SuperController User Manual

Applies to: v0.31.2+ | Firmware command set: CT V2R05C01 | Updated: 2026-11-11 | ComXim | 中文说明书

SuperController is the unified host software for ComXim CT devices (electric turntables / smart lights / programmable turntables). It supports multi-device tabs, graphical control, a protocol terminal, factory calibration — and built-in **AI access**: let WorkBuddy, Codex, Claude, Doubao and other mainstream AI tools control your hardware with natural language.

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1. Architecture Overview

SuperController uses a strict five-layer one-way-dependency architecture: the UI never touches the CT protocol or serial ports directly. All CT commands (plain-text ASCII) are assembled only in the protocol layer; the transport layer only moves bytes; the business layer owns rules and state.

Flow	Path
Command flow	UI button / AI tool → CommandService → CT command assembly → LinkManager → device
Data flow	Device bytes → LinkManager → parsing → DeviceState (single source of truth) → signals → UI refresh
Log flow	Every TX/RX frame → terminal panel (graphical actions ↔ protocol frames, one-to-one)

2. Install & Launch

1. Run `SuperController_Setup.exe` and choose an install folder;

2. Everything is bundled — **no Qt or VC++ runtime needed**;
3. Launch from the desktop shortcut. The `help\` folder contains this manual (English / Chinese) — the in-app **Help** button opens it.

