 104).

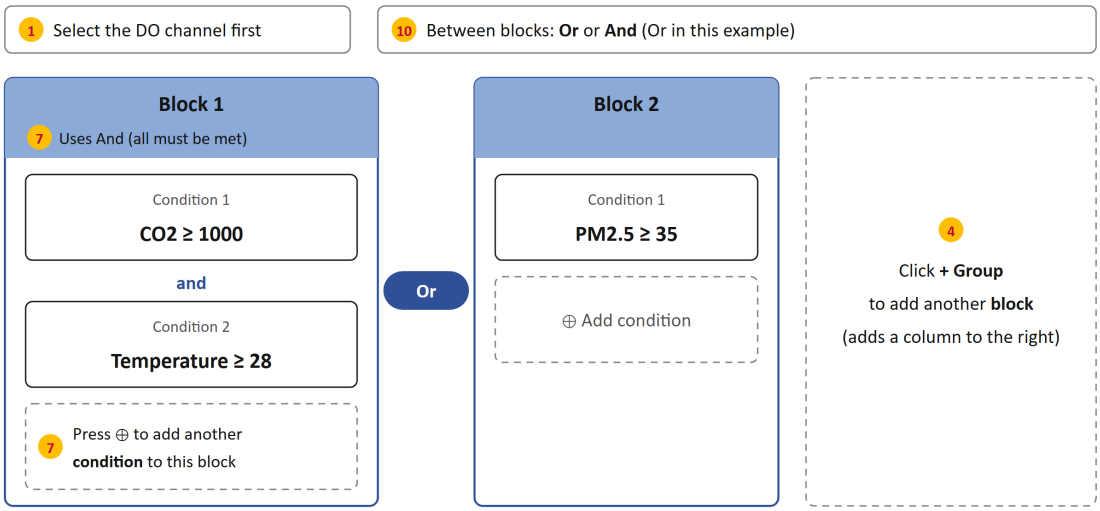
Screen term	Term in this manual
Group 1, Group 2, … (code 7)	Block
Or/And between blocks (code 10)	Or/And between blocks
+ Group (code 4)	Add a block
AND / OR in the block header (code 7)	Or/And between conditions within the same block
Add, + in the block header (codes 9, 7)	Add a condition

Rules on the screen are arranged cell by cell. This manual calls them blocks and conditions:

- Block: one group on the screen. Blocks are combined by one Or/And.
- Condition: each condition card within a block. Conditions within the same block are combined by the Or/And of that block.
- Or = switches on when any one is met; And = switches on only when all are met.

Example	How to write it
Switch on if CO2 ≥ 1000 or PM2.5 ≥ 35	One block with two conditions; select Or for the block
Switch on only if CO2 ≥ 1000 and temperature ≥ 28	One block with two conditions; select And for the block
(CO2 high and temperature high) or PM2.5 high	Two blocks; select Or between blocks; select And for the two conditions of block 1

The third example drawn as a diagram:



This diagram means: (CO2 ≥ 1000 and temperature ≥ 28) or PM2.5 ≥ 35 → this output turns on.
Each condition needs: Source, Compare with, Operator, Value, ON delay, OFF delay, Deadband; press Apply, then Save.
Limits: up to 3 blocks per output; up to 15 conditions in total across all blocks (see 7-3-2).

7-3-2 Capacity Limits

Item	Limit
Maximum blocks per output	3
Maximum conditions across all blocks	15 (shared across blocks; the remaining quota is shown on Add, example: 14 free)
When the quota is used up	Empty blocks can still be added, but no conditions can be added

If the rules do not fit, see 7-10 When Rules Exceed Capacity: Virtual Channels (p. 124).

7-3-3 Conditions and Operators

Compare with	Meaning
Value + =, ≠, ≥, ≤	Channel value equal to, not equal to, greater than or equal to, or less than or equal to a value
Ch + =, ≠, ≥, ≤	Compared with the value of another channel
Alarm (AI channels only)	The alarm status of the channel (uses the AI alarm settings in 6-3 External Channels: AI (Analog Input) (p. 63) as the condition). Operator = or ≠; NORMAL/LO/LL/HI/HH can be selected. The condition is met only when it exactly matches the current alarm stage (example: when HH occurs, Alarm = HI is not met)
A/M (DO channels only)	Whether another DO output is currently automatic or manual

CAUTION: Values of a built-in DO (Ch1–Ch4) used as a condition

The values are the same as the channel values in 6-1 Channel Settings Overview (p. 55): from the web page, off = 0 and on = 1; knob OFF = 2, knob ON = 4. Operators compare the value as a number.

Example: “switch on Relay2 when the motor is on” is written on Relay2 as Ch1 = 1 (Compare with Value, operator =, value 1). When the knob is turned to ON, the value is 4 and Ch1 = 1 is not met; Ch1 = 0 is also not met when the knob is turned to OFF.

With a built-in DO as the source, Compare with offers Value / Ch / A/M, and the value is a number box. A virtual channel as the source has no operator; see 7-10 When Rules Exceed Capacity: Virtual Channels (p. 124).

Each condition also has:

Field	Purpose	Example
ON delay	The condition must persist this long before switching on, filtering out momentary peaks. Seconds (s) or minutes (m) can be selected	10 s
OFF delay	After the condition clears, it must persist this long before switching off	0 s
Deadband	How far the switch-off line is moved back; see 7-4 Deadband and Delays (p. 111)	50

7-3-4 Reset Data

Numbers in this section refer to the Logic page figure at the start of 7-3 Logic Control (p. 104).

> **WARNING: "Reset data" clears all logic rules of this output**
>
> Clicking it clears the logic conditions and enable state of this output; rules that have been set must be set again. Manual/Automatic, Independent control, Schedule Control, Cycle Control, the settings of other channels, and the channel configuration are not affected.

When to click it: when the rules are set and all four conditions are met, but the equipment does not act.

A channel that reuses the configuration of another device or a previous site may retain old logic settings internally, which prevent new rules from executing. To resolve this:

1. Click Reset data 11 in the lower-left corner of the Logic page → confirm.
2. Set the same rule again, switch on Enable (green) → Save.
3. Go back to Channel → Control set and make sure it is still "Automatic".

7-4 Deadband and Delays

The deadband moves only the switch-off line; it does not change the switch-on threshold.

Example: condition CO2 ≥ 1000, deadband 50 → switches on above 1000 and switches off only when the value falls to 950.

Deadband	Result
0	Switch-on and switch-off use the same line. When the value fluctuates around 1000, the equipment switches on and off repeatedly
50	Switches on at 1000 and off at 950; there is no repeated switching within the 50 range in between

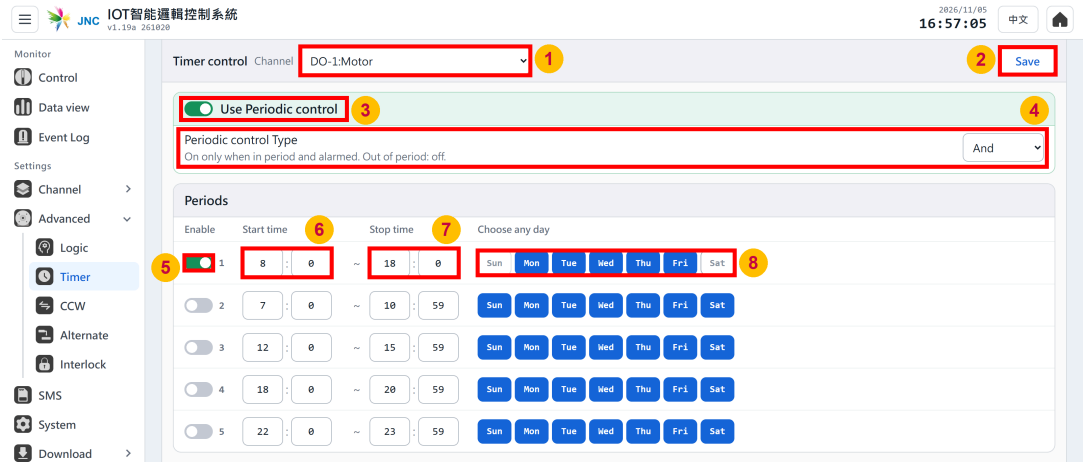
- When the condition is ≤, the direction is reversed: example: temperature ≤ 20 switches on, deadband 5 → switches off only when the value rises to 25.
- The ON delay is "how long the condition must persist before switching on". Use both together: the deadband prevents repeated switching, and the ON delay filters out momentary peaks.

7-5 Schedule Control

Scenario: run only within 8:00–18:00 on weekdays.

Path: Login → left menu → Advanced → Timer → select a channel → switch on Use Periodic control → set the type → switch on the rows to use → enter the Start time/Stop time and days of week → Save.

> **NOTE: Screen names**
>
> **On the screen, schedule control is called Timer (menu), Timer control (page), and Periodic control (settings). The same settings also appear on the Control set tab of each DO channel (section Periodic Control).**



Description:

Code	Name	Function
1	Channel	Drop-down list; select the DO channel for which the schedule is set
2	Save	Writes all settings on this page to the device. If it is not clicked after changes, the changes do not take effect
3	Use Periodic control	When switched on, the schedule rows below are executed
4	Periodic control Type	And/Or; see the table below for the meaning. The line below describes the selected type (for Or: In period: forced on. Out of period: follows alarm.)
5	Enable (schedule row)	Only rows switched on are executed
6	Start time	Hour : minute at which the period starts

Code	Name	Function
7	Stop time	Hour : minute at which the period ends
8	Choose any day	Which days of the week the row runs (Sun–Sat)

Type	Meaning	Example
And	Switches on only when the logic condition is met and within the schedule	Switch on only during working hours and when CO2 is high
Or	Switches on when the logic condition is met or within the schedule; either one switches it on	Always on during working hours; after hours, also on when CO2 is high

WARNING: Schedule type Or allows equipment to start outside the schedule

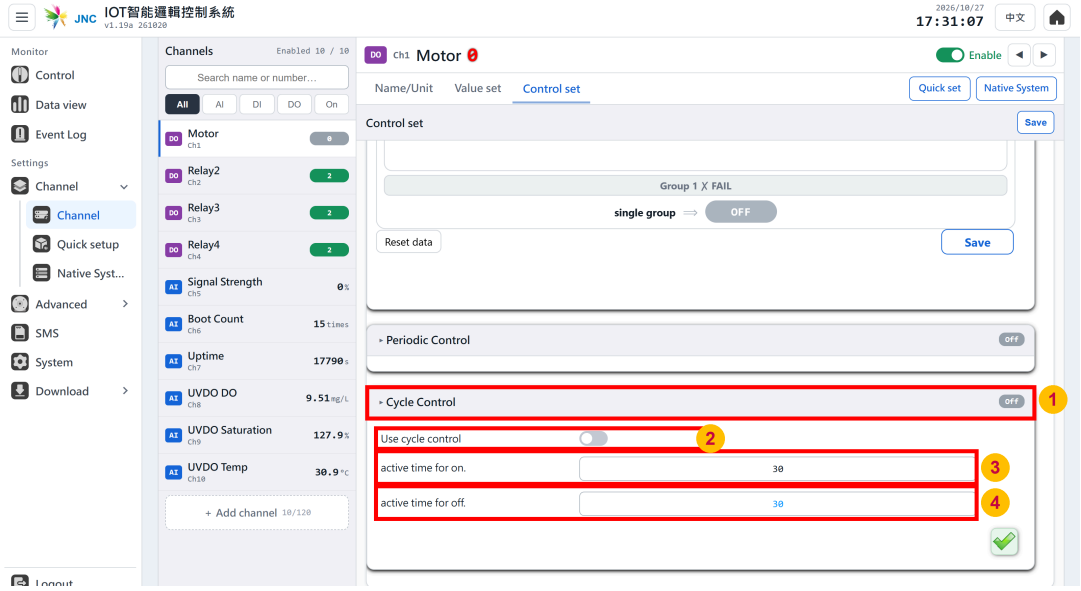
Whenever the logic condition is met, the equipment switches on even outside the schedule (for example, at midnight). To act only within the schedule, select And.

- Midnight can be crossed: the start time can be later than the end time, for example 22:00–06:00.
- Rows are combined by Or: if any row is met, the time is within the schedule.
- Up to 5 rows.
- The schedule is based on the device time. If the device time is incorrect, Schedule Control acts at the wrong time; see 6-10-2 Time Adjustment (p. 89).

7-6 Cycle Control

Scenario: run for 30 seconds, stop for 30 seconds, and repeat.

Path: Login → left menu → Channel → Channel → select a DO channel → Control set → Cycle Control.



Code	Field	Function
1	Section title	Click to expand or collapse; Off = Cycle Control not enabled
2	Use cycle control	Turns Cycle Control on or off for this output
3	active time for on.	On duration of each cycle
4	active time for off.	Off duration of each cycle

- Press ✓ at the lower right of the section to save. The DO tab of Quick setup (jump to Control) also lists these values.
- “Independent control” switched on: Logic Control is skipped; when Schedule Control is enabled, the output cycles on and off only within the schedule (when the schedule type is And).
- “Independent control” switched off: the output cycles on and off only when the logic or schedule is met (see 7-2 Automatic Control Decision Sequence (p. 103)).

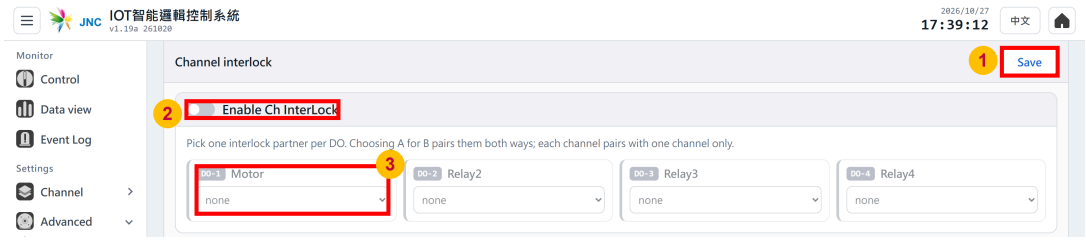
7-7 Interlock

Scenario: a reversible motor whose forward and reverse must not start at the same time.

Path: Login → left menu → Advanced → Interlock.

Setup procedure:

1. **Switch on Enable Ch InterLock (2).**
2. **Under one DO output in (3), select its interlock partner. The partner is filled in automatically (example: select DO-2 for DO-1, and DO-1 is filled in for DO-2).**
3. **Click Save (1).**



Description:

Code	Name	Function
1	Save	Writes and saves the interlock settings
2	Enable Ch InterLock	When switched on, the interlock settings are enabled and executed
3	Partner selection	One drop-down list per DO output: select the DO output to interlock with. Choosing A for B pairs them both ways; there is no need to set both sides. Each output pairs with one output only

How the interlock actually works:

Situation	Result
Both sides automatic	The one that starts first wins, and the other is locked; when the first one stops, the locked one starts automatically at once if its condition is still met
One side running automatically, and the knob of the other side turned to ON	The ON knob takes priority; the automatically running output is stopped immediately
Both knobs turned to ON	Both outputs conduct at the same time; the software interlock does not act
The locked output	The tile on the Control page shows a lock icon and hides the M/A and power buttons; it cannot be operated

DANGER: Do not use the software interlock as the only protection

When both knobs are turned to ON, the interlock on the web page does not act. For equipment that would be damaged or dangerous if both sides switched on at the same time, such as reversible motors, a hardware interlock is required (jumper cap on the relay board, see 3-2 Internal Components (p. 22); or an MC electrical interlock in the distribution panel). The work involves mains power; follow local electrical codes.

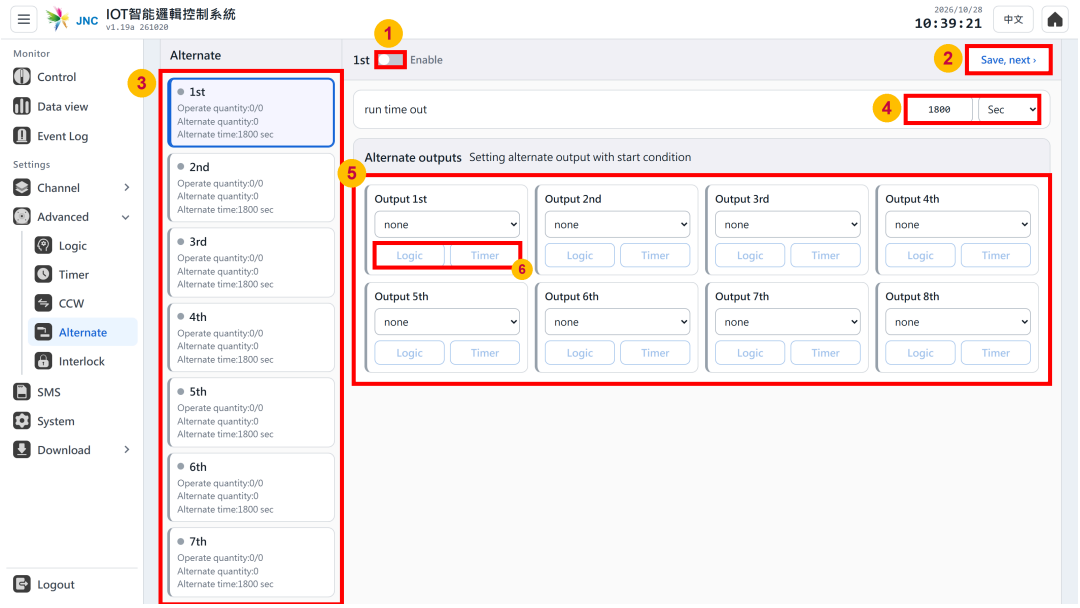
7-8 Alternating Operation

Scenario: 2 aerators run in turns to share the running hours evenly.

The conditions decide “whether equipment needs to start”, the number of units to run in the schedule decides “how many units start”, and alternating operation decides “which unit runs and how long before switching”.

Path: Login → left menu → Advanced → Alternate.

Page 1: group window



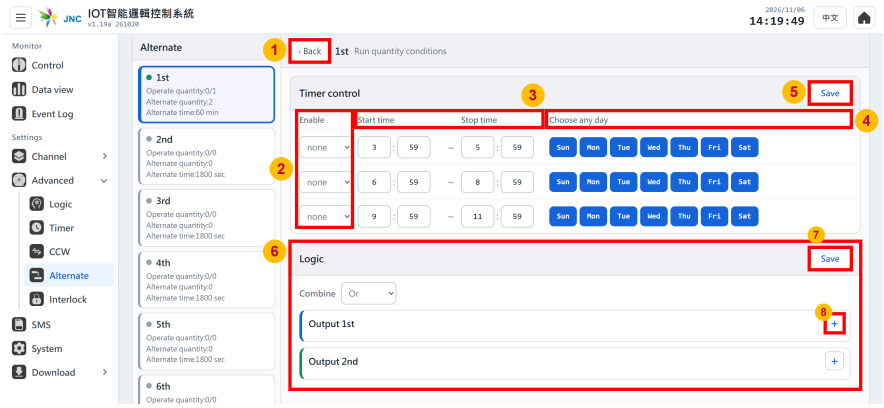
Description:

Code	Name	Function
1	Enable	When switched on, the selected group is enabled and units take turns according to run time out 4
2	Save, next ›	Saves page 1 and opens page 2, “run quantity conditions” (number of units to run, schedule, and logic)
3	Alternating group	Up to 8 groups (1st–8th). Each group card shows three numbers: Operate quantity = number of units to run / number of units used. Alternate quantity = number of units set to take turns in this group. Alternate time = how long a unit runs before switching to the next

Code	Name	Function
4	run time out	Example: set to 60 min; when one unit has run for 60 minutes, another unit takes over, and so on. Units: sec, min, hour, day. For testing, temporarily change it to 10 seconds to check that switching works normally. Note: When three or more units are bound, the unit with the longest idle time takes over
5	Output selection	Drop-down lists Output 1st–Output 8th; select the DO channels that take turns
6	Logic / Timer	Logic: start condition of the equipment. Even if no condition is needed, open it and switch on Enable and click Save; otherwise this unit does not join the rotation. Timer: the equipment can be controlled only within the set schedule. Both buttons are available only after a DO channel is selected in 5

Save before opening Logic or Timer. If outputs are selected but not saved, clicking Logic or Timer shows Unsaved changes; for the buttons, see 6-1-1 Unsaved Changes (p. 58).

Page 2: run quantity conditions (opened with Save, next ›, 2 in the first figure of this section, which saves page 1 first)



Code	Name	Function
1	‹ Back	Returns to the group window on page 1
2	Enable (Timer control)	Number of units to run within the time range of that row (none, or 1 up to the number of units selected in the group window; when all units are none, only none can be selected)
3	Start time / Stop time	The time range of each row (3 rows)
4	Choose any day	Which days of the week the row applies
5	Save (Timer control)	Writes the Timer control settings
6	Logic card, Combine	Or: one more unit starts when any single logic within one output row is met. And: one more unit starts only when all logic within one output row is met. (When the first output row is met → one unit starts; when the second output row is also met → two units start.) The condition table is listed after outputs are selected on page 1
7	Save (Logic)	Writes the logic settings
8	+ (right end of the unit row)	Adds a condition for that unit

Setup procedure (numbers refer to the first figure of this section, the Alternate page):

Page 1 (group window)

1. **Select a group in 3.**
2. **Switch on Enable 1 and set run time out 4.**
3. **Select the DO channels that take turns in 5 (Output 1st, Output 2nd, …).**
4. **Save page 1: click Save, next › 2 (saves and opens page 2; return with ‹ Back), or click Logic 6 and select Save and leave in the Unsaved changes window. Then open Logic 6 for every unit, switch on Enable (green), click Save at the lower right of that screen, then ← Back (enable it even if no condition is needed).**

Page 2 (run quantity conditions; numbers refer to the page 2 figure)

1. **Click Save, next › (2 in the first figure) to open page 2: select the number of units to run in Enable 2, set the time range 3 and days 4, then click Save 5 on the Timer control card.**
2. **To increase the number of running units according to values, in the Logic card 6, click + 8 at the right end of the unit row to add a row → click the new row → fill in the condition → Apply → click Save 7. Both the Timer control and the Logic must be saved.**

CAUTION: Alternating operation changes the Logic Control and Schedule Control of the channel

Logic in alternating operation shares its data with the channel's 7-3 Logic Control (p. 104), and only one side can be enabled at a time. If Logic Control is enabled for a DO, Logic shows "This channel's logic is used by Logic Control. Adjust it there, or turn that mode off first"; switch off Enable on the Logic Control page first. Once Logic is enabled here, the Logic Control page shows the channel as used by Alternation. Timer in alternating operation shares its data with the channel's 7-5 Schedule Control (p. 112); changing one changes the other.

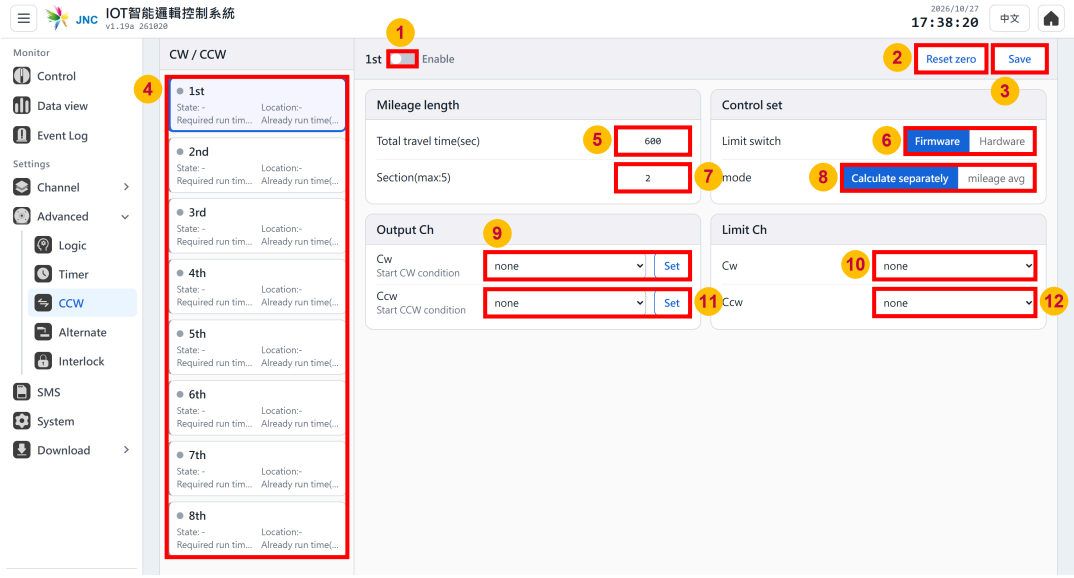
7-9 Forward/Reverse Control

Scenario: shade nets and side curtains roll up in forward and roll down in reverse, and stop at the limits.

Path: Login → left menu → Advanced → CCW.

WARNING: Always use a hardware interlock with forward/reverse control

Before setting it up, always provide a hardware interlock (jumper cap on the relay board, see 3-2 Internal Components (p. 22); or an MC electrical interlock in the distribution panel).