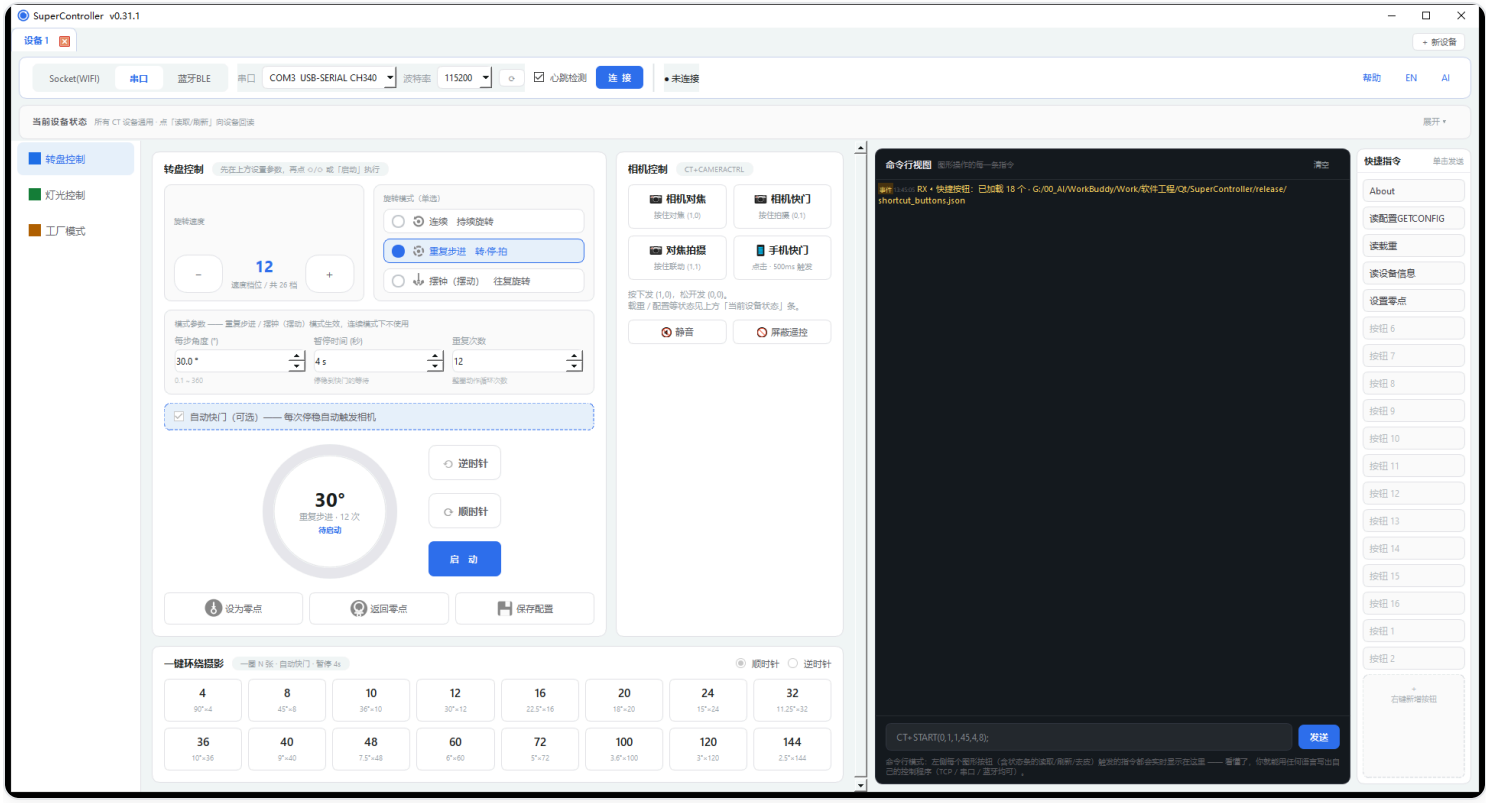

Fig 2-1 Main window: device tabs (top) | connection bar | left navigation | terminal & quick actions (right)

3. Connecting a Device

Channel	How	Notes
Socket (WiFi)	Enter device IP + port	Wi-Fi models; device IP settable via CT+SETIP (reboot to apply)
Serial	Pick COM port + baud	Ports auto-enumerated with driver description (e.g. COM3 USB-SERIAL CH340)
Bluetooth BLE	Scan → pick device name	BLE GATT connection

> 💡 Enable **heartbeat**: software and device exchange a heartbeat every second; loss > 5 s raises an alarm. Recommended for multi-device setups.

4. Turntable Control Page

4.1 Three rotation modes

Mode	Behavior	Typical use
Continuous	Constant rotation	Video, display
Step-repeat (rotate·pause·shoot)	Rotate one angle → pause → (auto shutter) → repeat N times	360° product photography
Pendulum	Swings between ± angle	Ambient display, dynamic shots

4.2 Controls

- **Parameters**: step angle, pause seconds, repeat count, auto shutter — used by step/pendulum modes;
- **Direction buttons**: ↺ CCW / CW ↻ start immediately with current parameters;
- **Dial**: live angle & progress (blue = CW arc, orange = CCW arc) plus progress text;
- **Speed**: circular ± buttons;
- **Zero-point trio**: ⊙ set zero | ↩ return to zero | 💾 save config (to flash).

> 💡 One-click orbit photography: quick action "Orbit N shots" — auto sets 360/N degrees, enables auto shutter, 4 s pause, N repeats.