Setup procedure:

1. **Select a group in 4 and switch on Enable 1.**
2. **Set Total travel time(sec) 5 and Section(max:5) 7.**
3. **Select the Limit switch 6 (Firmware/Hardware) and the mode 8.**
4. **Select the forward and reverse DO outputs in 9 and 11; when the limit switch is Firmware, select the limit-switch DI channels in 10 and 12; click Save 3. Then click each Set: click + at the right end of the section row (see 4 in the start condition figure below) to add a row → click the new row → fill in the condition → Apply → switch on Enable (green) → click Save at its upper right → ‹ Back.**
5. **In Channel, change the Control set of both the forward and reverse outputs to Automatic (forward/reverse control acts on conditions and does not act in manual; see 7-1 Four Conditions for Automatic Control (p. 102)).**
6. **Click Save 3.**

Description:

Code	Name	Function
1	Enable	When switched on, the selected group is enabled
2	Reset zero	Asks for confirmation, then clears the position record of this group; Location then shows 255. Pressing it does not drive the forward or reverse output
3	Save	Writes all parameters of this group to the device
4	Forward/reverse group	Up to 8 groups (1st–8th). Each card shows State, Location, Required run time, and Already run time
5	Total travel time(sec)	Time for either DO to run to the end, 0–65535
6	Limit switch	Firmware: a limit-switch DI channel must be selected in 10 or 12; otherwise it does not act. Hardware: relies on the limit switch of the equipment itself, which triggers a stop signal when the part reaches the limit position. Note: Still limited by the total travel time; the output stops when it is reached 10 and 12 appear in both modes; with Hardware, no DI channel needs to be selected; when saving, the message "No DI limit switch channel selected. Do you still want to proceed with the setup?" appears, click OK
7	Section(max:5)	Divides the total travel into sections; each section can be handled by run time (equal or unequal). Each time the condition is met, only one section is traveled; the next section requires its own condition to be met
8	mode	Calculate separately: run time of each section = the "Move time" of the condition for that section (example: set to 3 → runs about 3 seconds). mileage avg: the total travel time is divided evenly by the number of sections; each section is the same length
9	Output Ch Cw + Set	The DO output used for forward. Set opens Start CW condition
10	Limit Ch Cw	With limit switch Firmware, the DI channel used as the forward limit signal
11	Output Ch Ccw + Set	The DO output used for reverse. Set opens Start CCW condition

Code	Name	Function
12	Limit Ch Ccw	With limit switch Firmware, the DI channel used as the reverse limit signal

Start conditions (Set in 9 and 11; example: 1st · CW start condition):



Code	Name	Function
1	‹ Back	Returns to the CCW page
2	Title	Group and direction (example: 1st · CW start condition)
3	Combine	Or / And (see below). Enable is on its left; Reset data and Save are at the upper right. Switch on Enable (green) and click this Save to write the conditions to the device
4	Section rows	One row per section: 0 ⇨ 1 = the condition for moving from position 0 to position 1, and so on. To add a condition: click + at the right end of the row, then click the new condition to open its settings

- Select the forward/reverse outputs in 9 and 11 of the first figure and click Save first, then click Set. If the page has unsaved changes, Unsaved changes appears first.
- If that output already uses Logic control, the screen only shows a message that the logic of this channel is in use on the Logic page; turn that mode off first.
- Or: switches section when any one condition is met; And: switches only when all are met.
- Condition settings (If, Open delay, Close delay, Deadband) have the same meaning as in 7-3 Logic Control (p. 104).
- Move time: when the mode is Calculate separately, it is the run time of that section in seconds.

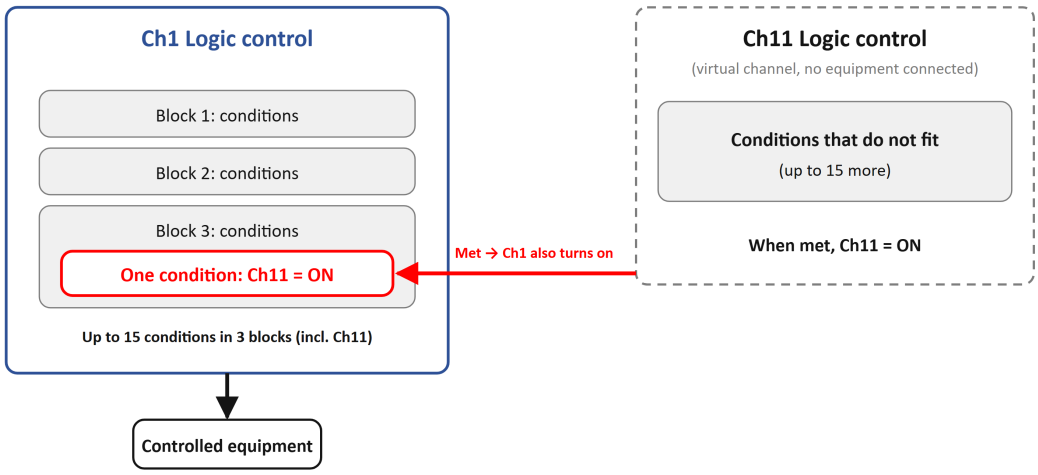
When CCW touch limit not stop (shown only when Limit switch is Hardware; switching to Firmware hides and turns it off):

When CCW touch limit not stop	Forward	Reverse
Off	Stops when the total travel time is reached	Stops when the total travel time is reached
On	Stops when the total travel time is reached	The DO stays triggered after the time is reached; the equipment is stopped by its own limit switch

- Before turning it on, make sure the motor has its own limit switch; if it is turned on without a limit switch, the reverse output keeps supplying power and does not stop automatically.
- The "Deadband" here has the same meaning as in 7-4 Deadband and Delays (p. 111): it moves only the line at which the condition clears, and is unrelated to the direction of rotation.
- If the condition clears during travel, the output still completes that section before stopping.

7-10 When Rules Exceed Capacity: Virtual Channels

The Logic Control of one output allows up to 3 blocks with a total of 15 conditions. If the rules do not fit, use a virtual channel to hold the remaining conditions, and then reference that virtual channel as a condition (as shown below).

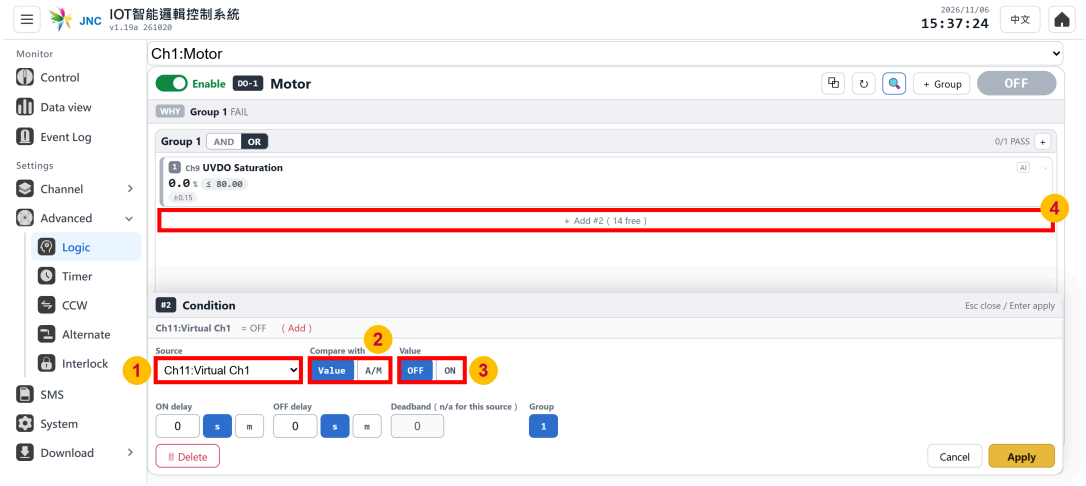


The procedure is as follows:

1. System → Basic Setting → Number of Channel: increase by 1 (example: 10 → 11) → Save.
2. Channel → Channel → new channel (shows that the channel type is not set): click Set channel type → Digital output → tick the confirmation → Create; channel source Local, ID 0, address 000002; enter a name on the Name/Unit tab (example: Virtual Ch1).

3. Change the Control set of the new channel to Automatic, write the second set of rules in Logic Control, and enable them.

4. Return to the output that actually needs to be controlled and add a condition: Source Ch11:Virtual Ch1, Compare with Value, then click ON for the value (a virtual channel as the source has no operator; only a built-in DO as the source shows a number box, see 7-3-3 Conditions and Operators (p. 110)).



Code	Name	Description
1	Source	Select the virtual channel
2	Compare with	Value and A/M only
3	Value	OFF/ON buttons
4	+ Add	Click this row on the Logic page to open this window

WARNING: An incorrect address may conflict with a physical output

Enter 000002 as the address of the virtual channel. Do not enter any other value.

7-11 Checklist: Rule Set but Output Does Not Respond

Check in order, and stop when the cause is found:

1. ☐ **Is the knob at Cloud? (OFF and ON both disable automatic rules)**
2. ☐ **Is Channel → Control set set to Automatic?**
3. ☐ **Is "Independent control" in Control set switched on by mistake? (If on, Logic Control is skipped)**
4. ☐ **Is the Enable switch of the rule green? Has Save been clicked?**
5. ☐ **Is the condition met? Open 🔍 Logic diagnosis on the Logic page, or check the value on the Data view page; if there is an ON delay, wait for the full time.**
6. ☐ **When a built-in DO is used as a condition, is the value correct? From the web page, off is 0 and on is 1; knob OFF is 2, knob ON is 4. When a virtual channel is used, is ON selected as the value?**
7. ☐ **Is Schedule Control enabled with type And, and is the current time outside the schedule? Is the device time correct?**
8. ☐ **Is Cycle Control enabled and currently in the "off" period?**
9. ☐ **Is the output blocked by an interlock (🔒 on the Control page tile)?**
10. ☐ **Everything above is correct but it still does not act → click Reset data → set the rules again → make sure Control set is still Automatic (7-3-4 Reset Data (p. 111)).**
11. ☐ **Still not acting → note the firmware version, channel, and rule contents, and contact JNC.**

PART 8.EXAMPLES: LOGIC AND RULE SETTINGS

Questions Answered in This Chapter

- How should I set up automatic control for my site? Which example scenario should I start with?
- Which functions does each example scenario use, and in what order are they set?

Not Covered in This Chapter

- Full descriptions of each setting field → PART 6, PART 7
- Conditions required for automatic control → 7-1 Four Conditions for Automatic Control (p. 102)

Each example scenario describes the complete settings for one site application. Select the example scenario closest to your site and follow its steps.

CAUTION: All settings in the example scenarios in this chapter are examples.

Actual thresholds and parameters must be set by the user organization based on site conditions, applicable regulations, and professional judgment.

- The channel numbers in each example scenario are examples; check the actual numbers in the Channels list on the Channel page.
- For the four conditions required for automatic control, see 7-1 Four Conditions for Automatic Control (p. 102). If a rule is set but the output does not respond, check according to 7-11 Checklist: Rule Set but Output Does Not Respond (p. 126).

Prepare the Channels First

Prepare the input channels and output channel names of each example scenario as follows:

- JNC sensors: Channel ▸ Native System ▸ Add device manually: select the device, enter the slave ID ▸ + Add ticked channels to the list ▸ Write to CB.
- Sensors from other manufacturers: System ▸ Basic Setting ▸ increase Number of Channel by 1 ▸ Save; Channel ▸ Channel ▸ new channel ▸ Set channel type ▸ Analog input ▸ tick the confirmation ▸ Create; on the Channel Source tab, enter the interface, ID, address, and data type ▸ Save. Look up the ID, address, and data type in the sensor's Modbus table.
- DI signals (e.g. limit switches): same steps as sensors from other manufacturers; under Set channel type choose Digital input; take the address from the DI module's Modbus table, prefix 1 (e.g. 100036).
- Output channel names: Channel ▸ Channel ▸ select the DO channel ▸ Name/Unit tab, enter the equipment name used in the example ▸ Save.

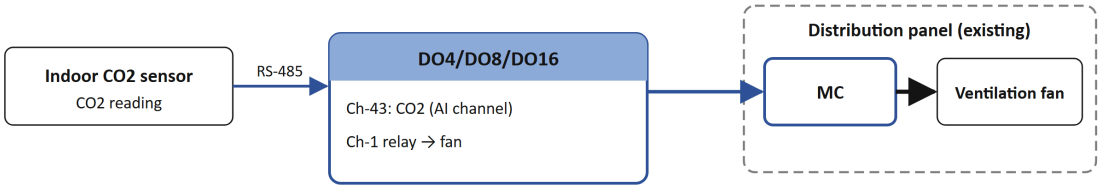
#	Example scenario	Functions covered
01	Automatic Office CO2 Ventilation	Logic Control, deadband, on delay, Schedule Control (And)
02	Aquaculture Pond Aeration	Alternating Operation
03	Aquaculture Pond Sluice Gate	Hardware interlock, channel interlock
04	Water Treatment pH Dosing	Alarm-linked control, on delay, timeout alarm
05	Zoned Climate Control for a Sheep Barn	Two-level logic (Or/And between blocks and between conditions within a block), virtual channel (multiple units sharing the same set of conditions)
06	Sheep Barn Side Curtain Roll-Up	Forward/Reverse Control, limit switch, total travel time
07	Vaccine Refrigerator Temperature Alarm	Alarm settings, SMS notification, disconnection alarm. This example does not control any equipment and does not use relay outputs
08	Wastewater Aeration (Functional Scope)	Product functional scope: start/stop control that the DO series can perform, and variable speed control that requires additional equipment

8-1 Example Scenario 01 Automatic Office CO2 Ventilation

Scenario: When the CO2 concentration exceeds the setpoint, the ventilation fan starts automatically. It does not operate outside office hours.

- **Applicable sites: Enclosed indoor spaces such as meeting rooms, offices, and classrooms where air quality must be maintained during hours of use.**
- **Functions covered: Logic Control, deadband, on delay, Schedule Control (And).**
- **Related sections: User Manual "Four Conditions for Automatic Control", "Logic Control", "Deadband and Delays", "Schedule Control".**

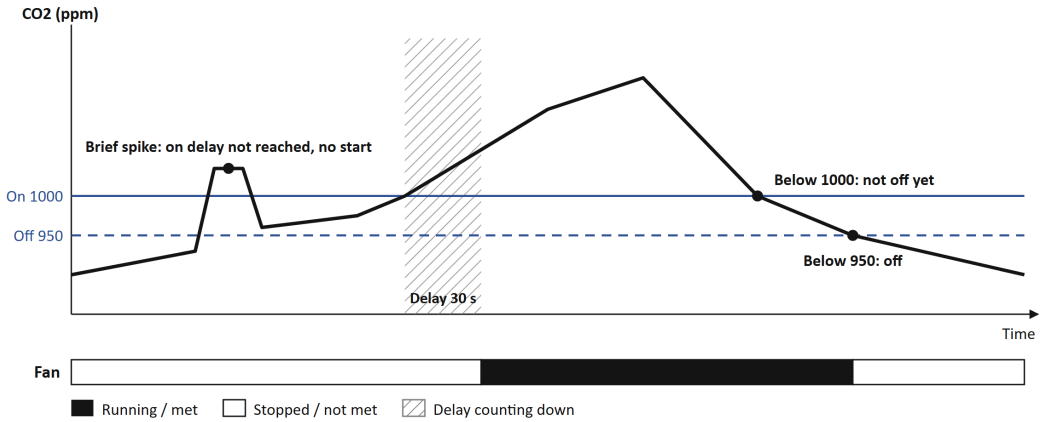
1 System Configuration



Item	This example	Connection
Input	CO2 reading from an indoor CO2 sensor	RS-485, uses one AI channel (Ch-43)
Output	Ventilation fan	Ch-1 relay → magnetic contactor (MC) in the distribution panel

The built-in relay only opens and closes a contact signal and does not power the fan directly; fan power is switched by the magnetic contactor (MC) in the distribution panel. DO8 and DO16 are wired the same way; only the number of outputs differs.

2 How It Works: Threshold and Deadband



Note: Turns on only when CO2 stays above 1000 for the on delay time; deadband 50 only lowers the off threshold to 950.
All values in the diagram are examples.

- **Deadband: Uses different thresholds for turning on and turning off, so the output does not switch repeatedly when the value fluctuates near the threshold. A deadband of 50 only lowers the off threshold to 950; the on threshold remains 1000.**
- **On delay: The condition must remain true for the set time before the output is triggered. If the value briefly exceeds the threshold for less than the on delay, the fan does not start.**

3 Settings

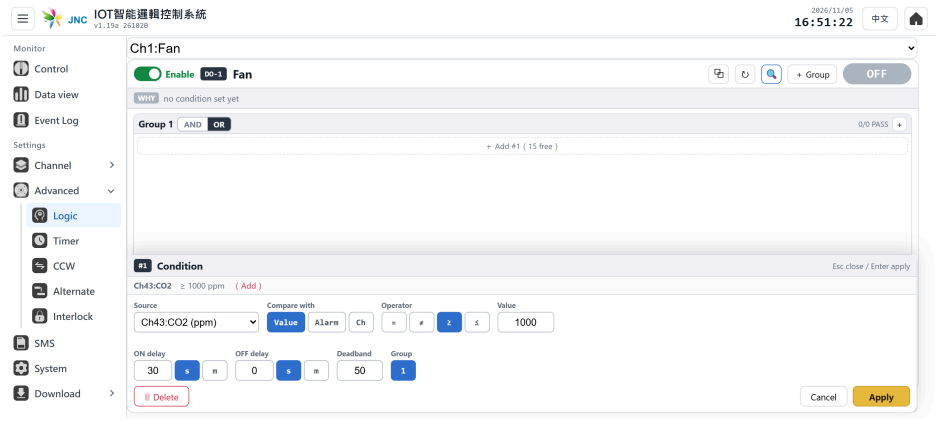
Setting	Example value	Where to set	Description
★ CO2 on threshold	1000	Logic Control	Set according to the user organization's management rules
★ Deadband (screen field: Deadband)	50	Logic Control	Determines the off threshold; 950 in this example
On delay (screen field: ON delay)	30 s	Logic Control	Time unit can be seconds (s) or minutes (m)
★ CO2 channel number	Ch-43	Channels list on the Channel page	Example number; check the Channels list on the Channel page
★ Office hours	08:00–18:00	Schedule Control, period 1	Set according to actual office hours
Schedule type (screen field: Periodic control Type)	And	Schedule Control	And: turns on only when within the schedule and CO2 exceeds the threshold
Days of week	Mon–Fri	Schedule Control	Select according to actual needs

★: Site-specific setting. All values in the table are examples.

4 Setup Procedure

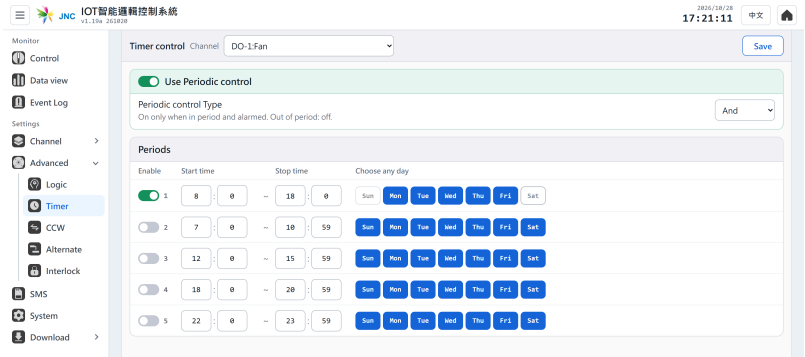
1. Channel ▸ Channel ▸ select Ch-1 Fan in the Channels list ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save In Manual mode, the output follows only the power button on the web page and no rules are executed. The output follows Logic Control only after it is set to Automatic.

2. Advanced ▸ Logic ▸ select Ch1 in the drop-down list at the top ▸ + Add ▸ Apply ▸ Enable ▸ Save In the Condition window: set Source to Ch43, Compare with to Value, Operator to ≥, Value to 1000, ON delay to 30 with s, and Deadband to 50 → press Apply to keep the condition → turn on Enable (green) at the top → press Save at the lower right. Settings do not take effect until you press Save. A green Enable switch means the rule is enabled; gray means it is not enabled. A rule that is not enabled is a common reason why the output does not respond after setup.



(Screen example: the Condition window filled in for this example.)

3. Advanced ▸ Timer ▸ select DO-1 in Channel ▸ turn on Use Periodic control ▸ turn on period 1 ▸ Save Period 1: Start time 8:0, Stop time 18:0, select Mon–Fri only in Choose any day, and set Periodic control Type to And. Skip this step if schedules are not needed.



(Screen example: the Timer page with period 1 filled in for this example.)

4. Front panel ▸ Knob 1 (for Ch-1) ▸ Cloud When the knob is at OFF or ON, automatic control is not executed. ON: conditions are not evaluated and the output stays on.

5 Automatic Control Conditions

① Knob	② Control set	③ Rule enabled	④ Condition
Cloud	Automatic	Green	CO2 ≥ 1000 and within the schedule

6 Operation Check

Perform this check during office hours. Temporarily set the threshold to a value lower than the current CO2 reading → press Apply → press Save → after the on delay, the fan should start and the tile for this output on the Control page turns green (the channel value in the Channels list on the Channel page is 1). After checking, restore the threshold to its original value → press Apply → press Save.

> **WARNING: Confirm site safety before testing**
>
> This step makes the equipment actually run. Make sure the area around the fan is clear, no one is performing maintenance, and the guard is installed.

7 Troubleshooting

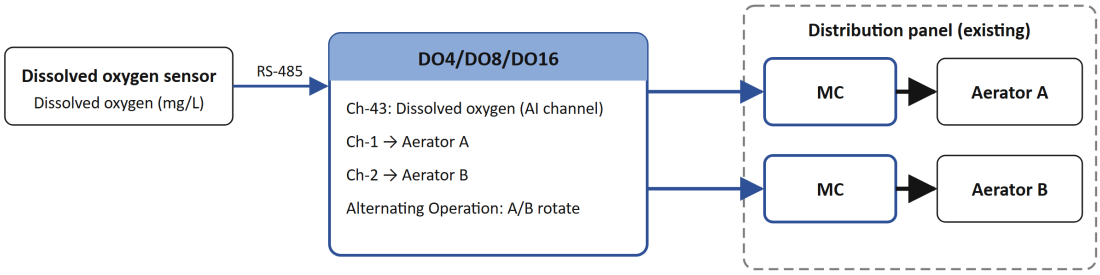
Symptom	Check
Rule is set but the fan does not run	Check each of the four conditions in Section 5. For the full checklist, see “Checklist: Rule Set but Output Does Not Respond” in the User Manual
Fan starts automatically outside office hours	Check whether the schedule type is set to Or by mistake (it should be And). Or: turns on when either the schedule or the logic is true
Fan starts and stops repeatedly near the threshold	Check whether the deadband is set to 0 (on and off thresholds are the same)
Rule does not work when another DO channel’s state is used as the condition	A built-in DO used as the source is compared by value: from the web page, off = 0 and on = 1; knob OFF = 2, knob ON = 4. = 1 is not met when the knob is turned to ON; = 0 is not met when the knob is turned to OFF
Fan starts some time after the condition becomes true	This is normal behavior; the on delay is counting

8-2 Example Scenario 02 Aquaculture Pond Aeration

Scenario: When dissolved oxygen falls below the setpoint, two aerators run in turn for the set time, sharing the running hours equally.

- **Applicable sites: Aquaculture ponds such as fish ponds and shrimp ponds, where aerators (paddlewheel aerators) must start when dissolved oxygen is low.**
- **Functions covered: Alternating Operation.**
- **Related sections: User Manual "Four Conditions for Automatic Control", "Logic Control", "Deadband and Delays", "Alternating Operation".**

1 System Configuration

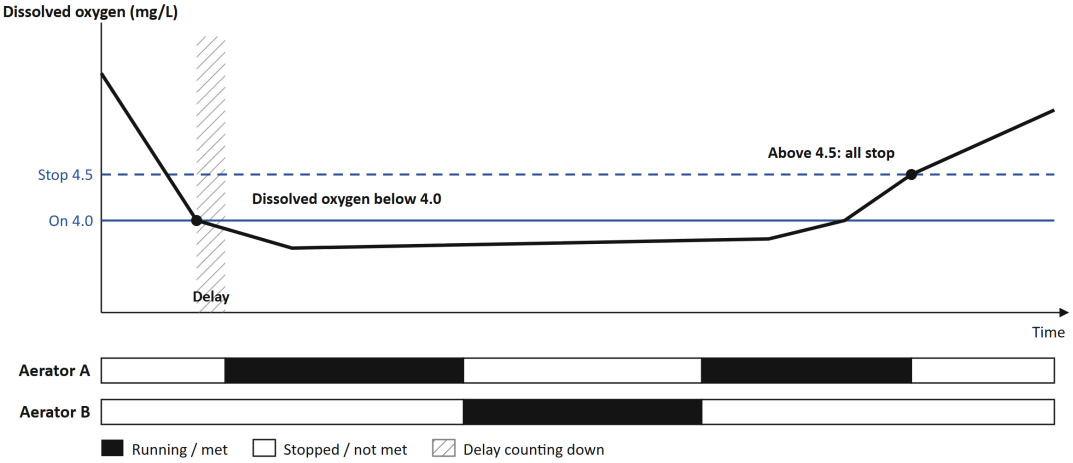


Note: Both units are wired the same way; start order and rotation time are set in Alternating Operation.
Wiring and rewiring involve mains power; follow local electrical codes.

Item	This example	Connection
Input	Dissolved oxygen reading (mg/L) from a dissolved oxygen sensor	RS-485, uses one AI channel (Ch-43)
Output	Aerator A, Aerator B	Ch-1, Ch-2 relays → MCs in the distribution panel

> **NOTE: Terminology**
>
> **"Dissolved oxygen" (DO) in this example refers to the oxygen content in water. It is different from the product name "DO series" and from "DO channel" (digital output).**

2 How It Works: Alternating Operation



Note: Units rotate when each reaches the run timeout (60 min in this example); with 1 unit to run, only one runs at a time.
With a ≤ condition, the deadband works in reverse: dissolved oxygen must rise to 4.5 to clear the condition. All values are examples.

Setting	What it determines	This example
Condition of each unit (Logic button)	Whether a unit needs to start	Start is needed when dissolved oxygen ≤ threshold
Number of units to run	How many units run at the same time	1 unit
Alternating Operation	Which unit starts and how long it runs before the next unit takes over	A and B take turns, each running 60 minutes

- The condition of each unit is set with its Logic button on the Alternate page. It shares its data with the Logic Control of that channel, and only one side can be enabled at a time. Ch-1 and Ch-2 must each have the condition dissolved oxygen ≤ threshold.
- When the condition uses ≤, the deadband works in the opposite direction: with a threshold of 4.0 and a deadband of 0.5, the condition is released only when dissolved oxygen rises to 4.5.

3 Settings

Setting	Example value	Where to set	Description
★ Dissolved oxygen channel number	Ch-43	Channels list on the Channel page	Example number; check the Channels list on the Channel page
★ Dissolved oxygen threshold	4.0	Alternate ▸ Logic button (one condition each for Ch-1 and Ch-2)	Set according to the farmed species and site conditions
Deadband (screen field: Deadband)	0.5	Alternate ▸ Logic button	Determines the release threshold; 4.5 in this example
On delay (screen field: ON delay)	30 s	Alternate ▸ Logic button	Filters out brief changes in the reading
★ Run timeout (screen field: run time out)	60 min	Alternate	How long each unit runs before the next unit takes over
Participating units	Output 1st Ch-1, Output 2nd Ch-2	Alternate ▸ Alternate outputs	Add more units in Output 3rd–8th (up to 8 per group)
Number of units to run	1	Alternate ▸ page 2 ▸ Timer control Enable column	Number of units running at the same time within the schedule
Schedule	0:00–24:00, all seven days selected	Alternate ▸ page 2 ▸ Timer control	Set according to actual needs

★: Site-specific setting. All values in the table are examples.

4 Setup Procedure

1. Channel ▸ Channel ▸ select Ch-1 ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save. Set Ch-2 to Automatic in the same way.

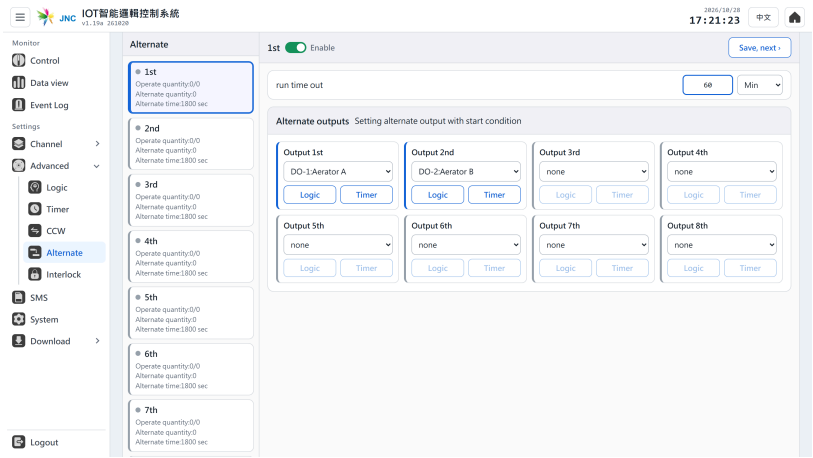
2. Advanced ▸ Alternate ▸ select 1st in the group list: Turn on Enable at the top → enter 60 in run time out and select min in the unit list → under Alternate outputs, set Output 1st to Ch-1 and Output 2nd to Ch-2 → save page 1 (press Save, next ›, which saves and opens page 2, then press ‹ Back to return to page 1; or press Logic → Save and leave). The Logic and Timer buttons of an output can be used only after it is saved. If you press them before saving, the Unsaved changes window appears; press Save and leave.

3. On page 1, press the Logic button of each of the two outputs: + Add: Source Ch43, Compare with Value, Operator ≤, Value 4.0, Deadband 0.5, ON delay 30 s → Apply → turn on Enable (green) → press Save at the lower right → ⬅ Back. A unit that needs no condition must also have Enable turned on; otherwise it is not included in the rotation.

4. On page 1, press Save, next › at the upper right to open page 2 → on the Timer control card, set Enable (number of units to run) to 1, the time range to 0:00–24:00, and select all seven days → press Save on the Timer control card. If logic is also set on page 2, save the logic separately. Both the schedule and the logic must be saved; settings that are not saved do not take effect.

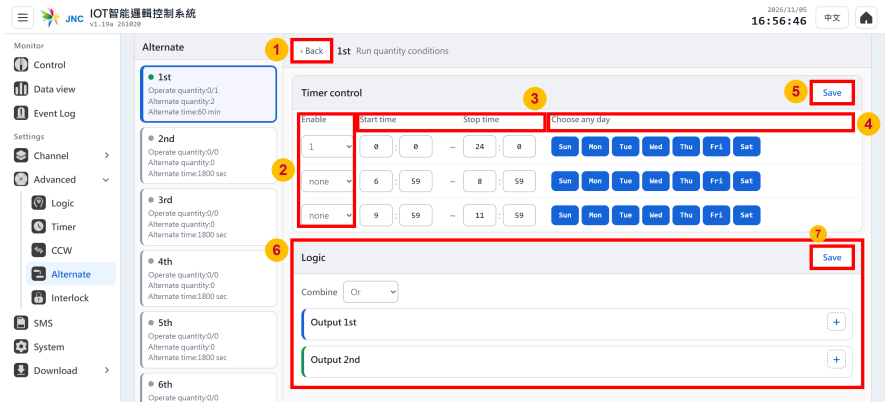
5. Front panel ▸ Knobs 1 and 2 (for Ch-1 and Ch-2) ▸ Cloud.

Alternate page 1: group window



(Screen example: the Alternate page with the 1st group filled in for this example. The left side lists groups 1st to 8th; the right side shows the settings of the selected group. The list on the left shows saved values and updates after Save.)

Alternate page 2: run quantity conditions (opened with Save, next ›)



(Screen example: page 2, with group 1st filled in for this example.)

Code	Name	This example
1	‹ Back	Returns to page 1
2	Enable (number of units to run)	Select 1 in the first row
3	Start time / Stop time	0:00–24:00
4	Choose any day	All seven days selected
5	Save (Timer control)	Press after setting the time range
6	Logic card (Combine)	Not set in this example
7	Save (Logic)	Press only when logic is set

5 Automatic Control Conditions

① Knob	② Control set	③ Rule enabled	④ Condition
Ch-1 and Ch-2 both at Cloud	Both Automatic	Each unit's condition enabled (green) + Alternate group enabled	Dissolved oxygen ≤ threshold

6 Operation Check

1. Temporarily change the run timeout to 10 s → press Save, next › → press ‹ Back; with the Logic button of each unit, click the condition to open it and temporarily change the threshold to a value higher than the current reading → Apply → Save at the lower right → ⬅ Back → after the on delay (30 s in this example), Aerators A and B should switch every 10 seconds.

2. After checking, restore the run timeout and thresholds to their original values: for the run timeout, press Save, next ›; for the thresholds, use the Logic button of each unit → Apply → Save at the lower right.

WARNING: Confirm site safety before testing

This step makes both units actually run in turn. Make sure no one is near the aerators and the area around the impellers is clear.

7 Troubleshooting

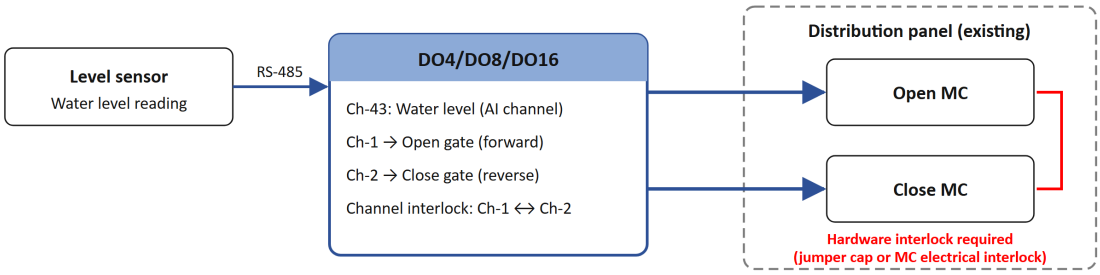
Symptom	Check
Only one unit runs and they do not alternate	Check whether the condition of the other unit (its Logic button) is enabled (a unit that is not enabled is not included in the rotation)
Neither unit runs	Check each of the four conditions in Section 5, and make sure the schedule covers the current time. For the full checklist, see “Checklist: Rule Set but Output Does Not Respond” in the User Manual
Aerators start and stop repeatedly when dissolved oxygen is near the threshold	Check whether the deadband is set to 0

8-3 Example Scenario 03 Aquaculture Pond Sluice Gate

Scenario: The sluice gate opens automatically to drain water when the water level is high and closes automatically when the water level is low. The open and close outputs must never be energized at the same time.

- **Applicable sites: Aquaculture ponds, reservoirs, and other bodies of water where the water level is regulated with a motorized sluice gate.**
- **Functions covered: Hardware interlock, channel interlock.**
- **Related sections: User Manual "Internal Components", "Four Conditions for Automatic Control", "Logic Control", "Deadband and Delays", "Interlock".**

1 System Configuration



Note: When both knobs are turned to ON, the channel interlock does not work;
a hardware interlock is required (relay board jumper cap, or MC electrical interlock in the distribution panel).
Follow local electrical codes for distribution panel wiring.

Item	This example	Connection
Input	Water level reading from a level sensor	RS-485, uses one AI channel (Ch-43)
Output	Gate motor (open, close)	Ch-1, Ch-2 relays → open MC and close MC in the distribution panel → gate motor

The built-in relay only opens and closes a contact signal and does not power the motor directly; motor power is switched by the magnetic contactors (MC) in the distribution panel. The sluice gate in this example has built-in limit switches that cut off the motor when the gate is fully open or fully closed.

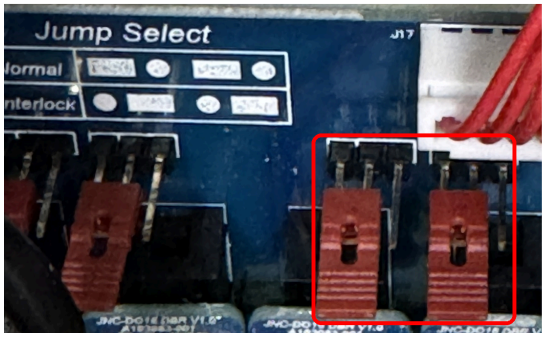
2 How It Works: Hardware Interlock and Channel Interlock

Opening and closing the gate are the forward and reverse rotation of the same motor. Energizing both outputs at the same time damages the motor and creates a hazard, so two layers of interlock are required: complete the hardware interlock first, then set the channel interlock.

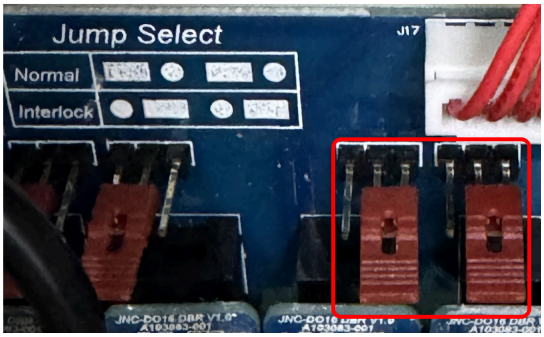
Layer 1: Hardware Interlock (Required)
The hardware interlock prevents the two outputs from being on at the same time at the circuit level, regardless of web page settings and knob positions. Use either method or both:

Method	Location	Description
Relay board jumper caps	Relay board inside this enclosure	Move the jumper caps of two adjacent outputs to the interlock position together; not interlocked by factory default. Power off before adjusting. See the figure below for the location
MC electrical interlock	Distribution panel	The open MC and close MC each cut the other's coil circuit, so when one is energized the other cannot be energized

Before Interlocking (Normal)



After Interlocking (Interlock)



(Relay board jumper caps: the red frame marks outputs 3 and 4 as a pair, shown as a demonstration; this example adjusts the leftmost pair (outputs 1 and 2) in the same way. Both jumper caps must be moved to the interlock position together.)

The MC electrical interlock in the distribution panel involves mains wiring. Follow local electrical codes.

Layer 2: Channel Interlock (Web Setting)
Channel interlock: while one output is running, automatic control does not turn on the other output. Each output has its own Logic Control, and the channel interlock prevents automatic control from turning on both outputs at the same time.

Situation	Result
Both outputs in Automatic	The output that starts first has priority and the other is locked. When the first output stops, the locked output starts automatically at once if its condition is still true
One output running automatically and the other knob turned to ON	The knob at ON has priority; the output running automatically stops immediately
Both knobs turned to ON	Both outputs are on at the same time; the channel interlock does not work
The locked output	Its tile on the Control page shows a lock icon and cannot be operated

DANGER: Do not use the channel interlock as the only protection

When both knobs are turned to ON, the channel interlock does not work; only the hardware interlock can prevent both outputs from being energized at the same time. Do not enable the settings in this example until the hardware interlock is complete.

> If travel control is needed (for example, controlling the gate opening by travel time), use Forward/Reverse Control instead; see Example Scenario 06.

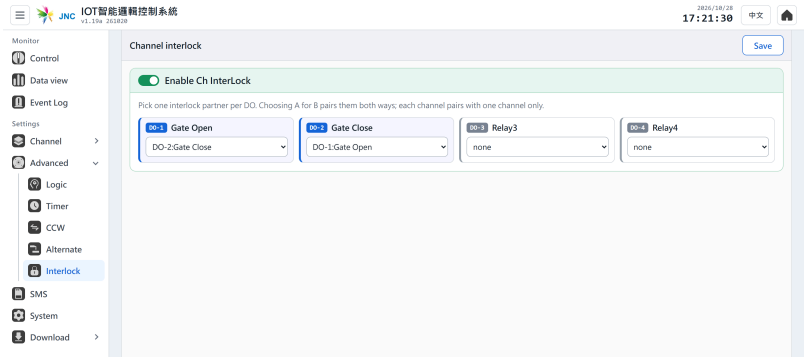
3 Settings

Setting	Value	Where to set	Description
★ Level channel number	Ch-43	Channels list on the Channel page	Example number; check the Channels list on the Channel page
★ Open threshold (high water level)	Set for the site	Ch-1 Logic Control: Ch-43 ≥ high level	Set according to pond depth
★ Close threshold (low water level)	Set for the site	Ch-2 Logic Control: Ch-43 ≤ low level	Set according to pond depth; must be lower than the high level with a margin
Deadband (screen field: Deadband)	Set for the site	One for each of the two logic rules	Prevents the motor from starting and stopping repeatedly when the water level is near the threshold
Interlock partner	Ch-1 ↔ Ch-2	Advanced ▸ Interlock	After you select it on one side, the other side is filled in automatically

★: Site-specific setting.

4 Setup Procedure

1. Make sure the hardware interlock is complete (see Layer 1 in Section 2).
2. Channel ▸ Channel ▸ select Ch-1 ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save. Set Ch-2 to Automatic in the same way.
3. Advanced ▸ Logic ▸ select the channel in the drop-down list at the top: Select Ch1 and Ch2 in turn, press + Add, and set each one. Ch-1 open: Source Ch43, Compare with Value, Operator ≥, Value = high level; enter the deadband value in the Deadband field → Apply → turn on Enable (green) → Save. Ch-2 close: Source Ch43, Compare with Value, Operator ≤, Value = low level; enter the deadband value in the Deadband field → Apply → turn on Enable (green) → Save. Enter only the threshold in the Value field. The deadband goes in the Deadband field separately; the two values are not added together.
4. Advanced ▸ Interlock ▸ turn on Enable Ch InterLock ▸ select DO-2 in the DO-1 field ▸ Save After you select it, the DO-2 field is filled in with DO-1 immediately. You do not need to set both sides. Each channel can be paired with one channel only.



(Screen example: the Channel interlock page with Enable Ch InterLock turned on and DO-1 and DO-2 selected as partners for this example. Each DO channel has one field; select the interlock partner from the drop-down list.)

5. Front panel ▸ Knobs 1 and 2 (for Ch-1 and Ch-2) ▸ Cloud.

5 Automatic Control Conditions

① Knob	② Control set	③ Rule enabled	④ Condition
Ch-1 and Ch-2 both at Cloud	Both Automatic	Both logic rules enabled (green)	Water level crosses the threshold

An output locked by the interlock does not operate either, and its tile on the Control page shows a lock icon.

6 Operation Check

1. Temporarily set the Ch-1 threshold lower than the current water level so that the open condition is true → press Apply → press Save → the sluice gate opens.

2. Temporarily set the Ch-2 threshold higher than the current water level so that the close condition is true → press Apply → press Save → Ch-2 should not turn on, and the Ch-2 tile on the Control page shows a lock icon.
3. Restore the Ch-1 threshold to its original value → press Apply → press Save so that the open condition is released → after Ch-1 stops, Ch-2 should turn on automatically at once and the sluice gate closes.
4. After checking, restore the Ch-2 threshold to its original value → press Apply → press Save.

WARNING: Confirm site safety before testing

This step makes the sluice gate actually open, close, and drain water. Make sure no one is working near the sluice gate and the downstream side can accept this discharge.

7 Troubleshooting

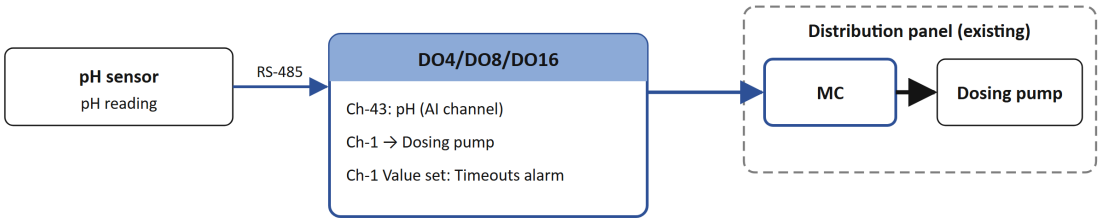
Symptom	Check
One output does not operate and the Control page shows a lock icon	The other output is running; this is normal interlock behavior. The output starts automatically after the other output stops
Open and close outputs are on at the same time	Turn both knobs to OFF immediately. Check whether both knobs are at ON (the channel interlock does not work in this case) and whether the hardware interlock is complete
Rule is set but the sluice gate does not move	Check each of the four conditions in Section 5. For the full checklist, see “Checklist: Rule Set but Output Does Not Respond” in the User Manual
Motor starts and stops repeatedly when the water level is near the threshold	Check whether the deadband is set to 0

8-4 Example Scenario 04 Water Treatment pH Dosing

Scenario: When pH crosses the dosing setpoint, the dosing pump starts automatically. When the dosing pump runs longer than the set time, an alarm is issued.

- **Applicable sites: Tanks where pH must be adjusted in wastewater treatment, such as rapid-mix tanks and equalization tanks.**
- **Functions covered: Alarm-linked control, on delay, timeout alarm.**
- **Related sections: User Manual "Four Conditions for Automatic Control", "External Channels: AI (Analog Input)", "Alarm Settings", "Logic Control", "Conditions and Operators", "Built-in Output Channels".**

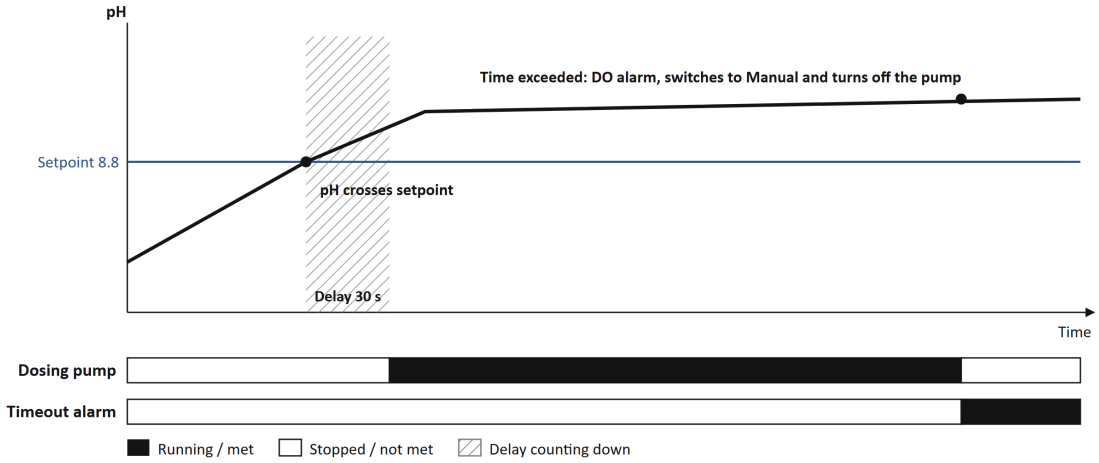
1 System Configuration



Note: Set the alarm type by chemical: acid uses the high alarm (HI), alkali uses the low alarm (LO).
Wiring and rewiring involve mains power; follow local electrical codes.

Item	This example	Connection
Input	pH reading from a pH sensor	RS-485, uses one AI channel (Ch-43)
Output	Dosing pump	Ch-1 relay → MC in the distribution panel

2 How It Works: Alarm-Linked Control, On Delay, and Timeout Alarm



Note: If the dosing pump runs longer than the Timeouts alarm time (10 s in this example) after an automatic start, a DO alarm is issued, the channel switches to Manual, and the dosing pump is turned off.
All values in the diagram are examples.

In this example, the dosing pump is turned on by alarm-linked control: first set an alarm value (the dosing setpoint) on the pH channel, then link that alarm in the Logic Control of the dosing pump (Ch-1) by setting Compare with to Alarm. When the pH alarm occurs, the dosing pump turns on.

Item	Function	This example
Alarm-linked control	When the pH channel alarm occurs, the dosing pump condition becomes true; when the alarm is cleared, the condition is released	High Alarm (HI) set to Alarm, 8.8
Alarm deadband	Determines the pH value at which the alarm is cleared, which is also the pH value at which dosing stops	0.2: cleared when pH falls below 8.6
On delay	The condition must remain true for the set time before the output turns on, filtering out brief changes in the pH reading	30 s
Timeout alarm	When the dosing pump has been on continuously longer than the set time after turning on automatically, a DO alarm is issued and the output switches to Manual and turns the dosing pump off	10 s

- **When the pH alarm occurs, it is also written to the device's Event Log. If the optional 4G module is installed, a SIM card is inserted, and SMS settings and the Phone Book are configured, an SMS is also sent.**

CAUTION: "Timeouts alarm" and "Manual open time" are different fields

- **Timeouts alarm: When the output has been on continuously longer than the set time after turning on automatically, a DO alarm is issued and the output switches to Manual and turns the equipment off. Applies only to automatic turn-on.**
- **Manual open time: Equipment turned on manually turns off automatically after the set time. Applies only to manual turn-on.**

Set the alarm type according to the chemical:

Chemical	Purpose	Alarm setting on the pH channel
Acid	Lower pH	High Alarm (HI) = dosing setpoint
Alkali	Raise pH	Low Alarm (LO) = dosing setpoint

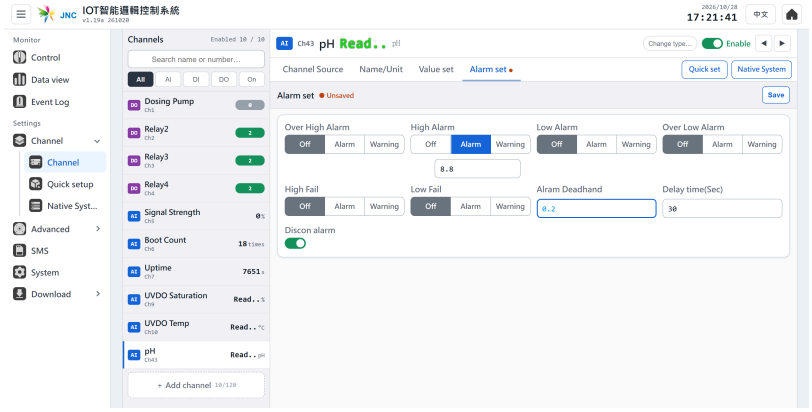
3 Settings

Setting	Example value	Where to set	Description
★ pH channel number	Ch-43	Channels list on the Channel page	Example number; check the Channels list on the Channel page
★ Dosing setpoint	High Alarm (HI) set to Alarm, 8.8	Channel ‣ pH channel ‣ Alarm set	Set according to the process; for the alarm type, see Section 2
Alarm deadband (screen field: Alarm Deadband)	0.2	Channel ‣ pH channel ‣ Alarm set	Determines the pH value at which dosing stops; 8.6 in this example
Dosing pump condition	Source Ch43, Compare with Alarm, Operator =, alarm stage HI	Ch-1 Logic Control	True when the pH channel alarm stage is HI; select LO when dosing alkali
★ On delay (screen field: ON delay)	30 s	Ch-1 Logic Control	Time unit can be seconds (s) or minutes (m)
★ Timeout alarm (screen field: Timeouts alarm)	10 (s)	Channel ‣ Ch-1 ‣ Value set	Set a value longer than the time needed for normal dosing. The screen shows no unit; the unit is seconds

★: Site-specific setting. All values in the table are examples.