5. Lighting Control Page

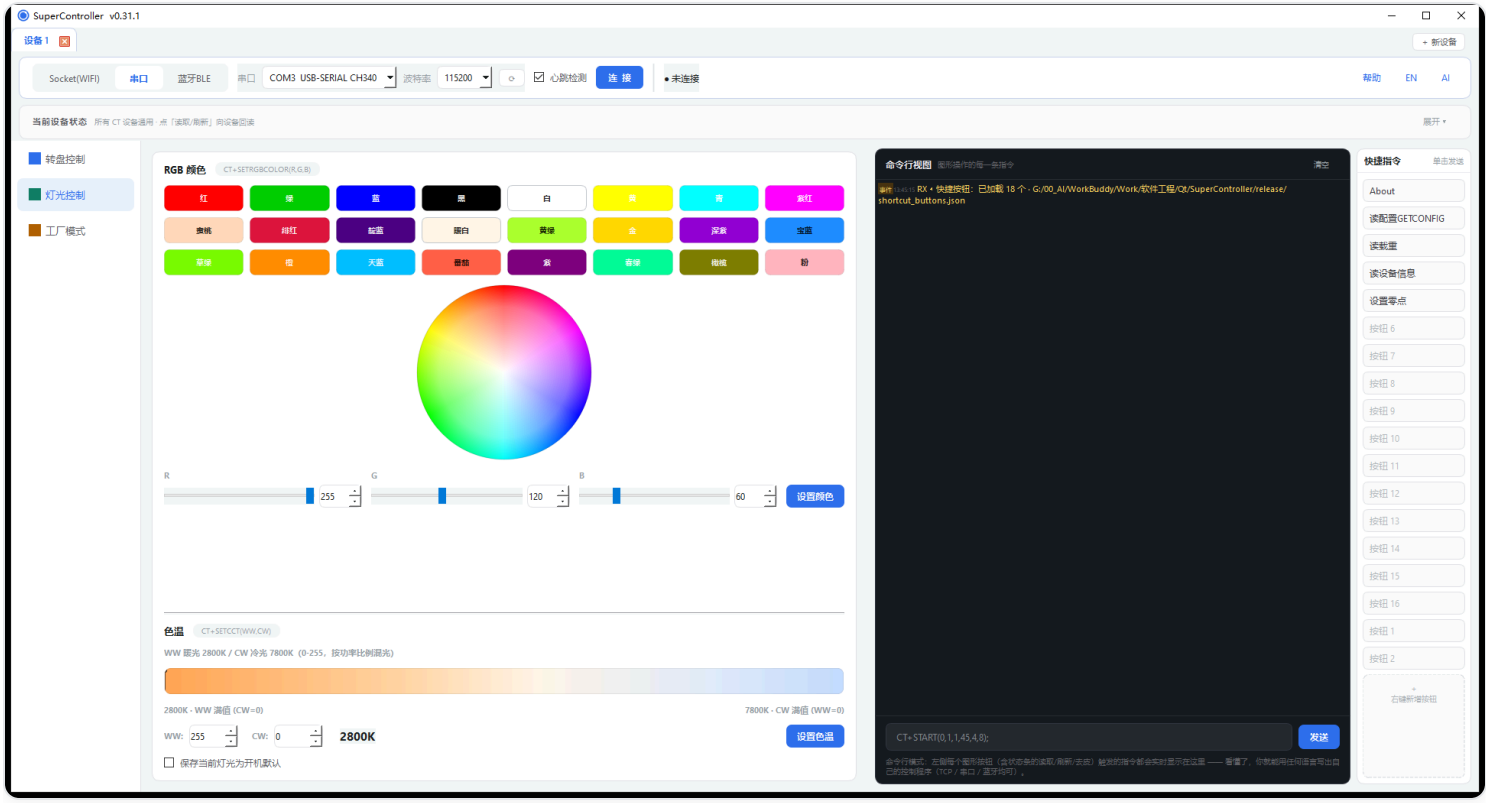

Fig 5-1 Lighting page: RGB presets & picker, CCT bar, camera control, accessory switches

- **RGB color**: preset swatches + circular color picker (`CT+SETRGBCOLOR`);
- **Effects** (supported models): solid / breathing / pulsing / color-cycle (`CT+SETRGBC`);
- **CCT light**: WW warm (2800K) / CW cold (7800K), each 0~255, mixed by power ratio;
- **Camera**: focus / shutter press-and-hold semantics; phone shutter accessory;
- **Accessory switches**: buzzer mute, IR remote disable.