4 Setup Procedure

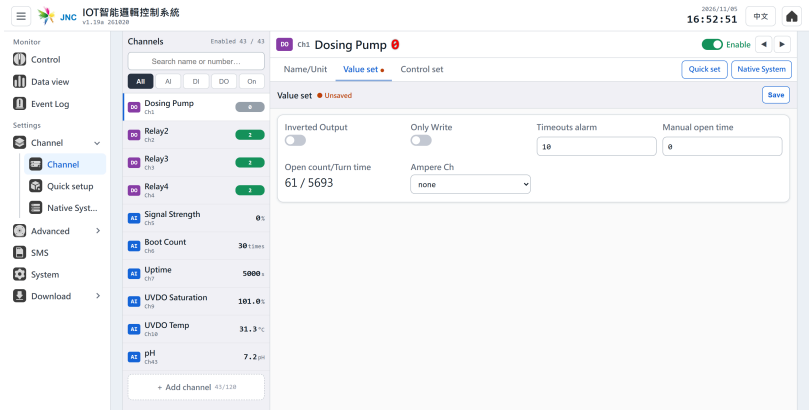
1. Channel ▸ Channel ▸ select the pH channel ▸ Alarm set: In High Alarm, select Alarm and enter 8.8 in the value field that appears (when dosing alkali, use Low Alarm instead), set Alarm Deadband to 0.2 → press Save.



(Screen example: Alarm set filled in for this example. The value field appears only after Alarm or Warning is selected. Delay time(Sec) keeps the device value and is not changed in this example.)

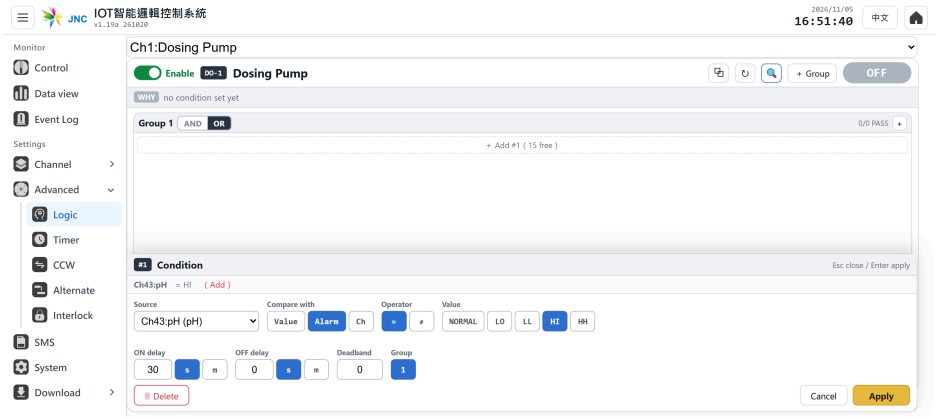
2. Channel ▸ Channel ▸ select Ch-1 Dosing Pump ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save

3. Channel ▸ Channel ▸ select Ch-1 Dosing Pump ▸ Value set ▸ Timeouts alarm: Enter 10 → press Save.



(The screen shows no unit for the Timeouts alarm field; the unit is seconds.)

4 Advanced ▸ Logic ▸ select Ch1 in the drop-down list at the top ▸ + Add: Set Source to the pH channel Ch43, Compare with to Alarm, Operator to =, the alarm stage to HI (select LO when dosing alkali), and ON delay to 30 s → Apply → turn on Enable (green) → Save. The alarm stage can be NORMAL/LO/LL/HI/HH. The condition is true only when it exactly matches the current alarm stage (example: when HH occurs, HI is not true).



(Screen example: the Condition window filled in for this example.)

5 If the optional 4G module is installed: SMS ▸ SMS Setting tab: Turn on Alarm notification and select the APN according to the SIM card → Save; Phone Book tab: Enter the mobile number and select Level 1 → Save → CH → None → select the pH channel → Apply. Skip this step if there is no 4G module.

6 Front panel ▸ Knob 1 (for Ch-1) ▸ Cloud.

5 Automatic Control Conditions

① Knob	② Control set	③ Rule enabled	④ Condition
Cloud	Automatic	Green	pH channel alarm occurs and remains for the on delay

6 Operation Check

1 Temporarily change the dosing setpoint (alarm value) on the pH channel to a value that makes the alarm occur immediately → press Save; temporarily reduce the timeout alarm → press Save → the pH alarm should appear in the Event Log; after the on delay, the dosing pump should start; after the timeout alarm time, a DO alarm should appear in the Event Log, and Ch-1 switches to Manual and turns off.

2 After checking, restore the dosing setpoint and timeout alarm to their original values and press Save; set the Ch-1 Manual / Automatic setting back to Automatic → press Save.

WARNING: Confirm site safety before testing

This step makes the dosing pump actually inject chemicals into the tank. Make sure the chemical piping is properly connected and the injected amount is acceptable on site.

7 Troubleshooting

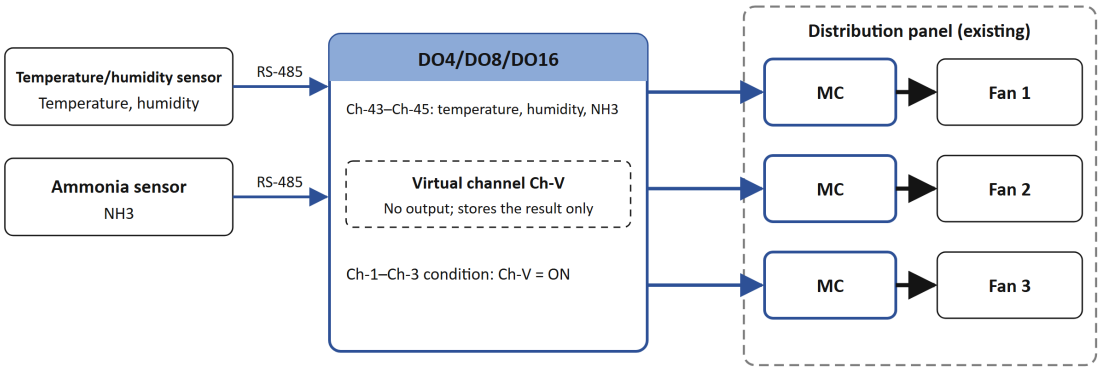
Symptom	Check
pH has crossed the dosing setpoint, but there is no pH alarm in the Event Log	Check whether Alarm is selected for the alarm on the pH channel and the dosing setpoint is entered
pH alarm has occurred, but the dosing pump does not run	Check each of the four conditions in Section 5. The output also does not run while the on delay is counting. For the full checklist, see “Checklist: Rule Set but Output Does Not Respond” in the User Manual
Dosing continues when pH is normal	Check whether the alarm type is reversed (per the table in Section 2: HI for acid, LO for alkali)
A timeout alarm occurs	The dosing pump has been on longer than the set value and has switched to Manual and turned off. Check the site, then set the Ch-1 Manual / Automatic setting back to Automatic
Timeout alarm is set, but no alarm is issued	Check whether the dosing pump is turned on by alarm-linked control (Compare with: Alarm). The timeout alarm times only DO outputs turned on automatically; manual turn-on is not timed

8-5 Example Scenario 05 Zoned Climate Control for a Sheep Barn

Scenario: When temperature and humidity are high or the ammonia concentration is too high, all fans in the same zone start.

- **Applicable sites: Zoned livestock barns such as sheep barns, cattle barns, and poultry houses, where each zone has several fans and the decision depends on several sensors together.**
- **Functions covered: Two-level logic (Or/And between blocks and between the conditions within a block), virtual channel (multiple devices sharing one set of conditions).**
- **Related sections: User Manual "Four Conditions for Automatic Control", "Logic Control", "When Rules Exceed Capacity: Virtual Channels", "Basic Setting".**

1 System Configuration

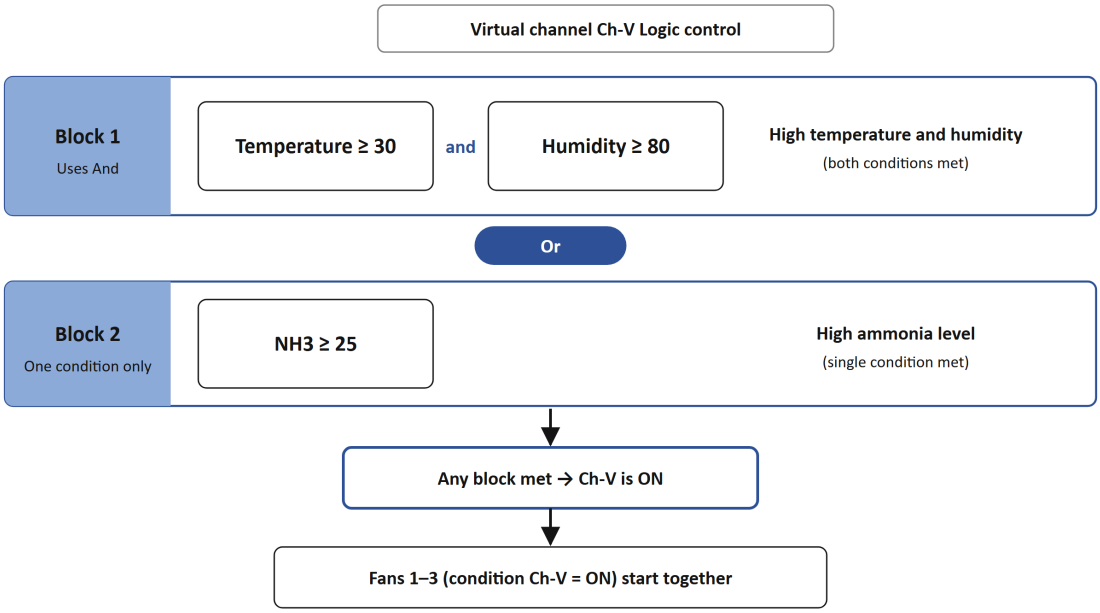


Note: Conditions are set only on the virtual channel; each fan uses Ch-V = ON, so a threshold is changed in one place only.

Item	This example	Connection
Input	Temperature, humidity, and ammonia (NH3) readings	RS-485, each using one AI channel (temperature Ch-43, humidity Ch-44, NH3 Ch-45)
Virtual channel	Ch-V (example name: Virtual L-Vent)	Not connected to a physical output; stores only the condition result
Output	3 fans on the left side	Ch-1 to Ch-3 relays → MCs in the distribution panel

- **Ch-V: The name used in this example for the virtual channel, that is, the channel added in Section 4, step 1. Its number is the original number of channels + 1 (example: Ch-46 when there were 45 channels).**

2 How It Works: Two-Level Logic and Virtual Channel



Note: (Temperature ≥ 30 and humidity ≥ 80) or NH3 ≥ 25 → all fans start.
This example has 2 blocks and 3 conditions; each output allows up to 3 blocks and 15 conditions shared across blocks. All values are examples.

- **Block: One group of conditions in Logic Control, shown as Group 1, Group 2… on the screen (add one with + Group). Blocks are combined with one Or/And.**
- **Condition: Each condition listed in the same block. The conditions within a block are combined with the AND/OR switch beside that block's title.**

Position	Content	Or/And
Block 1	Condition 1: temperature ≥ 30 Condition 2: humidity ≥ 80	Select And for this block (both conditions must be met)
Block 2	Condition 1: NH3 ≥ 25	Only one condition; the selection does not affect the result
Between blocks	—	Or (the output turns on when any block is met)

Purpose of the virtual channel: The 3 fans use the same set of conditions. If each fan is set separately, a threshold change must be made in 3 places. With the conditions set on the virtual channel and each fan set only to Ch-V = ON (Compare with Value, click ON for the value), a threshold change is made in one place.

3 Settings

Setting	Example value	Where to set	Description
★ Temperature, humidity, and NH3 channel numbers	Ch-43, Ch-44, Ch-45	Channels list on the Channel page	Example numbers; check the Channels list on the Channel page
★ Temperature threshold	30	Virtual channel Ch-V logic, Group 1	Set according to the livestock species and site conditions
★ Humidity threshold	80	Virtual channel Ch-V logic, Group 1	Set according to the livestock species and site conditions
★ NH3 threshold	25	Virtual channel Ch-V logic, Group 2	Set according to the livestock species and site conditions
Deadband of each condition (screen field: Deadband)	Temperature 1, humidity 5, NH3 5	Same as above	Determines the off threshold
On delay (screen field: ON delay)	60 s	Same as above	Filters out brief changes in readings
Fan condition	Ch-V = ON	Logic Control of Ch-1 to Ch-3	When the virtual channel is the source, Compare with offers only Value and A/M, with no operator; click ON for the value

★: Site-specific setting. All values in the table are examples.

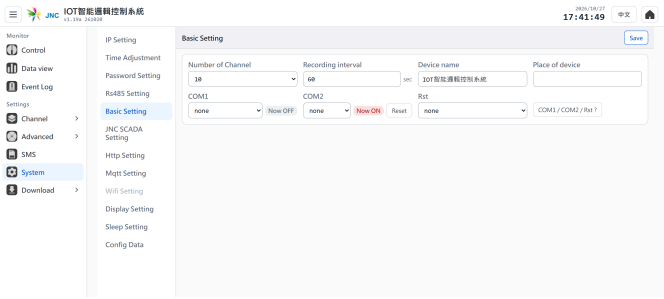
Each channel allows up to 3 blocks (groups), with up to 15 conditions across all blocks (the + Add button shows how many are free). This example uses 2 blocks and 3 conditions.

4 Setup Procedure

WARNING: An incorrect address may conflict with a physical output

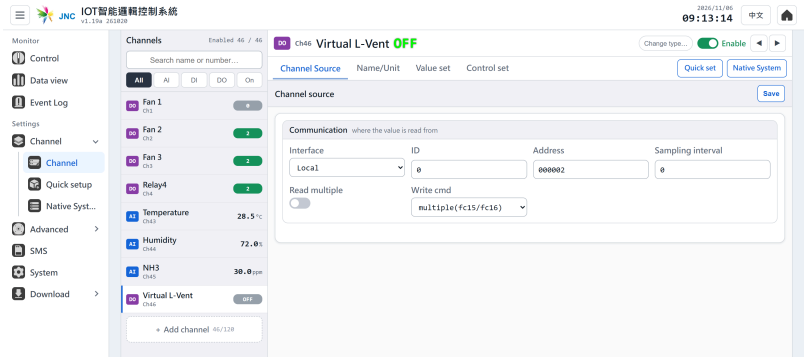
Enter 000002 as the virtual channel address. Do not enter any other value (step 2).

1. **System ▸ Basic Setting ▸ Number of Channel: Select a value 1 larger than the current value (example: 45 → 46) → press Save. Reducing the number of channels deletes the last channels and all their settings. This step only adds 1.**



(Example screen for step 1: Basic Setting. Number of Channel is the first field.)

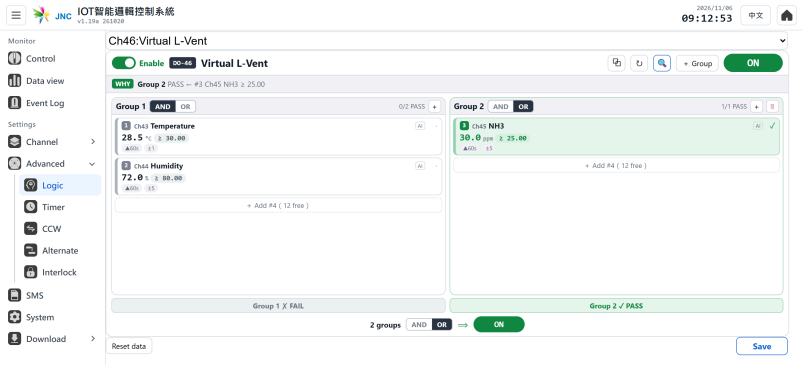
2. **Channel ▸ Channel ▸ select the new channel (Ch-V) at the end of the Channels list: The new channel shows that its channel type is not set. Press Set channel type, choose Digital output, tick the confirmation and press Create; on the Channel Source tab, set Interface to Local, ID to 0, and Address to 000002 → Save; on the Name/Unit tab, enter Virtual L-Vent as the name → Save. Save each tab before switching to another tab or channel; otherwise an unsaved-changes window appears.**



(Example screen for step 2: the Channel Source tab.)

3. **Channel ▸ Channel ▸ select Ch-V ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save.**

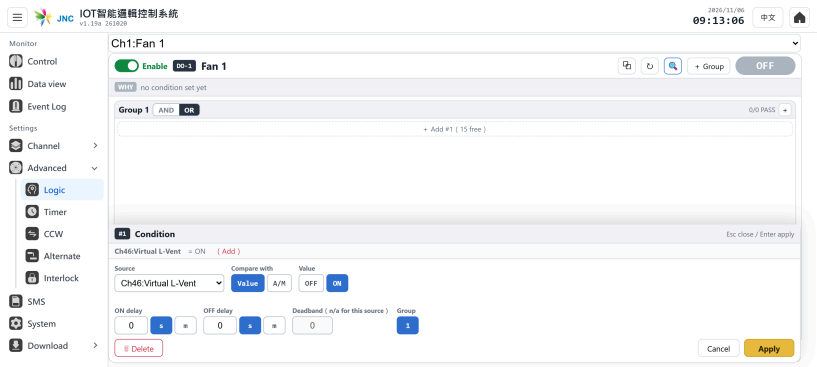
4 **Advanced ▸ Logic ▸ select the virtual channel in the drop-down list at the top: Set Group 1 to AND and add two conditions with + Add (temperature, humidity) → press + Group to add Group 2, and add one condition (NH3) with Group set to 2 (enter Deadband and ON delay for each condition and press Apply) → under 2 groups at the bottom, choose OR → turn on Enable (green) → Save.**



(Example screen for step 4: the Logic page of the virtual channel.)

5 **Channel ▸ Channel ▸ select Ch-1 (then Ch-2, Ch-3) ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save.**

6 **Advanced ▸ Logic ▸ select Ch1 in the drop-down list at the top ▸ + Add: Source Ch-V, Compare with Value, click ON for the value → Apply → turn on Enable (green) → Save. Repeat for Ch2 and Ch3.**



(Example screen for step 6: a condition whose source is a virtual channel; Compare with offers only Value and A/M, with no operator, and the value is set with OFF/ON buttons.)

7 **Front panel ▸ Knobs 1 to 3 (for Ch-1 to Ch-3) ▸ Cloud.**

5 Automatic Control Conditions

① Knob	② Control set	③ Rule enabled	④ Condition
Cloud for each fan channel	Virtual channel and fans are all Automatic	Logic Control of the virtual channel and fans are all enabled (green)	Virtual channel is ON

The virtual channel itself must also be set to Automatic and enabled; otherwise its conditions are not evaluated.

6 Operation Check

1. Check the virtual channel: Temporarily set the NH3 threshold in Group 2 below the current reading → press Apply → press Save → after the on delay (60 s in this example), the virtual channel should change from Off to On on the Data view page, or its value in the Channels list should change from 0 to 1.
2. Check the fans: After the virtual channel turns ON, Ch-1 to Ch-3 should start at the same time.
3. Restore the original threshold → press Apply → press Save → the virtual channel returns to Off → the fans stop.

> **WARNING: Confirm site safety before testing**
>
> This step runs 3 fans at the same time. Make sure no one is near the fans and no animals are near the blades.

7 Troubleshooting

Symptom	Check
Virtual channel stays OFF	Check whether Manual / Automatic of the virtual channel is Automatic and whether Logic Control is enabled (green). The WHY line on the Logic page shows which group fails
Virtual channel is ON, but the fans do not operate	Check that ON (not OFF) is selected as the value of the fan condition (if OFF is selected, the fans run only while the virtual channel is off), and that Manual / Automatic of the fans is Automatic
Fans start when only the temperature exceeds the threshold	Check whether Group 1 is incorrectly set to OR (select AND when temperature and humidity must both be met)
Fans do not start when ammonia exceeds the threshold	Check whether the combination between groups is incorrectly set to AND (it should be OR)
No more conditions can be added	All 15 conditions are used (shared by all groups; the + Add button no longer appears); set up another virtual channel
Rule is set, but nothing operates	Check each of the four conditions in Section 5. For the full checklist, see “Checklist: Rule Set but Output Does Not Respond” in the User Manual

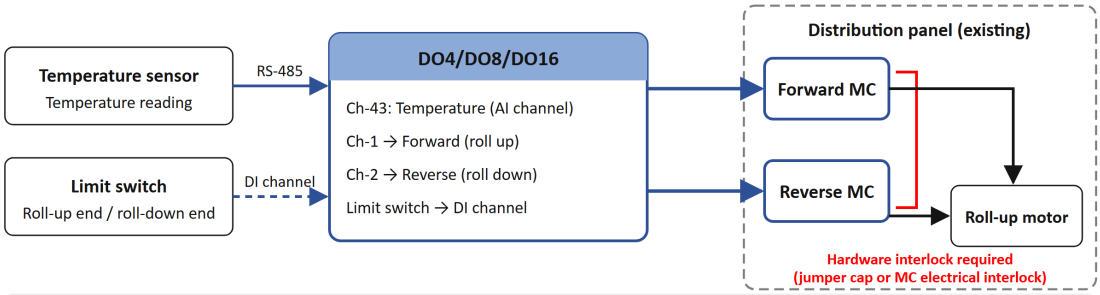
8-6 Example Scenario 06 Sheep Barn Side Curtain Roll-Up

Scenario: When the temperature rises above the set value, roll up the side curtain for ventilation; when it falls below the set value, roll it down. Stop when the end of travel is reached.

- **Applicable sites: Equipment that uses one motor running forward to roll up and in reverse to roll down, such as barn side curtains, greenhouse roll-up films, and shade nets.**
- **Functions covered: Forward/reverse control, limit switches, total travel time.**
- **Related sections: User Manual "Forward/Reverse Control", "Logic Control", "Deadband and Delays", "Interlock".**

> **WARNING: Set up a hardware interlock before configuring these settings**
>
> **For hardware interlock methods, see the DANGER message in Section 1.**

1 System Configuration

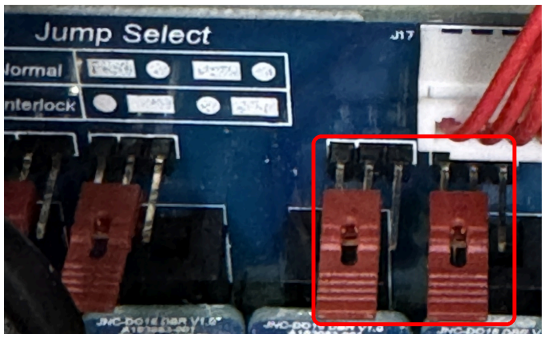


Note: The motor is damaged if it receives forward and reverse signals at the same time.
When both knobs are turned to ON, the channel interlock does not work; a hardware interlock is required.
Limit switches are read through DI channels.