6. Factory Mode (password protected)

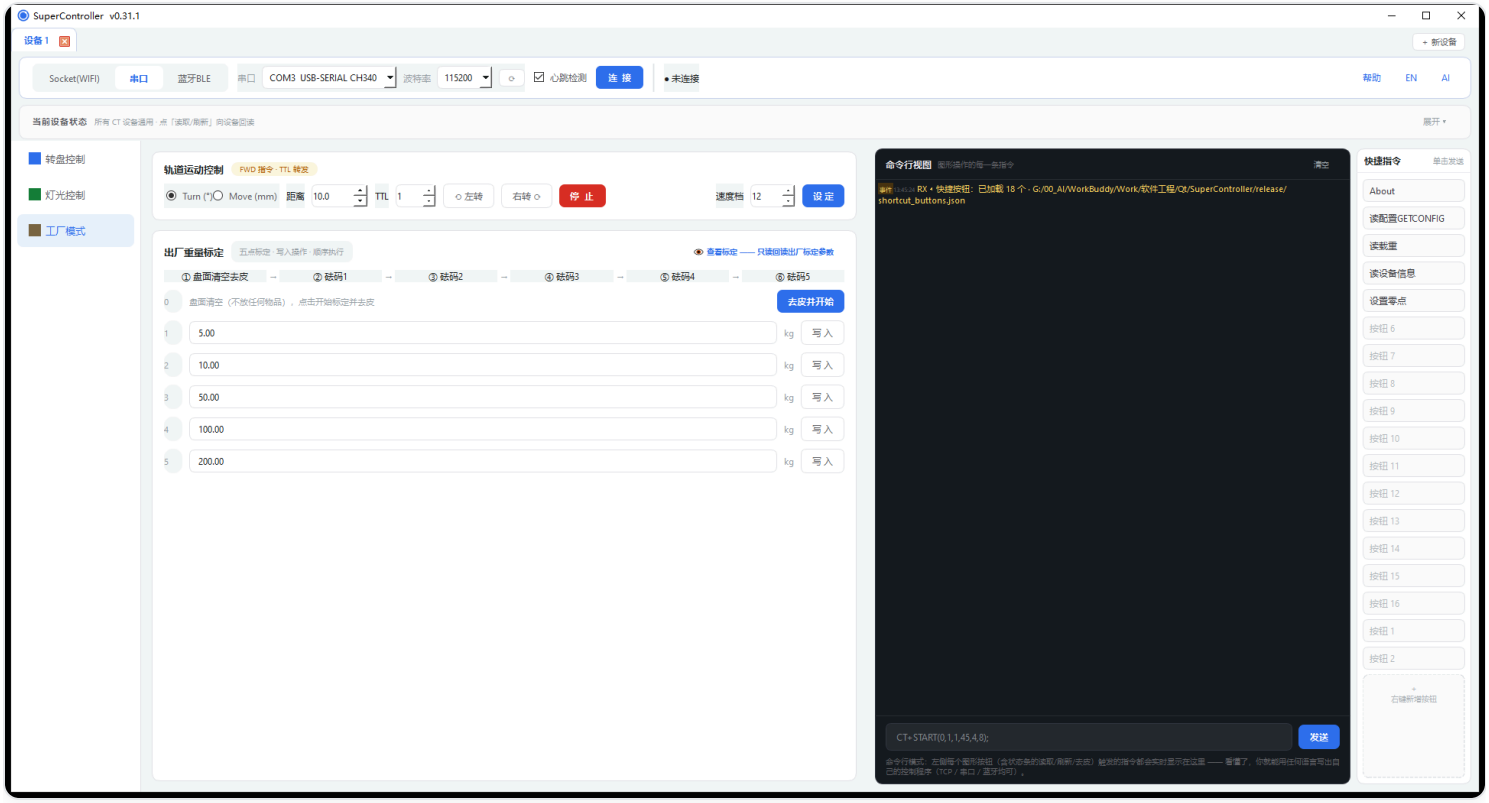

Fig 6-1 Factory page: rail motion control and 5-point weight calibration

- **Password gate**: locked by default; factory password unlocks the session;
- **Rail motion**: FWD command family (rotate / move / set speed / stop) for production-line testing;
- **5-point calibration**: clear/tare → place standard weights in order (defaults 5/10/50/100/200 kg) → write.

> ⚠ Once calibration data is overwritten it cannot be restored by ordinary users (a physical re-calibration with weights is required). This is why AI is **not allowed to write calibration by default**.

7. AI Access Overview

SuperController exposes the device's full capability set as **34 AI tools** (covering every command in CT V2R05C01). Mainstream AI tools connect through two paths:

	MCP stdio (recommended)	HTTP API (advanced)
Setup cost	**Zero config**: paste one connector JSON	Programmatic; enable network switch
Token	Not needed (dedicated child-process pipe)	Required (auto-generated)
Clients	WorkBuddy / Codex / Claude Desktop / Cursor	Doubao / Coze / ChatGPT / Dify / n8n / custom apps

Hardware ownership	UI running → proxy to UI; UI closed → headless takeover	Served by the SuperController process

7.1 "AI Control" settings

Click the **AI** button (top-right of any tab):

Setting	Default	Description
Allow AI control (MCP)	On	Master switch; when off every AI call returns "disabled"
Copy MCP config	-	One-click copy of the connector JSON
Control port	19840	1024~65535, user configurable (advanced)
Listen scope	Localhost	Switchable to LAN 0.0.0.0 (advanced)
Access token	Auto-generated	The lock of the HTTP API; viewable/resettable (advanced)
Allow AI to write calibration	**Off**	Overwriting factory calibration is not self-restorable (advanced)

⚠ **Token**: an auto-generated 32-hex "door key" (e.g. `96a02ac1787846fe9c50344f967f7ca6`). Every HTTP call must carry it in the `X-SC-Token` header or it is rejected with 401. MCP over stdio runs on a dedicated pipe and does not need it. LAN listen mode makes it the only lock — keep it safe; "Reset" invalidates the old token and all callers must be updated.