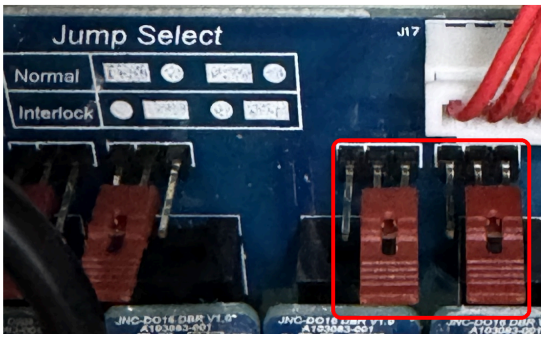
Item	This example	Connection
Input	Temperature reading	RS-485, uses one AI channel (Ch-43)
Input	Limit switches (roll-up end, roll-down end)	Read through DI channels
Output	Roll-up motor forward and reverse	Two DO outputs: Ch-1 forward, Ch-2 reverse → MCs in the distribution panel

> **DANGER: Forward and reverse must never be energized at the same time**
>
> **If the motor receives forward and reverse signals at the same time, damage and hazards will result. A separate hardware interlock is required (relay board jumper cap, see the figure below; or MC electrical interlock in the distribution panel). Distribution panel wiring involves mains power; follow local electrical codes. When both knobs are turned to ON, the channel interlock does not work (see Example Scenario 03).**

Before Interlocking (Normal)

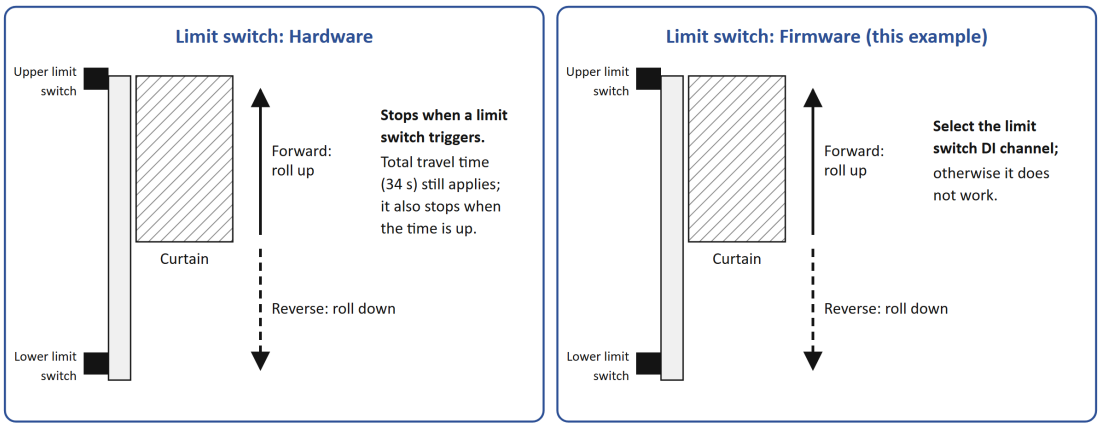


After Interlocking (Interlock)



(Relay board jumper caps: the red frame marks outputs 3 and 4 as a pair, shown as a demonstration; this example adjusts the leftmost pair (outputs 1 and 2) in the same way. Both jumper caps must be moved to the interlock position together. Power off before adjusting)

2 How It Works: Stop Methods and Travel Settings



Note: Total travel time = seconds for the curtain to go from fully down to fully up; measure it on site. All values are examples.
If the condition clears while moving, the curtain finishes the current section before stopping.

Setting	Description	When to use
Total travel time (screen field: Total travel time(sec))	Time required to move from one end to the other	Must be measured on site; do not estimate
Limit switch: Firmware	The DI channel of the limit switch must be selected; otherwise it does not work	When the limit switch is connected to a DI channel
Limit switch: Hardware	Stops when the limit switch is triggered; still limited by the total travel time and also stops when the time is reached	When limit switches are installed

Setting	Description	When to use
When CCW touch limit not stop (switch; shown only when the limit switch is Hardware)	Applies to reverse only: when turned on, the DO stays triggered when reverse reaches the total travel time, and the motor's own limit switch stops it; forward still stops when the total travel time is reached. Before turning it on, make sure the motor has its own limit switch. If it is turned on without a limit switch, the reverse output stays energized and does not stop automatically	When the limit switch is set to Hardware
Section (screen field: Section(max:5))	Divides the total travel into several sections (up to 5); each time the condition is met, the curtain moves only one section, and the next section requires that section's condition to be met again	According to site needs
Mode: mileage avg	Time of each section = total travel time ÷ number of sections	Sections of equal length
Mode: Calculate separately	Run time of each section in seconds = "Move time" of that section's condition	Sections of different lengths

Set one condition each for forward and reverse (same method as Logic Control):

Direction	Condition (example value)	Deadband (example value)
Forward (roll up for ventilation)	Temperature ≥ 28	1: The forward condition is released when the temperature falls to 27 or below
Reverse (roll down for insulation)	Temperature ≤ 24	1: The reverse condition is released when the temperature rises to 25 or above

The deadband here is unrelated to the direction of rotation. It only determines the release threshold of the condition, preventing repeated starts and stops when the value fluctuates near the threshold.

3 Settings

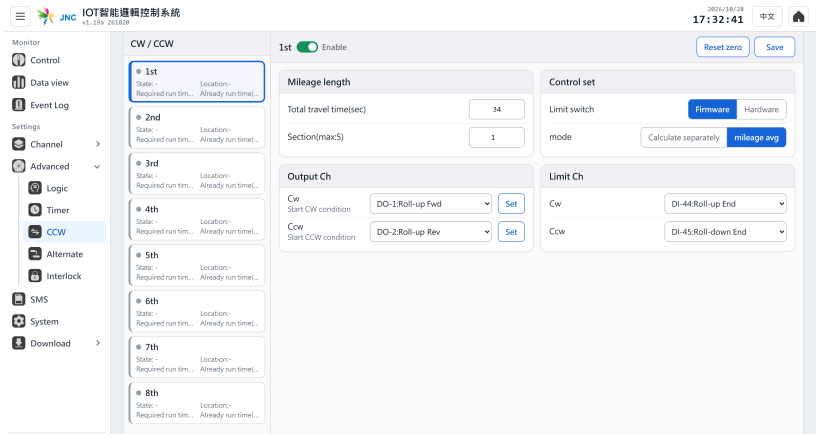
Setting	Example value	Where to set	Description
★ Total travel time	34 s	CCW ‣ Mileage length ‣ Total travel time(sec)	Measure on site the seconds the curtain takes from fully down to fully up
Section	1 (no sections in this example)	Mileage length ‣ Section(max:5)	According to site needs
★ Limit switch	Firmware	Control set ‣ Limit switch	Also select the DI channels of the limit switches in Limit Ch
Mode	mileage avg	Control set ‣ mode	Select mileage avg for sections of equal length, or Calculate separately for sections of different lengths
Forward DO/Reverse DO	Ch-1/Ch-2	Output Ch ‣ Cw/Ccw	According to the actual wiring
★ Forward condition	Temperature ≥ 28, deadband 1	Output Ch ‣ Cw ‣ Set (Start CW condition)	Set according to the livestock species and site conditions
★ Reverse condition	Temperature ≤ 24, deadband 1	Output Ch ‣ Ccw ‣ Set (Start CCW condition)	Set according to the livestock species and site conditions
Limit switch DI	One each for the roll-up end and roll-down end	Limit Ch ‣ Cw/Ccw	According to the actual wiring

★: Site-specific setting. All values in the table are examples.

4 Setup Procedure

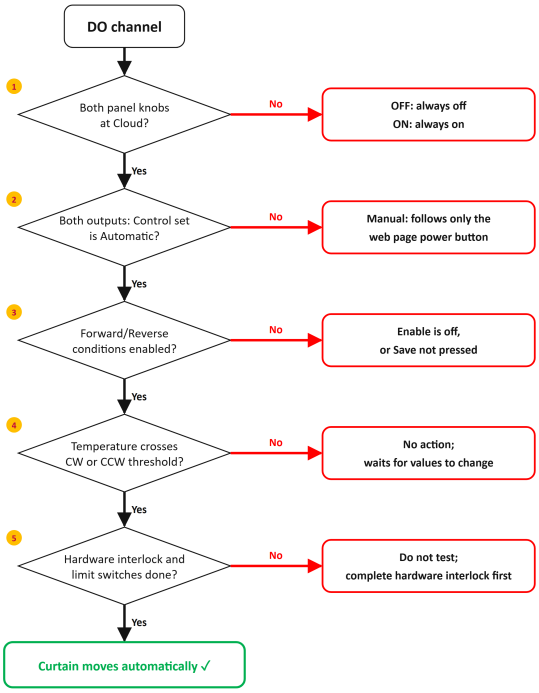
1. Make sure the hardware interlock is complete (see the DANGER message in Section 1).
2. Have on-site personnel measure and record the seconds the curtain takes from fully down to fully up.
3. Channel ‣ Channel ‣ select Ch-1 and Ch-2 in turn ‣ Control set ‣ Manual / Automatic: Automatic ‣ Save (forward/reverse control operates based on conditions and must be set to Automatic).
4. Advanced ‣ CCW ‣ select 1st in the group list ‣ turn on Enable at the top
5. Mileage length: Total travel time(sec) 34, Section(max:5) 1.

6. **Control set: Limit switch Firmware, mode mileage avg.**
7. **Output Ch: Cw Ch-1, Ccw Ch-2.**
8. **Limit Ch: Select the DI channels of the two limit switches in Cw and Ccw.**
9. **Press Save at the upper right.**
10. **Press Set beside Cw and Ccw under Output Ch in turn and press + in the section row to add a row → click the new row to open the condition settings: in If, select Ch43, ≥ (Ccw ≤), and enter 28 (Ccw 24); Deadband 1 → Apply; on the condition screen, switch on Enable (green) → press Save at its upper right → ‹ Back.**
11. **Front panel ▸ Knobs 1 and 2 (for Ch-1 and Ch-2) ▸ Cloud.**



(Example screen: the CCW page with the 1st group filled in for this example. The left side lists groups 1st to 8th with their state and run time.)

5 Operating Conditions



① Knob	② Control set	③ Forward/reverse	④ Condition	⑤ Hardware
Both forward and reverse outputs are Cloud	Both outputs are Automatic (see Section 4, step 3)	The group's Enable is turned on and the settings are saved	Temperature crosses the forward or reverse threshold	Hardware interlock and limit switches are complete

6 Operation Check

1. Make sure there are no people, animals, or obstacles within the curtain's travel range.
2. Under Set for Cw, click the condition row and temporarily set the threshold below the current temperature → press Apply → press Save → the curtain should start rolling up and stop when the upper limit switch is triggered (or when the total travel time is reached).
3. Restore the original forward threshold → press Apply → press Save; under Set for Ccw, click the condition row and temporarily set the threshold above the current temperature → press Apply → press Save → the curtain should roll down and stop at the lower end.
4. Restore the original reverse threshold → press Apply → press Save.

WARNING: Confirm site safety before testing

This step actually runs the roll-up motor and moves the curtain. Keep everyone away from the roll-up mechanism and keep hands away from the roller.

7 Troubleshooting

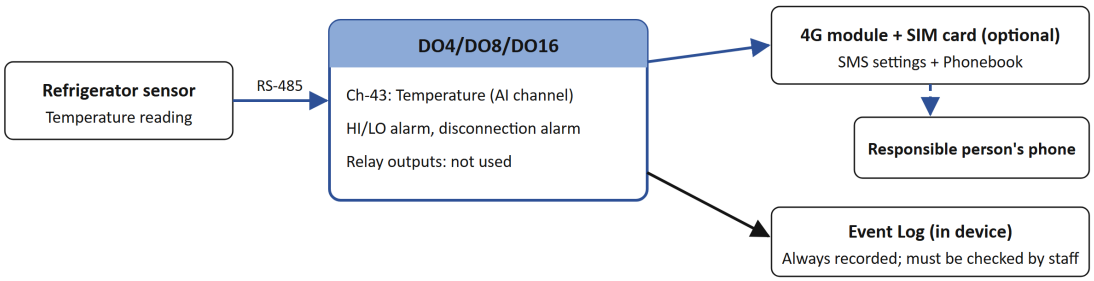
Symptom	Check
Curtain stops before reaching the end	The total travel time may be shorter than the actual travel; measure it again
Curtain moves repeatedly when the temperature is near the threshold	The deadband may be set to 0
Curtain keeps moving after the condition is released during travel	This is normal behavior: when the condition is released during travel, the curtain completes the current section before stopping
Rule is set, but nothing operates	Check the knob positions, whether the group's Enable is turned on, and whether the settings are saved

8-7 Example Scenario 07 Vaccine Fridge Temperature Alarm

Scenario: When the refrigerator temperature goes outside the upper or lower limit or the sensor is disconnected, send an SMS to the person in charge.

- **Applicable sites: Sites that only need monitoring and no equipment control, such as vaccine refrigerators, pharmaceutical refrigerators, and cold-chain warehouses.**
- **Functions covered: Alarm settings, SMS notification, disconnection alarm. This example does not control any equipment and does not use relay outputs.**
- **Related sections: User Manual "External Channels: AI (Analog Input)", "Alarm Settings", "SMS Settings", "Event Log".**

1 System Configuration



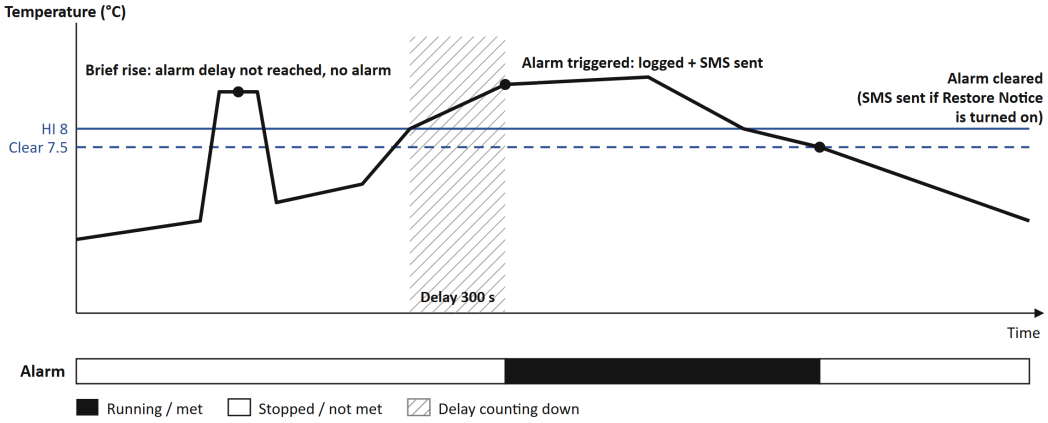
Note: Without a SIM card and cloud platform connection, alarms are only recorded in the device; no notification is sent.
This example only monitors; it does not control any equipment.

Item	This example	Connection
Input	Temperature reading inside the refrigerator	RS-485, uses one AI channel (Ch-43)
Notification	SMS sent to the mobile phone of the person in charge	Optional 4G module + SIM card
Output	None	No load connected

CAUTION: The SMS function requires the optional 4G module and a SIM card

Without a SIM card and without a connection to the cloud platform, alarms are only recorded on the device's Event Log page and no notification is sent; someone must check the page.

2 How It Works: Alarm Activation and Notification



Note: The alarm triggers only after the temperature stays above HI for the alarm delay; with deadband 0.5, it clears below 7.5.
The Low Alarm (LO 2) works the same way. SMS requires the optional 4G module and a SIM card.
All values are examples; set actual alarm setpoints according to the storage conditions of the stored items.

Step	Action	Description/Requirements
①	Temperature crosses the alarm value; timing starts	—
②	The condition lasts longer than the alarm delay; the alarm is activated	Filters out brief temperature rises, such as when the door is opened to take items out
③	Written to the Event Log	This level is set to Alarm
④	SMS sent	4G module + SIM card + Alarm notification turned on in the SMS settings + number set in the Phone Book with this channel selected

Disconnection alarm: When the sensor does not return a value, the device web page shows Read.. for that channel. If the disconnection alarm (Discon alarm) is not turned on, abnormal temperatures during the disconnection cannot be detected.

3 Settings

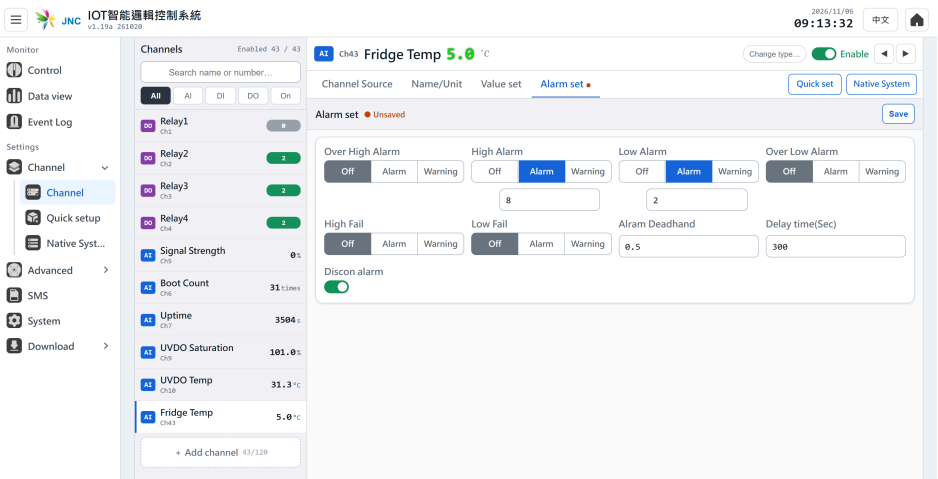
Setting	Example value	Where to set	Description
★ Temperature channel number	Ch-43	Channels list on the Channel page	Example number; check the Channels list on the Channel page
★ High Alarm (HI)	8 °C	Channel ▸ Ch-43 ▸ Alarm set ▸ High Alarm: Alarm	Set according to the storage conditions of the stored items
★ Low Alarm (LO)	2 °C	Same as above ▸ Low Alarm: Alarm	Set according to the storage conditions of the stored items
Alarm deadband (screen field: Alarm Deadband)	0.5	Same as above	Determines the threshold at which the alarm is released (shown as return to normal on the screen)
★ Alarm delay (screen field: Delay time(Sec))	300 s	Same as above	Set a value longer than the duration of the temperature rise caused by opening the door to take items out
Disconnection alarm (screen field: Discon alarm)	On	Same as above	Must be turned on
Alarm notification	On; Restore Notice on	SMS ▸ SMS Setting tab	Restore Notice: an SMS is also sent when the value returns to normal; turn on as needed
Channel disconnection notification (screen field: Disconnected notify)	On	SMS ▸ SMS Setting tab	Sends an SMS when a disconnection occurs
Resend interval (screen field: Interval of resending SMS)	Set on site	SMS ▸ SMS Setting tab	Interval for resending while the alarm continues
★ Mobile number of the person in charge	Set on site	SMS ▸ Phone Book	Enter the number and select this temperature channel with the CH button

Setting	Example value	Where to set	Description
SMS alarm stage	Level 1	Phone Book	Level 1: receives HI, LO, HH, and LL alarms; Level 2: receives HH and LL alarms only

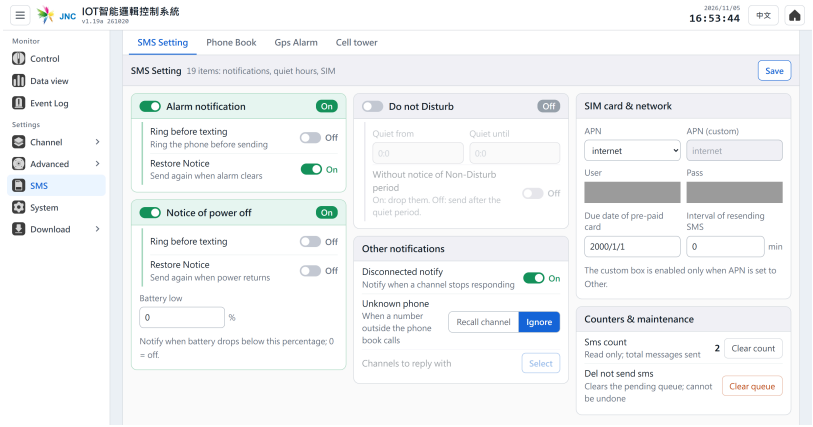
★: Site-specific setting. All values in the table are examples.

4 Setup Procedure

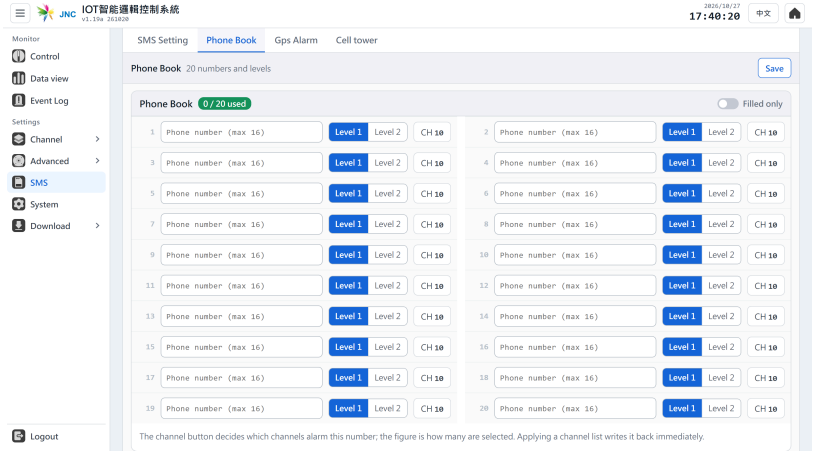
1. Channel ▸ Channel ▸ select the temperature channel ▸ Alarm set: In High Alarm, select Alarm and enter 8; in Low Alarm, select Alarm and enter 2; set Alarm Deadband to 0.5 and Delay time(Sec) to 300, and turn on Discon alarm → press Save.
2. SMS ▸ SMS Setting tab: Turn on Alarm notification (turn on Restore Notice under it as needed), turn on Disconnected notify under Other notifications, and select the APN according to the SIM card, and enter Interval of resending SMS as set on site (unit: minutes) → press Save.
3. SMS ▸ Phone Book tab: Enter the mobile number of the person in charge and select Level 1 → press Save → press CH, press None in the window that appears, select this temperature channel, and press Apply. A channel selection applied in the CH window is written back immediately.
4. For channels with no device connected, turn off Discon alarm to avoid continuous false alarms.



(Example screen: Alarm set filled in for this example. The value field of an item appears only after Alarm or Warning is selected.)

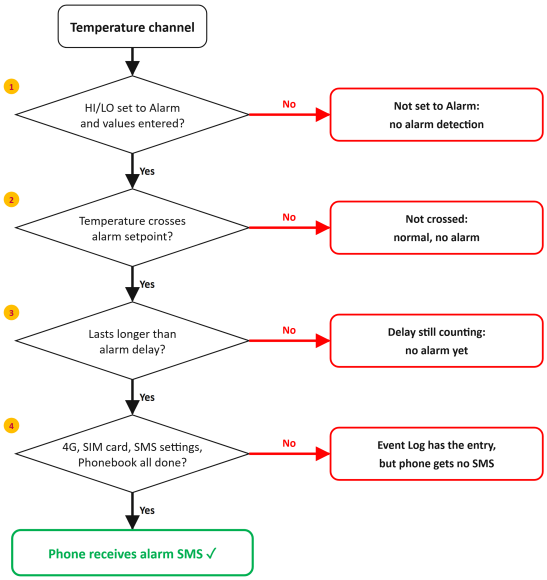


(Example screen: the SMS Setting tab, with Alarm notification, Restore Notice, Disconnected notify, and APN.)



(Example screen: the Phone Book tab. Each row contains the mobile number, Level 1/Level 2, and the CH button (the number shows how many channels are selected); 20 numbers in total.)

5 Alarm Conditions



① Alarm selected	② Alarm value crossed	③ Alarm delay	④ Notification method
HI/LO set to Alarm and values entered	Temperature crosses the alarm value	The condition lasts longer than the alarm delay	SMS: 4G module, SIM card, SMS settings, and Phone Book must all be complete

This example does not require setting the knob to Cloud, setting Control set to Automatic, or enabling Logic Control. These settings are only used to control equipment.

6 Operation Check

1. Temporarily set the High Alarm below the current temperature and temporarily shorten the alarm delay → press Save → after the delay time, a new entry should appear in the Event Log and the person in charge should receive an SMS.
2. Restore the original settings and press Save.

This example does not control any equipment; the test does not operate any load.

7 Troubleshooting

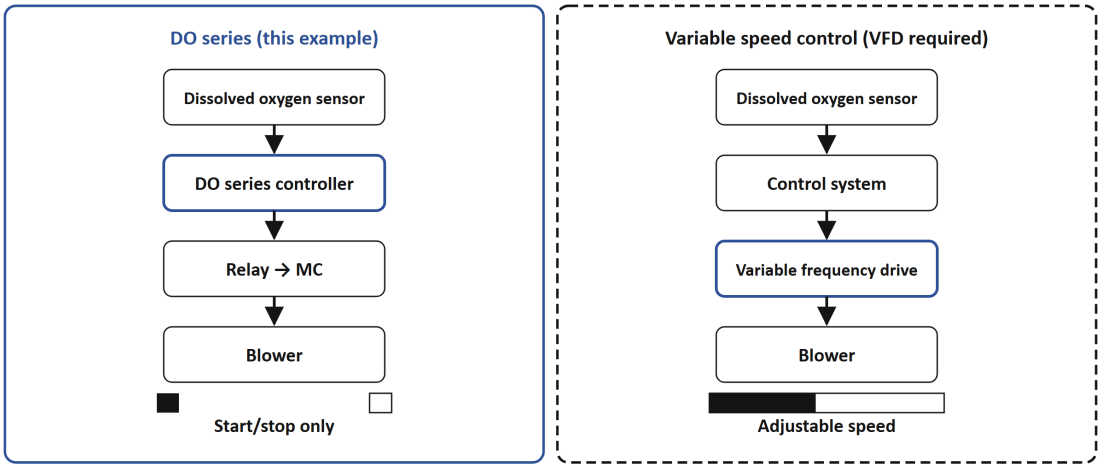
Symptom	Check
The alarm is in the Event Log, but no SMS is received	Check the 4G module and SIM card, whether Alarm notification is turned on, whether this channel is selected with the CH button in the Phone Book, whether SMS service is activated on the SIM card, and whether the SIM card data plan or prepaid card has expired
An alarm is triggered whenever the door is opened to take items out	Check whether the alarm delay is set too short
Alarms are repeatedly triggered and cleared when the temperature is near the alarm value	Check whether the alarm deadband is set to 0
The device web page shows Read.. for the channel	The sensor is not returning a value; check the wiring and power. If Discon alarm is turned on, it should already be written to the Event Log
The Event Log shows many disconnections, but the refrigerator is normal	Discon alarm may be turned on for channels with no device connected; turn it off

8-8 Example Scenario 08 Wastewater Aeration (Functional Scope)

Scenario: When dissolved oxygen in the aeration tank falls below the set value, start the blower; stop it when the value recovers. The DO series provides start/stop control only, not variable speed control.

- **Applicable sites: Treatment tanks that require aeration, such as aeration tanks in wastewater treatment.**
- **Functions covered: Product functional scope: start/stop control available with the DO series, and variable speed control that requires additional equipment.**
- **Related sections: User Manual “Four Conditions for Automatic Control”, “Logic Control”, “Deadband and Delays”.**

1 System Configuration



Note: DO series outputs are relays and can only start or stop the blower; variable speed control requires a separate VFD.
Dissolved oxygen thresholds for aeration tanks and other water bodies differ by use; do not apply one to another.

Item	This example	Connection
Input	Dissolved oxygen reading of the aeration tank (mg/L)	RS-485, uses one AI channel (Ch-43)
Output	Blower	Ch-1 relay → MC in the distribution panel

2 Functional Scope

Item	DO series (this example)	Variable speed control
Blower control method	Start and stop only	Adjustable speed
Control component	Relay contact closes/opens	RS-485 VFD
When to use	Start/stop control meets the requirement	Airflow must be adjusted continuously according to dissolved oxygen

The DO series outputs are relays. They can only start or stop equipment and cannot output a 0–100% speed control signal. When variable speed control is required, an RS-485 VFD must be added.

Dissolved oxygen thresholds for aeration tanks and other bodies of water (such as aquaculture ponds) differ by application and must not be applied interchangeably.

3 Settings (Start/Stop Control)

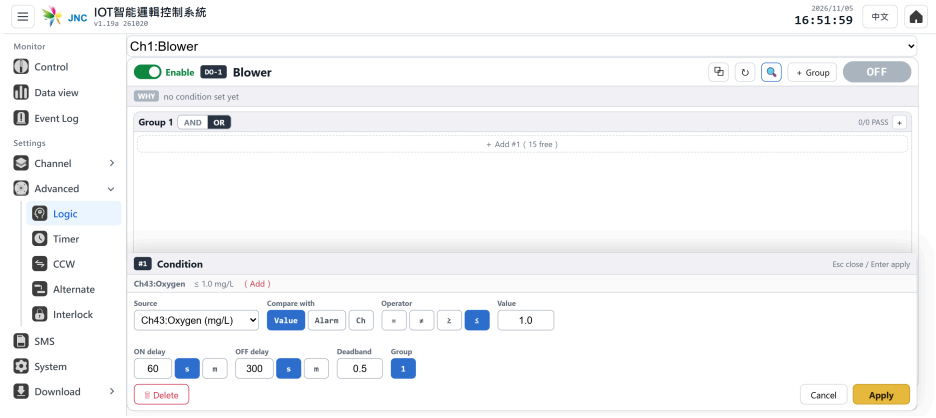
Setting	Example value	Where to set	Description
★ Dissolved oxygen channel number	Ch-43	Channels list on the Channel page	Example number; check the Channels list on the Channel page
★ On threshold	1.0	Logic Control	Set according to the treatment process
Condition direction (screen field: Operator)	≤	Logic Control	Turns on when dissolved oxygen falls below the threshold
★ Deadband (screen field: Deadband)	0.5	Logic Control	Determines the release threshold; 1.5 in this example
On delay (screen field: ON delay)	60 s	Logic Control	Filters out brief changes in readings
Off delay (screen field: OFF delay)	300 s	Logic Control	Time the blower keeps running after the condition is released

★: Site-specific setting. All values in the table are examples.

4 Setup Procedure

1. Channel ▸ Channel ▸ select Ch-1 Blower ▸ Control set ▸ Manual / Automatic: Automatic ▸ Save

2 **Advanced ▸ Logic ▸ select Ch1 in the drop-down list at the top ▸ + Add: Source Ch43, Compare with Value, Operator ≤, Value 1.0, Deadband 0.5, ON delay 60 s, OFF delay 300 s → Apply → turn on Enable (green) → Save.**



(Example screen: the Condition window filled in for this example.)

3 **Front panel ▸ Knob 1 (for Ch-1) ▸ Cloud.**

5 Automatic Control Conditions

① Knob	② Control set	③ Rule enabled	④ Condition
Cloud	Automatic	Green	Dissolved oxygen ≤ threshold, lasting for the on delay

6 Operation Check

1 **Temporarily set the threshold above the current dissolved oxygen reading → press Apply → press Save → after the on delay, the blower should start.**

2 **Restore the original threshold → press Apply → press Save → the condition is released only when dissolved oxygen rises above "threshold + deadband" (1.5 in this example) → after the off delay, the blower should stop.**

> **WARNING: Confirm site safety before testing**
>
> This step actually runs the blower. Make sure no one is servicing the blower or piping.

7 Troubleshooting

Symptom	Check
The blower speed needs to be reduced	The DO series does not have this function; an RS-485 VFD must be added (see Section 2)
Blower starts and stops repeatedly	The deadband may be set to 0
Blower keeps running after the condition is released	The off delay may still be counting
Rule is set, but the blower does not operate	Check each of the four conditions in Section 5. For the full checklist, see “Checklist: Rule Set but Output Does Not Respond” in the User Manual

PART 9.CLOUD PLATFORM (SCADA)

Questions Answered in This Chapter

- Where does the device data go? What is the difference between connecting to the device with a mobile phone, uploading to the cloud, and being read by another system?
- What do I need to prepare before using the cloud platform?
- How do I set up the device so that it appears on the cloud platform?
- How does the device web page Download differ from historical data in the cloud?

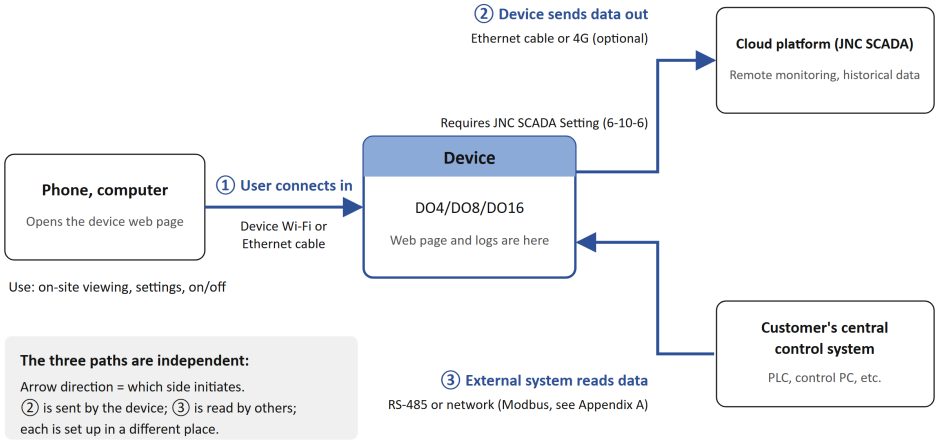
Not Covered in This Chapter

- Upload settings fields → 6-10-6 JNC SCADA Setting (p. 94)–6-10-8 Mqtt Setting (p. 96)
- Data formats and Modbus addresses → 6-10-9 Data Formats (p. 97), APPENDIX A Modbus Register Table (p. 189)

9-1 Where Device Data Goes

Device data can be sent to three destinations, independent of each other. This chapter describes route ②: the device uploading to the cloud platform.

Route	Initiated by	Via	Purpose
① Mobile phone connects to the device web page	Person	Device Wi-Fi (AP) or Ethernet cable	On-site viewing, settings, on/off control
② Device uploads to the cloud	Device sends data	Ethernet cable or 4G (optional) + upload settings	Remote monitoring, historical data
③ External system reads the device	External system reads data	RS-485 or network (Modbus)	Integration with the customer's central control system; see APPENDIX A Modbus Register Table (p. 189)



9-2 Before You Start

For the cloud platform license (add-on purchase, term) and account, and how the 4G module and SIM card are provided, contact JNC.

9-3 Connecting the Device to the Cloud Platform

The values below apply to the cloud platform hosted by JNC. For a self-hosted cloud platform, use the address, port, and platform URL of that platform. The JNC SCADA Setting page is normally marked as a factory setting not to be changed; when connecting to the cloud platform, change only the fields listed in this section.

Step 1: Set up upload on the device

1. **For 4G upload: Power off first, insert the SIM card into the SIM card slot inside the enclosure (see 3-2 Internal Components (p. 22) 4), then power on again.**
2. **For 4G upload: select the APN and click Save (see 6-9-1 SMS Settings Tab (p. 80)), then disconnect power for 5 seconds and power on again.**
3. **Log in to the device web page and click System → JNC SCADA Setting in the left menu.**
4. **Turn on Start JNC SCADA.**
5. **Set Upload method to Ethernet (Ethernet cable) or Sim card (4G).**
6. **Enter 59.125.238.217 in Address and 12345 in Port.**
7. **Click Save.**

For the fields, see 6-10-6 JNC SCADA Setting (p. 94).

Step 2: Note the device Mac

8. **Click System → IP Setting and note the Mac. For the fields, see 6-10-1 IP Setting (p. 88).**

Step 3: Add the device on the cloud platform

9. **Open 59.125.238.217:11223 in a browser.**

10 Enter the account 1 and password 2, then click Login 3.

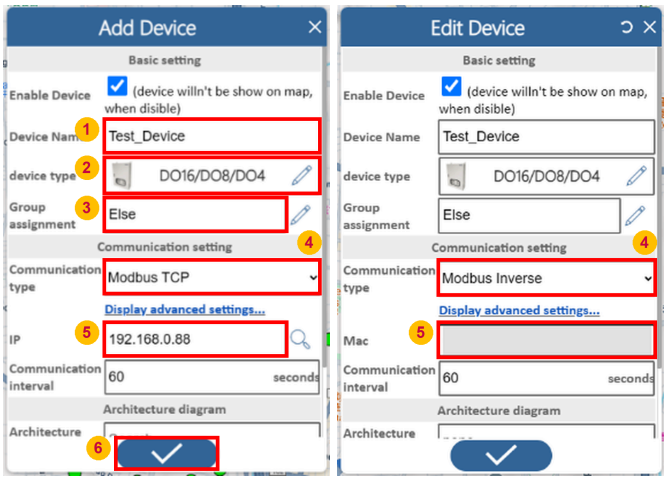


11 Click ▶ 1 at the upper right to open the Device List.

12 Click + 2 below the list.



13 In the Add Device window, fill in the fields below, then click ✓ 6.



Code	Name	Entry
1	Device Name	Device name, up to 20 characters (letters, digits, Chinese)
2	device type	Select DO16/DO8/DO4
3	Group assignment	Device group; default Else

Code	Name	Entry
4	Communication type	Select Modbus Inverse; it works with Ethernet and 4G, and the field below becomes Mac (right image). Use Modbus TCP only when the cloud platform can reach the device IP directly (left image)
5	Mac	The Mac noted in Step 2, without colons, 12 characters
6	✓	Saves and starts the connection

14 A ✓ next to the device in the device list means it is online. If ✗ appears, check the device network according to item 9 of 10-1 Symptoms and Checks (p. 180).

Step 4: Confirm that upload works

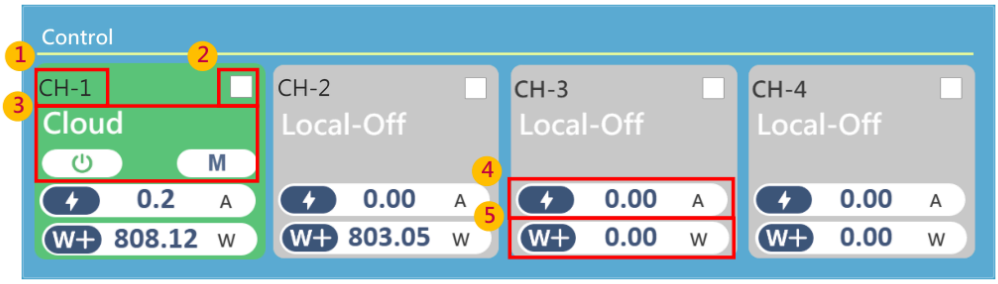
15 On the Data view page of the device web page, select a channel whose value changes, and note the value.

16 On the cloud platform, click the same device in the Device List. If the channel value matches the device web page and updates about every 60 seconds, upload works.

17 If the value on the cloud platform does not update, check according to item 9 of 10-1 Symptoms and Checks (p. 180).

- The right image is the Edit Device window after the device is added; its fields are the same as in Add Device.
- Cloud platform screens vary by platform version.

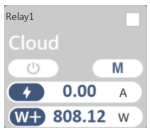
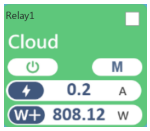
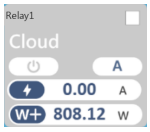
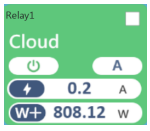
9-4 Control Screen on the Cloud Platform (SCADA)



- The actual screen varies by project site.

Description:

Code	Name	Icon	Function
1	Device name		Sets the names of the control items on this unit.

Code	Name	Icon	Function
2	Open record		When checked, each time the equipment turns on, the action is recorded in the events.
3	Control status (icon description)		Local off (gray background) (Local-Off)
			Local on (green background) (Local-ON)
			Cloud Manual (M) off (gray background) (Cloud)
			Cloud Manual (M) on (green background) (Cloud)
			Cloud Automatic (A) off (gray background) (Cloud)
			Cloud Automatic (A) on (green background) (Cloud)
4	Real-time current		Current value of the equipment. Requires the optional CT
5	Cumulative energy consumption		Cumulative energy consumption of the equipment since installation. Requires the optional CT

WARNING: Devices can also be changed directly from the cloud

On the cloud platform, you can turn equipment on and off, and some screens allow values to be modified and written back to the device. An accidental operation may cause on-site equipment to operate.

9-5 Device Downloads vs. Cloud Historical Data

	Device web page Download → Record	Cloud historical data
Where the data is stored	On the device	On the cloud server
On-site access required	Must connect to the device (on-site Wi-Fi or the same network)	No
Without cloud connection	Still available	Not available

For how data downloaded from the device is stored, see 6-11 Download (p. 99).

PART 10.MAINTENANCE AND TROUBLESHOOTING

Questions Answered in This Chapter

- What should I check first when I see an abnormal condition?
- Which conditions are not malfunctions?
- What are the factory defaults of the device? How do I restore them?
- How do I update the firmware and device web page?
- When should I contact JNC?

Not Covered in This Chapter

- Opening the enclosure for repair → Contact JNC

10-1 Symptoms and Checks

First, check according to the table below. Each item is arranged from simple to difficult; for the meaning of the labels, see 1-4 Pre-Operation Labels (p. 14). If the problem persists after following the table, contact JNC (see "About Us" on the last page of this manual).

#	Symptom	Check
1	Mobile phone cannot connect to the device web page	● Is the device powered? Is the green indicator light on the front panel on? ● Is the phone Wi-Fi connected to the SSID on the device label? (The phone may automatically switch back to another Wi-Fi network.) ● Did you enter the IP on the label in the browser? (See 5-3 Connecting to the Device Web Page (p. 43).) ● Are you using Google Chrome? → Still not working: The IP or Wi-Fi settings may have been changed. Contact JNC.
2	No power button on the web page	● On the Control page, is the knob for that output at Cloud? When the status label starts with Local (for example Local-Off), the knob is at OFF or ON (see 5-2 Panel Three-Position Selector Switches (p. 42)). → Ask on-site personnel to turn the knob to Cloud (confirm that the area around the load is safe first). ● Is Only Write on for this output? When it is on, the web page does not read back the state of this output and no power button appears; to switch this output from the web page, turn Only Write off first (see 6-2-1 Value Set (p. 60)).

#	Symptom	Check
3	Rule is set, but the equipment does not respond	● Is the knob at Cloud? ● Channel → Channel → select the channel → Control set tab: is Manual / Automatic set to Automatic? ● Advanced → Logic: is the rule's Enable switch on (green)? → For the full 11-item check, see 7-11 Checklist: Rule Set but Output Does Not Respond (p. 126).
4	The power button of an output cannot be operated	● 🔒 shown: Is an interlock set, and is the other output running? This output recovers when the other one stops (see 7-7 Interlock (p. 115)). ● Tile shows A: the power button is locked in automatic mode. → Click the M/A button to switch it to M (make sure no one is near the load first).
5	Sensor value shows Read..	The device cannot read the sensor. ● Is the sensor powered? Is the RS-485 cable connected properly? ● Has the channel source (slave ID, address) been changed? Factory setting – do not change (see 6-3 External Channels: AI (Analog Input) (p. 63)) ● Is no equipment connected to the channel at all? → Hide the channel or turn off the disconnection alarm.
6	The Control page has fewer tiles than knobs	● Is the missing channel disabled? → Channel → Channel → select the channel in the list → turn on the Enable switch at the upper right (see 6-1 Channel Settings Overview (p. 55)).
7	Device time or date is incorrect	● System → Time Adjustment in the list on the left → turn on Renewal Time → Save (see 6-10-2 Time Adjustment (p. 89)). ● Time still incorrect after power is restored following a power outage? → The coin cell battery on the controller board that keeps the time may be depleted. Connect to the network and turn on Ntp enable; the device synchronizes its time automatically (see 6-10-2 Time Adjustment (p. 89)). Incorrect time causes Schedule Control to switch equipment at the wrong times. Correct it as soon as possible.

#	Symptom	Check
8	An alarm occurred, but no one received a notification	● Is the optional 4G installed, a SIM card inserted, and SMS settings and phonebook completed? Is SMS enabled on the SIM card? If any item is missing, no SMS is sent (see 6-9 SMS Settings (p. 79)). ● Without 4G or a cloud connection, alarms are only recorded on the Event Log page (left menu, under Monitor) and no one is notified (see 6-6 Alarm Settings (p. 73)).
9	Network disconnects intermittently, no data in the cloud	● Is the Ethernet cable connected properly? Are the Ethernet port lights on and flashing? ● Does another device on the same network use the same IP? Factory setting – do not change (see 6-10-1 IP Setting (p. 88)) ● When uploading via 4G: Is the 4G status icon at the lower right of the Control page normal? What is the result of the base station signal test (SMS → Cell tower tab)? (See 6-9-4 Base Station (p. 86).)
10	Communication error, no response after wiring	● Is the power supply normal? Does the wiring comply with 3-3 Contacts and Terminals (p. 24)? Is there a short circuit? Power off first

10-2 Not a Malfunction

Symptom	Cause
Fan or motor keeps turning after being turned off	It rotates by inertia. Do not touch it until it stops completely
A click is heard when turning the knob, but no sound is heard from inside the enclosure	The click is the detent click of the knob itself. The relay sound is very quiet and may not be audible outside the enclosure. Check whether the load operates to confirm success
After a function is turned off, the fields below it disappear	General rule for the entire web page: when a function is off, its sub-fields are hidden as a group
The information field on a tile of the Control page keeps changing	Total run count, total run time, and real-time current rotate automatically

10-3 Factory Defaults and Factory Reset

Item	Factory default
IP / Mask / Gateway	192.168.0.88 / 255.255.255.0 / 192.168.0.1
Wi-Fi name (SSID)	JNC_<model>_<last 4 digits of serial number>; refer to the device label
Wi-Fi password	None (open network)
Web page login password	1234
RS-485 communication format	9600 bps, N, 8, 1
Logging interval	Refer to System → Basic Setting → Recording interval on the web page
Device name	Refer to System → Basic Setting → Device name (also shown at the top of the web page)

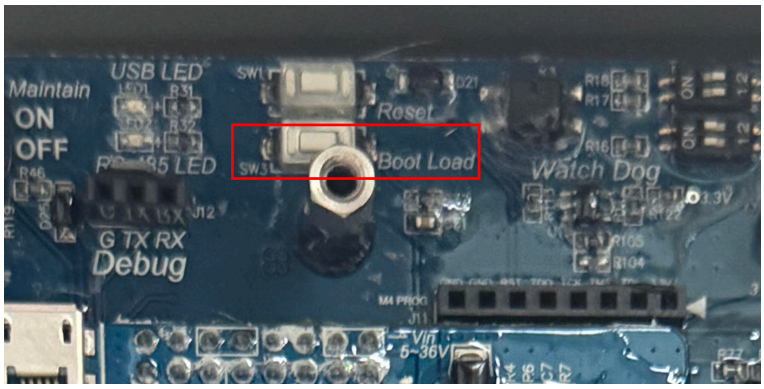
What you want to do	Action
Forgot the login password	Factory reset (see 10-3-1 Factory Reset (p. 184); all settings are cleared)
Forgot or changed the IP incorrectly and cannot connect	Factory reset (see 10-3-1 Factory Reset (p. 184); all settings are cleared)
Clear only the logic rules of one output	Advanced → Logic → select the channel → Reset data (see 7-3-4 Reset Data (p. 111))
Update the firmware or device web page as instructed by JNC	See 10-4 Firmware and Web Page Update (p. 185) (export a configuration backup first)

10-3-1 Factory Reset

Live work

The built-in controller board (Cloud Box) of this unit has an SW3 button (Boot Load).

Operation	Result
Press and hold SW3 for more than 10 seconds	System reset; all internal parameters return to factory defaults (see the factory default table above)



DANGER: SW3 is inside the enclosure, which is connected to 110/220 VAC mains power

- SW3 only works when pressed with power applied. Applying power and pressing the button with the enclosure door open is live work; follow local electrical codes, and touch only SW3, not other components or terminals.

WARNING: Factory reset clears all settings

Channel, alarm, logic and schedule rule settings all return to factory defaults and must be set again. Export a configuration backup first (see 6-10-10 Config Data (p. 98)). After the reset, reconnect using the factory defaults (IP, login password 1234).

Procedure:

1. Note each knob position, then power off and open the enclosure: Power off according to 5-1 Power On and Power Off (p. 41), confirm that the red display on the power supply is completely dark, then open the enclosure and locate the SW3 button on the controller board (red frame in the figure above, printed Boot Load on the board).
2. Apply power. After about 1 minute, when the Wi-Fi name on the device label appears in the phone's Wi-Fi list, press and hold SW3 for more than 10 seconds. Release it when the buzzer sounds; the device restarts automatically. Touch only SW3, not other components or terminals.
3. Reconnect using the factory defaults (IP, login password 1234).
4. Close the enclosure door.

5 After confirming that the area around the load is safe, return the knobs to their original positions.

10-4 Firmware and Web Page Update

Live work

When it is confirmed that the firmware needs to be updated (for example, the firmware version is incorrect), update it according to this section. JNC provides the update files. The two files are updated as a pair:

Update file	What it updates	Update method
FIRMWARE.bin (firmware)	The device control program: reads inputs, evaluates logic, controls outputs	USB flash drive + SW1 and SW3 buttons on the controller board
fs.bin (web page file)	The device web page screens	USB flash drive + Load fs on the web page

DANGER: Updating the firmware requires pressing buttons with the enclosure door open and power applied; the enclosure is connected to 110/220 VAC mains power

- Follow local electrical codes.
- Always open the enclosure and change the USB flash drive with power off; after applying power, touch only SW1 and SW3, not other components or terminals.

WARNING: Do not power off while LED1 is on

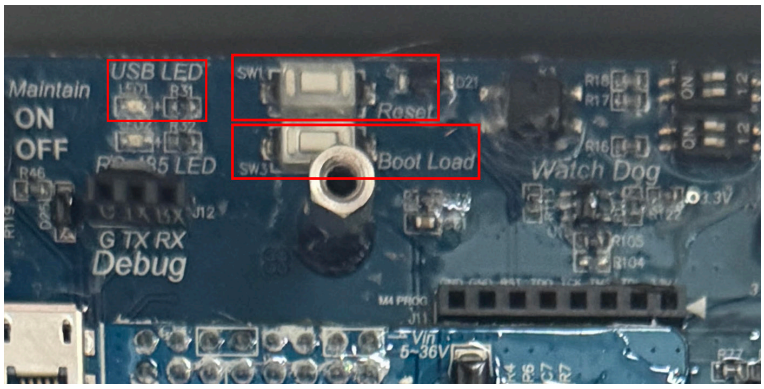
LED1 on indicates that the firmware is being written. Powering off at this time may prevent the device from starting. If LED1 stays on for more than 5 minutes, keep the power on and contact JNC.