8. WorkBuddy — Setup & Phrase Book (all 34 tools)

8.1 Three steps

1. Click **AI**, confirm "Allow AI control" is on, click **Copy MCP config**;
2. WorkBuddy: left-bottom 「+」 → **Connectors** → **MCP** → **custom server**, paste the JSON;
3. Save, then click **Trust** to enable it. Done — just talk.

```
{
  "mcpServers": {
    "SuperController": {
      "command": "C:\\Program Files\\ComXim\\SuperController\\SuperControllerMCP.exe"
    }
```

```
    }
  }
```

8.2 What to say to WorkBuddy — every tool, natural phrases

Status queries

Say	Tool called
"What's the current turntable status?"	get_status
"Show the model, barcode and firmware"	get_device_info
"How heavy is the load?"	get_weight
"How far is it from zero?"	get_offset_angle

Rotation control

Say	Tool called
"Rotate clockwise, step mode, 30° per step, 4s pause, shoot each step, one full circle"	start_rotation(angle=30, mode=repeat_step, shutter=true, times=12, pause_seconds=4)
"Just spin continuously clockwise"	start_rotation(mode=continuous, direction=cw)
"Stop" / "Stop right now"	stop_rotation
"Turn counter-clockwise by 45 degrees once"	turn_single(direction=ccw, angle=45)
"Start with the parameters I set earlier"	run_rotation
"Set direction to ccw"	set_direction(direction=ccw)
"Switch to pendulum mode"	set_rotation_mode(mode=pendulum)
"Change step angle to 22.5 degrees"	set_step_angle(angle=22.5)
"Pause 5 seconds each step"	set_pause_time(seconds=5)
"Repeat 24 times"	set_repeat_times(times=24)
"Speed up" / "Slow down"	change_speed(up=true / false)
"Set speed grade to 10"	set_speed_grade(grade=10)

Zero point

Say	Tool called
"Make the current position the zero point"	set_zero_point
"Go back to zero"	return_to_zero
"Re-zero from the hardware mark"	goto_hardware_zero

Lighting & shooting

Say	Tool called
"Turn the light red"	set_rgb_color(r=255,g=0,b=0)
"Purple breathing light"	set_rgb_effect(r=128,g=0,b=128,effect=1)
"Warmer color, WW=200"	set_color_temperature(ww=200,cw=0)
"Light 1 brightness to 80"	set_led_brightness(light_id=1,brightness=80)
"All power LEDs to max"	set_power_led(led_num=0,grade=max)
"Turn all three color LEDs on"	set_color_led(led1=1,led2=1,led3=1)
"Disable the dimming knob"	set_knob_disable(on=true)
"Take a photo"	phone_shutter
"Turn off auto shutter"	set_auto_shutter(on=false)
"Shutter after rotation, 500 ms"	set_shutter_timing(timing=1,duration_ms=500)

Protocol & device management

Say	Tool called
"Save this config to the device"	save_config
"Disable heartbeat"	set_heartbeat(on=false)
"Disable ACK feedback" / "Disable event reports"	set_ack_report / set_event_report
"Use adaptive auto calibration"	set_autocalibrate(mode=2)

"Sleep after 10 minutes idle"	set_autosleep(minutes=10)

Dangerous group (disabled by default — enable in AI settings → advanced)

Say	Tool called
"Tare the scale"	tare
"Write calibration point 1 = 0.5 kg"	write_calibration(n=1, kg=0.5)
"Factory reset"	factory_reset
"Set device IP to 192.168.4.1"	set_device_ip(ip=192.168.4.1)

9. Codex CLI

Edit `~/.codex/config.toml`:

```
[mcp_servers.SuperController]
command = "C:\\Program Files\\ComXim\\SuperController\\SuperControllerMCP.exe"
```

Restart Codex CLI and run `/mcp` to confirm SuperController is listed. Chinese phrases (see chapter 8) work equally well; the full English phrase book above applies one-to-one.

10. Claude Desktop / Cursor

Tool	Config location
Claude Desktop	Settings → Developer → Edit Config (`%APPDATA%\Claude\claude_desktop_config.json`) — paste the chapter-8 JSON
Cursor	Settings → MCP → Add MCP Server (same JSON)

After restart the SuperController tools appear in the tool list. Chinese instructions work identically (see chapter 8).

11. Doubao / Coze / ChatGPT / Dify / n8n (HTTP)

Any AI platform that can issue HTTP requests uses this path (enable network control in advanced options first):

Platform	Integration
Coze / Dify / n8n	Add an "HTTP request" node: POST `http://<pc-ip>:19840/api/call`, header `X-SC-Token`, body `{"name":"start_rotation","arguments":{...}}`
ChatGPT (Actions)	Describe `/api/tools` and `/api/call` via the OpenAPI schema in an Action
Doubao desktop	MCP-capable builds use the chapter-8 JSON; otherwise HTTP API + agent orchestration

Chinese natural phrases identical to the WorkBuddy table in chapter 8 work here — the agent orchestration maps them onto the HTTP calls.