10-4-1 What You Need

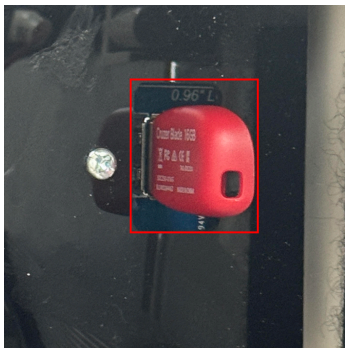
- FIRMWARE.bin and fs.bin provided by JNC
- A computer (able to read a USB flash drive)
- A mobile phone or computer that can connect to the device Wi-Fi

- **USB flash drive: use the flash drive already on the controller board; no additional drive is needed**

Components used on the controller board (left red frame: LED1; upper and lower right red frames: SW1 and SW3):



Component	Board marking	Function
SW1	Reset	Press once to restart
SW3	Boot Load	Used with SW1 to enter firmware update; pressing and holding for more than 10 seconds performs a factory reset (see 10-3-1 Factory Reset (p. 184))
LED1	USB LED	Lights up during firmware update and goes off when the update is complete
USB port	—	Insert the USB flash drive (red frame in the figure below)



CAUTION: There are other buttons and switches on the controller board and communication module

Press only the two buttons marked Reset (SW1) and Boot Load (SW3). Do not operate the similarly named Reset and Power ON buttons on the communication module, or any slide switches or DIP switches.

10-4-2 Update Procedure

Preparation (no need to open the enclosure)

1. **Note the current firmware version: shown to the right of the JNC logo on the device web page, below the system name (for example, v1.19a 261020).**
2. **Export a configuration backup: System → Config Data in the list on the left, press Ethernet export under Ethernet Config; config.cws is downloaded to the mobile phone or computer in use (see 6-10-10 Config Data (p. 98)).**

Power off and load the update files

3. **Note the position of each knob, then power off according to 5-1 Power On and Power Off (p. 41), confirm that the red display on the power supply is completely dark, then open the enclosure.**
4. **Remove the USB flash drive from the controller board and note its insertion direction.**
5. **On the computer, first copy all files on the flash drive to the computer for safekeeping. The flash drive contains the device log files and may also contain update files of the current version; in the next step, the new files overwrite old files with the same name.**
6. **Copy FIRMWARE.bin and fs.bin to the root folder of the flash drive (not inside a folder), leaving other files unchanged.**
7. **Safely remove the flash drive from the computer; with the device still powered off, insert it back into the controller board in the original direction.**

Apply power and update the firmware

8. **Apply power according to 5-1 Power On and Power Off (p. 41) and keep your hands out of the enclosure. After about 1 minute, the Wi-Fi name on the device label appears in the phone's Wi-Fi list, indicating that the device has started.**

> **CAUTION: If LED1 does not light up about 5 seconds after SW1 is released, do not keep holding SW3**
>
> **Holding SW3 for more than 10 seconds performs a factory reset. Release SW3 immediately and contact JNC.**

9. Use one hand, touching only SW1 and SW3:
   1. Press and hold SW1 and SW3 at the same time.
   2. Release SW1 while continuing to hold SW3.
   3. When LED1 lights up, release SW3.

	Step 1	Step 2	Step 3
SW1	Pressed	Released	—
SW3	Pressed	Held	Released
LED1	Off	On	On

10. When LED1 goes off, the firmware update is complete and the device restarts automatically.
11. Reconnect to the device web page and confirm that the firmware version to the right of the JNC logo has changed.

Update the web page file

12. Log in to the device web page → System → Config Data in the list on the left, and under Load Web, press Load fs (see 6-10-10 Config Data (p. 98)). Alternatively, enter "/Flash.html" in the browser and press Load fs.bin.
13. One beep from the buzzer indicates that the update has started; after 10–20 seconds, two beeps or a success message on the web page indicates completion. Do not switch screens or power off during the update.

Confirm and finish

14. Refresh the web page, confirm that all channels appear on the Data view page, and spot-check that settings are retained (for example, Logic Control rules). If settings have been cleared, import the config.cws exported during preparation (see 6-10-10 Config Data (p. 98)).
15. Close the enclosure door and leave the USB flash drive on the controller board (the device continuously logs data to the flash drive).
16. After confirming that the area around the load is safe, return the knobs to their original positions.

If the device behaves abnormally after the update, contact JNC and keep the files copied to the computer before the files were replaced, so that the previous version can be restored.

APPENDIX A.MODBUS REGISTER TABLE

Who Should Read This Appendix

System engineers: when the customer's central control system (PLC, control PC, etc.) needs to read or control this unit. General users do not need to read this appendix.

A-1 Direction of Communication

Situation	Role of this unit	Whose table to use
This unit reads an external sensor	Master	The sensor's Modbus table
Another system reads this unit	Slave	This unit's table, i.e., this appendix

A-2 Default Communication Settings

Item	Value
RS-485 communication format	9600 bps, N, 8, 1
Actual values	As set on the device web page under System → Rs485 Setting

A-3 Register Tables

The registers of this unit are divided into the following eight types of tables. DO4, DO8, and DO16 share the same register table, and the channels are always CH1–CH120; the first 4/8/16 channels are fixed as the physical DO switches of this unit, and the remaining channels can be configured for other uses (e.g., virtual channels).

Before using the tables, note the following three conventions:

- Addresses written as a range (e.g., 0x0000–0x0077): each address in the range holds one entry, and the number in the Item column increases by 1 with the address (e.g., CH1–CH120).
- FLOAT and ULong occupy 2 addresses: the first address holds the low word and the next address holds the high word; to assemble the value, place the high word first and then convert (see the read examples at the end of this section).

- For repeated groups, only group 1 is listed: the number of groups and the address interval are noted above the table; the address of group n = listed address + (n−1) × interval.

System Parameters (Function 03 read / 06, 16 write)

Address	Register No.	Item	Type	R/W	Remarks
0x0000–0x0002	400001–400003	Device model[1]|[0]–[5]|[4]	ASCII	R	
0x0003	400004	Device main version	INT16	R	0xABCD BCD = numeric version A = letter version 0='', 1='a', 2='b', 3='c'... Example: v1.05c = 0x3105
0x0004	400005	RTU(D1) slave ID	UINT16	R/W	
0x0005	400006	RTU(D1) baud rate	UINT16	R/W	2400 = 0 4800 = 1 9600 = 2 19200 = 3 38400 = 4 57600 = 5 115200 = 6 Values of 7 or higher are treated as 9600
0x0006	400007	RTU(D1) stop bits	UINT16	R/W	One = 1 Two = 2
0x0007	400008	RTU(D1) parity	UINT16	R/W	None = 0 Even = 1 Odd = 2
0x0008	400009	RTU(D1) data bits	UINT16	R/W	7 or 8
0x0009	400010	Number of channels	UINT16	R/W	Maximum 150 (larger written values are treated as 150)
0x000A–0x000B	400011–400012	COM1–COM2	INT16	R/W	0 = None 0x80 = Buzzer 1–150 = channel order (values above 150 are treated as 0)
0x000C	400013	Reset	INT16	R/W	
0x000D	400014	Logging interval	UINT16	R/W	Unit: seconds Factory default 60; web page minimum 10 0 = no logging
0x000F–0x0012	400016–400019	Device IP1–IP4 address	INT16	R/W	Used by network protocols Writing IP4 (0x0012) or Gateway4 (0x001A) saves IP, Mask, and Gateway as a set
0x0013–0x0016	400020–400023	Device Mask1–Mask4 address	INT16	R/W	Same as above
0x0017–0x001A	400024–400027	Device Gateway1–Gateway4 address	INT16	R/W	Same as above
0x001B–0x0020	400028–400033	Device Mac1–Mac6 address	INT16	R/W	Saved when Mac6 (0x0020) is written
0x0021	400034	RTU(D2) slave ID	UINT16	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x0022	400035	RTU(D2) baud rate	UINT16	R/W	2400 = 0 4800 = 1 9600 = 2 19200 = 3 38400 = 4 57600 = 5 115200 = 6 Values of 7 or higher are treated as 9600
0x0023	400036	RTU(D2) stop bits	UINT16	R/W	One = 1 Two = 2
0x0024	400037	RTU(D2) parity	UINT16	R/W	None = 0 Even = 1 Odd = 2
0x0025	400038	RTU(D2) data bits	UINT16	R/W	7 or 8
0x0026	400039	Reserved (display switch time)	UINT16	R/W	The DO series has no display; no effect
0x0027	400040	Reserved (display voltage)	UINT16	R/W	Same as above
0x0028	400041	Reserved (display time)	UINT16	R/W	Same as above
0x0029	400042	Scheduled restart	UINT16	R/W	On = 1 Off = 0
0x002A	400043	VBatAlarm (battery low-voltage alarm)	UINT16	R/W	Value/10
0x002B	400044	VInAlarm (power failure alarm)	UINT16	R/W	On = 1 Off = 0 Writing also sets 0x8019 (SMS power failure alarm)
0x002C	400045	Self-cleaning upper limit	UINT16	R/W	0–255
0x002D	400046	GPS on/off	UINT16	R/W	On = 1 Off = 0
0x002E	400047	PCB version	UINT16	R	0x00 : 1.0/1.1 0x01 : 1.2 0x03 : 1.3
0x0030	400049	Wind speed channel	UINT16	R/W	None = 0 Channel order = other values Example: 0x0011 is the 17th channel
0x0031	400050	Wind direction channel	UINT16	R/W	Same as above
0x0032	400051	Temperature channel	UINT16	R/W	Same as above
0x0033	400052	Humidity channel	UINT16	R/W	Same as above
0x0034	400053	Number of DOs on DO16	UINT16	R/W	bit0–6: number of DOs (≤16) bit7: flag
0x0035	400054	Lock Enable	UINT16	R/W	On = 1 Off = 0
0x0038	400057	System time - year	INT16	R/W	Applied about 5 seconds after writing
0x0039	400058	System time - month	INT16	R/W	
0x003A	400059	System time - day	INT16	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x003B	400060	System time - hour	INT16	R/W	
0x003C	400061	System time - minute	INT16	R/W	
0x003D	400062	System time - second	INT16	R/W	
0x003E	400063	Web port	UINT16	R/W	
0x003F	400064	Modbus port	UINT16	R/W	
0x0040	400065	tcp crc	UINT16	R/W	On = 1 Off = 0
0x0042	400067	Status update	UINT16	W	Writing changes only the flag (0/1); not saved
0x0048–0x004B	400073–400076	WQI-PSU, NTU, pH, O2 channels	UINT16	R/W	0 = None Other values = channel order (starting from 1)
0x004F	400080	HTTP upload method	UINT16	R/W	Ethernet = 0 Sim card = 1
0x0050–0x005D	400081–400094	HTTP upload page[1]|[0]–[27]|[26]	ASCII	R/W	
0x005E	400095	HTTP upload format	UINT16	R/W	Array= 0 JSON-J001 = 1 JSON-J002 = 2 YouYou = 0x80 WaterLevel = 0x81
0x005F	400096	HTTP upload interval	UINT16	R/W	
0x0060	400097	HTTP upload port	UINT16	R/W	
0x0061–0x006E	400098–400111	HTTP upload address[1]|[0]–[27]|[26]	ASCII	R/W	
0x006F	400112	HTTP encryption	UINT16	R/W	On = 1 Off = 0
0x0070–0x007F	400113–400128	Inverse upload address[1]|[0]–[31]|[30]	ASCII	R/W	
0x0080	400129	Inverse enable	UINT16	R/W	On = 1 Off = 0
0x0081	400130	Inverse upload method	UINT16	R/W	Ethernet = 0 Sim card = 1
0x0082	400131	Inverse Log	UINT16	R/W	
0x0083	400132	Inverse Modbus Port	UINT16	R/W	
0x0084	400133	Inverse Event Port	UINT16	R/W	
0x0085	400134	USB log clear	UINT16	R/W	Write any value to clear; reads back 0
0x0090–0x009F	400145–400160	Device name (characters 1–16)	UTF-16	R/W	
0x00A0–0x00AF	400161–400176	Location (characters 1–16)	UTF-16	R/W	
0x00B0	400177	Sleep on/off	UINT16	R/W	On = 1 Off = 0
0x00B1	400178	Normal sleep period	UINT16	R/W	
0x00B2	400179	First-stage alarm sleep period	UINT16	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x00B3	400180	Second-stage alarm sleep period	UINT16	R/W	
0x00B4–0x00B5	400181–400182	Normal upload period	ULong	R/W	
0x00B6–0x00B7	400183–400184	First-stage alarm upload period	ULong	R/W	
0x00B8–0x00B9	400185–400186	Second-stage alarm upload period	ULong	R/W	
0x00BA	400187	Keep connection on alarm	UINT16	R/W	Bit1: first-stage alarm Bit2: second-stage alarm
0x00BB	400188	Run time after wake-up	UINT16	R/W	
0x00BC	400189	DI wake-up	UINT16	R/W	
0x00BD	400190	Alarm delay after wake-up	UINT16	R/W	
0x00C0	400193	Browse function	UINT16	R/W	On = 1 Off = 0
0x00C1–0x00C6	400194–400199	Browse password[1]|[0]–[11]|[10]	ASCII	R/W	
0x00C7–0x00CC	400200–400205	Administrator password[1]|[0]–[11]|[10]	ASCII	R/W	
0x8340	433601	NTP enable	UINT16	R/W	Off = 0 Ethernet = 1 Sim-Internet = 2 Sim-GPS = 3
0x8341	433602	NTP time zone	UINT16	R/W	v = GMT (v-12) Example: GMT +8 = 20 GMT 0 = 12
0x8350–0x835F	433617–433632	NTP server address[1]|[0]–[31]|[30]	ASCII	R/W	
0x9000	436865	Mqtt enable	UINT16	R/W	On = 1 Off = 0
0x9001	436866	Mqtt upload method	UINT16	R/W	Ethernet = 0 Sim card = 1
0x9002	436867	Mqtt Qos	UINT16	R/W	
0x9003	436868	Mqtt format	UINT16	R/W	Array= 0 JSON-J001 = 1 JSON-J002 = 2
0x9004	436869	Mqtt KeepTime	UINT16	R/W	
0x9005	436870	Mqtt Port	UINT16	R/W	
0x9006	436871	Mqtt upload interval	UINT16	R/W	
0x9010–0x901F	436881–436896	Mqtt upload address[1]|[0]–[31]|[30]	ASCII	R/W	
0x9020–0x903F	436897–436928	Mqtt Topic[1]|[0]–Topic[63]|[62]	ASCII	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x9040–0x904F	436929–436944	Mqtt User[1]|[0]–User[31]|[30]	ASCII	R/W	
0x9050–0x905F	436945–436960	Mqtt Pass[1]|[0]–Pass[31]|[30]	ASCII	R/W	
0x9060–0x907F	436961–436992	Mqtt ID[1]|[0]–ID[63]|[62]	ASCII	R/W	

Forward/Reverse Control and Alternating Operation apply to DO4, DO8, and DO16; each forward/reverse group requires 2 DO outputs, so plan according to the actual number of points of your model.

There are 8 forward/reverse groups, and the table below shows group 1; the address of group n = listed address + (n−1) × 0x0020, and the register number increases by (n−1) × 32 accordingly.

Address	Register No.	Item	Type	R/W	Remarks
0x9100	437121	Forward/reverse (1) enable	UINT16	R/W	On = 1 Off = 0
0x9101	437122	Forward/reverse (1) number of sections	UINT16	R/W	1–5
0x9102	437123	Forward/reverse (1) forward DO	UINT16	R/W	None = 255 Channel order = other values Example: 0x0011 is the 17th channel
0x9103	437124	Forward/reverse (1) reverse DO	UINT16	R/W	Same as above
0x9104	437125	Forward/reverse (1) forward DI	UINT16	R/W	Same as above
0x9105	437126	Forward/reverse (1) reverse DI	UINT16	R/W	Same as above
0x9106	437127	Forward/reverse (1) run time (total travel)	UINT16	R/W	
0x9107	437128	Forward/reverse (1) timing mode	UINT16	R/W	Mileage avg = 1 Calculate separately = 0
0x9108	437129	Forward/reverse (1) limit switch type	UINT16	R/W	Hardware = 1 Firmware = 0

There are 8 alternating operation groups, and the table below shows group 1; the address of group n = listed address + (n−1) × 0x0020, and the register number increases by (n−1) × 32 accordingly.

Address	Register No.	Item	Type	R/W	Remarks
0x9200	437377	Alternating operation (1) enable	UINT16	R/W	On = 1 Off = 0
0x9201	437378	Alternating operation (1) operate quantity logic	UINT16	R/W	And = 1 Or= 0
0x9202	437379	Alternating operation (1) alternate quantity	UINT16	R	
0x9203	437380	Alternating operation (1) alternate time	UINT16	R/W	bit15–14 (unit): 00 = sec, 01 = hr, 10 = min, 11 = day bit13–0: time value Example: 0x0708 = 1800 sec
0x9208–0x920F	437385–437392	Alternating operation (1) Output 1–8	UINT16	R/W	None = 255 Channel order = other values Example: 0x0011 is the 17th channel
0x9210–0x9212	437393–437395	Alternating operation (1) time slot 1–3 enabled quantity	UINT16	R/W	
0x9214–0x9216	437397–437399	Alternating operation (1) time slot 1–3 days of week	UINT16	R/W	bit0 = Sunday to bit6 = Saturday 1 = selected, 0 = not selected Example: 0x003F = Sun–Fri selected Example: 0x007E = Mon–Sat selected
0x9218–0x921A	437401–437403	Alternating operation (1) time slot 1–3 start time	UINT16	R/W	Hour*60+minute
0x921C–0x921E	437405–437407	Alternating operation (1) time slot 1–3 stop time	UINT16	R/W	Same as above

Address	Register No.	Item	Type	R/W	Remarks
0xFF52	465363	Device restart	UINT16	W	Write any value; the device restarts after about 3 seconds
0xFF53	465364	Import USB configuration	UINT16	W	Executed only when 0x2852 is written
0xFF54	465365	Export USB configuration	UINT16	W	Executed only when 0x2852 is written
0xFF55	465366	Rename USB data.csv	UINT16	W	Write any value
0xFF56	465367	Rename USB event.csv	UINT16	W	Write any value
0xFF57	465368	Rename USB config.cws	UINT16	W	Write any value

SMS Parameters (Function 03 read / 06, 16 write)

Address	Register No.	Item	Type	R/W	Remarks
0x8010	432785	Return to normal: enable SMS alarm	UINT16	R/W	
0x8011	432786	Return to normal: ring before sending	UINT16	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x8012	432787	Return to normal: return-to-normal notification	UINT16	R/W	
0x8013	432788	Return to normal: resend interval	UINT16	R/W	
0x8014–0x8016	432789–432791	Prepaid card expiration date (year, month, day)	UINT16	R/W	
0x8017	432792	Power restored: return-to-normal notification	UINT16	R/W	
0x8018	432793	Power restored: ring before sending	UINT16	R/W	
0x8019	432794	Power restored: enable power failure alarm	UINT16	R/W	Writing also sets 0x002B (VInAlarm)
0x801A	432795	Do-not-send period: enable	UINT16	R/W	
0x801B	432796	Do-not-send period: start time	UINT16	R/W	High byte = hour, low byte = minute
0x801C	432797	Do-not-send period: end time	UINT16	R/W	Same as above
0x801D	432798	Check number	UINT16	R/W	
0x801E	432799	Encoding mode	UINT16	R/W	
0x801F	432800	2G/3G/4G channel mode	UINT16	R/W	
0x8020–0x8027	432801–432808	Real-time value reply channels (CH1–16, 17–30, 31–46, 47–60, 61–76, 77–90, 91–106, 107–120)	UINT16	R/W	Bit mask: every 2 addresses cover 30 channels First address bit0–15 = channels 1–16 of the block Second address bit0–13 = channels 17–30 of the block

There are 20 phonebook groups, and the table below shows group 1; the address of group n = listed address + (n−1) × 0x0020, and the register number increases by (n−1) × 32 accordingly.

Address	Register No.	Item	Type	R/W	Remarks
0x8040–0x8047	432833–432840	Phonebook (1) assigned channels (CH1–16, 17–30, 31–46, 47–60, 61–76, 77–90, 91–106, 107–120)	UINT16	R/W	Same as 0x8020–0x8027
0x8048	432841	Phonebook (1) SMS level	UINT16	R/W	Read: 1 = options bit0 is 1, 2 = bit0 is 0 Write: 2 = clear bit0, other values = set bit0
0x8049–0x8052	432842–432851	Phonebook (1) number[1]|[0]–[19]|[18]	ASCII	R/W	Each address stores 2 characters, 20 characters in total The low byte holds the earlier character

Virtual AI Parameters (Function 03 read / 06, 16 write)

The item names are the variable names used in the program. Addition has 4 groups (interval 0x0010), Formula has 4 groups (interval 0x0010), and FormulaPro has 8 groups (interval 0x0020); the table below lists group 1 of each. The address of group n = listed address + (n−1) × interval.

To use a virtual AI on an AI channel: set the data interface of the data source to Local (or set the slave ID to 0), then select the group with the data address: 100–103 = Addition groups 1–4, 200–203 = Formula groups 1–4, 400–407 = FormulaPro groups 1–8. Each field in 0x7900–0x797F is internally 1 byte, with valid values 0–255.

Address	Register No.	Item	Type	R/W	Remarks
0x7900–0x790E	430977–430991	Addition[0].index[0]–[14]	UINT16	R/W	Number of a channel used in the calculation, starting from 0 (0 = CH1) 255 = not used
0x790F	430992	Addition[0].Math	UINT16	R/W	0 = Sum 1 = Average 2 = Maximum 3 = Minimum 4 = Range (maximum minus minimum) 5 = Median (average of the two middle values for an even count) Only channels with a normal connection are calculated; disconnected is shown when there is no valid channel The result is then multiplied by the data source gain and the offset is added
0x7940–0x7947	431041–431048	Formula[0].index[0]–[7]	UINT16	R/W	Number of a channel used in the calculation, starting from 0 (0 = CH1) 255 = not used
0x7948–0x794F	431049–431056	Formula[0].type[0]–[7]	UINT16	R/W	type[1]–[7]: 0 = add, 1 = subtract, 2 = multiply, 3 = divide type[0] is not used; the channel value of index[0] is the starting value Calculated item by item from left to right (multiplication and division do not take precedence) The result is then multiplied by the data source gain and the offset is added
0x7980–0x7997	431105–431128	FormulaPro[0].index[0]–[11]	FLOAT	R/W	Each item occupies 2 addresses; both addresses must be written consecutively to take effect type bit3 = 1: this item is a constant (formula coefficient) bit3 = 0: channel number, starting from 0; 240–243 = temporary values A–D; 255 = not used
0x7998–0x7999	431129–431130	Reserved	—	—	Not a valid field; writing here changes 0x799A–0x799B

Address	Register No.	Item	Type	R/W	Remarks
0x799A–0x799F	431131–431136	FormulaPro[0].type[1]|[0]–[11]|[10]	UINT16	R/W	Each address stores 2 items: low byte = items 1, 3, 5…, high byte = items 2, 4, 6… bit0–1: 0 = add, 1 = subtract, 2 = multiply, 3 = divide bit2: 0 = accumulated value ± f(this item), 1 = f(accumulated value ± this item) bit3: 1 = this item is a constant bit4–7 (function f): 0 = none, 1 = sin, 2 = cos, 3 = square, 4 = cube, 5 = square root, 6 = absolute value, 7 = log (base 10) Values 240–243: store the current accumulated value in temporary value A–D, then restart from this item The accumulated value starts from 0, and item 1 normally uses “add”; sin and cos use radians The result is not multiplied by the gain and the offset is not added

Channel Parameters: AI and DI Channels (Function 03 read / 06, 16 write)

The channel parameter tables are listed for Ch1. The high byte of the address = channel and the low byte = item, so the address of Ch n = listed address + (n−1) × 0x0100, and the register number increases by (n−1) × 256 accordingly. The same address range has two kinds of content depending on the channel type (0x0120): for AI and DI channels, use this table; for DO channels, use the next table.