> ⚠ LAN mode opens control to everyone on the network. Use on trusted networks, keep the token safe, and switch back to localhost-only when not needed.

12. All 34 AI Tools

12.1 Status queries (read-only)

Tool	Params	Description
get_status	-	Connection/identity/progress/gear/load snapshot
get_device_info	-	Product name / barcode / firmware
get_weight	-	Current plate load kg
get_offset_angle	-	Angle offset from zero point

12.2 Rotation control

Tool	Params	Description
start_rotation	angle, mode, direction, times, pause_seconds, shutter	One-shot start (six parameters)
stop_rotation	-	Stop immediately

turn_single	direction, angle	Single rotation
run_rotation	-	Start with configured parameters
set_direction	direction	Set direction only
set_rotation_mode	mode	Set mode only
set_step_angle	angle	Set step angle
set_pause_time	seconds	Set pause seconds
set_repeat_times	times	Set repeat count
change_speed	up	Shift one gear
set_speed_grade	grade (0~127)	Set gear directly

12.3 Zero point & calibration modes

Tool	Params	Description
set_zero_point	-	Set zero
return_to_zero	-	Return to zero
goto_hardware_zero	-	Hardware zero
set_autocalibrate	mode (0~2)	Auto-calibration mode

12.4 Lighting & shooting

Tool	Params	Description
set_rgb_color	r, g, b	RGB color
set_rgb_effect	r, g, b, effect	RGB + effect
set_color_temperature	ww, cw	CCT mixing
set_led_brightness	light_id, brightness	Single light brightness
set_power_led	led_num, grade	Power LED brightness
set_color_led	led1, led2, led3	Color LED switches

set_knob_disable	on	Knob dimming disable
phone_shutter	-	Phone shutter
set_auto_shutter	on	Auto shutter switch
set_shutter_timing	timing, duration_ms	Shutter timing & duration

12.5 Protocol & device management

Tool	Params	Description
save_config	-	Save config
set_heartbeat	on	Heartbeat switch
set_ack_report	on	ACK switch
set_event_report	on	Event switch
set_autosleep	minutes (0~30)	Auto sleep
set_device_ip DANGER	ip	Set device IP
factory_reset DANGER	-	Factory reset
tare DANGER	-	Tare
write_calibration DANGER	n, kg	Write calibration point

13. HTTP API Reference

```
GET  /api/tools        tool list (with JSON schema)
POST /api/call         execute a tool  body: {"name":"...","arguments":{...}}
auth: header X-SC-Token: <token>
```

```
curl -X POST http://127.0.0.1:19840/api/call ^
  -H "X-SC-Token: 96a02ac1787846fe9c50344f967f7ca6" ^
  -H "Content-Type: application/json" ^
  -d "{\"name\":\"start_rotation\",\"arguments\":{\"angle\":30,\"mode\":\"repeat_step\"}}"
```

Responses use MCP content format: `{"content":[{"type":"text","text":"…"}],"isError":true?}`.

14. FAQ & Error Codes

Symptom	Fix
"AI control is disabled"	Tick "Allow AI control" in AI settings
"SuperController UI is not running"	Normal headless takeover; start SuperController to proxy via UI
AI cannot see calibration tools	Disabled by default; enable in advanced options
Port 19840 busy	Another instance owns the hardware — MCP auto-proxies; or change the port
Queries return "--"	Field not queried yet — ask "show device info"
Device silent	Check connection & heartbeat; inspect TX/RX in the terminal panel

CR+ERR	Meaning	CR+ERR	Meaning
31	Serial timeout	51	Command name too long
40	Unsupported function	52	Invalid command name
41	Command too short	61	Empty parameter
42	Invalid header (CT)	62	Parameter too long
43	Invalid connector (+)	63	Too many parameters
45	Invalid param start ("(")	64	Parameter count mismatch
46	Invalid param end (")")	70~79	Param N not numeric
48	Invalid terminator (;)	80~89	Param N out of range

15. Security & Permissions

- **Least privilege by default**: calibration write / factory reset / device IP change are denied to AI unless explicitly enabled;
- **Localhost isolation**: the control port binds 127.0.0.1 by default;
- **LAN mode**: the token is the only lock — trusted networks only;
- **Token reset**: one click invalidates the old token;
- **Full auditability**: every AI-issued command flows through the unified pipeline and is visible in the terminal panel.