Address	Register No.	Item	Type	R/W	Remarks
0x0100–0x010F	400257–400272	Ch1 channel name[0–15]	UTF-16	R/W	Send: 0x0102, 01 = channel; 02 = address corresponds to first channel name (3rd character) Example: Send: 0x0202, 02 = channel; 02 = address corresponds to second channel name (3rd character)
0x0110–0x011F	400273–400288	Ch1 channel unit[0–15]	UTF-16	R/W	Same as above
0x0120	400289	Ch1 channel type	UINT16	R/W	1 : AI 2 : DI 4 : DO Writing a different type resets all settings of the channel From v1.19, if the channel type is abnormal, all writes to the channel are rejected

Address	Register No.	Item	Type	R/W	Remarks
0x0121	400290	Ch1 data source slave ID	UINT16	R/W	0–255 0 = does not read from an external device and uses the data of this unit instead (same as data interface Local) 1–255 = slave ID
0x0122	400291	Ch1 data source data interface	UINT16	R/W	0 : RS-485-1 1 : TCP 2 : Reserved 3 : Local (this unit) 4 : RS-485-2 When 0 or 4 is used, the corresponding RS-485 port must be set to Master in the system settings before external reads are performed
0x0123	400292	Ch1 data source data function	UINT16	R/W	AI channel: 3 = read 4xxxxx (Function 03), 4 = read 3xxxxx (Function 04); other values are treated as 4 DI channel: 2 = read 1xxxxx (Function 02), 1 = read 0xxxxx (Function 01); other values are treated as 1 DO channel: 1 = coil (read Function 01, write Function 05, 15), 6 = register 4xxxxx (read Function 03, write Function 06, 16); other values are treated as 6 Set automatically when an address with a prefix (e.g., 400001) is entered on the device web page
0x0124	400293	Ch1 data source data address	UINT16	R/W	Starting from 1
0x0125	400294	Ch1 data source data type	UINT16	R/W	0 : INT16 1 : INT32 2 : UINT16 3 : UINT32 4 : Float 5 : DATA 6 : INT64, 7 : UINT64, and 8 : DOUBLE can be set only on the device web page; Modbus writes are limited to 0–5
0x0126	400295	Ch1 data source gain	UINT16	R/W	Integer, v/10000
0x0127	400296	Ch1 data source offset	UINT16	R/W	Integer, v/10^decimal places
0x0128	400297	Ch1 data source byte/word order	UINT16	R/W	0xAABB AA: 1 = high byte first, 0 = low byte first BB: 1 = high word first, 0 = low word first
0x0129–0x012A	400298–400299	Ch1 data source IP1 IP2–IP3 IP4	UINT16	R/W	0x0129: low byte = IP octet 1, high byte = octet 2 0x012A: low byte = IP octet 3, high byte = octet 4 Example: 192.168.1.100 → 0x0129 = 0xA8C0, 0x012A = 0x6401
0x012B	400300	Ch1 data source Port	UINT16	R/W	0–65535; factory default 502 Used only when the data interface is TCP

Address	Register No.	Item	Type	R/W	Remarks
0x012C	400301	Ch1 data source interval	UINT16	R/W	Unit: 0.1 s 1–254 = 0.1–25.4 s 0 or 255 = no separate interval (read every cycle) Value shown in Sampling interval (ms) on the device web page = register value × 100
0x012D	400302	Ch1 data source read multiple	UINT16	R/W	0 = Off Other than 0 = On
0x0130	400305	Ch1(AI) channel enable	UINT16	R/W	
0x0131	400306	Ch1(AI) decimal places	UINT16	R/W	0–4 (values of 5 or higher are invalid)
0x0132	400307	Ch1(AI) original range maximum	UINT16	R/W	0x0132–0x013F (except 0x0136 and 0x013E): integer = actual value × 10^decimal places
0x0133	400308	Ch1(AI) original range minimum	UINT16	R/W	
0x0134	400309	Ch1(AI) corresponding range maximum	UINT16	R/W	
0x0135	400310	Ch1(AI) corresponding range minimum	UINT16	R/W	
0x0136	400311	Ch1(AI) gain	UINT16	R/W	Integer, v/10000
0x0137	400312	Ch1(AI) offset	UINT16	R/W	
0x0138	400313	Ch1(AI) Over High alarm value	UINT16	R/W	
0x0139	400314	Ch1(AI) High alarm value	UINT16	R/W	
0x013A	400315	Ch1(AI) Low alarm value	UINT16	R/W	
0x013B	400316	Ch1(AI) Over Low alarm value	UINT16	R/W	
0x013C	400317	Ch1(AI) High Fail alarm value	UINT16	R/W	
0x013D	400318	Ch1(AI) Low Fail alarm value	UINT16	R/W	
0x013E	400319	Ch1(AI) alarm delay time	UINT16	R/W	
0x013F	400320	Ch1(AI) alarm deadband	UINT16	R/W	
0x0140	400321	Ch1(AI) Over High alarm relay	UINT16	R/W	
0x0141	400322	Ch1(AI) High alarm relay	UINT16	R/W	
0x0142	400323	Ch1(AI) Low alarm relay	UINT16	R/W	
0x0143	400324	Ch1(AI) Over Low alarm relay	UINT16	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x0144	400325	Ch1(AI) Over High alarm switch	UINT16	R/W	0 = Off 1 = Alarm 2 = Alarm + log
0x0145	400326	Ch1(AI) High alarm switch	UINT16	R/W	0 = Off 1 = Alarm 2 = Alarm + log
0x0146	400327	Ch1(AI) Low alarm switch	UINT16	R/W	0 = Off 1 = Alarm 2 = Alarm + log
0x0147	400328	Ch1(AI) Over Low alarm switch	UINT16	R/W	0 = Off 1 = Alarm 2 = Alarm + log
0x0148	400329	Ch1(AI) High Fail alarm switch	UINT16	R/W	0 = Off 1 = Alarm 2 = Alarm + log
0x0149	400330	Ch1(AI) Low Fail alarm switch	UINT16	R/W	0 = Off 1 = Alarm 2 = Alarm + log
0x014A	400331	Ch1(AI) LowCut	UINT16	R/W	
0x014B	400332	Ch1(AI) accumulation function	UINT16	R/W	0 = Off 1 = Second 2 = Minute 3 = Hour
0x014C	400333	Ch1(AI) accumulated value	UINT16	R/W	v/100
0x014D	400334	Ch1(AI) accumulated current (gain)	UINT16	R/W	v/100
0x014E	400335	Ch1(AI) disconnection alarm	UINT16	R/W	0x00 : On 0x01 : Off 0X70 : Read
0x0150–0x0151	400337–400338	Ch1(AI) original range maximum	FLOAT	R/W	
0x0152–0x0153	400339–400340	Ch1(AI) original range minimum	FLOAT	R/W	
0x0154–0x0155	400341–400342	Ch1(AI) corresponding range maximum	FLOAT	R/W	
0x0156–0x0157	400343–400344	Ch1(AI) corresponding range minimum	FLOAT	R/W	
0x0158–0x0159	400345–400346	Ch1(AI) gain	FLOAT	R/W	
0x015A–0x015B	400347–400348	Ch1(AI) offset	FLOAT	R/W	
0x015C–0x015D	400349–400350	Ch1(AI) Over High alarm value	FLOAT	R/W	
0x015E–0x015F	400351–400352	Ch1(AI) High alarm value	FLOAT	R/W	
0x0160–0x0161	400353–400354	Ch1(AI) Low alarm value	FLOAT	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x0162–0x0163	400355–400356	Ch1(AI) Over Low alarm value	FLOAT	R/W	
0x0164–0x0165	400357–400358	Ch1(AI) High Fail alarm value	FLOAT	R/W	
0x0166–0x0167	400359–400360	Ch1(AI) Low Fail alarm value	FLOAT	R/W	
0x0168–0x0169	400361–400362	Ch1(AI) alarm deadband	FLOAT	R/W	
0x016A–0x016B	400363–400364	Ch1(AI) LowCut	FLOAT	R/W	
0x016C–0x016D	400365–400366	Ch1 data source gain	FLOAT	R/W	
0x016E–0x016F	400367–400368	Ch1 data source offset	FLOAT	R/W	
0x0180	400385	Ch1(DI) channel enable	UINT16	R/W	
0x0181	400386	Ch1(DI) start delay	UINT16	R/W	Unit: seconds An alarm is issued only after the DI state lasts longer than this number of seconds
0x0182	400387	Ch1(DI) off delay	UINT16	R/W	Unit: seconds No effect in the current firmware; not available on the device web page
0x0183	400388	Ch1(DI) inverted	UINT16	R/W	
0x0184	400389	Ch1(DI) alarm switch	UINT16	R/W	
0x0185	400390	Ch1(DI) control relay	UINT16	R/W	
0x0186	400391	Ch1(DI) alarm log	UINT16	R/W	
0x0187	400392	Ch1(DI) disconnection alarm	UINT16	R/W	0x00 : On 0x01 : Off 0X70 : Read
0x01C0–0x01C1	400449–400450	Ch1(AI) accumulated value	FLOAT	R/W	
0x01C2–0x01C3	400451–400452	Ch1(AI) hourly accumulated value	FLOAT	R/W	
0x01C4–0x01C5	400453–400454	Ch1(AI) daily accumulated value	FLOAT	R/W	

Channel Parameters: DO Channels (Function 03 read / 06, 16 write)

0x0100–0x012D (channel name, unit, type, and data source) are the same as in the previous AI and DI channel table; this table starts from 0x0130.

Address	Register No.	Item	Type	R/W	Remarks
0x0130	400305	Ch1(DO) channel enable	UINT16	R/W	1 :On 0 :Off
0x0131	400306	Ch1(DO) independent control	UINT16	R/W	1 :On 0 :Off
0x0132	400307	Ch1(DO) start log	UINT16	R/W	1 :On 0 :Off

Address	Register No.	Item	Type	R/W	Remarks
0x0133	400308	Ch1(DO) inverted	UINT16	R/W	1 :On 0 :Off
0x0134	400309	Ch1(DO) manual/automatic mode	UINT16	R/W	1 :Manual 0 :Automatic
0x0135	400310	Ch1(DO) periodic control enable	UINT16	R/W	1 :On 0 :Off
0x0136	400311	Ch1(DO) periodic control on time	UINT16	R/W	Unit: seconds
0x0137	400312	Ch1(DO) periodic control off time	UINT16	R/W	Unit: seconds
0x0138	400313	Ch1(DO) timeout alarm	UINT16	R/W	Unit: seconds
0x0139	400314	Ch1(DO) manual open time	UINT16	R/W	
0x013A	400315	Ch1(DO) linked control	UINT16	R/W	DO channel number, starting from 1 0 = none
0x013B	400316	Ch1(DO) on delay control	UINT16	R/W	
0x013C	400317	Ch1(DO) off delay control	UINT16	R/W	
0x013D	400318	Ch1(DO) memory on value	UINT16	R/W	Output range for AO retransmission (see 0x0168)
0x013E	400319	Ch1(DO) memory off value	UINT16	R/W	Same as above
0x013F	400320	Ch1(DO) schedule control enable and type	UINT16	R/W	0 :Schedule control off, type Or 1 :Schedule control on, type Or 2 :Schedule control off, type And 3 :Schedule control on, type And
0x0140–0x0147	400321–400328	Ch1(DO) schedule control first to eighth time slot switches	UINT16	R/W	Read: returns the bit mask value of the time slot (time slot n = 2^(n−1)); any value other than 0 means on Write: other than 0 = On, 0 = Off
0x0148–0x014F	400329–400336	Ch1(DO) schedule control first to eighth time slot days of week	UINT16	R/W	bit0 = Sunday to bit6 = Saturday 1 = selected, 0 = not selected Example: 0x003F = Sun–Fri selected Example: 0x007E = Mon–Sat selected
0x0150–0x0157	400337–400344	Ch1(DO) schedule control first to eighth time slot start time	UINT16	R/W	Hour*60+minute (written value must be <1440)
0x0158–0x015F	400345–400352	Ch1(DO) schedule control first to eighth time slot stop time	UINT16	R/W	Hour*60+minute (written value must be ≤1440)
0x0160	400353	Ch1(DO) self-cleaning mode enable	UINT16	R/W	1 :On 0 :Off On the device web page, this setting is available only for DO channels whose data source is external Modbus
0x0161	400354	Ch1(DO) self-cleaning mode detection channel	UINT16	R/W	

Address	Register No.	Item	Type	R/W	Remarks
0x0162–0x0163	400355–400356	Ch1(DO) self-cleaning mode last cleaning time	ULong	R/W	
0x0164	400357	Ch1(DO) cleaning frequency	UINT16	R/W	Unit: minutes; minimum 60
0x0165	400358	Ch1(DO) cleaning time	UINT16	R/W	Unit: seconds; maximum 300
0x0166	400359	Ch1(DO) cleaning delay	UINT16	R/W	Unit: seconds; minimum 10 Called Keep time on the device web page
0x0167	400360	Ch1(DO) disconnection alarm	UINT16	R/W	0x00 : On 0x01 : Off 0X70 : Read
0x0168	400361	Ch1(DO) AO retransmission channel	UINT16	R/W	Source AI channel 0 = Off Other values = channel order The source value is scaled proportionally using the source range 0x016A–0x016D and the output range 0x013D–0x013E before output On the device web page, this setting is available only for DO channels whose data source is external Modbus
0x0169	400362	Reserved (AO retransmission type)	UINT16	R/W	Not implemented in the firmware; writing does not affect operation
0x016A–0x016B	400363–400364	Ch1(DO) AO original range minimum	FLOAT	R/W	Source range
0x016C–0x016D	400365–400366	Ch1(DO) AO original range maximum	FLOAT	R/W	Same as above
0x0170	400369	Ch1(DO) write-only mode	UINT16	R/W	
0x0171	400370	Ch1(DO) queue priority	UINT16	R/W	1 :On 0 :Off
0x0172	400371	Ch1(DO) corresponding current channel	UINT16	R/W	
0x0173	400372	Ch1(DO) interlock function switch	UINT16	R/W	
0x0174–0x0175	400373–400374	Ch1(DO) open count	ULong	R/W	
0x0176–0x0177	400375–400376	Ch1(DO) run time	ULong	R/W	Unit: seconds (including the current on time)
0x0180	400385	Ch1(DO) Logic(1) switch	UINT16	R/W	0 : Close 1 :General logic control 2 : Forward/reverse mode 3 : Alternating operation Modbus writes save only 0/1; 2 and 3 must be set on the device web page

Address	Register No.	Item	Type	R/W	Remarks
0x0181	400386	Ch1(DO) Logic(1) condition	UINT16	R/W	0: Or 1: And 2: First if>=0x10 pro condition
0x0182	400387	Ch1(DO) Logic(1) output value	UINT16	R	Read-only; returns only the integer part
0x0183	400388	Ch1(DO) Logic(1) condition switch	UINT16	R/W	bit0: condition 1 switch bit1: condition 2 switch bit2–bit13: and so on bit14: condition 15 switch
0x0184– 0x0187	400389– 400392	Ch1(DO) Logic(1) Pro condition 1–4	UINT16	R/W	bit0: condition 1 switch bit1–bit13: and so on bit14: condition 15 switch bit15: Or/And

There are 15 conditions, and the table below shows condition 1; the address of condition n = listed address + (n−1) × 0x0008, and the register number increases by (n−1) × 8 accordingly.

Address	Register No.	Item	Type	R/W	Remarks
0x0188	400393	Ch1(DO) Logic(1) condition 1 channel + type	UINT16	R/W	bit0–7: channel bit8–15: type 0x00xx = 0x01xx ≠ 0x02xx ≥ 0x03xx ≤ 0x08xx A/M 0x10xx Alr= 0x11xx Alr≠ 0x20xx =Ch 0x21xx ≠Ch 0x22xx ≥Ch 0x23xx ≤Ch
0x0189	400394	Ch1(DO) Logic(1) condition 1 on delay	UINT16	R/W	bit15: 0→seconds, 1→minutes bit0–14: time
0x018A	400395	Ch1(DO) Logic(1) condition 1 off delay	UINT16	R/W	Same as above
0x018B	400396	Ch1(DO) Logic(1) condition 1 deadband	UINT16	R/W	
0x018C– 0x018D	400397– 400398	Ch1(DO) Logic(1) condition 1 value	FLOAT	R/W	
0x018E– 0x018F	400399– 400400	Ch1(DO) Logic(1) condition 1 output value	FLOAT	R/W	

Real-Time Values (Function 04 read)

Address	Register No.	Item	Type	R/W	Remarks
0x0000– 0x0077	300001– 300120	CH1–CH120 real-time value	INT16	R	AI : Value/(10^decimal places) DI : HI=1,LO=0 DO : ON=1,OFF=0

Address	Register No.	Item	Type	R/W	Remarks
0x0078	300121	SMS status	INT16	R	In standby: signal strength 0–5 10 (0x0A): not registered (same value as CheckState) 17 (0x11): SIM PIN locked When busy, the following values are returned: 7 : Http upload 8 : Sending SMS 9 : Dialing 11 : Https upload 12 : SIM MQTT 13 : Telit Http 14 : Telit MQTT 15 : SIM FTP 16 : Telit FTP
0x0079	300122	USB status	INT16	R	bit0: USB present bit1: USB present before sleep bit4 and above: result of the last USB access
0x007A	300123	Alarm status	INT16	R	1 : A channel alarm has triggered common contact COM2
0x007B	300124	Update	INT16	R	Settings changed = 1; clear with Function 06 by writing 0x0042 = 0
0x007C	300125	Alarm count	INT16	R	Alarm event count (0–255, cyclic)
0x007D	300126	Firmware version	INT16	R	Same format as Function 03 0x0003
0x007E	300127	Hardware version	INT16	R	
0x007F	300128	Sleep status	INT16	R	Same as 0x01FD
0x0100– 0x01EF	300257– 300496	CH1–CH120 real-time value	FLOAT	R	AI : Value DI : high word HI=1, LO=0; low word 0 DO : high word ON=1, OFF=0; low word = Value (when the data function is FC01, returns 0)
0x01F0	300497	SMS status	INT16	R	Same as 0x0078
0x01F1	300498	USB status	INT16	R	Same as 0x0079
0x01F2	300499	Alarm status	INT16	R	Same as 0x007A
0x01F3	300500	Update	INT16	R	Same as 0x007B
0x01F4	300501	Alarm count	INT16	R	Same as 0x007C
0x01F5	300502	Firmware version	INT16	R	Same as 0x007D
0x01F6– 0x01F7	300503– 300504	GPS East	FLOAT	R	Value/10^5
0x01F8– 0x01F9	300505– 300506	GPS North	FLOAT	R	Same as above
0x01FA– 0x01FB	300507– 300508	GPS High	FLOAT	R	Value/10
0x01FC	300509	Hardware version	INT16	R	Same as 0x007E

Address	Register No.	Item	Type	R/W	Remarks
0x01FD	300510	Sleep status	INT16	R	bit0: sleep hardware switch bit1: sleep firmware switch bit2: USB read/write in progress bit3: self-cleaning in progress bit4: post-wake-up work in progress bit5: Inverse upload in progress bit6: Http upload in progress bit7: Sleep Delay (hardware switch toggled) bit8: no sleep during channel alarm bit9: GPS reading in progress bit10: NTP reading in progress
0x0200–0x0277	300513–300632	CH1–CH120 Read status	INT16	R	0 : Normal 1 : Disconnected/cannot be read
0x0300–0x0377	300769–300888	CH1–CH120 type	INT16	R	1 : AI 2 : DI 4 : DO
0x0400–0x0477	301025–301144	CH1–CH120 manual/automatic	INT16	R	DO: 0 : Automatic, 1 : Manual AI, DI: returns 0
0x04FF	301280	Power failure status	INT16	R	0 : No SMS module 1 : Powered 2 : Power failure Also returns 2 when the charging IC detects an external power failure For PCB v3 or later with an SMS module, always returns 1
0x0500–0x0577	301281–301400	CH1–CH120 combined status	INT16	R	bit0–3: type (1 AI, 2 DI, 4 DO) bit4: manual (DO) bit5: interlock locked (DO) bit8: communication failure bit12: DO manual timeout
0x0800–0x08EF	302049–302288	CH1–CH120 total accumulated value	FLOAT	R	AI: total accumulated value DI: returns 0 DO: returns the value of the corresponding AI channel if one is assigned; otherwise returns 0
0x0900–0x09EF	302305–302544	CH1–CH120 hourly accumulated value	FLOAT	R	Same as 0x0800 Returns 0 when accumulation is not enabled for the AI channel
0x0A00–0x0AEF	302561–302800	CH1–CH120 daily accumulated value	FLOAT	R	Same as 0x0800 Returns 0 when accumulation is not enabled for the AI channel
0x0B00–0x0BEF	302817–303056	CH1–CH120 open count	ULong	R	AI, DI: returns 0 DO: open count
0x0C00–0x0CEF	303073–303312	CH1–CH120 total run time	ULong	R	AI, DI: returns 0 DO: total run time in seconds (including the current on time)

There are 85 alarm log entries, and the table below shows entry 1; the address of entry n = listed address + (n−1) × 0x0008, and the register number increases by (n−1) × 8 accordingly.

Address	Register No.	Item	Type	R/W	Remarks
0x2000–0x2001	308193–308194	Alarm log (1) occurrence time	FLOAT	R	Entry 1 is the latest entry, and later entries are older Wraps around from entry 86 (0x22A8)
0x2002	308195	Alarm log (1) occurrence channel	UINT16	R	Low 8 bits: occurrence channel High 8 bits: event sequence number
0x2003	308196	Alarm log (1) alarm type	UINT16	R	0x00 = Normal 0x01 = LO 0x03 = LOLO 0x04 = HI 0x0C = HIHI 0x10 = HFAIL 0x20 = LFAIL 0x30 = Power failure 0x40 = DO timeout 0x50 = DO manual 0x60 = DO automatic (returns 0x8000 | automatic control data) 0x70 = Disconnected 0x80 = Initialization 0x90 = GPS displacement 0xA0 = Memory error 0xA1 = Reset 0xB0 = Battery low voltage
0x2004–0x2005	308197–308198	Alarm log (1) alarm value	FLOAT	R	When the alarm type is DO automatic: automatic control data Otherwise: alarm value
0x2006–0x2007	308199–308200	Alarm log (1) end time	FLOAT	R	

Digital Outputs (Function 01 read / 05, 15 write)

Address	Register No.	Item	Type	R/W	Remarks
0x0000–0x0077	000001–000120	CH1–CH120 real-time value	INT16	R/W	The channel signal must be set to DO DO : ON=1,OFF=0 Reads back 0 for non-DO channels or when the address ≥ number of channels No action when the written value is the same as the current state

Digital Inputs (Function 02 read)

Address	Register No.	Item	Type	R/W	Remarks
0x0000–0x0077	100001–100120	CH1–CH120 real-time value	INT16	R	The channel signal must be set to DI DI : HI=1,LO=0 Reads back 0 for non-DI channels or when the address ≥ number of channels

Read/Write Examples

In the following examples, the slave ID is always 01, and the CRC is the Modbus RTU 16-bit check code (low byte first).

Example 1: Read the logging interval (Function 03, UINT16)

Master request:

Slave ID	Function code	Start address	Quantity (words)	CRC
01	03	00 0D	00 01	15 C9

Slave response:

Slave ID	Function code	Byte count	Data	CRC
01	03	02	00 3C	B8 55

Data 0x003C = 60, so the logging interval is 60 seconds.

Example 2: Read the CH1 real-time value (Function 04, INT16)

Master request:

Slave ID	Function code	Start address	Quantity (words)	CRC
01	04	00 00	00 01	31 CA

Slave response:

Slave ID	Function code	Byte count	Data	CRC
01	04	02	01 04	B9 63

Data 0x0104 = 260. The INT16 real-time value of an AI channel must be further divided by 10 to the power of the decimal places setting (for the decimal places setting, see channel parameter 0x0131).

Example 3: Read the CH1 real-time value (Function 04, FLOAT)

Master request:

Slave ID	Function code	Start address	Quantity (words)	CRC
01	04	01 00	00 02	70 37

Slave response:

Slave ID	Function code	Byte count	Data	CRC
01	04	04	01 21 41 D0	9B BE

The first 2 bytes of the data, 01 21, are the low word, and the last 2 bytes, 41 D0, are the high word. Placing the high word first gives 41 D0 01 21, which converts to approximately 26.0 as a FLOAT. The value displayed on the device web page is further adjusted according to the decimal places setting of the channel.

CAUTION: Real-time values must be read with Function 04

Reading 0x0100 with Function 03 returns the Ch1 channel name (UTF-16), not the real-time value.

Example 4: Turn on CH2 (Function 05)

Master request:

Slave ID	Function code	Start address	Write value	CRC
01	05	00 01	FF 00 (on)	DD FA

To turn the channel off, write 00 00; the CRC is 9C 0A.

Slave response:

Slave ID	Function code	Start address	Write value	CRC
01	05	00 01	FF 00	DD FA

WARNING: Writing via Modbus switches the equipment directly

Writing to a DO register is the same as pressing a switch remotely; when the knob is at Cloud, the equipment operates immediately. Before integration testing, confirm that the area around the load is safe.

Example 5: Read the CH2 digital input (Function 02)

Master request:

Slave ID	Function code	Start address	Quantity	CRC
01	02	00 01	00 01	E8 0A

Slave response:

Slave ID	Function code	Byte count	Data	CRC
01	02	01	00	A1 88

Data 00: CH2 is LO.

Revision History

Version	Revision date	Revision description	Maintenance personnel
V1.00	2023/08/30	Create DO16 operation manual	Siao jǐng jhou
V1.08	2026/11/09	Applies to DO4/8/16; fully rewritten for the new web interface of firmware v1.19a; added example scenarios; errors corrected	Ran

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